Dr. Dräger & Thielmann PartG Geographen

Ex-ante Evaluation of the

Cooperation Programme INTERREG VB North-West Europe 2014 - 2020

Strategic Environmental Assessment
Environmental Report

for

GEIE GECOTTI
INTERREG IVB
„Les Arcuriales“, 6th floor
45d, rue de Tournai
F-59000 LILLE

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Cooperation Programme INTERREG VB North-West Europe 2014 - 2020

Strategic Environmental Assessment
Environmental Report

Prepared by:

Dr. Dräger & Thielmann PartG
Marburger Straße 7
D-60487 Frankfurt am Main
Tel: 069 – 70792026
Mail: stefan.draeger@iesy.net

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List of abbreviations:

CBD	Convention on Biological Diversity
CLIM	EEA Climate Indicators
CO_2	Carbon dioxide
COSME	Programme for competitiveness of Enterprises and SMEs 2014-2020
CPR	Common Provisions Regulation
CSI	Core Set of Indicators (of EEA)
EC	European Communities
EEA	European Environment Agency
ENER	EEA Energy Indicators
ERDF	European Regional Development Fund
ESI	European Structural and Investment Funds (ESI Funds)
ESPON	European Spatial Observation Network
ETC	European Territorial Cooperation
ETC/BD	European Territorial Cooperation Biodiversity
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gas
G&J	Growth and Jobs
ICUN	International Union for Conservation of Nature
IP	Investment Priority
IPTS	Institute for Prospective Technological Studies
MS	Member States
NECD	National Emission Ceiling Directive
NH_3	Ammonia
NOx	Nitrogen Oxides
R&I	Research and Innovation
PM	Particulate Matter
SCI	Site of Community Importance
SEA	Strategic Environmental Assessment
SEBI	Streamlining European Biodiversity Indicators
SME	Small and Medium-Sized Enterprise
SO	Specific Objective
SOER	"State and Outlook of the European Environment" report
ToA	Type of Actions
TO	Thematic Objective

NON-TECHNICAL SUMMARY

INTRODUCTION

Strategic Environmental Assessment (hereinafter: SEA) is a key policy instrument to mainstream environmental considerations into plans, programmes and strategies. The main objective of SEA is to ensure that the significant environmental implications of decisions are taken into account before the decisions are made.

The SEA comprises the development of the environmental report on the likely significant effects on the environment as well as consultations of relevant authorities and the public. The findings and recommendations of the environmental report and of the consultations will be considered in the finalisation and approval of the programme.

According to the Directive 2001/42/EC (hereinafter: SEA-Directive) an assessment of the effects on the environment of the **Cooperation Programme INTERREG VB North-West Europe 2014 - 2020** (hereinafter: NWE-Programme) is obligatory.

The assessment covers the general strategic approach, defined Specific Objectives (SOs) and related Types of Actions (ToA) to be supported as well as the defined indicators as stated in the NWE-Programme. The territorial area of the assessment covers the Member States of Interreg NWE (see graphic). The formal time frame for the Programme covers the years 2014 till 2020. Adding 3 more years for the finalisation of funded projects, the period considered in the assessment is 2014 till 2023.

The environmental report is based on the draft NWE-Programme, version dated 4 March 2014.

Area of INTERREG North-West Europe

METHODOLOGY OF THE ASSESSMENT

The assessment follows the methodology prescribed in the SEA-Directive: Referring to the determinations of the NWE-Programme, relevant environmental objectives and related indicators were identified which serve as a base for the description of the present status of the environment and its development trends in the programme's area as well as for the assessment of likely significant effects of the programme on the environment.

Relevant environmental objectives are presented in numerous European directives, strategies, roadmaps and conventions. Indicators are defined to measure the achievement of the set objectives and to describe the status of the European environment. The indicators are also used to formulate 'assessment questions', which serve to appraise the likely significant effects on the environmental issues of the NWE-Programme and its contributions to the relevant EU environmental objectives.

According to the SEA Directive, the assessed environmental issues cover population/human health, landscape, water, soil, air and material assets/cultural heritage (including architectural and archaeological heritage). Additionally, the aspect 'Global Climate' as a separate environmental issue is considered. 'Resource Efficiency' as an important field of interventions with manifold direct and indirect effects on the environmental issues is also included.

It has to be emphasised that the complex interdependencies between the environmental issues are known although the description of the present state of the environment in the NWE area and the assessment of the effects focuses on the individual environmental issues first of all. A detailed description of complex effect-chains is seriously not possible at this high strategic programming level. Statements to existing interdependencies are provided where necessary and possible.

STRUCTURE OF THE NWE-PROGRAMME

The ambition of the NWE-Programme defined by the Partner States says

"To be a key economic player in the world and create an attractive place to work and live, with high levels of innovation, sustainability and cohesion".

The NWE-Programme bases on six identified key challenges in the NWE area which can each be allocated to one of the priorities of the "Europe 2020"-Strategy:

- Challenge 1: Boosting knowledge flows
- Challenge 2: SMEs innovative capabilities
- Challenge 3: Resource and materials efficiency
- Challenge 4: Energy security and supply
- Challenge 5: Vulnerability to climate change events
- Challenge 6: Inclusion

To respond to the challenges, the Member States identified three Priorities which are based on four Thematic Objectives as prescribed by Article 9 of the Common Provisions Regulation (CPR)[1]. Within the Priorities a total of five Investment Priorities, as prescribed by Article 5 of ERDF Regulation[2], are covered which were further focussed in five Specific Objectives, i.e. one Specific Objective per each

[1] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006

[2] Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006

Investment Priority. The individual Specific Objectives form the framework for concrete interventions to be supported. The latter are described in nine Types of Actions.

Distribution of ERDF-funds per Specific Objective

Priorities	Specific Objectives	assigned ERDF-funds [in Mio. €]*	assigned ERDF-funds [%]*
P1: Innovation	**SO1:** To enhance innovation performance in NWE through international cooperation	130.7	35.1
P2: Low Carbon	**SO2**: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection strategies	47.5	12.8
	SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	51.5	13.8
	SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	47.5	12.8
P3: Resource and materials efficiency	**SO5**: To optimise (re)use of material and natural resources in NWE through international cooperation	95.0	25.5
TOTAL		372.2	100.0

* without funds for Technical Assistance

The NWE-Programme is embedded in a framework of numerous European policies, programmes and strategies. Additionally, country specific recommendations for ETC-programmes complement the complex context of this Programme.

EXISTING ENVIRONMENTAL PROBLEMS AND TRENDS OF ENVIRONMENTAL DEVELOPMENT

Despite improvements over the last years numerous challenges concerning the environment exist which need to be solved. Due to the intensive economic activities and high population density in the NWE area, all environmental issues are still under pressure.

This holds particular to:

- Biodiversity: The loss of biodiversity continued; the target to halt the loss of biodiversity by 2010 is missed.
- Air quality: Urban air pollution concentrations are still too high causing problems on human health.
- Global Climate. Although the greenhouse gas (GHG) emissions in Europe have fallen evidently in NWE, global warming however presents a considerable challenge; climate change effects are starting to become evident, adaptation is needed to protect people, buildings, infrastructure, businesses and ecosystems.

ENVIRONMENTAL EFFECTS OF THE PROGRAMME

The (financial) extent of the Programme and the proposed Types of Actions do not allow, considering the spatial coverage of the programme, for widespread, significant direct effects on the environment

in the short-run. Instead, ERDF-programmes like the NWE-Programme have an important function for strengthening the framework conditions for the transition towards a resource efficient, low carbon economy ('green economy') and for the establishment of a circular economy. The NWE-Programme serves this function by its general strategic approach and by the proposed individual Types of Actions as well.

The assessment follows three steps:

- At first the strategic approach of the NWE-Programme is analysed concerning the general orientation of the defined Priorities and Specific Objectives, the interrelations between the Priorities, the consideration of the horizontal principle 'sustainable development' and the defined indicators.
- Secondly the effects of individual Specific Objectives and Types of Actions are assessed. Due to the fact that detailed conditions of the individual funded projects (location, volume, aim, activities, etc.) are not known, the assessment has to focus on qualitative statements and the presentation of general cause-effect-relations.
- In a third step the overall potential effects of the NWE-Programme on the individual environmental issues and contributions to EU environmental objectives are assessed. For this, assessment questions per environmental issue were formulated based on the environmental objectives and related indicators.

At the **strategic level** two elements are decisive to support positive contributions of the NWE-Programme to the EU environmental objectives:

- Two out of the three priorities (Priority 2: 'low carbon' and Priority 3: 'Resource and material efficiency') aim directly at the improvement of development, testing and uptake of new technologies in the fields of reduction of GHG-emission and resource efficiency. The term 'new technologies' includes products, services, and processes but also management systems, governance arrangements and networks. A comprehensive set of necessary conditions for further improvement of climate protection and resource efficiency can therefore directly be addressed. Under Priority 1 ('Innovation') capacities will be developed to improve the innovation performance in regions and of enterprises. These capacities could serve as important intermediate structures and 'transmission belts' for promoting the transition towards green economy.
- The criterion "project proposals are only eligible if the project objectives and activities do not conflict with the principles of sustainable development, as defined by the programme" asks for an early consideration of the principles of sustainable development in the preparation of projects, even though the criterion is formulated quite soft.

At the **level of Type of Actions (ToA)**, the actual effects and their characteristics depend on the design, execution conditions and results of the projects supported by the NWE-Programme which in turn depend on the effective application of selection criteria related to environmental, climate and resource protection.

According to the orientation of the Priorities 2 and 3 with the Specific Objectives 2 - 5, all supported projects need to contribute to the mitigation of GHG-emissions or to resource efficiency. Additionally under Specific Objective 2 (ToA5) projects will contribute to adaptation to risks of climate change. For the supported projects under Priority 1, respectively Specific Objective 1, the link to topics related to environmental, climate or resource protection is not required in the NWE-Programme consistently. However, the consideration of principles of sustainable development is required.

The risk of significant negative effects and conflicting contributions to sustainable development is limited, nevertheless existent. Potential negative effects have to be considered connected to the promotion of energy generation out of renewable energy sources, e.g. wind power plants, hydro

power plants, biomass power plants, large solar power plants on green fields or distribution networks, but also connected to construction work linked to adaptation measures.

The assessment of the cumulative and synergistic effects can be done in an abstract manner only. Important criteria of a detailed assessment as the particular spatial conditions and the extent, duration, frequency and the range of the effects are not known. Fields of positive cumulative effects can be seen in reducing GHG-emissions and improvement of resource efficiency; cumulative effects on particular territories cannot be assessed due to lack of details regarding territorial aspects and contents of the projects. By promotion of low-carbon economy as well as resource efficiency the NWE-Programme tackles two areas which could generate a number of potential **synergistic effects**: (a) the mitigation of GHG-emissions and (b) the reduction of the consumption of resources for (industrial) production and energy generation support also the protection of other environmental media as air, water, soil, biodiversity and landscape. Human health and human well-being is positively influenced by less polluted air, particularly in urban areas, but also by better quality of waters, landscape and soil.

Summarising it can be stated that the NWE-Programme shows a strong potential to generate positive effects on the environment and to contribute to the EU environmental objectives. This holds for effects delivered by the projects as well as for developing framework conditions to strengthen the transition towards a green economy and to respect sustainable development. Decisive tools to exploit the potential of the programme are: A thorough assessment of applications, ensuring the selection of projects with the best possible contribution to environmental, climate and resource protection and an effective monitoring of the implementation of projects.

The assessment of the alternative to change the funding of the individual priorities revealed that shifting of the funds in favour of Priorities 2 and 3 would generate limited additional positive effects concerning climate and resource protection. At the same time this change of funding would reduce the enhancement of innovation performance capabilities.

For mitigating the potential negative effects only general procedural recommendations can be made:

- The potential for tiering, i.e. assessing effects on the level of projects being funded by the NWE-Programme, must be strictly used.
- Beside the application of formal procedures, environmental competences must be integrated with the approval of applications showing the risk of potential negative effects on environmental issues.
- Prior to the approval phase, an important instrument for the mitigation of potential negative effects (and strengthening potential positive effects too of course) is building capacities to provide advice to the applicants.

RECOMMENDATIONS

Although the NWE-Programme contributes to the set EU environmental objectives recommendations can be given in order to exploit the potential to an optimum. The recommendations aim mainly on arrangements concerning the implementation of the programme.

1. In chapter 8.1 it is stated that “innovation in the NWE programme strategy also includes eco-innovation”[3]. However, the consideration of eco-innovations as a privilege for the selection of projects should be added for Priority 1, respectively Specific Objective 1. Projects under priority 1 should also, as far as possible, respond on the environmental challenges in the NWE area and contribute to the transition towards green economy.

[3] NWE-Programme; p. 81

The compliance of Priority 1 with important EU environmental priorities could be strengthened; the positive contribution to these priorities would not "depend on the actual projects".

2. Additionally to recommendation 1, selection criteria should be included in chapter 8.1 clearly asking for the contribution of the proposed projects on the environmental challenges in the NWE are as there are resource and materials efficiency, GHG-emission and vulnerability to climate change events.

   The current formulation "do not conflict with the principles of sustainable development" as stated in chapter 8.1 opens a wide room for interpretations and different perceptions.

   It should also be stated explicitly that EU and national environmental legislations must be applied and EU and national environmental standards must be met by all supported projects.

3. In the selection process for projects aiming on the promotion of energy generation by renewables and distribution networks (ToA4 and ToA5 of SO2, ToA6 of SO3), the possible effects on biodiversity, landscape, soil and water have to be taken into account seriously. The use of new generation biomass (e.g. agricultural waste, organic waste, sludge) should be promoted.

4. By designing appropriate implementation guidance or application manuals, the consideration and incorporation of criteria concerning environmental, climate and resource protection in project applications must be ensured. The criteria must not be too strict but should guarantee a sufficient environmental quality standard of the projects.

5. Each project application should be complemented by a concise description of the environment-related aspects to be addressed and of expected environmental effects. Depending whether the project has a clear territorial focus, a short description of the existing environmental conditions could be added.

6. At the level of the Member States, arrangements should be established to enable applicants to receive information and advice for the consideration of environmental aspects in the design and execution of projects.

7. Relevant national or regional authorities responsible for environmental and nature protection should be involved in the assessment and selection of project applications.

8. To exploit the potential to an optimum, the Joint Secretariat should support the exchange of information and knowledge between beneficiaries on the projects' outputs and lessons learned of the different Types of Actions. This should be done for projects within one priority or across the different priorities. The functions of the Joint Secretariat could be complemented with: "Promotion of information exchange and cooperation between the beneficiaries of the different supported projects." It could be linked to the listed function "to assist and organise activities to support project generation and development" (function h)[4].

NOTES ON PROBLEMS IN THE COMPILATION OF REQUIRED DATA AND INFORMATION

In the course of the assessment, no problems occurred to find and use accurate data and information.

[4] NWE-Programme; p. 64

PROPOSED MONITORING MEASURES

The SEA Directive requires that "Member States shall monitor the significant environmental effects of the implementation of the plans and programmes, in order, inter alia, to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action."[5]

The lack of details of supported projects does not allow the identification of measures to monitor concrete possible effects on the environment. The monitoring must aim to ensure that no adverse effects to the EU environmental objectives and the EU environmental policy are supported by the Programme, even if the effects will only occur in the long run.

Monitoring measures should include:

1. Environmental criteria have to be safeguarded by including them in the project implementation guidance or application manuals of the NWE-Programme.
2. The consideration of potential environmental effects has to be proven in the application for a project. Projects which potentially show effects not compliant with EU environmental objectives and with the principles of sustainable development as described in the application manual can be screened out or amendments can be demanded by the Monitoring Committee. The selection process must be used to avoid contradictions to the effective EU environmental objectives and the general EU environmental policy.
3. In the progress and final reports of the projects the initiated indirect effects should be described and assessed towards the expected effects stated in the applications.
4. As part of the function "to monitor progress made by projects through collecting and checking project monitoring reports, monitoring outputs, results and financial implementation"[6] of the Joint Secretariat, the expected effects and contributions and the actually initiated ones as stated in the projects progress and final reports have to be compiled and assessed on regular base in order to avoid incompatibility of the overall implementation orientation of the NWE-Programme towards the effective EU environmental objectives and general environmental policy.
5. As part of the monitoring systems to be established and in course of defining indicators, complementary to the result and output indicators, to ensure an effective progress and implementation monitoring[7], adequate indicators should be defined to measure the contribution of the NWE-Programme to the effective EU environmental objectives in particular and sustainable development in general. Areas of monitoring could be:
   - Energy consumption
   - (Raw-) material consumption
   - Land take for construction
   - Direct and indirect impacts on biodiversity
   - Pollution of water and air.
6. Depending on the nature of the individual projects, relevant existing national, regional and/or local environmental monitoring systems should be used (for example to measure air pollution, noise, water pollution). Relevance and mode of utilisation could be clarified by involvement of the authorities responsible for the monitoring (linked to recommendations 6 and 7).

[5] Directive 2001/42/EC, Art. 10
[6] NWE-Programme; p. 64
[7] NWE-Programme; p. 69

1 INTRODUCTION

1.1 SEA OBLIGATION

Strategic Environmental Assessment (hereinafter: SEA) is a key policy instrument to mainstream environmental considerations into plans, programmes and strategies. The main objective of SEA is to ensure that the significant environmental implications of decisions are taken into account before the decisions are made.

Pursuant to the Directive 2001/42/EC (hereinafter: SEA-Directive) adopted by the European Parliament and European Council, a Strategic Environmental Assessment (SEA) is required for the development and amendment of certain plans and programmes including those programmes which influence other plans and programmes (Art. 3 and Annex II SEA-Directive). Accordingly the assessment of the impacts on the environment of the **Cooperation Programme INTERREG VB North-West Europe 2014 - 2020** (hereinafter: NWE-Programme) is obligatory. Annex II of the SEA Directive stipulates the criteria for the assessment of potential environmental impacts.

The overall European strategy "Europe 2020 - a strategy for smart, sustainable and inclusive growth (COM(2010) 2020)" requires that all instruments at EU-level contribute to this overarching strategy. By this, the strengthening of a sustainable and ecological-sound economic development is imposed as a commitment to all actors. The assessment has to verify how far the NWE-Programme supports the environmental objectives of the European Union and does not counteract environmental targets and objectives as stated in relevant strategies as the *Roadmap to resource efficient Europe (resource efficiency roadmap)* (COM(2011) 571), the *Roadmap for moving to a competitive to low carbon economy (low carbon roadmap)* (COM(2011) 112), the *Water Framework Directive (WFD)* (Directive 2000/60/EC), *EU Adaptation Strategy* (COM(2013) 216) or the *EU Biodiversity Strategy to 2020* (COM(2011) 24). The present SEA is being carried out alongside the development of NWE-Programme in order to identify and assess likely significant environmental effects of the Programme, and of any reasonable alternatives, during the preparation stage and before it is adopted.

The Environmental Report is based on the draft Cooperation Programme INTERREG VB North-West Europe 2014 - 2020, version dated 4 March 2014.

1.2 THE SEA PROCESS

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment (SEA Directive)

Article 1

Objectives

The objective of this Directive is to provide for a high level of protection of the environment and to contribute to the integration of environmental considerations into the preparation and adoption of plans and programs with a view to promoting sustainable development, by ensuring that, in accordance with this Directive, an environmental assessment is carried out of certain plans and programs which are likely to have significant effects on the environment.

The SEA process comprises the development of the environmental report on the likely significant effects on the environment as well as consultations of relevant authorities and the general public as an integral part of the SEA procedure. The findings and recommendations of the environmental report and of the consultations will be considered in the finalisation and approval of the programme.

The SEA process follows definite steps:

- The scoping stage is mandatory under the SEA. In this stage the content and the scope of the environmental report will be defined. The scoping procedure includes the consultation of relevant authorities.
- Next stage is the preparation of the environmental report. The environmental report is detailing the likely significant environmental effects and reasonable alternatives. Issues that should be considered are listed in Annex I of the SEA Directive.
- The environmental report must be accessible for the public as base for the consultations with the public and the authorities with environmental responsibilities.
- The report on environmental effects and the results of consultations shall be considered before the programme is adopted.
- Once the programme and the environmental report are adopted, the authorities with environmental responsibilities and the public shall be informed and the relevant information made available to them.
- In order to determine any unforeseen adverse effects as early as possible, it is necessary to ensure that the significant environmental effects of the programme are monitored.[8]

For the SEA of the NWE- Programme, a scoping note presenting a proposal on the extent and level of detailing of the assessment was sent to authorities with environmental responsibilities in the member states of INTERREG NWE asking for comments and suggestions. The scoping consultation period formally lasted from 22 November 2013 till 9 December 2013. However, comments were received (and accepted) later than the official deadline. The received comments and suggestions were taken into account while developing the environmental report.

Together with the draft NWE-Programme, the Environmental Report is subject of the authorities and public consultation being conducted in April and May 2014. After the public consultation, a consultation report will be drafted presenting the received comments and their consideration.

1.3 ASSESSMENT FRAME

The assessment of potential significant impacts on the environment refers to the **Cooperation Programme INTERREG VB North-West Europe 2014 - 2020**. Technical areas of the assessment are the general strategic approach, defined Specific Objectives (SOs) and related Types of Actions (ToA) to be supported as well as the defined indicators.

The territorial area of the assessment covers the Member States of NWE (see graphic 1). Significant effects beyond the borders of this territory cannot be expected for effects on most of the environmental issues. Exceptions are ‘global climate’ and partly effects linked to the important intervention field ‘resource efficiency’ (see EU (2011) EU Resource Efficiency Perspectives in a Global Context; pp. 26). However, the presentation of “Relevant environmental objectives and indicators” (chapter 3) and “Existing environmental problems and trends of environmental development” (chapter 4) refer to the area of the European Union with focus on NWE Member States.

[8] http://ec.europa.eu/environment/eia/sea-legalcontext.htm (21.11.2013)

The formal time frame for the Programme covers the years 2014 till 2020. Adding 3 more years for the finalisation of funded projects, the period considered in the assessment is 2014 till 2023.

Graphic 1: Area of INTERREG North-West Europe

1.4 METHODOLOGY

The assessment follows the methodology prescribed in the SEA-Directive: Referring to the determinations of the NWE-Programme, relevant environmental objectives and related indicators were identified which serve as a base for the description of the present status of the environment and its development trends in the programme's area as well as for the assessment of likely significant effects of the programme on the environment.

Relevant environmental objectives are presented in numerous European directives, strategies, roadmaps and conventions. Indicators are defined to measure the achievement of the set objectives and to describe the status of the European environment. The selected indicators focus on the "Core Set of Indicators (CSI)" of the European Environment Agency (EEA). Due to the general character of the Programme it is not possible to measure possible impacts directly with indicators. The indicators are also used to formulate 'assessment questions', which serve to appraise the likely significant effects on the environmental issues of the NWE-Programme and its contributions to the relevant EU environmental objectives.

According to the SEA Directive- Annex I, the assessed environmental issues cover population/human health, landscape, water, soil, air, climate conditions and material assets/cultural heritage (including architectural and archaeological heritage) as well as the interrelationship between these factors.

Additionally in this assessment, the explicit consideration of 'Global Climate' as a separate environmental issue is included. The outstanding importance of the protection of the global climate and the position in the EU environmental policy ask for a particular assessment of the programme's effects on this issue and contribution to the relevant EU objectives.

Beside global climate also 'Resource Efficiency' is included in the assessment as an important field of interventions with manifold direct and indirect relations to the environmental issues. The consumption of resources, for economic processes as well as societal needs, presents a key factor in the complex interrelations between ecology and economy. In the last years, the awareness is increasing that decoupling of (economic) growth from resource consumption is required in order to maintain biodiversity and the natural base of human living. The understanding of resource efficiency in the context of this assessment is defined in chapter 3.

For the assessment of NWE-Programme and the preparation of the environmental report, the following documents have been used as technical references:

- Protocol on strategic environmental assessment to the convention on environmental impact assessment in a transboundary context (2003)
- Implementation of Directive 2001/42 on the assessment of the effects of certain plans and programmes on the environment (2004)
- Leitfaden zur Strategischen Umweltprüfung (German Federal Environmental Agency) (2009)
- Guidance document on ex-ante evaluation (January 2013) - Annex 1: Ex-ante evaluation and the Strategic Environmental Assessment

The assessment follows three steps:

- After a short discussion of possible alternatives, in a first step the strategic approach of the NW-Programme is analysed concerning the general orientation of the defined priorities and Specific Objectives, the interrelations between the Priorities, the consideration of the horizontal principle 'sustainable development' and the defined indicators.
- In a second step, the effects of individual Specific Objectives and Types of Actions are assessed. Due to the fact that detailed conditions of the individual funded projects (location, volume, aim, activities, etc.) are not known, the assessment has to focus on qualitative statements and the presentation of general cause-effect-relations.
- In a third step, the overall potential effects of the NWE-Programme on the individual environmental issues and its contributions to the EU objectives regarding each environmental issue are assessed. For this, assessment question per environmental issue were formulated based on the environmental objectives and related indicators (see table 2).

For the presentation of the findings textual explanations are applied. It allows discussing potential effects and possible impact-chains. This is particular important if only qualitative and principle statements can be made. Summary tables provide an easy access to the assessment's results per Specific Objective.

It has to be emphasised that the complex interdependencies between the environmental issues are known although the description of the present state of the environment in the NWE area and the assessment of the effects focuses on the individual environmental issues first of all. A detailed description of complex effect-chains is seriously not possible at this high strategic programming level. Statements to existing interdependencies are provided where necessary and possible.

2 STRUCTURE OF THE NWE-PROGRAMME

2.1 INTERVENTION LOGIC

The ambition of the NWE-Programme defined by the Partner States says

"To be a key economic player in the world and create an attractive place to work and live, with high levels of innovation, sustainability and cohesion".[9]

The intended contribution of the NWE-Programme to realise this ambition is based on six identified key challenges in the NWE area which can each be allocated to one of the Priorities of the "Europe 2020"-Strategy:[10]

- Challenge 1: Boosting knowledge flows
- Challenge 2: SMEs innovative capabilities
- Challenge 3: Resource and materials efficiency
- Challenge 4: Energy security and supply
- Challenge 5: Vulnerability to climate change events
- Challenge 6: Inclusion

To respond to the challenges, the Member States identified three Priorities which are based on four Thematic Objectives as prescribed by Article 9 of the Common Provisions Regulation (CPR)[11]. Within the Priorities a total of five Investment Priorities, as prescribed by Article 5 of ERDF Regulation[12], are covered which were further focussed in five Specific Objectives, i.e. one Specific Objective per each Investment Priority. The individual Specific Objectives form the framework for concrete interventions to be supported. The latter are described in nine Types of Actions.

The following table presents the elements of the intervention system of the NWE-Programme:

9 NWE-Programme; p. 7

10 NWE-Programme; p. 7ff

11 Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006

12 Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006

Table 1: Intervention system of the NWE-Programme

Priorities	Thematic Objectives (TO)	Investment Priorities (IP)	Specific Objectives (SO)	Type of Actions (ToA)
Priority 1: Innovation	**TO1**: Strengthening research, technological development and innovation.	**IP 1b**: Promoting business […] investment in innovation and research, and developing links and synergies between enterprises, R&D centres and higher education […]	**SO1:** To enhance innovation performance in NWE through international cooperation	**ToA1**: Building the capacity of regions and territories to improve their innovation performance**.** **ToA2**: Improving the competitiveness of enterprises, through cooperative actions that take forward the development of specific products, services or processes to a stage of market-readiness. **ToA3**: Delivering societal benefits through innovation.
Priority 2: Low Carbon	**TO4**: Supporting the shift towards a low-carbon economy in all sectors.	**IP 4e**: Supporting the shift towards a low carbon economy in all sectors through (4e) promoting low carbon strategies for all types of territories, in particular urban areas, including the promotion of sustainable urban mobility and mitigation relevant adaptation measures.	**SO2**: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection strategies	**ToA4**: Promoting carbon reduction in cities and regions through the implementation of emerging or existing low carbon, energy or climate protection strategies **ToA5**: Implementing combined mitigation and adaptation solutions, to demonstrate feasibility and refine design and development plans for the future.
		IP 4f: Promoting research, innovation and adoption of low carbon technologies.	**SO3:** To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	**ToA6**: Implementing low carbon technologies and other solutions through demonstrations and rollout of existing low carbon products, technologies, or solutions.
	TO7: Promoting sustainable transport and removing bottlenecks in key network infrastructures.	**IP 7c**: Developing environmental friendly and low carbon transport systems including river and sea transport, ports and multimodal links […]	**SO4:** To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	**ToA7**: Implementing transnational solutions for low carbon transport systems to reduce GHG emissions**.** **ToA8**: Implementing solutions for optimised traffic management to enhance capacity and to show tangible transfer to lower-carbon forms of transport, in order to reduce GHG emissions.
Priority 3: Resource and materials efficiency	**TO6**: Preserving and protecting the environment and promoting resource efficiency.	**IP 6f**: Promoting innovative technologies to improve environmental protection and resource efficiency in the waste sector, water sector, soil protection or to reduce air pollution.	**SO5**: To optimise (re)use of material and natural resources in NWE through international cooperation	**ToA9**: Implementing new technologies, services, products and processes to improve resource efficiency.

2.2 RELATIONS TO OTHER RELEVANT PROGRAMMES AND STRATEGIES

The NWE-Programme is embedded in a frame of numerous European policies, programmes and strategies. Additionally, country specific recommendations for ETC-programmes complement the complex context of this Programme.[13]

As an instrument for the implementation of the EU cohesion policy, the NWE-Programme contributes to the overall aim of the cohesion policy namely to reduce existing disparities between EU member states and regions in terms of their social and economic development and environmental protection in consideration of their specific territorial and societal conditions and potentials.

The cohesion policy supports the priorities of the Europe 2020 strategy (COM(2010) 2020):

- Smart growth: developing an economy based on knowledge and innovation,
- Sustainable growth: promoting a more resource efficient, greener and more competitive economy,
- Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion.

"Europe 2020"-strategy thus presents the overall 'strategic anchor' for the NWE-Programme.

The Programme is directly linked to a number of EU policy documents which are developed in order to support the priorities of Europe 2020. This includes

- the Territorial Agenda of the European Union 2020 - Towards an Inclusive, Smart and Sustainable Europe of Diverse Regions (May 2011)
- Horizon 2020 - Framework Programme for Research and Innovation 2014-2020 (COM(2011) 809)
- Programme for the Competitiveness of Enterprises and SMEs 2014 – 2020 (COSME) (COM (2011) 834)
- the Roadmap for Moving to a Competitive Low Carbon Economy in 2050 (COM(2011)112)
- the Roadmap to a Resource Efficient Europe (COM(2011) 572)
- EU Strategy on Adaptation to Climate Change (COM(2013) 216)
- Programme for the Environment and Climate Action (LIFE Programme) for the period 2014-2020 (PE-COS 70/13, 16103/13 ADD1)
- the Eco-innovation Action Plan (Eco-AP) (COM(2011) 899)
- Green Infrastructure (GI) - Enhancing Europe's Natural Capital (COM(2013) 249)

Furthermore, the Programme shows linkages to several EU Directives and Strategies such as the Water Framework Directive (WFD), the Urban Waste Water Treatment Directive, or the EU Waste Framework Directive.

Country specific recommendations describe particular needs of Member States which should be dealt with by transnational cooperation. For the NWE Partner States, the following recommendations are given showing importance for the Programme:

- "Strengthening research and innovation (NL, BE, UK and LU) with a focus on eco-innovation, such as production and distribution of renewable energy (IE, UK, FR), the environment (IE, LU, FR, NL) and energy and resource use (NL, LU).

[13] In chapter 1.1, sub-chapter 'Context of the NWE strategy for smart, sustainable and inclusive growth' of NWE-Programme, the relations to most important policies, strategies and programmes are presented.
See: NWE-Programme; p. 3ff

- Integrated networking ideas (DE), cluster nodes (NL, BE, UK) and open innovation through smart specialisation (IE) by sharing best practices or mobilising co-investments (NL, UK).
- Stimulating the cross-border SME environment (LU, FR) by increased co-operation, sharing of best practices and economies of scale between SMEs from different Member States (IE). Themes preferably include market integration and participation (NL) and labour mobility (BE).
- Organising transnational cooperation initiatives in the context of national policies and other Community-funded programmes, based on a strong sense of partnership, such as European Grouping of Territorial Cooperation (EGTC) as a legal framework (NL, DE), while recognising the various needs and priorities across borders (DE)."[14]

The NWE-Programme considered these recommendations in the elaboration of the strategic approach of the programme and the defined interventions (Types of Actions).

Furthermore, the area of NWE-Programme is also partly included into sea-basin and macro-regional strategies:

- The Atlantic Sea-basin Strategy includes France, Ireland and the United Kingdom. The priorities set in the strategy show partially similarities with the NWE-Programme concerning the strategic orientation:
  - Promote entrepreneurship and innovation;
  - Protect, secure and develop the potential of the Atlantic marine and coastal environment;
  - Improve accessibility and connectivity;
  - Create a socially inclusive and sustainable model of regional development.

  The NWE-Programme will contribute to some of the specific objectives of the Atlantic Sea-basin Action Plan:
  - Sharing knowledge between higher education organisations, companies and research centres (complementary to SO1 of the NWE programme);
  - Fostering adaptation and diversification of economic activities by promoting the potential of the Atlantic area (complementary to SO1 of the NWE programme);
  - Exploitation of the renewable energy potential of the Atlantic area's marine and coastal environment (complementary to SO3 of the NWE programme);
  - Promoting cooperation between ports (complementary to SO4 of the NWE programme). [15]
- The Danube Macro-Region Strategy includes parts of Germany (Baden-Württemberg and parts of Bavaria). The strategy focuses on four priorities:
  - Connecting the region (mobility and multimodality, sustainable energy, culture and tourism, people to people);
  - Protecting the Environment (Water quality, environmental risks, biodiversity, landscapes and the quality of air and soils);
  - Building Prosperity (Knowledge Society, competitiveness, people and skills);
  - Strengthening the Region (institutional capacity and cooperation, security).

  Coordinated actions between NWE-Programme and the Danube Macro-Region Strategy are only possible in the limited area of Southern and South-Western Germany. Topics of contributions can be seen in innovation, renewable energy development and mobility and multimodality.[16]

[14] NWE-Programme; p. 6
[15] NWE-Programme; p. 61
[16] NWE-Programme; p. 61

Links to national and regional programmes and strategies exist towards smart specialisation strategies, low-carbon strategies, energy strategies, climate strategies as well as the regional ERDF programmes.

For the implementation of projects supported by the NWE-Programme national legislation and permit procedures must be considered.

3 RELEVANT ENVIRONMENTAL OBJECTIVES AND INDICATORS

In the following table, the most relevant current objectives with related indicators are listed. An overview of the environmental policy targets and objectives 2010-2050 can be found in the EEA report "Towards a green economy in Europe", published in 2013.

As mentioned above the selected indicators focus on the "Core Set of Indicators (CSI)" of the European Environment Agency (EEA). The purpose of the indicators is to describe the status of the European environment. Due to the general character of the NWE-Programme it is not possible to measure possible impacts with these indicators directly. The indicators guide to formulate the "assessment questions". On base of these questions the possible effects on the environmental issues and contributions to the EU environmental objectives will be assessed.

The assessed environmental issues follow the SEA Directive (Annex I) and cover population/human health, landscape, water, soil, air, climatic conditions and material assets/cultural heritage (including architectural and archaeological heritage). Beside the additional explicit consideration of 'Global Climate', also 'Resource Efficiency' is included in the assessment as an important field of interventions with manifold direct and indirect effects on the environmental issues.

The consumption of resources, for economic processes as well as societal needs, presents a key factor in the complex interrelations between ecology and economy. In the last years, the awareness is increasing that a decoupling of (economic) growth from resource consumption is required in order to maintain biodiversity and the natural base of human living.

Up to date, there is no generally accepted definition of 'resource efficiency'. Among the EU Member States "there is neither a clear definition nor a common understanding of key terminology.(...) Generally, most countries seem to interpret resource efficiency quite broadly, including raw materials, energy sources, biomass, waste, land and soil, water and biodiversity. This is largely in line with the European Commission's interpretation in documents published to date."[17] Furthermore the EEA states an uncertainty about the definition of 'resource efficiency' and its relationship to other concepts such as 'sustainable consumption and production' and 'the green economy'. The Roadmap to a Resource Efficient Europe describes its vision to 2050 as follows: "By 2050 the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts. All resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored."[18]

[17] European Environmental Agency (2011): Resource Efficiency in Europe; p. 8 (underline by D&T)
[18] European Commission (2011): Roadmap to a Resource Efficient Europe; p. 3 (underline by D&T)

It is not intended to dissolve uncertainties concerning the definition of ‘resource efficiency’ in this environmental report. Instead as a pragmatic approach a more limited definition for the aspect ‘resource efficiency’ is chosen: As the environmental issues will be described separately, the sub-chapter ‘resource efficiency’ focuses on aspects related to the consumption of raw materials and energy. As there are many relationships between the assessed issues, some aspects of energy will be discussed in the sub-chapter ‘global climate’ already. Aspects of a ‘green economy’ like consumption and production patterns, waste and circular economy will be addressed in the sub-chapter ‘resource efficiency’.

The presentation of the environmental objectives and indicators follows the individual environmental issues. However, the complex interdependencies of the environmental issues are known and respected. Mutual reactions influence the final effects on the individual issue and on complex ecosystems as well. In chapter 4 (Existing environmental problems and trends of environmental development), these interdependencies are mentioned if required for better understanding.

Table 2: Relevant environmental issues, EU environmental objectives and targets, and related indicators

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
Population, Human Health	**Thematic Strategy on Air Pollution (COM(2005) 446):** Compared with the situation in 2000, the Strategy sets specific long term objectives (for 2020): • 47 % reduction in loss of life expectancy as a result of exposure to particulate matter; • 10 % reduction in acute mortalities from exposure to ozone.	Exceedance of air quality limit values in urban areas (CSI 004) - Assessment published Oct 2013	Does the NWE-Programme positively / negatively contribute to human health? Does the programme positively / negatively contribute to reduce concentrations of air pollutants in urban areas?
Landscape	**Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050; soil erosion is reduced and the soil organic matter increased, with remedial work on contaminated sites well underway. **European Landscape Convention (2000) (European Treaty Series - No. 176)** Article 3 – Aims The aims of this Convention are to promote landscape protection, management and planning, and to organise European co-operation on landscape issues.	Land take (CSI 014/LSI 001) - Assessment published Feb 2011	Does the NWE-Programme positively / negatively contribute to land take?
Biodiversity, Fauna, Flora	**Our life insurance, our natural capital: An EU biodiversity strategy to 2020 (COM(2011) 24):** <u>2050 vision</u> By 2050, European Union biodiversity and the ecosystem services it provides — its natural capital — are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity, and so that catastrophic changes caused by the loss of biodiversity are avoided. <u>2020 headline target</u> Halting the loss of biodiversity and the degradation of ecosystem	Species diversity (CSI 009) - Assessment published Nov 2005 Designated areas (CSI 008) - Assessment published Mar 2009 Exposure of ecosystems to acidification, eutrophication and ozone (CSI 005) - Assessment published Nov 2012 Land take (CSI 014/LSI 001) - Assessment published Jun 2013	Does the NWE-Programme positively / negatively contribute to halt the loss of biodiversity and the degradation of ecosystem services? Does the NWE-Programme positively / negatively contribute to the progress with the national designation of protected areas as a tool for biodiversity conservation? Does the NWE-Programme positively /

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
	services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss. Target 1: Fully implement the Birds and Habitats Directive Target 2: Maintain and restore ecosystems and their services Target 3: Increase the contribution of agriculture and forestry to maintain and enhancing biodiversity Target 4: Ensure the sustainable use of fisheries resources Target 5: Combat invasive alien species Target 6: Help avert global biodiversity loss **Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020 natural capital and ecosystem services will be properly valued and accounted for by public authorities and businesses. By 2020 the loss of biodiversity in the EU and the degradation of ecosystem services will be halted and, as far as feasible, biodiversity will be restored.		negatively contribute to reach the targets for reducing the exposure of ecosystems to acidification, eutrophication and ozone? Does the NWE-Programme positively / negatively contribute to land take?
Water	**Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020, all WFD River Basin Management Plans (RBMPs) have long been implemented. Good status – quality, quantity and use - of waters was attained in all EU river basins in 2015. The impacts of droughts and floods are minimised, with adapted crops, increased water retention in soils and efficient irrigation. Alternative water supply options are only relied upon when all cheaper savings opportunities are taken. Water abstraction should stay below 20% of available renewable water resources. By 2020, good environmental status of all EU marine waters is achieved, and by 2015 fishing is within maximum sustainable yields. **The EU Water Framework Directive - integrated river basin management for Europe (Directive 2000/60/EC):** All surface and groundwater bodies in river basins achieve 'good status' by 2015.	Emission intensity of manufacturing industries in Europe (WREI 003) - Assessment published Feb 2014 Emission intensity of domestic sector in Europe (WREI 002) - Assessment published Feb 2014 Use of freshwater resources (CSI 018) - Assessment published Dec 2010 Urban waste water treatment (CSI 024) - Assessment published Jan 2013	Does the NWE-Programme positively / negatively contribute to decoupling emission to water of nutrients and heavy metals by manufacturing from economic growth? Does the NWE-Programme positively / negatively contribute to decoupling emission to water of nutrients and heavy metals by the domestic sector from urban and population growth? Does the NWE-Programme positively / negatively contribute to sustainable water use? Does the NWE-Programme positively /

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
			negatively contribute to the target of the EU Water Framework Directive "All surface and groundwater bodies in river basins achieve 'good status' by 2015"?
Soil	**Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050; soil erosion is reduced and the soil organic matter increased, with remedial work on contaminated sites well underway. **Thematic Strategy for Soil Protection (COM(2006) 231)** The overall objective is protection and sustainable use of soil, based on the following guiding principles: (1) Preventing further soil degradation and preserving its functions: – when soil is used and its functions are exploited, action has to be taken on soil use and management patterns, and – when soil acts as a sink/receptor of the effects of human activities or environmental phenomena, action has to be taken at source. (2) Restoring degraded soils to a level of functionality consistent at least with current and intended use, thus also considering the cost implications of the restoration of soil.	Land take (CSI 014/LSI 001) - Assessment published Jun 2013 Soil erosion (CLIM 028) - Assessment published Nov 2012 Exposure of ecosystems to acidification, eutrophication and ozone (CSI 005) - Assessment published Nov 2012	Does the NWE-Programme positively / negatively contribute to land take? Does the NWE-Programme positively / negatively contribute to reduce soil erosion? Does the NWE-Programme positively / negatively contribute to reach the targets for reducing the exposure of ecosystems to acidification, eutrophication and ozone?
Air	**Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020, the EU's interim air quality standards will have been met, including in urban hot spots, and those standards will have been updated and additional measures defined to further close the gap to the ultimate goal of achieving levels of air quality that do not cause significant impacts on health and the environment. **Thematic Strategy on Air Pollution (2005) (COM(2011) 571):** Compared with the situation in 2000, the Strategy sets specific long	Exposure of ecosystems to acidification, eutrophication and ozone (CSI 005) - Assessment published Nov 2012 Exceedance of air quality limit values in urban areas (CSI 004) - Assessment published Oct 2013	Does the NWE-Programme positively / negatively contribute to reduce concentrations of air pollutants in urban areas? Does the NWE-Programme positively / negatively contribute to reduce emissions of acidifying substances, particulates and ozone precursors from transport?

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
	term objectives (for 2020): • 47 % reduction in loss of life expectancy as a result of exposure to particulate matter; • 10 % reduction in acute mortalities from exposure to ozone. • 43 % reduction in areas or ecosystems exposed to eutrophication. • reduction in excess acid deposition of 74 % and 39 % in forest areas and surface freshwater areas respectively.	Transport emissions of air pollutants (TERM 003) - Assessment published Feb 2013 Emissions of primary particulate matter and secondary particulate matter precursors (CSI 003/APE 009) - Assessment published Dec 2012 Emissions of ozone precursors (CSI 002/APE 008) - Assessment published Dec 2012	Does the NWE-Programme positively / negatively contribute to reduce the exposure of ecosystems to acidification, eutrophication and ozone?
Global Climate	**Greenhouse Gas Emission** **"20-20-20 targets" Europe 2020 strategy (COM(2010) 2020)** Reduce emissions to 20 % below 1990 levels by 2020 **A Roadmap for moving to a competitive low carbon economy in 2050 (COM(2011) 571):** Milestones: 40 % by 2030, 60 % by 2040 and to 80 % by 2050 below 1990	Atmospheric greenhouse gas concentrations (CSI 013/CLIM 052) - Assessment published Feb 2014 Greenhouse gas emission trends (CSI 010/CLIM 050) - Assessment published May 2013	Does the NWE-Programme contribute to reduce greenhouse gas emission?
	Renewable Energy **Directive 2009/28/EC** Increase renewable energy to at least 20 % of final energy consumption by 2020	Share of renewable energy in final energy consumption (ENER 028) - Assessment published Mar 2013	Does the NWE-Programme positively / negatively contribute to raise the share of renewable energy in final energy consumption?
	Energy Efficiency **Energy efficiency action plan (COM(2006)545), '20-20-20' targets Europe 2020 strategy (COM(2010) 2020), Energy Efficiency Directive (Directive 2012/27/EU):** Reduce consumption of primary energy by 20 % compared to energy consumption projections for 2020 **Directive on the Energy Performance of Buildings (Directive**	Progress on energy efficiency in Europe (ENER 037) - Assessment published Mar 2013	Does the NWE-Programme positively / negatively contribute to progress on energy efficiency?

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
	2010/31/EU): All new buildings occupied and owned by public authorities are 'nearly zero-energy' buildings by 2019 All new buildings are 'nearly zero-energy' buildings by 2020		
	Transport **Roadmap to a Resource Efficient Europe (COM(2011) 571):** Milestone: By 2020 overall efficiency in the transport sector will deliver greater value with optimal use of resources like raw materials, energy, and land, and reduced impacts on climate change, air pollution, noise, health, accidents, biodiversity and ecosystem degradation. Transport will use less and cleaner energy, better exploit a modern infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems. There will be on average a 1 % yearly reduction, beginning in 2012, in transport GHG emissions. **Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC:** share of renewable energy use in transport rises to a minimum 10 % in every Member State by 2020. **WHITE PAPER - Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system (COM(2011) 144):** Reduce CO_2 emissions from the transport sector by 20 % compared to 2008 levels by 2030 Reduce CO_2 emissions from the transport sector by 60 % compared to 1990 levels by 2050	Transport emissions of greenhouse gases (TERM 002) - Assessment published Dec 2013 Use of cleaner and alternative fuels (CSI 037/TERM 031) - Assessment published Dec 2013 Freight transport demand (CSI 036) - Assessment published Jan 2011 Passenger transport demand (CSI 035) - Assessment published Jan 2011	Does the NWE-Programme positively / negatively contribute to reduce emissions of greenhouse gases by transport? Does the NWE-Programme positively / negatively contribute to increase the use of cleaner and alternative fuels? Does the NWE-Programme positively / negatively contribute to Modal split?
	Adaptation to Climate Change **An EU Strategy on Adaptation to Climate Change (COM(2013) 216):**	Global and European temperature (CSI 012/CLIM 001) - As-	Does the NWE-Programme positively / negatively contribute to adaptation to

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
	The overall aim of the EU Adaptation Strategy is to contribute to a more climate-resilient Europe. This means enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination.	sessment published Aug 2013 Floods and health (CLIM 046) - Assessment published Nov 2012 River flow drought (CLIM 018) - Assessment published Nov 2012 Damages from weather and climate-related events (CLIM 039) - Assessment published Nov 2012 Storm surges (CLIM 045) - Assessment published Dec 2013 Storms (CLIM 005) - Assessment published Nov 2013	Climate Change concerning (concerning human health, biodiversity, soil erosion, floods, droughts, damages from extreme weather)
Material Assets, Cultural Heritage including Architectural and Archaeological Heritage	**Treaty of Lisbon (2007):** Article 3.3. "(…) The Union shall respect its rich cultural and linguistic diversity, and shall ensure that Europe's cultural heritage is safeguarded and enhanced". **European Convention on the Protection of the Archaeological Heritage (Revised),** Valetta, 16.I.1992 Article 1: The aim of this (revised) Convention is to protect the archaeological heritage as a source of the European collective memory and as an instrument for historical and scientific study. To this end shall be considered to be elements of the archaeological heritage all remains and objects and any other traces of mankind from past epochs: • the preservation and study of which help to retrace the history of mankind and its relation with the natural environment; • for which excavations or discoveries and other methods of research into mankind and the related environment are the main	--	Does the NWE-Programme positively / negatively contribute positive or negative to "Material Assets, Cultural Heritage including Architectural and Archaeological Heritage"?

Environmental Issues	Environmental Objectives and Targets	Indicators *Source: European Environment Agency - Indicators and fact sheets about Europe's environment - Website 10.3.2014*	Assessment Question
	sources of information; and • which are located in any area within the jurisdiction of the Parties. The archaeological heritage shall include structures, constructions, groups of buildings, developed sites, moveable objects, monuments of other kinds as well as their context, whether situated on land or under water.		
Resource Efficiency	**Roadmap to a Resource Efficient Europe (COM(2011) 571):** By 2020, market and policy incentives that reward business investments in efficiency are in place. These incentives have stimulated new innovations in resource efficient production methods that are widely used. All companies, and their investors, can measure and benchmark their lifecycle resource efficiency. Economic growth and wellbeing is decoupled from resource inputs and come primarily from increases in the value of products and associated services. By 2020, waste is managed as a resource. Waste generated per capita is in absolute decline. Recycling and re-use of waste are economically attractive options for public and private actors due to widespread separate collection and the development of functional markets for secondary raw materials. More materials, including materials having a significant impact on the environment and critical raw materials, are recycled. Waste legislation is fully implemented. Illegal shipments of waste have been eradicated. Energy recovery is limited to non recyclable materials, landfilling is virtually eliminated and high quality recycling is ensured.	Ecological Footprint of European countries (SEBI 023) - Assessment published May 2010 Waste electrical and electronic equipment (waste 003) - Assessment published Jun 2013 Generation and recycling of packaging waste (CSI 017/waste 002) - Assessment published Nov 2012 Municipal waste generation (CSI 016/waste 001) - Assessment published Dec 2011	Does the NWE-Programme positively / negatively contribute to increase recycling rates? Does the NWE-Programme positively / negatively contribute to circular economy? Does the NWE-Programme positively / negatively contribute to decoupling resource consumption from economic growth?

4 EXISTING ENVIRONMENTAL PROBLEMS AND TRENDS OF THE ENVIRONMENTAL DEVELOPMENT

The following text provides a brief and concise review of the state and development of the environmental issues relevant for the NWE-Programme. The main sources for the environmental data and information integrated in this report are:

- Interreg IVB (2013): SWOT-analysis for the smart, sustainable and inclusive growth objectives. A reviewed SWOT-analysis for North West Europe, presented according to the main objectives of the Europe 2020 Strategy and the thematic objectives of the CSF-funds regulation - Main Report.
- EEA: website
- EEA (2010): "*The State and Outlook of the European Environment Report (SOER)*", an EEA flagship assessment.
- EEA (2013): Report - Trends and projections in Europe 2013 - Tracking progress towards Europe's climate and energy targets until 2020
- Eurostat, European Commission (2013): Pocketbook - Energy, transport and environment indicators.
- European Commission (2014): Sustainable development in the European Union - 2013 monitoring report of the EU sustainable development strategy (Eurostat Statistical Books)

Tables in front of the sub-chapters:

The report on "Sustainable development in the European Union - 2013 monitoring report of the EU sustainable development strategy" (2014) provides 12 'headline indicators' which reflect the results of the progress evaluation since 2000. They are intended to give an overall picture whether the EU has achieved progress towards sustainable development in terms of the objectives and targets defined in the EU Sustainable Development Strategy. As far as they are relevant for the environmental issues assessed in this report, these headline indicators are shown in tables placed in front of the correspondent sub-chapters.

Graphic 2: Categories and associated symbols for the evaluation of the indicators

Evaluation category	Symbol (continuous trend)	Symbol (non-continuous trend)
Changes are **clearly favourable** in relation to SD objectives		
No or **moderately favourable** changes in relation to SD objectives		
Changes are **moderately unfavourable** in relation to SD objectives		
Changes are **clearly unfavourable** in relation to SD objectives		
Contextual indicator or not enough data available for an evaluation	:	

(European Union (2013): Sustainable development in the European Union P. 24)

The Categories and associated weather symbols for the evaluation of the indicators are shown in Graphic 2. The tables show different types of indicators:

- Level 1: Overall objectives
  they are related to the seven key challenges of the EU SDS. On the whole they are widely used indicators with a high communicative and educational value. They are robust and available for most EU Member States, generally for a period of at least five years.
- Level 2: Operational objectives and targets
  these indicators related to the 'operational objectives' of the Strategy. They are the lead indicators in their respective sub-themes. They are robust and available for most EU Member States for a period of at least three years.
- Level 3 Actions/explanatory variables
  indicators related to actions described in the strategy or to other issues which are useful for analysing progress towards its objectives. Breakdowns of higher level indicators, for example by gender or income group, are usually also found at level 3. [19]

For more information see the report: Sustainable development in the European Union (2013).

Graphic 3: Evaluation of changes in the public health theme (EU-27, from 2000)

Level 1	Level 2	Level 3
	Health and health inequalities	
	Deaths due to chronic diseases	Suicides
		: Unmet needs for healthcare
Life expectancy and healthy life years (*)	Determinants of health	
	Production of toxic chemicals (**)	Exposure to air pollution by particulate matter
		Exposure to air pollution by ozone

(*) From 2004. (**) From 2002.

(European Union (2013): Sustainable development in the European Union; p. 157)

POPULATION / HUMAN HEALTH

Human health depends on different factors, as socio-economic criteria (like income, health care, education). But also a clean environment is essential for human health; this report will reflect environmental aspects exclusively. The major environment-related health concerns are related to outdoor and indoor air pollution, poor water quality, poor sanitation and hazardous chemicals. All environmental issues, which are assessed in this report, show interdependencies to human health, as for example man made emission pollutes water and polluted water threatens human health. As emissions and pollution may increase with production, to move towards a more sustainable economic growth is essential for public health, i.e. transition to green economy.

Climate Change can multiply risks and existing health problems. Its impacts can affect human health in different ways:

[19] European Union (2013): Sustainable development in the European Union; p. 22

- directly as for example by heat waves, floods or the extend of the Asian tiger mosquito
- indirectly through changes in water, air and food quality and quantity, ecosystems, agriculture, livelihoods and infrastructure.[20]

Therefore, potential health effects depend on population's vulnerability and the ability to adapt.

The key trends in public health are summarized in the report "Sustainable development in the European Union" as follows[21]:

- Improvements in life-expectancy not leading to longer life in good health
- Improvements in health indicators slowing since the onset of the economic crisis, and health inequalities persist
- No or insufficient improvements in health determinants such as toxic chemical production and exposure to air pollution.

The SWOT-analysis for NWE-area summarizes the key facts concerning health in NWE and stresses the connection of many respiratory diseases with air pollution, which makes this topic transnationally relevant.[22]

LANDSCAPE

Landscape represents a multifunctional resource capable of delivering a wide range of environmental and quality of life benefits, including maintaining and improving ecological functions. In Europe most landscapes are transformed into man-made environments and also reflect economic, cultural, historical and aesthetic aspects.

Europe is one of the most intensively used continents on the globe, with the highest share of land used for settlement, production systems (including agriculture and forestry) and infrastructure (up to 80 %).[23] Annually, more than 1,000 km² are subject to land take for housing, industry, roads or recreation.[24] Land take causes change of the use of land as well as fragmentation of land and affects biodiversity by the expansion of different areas of human activity.

In the last years urban sprawl seemed to be slowing: artificial land cover, such as roads and buildings, increased 2.3 % per year between 1990 and 2000, but this rate fell to 1.5 % between 2000 and 2006.[25] The last assessment of land take in Europe for the period 2000-2006 showed that in general more forests, natural grasslands and open spaces were taken by artificial land development then in the previous decade. This meant a higher loss of natural ecosystems.[26]

Accordant to the population density the Benelux countries show the highest shares of artificial areas in total land area in the NWE region.[27]

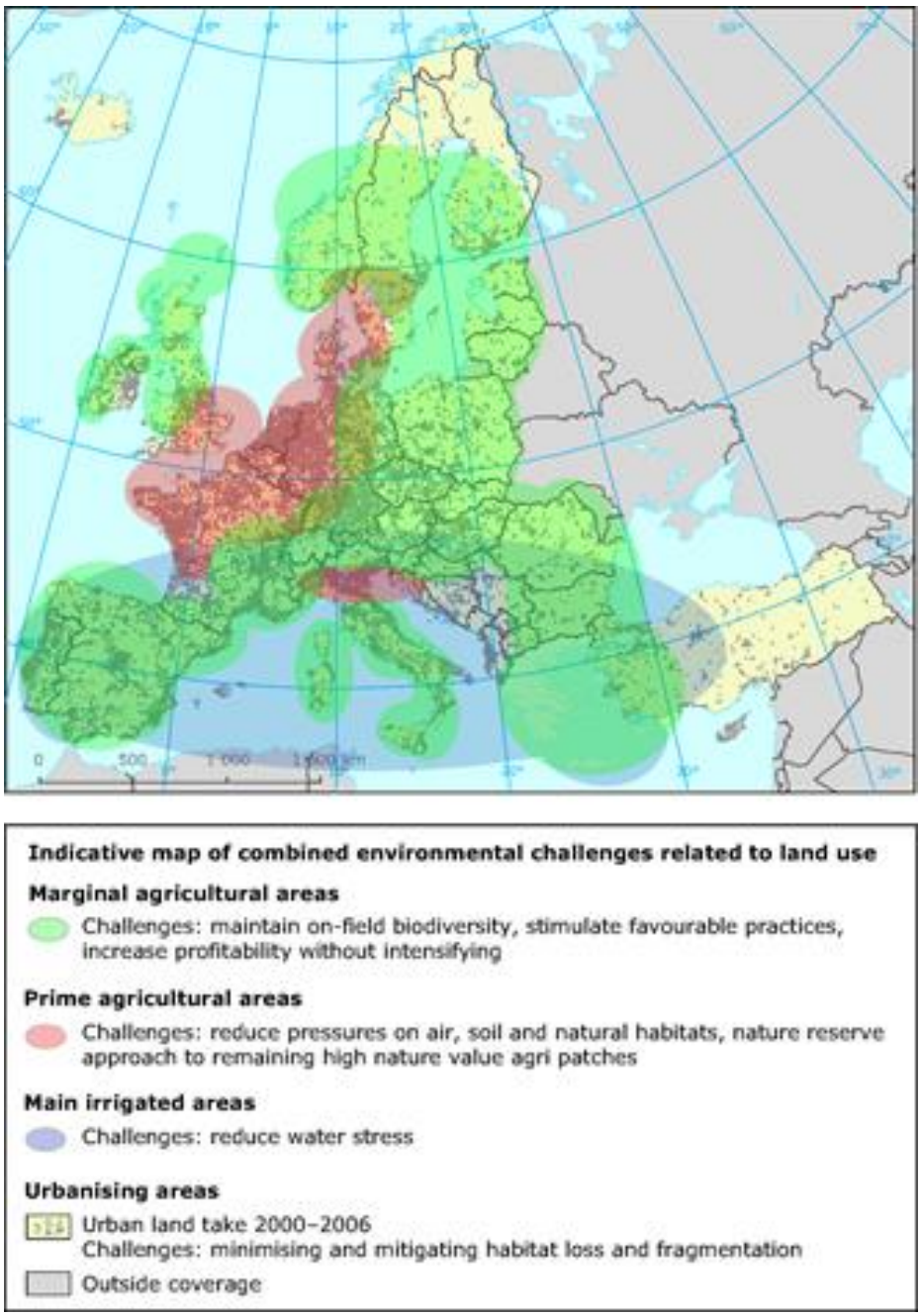
The SWOT-analysis for NWE gives a detailed overview of land cover features, changes in land use and landscape diversity in NWE[28] and stresses the importance of this topic: "Addressing the challenge of increasing urban land use and growing soil sealing as well as of a further fragmentation of landscapes and of a loss of biodiversity in NWE is thus also a core issue of relevance for transnational co-

[20] EEA Climate change and health is an emerging challenge for Europe (website 6.3.2014) http://www.eea.europa.eu/soer/synthesis/synthesis/chapter5.xhtml
[21] European Union (2013): Sustainable development in the European Union; p. 13
[22] Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 63
[23] EEA: Landuse, website 8.3.2014 http://www.eea.europa.eu/themes/landuse
[24] European Commission 2011: Roadmap to resource efficient Europe (COM(2011) 571), p.15
[25] EEA: Urban sprawl eating into wildlife habitats in Europe, website 8.3.2014 http://www.eea.europa.eu/highlights/urban-sprawl-eating-into-wildlife
[26] EEA (Website 5.3.2014) Land take http://www.eea.europa.eu/data-and-maps/indicators/land-take-2/assessment-2
[27] Eurostat (2013): Sustainable development in the European Union P. 232
[28] Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 39-40

operation, which could be addressed best through designing and implementing large-scale or place-based integrated policy approaches helping to balance sector demands on land and to manage land use in a sustainable manner, both in the urbanised and in the less urbanised areas."[29]

Graphic 4 captures some of the complexity of the multiple demands on land resources, with urban sprawl, agricultural intensification and land abandonment exerting pressures on biodiversity and water resources.

Graphic 4: Indicative map of combined environmental challenges related to land use



EEA: Data and maps website 10.3.2014

[29] Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 40

FLORA, FAUNA, BIODIVERSITY

"From the depths of oceans to the highest summits, from icy waters to baking deserts, life flourishes in every corner of our planet. We are currently witnessing a steady loss of biodiversity, with profound consequences for the natural world and for human well-being." [30]

Changes in land use and land cover due to growing human demands for food, renewable energy and infrastructure are key factors behind biodiversity decline (see also sub-chapter "landscape").

Where does Europe stand in 2010 with biodiversity?

Species faced with the risk of extinction
Up to 25% of European animal species, including mammals, amphibians, reptiles, birds and butterflies face the risk of extinction and are therefore included in the EU Regional Red List by IUCN.

Poor conservation status
62% of the habitats and 52% of the species covered by the EU Habitats Directive are considered to be in an unfavourable conservation status (EEA-ETC/BD, 2009).

Natura 2000 site designation - nearly completed
Designation of Natura 2000 terrestrial sites in Europe is nearly completed. Much more effort is needed for the marine sites (EEA-ETC/BD, 2010).

Source: EEA: biodiversity, website 10.3.2014

The EEA (2010) assessed status and trend regarding the EU biodiversity objectives as follows:

- The EU missed its objective "To halt the loss of biodiversity by 2010 – and beyond" and all respective efforts are still insufficient. For example: Although the total area of nationally designated protected areas and Natura 2000 areas increased, the loss of biodiversity is not stopped yet and the EU failed to achieve its 2010 biodiversity target. The trend is still negative.
- Europe is not on the track to meet the 2020 objective "*To halt the loss of biodiversity*", terrestrial as well as marine with negative development (decreasing trend).
- Regarding the objective "*To achieve favourable conservation status, set up Natura 2000 network*", the progress is different across the EU, but the overall problem remains with stable trend.[31]

Climate change is projected to play a substantial role in biodiversity loss and puts terrestrial as well as aquatic ecosystem functions at risk. Also migration of species and the invasion of alien species into the eco-systems because of climate change cause dramatic changes in the biotopes.

Birds are a good indicator to monitor the overall status of biodiversity: they reflect environmental changes in ecosystems rather rapidly because they are at, or close to the top of the food chain.[32]

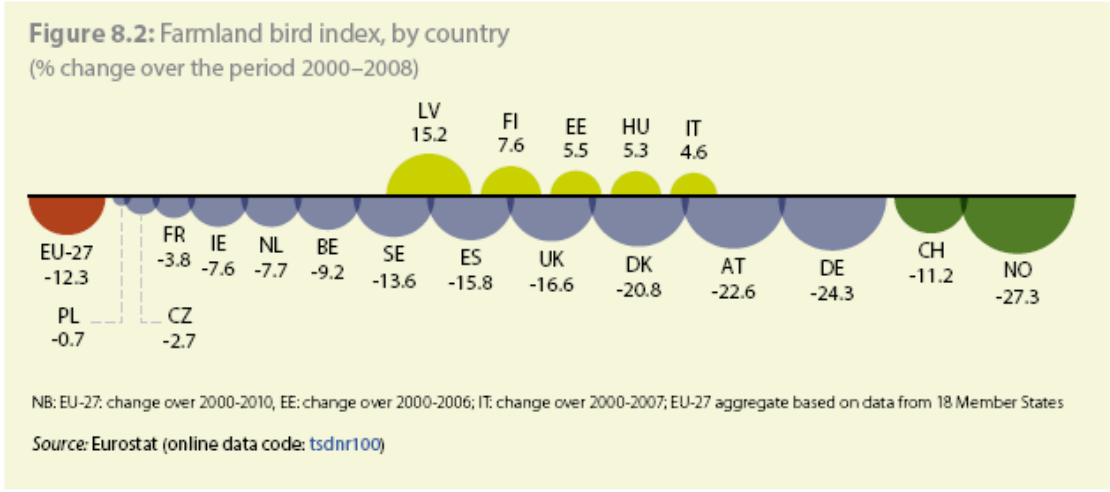
Between 2000 and 2011 the index of all common birds in Europe remained relatively stable. But there is an important difference between the developing of forest birds and farmland birds: forest birds increased by 9.7 percentage points between 2000 and 2011, farmland birds continued to decrease dramatically and reached an all-time low in 2010.[33] In the NWE region Germany and the United Kingdom showed the highest annual average rates of decline of the common farmland birds (see Graphic 5).

Changes in agricultural methods, intensification and specialisation are mainly responsible for the decline of "High Nature Value Farmland" and farmland bird in Northern and Western Europe. Fur-

[30] EEA: Biodiversity Baseline: where do we stand? website 10.3.2014, http://www.eea.europa.eu/themes/biodiversity/where-we-stand
[31] EEA 2010: The European Environment, State and Outlook, Synthesis, p.18
[32] European Union (2013): Sustainable development in the European Union; p. 223
[33] European Union (2013): Sustainable development in the European Union; p. 221

thermore, rising demand for biomass for bio-energy production has led to a significant increase in cultivation of high-input crops such as corn and rape, which has resulted in additional threats to biodiversity and ecosystem functions.[34]

Graphic 5: Farmland bird index by EU Member States



(European Union (2013): Sustainable development in the European Union, p. 221)

WATER

Water quality is closely linked to human health and biodiversity. Furthermore it is in manifold ways essential for human life.

The *European Water Framework Directive (WFD) (2000/60/EC)* aims to protect "water" by an integrated, all-embracing 'ecosystem-based approach'. Water ecosystems shall be protected equally in terms of water quality, water quantity, and their role as habitats. The achievement of these objectives are supported by the *Blueprint to safeguard Europe's water resources (SWD (2012) 382)* which propose packages to improve management and knowledge of water protection.

During the last 25 years, significant progress has been made in numerous European waters in reducing the pollution. This progress includes improved wastewater treatment, reduced volumes of industrial effluents, reduced use of fertilizers, reduced or banned phosphate content in detergents, as well as reduced atmospheric emissions.[35]

Nevertheless, more than 50 % of the surface water bodies in Europe are still in less than good ecological status or potential. Concerning ecological status and pressures in freshwater the worst areas of Europe are in Central and North-Western Europe. For coastal and transitional waters, the Baltic Sea and Greater North Sea regions are most negatively affected. Poor chemical status for groundwater, by area, was stated for 25 % across Europe. Referring to rivers, lakes, and transitional and coastal waters, poor chemical status does not exceed 10 % in whole Europe. Admittedly the chemical status of many of Europe's surface waters - ranging between one third of the lakes and more than half of transitional waters - remains unknown.[36]

In 2010, the EEA assessed status and trend regarding the EU water quality objective as follows:

[34] European Union (2013): Sustainable development in the European Union; p. 222
[35] EEA (2012): European waters - assessment of status and pressures, p.8
[36] EEA (2012): European waters - assessment of status and pressures, p. 8-9

Regarding the objective "*To achieve good ecological and chemical status of water bodies*" as well as concerning water exploitation and the objective "T*o achieve good quantitative status of water bodies"* the EU is attested a "mixed progress" by remaining overall problem and stable trend.[37]

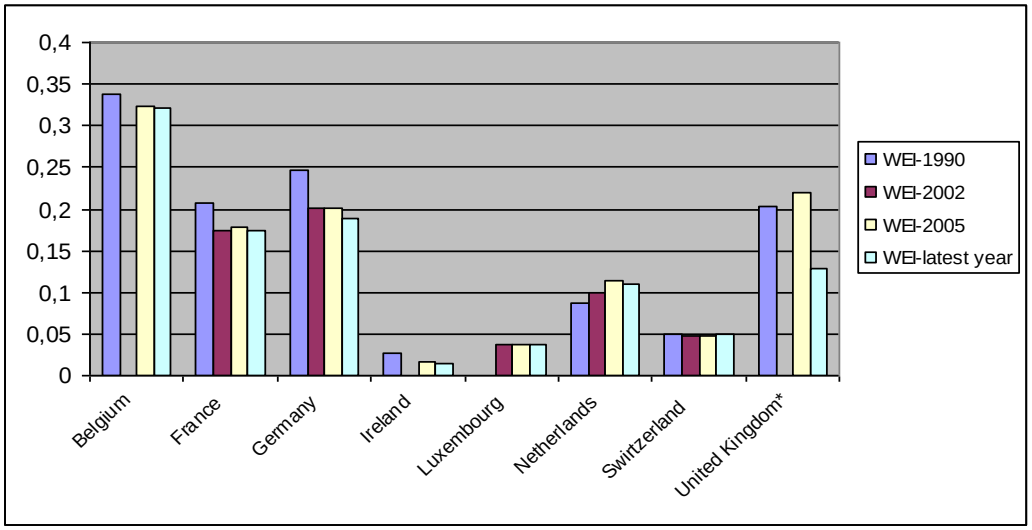
"**Pollution of rivers and lakes and other freshwater resources** is still an important issue in NWE which should be addressed by transnational co-operation. NWE is the part in the EU where the annual diffuse agricultural emissions of nitrogen to freshwater are most significant. The core areas with the highest values are the South of Ireland, Northern Ireland, Wales and the South-West and North-West of England in the UK, Bretagne and Normandy in France, most of the Netherlands and the bordering provinces and regions in Belgium and Germany. The annual average nitrate river concentration was highest in the river basin districts in the East of England, followed at a still high level by the river basin districts in many other parts of England, in western France, Belgium, Luxembourg and smaller parts along the German north-western border".

Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 39)

In most NWE Partner States **decoupling of manufacturing industries emissions into waters from the GVA** (gross value added) is observed, resp. decrease in emission coupled with decrease in GVA.[38]

"Absolute decoupling of nutrient emissions (as an indicator for of potential water pollution) from domestic sector and the population growth over the period of almost two decades (1990-2009) is observed in thirteen countries (Austria, **Belgium**, Czech Republic, **Germany**, Greece, Finland, **Ireland**, **Switzerland**, **the Netherlands**, Norway, Portugal, Slovenia and Turkey). The actual extent of decoupling, and the differences in trends among countries, may be partially explained by different levels of numbers of inhabitants connected to tertiary wastewater treatment technologies." [39]

Graphic 6: Water Exploitation Index (WEI)[40] for the NWE Partner States



http://www.eea.europa.eu/data-and-maps/figures/water-exploitation-index-wei-3 (06.03.2014)

[37] EEA 2010: The European Environment State and outlook, Synthesis; p.19
EEA 2013: "Towards a green economy in Europe", p.6

[38] EEA website 6.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/emission-intensity-of-manufacturing-industries/assessment

[39] EEA website 7.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/emission-intensity-of-domestic-sector/assessment

[40] The Water Exploitation Index (WEI) describes annual total water abstraction as a percentage of available long-term freshwater resources: "The warning threshold for the WEI, which distinguishes a non-stressed from a stressed region, is around 20 % (Raskin et al. 1997). Severe water stress can occur where the WEI ex-ceeds 40 %, indicating unsustainable water use."http://www.eea.europa.eu/data-and-maps/indicators/use-of-freshwater-resources/use-of-freshwater-resources-assessment-2 (06.03.2014)

Total water abstraction decreased over the past decade in most regions of Europe as well as in NWE; Belgium made significant progress towards more sustainable water management.[41] Though NWE-countries show big differences: Between 2000 and 2011 in NWE, the highest increase in total abstraction of fresh surface water per capita were recorded in the Netherlands (17 % in 2001-10), while the highest decreases were recorded in the United Kingdom (– 41 %).[42]

Wastewater treatment in all parts of Europe has improved during the last 15-20 years. In NWE the share of population connected to wastewater treatment is higher than in other parts of Europe.[43]

SOIL

Soil is one of the planet's invaluable resources but its degradation continues in Europe. The mineral particles, water, air, organic matter, and living organisms that constitute soil perform key functions which underpin our society.[44] "The unsustainable use and management of land is leading to increased soil degradation and the loss of a key resource that is fundamental to life on the planet."[45] Despite its importance for our society, and unlike air and water, there is no EU legislation specifically targeting the protection of soil.

Land take causes soil sealing (see sub-chapter "landscape"), air pollution causes acidification and eutrophication of soils (see below "air").

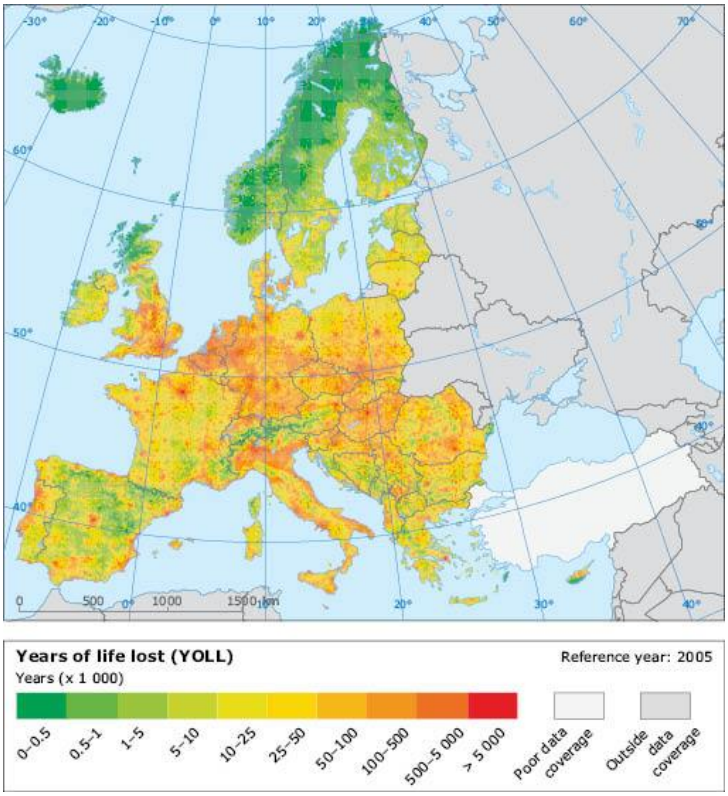
For Europe there is no systematic data collection concerning soil erosion. But it is estimated that the surface area in the EU-27 (excluding Greece, Cyprus and Malta, which lack CORINE land cover data for 2006) affected by water erosion sums up to 130 million ha. Wind erosion is estimated to be a serious problem in many parts of eastern England, north-western France, northern Germany, parts of the Iberian Peninsula and the eastern Netherlands.[46]
Soil erosion depends on land use; it may also increase in the course of climate change, caused by changing rain patterns, storm and floods (as could be observed recently at the Channel coast of the United Kingdom).

The EEA (2010) assessed status and trend regarding the EU soil objective as follows:

- EU is not on the track to achieve the objective "*To prevent further soil degradation and preserve its functions"*. The development is also stated negative (increasing trend).[47]

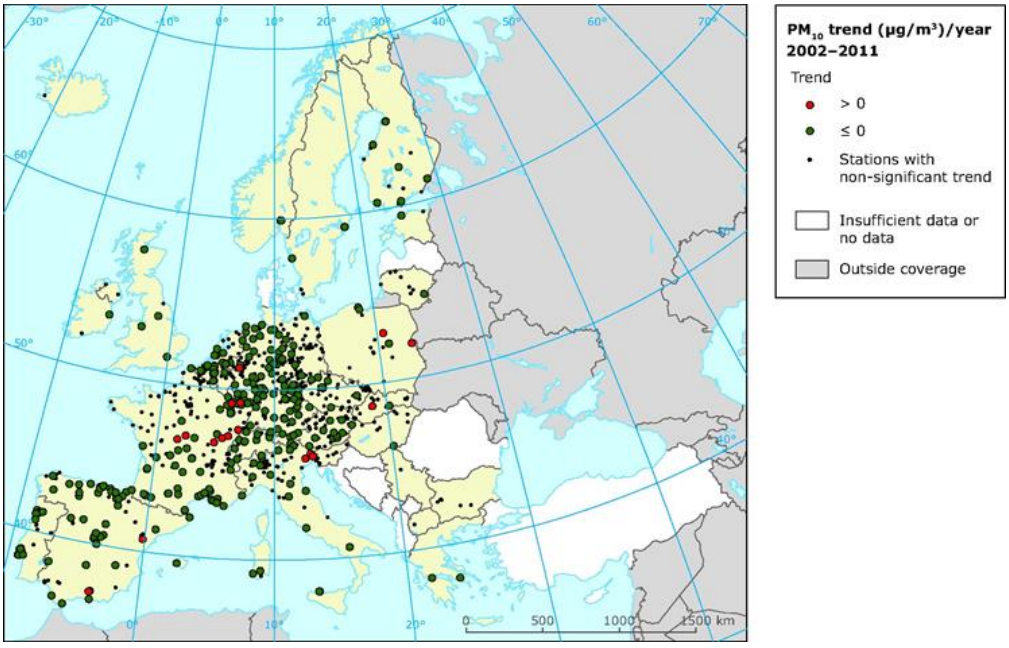
[41] European Union (2013): Sustainable development in the European Union; p.15
[42] Eurostat: Energy, transport and environment indicators; p. 209
[43] EE: urban waste water treatment: website 7.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/urban-waste-water-treatment/urban-waste-water-treatment-assessment-3
[44] EEA: Soil, website 8.3.2014 http://www.eea.europa.eu/themes/soil
[45] EEA 2012: The State of Soil in Europe, p.4
[46] EEA: Soil erosion, website 10.3.2014, http://www.eea.europa.eu/data-and-maps/indicators/soil-erosion-by-water-1/assessment
[47] EEA 2010: The European Environment, State and outlook, Synthesis, p.18

Graphic 7. Estimated years of life lost (YOLL) in reference year 2005 attributable to long-term $PM_{2.5}$ exposure



(EEA Website 6.3.2014, EEA, ETC Air and Climate Change, http://www.eea.europa.eu/soer/synthesis/synthesis/chapter5.xhtml)

Graphic 8: Annual changes in concentrations of PM_{10}, O_3 and NO_2 in the period 2001–2010



(EEA Website 3.5.2014 http://www.eea.europa.eu/publications/air-quality-in-europe-2013)

AIR

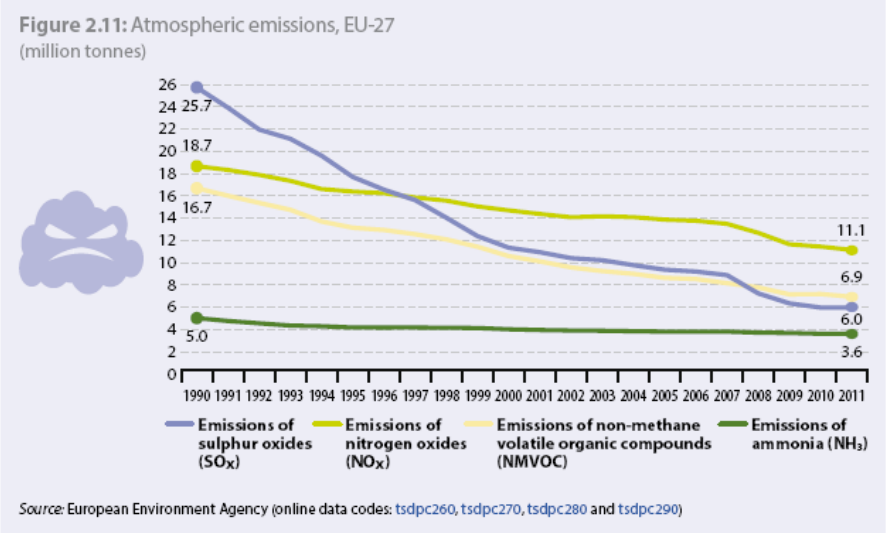
Air pollution is a major environmental risk to human health and also harms the environment. In Europe, emissions of many air pollutants have declined over the past decades, resulting in improved air quality across the region. But air pollutant concentrations are still too high, and air quality problems persist. A significant proportion of Europe's population live in areas, especially urban areas, where exceedances of air quality standards occur.[48]

As the actual report on air quality in EU states, the **main air pollutants in Europe** declined in the considered period 2002–2011. But nonetheless, particulate matter, organic pollutants and ozone are still Europe's most problematic pollutants in terms of harm to human health. Thus the report stresses: "Particulate Matter (PM) and Ozone (O_3) pollution are particularly associated with serious health risks, and exposure to high levels of organic pollutants, in particular PAHs (PAHs: a type of carcinogenic substances) is a growing health concern in Europe."[49]

Graphic 7 shows that the population in the most parts of NWE are affected by pollution of particular matter as an example for air pollution. Although the concentration of PM_{10} is declining, in NWE still serious health risks are persisting connected with air pollution.

Graphic 9: Atmospheric emissions, EU-27

Significant fall in emissions of the four air pollutants SO_x, NO_x, NMVOC and NH_3 between 2000 and 2011. Regulatory actions, in particular emission ceiling targets, contributed to the decline



(European Union (2013): Sustainable development in the European Union; p. 84)

Negative impacts of air pollution on ecosystems are damage to vegetation by **ozone, eutrophication and acidification**: "As SO_2 emissions have fallen, ammonia (NH_3) emitted from agricultural activities, and nitrogen oxides (NO_X - a family of gases that includes nitrogen dioxide - NO_2 and nitrogen oxide - NO) emitted from combustion processes have become the predominant acidifying and eutrophying air pollutants."[50]

[48] EEA: Air, website 8.3.2014, http://www.eea.europa.eu/themes/air/intro
[49] EEA 2013: Air quality in Europe - 2013 report; p. 9
[50] EEA 2013: Air quality in Europe - 2013 report; p. 8

Air pollution also damages our environment.

Acidification was substantially reduced between 1990 and 2010 in Europe's sensitive ecosystem areas that were subjected to acid deposition of excess sulphur and nitrogen compounds.

Eutrophication, an environmental problem caused by the input of excessive nutrients into ecosystems, saw less progress. The area of sensitive ecosystems affected by excessive atmospheric nitrogen diminished only slightly between 1990 and 2010.

Crop damage is caused by exposure to high ozone concentrations. Most agricultural crops are exposed to ozone levels that exceed the EU long-term objective intended to protect vegetation. This notably includes a significant proportion of agricultural areas, particularly in southern, central and eastern Europe.

Source: EEA: Air website 10.3.2014

In the period from 1990 to 2010, **transport emission** driven main pollutants that contribute to acidification and particulate and ozone formation have shown a decreasing trend in the EEA-32. The largest percentage decreases over this period have been for CO (76 %) and non-methane volatile organic compound (NMVOC) (75 %). The decline has occurred in spite of a growth in transport activities. This trend follows the progressive introduction of tighter Euro emission standards on new road vehicles supplemented by improvements in fuel quality driven by EU Fuel Quality Directives.[51]

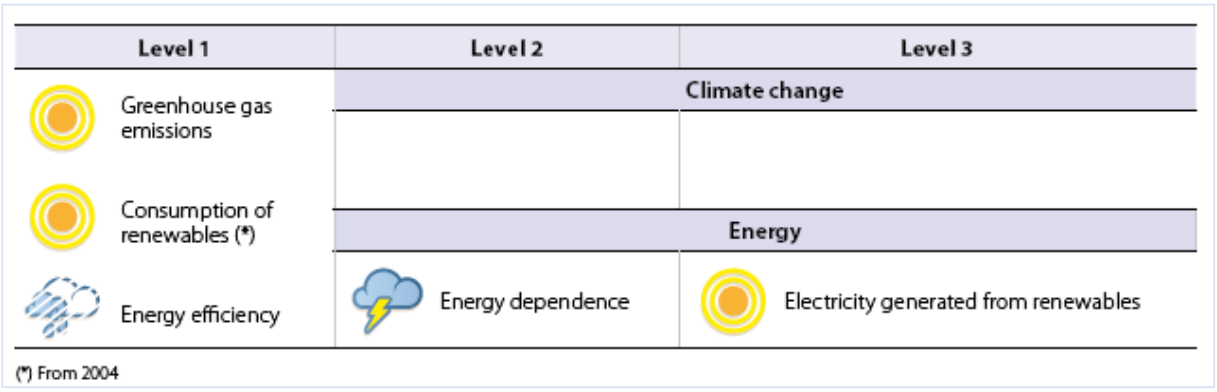
The EEA (2010) assessed status and trend regarding the EU air pollution objectives as follows:

- The EU is related to *"Air quality in urban areas (PM and O_3)"* not on the track to meeting environmental targets and objectives.[52]
- The EU is related *"Pressure on ecosystems (from air pollution, e.g. eutrophication)"* not on the track to meeting environmental targets and objectives.[53]

GLOBALE CLIMATE

"Climate change is happening now: Temperatures are rising, rainfall patterns are shifting, glaciers and snow are melting, and the global mean sea level is rising. We expect that these changes will continue, and that extreme weather events resulting in hazards such as floods and droughts will become more frequent and intense."[54]

Graphic 10: Evaluation of changes in the climate change and energy theme (EU-27, from 2000)



(European Union (2013): Sustainable development in the European Union; p.179)

[51] EEA: Transport emissions of air pollutants, website 10.3.2014, http://www.eea.europa.eu/data-and-maps/indicators/transport-emissions-of-air-pollutants-8/transport-emissions-of-air-pollutants-9

[52] EEA 2010: The European Environment, State and Outlook, p.19 Synthesis; EEA 2013: Towards a green economy in Europe, p.6

[53] EEA 2010: The European Environment, State and Outlook, p.19 Synthesis; EEA 2013: Towards a green economy in Europe, p.6

[54] EEA: Climate Change, Website 19.3.2014, http://www.eea.europa.eu/themes/climate

Greenhouse Gas Emission

The global average concentrations of various greenhouse gases in the atmosphere remain increasing.

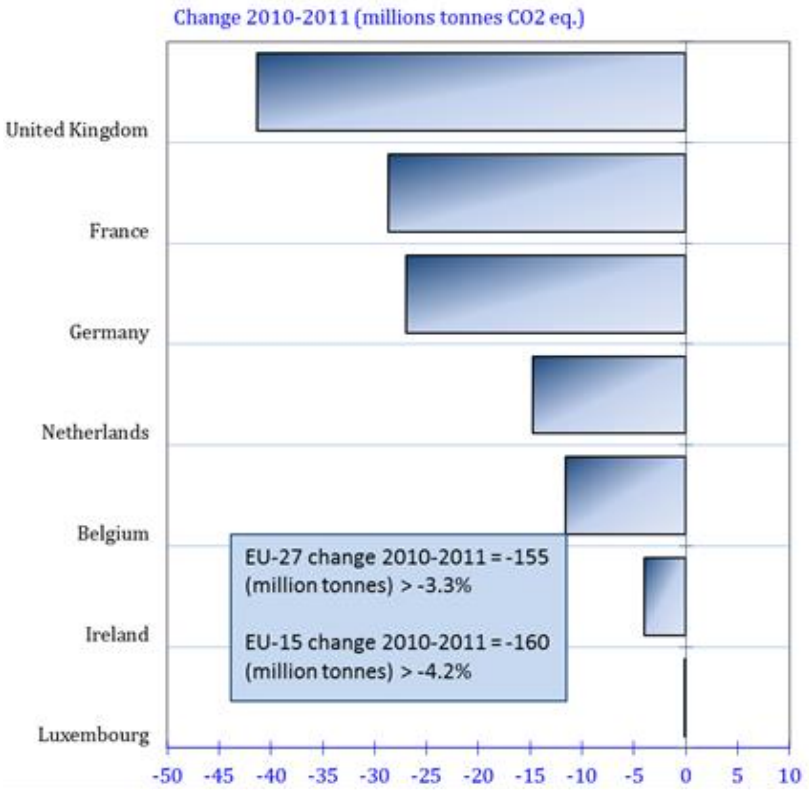
Since 1990 the greenhouse gas emissions in Europe have fallen clearly. The Europe 2020 target reducing the GHG-emission by 20 % compared to 1990 is in reach. Nevertheless the global mean temperature is rising, caused by still rising global emissions.

The global combustion of fossil fuels from human activities and land-use changes are largely responsible for this increase.[55] The main sources of man-made GHGs are:

- burning of fossil fuels (coal, oil and gas) in electricity generation, transport, industry and households (CO_2);
- agriculture (CH_4) and land-use changes like deforestation (CO_2);
- land filling of waste (CH_4);
- use of industrial fluorinated gases.[56]

There is no clear trend towards lower energy demand: "After having risen more or less continuously between 1990 and 2006, primary energy consumption in the EU fell to 1990 levels in 2011. Yet, the downward trend was not continuous. It remains to be seen if the decline can be maintained once the EU economy returns to higher economic growth".[57]

Graphic 11: Greenhouse gas emissions by NWE Countries: Absolute change 2010-2011



EEA: Greenhouse-gas-emission-trends Website 10.3.2014

[55] EEA Website 6.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/atmospheric-greenhouse-gas-concentrations-3/assessment

[56] EEA: Climate Change, website 8.3.2014, http://www.eea.europa.eu/themes/climate/intro

[57] European Union (2013): Sustainable development in the European Union; p. 14

The EEA (2010) assessed status and trend regarding the world's climate objectives as follows:

- The world is not on the track, meeting the objective "*to limit increases to below 2°C globally*". The development is negative (increasing trend).[58]

The EEA-report "*Trends and projections in Europe 2013 - Tracking progress towards Europe's climate and energy targets until 2020*" summarizes the **latest findings respective Europe's climate and energy targets**:[59]

- Progress towards 2008–2012 Kyoto targets:
  EU is on the track towards its 8 % reduction target. Total average emissions of the EU-15 in the 2008–2012 period have declined by 12.2 % compared to base year levels.
- Individual Greenhouse Gas targets of the EU countries:
  Almost all European countries with an individual GHG limitation or reduction target under the Kyoto Protocol (KP) (26 EU Member States, Iceland, Liechtenstein, Norway and Switzerland) are on track towards achieving their respective targets.
- The 20/20/20 objectives:
  - 20 % reduction of the EU's GHG emissions compared to 1990:
    The EU is very close to reaching its 20 % reduction target, eight years ahead of 2020.
  - 20 % share of renewable energy in the EU's gross final energy consumption: Renewable energies contributed 13 % of gross final energy consumption in the EU-27 in 2011. The EU has therefore met its 10.8 % indicative target for 2011–2012 and is currently on track towards its target of 20 % of renewable energy consumption in 2020.
  - 20 % increase of the EU's energy efficiency:
    EU Member States are moving towards the level of ambition required by the Energy Efficiency Directive. Their collective primary energy consumption in 2020 is expected to be close to the level required by the EU political objective of 1,483 Mtoe (million tonnes of oil equivalent) but will remain insufficient to achieve the 20 % energy efficiency target.

The NWE countries belong to the major polluters of the EU in terms of greenhouse gas emissions which contribute to global climate change: Germany, the UK and France have the greatest share in the total EU27 greenhouse emission. Reaching the reduction targets established will thus prove to be a difficult task especially in the case of Luxembourg and the Netherlands, given the little decrease which is observed in both countries (in the Netherlands even an increase in emissions is observed between 2005 and 2010). There are, however, significant differences in the national approaches regarding CO2 reduction and the regional and local strategies might even further differ from the national ones and exceed national targets in their ambitions.
Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 37)

Renewable Energy

The share of renewable energy in final energy consumption in the EU-27 increased between 2005 and 2011 and reached 12.5 % in 2010 representing 60% of the Europe 2020 target (20 %). Renewable energies represented in 2010, 14.3 % of total final heat consumption, 19.6 % of electricity consumption and 4.7 % of transport fuels consumption. The contribution of biomass is by far the largest, but wind and solar energy have expanded fastest. The share of renewables used in transport went down

[58] EEA 2010: The European Environment State and outlook, Synthesis; p.18
[59] EEA 2013: Trends and projections in Europe 2013 - Tracking progress towards Europe's climate and energy targets until 2020, p.10-11

in 2011 compared to the previous year.[60]

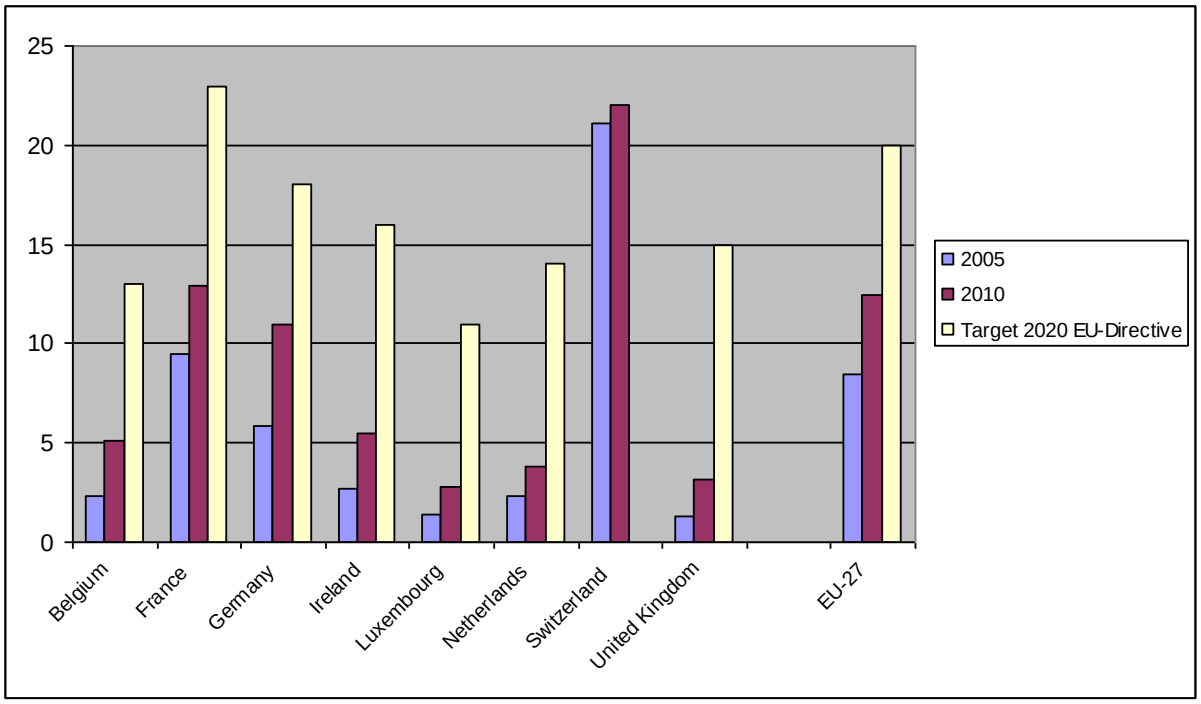
So the European Union is on the track to reach its target "increase renewable energy to at least 20 % of final energy consumption by 2020".

The share of renewable energy in the final energy consumption in NWE differs considerably across the Partner States (see graphic 12). Efforts are still necessary to reach the respective national targets set in the Directive on the promotion of the use of energy from renewable sources - Annex 1 for each EU Member State.

Increasing the share of renewable energies in the production and consumption mix: The share of renewables in energy production and consumption is below EU 27 average in all of NWE countries except Germany. Transnational cooperation may bring opportunities in the development of efficient and sustainable transnational infrastructures for renewable energy production and distribution (e.g. smart grids). The NWE area is directly concerned by a number of European priority corridors for future infrastructure development in the field of electricity, gas and oil (e.g. North Seas Offshore Grid). It is worth highlighting that NWE coastal regions possess a very high potential for wave power generation. In addition, the EU Maritime Strategy for the Atlantic Area provides a valuable basis for the development of joint actions in the field of environmental protection, energy efficiency and renewable energy.

Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 55)

Graphic 12: Share of renewable energy in final energy consumption (FEC) (%)



(http://www.eea.europa.eu/data-and-maps/figures/share-of-renewable-energy-to-7 (06.03.2014))

[60] EEA website 7.3.2014 *http://www.eea.europa.eu/data-and-maps/indicators/renewable-gross-final-energy-consumption-1/assessment;* and European Union (2013): Sustainable development in the European Union; p.14

Energy Efficiency

The indicator "Progress on energy efficiency in Europe" shows, that over the period 1990-2010, energy efficiency increased by 20 % in EU-27 countries at an annual average rate of 1.1 %/year, driven by improvements in the industrial sector (1.7 %/year) and households (1.6 %/year)".[61]

Increasing resource efficiency: As is the case of other European countries, there is still a significant challenge regarding the de-coupling of economic growth and resource consumption. In the NWE area, part of this solution lies within the optimisation of resource use and consumption through for example industrial symbiosis schemes and the implementation of closed circuits (e.g. water). Increasing resource efficiency can bring about major economic opportunities, improve productivity, drive down costs and boost competitiveness (securing jobs and growth). Transnational cooperation aimed at supporting resource efficiency would be a good complement to Regional Operation programmes which will be strongly focused on renewable energy production and consumption.

Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p.54)

Transport

A third of all final energy consumption in the EEA member countries and more than a fifth of greenhouse gas emissions is caused by transport. Transport in terms of energy consumption trends, is the fastest growing sector. Transport is also responsible for air pollution, for the fragmentation of the land witch causes negative effects on biodiversity as well as for negative effects on human health by noise exposure, but also accidents.[62]

The annual energy consumption from transport rose continually between 1990 and 2007 in EEA member countries. Between 2007 and 2009, the total energy demand from transport fell by 4 %, due to the effects of the economic recession.[63]

Achieving Europe's targeted 60 % CO_2 reduction by 2050 compared with 1990 will require the consumption of oil in the transport sector to drop by around 70 %. The current 96 % oil dependence of the transport-sector is unsustainable.[64]

The Report "Sustainable development in the European Union" (2014: P. 14-15) summarizes the trends in sustainable transport as follows:

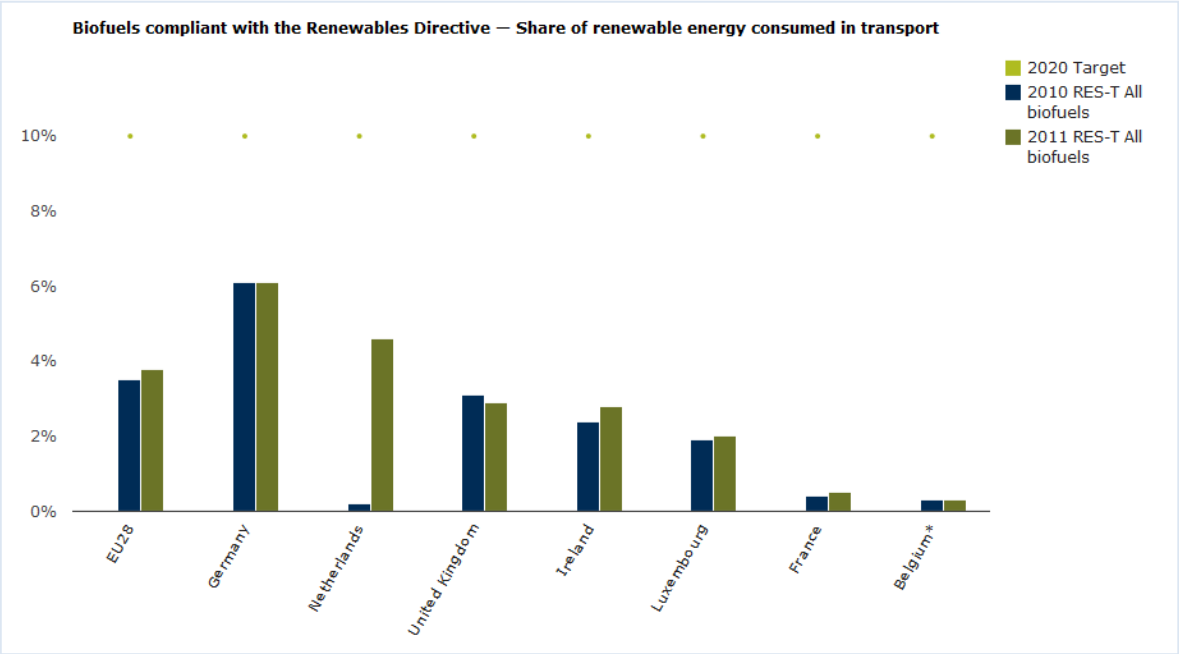
- No absolute decoupling of energy consumption of transport from economic growth:
  Overall, between 2000 and 2011 transport energy use increased by 6.7 %, while economic growth was faster, with 16.5 %. This implies relative decoupling of energy consumption of transport from economic growth, but it is uncertain whether this is an ongoing trend or merely a consequence of the economic crisis.
- No substantial change of transport modes and mobility:
  Modal split of passenger transport in 2011 remained very similar to its 2000 levels. Freight transport has shown slight shifts since 2009, with rail regaining its lost share from road transport.
- Negative transport impacts yet to be reduced:
  - Greenhouse gas emissions from transport still have to decrease

[61] EEA website 7.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/progress-on-energy-efficiency-in-europe/assessment
[62] EEA: Transport, website 17.1.2014 http://www.eea.europa.eu/themes/transport/intro
[63] EEA: Transport, website 17.1.2014 http://www.eea.europa.eu/themes/transport/intro
[64] EEA: Transport, website 17.1.2014 http://www.eea.europa.eu/themes/transport/intro

- road fatalities have continued to fall since 2000, but further efforts need to be implemented to attain the 2020 goal of fewer than 15 500 fatalities (27 000 in 2010).

Concerning the use of biofuels the EEA provides data only for the transport sector. The average share of renewable energy across the EU-28 consumed in transport between 2010 and 2011 increased from 3.5 % to 3.8 %. In the NWE Partner States, the extent using biofuels compliant with the Directive (on the promotion of the use of energy from renewable sources) is quite different, although considerable improvements can be seen since 2005.[65]

Graphic 13: Share of renewable energy consumed in transport



(EEA: Use of cleaner and alternative fuels, Website 12.3.2014)

Graphic 14: Evaluation of changes in the sustainable transport theme (EU-27, from 2000)

Level 1	Level 2	Level 3
	Transport and mobility	
Energy consumption of transport relative to GDP	Modal split of freight transport	
	Modal split of passenger transport	
	Transport impacts	
	Greenhouse gas emissions from transport	
	People killed in road accidents (*)	

(*) From 2001

(European Union (2013): Sustainable development in the European Union; p. 199)

[65] EEA: Use of cleaner and alternative fuels (CSI 037/TERM 031) website 12.3.2014 http://www.eea.europa.eu/data-and-maps/indicators/use-of-cleaner-and-alternative-fuels/use-of-cleaner-and-alternative-7

Adaptation to Climate Change

European regions particularly vulnerable to climate change risks include:

- Southern Europe and the Mediterranean basin (due to increases in heat waves and droughts);
- mountainous areas (due to increasing melting of snow and ice);
- coastal zones, deltas and floodplains (due to sea level rises, and increasing intense rainfall, floods
- Europe's far North and the Arctic (due to increasing temperatures and melting ice).

An impression of 'aggregate potential impact of climate change' for the EU shows graphic 15.

The EEA provides some indicators to estimate the effects of climate change in Europe. The table shows some findings of the projections (further information at the website of EEA).

Adaptation is needed to protect people, buildings, infrastructure, businesses and ecosystems of consequences of climate change.

The "EU Strategy on adaptation to climate change" focuses on three key objectives: Promoting action by Member States; climate-proofing action at EU level; and better informed decision-making. Indicators to measure successful and effective adaptations are not defined yet.

Table 3: Indicators of the EEA concerning estimated effects of climate change in Europe

Floods and health (CLIM 046) - Assessment published Nov 2012	Heavy precipitation events are likely to become more frequent in many regions in Europe. In the absence of adaptation, river flooding is estimated to affect 250,000 to 400,000 additional people per year in Europe by the 2080's, which corresponds to more than a doubling with respect to the 1961–1990 period. The increase is projected in Central Europe and the British Isles.
River flow drought (CLIM 018) - Assessment published Nov 2012	River flow droughts are projected to increase in frequency and severity in southern and south-eastern Europe, the United Kingdom, France, Benelux, and western parts of Germany over the coming decades. Climate change will affect not only water supply but also water demand. For example for irrigation
Damages from weather and climate-related events (CLIM 039) - Assessment published Nov 2012	Although it is currently difficult to determine accurately the proportion of losses that are attributable to climate change [vi], in view of current and projected climate change impacts and risks its contribution to losses is expected to increase.
Storm surges (CLIM 045) - Assessment published Dec 2013	Several climate modelling studies have projected changes in storm surge height and frequency for the 21st century. Larger increases in storm surge for the North Sea region during the 21st century cannot yet be ruled out.
Storms (CLIM 005) - Assessment published Nov 2013	Climate change projections from a recent climate model ensemble study show a small increase in extreme wind speeds over northern parts of Central and Western Europe, and a decrease in Southern Europe. The results of studies into changes in winter storm tracks show no clear signal.

EEA: Indicators website 10.3.2014

Climate change adaptation & risk prevention/management

One among the many challenges and territorial impacts that result out of climate change in Europe is the increase of frequency and scope of extreme natural events and hazards (e.g. sea level rise, river floods, flash floods, storm surges, heat waves, drought and forest fire etc), which then have significant negative impacts on the areas affected (i.e. loss of human lives, physical & material damages, cost for eliminating damages, cause of other associated technological disasters). Recent ESPON research results on climate change and its aggregate potential impact (i.e. the ESPON 2013 project "CLIMATE") show that in NWE high negative impacts can be expected in larger parts of the Netherlands and Belgium and medium-high negative impacts in France, Ireland and several coastal regions in the UK. The NWE coastal regions present a remarkably high potential physical impact as a result from climate change, which relates to the density of physical structures such as settlements, transport infrastructure, thermal power plants and refineries in these areas that are mainly sensitive to extreme events.

In the seas that form part of NWE (North Sea, Channel area, Irish Sea, Atlantic), the observed and projected increases in sea surface temperature will lead to the northward movement of species and changes in the distribution of phytoplankton biomass. Coastal flooding has already impacted low-lying NWE coastal areas in the past and the risks are expected to increase due to sea-level rise and an increased risk of storm surges. The NWE regions located at the North Sea are particularly vulnerable to coastal flooding, especially in the United Kingdom, Belgium and the Netherlands. The highest coastal flood damage potential which is expected to exceed 3 billion EUR at individual points is heavily concentrated along the coasts of Belgium and the Netherlands, whereas along the coasts of the UK and France or Ireland the expected damage potential is most frequently below one billion EUR and only at some points ranging between 1 and 2 billion EUR.

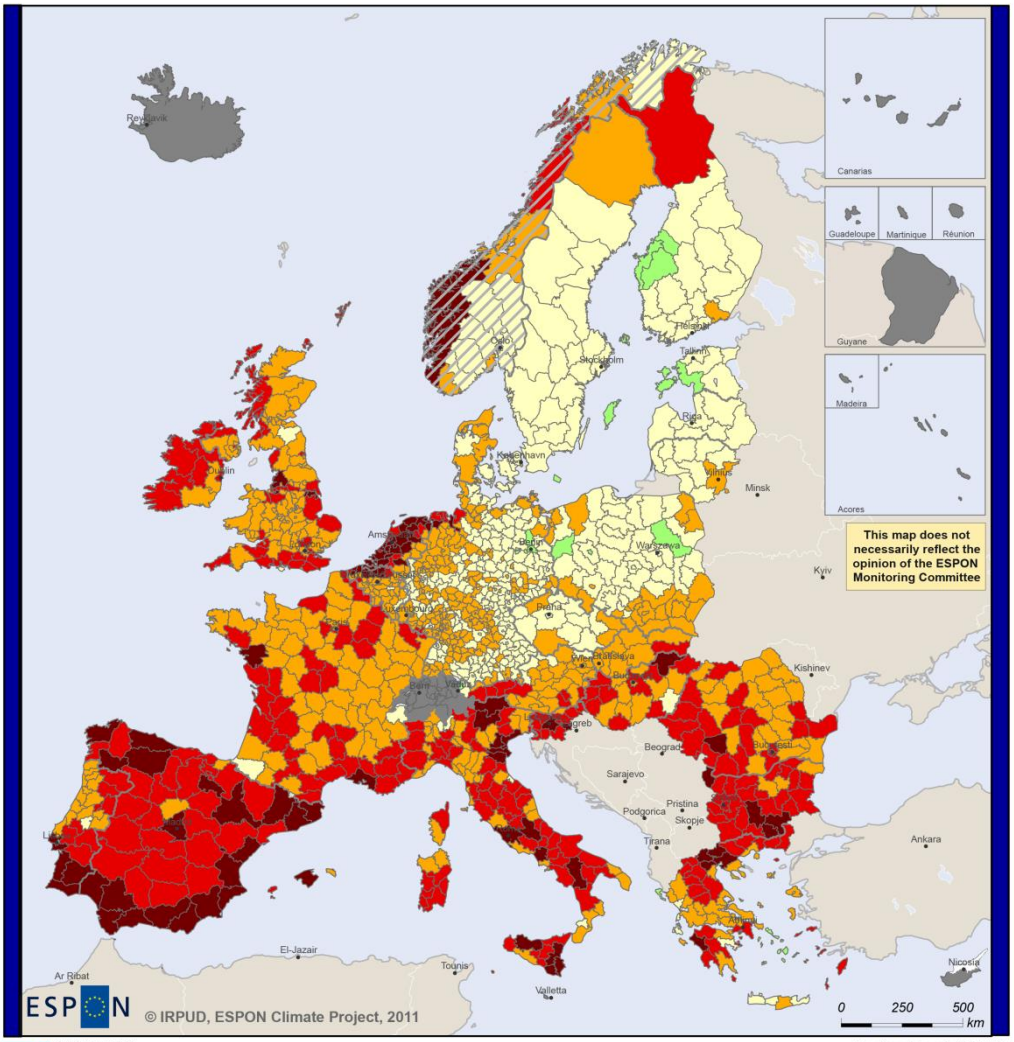
River flooding is an extreme natural event that is historically experienced in NWE, but data from the EEA environmental report 2010 shows that more recently (1998-2009) the frequency of flood events was very high in the UK and much less so – although still present – on the continent. Forecasts show that NWE will also in the future remain an EU-wide "hot-spot" for extreme flooding events. Increases in winter precipitation are projected to increase the intensity and frequency of winter and spring river flooding, although to date no increased trends in flooding have been observed. Within NWE, the expected future riverine flood damage potential is strongly concentrated on the UK and on the Dutch and Belgian regions bordering the Scheldt Estuary (expected damage potentials ranging from 100 – 280 million EUR).

NWE is also increasingly affected by heat waves which, in the past, had either a general extension (2003, 2006) or a more "localised" character (heat waves 2007 and 2010 in Germany, autumn heat wave 2011 in the UK), leading not only to health problems and human casualties but also to drought affecting the agriculture in the concerned areas.

Extreme natural events resulting out of climate have also a strong urban dimension because European cities are expected to continue to be vulnerable to heat waves, flooding and droughts which may have significant wide-ranging knock-on effects on infrastructures, public health and the economy (i.e. the water, energy, building and transport infrastructures are particularly vulnerable). Flooding is also expected to take place in urban centres due to the high degree of soil sealing, as the percentage of the population living on urban land that might be exposed to potential floods is estimated in several urban areas of NWE (esp. in Belgium, the Netherlands and in the north and east of France) to range between 6-10 % and in some extreme cases even between 10-20 % or above 20 %.

Interreg IVB (2013): SWOT-analysis for North West Europe, Main report; p. 37-38)

Graphic 15: Aggregate potential impact of climate change, 2009



MATERIAL ASSETS, CULTURAL HERITAGE INCLUDING ARCHITECTURAL AND ARCHAEOLOGICAL HERITAGE

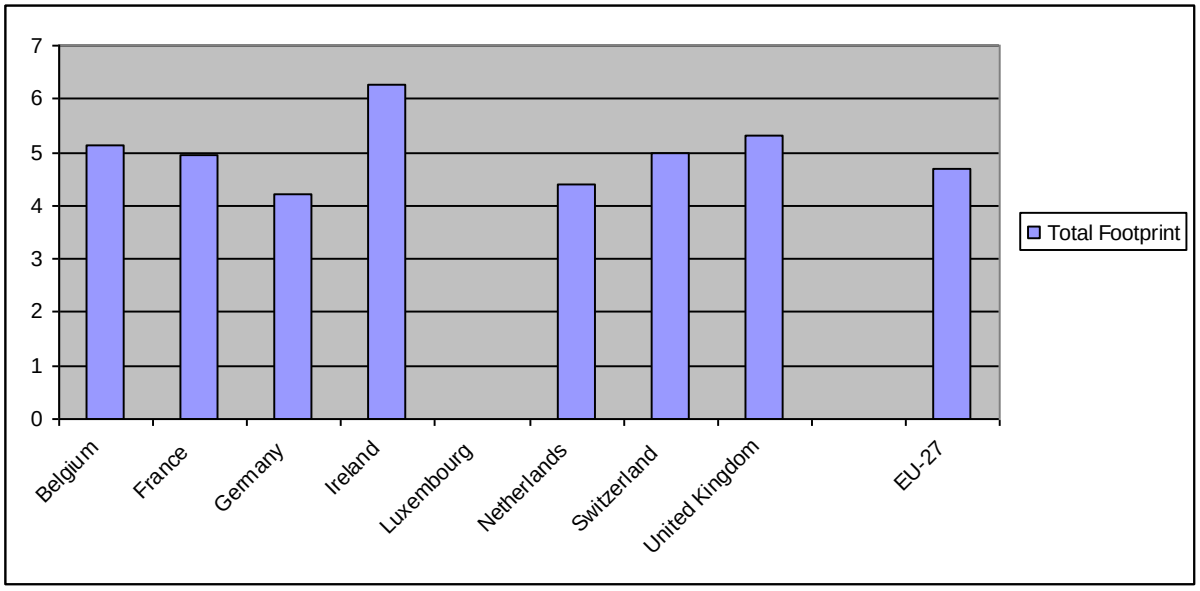
The EU does not have decision making power in the cultural heritage policy. However, culture and cultural heritage play a crucial role in at least four of the Europe 2020 flagship initiatives: innovation union, the digital agenda, an industrial policy for the globalisation era and an agenda for new skills and jobs.[66]

IMPORTANT FIELD OF INTERVENTION: RESSOURCE EFFICIENCY

The ecological footprint is an indicator to exemplify sustainability of life and economy. The key question is: Are Europeans using more than their share of the world's resources? The answer is clearly "yes". The EU-27 on its own has a Footprint of 4.7 global hectares per person, twice the size of its bio-capacity, for pan- Europe the deficit per person is significantly smaller. Accordantly the EEA summarizes: "The Ecological Footprint for pan-Europe[67] has been increasing almost constantly since 1961, while Europe's bio-capacity[68] has decreased. This results in an ever larger deficit, with negative consequences for the environment within and outside Europe."[69]

Most of the NWE Partner States show an ecological footprint between 4 and around 5 global hectares which is similar to the average value of the EU (no data available for Luxembourg). A considerable high value can be stated for Ireland: With 6.26 global hectares per person the ecological footprint is some three times higher than the average bio-capacity of the EU (around 2 global hectares per person).[70]

Graphic 16: The Ecological footprint of NWE Partner States



(http://www.eea.europa.eu/data-and-maps/figures/ecological-footprint-variation-per-region-2005 (06.03.2014))

66 European Commission Website 17.Nov 2013 http://ec.europa.eu/culture/our-policy-development/cultural-heritage_en.htm

67 For this analysis, data from all European countries were used, except for nations that were excluded because of insufficient population (Cyprus, Iceland, Liechtenstein, Luxembourg and Malta) and nations for which data are lacking (Andorra, Monaco, San Marino)

68 Bio-capacity: the capacity of ecosystems to produce useful biological materials and to absorb waste materials generated by humans, using current management schemes and extraction technologies.

69 EEA: Ecological Footprint of European countries (SEBI 023) website 12.3.2014; http://www.eea.europa.eu/data-and-maps/indicators/ecological-footprint-of-european-countries/ecological-footprint-of-european-countries

70 http://www.eea.europa.eu/data-and-maps/figures/ecological-footprint-variation-per-region-2005

To improve sustainability transforming the economy onto a resource-efficient path is one of the key objectives of the European Union. On the way to a "**green economy**" in Europe it is necessary to re-build the complex relationship between economy and ecology.

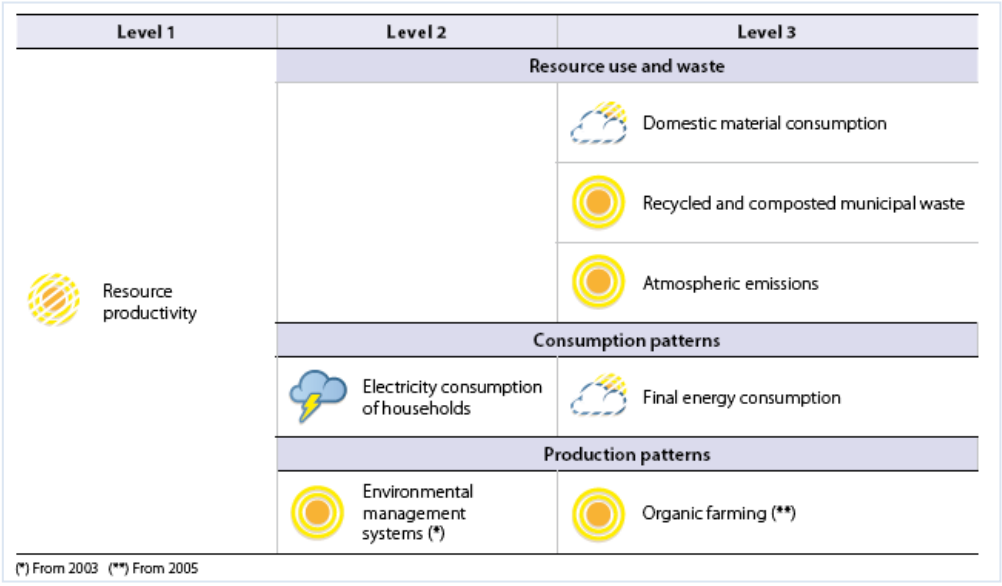
The "Roadmap to Resource Efficient Europe" comprises the most important aspects in order to de-couple resource use from economic growth:

- Sustainable consumption and production
  - Improving products and changing consumption patterns
  - Boosting efficient production
- Turning Waste into a resource
- Supporting research and innovation
- To phase out environmentally harmful subsidies[71]

For the years 2000 to 2011, no unambiguous trend was observed to absolute **decoupling of material use from economic growth**. A considerable improvement in resource productivity in that period was seen and the GDP was growing faster than domestic material consumption (DMC). These divergent trends — GDP growing while DMC falls — imply an absolute decoupling of economic growth from resource use in the EU between 2000 and 2011. However, it is unclear whether this is an actual turn-around in resource use patterns or merely a reflection of the impact of the economic crisis on re-source-intensive industries such as construction.[72]

Waste Management is very important, because waste may impact human health and the environ-ment through emissions to air, soil, surface water and groundwater. Waste can also represent loss of material resources (metals and other recyclable materials), and has potential as an energy source.[73] Waste treatment practices have improved considerably in the EU since 2000. In 2011, about 40 % of municipal waste was recycled or composted.[74]

Graphic 17: Evaluation of changes in the sustainable consumption and production theme (EU-27, from 2000)



(European Union (2013): Sustainable development in the European Union; p. 69)

[71] European Commission 2011: Roadmap to resource efficient Europe (COM(2011) 571)
[72] European Union (2013): Sustainable development in the European Union; p. 9f
[73] EEA: Waste, website 8.3.2014 http://www.eea.europa.eu/themes/waste/intro
[74] European Union (2013): Sustainable development in the European Union; p. 10

There is no clear trend towards more sustainable consumption patterns: "**Electricity consumption of households** has risen almost continuously since 1990. This trend has been driven mainly by a rise in the number of households and changes in their consumption patterns, outstripping efficiency improvements of electronic devices."[75] On the whole household electricity consumption proved rather unresponsive to the economic crisis.

Also **final energy consumption** in the EU has been on the rise since 1990. But 2005 marks a turning point with energy use stabilising and then falling in the years after. The contractions in the EU economy in 2009 and 2011 contributed to the drop, pushing final energy consumption in 2011 down to pre-2000 levels.[76]

Production patterns have improved in the EU over the past years. The number of organisations implementing a certified environmental management system according to the Eco-Management and Audit Scheme (EMAS) has grown since 2003.[77]

In the NWE countries, municipal waste generation between 2003 and 2010 remained in most cases stable (LU, BE) or decreased (IE, NL, DE, UK), but in France and Switzerland one can observe an increase. However, except Belgium, all other NWE countries were in 2010 either significantly (CH, LU, IE) or still clearly (NL, DE, UK, FR) above the European average in terms of municipal waste generation. In order to reduce the environmental pressures from landfill (esp. methane emissions and leachates), the EU Directive on the landfill of waste requires Member States to reduce landfill of biodegradable municipal waste to 75 % of the amounts generated in 1995 by 2006, to 50 % by 2009, and to 35 % by 2016. Most of the NWE countries had already met the 2016 target in 2006 (DE, CH, BE, LU, NL) and France was already close by. Only Ireland and the United Kingdom, both with derogation periods, still needed to further reduce landfill of biodegradable municipal waste in order to meet the 2006 target (substantial decrease needed in Ireland). As concerns a recycling of packaging waste, one can observe for 2009 that the rates are highest in Germany, Belgium, Switzerland and the Netherlands (> 65%) and slightly lower in France, Luxembourg Ireland and the UK (55-65%).
Within NWE, the percentage of waste that is recycled is slightly growing year by year. Most waste (relatively speaking) is recycled in Germany and Belgium. In absolute numbers, by far most waste is recycled in Germany, the UK and France.
At regional level, the highest material recycling rate is found in most German regions, especially East-Germany, and in Belgium regions.
SWOT-analysis for North West Europe, Main report (2013; p. 36)

5 ENVIRONMENTAL EFFECTS OF THE PROGRAMME

5.1 DISCUSSION OF ALTERNATIVES

The NWE-Programme is located at a high strategic level. In principle, at this strategic level possible alternatives can be seen related to spending the available funds differently as proposed in the Programme and to changing the main environmental issues as addressed in the Programme:

- For option A it can be said that shifts in the share of funds dedicated to the individual defined Priorities and Specific Objectives can be seen as alternatives. At present, the Priority 2 ('Low Carbon') receives 39.36 %[78] of the available ERDF funds (146 Mio. €), Priority 1 ('Innovation') receives 35.12 % (131 Mio €) while priority 3 (Resource and material efficiency') receives 25.52

[75] European Union (2013): Sustainable development in the European Union; p. 10
[76] European Union (2013): Sustainable development in the European Union; p. 10
[77] European Union (2013): Sustainable development in the European Union; p. 10
[78] The shares of the available ERDF-funds are calculated without the funds for Technical Assistance.

% (95 Mio. €)[79]. A higher share for Priority 3 could, of course, increase the possibility to achieve higher quantity of positive effects in the field of resource and material efficiency. Similar holds for an increase of funds in favour of Priority 2 which could increase quantity of positive effects in the field of reduced GHG emissions. However, the principle character of effects of Priorities 2 and 3 will not be changed by re-structuring shares of the available funds on the one side. The determination of the 'most appropriate funding of priorities' is highly arbitrary on the other side. Reference is made to this alternative in the course of description of the overall environmental effects of the NWE-Programme.

- Option B focuses on addressing other environmental issues than the ones defined in the NWE-Programme, e.g. explicit protection of biodiversity or quality of surface and ground waters. The defined foci of the NWE-Programme, addressing low carbon economy and resource and material efficiency, respond to the environmental needs and structural deficits in the Interreg NWE area as well as the required thematic concentration on reduction of CO_2-emissions (Art. 4, 1(a), EFRE regulation). The orientation on other environmental issues than the chosen ones cannot be seen as a "reasonable alternative".

Changes in phasing the implementation of the NWE-Programme cannot be seen as a 'reasonable alternative'. Actually, phases for the implementation of the different Types of Actions are not predictable.

The zero alternative, i.e. non-implementation of the Programme, is kept as an alternative and serve as base for the following assessment.

Serious alternatives can be seen at the level of individual projects. Improvements in the consideration of environmental issues can be realised by demanding guiding principles for the application, selection, conduction and monitoring of projects funded by the NWE-Programme.

5.2 ASSESSMENT OF THE STRATEGIC APPROACH - CONSIDERATION OF ENVIRONMENTAL OBJECTIVES IN THE DEVELOPMENT OF THE NWE-PROGRAMME

The NWE-Programme shows a strong orientation towards aspects of climate and resource protection. In this respect, the NWE-Programme responds to the formal requirements of thematic focussing as stipulated in the EFRE regulation (Art. 4, 1(a)) as well as to the identified challenges of the Interreg NW area[80].

PRIORITIES AND SPECIFIC OBJECTIVES

The NWE-Programme includes three (3) priorities out of which two priorities explicitly deal with important environment-related issues of the European Union:

- The potential of Priority 1 ('Innovation') to contribute to environment, climate and resource protection is different than the one of Priorities 2 and 3. Whereas priorities 2 and 3 explicitly contribute, the potential of Priority 1 is implicit and must be tapped by adequate application and selection criteria. The enhancement of innovation performance in NWE through international cooperation (Specific Objective 1) can open the door for the development and market-readiness of eco-innovations; indirect positive effects on the environment can be realised. Contrary to Priorities 2 and 3 which focus purposely on particular protection issues the character of Priority 1 allows the consideration of different environmental issues and such broadens

[79] NWE-Programme; p. 18
[80] NWE-Programme; p. 7ff

the potential range of positive effects on environmental issues - in case the implicit potential is actually exploited. In the NWE-Programme, criteria are stated which covers the consideration of environmental issues:

a) As sector specific guiding principle for the selection of operations, it is required "that they contribute to one or more social, economic or environmental challenge of the NWE area".[81]
b) In Chapter 8.1 (horizontal principle 'Sustainable Development'), it is mentioned that "project proposals are only eligible if the project objectives and activities do not conflict with principles of sustainable development" and "applicants are obliged to define in their application how their projects contribute to sustainable development in NWE."[82]

Although the commitment of the Programme to consider sustainable development and environmental protection in the implementation of Priority 1 can be seen, the quite soft statements in the NWE-Programme show that utilising the potential of Priority 1 to contribute to environment, climate and resource protection is not actively challenged.

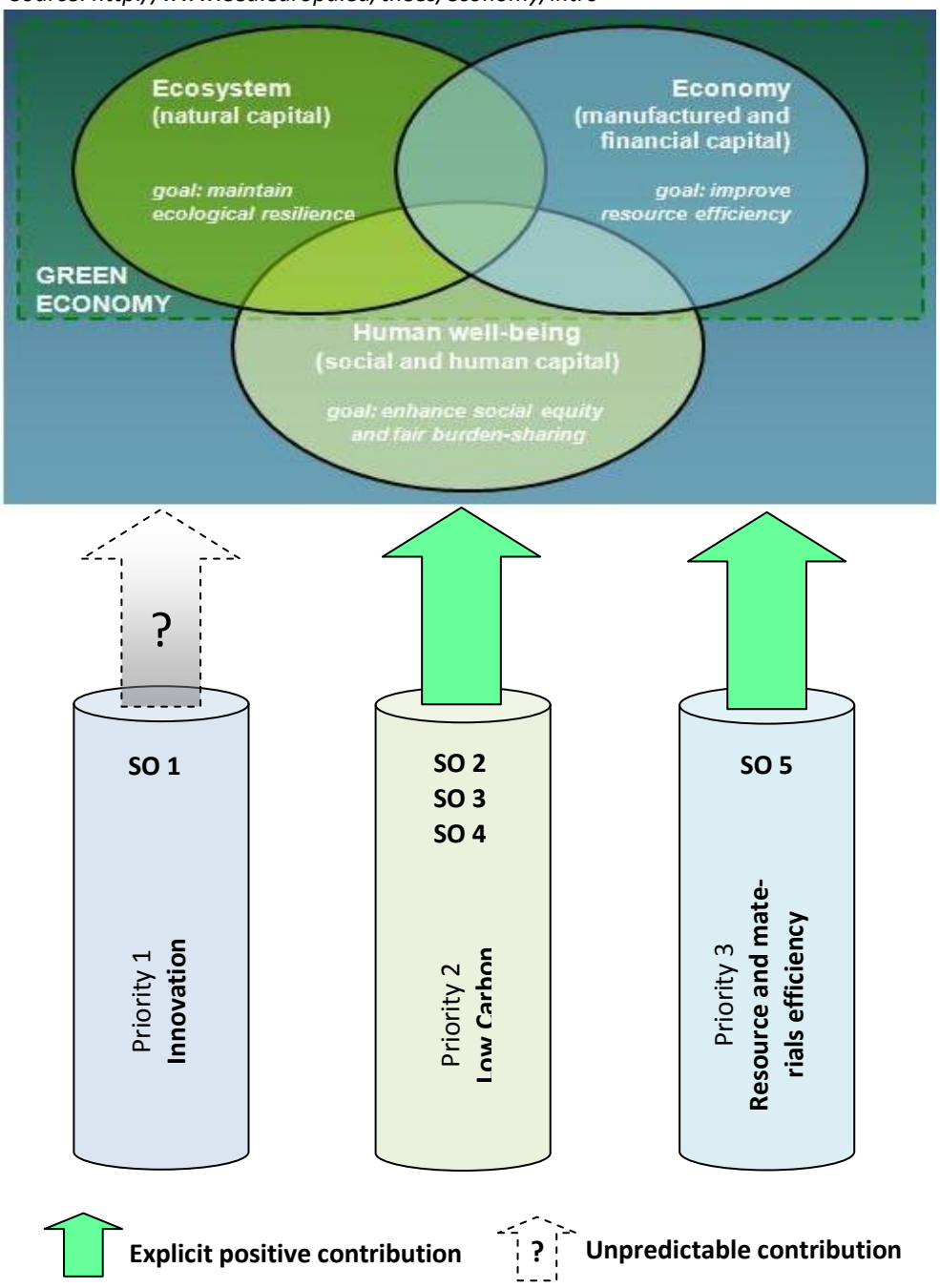
- Priority 2 ('Low Carbon') addresses environmental objectives in the area of climate protection. By its three Specific Objectives this priority covers a wide range of possible intervention areas for reducing GHG-emissions. The integration of adaptation solutions (combined with mitigation solutions as part of Specific Objective 2) reflects the need for strengthening resilience against negative impacts and risks of the climate change. Specific Objective 4 deals exclusively with GHG emissions caused by the transport sector, which forms a particular challenge in the NWE area. Positive effects can be generated due to the approach that "real solutions" should put into practise and the uptake of low carbon technologies will be supported rather than conceptual work. This Priority contributes to the aims of the *Roadmap for moving to a competitive low-carbon economy in 2050; r*elevance is given for all the sectoral perspectives of the roadmap. Furthermore, the 20-20-20 targets of the *"Europe-2020"-Strategy*, the *Directive on the promotion of the use of energy from renewable sources*, the *Energy efficiency action plan* and *Energy efficiency directive*, the *Directive on the energy performance of buildings*, the *Thematic strategy on air pollution*, *Communication on Green Infrastructure* or the *Roadmap to a single European transport area - towards a competitive and resource efficient transport system (white paper)* are supported.
- Priority 3 ('Resource and materials efficiency') contributes to the overarching aim of the European Union to decouple economic growth from consumption of resources. The Specific Objective of this Priority targets directly the use and reuse of material and natural resources by promoting implementation and application of respective technologies, services, products and processes. This priority contributes to the aims of the *Roadmap to a resource efficient Europe*. Relevance is given to the priority 'sustainable growth' of the *"Europe 2020"-Strategy* and the *Eco-innovation Action Plan*. More indirectly also other strategies and directives are addressed as the *EU biodiversity strategy to 2020* or the *Water framework directive*.

The strategic approach of the NWE-Programme reveals the commitment to support the overarching target of the EU to moving towards a green economy: The Priorities 2 and 3 explicitly contribute positively to this target, whereas the contribution of Priority 1 cannot be predicted without having more detailed information on actual projects within this Priority (see Graphic 18).

[81] NWE-Programme; p. 26
[82] NWE-Programme; p. 81

Graphic 18: Contribution of the Priorities to 'Green Economy' as an overarching target of the European Union

Source: http://www.eea.europa.eu/thees/economy/intro



The distribution of the available funds to the individual Priorities respectively Specific Objectives illustrates that the individual Specific Objectives of Priority 2 (SO2, SO3, SO4) are financially less equipped than Specific Objective 1 and Specific Objective 5 (see Table 4). However, summing up the shares of all Specific Objectives of Priority 2 the entire share for contributing to low carbon economy is the biggest of all three Priorities. All together almost two thirds of the available EFRE-funds (without funds for Technical Assistance) will be spent for contributing explicitly to improved environmental protection, either for reduction of GHG-emission or resource and material efficiency. Taking the implicit potential of Priority 1 into account, it can be stated that the NWE-Programme presents a posi-

tive orientation to tackle the environmental challenges in the NWE area and contribute to important environmental objectives of the European Union.

Table 4: Distribution of ERDF-funds per Specific Objectives

Priorities	Specific Objectives	assigned ERDF-funds [in Mio. €]*	assigned ERDF-funds [%]*
P1: Innovation	**SO1:** To enhance innovation performance in NWE through international cooperation	130.7	35.1
P2: Low Carbon	**SO2**: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection strategies	47.5	12.8
	SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	51.5	13.8
	SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	47.5	12.8
P3: Resource and materials efficiency	**SO5**: To optimise (re)use of material and natural resources in NWE through international cooperation	95.0	25.5
TOTAL		372.2	100.0

* without funds for Technical Assistance

INTERNAL INTERRELATIONS

A clear distinction is made between actions financed under Priority 2 and those financed under Priority 3[83]. Although the reduction of GHG emissions is linked to resource efficiency and vice versa it is comprehensible to follow a thematic concentration under each priority. Nevertheless, a value added for positive effects on the environment by actively promoting interrelations between the two Priorities can be generated.

More important are the relations between Priorities 2 and 3 on the one hand and Priority 1 on the other. As stated in the NWE-Programme, Priority 3 respectively Specific Objective 5 "is complementary to IP1b since it focuses on the implementation and uptake of technologies, products and services, rather than on the development and proof of concept of innovations (IP1b focuses on applied research and innovation)."[84] This understanding can also be highlighted for the relation between the Priorities 1 and 2.

Linking Priority 1 with Priorities 2 and 3 could provide a robust base for utilising the potentials of each priority better. The development and proof of concepts of innovations can benefit from an exchange with projects under Priorities 2 and 3 in order to test, implement and uptake the innovation results and to contribute better to topics of environmental protection. The other way round, Priorities 2 and 3 can gain inputs from projects under Priority 1.

Strong internal interrelations, mainly in form of exchange and cross-cutting cooperation, could support the further strengthening of potential positive effects as well as mitigating potential negative

[83] NWE-Programme; p. 46
[84] NWE-Programme; p. 46

effects on environmental, climate and resource protection and contribution to the environmental objectives of the EU. Synergistic effects could be better utilized.

HORIZONTAL PRINCIPLE 'SUSTAINABLE DEVELOPMENT'

The consideration of the horizontal principle 'Sustainable development' (acc. Art. 8 CPR) is described in chapter 8.1 of the NWE-Programme[85].

The link between Priorities 2 and 3 and the horizontal principle is elaborated in a concise manner. The link between Priority 1 and this principle is explained by the statement that "innovation in the NWE programme strategy also includes eco-innovation: innovation that contributes to sustainable development of NWE".[86]

A criterion for the project application and selection is provided which requires that project proposals are eligible only if they "do not conflict with the principles of sustainable development as defined by the programme"[87]. Contributions of the projects to sustainable development have to be mentioned in the application and the applicant, by signing the application, immediately agrees to the principles of sustainable development[88]. At the first glance, these formal requirements sound sufficient and straight forward to consider the horizontal principle. Problems arise because the principles of sustainable development are very broad and the meaning of 'sustainable development' can be interpreted according to concrete situations. What is missing are unambiguous definitions what is understood by principles of sustainable development and in which way they should be respected in the applications. Getting a clear idea is helpful for the applicants as well as for the assessors of the project applications.

Regarding the monitoring of the NWE-Programme's effects on the environment it is mentioned that "the promotion of sustainable development will be part of the NWE programme evaluation"[89]. Statements are missing in which way the consideration of sustainable development and the prevention of negative effects can be included in the continuous monitoring of the implementation of the programme and the execution of the individual projects.

INDICATORS

In a number of output indicators to each Specific Objective binding targets are defined which show relevance for environmental protection:

- For the reduction of GHG-emissions and promoting of low carbon economy five out of seven output indicators consider new solutions, technologies, products, services or management systems. Across all Specific Objectives, a total of 37 of such targets have to be realised. According the wide range of types of actions the nature of these solutions, technologies, etc. will be quite different.
- For resource and materials efficiency (Priority 3), the NWE-Programme foresees the implementation and testing of at least 24 solutions, processes, products and services (two out of three defined output indicators).

[85] NWE-Programme; p. 81
[86] NWE-Programme; p. 81
[87] NWE-Programme; p. 81
[88] NWE-Programme; p. 81
[89] NWE-Programme; p. 81

The formulation of these targets (in total 61 solutions, technologies, products, etc.) underlines the commitment of the NWE-Programme to tackle key environmental challenges in the NWE area comprehensively.

In the relevant output indicator concerning Priority 1, Specific Objective 1 “Number of technologies, products, services and processes developed and tested in real life conditions”, a hint is missing on preference of eco-innovations, circular economy or resource efficiency.

Due to the fact that at the time of the development of the environmental report target values for the result indicators were not defined yet, the result indicators could not be considered.

Table 5: Compliance of the NWE Programme with the general EU environmental policy - relations to priorities stated in key documents

INTERREG NWE Programme 2014-2020	Europe 2020	Low-carbon Roadmap	Resource Efficiency Roadmap	EU Adaptation Strategy	7. Environmental Action Plan (7. EAP)	The Eco-innovation Action Plan (Eco-AP)
Priority 1: Innovation						
SO1: To enhance innovation performance in NWE through international cooperation	Smart growth - developing an economy based on knowledge and innovation Sustainable growth - promoting a more resource efficient, greener and more competitive economy *(depending on the actual projects)* Inclusive growth - fostering a high-employment economy delivering economic, social and territorial cohesion	---	Sustainable consumption and production *(depending on the actual projects)* Turning waste into a resource *(depending on the actual projects)* Key sector: Ensuring efficient mobility *(depending on the actual projects)*	---	Priority objective 3: To safeguard the Union's citizens from environment-related pressures and risks to health and well-being *(depending on the actual projects)* Priority objective 5: To improve the knowledge and evidence base for Union environment policy *(depending on the actual projects)*	Action 3: Standards and performance targets for key goods, processes and services to reduce their environmental footprint *(depending on the actual projects)* Action 5: International cooperation
Priority 2: Low carbon						
SO2: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection	Sustainable growth - promoting a more resource efficient, greener and more competitive economy	Reducing Europe's energy bill and its dependency on fossil fuel imports Improving air quality and health	---	Action 4: Bridge the knowledge gap Action 7: Ensuring more resilient infrastructure	Priority objective 3: To safeguard the Union's citizens from environment-related pressures and risks to health and well-being Priority objective 8: To	Action 5: International cooperation Action 7: European Innovation Partnerships

strategies					enhance the sustainability of the Union's cities	
SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services	Sustainable growth - promoting a more resource efficient, greener and more competitive economy	Reducing Europe's energy bill and its dependency on fossil fuel imports Improving air quality and health Industrial sectors, including energy intensive industries	---	Action 7: Ensuring more resilient infrastructure	Priority objective 6: To secure investment for environment and climate policy and address environmental externalities	Action 2: Demonstration projects and partnerships for eco-innovation
SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems	Sustainable growth - promoting a more resource efficient, greener and more competitive economy	Reducing Europe's energy bill and its dependency on fossil fuel imports Improving air quality and health Sustainable mobility through fuel efficiency, electrification and getting prices right	---	---	Priority objective 2: To turn the Union into a resource-efficient, green and competitive low-carbon economy	Action 5: International cooperation Action 7: European Innovation Partnerships
Priority 3: Resource and materials efficiency						
SO5: To optimise (re)use of material and natural resources in NWE through international cooperation	Sustainable growth - promoting a more resource efficient, greener and more competitive economy	---	Sustainable consumption and production Turning waste into a resource Key sector: Ensuring efficient mobility	---	Priority objective 2: To turn the Union into a resource-efficient, green and competitive low-carbon economy	Action 2: Demonstration projects and partnerships for eco-innovation Action 3: Standards and performance targets for key goods, processes and services to reduce their environmental footprint

5.3 ASSESSMENT OF THE INDIVIDUAL SPECIFIC OBJECTIVES

In the following chapter, the potential significant effects of the defined Types of Actions per Specific Objective on the environment are described. The effects are presented in tabular form as an overview and are subsequently clarified textually.

The tabular assessment scheme is based on a simple categorization in order to increase the information value:

+	potential positive effect,
(+)	potential positive effect possible, depending on the individual project
0	neutral, no significant effect
-	potential negative effect,
(-)	potential negative effect possible, depending on the individual project
-/+	Potential negative or positive effect possible depending on the individual project
?	no assessment statement possible

Some hints need to be given to avoid misunderstandings of the following assessment:

1. Detailed conditions of the individual funded projects (location, volume, aim, activities, etc.) are not known. Due to the uncertainties only general cause-effect-relations can be presented. Actual effects on the environment and eco-systems depend on the specific design of the individual projects and the respective spatial patterns.
2. Though the assessment of the effects focuses on the individual environmental issues, the complex interdependencies between the environmental issues are seen. Nevertheless, a detailed description of complex effect-chains is not possible at this high strategic programming level. Principle potential synergistic effects will be mentioned in chapter 5.5.
3. 'Resource efficiency'[90] is seen as a field of intervention of outstanding importance for the NWE area. It is included in the assessment although it is not an environmental issue in the narrow sense. However, resource consumption is directly linked to numerous effects on environmental issues. The consideration of interventions in the field of resource efficiency in the scope of the individual Types of Actions provides additional information to which extent the NWE-Programme serves environmental protection and sustainable development and contributes to the target of the European Union to decouple economic growth from resource consumption.
4. The following summarising tabular presentation of potential effects reflects potential direct effects of the defined Types of Actions. Potential indirect effects are described in the textual explanations.
5. Due to further development of the NWE-Programme and clarification of some defined Types of Actions the assessment results might differ from the ones stated in the Scoping Note.

[90] For definition of resource efficiency see chapter 3 (p. 9f).

5.3.1 PRIORITY 1: INNOVATION

Priority 1 aims to bring innovations closer to the market; existing disparities in innovative performance between the regions of the NWE area should be reduced and the implementation of smart specialisation strategies should be supported. Additionally, innovations with a high impact on societal problems ('social innovations') will be promoted.[91]

For Priority 1, a share of 35.1 % of the available EFRE-funds is earmarked (130.7 Mio. €).

INVESTMENT PRIORITY IP 1.1: PROMOTING BUSINESS […] INVESTMENT IN INNOVATION AND RESEARCH, AND DEVELOPING LINKS AND SYNERGIES BETWEEN ENTERPRISES, R&D CENTRES AND HIGHER EDUCATION […]

Specific Objective 1: To enhance innovation performance in NWE through international cooperation

Table 6: Summary of potential effects - Specific Objective 1

Type of Action	Environmental issues								Intervention field
	Population Human Health	Landscape	Flora, Fauna, Biodiversity	Water	Soil	Air	Global Climate	Cultural Heritage	Resource efficiency
ToA1: Building the capacity of regions and territories to improve their innovation performance.	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
ToA2: Improving the competitiveness of enterprises, through cooperative actions that take forward the development of specific products, services or processes to a stage of market-readiness.	**0**	**?**	**?**	**?**	**?**	**?**	**?**	**0**	**(+)**
ToA3: Delivering societal benefits through innovation.	**+**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Each individual ToA covers a wide range of possible projects. In principle, the exploitation of research outcomes in the different areas should be improved.

Potential direct effects:

The potential direct effects of the envisaged ToA's are very limited except ToA2.

Concerning ToA2 it can be assumed that the further development, demonstrating and testing of innovative products, services or processes can generate positive effects on resource efficiency. Due to the fact that no details of those products, services and processes are known, a reliable statement is not possible (therefore the plus in the table is put in parentheses). For the identification of potential other effects sufficient information are not available but those effects cannot be neglected per se (in the table marked by question marks).

[91] For more detailed description of Priority 1 see NWE-Programme; p. 21

Concerning ToA3, the projects will have a positive effect on population/human health. By this ToA particularly excluded population or population at risk for exclusion and communities under pressure shall be supported. Social needs and problems shall be addressed by funded projects.

Potential indirect effects:

Potential indirect effects depend on the specific design of the funded projects. In case of realised improved resource efficiency (ToA2) an impact-chain can be presumed with positive effects on the environmental issues landscape, flora-fauna-biodiversity, water, soil and air and following this on human health.

5.3.2 PRIORITY 2: LOW CARBON

Priority 2 aims to contribute to the transition to a low carbon economy.[92]

For Priority 2, a share of 39.4 % of the available EFRE-funds is earmarked (146.5 Mio. €).

INVESTMENT PRIORITY IP 4E: SUPPORTING THE SHIFT TOWARDS A LOW CARBON ECONOMY IN ALL SECTORS THROUGH (4E) PROMOTING LOW CARBON STRATEGIES FOR ALL TYPES OF TERRITORIES, IN PARTICULAR URBAN AREAS, INCLUDING THE PROMOTION OF SUSTAINABLE URBAN MOBILITY AND MITIGATION RELEVANT ADAPTATION MEASURES.

Specific Objective 2: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection strategies.

Table 7: Summary of potential effects - Specific Objective 2

Type of Action	Environmental issues								Inter-vention field
	Population Human Health	Landscape	Flora, Fauna, Biodiversity	Water	Soil	Air	Global Climate	Cultural Heritage	Resource efficiency
ToA4: Promoting carbon reduction in cities and regions through the implementation of emerging or existing low carbon, energy or climate protection strategies	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**
ToA5: Implementing combined mitigation and adaptation solutions, to demonstrate feasibility and refine design and development plans for the future.	**+**	**(-)**	**(-)**	**(-/+)**	**(-/+)**	**+**	**+**	**(+)**	**+**

Regional and local stakeholders increasingly have to deliver strategies aimed at reducing emissions and optimising energy performance. The actions under ToA4 support the implementation of low carbon, energy and climate protection strategies. As a second pillar of this Specific Objective 2 combined mitigation and adaptation measures will be supported. The high urbanisation rate, population density and extensive infrastructure make the NWE area highly vulnerable for climate change effects.

[92] For more detailed description of Priority 2 see NWE-Programme; p. 29

Potential direct effects:

The implementation of emerging or existing low carbon, energy or climate protection strategies (ToA4) shows positive effects on global climate, air quality and resource efficiency throughout.

Same holds for the implementation of mitigation measures as part of combined mitigation and adaptation solutions (ToA5).

Direct effects on other environmental issues can be expected by adaptation measures as well. Depending on the actual design of projects, adaptation measures may contribute positively to the quality of waters by measures to reduce water consumption, renaturation of rivers, improved management of catchment areas, etc. Also soil erosion can be mitigated by adequate measures. Finally, measures to mitigate risks and impacts of climate change will result in positive effects on the population and human health. Measures to increase the resilience of physical infrastructure against climate change effects (floods, storms, etc.) can also include structures important for cultural heritage. Positive effects on this issue can be presumed if addressed by projects. Due to the fact that no details of finally implemented projects are known reliable statements are not possible (therefore the mark for cultural heritage in the table is put in parentheses).

Adaptation measures for reducing vulnerability of infrastructure which are linked to construction works could generate negative effects on landscape, biodiversity, soil, and water (by obstruction of waters). Due to the fact that no details of finally implemented projects are known reliable statements are not possible (therefore the marks for the environmental issues water, soil, landscape and biodiversity in the table are put in parentheses).

Referring to provided possible actions for ToA5[93] it must be stated that the examples for combined mitigation and adaptation solutions under bullet points 2 and 3 are misleading:

- Bullet point 2 '*Water planning at a catchment level to address adaptation whilst promoting mitigation; for example where water is allocated between hydroelectricity and consumption'*: The allocation of water for hydroelectricity shows a link to mitigation whereas the link between allocation for consumption and adaptation is finally not clear. A more explaining example could be the combination of hydroelectricity and flood prevention measures at the level of a catchment area.
- Bullet point 3 '*Adapting regional economies to the effects of climate change; for example by addressing environmental risks in a way which will reduce CO_2 emissions, such as reducing the vulnerability of electricity distribution networks to extreme weather*': Reducing the vulnerability of electricity distribution networks to extreme weather can be seen as an adaptation measure. The link to reduce GHG-emissions and by this contribute to mitigation is not obvious. Adapting regional economies to the effects of climate change by consideration of mitigation could be seen in a territorial perspective that adaptation and mitigation measures are elements of the same (regional) strategy but not definitely elements of the same individual project.

Potential indirect effects:

Realised improved air quality has positive effects on human health.

Reduction of GHG-emissions, improvement of air quality and improved resource efficiency can have positive effects on the environmental issues landscape, flora-fauna-biodiversity, water, soil and following this on human health.

[93] NWE-Programme; p. 33

Potential negative effects could be caused by supporting energy generation or distribution under ToA4 or ToA5:

- Wind energy plants can negatively affect birds, bats and other terrestrial and marine mammals and also "pollute" landscape.[94]
- Biomass plants could cause the further promotion of monoculture of biomass with negative impacts on natural goods as landscape, water, soil, biodiversity in Europe but also in other regions of the World due to possible imports of biomass. Particularly by the transition of grassland into production land for biomass the biodiversity is reduced; the farmland bird index forms a qualified indicator in this respect (see chapter 4; p. 23)[95]. The so-called second generation of biomass (straw, sludge, and agricultural waste) has to be put on the agenda regarding the further promotion of biomass plants.
- The construction of hydropower plants could cause negative impacts on water flows and aquatic habitats because of constructions; also fish population might be affected negatively.
- The construction of extended solar power plants on 'green fields' could generate negative impacts on landscape.
- Distribution networks could show negative effects on landscape and soil (construction work).

Increasingly, conflicts between climate protection aims and protection of natural assets and biodiversity aims can be stated in the last years in Europe. Support of energy generation by renewable sources has to take those conflicts into account and find an acceptable balance between the possible conflicting protection objectives.

INVESTMENT PRIORITY IP 4F: PROMOTING RESEARCH, INNOVATION AND ADOPTION OF LOW CARBON TECHNOLOGIES.

Specific Objective 3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services.

Table 8: Summary of potential effects - Specific Objective 3

Type of Action	Environmental issues								Intervention field
	Population Human Health	Landscape	Flora, Fauna, Biodiversity	Water	Soil	Air	Global Climate	Cultural Heritage	Resource efficiency
ToA6: Implementing low carbon technologies and other solutions through demonstrations and rollout of existing low carbon products, technologies, or solutions.	**0**	**(-)**	**(-)**	**(-)**	**0**	**+**	**+**	**0**	**+**

[94] See also European Commission (2011): Wind energy developments and Natura 2000. Guidance Document

[95] UNEP World Conservation Monitoring Center Website 25.11.2013
Another appropriate impact indicator in this respect is described in EEA (2013): The European grassland butterfly indicator: 1990-2011

Specific Objective 3 aims on the increase of the proportion of renewable energies in the production and consumption mix in the NWE area. The market opportunities presented by Low Carbon and Environmental Goods and Services (LCEGS) should be better realised.

Potential direct effects:

The demonstration and roll-out of existing low carbon products, technologies and solutions show positive effects on global climate, air quality and resource efficiency throughout.

Potential negative effects could be caused by supporting energy generation or distribution (see explanation under Specific Objective 2, p. 52). Due to the fact that no details of finally implemented projects are known reliable statements are not possible (therefore the minus marks in the table are put in parentheses).

It is a positive move of the NWE-Programme to explicitly recognise that bio-fuel production could have negative effects on landscape, biodiversity, soil and water resources and that the example is stated to "finding ways for bio-fuel production to not negatively impact on agricultural and water resources"[96].

Potential indirect effects:

Realised improved air quality has positive effects on human health.

Reduction of GHG-emissions, improvement of air quality and improved resource efficiency can have positive effects on the environmental issues landscape, flora-fauna-biodiversity, water, soil and following this on human health.

The cultivation of biomass because of the promotion of biogas technologies could have - beside the above mentioned environmental issues - negative effects on soil as well.

INVESTMENT PRIORITY IP 7C: DEVELOPING ENVIRONMENTAL FRIENDLY AND LOW CARBON TRANSPORT SYSTEMS INCLUDING RIVER AND SEA TRANSPORT, PORTS AND MULTIMODAL LINKS […].

Specific Objective 4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems

Table 9: Summary of potential effects - Specific Objective 4

Type of Action	Environmental issues								Intervention field
	Population Human Health	Landscape	Flora, Fauna, Biodiversity	Water	Soil	Air	Global Climate	Cultural Heritage	Resource efficiency
ToA7: Implementing transnational solutions for low carbon transport systems to reduce GHG emissions.	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**
ToA8: Implementing solutions for optimised traffic management to enhance capacity and to show tangible transfer to lower-carbon forms of transport, in order to reduce GHG emissions.	**0**	**0**	**0**	**0**	**0**	**+**	**+**	**0**	**+**

[96] NWE-Programme; p. 37

The transport sector is one of the main sources of GHG-emissions. In the NWE area transport is still growing using more and more energy and increasing pollution. Specific Objective 4 aims to promote solutions for low carbon transport systems as well as for more efficient traffic management. Construction of physical transport infrastructure is not funded by the NWE-Programme.

Potential direct effects:

The implementation of transnational solutions for low carbon transport systems (ToA7) and solutions for optimised traffic management to enhance capacity and to show tangible transfer to lower-carbon forms of transport (ToA8) shows positive effects on global climate, air quality and resource efficiency throughout.

Direct negative effects cannot be expected.

Potential indirect effects:

Realised improved air quality has positive effects on human health.

By the reduction of GHG-emissions, improvement of air quality and improved resource efficiency an impact-chain can be initiated generating positive effects on the environmental issues landscape, flora-fauna-biodiversity, water, soil and following this on human health.

As an element of ToA7, also the use of alternative fuels can be subject of supported projects. In case of the production of bio-fuel, negative effects on landscape, biodiversity, soil and water resources can be generated. Possible negative effects can be mitigated or even avoided if the provision of the NWE-Programme ("finding ways for bio-fuel production to not negatively impact on agricultural and water resource"; see p. 53) will be applied strictly.

5.3.3 PRIORITY 3: RESOURCE AND MATERIALS EFFICIENCY

Priority 3 responds to the growing need to foster decoupling economic growth from consumption of resources. The aim is to achieve better results in resource efficiency and to strengthen the transition to a circular economy. For Priority 3, a share of 25.5 % of the available EFRE-funds is earmarked (95.0 Mio. €).

INVESTMENT PRIORITY 6F: PROMOTING INNOVATIVE TECHNOLOGIES TO IMPROVE ENVIRONMENTAL PROTECTION AND RESOURCE EFFICIENCY IN THE WASTE SECTOR, WATER SECTOR, SOIL PROTECTION OR TO REDUCE AIR POLLUTION.

Specific Objective 5: To optimise (re)use of material and natural resources in NWE through international cooperation

Table 10: Summary of potential effects - Specific Objective 5

Type of Action	Environmental issues								Intervention field
	Population Human Health	Landscape	Flora, Fauna, Biodiversity	Water	Soil	Air	Global Climate	Cultural Heritage	Resource efficiency
ToA9: Implementing new technologies, services, products and processes to improve resource efficiency.	**0**	**0**	**+**	**+**	**0**	**(+)**	**(+)**	**0**	**+**

By the projects funded under this Specific Objective 5, the development and uptake of technologies, services, products and processes to better (re)use material and natural resources is supported. As the result of Specific Objective 5 more organisations benefit from international cooperation in this field of eco-innovations.

Potential direct effects:

The increase of resource efficiency by optimizing (re)use of materials and natural resources will have positive effects on flora-fauna-biodiversity and water.

Depending on the type of projects being implemented also positive effects could be generated for global climate and air quality. But due to the fact that no details of finally implemented projects are known reliable statements are not possible (therefore the plus marks in the table are put in parentheses).

Potential indirect effects:

A reduction of landfill needs as a consequence of improved recycling and use of waste (secondary raw materials) could generate positive effects on landscape, soil and groundwater.

Positive effects on the environmental issues water, biodiversity and, possibly, on landscape and soil will generate positive effects on human health.

5.3.4 CHARACTERISTICS OF POTENTIAL EFFECTS

According the EU SEA-Directive (annex II) the effects shall be assessed concerning their characteristics as the probability, duration, frequency and reversibility. A serious assessment of these characteristics is not possible because the NWE-programme provides only general proposals on individual projects and concrete measures. Spatial conditions, volume and technical particularities of the implementation are not known. The actual interventions cannot be predicted.

The approach of the NWE-Programme bases on transnational cooperation between the Member States and possibly neighbouring states and/or regions. Transboundary nature of the potential effects is difficult to expect; most of the effects - beside global climate - will appear spatially linked to the ultimate intervention. “Magnitude and spatial extent of the effects (geographical area and size of the population likely to be affected)”[97] depend on the nature of the concrete interventions. Improvement of water quality can in principle influence the water quality downstream; but the volume of the NWE-Programme and the extent of potential effects are limited. The reduction of GHG emissions contributes of course per definition to a wider area. The reduction of resource consumption might also have global effects outside the programme’s area if the resources are imported. Against the knowledge background of actual implementation no reasonable conclusions can be drawn.

General statements can be given to potential reversibility of effects. The effects generated by constructions are usually irreversible because natural structures can be damaged or destroyed definitely. The effects generated by eco-innovations (e.g. mitigation of GHG-emission or resource consumption) usually are reversible. If the application and the use of innovation products, technologies, processes will be halted the effects will be reduced or even halted as well.

Facing this unpredictability, the more important is to realise further environmental assessments closer to concrete measures. The opportunity respectively requirement and the appropriate procedure for **‘tiering’** again depend on nature, extent and spatial context of the planned measure. The following procedures can be applied according to the specific conditions and national legislation:

[97] EU SEA-Directive; Annex II

- Environmental impact assessment (EIA)
- Impact assessment under nature protection law
- Flora-Fauna-Habitat (FFH) impact assessment
- Approval process (e.g. for pollution or immission control of technologies or industrial sites)
- Strategic environmental assessment (SEA) for plans and programmes

The following table provides an overview on general reversibility of effects and principle possibilities for assessments of potential environmental effects on lower strategic or operational level:

Table 11: Overview on general reversibility and principle possibilities for tiering of potential effects

Intervention system	Reversibility	Possibility for tiering
SO1: To enhance innovation performance in NWE through international cooperation		
ToA1: Building the capacity of regions and territories to improve their innovation performance**.**	---	---
ToA2: Improving the competitiveness of enterprises, through cooperative actions that take forward the development of specific products, services or processes to a stage of market-readiness.	yes	EIA Approval process
ToA3: Delivering societal benefits through innovation.	yes	---
SO2: To reduce GHG emissions in NWE through international cooperation on the implementation of low carbon, energy or climate protection strategies		
ToA4: Promoting carbon reduction in cities and regions through the implementation of emerging or existing low carbon, energy or climate protection strategies	yes	EIA Approval process SEA
ToA5: Implementing combined mitigation and adaptation solutions, to demonstrate feasibility and refine design and development plans for the future.	yes (technologies) no (construction measures)	EIA Impact assessment under nature protection law FFH impact assessment Approval process SEA
SO3: To reduce GHG emissions in NWE through international cooperation on the uptake of low carbon technologies, products, processes and services		
ToA6: Implementing low carbon technologies and other solutions through demonstrations and rollout of existing low carbon products, technologies, or solutions.	yes	EIA Approval process
SO4: To reduce GHG emissions in NWE through international cooperation on transnational low carbon solutions in transport systems		
ToA7: Implementing transnational solutions for low carbon transport systems to reduce GHG emissions**.**	yes	EIA Approval process
ToA8: Implementing solutions for optimised traffic management to enhance capacity and to show tangible transfer to lower-carbon forms of transport, in order to reduce GHG emissions.	yes	---
SO5: To optimise (re)use of material and natural resources in NWE through international cooperation		
ToA9: Implementing new technologies, services, products and processes to improve resource efficiency.		EIA Approval process

5.4 EFFECTS CAUSED BY THE NWE-PROGRAMME ON THE INDIVIDUAL ENVIRONMENTAL ISSUES

POPULATION / HUMAN HEALTH

Assessment questions	Findings
Does the NWE-Programme positively / negatively contribute to human health?	Projects of two ToA's can contribute directly positive to this issue: ToA3 by delivering societal benefits through innovation and ToA5 by implementing adaptation measures (combined with mitigation). Indirectly, positive contributions may be generated by all ToA's which contribute to mitigation of GHG-emissions and improvement of resource efficiency. Impact-chains with positive effects on for example air and water result in positive effects on the population and human health finally. Measures in the frame of ToA7 aim to implement solutions for low carbon transport systems; optimised traffic management (ToA8) could result in reduced traffic. Therefore, by measures of both ToA's indirect positive contributions can be realised to reduce emissions and noise.
Does the NWE-Programme positively / negatively contribute to reduce concentrations of air pollutants in urban areas?	All measures under Priority 2 ('Low carbon') generate direct positive contributions to reduction of air pollutants. Efforts to reduce GHG-emission will cause also in the mitigation of other air pollutants as well. Optimised traffic management (ToA8) could result in reduced traffic which causes less air pollution. For ToA4 and ToA5 the potential of energy-generating buildings especially in urban areas is particularly mentioned as being of importance.[98]

LANDSCAPE

Assessment questions	Findings
Does the NWE-Programme positively / negatively contribute to land take?	In the frame of several ToA's (5, 6) construction can be supported (for energy generation, adaptation measures); land might be sealed and used for buildings or physical infrastructure. This may cause direct negative contributions. Indirect positive contribution could be achieved by improved recycling and reuse of waste which reduce the need for land fills (ToA9). Indirect negative contribution might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also the construction of regenerative energy power plants, for example solar power plants, wind farms, cultivation of crops for biomass production.

FLORA, FAUNA, BIODIVERSITY

Assessment questions	Findings
Does the NWE-Programme positively / negatively contribute to halt the loss of biodiver-	The contribution of the NWE-Programme to halt the loss of biodiversity is quite different. Potential direct positive contribution can be generated in case of improved resource efficiency (ToA9). Reduced consumption of re-

[98] NWE-Programme; p. 33

sity and the degradation of ecosystem services?	sources and optimising (re)use of materials, i.e. less waste disposal, could help at least to slow down the loss of biodiversity and the degradation of ecosystems. Direct negative contribution can be caused by the support of constructions for energy generation (ToA5 and ToA6) and for adaptation measures (ToA6). Indirect positive contributions may be expected in case of mitigation of GHG-emission and improvement of air quality (ToA4, ToA5, ToA6, ToA7, ToA8) which could generate positive effects on biodiversity. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on biodiversity. Indirect negative contribution might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also the construction of regenerative energy power plants and adaptation structures, for example solar power plants, wind farms, hydropower plants, cultivation of crops for biomass production. It is particularly problematic if biomass production causes changes in agricultural methods, intensification and specialisation. In case of import of biomass for the production of alternative fuels or the import of bio-ethanol from regions outside the EU indirect negative impacts on the environment in these regions are likely (ToA7).
Does the NWE-Programme positively / negatively contribute to the progress with the national designation of protected areas as a tool for biodiversity conservation?	The NWE-Programme does not contribute to the designation of protected areas.
Does the NWE-Programme positively / negatively contribute to reach the targets for reducing the exposure of ecosystems to acidification, eutrophication and ozone?	Direct contributions will not be generated by the NWE-Programme. Indirect positive contributions may be expected in case of mitigation of GHG-emission and improvement of air quality (ToA4, ToA5, ToA6, ToA7, ToA8). Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which in turn may have positive effects on biodiversity by reducing the exposure of ecosystems to acidification, eutrophication and ozone.
Does the NWE-Programme positively / negatively contribute to land take?	In the frame of several ToA's (5, 6) constructions can be supported (for energy generation, adaptation measures); land might be sealed and used for buildings or physical infrastructure. This may cause direct negative effects. Indirect positive contributions could be achieved by improved recycling and reuse of waste which reduce the need for land fills (ToA9). Indirect negative contributions might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also the construction of regenerative energy power plants.

WATER

Assessment questions	Findings
Does the NWE-Programme positively / negatively contribute to decoupling emission of nutrients and heavy metals to water by manufacturing industries from economic growth?	Measures in the frame of ToA9 aim to improve resource efficiency. Direct positive contributions can be realised to decouple emissions to water from economic growth. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on decoupling emission of nutrients and heavy metals to water by manufacturing industries from economic growth.
Does the NWE-Programme positively / negatively contribute to decoupling emission of nutrients and heavy metals to water by the domestic sector from urban and population growth?	The NWE-Programme does not contribute to decoupling emission of nutrients and heavy metals to water by the domestic sector from urban and population growth. Highly indirectly, measures in the frame of ToA2 could contribute positively.
Does the NWE-Programme positively / negatively contribute to sustainable water use?	Measures in the frame of ToA9 aim to improve resource efficiency. Positive direct contributions can be realised to sustainable water use. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on sustainable water use.
Does the NWE-Programme positively / negatively contribute to the target of the EU Water Framework Directive “All surface and groundwater bodies in river basins achieve 'good status' by 2015”?	Measures in the frame of ToA9 aim to improve resource efficiency. Positive direct contributions can be realised to achieve good status of surface and groundwater bodies in river basins. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on achieve good status of surface and groundwater bodies in river basins. Indirect negative contributions might be caused if the implementation of low carbon, energy or climate protection strategies (ToA4) promotes also the construction of hydro power plants.

SOIL

Assessment questions	Findings
Does the NWE-Programme positively / negatively contribute to land take?	In the frame of several ToA5 and ToA6 constructions can be supported (for energy generation, adaptation measures); soil might be sealed and will be destroyed and will get lost of all of its functions. Indirect positive contributions could be achieved by improved recycling and reuse of waste which reduce the need for land fills (ToA9). Indirect negative contributions might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also the construction of regen-

	erative energy power plants.
Does the NWE-Programme positively / negatively contribute to reduce soil erosion?	Adaptation measures (ToA5) might contribute to mitigation of soil erosion.
Does the NWE-Programme positively / negatively contribute to reach the targets for reducing the exposure of ecosystems to acidification, eutrophication and ozone?	Direct contributions will not be generated by the NWE-Programme. Indirect positive contributions may be expected in case of mitigation of GHG-emission and improvement of air quality (ToA4, ToA5, ToA6, ToA7, ToA8). Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on soils by reducing the exposure of ecosystems to acidification, eutrophication and ozone.

AIR

Assessment questions	**Findings**
Does the NWE-Programme positively / negatively contribute to reduce concentrations of air pollutants in urban areas?	All measures under Priority 2 ('Low carbon') generate direct positive contributions to air quality. Efforts to reduce GHG-emission will cause also in the mitigation of other air pollutants as well. Optimised traffic management (ToA8) could result in reduced traffic which stands for less air pollution. For ToA4 and ToA5 the potential of energy-generating buildings especially in urban areas is particularly mentioned as being of importance. Depending on the concrete projects, measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which in turn may have positive effects on air quality.
Does the NWE-Programme positively / negatively contribute to reduce emissions of acidifying substances, particulates and ozone precursors from transport?	Measures in the frame of ToA7 aim to implement solutions for low carbon transport systems. By those measures also direct positive contributions can be realised to reduce emissions of acidifying substances, particulates and ozone precursors. Optimised traffic management (ToA8) could result in reduced traffic which causes less air pollution, and show direct positive contributions as well. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on air by reducing emissions of acidifying substances, particulates and ozone precursors from transport.
Does the NWE-Programme positively / negatively contribute to reduce the exposure of ecosystems to acidification, eutrophication and ozone?	Direct contributions will not be generated by the NWE-Programme. Indirect positive contributions may be expected in case of mitigation of GHG-emission and improvement of air quality (ToA4, ToA5, ToA6, ToA7, ToA8). Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on air by reducing the exposure of ecosystems to acidification, eutrophication and ozone.

GLOBALE CLIMATE

Assessment questions	Comments
Does the NWE-Programme contribute to reduce GHG-emission?	All ToA's of Priority 2 (ToA4, ToA5, ToA6, ToA7, ToA8) contribute directly positive to the reduction of GHG-emissions. Also measures in the frame of ToA9 (improvement of resource efficiency) might contribute direct positive-ly depending on concrete projects. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to resource efficiency which may have positive effects on global climate by reducing GHG-emissions.
Does the NWE-Programme positively / negatively contrib-ute to raise the share of renew-able energy in final energy consumption?	Four out of the five ToA's of Priority 2 (ToA4, ToA5, ToA7 and partly ToA6) contribute directly positively to raise the share of renewable energy in final energy consumption. Depending on the concrete projects, measures of ToA2 could realise direct positive contributions by the development of innovative products, services or processes contributing to raise the share of renewable energy in final energy consumption. Indirect positive contribution might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also raising the share of renewable energy in final energy consumption.
Does the NWE-Programme positively / negatively contrib-ute to progress on energy effi-ciency?	All ToA's of Priority 2 (ToA4, ToA5, ToA6, ToA7, ToA8) contribute directly positive to progress on energy efficiency. Depending on the concrete pro-jects, also measures of ToA2 could realise direct positive contributions by the development of innovative products, services or processes contributing to progress on energy efficiency. Indirect positive contribution might appear if the implementation of low carbon, energy or climate protection strategies (ToA4) includes also the promotion of energy efficiency.
Does the NWE-Programme positively / negatively contrib-ute to reduce emissions of greenhouse gases by transport?	Measures in the frame of ToA7 aim to implement solutions for low carbon transport systems. By those measures direct positive contributions can be realised to reduce emissions of greenhouse gases by transport. Optimised traffic management (ToA8) will result in reduced traffic which causes less greenhouse gases by transport, and show direct positive contributions as well. Depending on the concrete projects, also measures of ToA2 could realise direct positive contributions by the development of innovative products, services or processes contributing to reduce emissions of green-house gases by transport.
Does the NWE-Programme positively / negatively contrib-ute to increase the use of cleaner and alternative fuels?	Measures in the frame of ToA7 contribute directly positive to increase the use of cleaner and alternative fuels. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to increase the use of cleaner and alter-native fuels.
Does the NWE-Programme positively / negatively contrib-ute to Modal split?	Measures in the frame of ToA8 (implementation of optimised traffic man-agement) contribute directly positive to Modal split.
Does the NWE-Programme positively / negatively contrib-	The implementation of adaptation measures (combined with mitigation) is

ute to adaptation to climate change concerning human health, biodiversity, soil erosion, floods, droughts, damages from weather?	the purpose of ToA5. All stated topics might be addressed by the measures.

CULTURAL HERITAGE

Assessment questions	**Comments**
Does the NWE-Programme positively / negatively contribute positive or negative to "Material Assets, Cultural Heritage including Architectural and Archaeological Heritage"?	Direct positive contributions to "Material Assets, Cultural Heritage including Architectural and Archaeological Heritage" could be made by the implementation of adaptation measures (ToA5), depending on the particular aims of the applied projects.

IMPORTANT FIELD OF INTERVENTION

RESSOURCE EFFICIENCY

Assessment questions	**Findings**
Does the NWE-Programme positively / negatively contribute to increase recycling rates?	Measures in the frame of ToA9 (improvement of resource efficiency) could contribute directly positive to increase recycling rates, depending on the particular aims of the applied projects. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to increase recycling rates.
Does the NWE-Programme positively / negatively contribute to circular economy?	Measures in the frame of ToA9 (improvement of resource efficiency) could contribute directly positive to circular economy, depending on the particular aims of the applied projects. Depending on the concrete projects, also measures of ToA2 could realise indirect positive contributions by the development of innovative products, services or processes contributing to circular economy.
Does the NWE-Programme positively / negatively contribute to decoupling resource consumption from economic growth?	Measures in the frame of ToA9 (improvement of resource efficiency) could contribute directly positive to decoupling resource consumption from economic growth, depending on the particular aims of the applied projects. Depending on the concrete projects, also measures of ToA2 could realise direct positive contributions by the development of innovative products, services or processes contributing to decoupling resource consumption from economic growth. All other ToA's could contribute indirectly positive, depending on the particular aims of the applied projects.

Particular importance receives ToA1 ('building capacities of regions and territories to improve their innovation performance') of Priority 1. By establishing mechanisms on collaboration, networking,

know-how sharing and infrastructure sharing for research and innovation, this ToA might generate indirect positive contributions to almost all of the topics stated above as assessment questions.

As mentioned in chapter 5.2 (p. 42), the potential of Priority 1, especially of ToA1 but also ToA2 could be challenged more actively in order to increase the positive contributions of the NWE-Programme to crucial environmental targets of the European Union.

5.5 CUMULATIVE UND SYNERGISTIC EFFECTS

The high level of abstraction of this type of programme hampers a detailed, quantitative and spatially differentiated assessment of the potential effects of the NWE-Programme. The assessment thus has been based on the verification how far the strategic approach and the individual specific objectives contribute to EU environmental objectives, to general EU environmental policy and to the environmental challenges of the NWE area. The assessment of possible cumulative and synergistic effects follows this approach.

The assessment of the cumulative and synergistic effects can be done in abstract manner only. Important criteria of a detailed assessment are not known as:

- The particular spatial conditions and
- the extent, duration, and frequency and as well the range of the effects.

Cumulative effects, on the one hand, result of effects on the same environmental issue by several measures. For the entire NWE area - without any spatial differentiation - two fields of possible cumulative effects can be seen caused by the Programme's intervention:

- Three Specific Objectives with together five ToA's directly aim to reduce GHG-emissions and promoting of low carbon economy. Additionally, this topic can be subject of innovation activities in the scope of Specific Objective 1. Although the actual interventions will contribute to limited extent each the cumulative effect of all interventions on climate protection might be significant.
- Counting the expected direct interventions in the field of resource efficiency together with possible relevant development of new technologies under Specific Objective 1, the added effects can generate a considerable cumulative effect.

A more focussed orientation of projects under Specific Objective 1 on eco-innovations could strengthen the cumulative effect of the contributions regarding climate protection and resource efficiency.

Significant negative cumulative effects caused by the Programme's implementation can not be presumed.

Cumulative effects, on the other hand, can also appear affecting particular territories caused by significant effects on different environmental issues more or less simultaneously. The overall carrying capacity of the affected territories' ecosystems might be overstressed. Due to lack of details regarding territorial aspects and contents of the projects possible cumulative effects on particular territories cannot be assessed.

It has to be taken into account that similar effects as the Programme's ones will be generated by other cross-border, national, regional and local initiatives in the NWE area in the period 2014+. The final cumulative impacts on particular environmental issues depend on the overall effects in the area. This holds for cumulative effects on particular environmental issues and on particular territories as well.

By promotion of low-carbon economy as well as resource efficiency the NWE-Programme tackles two areas which could generate a number of potential indirect **synergistic effects**. The mitigation of GHG-emissions and the reduction of the consumption of resources for (industrial) production and energy generation support also the protection of other environmental media as air, water, soil, biodiversity and landscape. Human health and human well-being is positively influenced by less polluted air, particularly in urban areas, but also by better quality of waters, landscape and soil. It must be highlighted again, that better use of projects under Specific Objective 1 could increase the potential positive synergistic effects.

5.6 MITIGATION OF POTENTIAL NEGATIVE ENVIRONMENTAL EFFECTS

Direct negative effects on environmental issues - as far as it can be verified on base of the described types of actions and available information - can be seen connected to two areas of interventions:

- Potential negative effects have to be considered in case of promotion of wind power plants, hydro power plants, biomass power plants, large solar power plants on green fields or distribution networks (see explanations on p. 52).
- Constructions (for example linked to adaptation measures) could generate negative direct and indirect effects on landscape, biodiversity, water, soil and air.

As highlighted several times above, the decisive element for generating effects are the projects funded by the NWE-Programme, not the programme as such. Options for mitigating potential negative effects are thus linked to the application, selection and execution of those projects. Selection and monitoring procedures have to include arrangements to emphasise on environmental protection and sustainable development.

For mitigating the negative effects of those possible interventions only general procedural recommendations can be made:

- The potential for tiering, i.e. assessing effects on the level of projects being funded by the NWE-Programme, must be used strictly. The existing formal procedures for assessing effects of plans, programmes or projects (see chapter 5.3.4) have to be applied as part of the application and approval process.
- Beside the application of formal procedures, environmental competences must be integrated with the approval of those applications showing the risk of potential negative effects on environmental issues. Authorities responsible for environmental and natural protection should be contacted in order to check the application and to provide recommendations for further handling of the application (rejection, amendment of critical approaches and solutions, definition of implementation conditions).
- Prior to the approval phase, an important instrument for the mitigation of potential negative effects (and strengthening potential positive effects too of course) is building capacities to provide advise to the applicants. An early consideration of environmental protection aspects helps to avoid potential negative effects in the planning phase already and opens options to design the project in a way that positive environmental effects could be generate.

5.7 OVERALL ENVIRONMENTAL EFFECT OF THE NWE-PROGRAMME

The ambition of the NWE-Programme reads "To be a key economic player in the world and create an attractive place to work and live, with high levels of innovation, sustainability and cohesion". This ambition should be achieved by a 3-track approach: (1) innovation, (2) low carbon, and (3) resource and material efficiency. This approach reflects the orientation of the NWE-Programme towards environmental, climate and resource protection as key elements of sustainable development.

However, the (financial) extent of the Programme and the proposed Types of Actions do not allow, considering the spatial coverage of the programme, widespread significant direct effects on the environment in the short run. Instead, ERDF-programmes like the NWE-Programme have an important function for strengthening the framework conditions for the transition to a resource efficient, low carbon economy ('green economy') and for the establishment of a circular economy. The NWE-Programme serves this function by its strategic approach and by the proposed Types of Actions as well.

At the **strategic level** two elements are decisive to support positive contributions of the NWE-Programme to the EU environmental objectives:

- Two out of the three priorities (Priority 2: 'low carbon' and Priority 3: 'Resource and material efficiency') aim directly at the improvement of development, testing and uptake of new technologies in the fields of reduction of GHG-emission and resource efficiency. The term 'new technologies' includes products, services, and processes but also management systems, governance arrangements and networks. A comprehensive set of necessary conditions for further improvement of climate protection and resource efficiency can therefore directly be addressed. Under Priority 1 ('Innovation') capacities will be developed to improve the innovation performance in regions and of enterprises. These capacities could serve as important intermediate structures and 'transmission belts' for promoting the transition towards green economy.
- The criterion "project proposals are only eligible if the project objectives and activities do not conflict with the principles of sustainable development, as defined by the programme"[99] asks for an early consideration of the principles of sustainable development in the preparation of projects, even though the criterion is formulated quite soft.

At the **level of type of actions**, the actual effects and their characteristics depend on the design, execution conditions and results of the projects supported by the NWE-Programme which in turn depend on the effective application of selection criteria related to environmental, climate and resource protection.

According to the orientation of the Priorities 2 and 3 with the Specific Objectives 2 - 5, all supported projects need to contribute to the mitigation of GHG-emissions or to resource efficiency. Additionally under Specific Objective 2 (ToA5) projects will contribute to adaptation to risks of climate change. For the supported projects under Priority 1 respectively Specific Objective 1 the link to topics related to environmental, climate or resource protection is not required in the NWE-Programme consistently but the consideration of principles of sustainable development definitely.

The positive effects could be even more strengthened if the outcomes of the individual projects under the respective specific objectives would be exchanged and mutually acknowledged and possibly utilised by the beneficiaries. Due to the fact that beside stand-alone solutions also systemic arrangements will be supported, added value of outcomes for other actors might be given. It should be ac-

[99] NWE-Programme; p. 81

counted, however, that the 'rebound effect' could lead to an increased consumption because of the existence of efficient, resource and by this cost saving technologies[100].

Summarising it can be stated that the NWE-Programme shows a strong potential to generate positive effects on the environment. This holds for effects delivered by the projects as well as for developing framework conditions to strengthen the transition towards a green economy and to respect sustainable development.

A possible principle **alternative** was presented for the funding of the different Priorities and Specific Objectives (see chapter 5.1, p. 39f). In the NWE-Programme, 35.12 % of the funds are assigned for priority 1, 39.36 % for Priority 2 and 25.52 % for Priority 3. As described in the chapters 5.2 and 5.3, Priorities 2 and 3 and their Types of Actions have the biggest potential to generate direct and indirect positive effects. At a first glance it might be stated that a larger share for these Priorities could enlarge the number of projects and/or the uptake and implementation of innovative products, technologies, processes contributing to mitigation of GHG-emission, to adaptation to climate change impacts and to improvement of resource efficiency. However, two critical aspects must be recognised:

1. The Priorities 2 and 3 focus on demonstration, testing, uptake and implementation of innovative products, technologies, processes and solutions on transnational level. An immediate widespread dissemination of these products, technologies, processes and solutions across the NWE area is not possible with the available funds for the NWE-Programme. Even an internal shifting of finances and spending more funds for Priorities 2 and 3 would not allow a significantly change of this approach.
2. As described in chapter 5.2, Priority 1 shows an implicit potential. The building of (regional) innovation capacities and the improvement of competitiveness of enterprises to development innovative products, services or processes are crucial to ensure eco-innovations in the long run. A reduction of funds would reduce the long term perspective to be capable to contribute to the solution of the environmental challenges.

It can be concluded that shifting of the funds in favour of Priorities 2 and 3 would generate limited additional positive effects concerning climate and resource protection, but at the same time would weaken the enhancement of innovation performance capabilities in the NWE area.

The risk of significant negative effects and conflicting contributions to sustainable development is limited, nevertheless existent. Potential negative effects have to be considered connected to the promotion of energy generation out of renewable energy sources, e.g. wind power plants, hydro power plants, biomass power plants, large solar power plants on green fields or distribution networks, but also connected to construction work linked to adaptation measures.

In the NWE-programme, due to its nature, only Types of Actions and examples can be presented. As mentioned above, the actual effects and their characteristics depend on the design and implementation conditions of the supported individual projects. Decisive tools to exploit the potential of the programme are:

- A thorough assessment of the application according to their relevance for environmental, climate or resource protection,
- the selection of the projects ensuring best possible contribution to environmental, climate or resource protection and to contribute to the solution of the of the environmental challenges in the NWE area and
- an effective monitoring of the implementation of the supported projects.

[100] European Commission (2011): Roadmap to a Resource efficient Europe; p. 5

6 RECOMMENDATIONS

Although the NWE-Programme contributes to the set EU environmental objectives recommendations can be given in order to exploit the potential to an optimum. The recommendations aim mainly on arrangements concerning the implementation of the programme.

1. In chapter 8.1 it is stated that "innovation in the NWE programme strategy also includes eco-innovation"[101]. However, the consideration of eco-innovations as a privilege for the selection of projects should be added for Priority 1, respectively Specific Objective 1. Projects under priority 1 should also, as far as possible, respond on the environmental challenges in the NWE area and contribute to the transition towards green economy.

   The compliance of Priority 1 with important EU environmental priorities could be strengthened; the positive contribution to these priorities would not "depend on the actual projects".[102]

2. Additionally to recommendation 1, selection criteria should be included in chapter 8.1 clearly asking for the contribution of the proposed projects on the environmental challenges in the NWE are as there are resource and materials efficiency, GHG-emission and vulnerability to climate change events.

   The current formulation "do not conflict with the principles of sustainable development" as stated in chapter 8.1 opens a wide room for interpretations and different perceptions.

   It should also be stated explicitly that EU and national environmental legislations must be applied and EU and national environmental standards must be met by all supported projects.

3. In the selection process for projects aiming on the promotion of energy generation by renewables and distribution networks (ToA4 and ToA5 of SO2, ToA6 of SO3), the possible effects on biodiversity, landscape, soil and water have to be taken into account seriously. The use of second generation biomass (e.g. agricultural waste, organic waste, sludge) should be promoted.

4. By designing appropriate implementation guidance or application manuals, the consideration and incorporation of criteria concerning environmental, climate and resource protection in project applications must be ensured. The criteria must not be too strict but should guarantee a sufficient environmental quality standard of the projects.

5. Each project application should be complemented by a concise description of the environment-related aspects to be addressed and of expected environmental effects. Depending whether the project has a clear territorial focus, a short description of the existing environmental conditions could be added.

6. At the level of the Member States, arrangements should be established to enable applicants to receive information and advice for the consideration of environmental aspects in the design and execution of projects.

7. Relevant national or regional authorities responsible for environmental and nature protection should be involved in the assessment and selection of project applications.

[101] NWE-Programme; p. 81
[102] see Table 5 on p. 46

8. To exploit the potential to an optimum, the Joint Secretariat should support the exchange of information and knowledge between beneficiaries on the projects' outputs and lessons learned of the different Types of Actions. This should be done for projects within one priority or across the different priorities. The functions of the Joint Secretariat could be complemented with: "Promotion of information exchange and cooperation between the beneficiaries of the different supported projects." It could be linked to the listed function "to assist and organise activities to support project generation and development" (function h) [103].

7 NOTES ON PROBLEMS IN THE COMPILATION OF REQUIRED DATA AND INFORMATION

In the course of the assessment, no problems occurred to find and use accurate data and information.

8 PROPOSED MONITORING MEASURES

The SEA Directive requires that "Member States shall monitor the significant environmental effects of the implementation of the plans and programmes, in order, inter alia, to identify at an early stage unforeseen adverse effects, and to be able to undertake appropriate remedial action."[104]

The lack of details of supported projects does not allow the identification of measures to monitor concrete possible effects on the environment. The monitoring must aim to ensure that no adverse effects to the EU environmental objectives and the EU environmental policy are supported by the Programme, even if the effects will only occur in the long run.

Monitoring measures should include:

1. Environmental criteria have to be safeguarded by including them in the project implementation guidance or application manuals of the NWE-Programme.

2. The consideration of potential environmental effects has to be proven in the application for a project. Projects which potentially show effects not compliant with EU environmental objectives and with the principles of sustainable development as described in the application manual can be screened out or amendments can be demanded by the Monitoring Committee. The selection process must be used to avoid contradictions to the effective EU environmental objectives and the general EU environmental policy.

3. In the progress and final reports of the projects the initiated indirect effects should be described and assessed towards the expected effects stated in the applications.

4. As part of the function "to monitor progress made by projects through collecting and checking project monitoring reports, monitoring outputs, results and financial implementation"[105] of the

[103] NWE-Programme; p. 64
[104] Directive 2001/42/EC, Art. 10
[105] NWE-Programme; p. 64

Joint Secretariat, the expected effects and contributions and the actually initiated ones as stated in the projects progress and final reports have to be compiled and assessed on regular base in order to avoid incompatibility of the overall implementation orientation of the NWE-Programme towards the effective EU environmental objectives and general environmental policy.

5. As part of the monitoring systems to be established and in the course of defining indicators, complementary to the result and output indicators, to ensure an effective progress and implementation monitoring[106], adequate indicators should be defined to measure the contribution of the NWE-Programme to the effective EU environmental objectives in particular and sustainable development in general. Areas of monitoring could be:
   - Energy consumption
   - (Raw-) material consumption
   - Land take for construction
   - Direct and indirect impacts on biodiversity
   - Pollution of water and air.

6. Depending on the nature of the individual projects, relevant existing national, regional and/or local environmental monitoring systems should be used (for example to measure air pollution, noise, water pollution). Relevance and mode of utilisation could be clarified by involvement of the authorities responsible for the monitoring (linked to recommendations6 and 7 - chapter 6, p. 68).

[106] NWE-Programme; p. 69

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