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STRATEGIC ENVIRONMENTAL ASSESSMENT OF THE NORTHERN PERIPHERY AND ARCTIC PROGRAMME 2014-2020



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Executive Summary

The Northern Periphery and Arctic Programme 2014-2020 aims to generate vibrant, competitive and sustainable communities by harnessing innovation, expanding the capacity for entrepreneurship, and by seizing the unique growth initiatives and opportunities of the Northern and Arctic regions in a resource-efficient way. The eligible regions are located in Finland, the Republic of Ireland, Northern Ireland, Sweden, Scotland, Greenland, Iceland, the Faeroe Islands and Norway.

The current INTERREG IV Northern Periphery Programme, which concludes in 2013, aims to strengthen the synergies between environmental protection and growth by addressing challenges to sustainable development, as identified in the Gothenburg agenda. The unspoiled natural environment is recognised as a significant asset, and it is acknowledged that the sustainable development of natural resources can contribute to the economy and stimulate innovation, as well as facilitating balanced and sustainable growth. The development of renewable energy is highlighted as of special relevance for the Northern Periphery. The Operational Programme 2007-2013 states that positive environmental impacts form a key element of the programme's implementation, and that high environmental standards and requirements will be integrated into project guidance and monitoring. The Final Evaluation Report noted that NPP regions are developing and applying highly innovative responses to combat climate change and to adapt to changing economic, climatic, marine and physical conditions.

The new Northern Periphery and Arctic Programme 2014-2020 has four thematic Priorities: Using Innovation to maintain and develop robust and competitive communities; Promoting Entrepreneurship to realise the potential of the programme area's competitive advantage; Fostering Energy-secure Communities through the promotion of renewable energy and energy efficiency; and Protecting, Promoting and Developing Cultural and Natural Heritage. The new programme aims to expand regions' horizons, building on concrete outcomes, and enabling the NPA area to be a first-class region in which to live, study, work, visit and invest.

Each country or region within the NPA programme area has a distinctive environmental profile that conditions and supports programme development, and relevant environmental themes are highlighted in the baseline data and trends. Insofar as possible, these factors have been identified in collaboration with competent authorities in the participating countries, culminating in an Environment SWOT analysis that summarises the principal environmental strengths, weaknesses, opportunities and threats to be considered within the programming process. From this methodology, four strategic environmental issues are identified.

Climate and Arctic Change is associated with a range of potential impacts, including drier summers, increased pressure on biodiversity, changes in sea temperatures, more extreme weather events, and increased coastal and inland flooding. At the same time, greater accessibility is bringing other stressors to the region, and pollution from both long-range transport and local sources threatens the health of Arctic species and ecosystems. Nevertheless, there are benefits as well as challenges from climate change impacts on the Arctic environment, as Greenland has new opportunities related to the growth of crops and vegetables, and shorter sea routes already offer savings in time and fuel.

Land-use Management relates to continuing pressures on biodiversity which result in loss or damage to natural habitats, for example from the exploitation of natural resources, energy generation, infrastructure enhancement, and agricultural and forestry practices. Clearing woodlands and overgrazing have also resulted in soil erosion and desertification, and agriculture has proved to be a key source of diffuse pollutants, with nutrient enrichment from agricultural run-off, and there are concerns about the impacts of mining (and other extractive industry) on water resources, soil, the landscape and biodiversity in general. However, there have also been positive impacts within the programme area, as nature conservation efforts have improved biodiversity in lakes, watercourses and wetlands.

With regard to Energy and Resource Efficiency, there is a clear need and considerable scope to develop renewable natural resources, promote ecological sustainability and gain social acceptability for these activities within the NPA programme area. Recent trends in emissions indicate that the participant countries have recorded significant improvements in relation to 1990 levels, but further behavioural change is required. With effective promotion of low-carbon activities in all sectors, countries that take a pro-active role in developing a sustainable green economy are more likely to be successful in the future global economy.

Lastly, with regard to Marine Pollution, source and diffuse pollution in coastal and transitional waters constitutes a key pressure, alongside marine litter and invasive species, with nutrient enrichment a principal cause of water pollution. Even within marine areas included in the Natura 2000 network, tackling marine eutrophication is regarded as a major challenge. Fish farming is the largest source of nutrient inputs to the Norwegian Sea, the Barents Sea and the North Sea. New Marine Protected Areas (MPA) and mechanisms for the protection of priority sites for marine conservation represent efforts to ensure clean, safe, productive and biologically diverse seas.

In the strategic environmental assessment, the programme's Vision and Priorities are considered for their conformity with the Europe 2020 Strategy and the proposed EU Seventh Environmental Action Programme. This analysis demonstrates a clear compatibility between the EU policies and the NPA programming document. Thereafter, each of the Objectives is assessed for impacts on the strategic environmental issues. With regard to significant positive effects, the potential environmental benefits could be long-term and cumulative in nature, for example as innovation systems promote R&D and green technology transfer, so reducing the impacts of climate change and improving resource efficiency amongst SMEs, with business support strategies supporting the transition to a resource-efficient and competitive low-carbon economy, reducing waste generation, halting the loss of biodiversity and ecosystem degradation. Other potentially significant positive impacts could include a sectoral focus for clusters in the development and transfer of marketing concepts and models that specialise in products that address environmental problems. Lastly, development of an integrated approach to protecting, promoting and developing the cultural and natural heritage could considerably enhance resource efficiency, sustainable management of natural resources and the constructive use of wastes and residues, as well as reducing impacts on marine and coastal waters.

Significant negative environmental effects would relate to unanticipated impacts, indirect effects or where projects are mismanaged or environmental conditions not fully observed. Risks to human health are anticipated as minimal, particularly since the partner countries have robust systems of environmental control and planning, and the transboundary nature of cooperation is likely to produce a better understanding and exchange of experience with regard to environmental control.

Nevertheless, expanding industries such as the tourism and experience industries may generate negative environmental impacts, damaging the natural and cultural heritage through lack of awareness on how to manage this resource, and cruise tourism contains potential risks for negative impacts, especially as increased traffic will bring associated environmental burdens that need to be estimated and prevented or appropriately managed. Achieving higher energy efficiency and greater security also could involve negative environmental impacts, depending upon the type of energy generated. There is also a risk of failing to meet sustainability principles, for example if resources are drawn only from other areas and building materials are not based on natural products from the programme area.

To mitigate negative impacts, the programme must convey a clear message that positive environmental impact is a key element of the programme's strategy, and that competitiveness should be based on high environmental standards and environmental management techniques. Innovation should be understood to include environmental excellence as a means of fulfilling the vision that the NPA programme is pursuing. Development of the tourism and experience industries within the natural and cultural heritage should incorporate the transfer and development of models and solutions containing appropriate and adequate training on best practice. Natural resources must be exploited in a sustainable manner, avoiding risks of further pollution, with greater awareness of sustainability thresholds and the capacity of various environments to accommodate greater loads to avoid threatening natural resources and habitats or polluting air, water or land. During implementation, appropriate monitoring and feedback will be required regarding the impacts of completed initiatives.

Monitoring indicators are required to determine environmental effectiveness. In practice, these indicators should not only encapsulate effectiveness in addressing the strategic environmental issues but should also contribute to measuring the effectiveness of the NPA programme overall. A range of potential indicators is provided, with suggestions for the division between Priorities and Objectives.

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1. INTRODUCTION

1.1 Objective of the Report

The objective of this strategic environmental assessment (SEA) is to compile an environmental report that improves the environmental dimension of the INTERREG Northern Periphery and Arctic Programme for the 2014-2020 period.

In the context of programme preparation, SEA represents a tool for greening plans and programmes and for improving their overall logic, consistency and effectiveness. The purpose of the SEA is to secure positive environmental impact through constructive participation in the programming process.

The findings of the SEA are not binding on an authority, but they allow scope to create targeted environmental impact. This means going beyond conventional environmental protection to secure environmental gain, defined as the attainment of environmental benefit as a direct or indirect result of economic development activity. In such a scenario, positive environmental impact is envisaged as a result of environmental integration, with development programmes enhancing the environment through innovative measures.

This report has been prepared in accordance with Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment, which describes its objective as:

'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 with a view to promoting sustainable development' (Article 1).

Article 2 of the Directive defines relevant plans and programmes as including those co-financed by the European Community, and which are likely to have significant environmental effects. Article 3 specifies that an environmental assessment should be carried out for plans and programmes related to activities in agriculture, forestry, fisheries, energy, industry, waste management, water management, telecommunications, tourism, town and country planning or land use, and which set the framework for development consent of projects listed in Annexes I and II to Directive 85/337/EEC (environmental impact assessment), or which, in the view of the likely effect on sites, have been determined to require an assessment pursuant to Article 6 or 7 of Directive 92/43/EEC (habitats). Projects are defined as construction works or other installations and schemes, and other interventions in natural surroundings and landscape, including those involving the extraction of mineral resources.¹ Criteria for such projects emanating from the programme and steering development consents could comprise limits on the type of activity which is permitted, or conditions to be met by an applicant if permission is granted, or the preservation of certain characteristics of the area concerned.

As the Northern Periphery and Arctic Programme 2014-2020 encompasses and addresses a number of these activities, and has the potential to deliver or support projects that could produce significant (positive and negative) environmental effects, it fulfils the Directive screening criteria for being subject to strategic environmental assessment.

¹ Article 1(2) of the EIA Directive.

The main steps of the SEA process comprise preparation of an environmental report, consultations with environmental authorities and the public, incorporation of the results of the consultations into decision-making, provision of information on the decision, and suggesting indicators for monitoring the effects of the programme during its implementation. The environmental report identifies likely significant effects of the programme on the environment, taking into account the programme's objectives and the consideration of alternatives, the contents and level of detail of the programme, the stage in the decision-making process, and the extent to which certain matters are more appropriately discussed at different levels in order to avoid duplication.

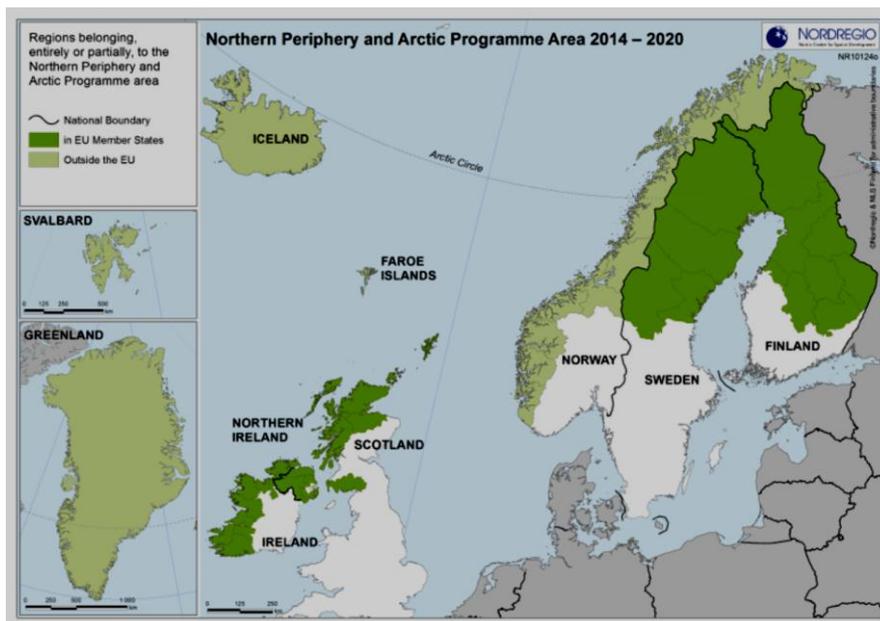
The SEA Directive states that the environmental authorities must be consulted with regard to the scope and level of detail of the information to be included in the environmental report, contributing to the definition of the content of the report and the fields to be covered. For the Northern Periphery and Arctic Programme, these consultations took place as part of the compilation of the country-specific environmental baseline and trend information from which an Environment SWOT was derived and Strategic Environmental Issues subsequently identified. These issues were then utilised within the structure of the strategic environmental assessment of the NPA programme.

1.2 Key Facts

Information on the Northern Periphery and Arctic Programme for 2014-2020 is presented in Table 1. These key facts identify the programme boundaries, explain the programme rationale, and specify a contact point where further information can be obtained. The programme's extensive territorial coverage is illustrated in Figure 1.

Table 1: Northern Periphery and Arctic Programme Key Facts

Managing Authority:	Västerbotten County Administrative Board, Umeå, Sweden.
Programme Title:	Northern Periphery and Arctic Programme 2014-2020, European Territorial Cooperation INTERREG V
Programme Rationale	By fostering cooperation between relevant stakeholders across the programme area, the NPA will open the horizon towards the rest of the world, and the cooperation will help to compensate for the lack of critical mass that characterises many public and private activities within the programme area. An overall strategy will overcome the area's complex and integrated development challenges by supporting local and regional economies to utilise the opportunities within the NPA area. Working on a transnational cooperative basis, the NPA programme will complement nationally focused policies and programmes to foster smart, sustainable and inclusive growth.
Programme Duration:	The programme will run for seven years from 2014 until 2020.
Programme Area:	Amongst the EU Member States, the programme area covers Northern and Eastern Finland, Western Ireland, Northern Ireland (excluding the larger Belfast region), Northern Sweden, and the Highlands and Islands and Dumfries and Galloway in Scotland. Amongst non-member countries, Greenland, Iceland, the Faeroe Islands and Northern and Western Norway and Svalbard belong to the programme area.
Contact Point:	Kirsti Mijnhijmer, Programme Manager for Information & Communication, Northern Periphery and Arctic Programme Secretariat, Strandgade 91, 4.sal, DK-1401 Copenhagen K, Denmark. Tel:+45 3283 3784 Email: kirsti.mijnhijmer@northernperiphery.eu Website: http://www.northernperiphery.eu

Figure 1: Map of Northern Periphery and Arctic Programme Area

1.3 Programme Context

To set the Strategic Environmental Assessment of the NPA 2014-2020 in context, it is important to consider the scale, scope and position of the programme, as well as the role of EU territorial cooperation more generally.

Territorial cooperation has been implemented through the long-standing INTERREG initiative, funded through the European Regional Development Fund. Introduced in 1990, INTERREG has evolved over five funding periods and territorial cooperation is now one of the three EU Structural Funds objectives. Under the current arrangements, territorial cooperation is subdivided into cross-border (Strand A), transnational (Strand B) and interregional (Strand C) cooperation. The transnational cooperation programmes, of which the NPA 2014-2020 is one, cover larger areas of cooperation and focus on encouraging regions from different countries ‘to work together and learn from each other through joint programmes, projects and networks’.²

The incorporation of territorial cohesion as a third dimension of regional policy has focused increased attention on the potential role of programmes, such as the Northern Periphery and Arctic Programme, to deliver more tangible results. Already, in terms of the qualitative impacts of territorial cooperation, the added value of European territorial cooperation is difficult to dispute:

- cooperation programmes can address areas of significant political and symbolic added value;
- cooperation enables specific territorial problems to be tackled which could not have been addressed through other support programmes;
- opportunities are provided for learning and the exchange of experience;

² http://ec.europa.eu/regional_policy/cooperate/cooperation/index_en.cfm

- different types of organisation that do not regularly work together can be brought together; and
- activities can result in a significant increase in the number, intensity and dynamics of cross-border contacts at national, regional and local levels.³

However, the comparatively limited budget allocated to cooperation programmes limits their scope to produce large-scale tangible impacts. Additionally, the character of INTERREG B (such as the NPA programme) and C programmes, focusing on larger geographic areas and often involving networking activities, limits their 'concrete' impact even further.

These broad considerations can all be applied to the Northern Periphery and Arctic Programme 2014-2020. However, it is also worth noting the programme's scale, scope and position, as follows.

(i) Scale

The geographic scale of the programme area is equivalent to 77 percent of the whole EU territory. Yet, the size of the programme budget is extremely modest relative to other EU Cohesion policy programmes. The EU contribution to the current Northern Periphery Programme (NPP) is just over €35 million, which contrasts with the €229 million for the 2007-13 Operational Programme for the BMW region in Ireland, which is just one region in the NPA area. In the 2007-13 programming period, the NPP supported 47 main projects and 56 preparatory projects. A similar figure is expected for the 2014-2020 period.

The scale of the programme area in contrast to the available resources means that the NPA 2014-2020 cannot expect to deliver major change on key environmental concerns at the programme level. The programme has had to be focused in its efforts, and it particularly addresses the needs of highly sparsely populated areas and remote communities. Thus, the most direct effects of the programme on the environment will be apparent at individual local/community levels in participating areas.

(ii) Scope

The NPA area faces a wide range of global environmental pressures and challenges. The programme area also incorporates countries and regions at the forefront of developing and applying new sustainable and green technologies and approaches to environmental protection and management. The NPA programme can work within key areas such as: supporting the shift towards a low-carbon economy in all sectors; promoting climate change adaptation, risk prevention and management; and protecting the environment and promoting resource efficiency.

However, the programme is constrained by the European Union Cohesion policy regulations and domestic policy priorities and agendas. According to the draft regulation, transnational cooperation programmes are expected to be selective in their focus and be results-oriented. From a prescribed list of 11 thematic objectives set out in the Common Strategic Framework, the NPA 2014-2020 had to choose only 4 themes for implementation. Within the selected themes, the programme was then required to select a limited number of investment priorities and develop its own tightly-defined specific

³ M Ferry and F Gross, *The Future of Territorial Cooperation in an Enlarged EU*, Paper prepared for 2nd International Conference, Benchmarking Regional Policy in Europe, Riga, 24-26 April 2005.

objectives. Actions were also expected to be in line with areas of activity highlighted as relevant for transnational cooperation programmes.⁴ In addition, the programme had to develop in line with domestic policies and agendas for territorial cooperation. These frameworks and regulations mean that the programme is, to an extent, limited in terms of the issues with which it can directly engage.

(iii) Position

The NPA 2014-2020 is situated in a congested policy environment. Therefore, the programme must carefully consider where it can best add value. In doing so, a range of factors were taken into account:

- contexts where the role of the NPA may be limited, as other policies and programmes could have a potentially more direct and extensive impact and may be better adapted to addressing specific development concerns;
- very specific areas where the NPA can contribute; and
- the scope for synergies on key issues and up-scaling projects either into or beyond the NPA programme. This is especially the case for environmental projects.

The added value of the NPA 2014-2020 is most likely to be in developing practical, but small-scale 'niche', solutions that have the potential to be developed further through other programmes, awareness-raising, learning and knowledge exchange.

The programme is deeply embedded in the development needs and potentials of the programme area, which especially include environmental development strengths, weaknesses, opportunities and challenges. As such, the programme aims to have an important, beneficial impact on environmental development issues in the NPA area. However, the scale, scope and position of the programme will impact on the extent and manner in which this contribution is made.

1.4 Structure of the Report

Section 2 reviews the environmental context of the Northern Periphery and Arctic Programme. This includes consideration of the environmental performance of the current INTERREG IVB Northern Periphery Programme, an overview of the priorities of the draft INTERREG V programme for 2014-2020, and a review of relevant environmental strategies, programmes and policies.

Section 3 examines the environmental baseline conditions and trends within the countries participating in the NPA programme area.

Section 4 identifies strategic environmental issues, grouped into the four themes of climate and Arctic change, land-use management, energy and resource efficiency, and marine pollution.

Section 5 presents an environmental assessment of the new programme. Following a description of how alternative scenarios were considered within the programming process, the programme vision, priorities and objectives are subjected to an environmental appraisal. Thereafter, the report discusses

⁴ CEC, (2012) Commission Staff Working Document, Elements for a Common Strategic Framework 2014 to 2020, 14 March 2012.

likely significant effects on the environment, measures envisaged in preventing adverse effects, and potential indicators for monitoring environmental effectiveness.

2. THE NORTHERN PERIPHERY AND ARCTIC PROGRAMME IN CONTEXT

2.1 Introduction

In a review of the environmental context of the programme, this section considers the environmental performance of the current INTERREG IVB Northern Periphery Programme, the content of the INTERREG V Northern Periphery and Arctic Programme, and the significance of existing environmental strategies, programmes and policies as guiding instruments.

2.2 INTERREG IV Northern Periphery Programme 2007-2013

The current INTERREG IV Northern Periphery Programme (NPP) relates to the 2007-2013 period. The vision of the NPP encompasses the prosperous and sustainable development of its communities and the wise management of resources, while contributing to European objectives and a more dynamic EU. Joint working on common problems and opportunities is expected to develop new structures and tools for longer-term cooperation. Strategic themes drawn from the SWOT analysis are perceived as interdependent, with actions on one theme expected to have an impact on the others. Accordingly, a holistic approach is adopted in taking forward priorities for action.⁵

The NPP 2007-2013 aims 'to help peripheral and remote communities achieve their economic, social and environmental potential'. This includes the sustainable development of community and natural resources and cultural heritage. The programme also aims to strengthen the synergies between environmental protection and growth by addressing challenges to sustainable development, as identified in the Gothenburg agenda. The unspoiled natural environment is recognised as a significant asset, and it is acknowledged that the sustainable development of natural resources can contribute to the economy and stimulate innovation, as well as facilitating balanced and sustainable growth. However, care must be taken to avoid environmental degradation, seeking a balance between sustainable growth and protection. The development of renewable energy is highlighted as of special relevance for the Northern Periphery in view of its considerable natural resources.

The 2007-2013 programme has two thematic Priorities, as well as one Priority devoted to technical assistance:

- Priority 1, *Promoting Innovation and Competitiveness in Remote and Peripheral Areas*, which focuses on innovation, networks and competitiveness, and on accessibility; and
- Priority 2, *Sustainable Development of Natural and Community Resources*, which focuses on environment as an asset in the periphery, strengthening synergies between environmental protection and growth, urban-rural development and the promotion of heritage.

In terms of programme funds allocation, Priority 1 receives 56.4 percent, Priority 2 receives 37.6 percent and Priority 3 (Technical Assistance) receives 6 percent.

With regard to NPP environmental performance, an appraisal can be drawn from completed evaluations. As part of the Ex-Ante Evaluation of the programme carried out by the European Policies

⁵ NPP (2006) Operational Programme of the Northern Periphery Programme 2007-13.

Research Centre in 2006, the Strategic Environmental Assessment (SEA) demonstrated clear compatibility between EU environmental policy frameworks and the vision, priorities and objectives of the Northern Periphery Programme 2007-13. It acknowledged that the NPP had considerable scope for environmentally favourable outcomes, especially due to the programme's focus on small-scale developments and high-quality solutions. Following on from the SEA recommendations, the Operational Programme stated that positive environmental impacts form a key element of the programme's implementation, and that high environmental standards and requirements would be integrated into project guidance and monitoring.

Referring to the scope for significant effects, which could be positive or negative in character, the SEA identified environmental issues considered to have a strategic dimension in the context of the Northern Periphery Programme. The range of themes was categorised under four headings: climate change, tourism, waste, and marine pollution.

- Action was needed to stave off *climate change* and to prepare for it. Preparations for climate change should ensure that people, natural environments, spatial structures and associated functions suffer minimal disturbance, and that the favourable impacts of climate change are used to advantage in the NPP area.
- With regard to *tourism*, natural heritage and cultural heritage are interlinked, as the environment essentially forms a cultural landscape. The challenges include protecting and managing vulnerable heritage sites, safeguarding cultural identity, and managing seasonal pressures on the environmental resources.
- The review of *waste* highlighted the need to explore waste minimisation techniques, including alternative procedures and processes, as well as considering the development of infrastructure within waste handling, an area where cross-border cooperation could be advantageous.
- *Marine pollution* was identified as important for most of the NPP area, even though emissions originate mainly in other parts of Europe and beyond. Coastal zone management was also highlighted as an overriding issue, with aquaculture, development and building, traffic and nature protection competing for limited resources.

The final Operational Programme states that these strategic environmental issues were utilised in the drafting of the programme. However, in the Final Evaluation Report⁶ of the on-going evaluation of the Northern Periphery Programme 2007-2013, opinions were expressed by the Regional Advisory Groups (RAGs) that the programme could have more impact on strategic environmental issues.⁷ Whereas the RAGs raised concerns about the overall lack of 'strategic focus' in project applications and the weak link to the specific needs of the NPP area, there was a common perception that the environmental issues in particular were not being addressed as fully as possible, with a 'tick box' approach being used, rather than a concrete description of how projects would actually address a theme during the implementation stage.

⁶ McMaster I (2010) The on-going Evaluation of the Northern Periphery Programme, 2007-2013: Final Evaluation Report, EPRC, Glasgow.

⁷ NPP Touchstone Survey of Regional Advisory Groups, NPP 2009.

The Final Evaluation states that the programme's core concepts are broadly addressed in the projects approved, including support for a considerable range of projects that address environmental concerns.⁸ A review of the proposed outputs included sustainable development as a particular strength, with key Expected Results also including information and training for SMEs on climate change, tools to promote sustainable rural development, and sustainable development of resources such as forestry and fisheries.⁹ Further potential links were also suggested between domestic administrations involved in the management and implementation of the programme, which are making individual commitments to carbon-offset schemes, energy saving, and recycling, and the programme's scope to support such efforts.

In a further dimension of its appraisal, the Final Report noted that NPP regions are developing and applying highly innovative responses to climate change, both to combat climate change and to adapt to changing economic, climatic, marine and physical conditions.¹⁰ Specifically in relation to climate change, the pace of Arctic melt appears to be more rapid than predicted, which will have major environmental, social/cultural and economic implications for the NPP area (Gaskell 2012).¹¹

The programme's analysis highlights how topographic and climatic conditions make accessibility a significant issue for large parts of the programme area. Accordingly, Priority 1 focuses on remote and peripheral regions where development resources are widely dispersed, and improving accessibility is perceived as vital in strengthening competitiveness.

Priority 2 acknowledges the unspoiled natural environment as one of the most significant assets of the Northern Periphery. It supports the sharing, expansion and development of skills in environmental management and sustainable development, designed to make an important contribution to the preservation and management of natural resources. Priority 2 also addresses the issue of climate change in the Northern Periphery, favouring more innovative public management policies. The sustainable exploitation of bio-fuels and other alternative energy sources are perceived as opportunities for innovative business development that can provide sustainable services to remote areas.

2.3 Northern Periphery and Arctic Programme 2014-2020

For 2014-2020, the Northern Periphery and Arctic Programme has four thematic Priorities, which follow from and contribute to the programme strategy:

- Using innovation to maintain and develop robust and competitive communities;
- Promoting entrepreneurship to realise the potential of the programme area's competitive advantage;

⁸ McMaster (2010), p. 50.

⁹ McMaster (2010), p. 11.

¹⁰ McMaster I, Van der Zwet A and Vironen H (2012) The Evaluation of the Northern Periphery Programme – Final Evaluation Report, EPRC, Glasgow.

¹¹ Gaskell F and Didriksen J (2012) NPP the Missing Link? Discussion Paper on options for the strategic framework of Northern Periphery Programme for the period 2014-20, presented to NPP EVA meeting Glasgow, May 2012.

- Fostering energy-secure communities through the promotion of renewable energy and energy efficiency; and
- Protecting, promoting and developing cultural and natural heritage.

These four Priorities and the associated six specific objectives, their rationale and examples of actions supported, are outlined in Tables 2 to 5.

Table 2: NPA Priority 1: Using Innovation to Maintain and Develop Robust and Competitive Communities

<p>Objective 1.1 Increased innovation and transfer of new technology to SMEs in remote and sparsely populated areas</p>
<p>Rationale:</p> <p>SMEs and micro-companies in remote and rural communities suffer from a lack of critical mass to be able to access innovation support. Transnational cooperation can help to overcome these challenges by contributing to transnational collaboration between businesses and research institutes, by facilitating the clustering of businesses across borders, and by facilitating transnational business networks. Indirectly, transnational cooperation can also contribute to attitude-change among the different actors in the innovation system to collaborate on targeted and demand-driven innovation support for local and regional SMEs in remote areas. Regional centres across the programme area where innovation actors are concentrated are important, such as campuses with their innovation tradition and larger firms with R&D departments. Intermediary actors that can help to cluster SMEs and connect them to research institutes are also essential, for example in a triple-helix context. Finally, it is recognised that creative industries and end-user demands can form drivers for innovative product and service design, for example in the development of user-driven clean technologies.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Transfer and development of models or solutions for clustering SMEs with shared needs in relation to accessing R&D in order to develop critical mass and support access to R&D links across regional and national borders • Transfer and development of models or solutions enabling R&D support for SME demand-driven innovation • Transfer and development of models or solutions facilitating technology transfer to, or across, the programme area, in particular benefiting SMEs • Transfer and development of models or solutions facilitating business networks across regional and national borders to help to diversify and broaden the regional sector base • Transfer and development of models or solutions linking the creative sector and SMEs to promote innovation • Transfer and development of models or solutions facilitating user-driven innovation in SMEs • Development in relation to the maritime and marine sectors relevant for the Atlantic coastal areas and development in relation to cold climate and exploitation of natural resources relevant for the Arctic areas • Transfer and development of models or solutions facilitating activities aimed at making innovative sectors more attractive for under-represented groups, such as young women
<p>Objective 1.2 Increased innovation within public service provision in remote and sparsely populated areas</p>
<p>Rationale:</p> <p>Remote and sparsely populated areas in the programme area face shared challenges in accessing key public services such as healthcare, social care, education and energy. Within these areas, public service providers are faced with the challenge of reconciling limited resources and a lack of critical mass with an increasing demand for public service provision. In addition, markets can fail to service extremely remote areas, even terms of the provision of basic goods. Transnational cooperation can facilitate the transfer and the development of innovative organisational models and solutions to address the viability of public service provision and the provision of basic goods and services, for example through private-public partnerships, urban-rural cooperation, social enterprises and other innovative ways of pooling competences and resources. In addition, collaboration with R&D institutes could result in innovative and distance-spanning technologies that enable new means of delivering public services, such as mobile health and wellbeing services in sparsely populated areas. Such developments are especially relevant in the NPA programme area, which faces particular challenges in terms of an ageing population, lifestyle diseases, cold climate and long distances.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Transfer and development of innovative models or solutions addressing viability and low critical mass in public service provision in remote and sparsely populated areas • Transfer and development of technology-driven solutions for public service provision in remote and sparsely populated areas

Table 3: NPA Priority 2: Promoting Entrepreneurship to Realise the Potential of the Programme Area's Competitive Advantage

<p>Objective 2.1 Improved support systems tailored for start-ups in remote and sparsely populated areas</p>
<p>Rationale:</p> <p>In remote and sparsely populated areas, operational challenges such as obtaining finance faced by start-up companies are amplified by the long distance from support facilities, as well as the same challenges facing existing companies in the periphery, such as a small customer base, long distances to market, and a generally poor business environment. Transnational cooperation can contribute to a better entrepreneurial climate by facilitating the transfer and development of start-up support strategies and solutions to overcome the challenges faced by start-up companies. Start-up support will focus on removing barriers and bottlenecks for start-ups, for example by facilitating campus incubator support and other types of start-up support over distance, promoting innovative funding mechanisms to attract internal and external investments such as crowd-funding, creating support networks of peers, developing inclusive business models and jobs/training positions based on recognising and utilising people's different talents and skills, and through targeted use of public procurement. In addition, NPA interventions will aim to support and encourage entrepreneurship among underrepresented groups. Start-up support systems will also be used to focus on realising the potential of place-based opportunities. For example, the programme area's unique cultural and natural heritage is a basis for the tourism and experience industries based on the area's natural environment, indigenous lifestyles, and creative industries.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Transfer and development of models or solutions that remove barriers for start-ups • Transfer and development of models or solutions that encourage entrepreneurship among underrepresented groups • Transfer and development of models or solutions that realise place-based opportunities in a new way
<p>Objective 2.2 Greater market reach beyond local markets for SMEs in remote and sparsely populated areas</p>
<p>Rationale:</p> <p>In addition to the usual challenges faced by entrepreneurs, SMEs and micro-companies in remote and sparsely populated areas are faced by particular challenges such as a small local customer base and long distances to markets. In addition, micro-enterprises commonly lack experience or a tradition of cooperation with enterprises outside the local area. Transnational cooperation can contribute to a better access to key markets and a wider customer base by facilitating the transfer and development of marketing concepts and models. Marketing models will be used to transnationally cluster SMEs with a complementary product or service portfolio. For example, exclusive product or service packages can be developed to attract high-end customers; a joint market approach can be used for high-quality natural products of the programme area, such as Arctic products, or products aimed at the growing global market in health products, cosmetics, pharmaceuticals and regional food and drinks. In addition, businesses can form networks to take advantage of trends such as the increasing cruise tourism or use market research to discover new consumer markets. Marketing models can also focus on the use of ICT solutions, e-commerce and social media to overcome the distance to markets. Marketing models will be used to realise the potential of place-based development opportunities and will also focus on capturing spinoffs from local or regional large-scale investments, such as models to reduce risks for SMEs in up-scaling their production and delivery capacity.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Transfer and development of marketing models or solutions suitable for SMEs in remote, sparsely populated areas, to increase their market reach • Transfer and development of concepts for clustering and creating networks of SMEs to meet a larger-scale, more diverse and/or more complex demand • Transfer and development of marketing models and solutions facilitating the use of distance-spanning technology to overcome long distance to market

Table 4: NPA Priority 3: Fostering Energy-Secure Communities through Promotion of Renewable Energy and Energy Efficiency

<p>Objective 3 Increased use of energy efficiency and renewable energy solutions in housing and public infrastructure in remote and sparsely populated areas</p>
<p>Rationale:</p> <p>Ensuring a reliable and affordable energy supply is particularly challenging in the remote and sparsely populated communities of the programme area, especially due to their low critical mass and issues linked to the harsh climate. Transnational cooperation can help to address these challenges by facilitating the transfer and development of models to help these communities access and utilise renewable energy solutions for housing and public infrastructure, suitable for cold climates and dispersed settlements. For example, opportunities include enabling communities to use energy sources based on local natural resources, symbiotic solutions can be developed, using the by-products of one activity to provide energy for public infrastructure or housing, such as using cooling water to heat buildings. There is also scope for new energy-efficiency concepts for constructing, maintaining and running housing and public infrastructure, suitable for cold climates and dispersed settlements. New concepts and measures could focus on energy-efficient housing using low-energy building materials based on natural products from the programme area and the promotion of low/zero energy housing, particularly in the Arctic.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Facilitating decision-making about the development and use of renewable energy solutions for public infrastructure and housing, suitable for cold climates and dispersed settlements • Developing models to sustainably utilise by-products from economic activities as energy sources for public infrastructure and housing • Promoting and facilitating the transfer and development of new energy-efficiency concepts for constructing, maintaining and running housing and public infrastructure, suitable for cold climates and dispersed settlements

Table 5: NPA Priority 4: Protecting, Promoting and Developing Cultural and Natural Heritage

<p>Objective 4 Increased capacity of remote and sparsely populated communities for sustainable environmental management</p>
<p>Rationale:</p> <p>Local communities in the programme area are faced by the impact of major global trends, such as climate change impacts on people, demographic change, and rapid economic and environmental changes through large-scale industrial projects. These developments can lead to major economic, environmental and social upheavals. The scale of the issues is often beyond the scope of the individual communities to cope with on their own, and requires a wide range of competences and expertise. This is particularly relevant in the Arctic and subarctic regions of the programme area, where the impacts of climate change are expected to be more dramatic than in other places and where small communities are faced by major commercial interests of multinational companies, such as mineral extraction. Transnational cooperation can help these communities by facilitating the transfer of best-practice models and solutions and the transnational pooling of competences and expertise to build capacity, share knowledge and know-how, and develop tools to help remote and sparsely populated communities balance the conflicting demands of economic, social and environmental interests. It can also facilitate the transfer and development of decision-making tools and solutions to help local authorities deal with complex changes as well as concepts and models for the protection, promotion and development of the natural and cultural heritage.</p>
<p>Actions supported:</p> <ul style="list-style-type: none"> • Development and transfer of best-practice models and solutions for up-skilling local authorities and community groups, focusing on skills and competences such as negotiation skills, change management skills, expertise on climate change impacts, environmental impacts, social impacts, and economic impacts • Development and transfer of new organisational models, such as pooling of competences across regional and national borders, and facilitating local authorities and community groups to cope with complex changes • Development and transfer of decision-making tools and solutions, such as new types of environmental assessments, to help local authorities deal with sustainable environmental management • Development and transfer of new governance concepts that involve all groups of civil society in the decision and policy-making process • Development and transfer of concepts and models for the protection, promotion and development of natural and cultural heritage according to a more dynamic interpretation of sustainable environmental management

2.4 Relevant Environmental Strategies, Programmes and Policies

This section identifies key environmental initiatives that characterise and determine the operational context for the Northern Periphery and Arctic Programme. This contextual awareness also highlights significant aspects of these various strategies, programmes or policies with regard to the scope for environmental impact afforded to the NPA programme.

2.4.1 Global initiatives

At global level, the major relevant initiatives are the United Nations Conference on Sustainable Development (Rio+20), which took place in Brazil in 2012, and the updated Kyoto Protocol.

Rio+20 marked the 20th anniversary of the 1992 United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro and the 10th anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg. Its objectives included securing renewed political commitment for sustainable development, and it resulted in a focused 'political outcome document' that contains practical measures for implementation. It also reaffirmed the need to achieve sustainable development by promoting sustained, inclusive and equitable economic growth, creating greater opportunities for all, reducing inequalities, raising basic standards of living, fostering equitable social development and inclusion, and promoting integrated and sustainable management of natural resources and ecosystems. The Conference also adopted guidelines on green economy policies, and launched a process to develop a set of Sustainable Development Goals (SDGs) that build upon the Millennium Development Goals and converge with the post-2015 development agenda.

The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty that sets binding obligations on industrialised countries to reduce emissions of greenhouse gases. The UNFCCC is an environmental treaty with the goal of preventing degenerative anthropogenic impacts on the climate system. As part of the Kyoto Protocol, which entered into force in 2005, many developed countries have agreed to legally binding limitations/reductions in their emissions of greenhouse gases over two commitment periods. The first commitment period applied to emissions between 2008 and 2012, and the second commitment period applies to emissions between 2013 and 2020. In December 2012, an agreement was reached to extend the Protocol to 2020 and to set a date of 2015 for the development of a successor document to be implemented from 2020. In addition, the new concept of 'loss and damage' was introduced, an agreement in principle that richer nations could be financially responsible to other nations for their failure to reduce carbon emissions.

2.4.2 EU perspectives

Within the European Union, the documents with the greatest relevance are the Europe 2020 Strategy and the proposed Seventh Environmental Action Programme. Sustainable development became a fundamental objective of the EU in 1997, when it was included in the Treaty of Amsterdam as an overarching objective. Subsequently, at the Gothenburg Summit in 2001, the first EU Sustainable Development Strategy (SDS) was launched. Whereas the Lisbon Strategy focused on employment, economic reform and social cohesion, the SDS added an environmental dimension and established a new approach to policy-making. In June 2006, the European Council adopted a renewed SDS.

Europe 2020

In 2010, a strategy for sustainable growth was launched – Europe 2020: A Strategy for smart, sustainable and inclusive growth¹² – which sets out a vision of Europe’s social market economy for the 21st century. All future INTERREG programmes are expected to be in line with Europe 2020. Its priority of sustainable growth means promoting a more resource-efficient, greener and more competitive economy. Such an approach is anticipated to help the EU to prosper in a low-carbon, resource-constrained world, while preventing environmental degradation, biodiversity loss and the unsustainable use of resources. It will also underpin economic, social and territorial cohesion.

Amongst its five objectives, which relate to employment, education, research and innovation, social inclusion and poverty reduction, and climate change/energy, the factors of greatest environmental relevance include limiting greenhouse gas emissions by 20 percent or even 30 percent compared to 1990 levels, creating 20 percent of energy needs from renewable sources, and increasing energy efficiency by 20 percent (the ‘20/20/20’ climate/energy targets). Each EU Member State has adopted its own targets in these areas.

In addition, specific areas of action have been addressed through seven flagship initiatives, three of which are especially environmentally relevant, as illustrated in Table 6.

Table 6 Europe 2020 Flagships

Resource-efficient Europe aims to decouple economic growth from the use of resources. It supports the shift towards a low-carbon economy, increased use of renewable energy resources, the development of green technologies and a modernised transport sector, and the promotion of energy efficiency. This flagship stresses the need for an urgent and significant transition towards using natural resources efficiently. This applies to producers and consumers in relevant areas such as energy, transport, climate, environment, agriculture, fisheries and regional policy.

An Industrial Policy for the Globalisation Era aims to improve the business environment, notably for SMEs, and it supports the development of a strong and sustainable industrial base able to innovate and compete globally. Its focus includes adjusting production processes and products to a low-carbon economy, realising opportunities within the green economy, supporting the transition to greater energy and resource efficiency, promoting technologies and production methods that reduce natural resource use, and increasing investment in the EU’s existing natural assets.

The *Innovation Union* flagship is also relevant, along with its associated financial instrument, Horizon 2020, turning innovative ideas into products and services that create growth and jobs. Its aim is to re-focus R&D and innovation policy on the challenges facing society, such as climate change, energy and resource efficiency, health and demographic change. A strategic research agenda will focus on challenges such as energy security, transport, climate change and resource efficiency, health and ageing, environmentally-friendly production methods and land management. It seeks to facilitate the key enabling technologies to shape Europe’s industrial future.

The targets within Europe 2020 are interrelated: increased resource efficiency will improve competitiveness and foster job-creation; and investing in cleaner, low-carbon technologies will help the environment, contribute to fighting climate change and create new business and employment opportunities.

¹² European Commission (2010) Europe 2020: A Strategy for smart, sustainable and inclusive growth. COM(2010) 2020 final.

Seventh EU Environmental Action Programme

The proposed 7th Environmental Action Programme¹³ sets out priority objectives to be attained (art. 192.3) in environmental policy in the context of the Europe 2020 Strategy. As part of the follow-up to the 2012 United Nations Conference on Sustainable Development described above, the new environmental action programme supports international and regional processes aiming to transform the global economy into an inclusive green economy in the context of sustainable development and poverty reduction.

Whereas many environmental challenges are global and can only be fully addressed through a comprehensive global approach, other environmental challenges have a strong regional dimension, which requires cooperation with neighbouring countries. The programme foresees significant scope for reducing greenhouse gas emissions and enhancing resource efficiency in the Union. This will ease pressures on the environment and bring increased competitiveness and new sources of growth and jobs through cost-savings from improved efficiency, commercialisation of innovations, and better management of resources over their whole lifecycle.

While progress has been made in the EU to decouple growth from greenhouse gas (GHG) emissions, resource use and environmental impacts, resource use is still largely unsustainable and inefficient, and waste is not yet properly managed. As a result, EU businesses are foregoing the significant opportunities that resource efficiency offers in terms of competitiveness, cost reductions, improved productivity and security of supply. Water quality and air pollution levels are still problematic in many parts of Europe, and EU citizens continue to be exposed to hazardous substances, potentially compromising their health and wellbeing. Unsustainable land use is consuming fertile soils, with impacts on food security and the achievement of biodiversity targets. Soil degradation continues largely unchecked. Addressing some of these complex issues requires tapping into the full potential of existing environmental technology and ensuring the continuous development and uptake by industry of the best available techniques and emerging innovations. Rapid advances in promising fields of science and technology are also needed.

Reflecting recent policy developments, the proposed 7th programme is more strategic in nature than the 6th programme, re-clustering the previous four areas for action into three core thematic objectives:

- (i) to protect, conserve and enhance the EU's natural capital;
- (ii) to turn the EU into a resource-efficient and more competitive low-carbon economy; and
- (iii) to safeguard EU citizens from environment-related pressure and risks to health and wellbeing.

In providing an overarching framework for environmental policy to 2020, the new programme should build on the EU Biodiversity Strategy to 2020, the EU climate and energy package, the Roadmap for

¹³ European Commission (2012) Proposal for a DECISION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a General Union Environment Action Programme to 2020 "Living well, within the limits of our planet" COM(2012) 710 final.

moving to a low-carbon economy in 2050, the Roadmap to a resource-efficient Europe, and the Innovation Union Flagship Initiative.

The proposed programme has nine Priority Objectives, as outlined in Table 7.

Table 7: Seventh Environmental Action Programme Priority Objectives

Examples of relevant features	
1: To protect, conserve and enhance the EU's natural capital	Halt the loss of biodiversity and ecosystem degradation, reduce impacts on fresh and coastal waters, reduce pressures on marine waters, protect soil and remediate contaminated sites, and improve the resilience of forests to climate change and fires.
2: To turn the EU into a resource-efficient, green and competitive low-carbon economy	Meet 2020 climate and energy targets, reduce the environmental impact of industry, increase resource efficiency, reduce waste generation, limit energy recovery to non-recyclable materials, eradicate landfilling of recyclable and compostable materials, and reduce or prevent water stress.
3: To safeguard EU citizens from environment-related pressures and risks to health and wellbeing	Improve air quality, decrease noise pollution, assess and minimise environmental risks, make progress in adapting to climate change impacts, and integrate climate change adaptation and disaster risk-management into policy initiatives and sectors.
4: To maximise the benefits of EU environment legislation	Ensure that EU citizens have access to clear information showing how EU environmental law is being implemented, reinforce respect for EU environmental law at all administrative levels, and enhance trust and confidence in environmental law.
5: To improve the evidence base for environment policy	Improve the basis for developing and implementing environment and climate policies, including measuring costs and benefits, improve the ability to evaluate and manage emerging environmental and climate risks, and strengthen the environment policy-science interface.
6: To secure investment for environment and climate policy and get the prices right	Achieve environment and climate change policy objectives in a cost-effective way, supported by adequate finance, and increase private sector funding for environment and climate-related expenditure.
7: To improve environmental integration and policy coherence	Integrate environmental and climate-related conditionalities and incentives in policy initiatives, and carry out systematic ex-ante assessments of environmental, social and economic impacts to ensure their coherence and effectiveness.
8: To enhance the sustainability of EU cities	Implement policies for sustainable urban planning and design, define criteria to assess the environmental performance of cities, and ensure that cities have access to financing for measures to improve urban sustainability.
9: To increase the EU's effectiveness in addressing regional and global environmental and climate challenges	Engage in relevant international, regional and bilateral processes in a strong, focused, united and coherent manner, and address challenges related to water, oceans, sustainable land and ecosystems, resource efficiency (particularly waste), sustainable energy and climate change.

The impact assessment accompanying the proposed programme acknowledges that greener, more efficient technologies, improved productivity and new employment opportunities will support growth and jobs; and a coherent and more integrated policy framework in support of resource efficiency and greener products will also help SMEs striving to become more resource-efficient by reducing their production costs and facilitating their access to new markets. Meanwhile, ensuring the resilience of our ecosystems that support growth and protecting the health of citizens is essential to ensure the sustainability of economic advancement.¹⁴

In a consultation, businesses stressed the need for innovation and resource efficiency while taking into account concerns of competitiveness.

Baltic Sea Region Strategy

The European Union Strategy for the Baltic Sea Region (EUSBSR)¹⁵ is the first macro-regional strategy in Europe. In addition to promoting more balanced development in the area, it aims at reinforcing cooperation between the eight EU countries that make up the Baltic Sea Region (Sweden, Denmark, Estonia, Finland, Germany, Latvia, Lithuania and Poland) by working together to tackle several common challenges. The Strategy provides an integrated framework for improving the environmental condition of the sea, transport bottlenecks and energy interconnections as well as facilitating the development of competitive markets across borders and common networks for research and innovation.

The objectives guide an array of Priority Areas specific to macro-regional cooperation that address the key challenges and opportunities in the region. Within the environmental priority, for example, relevant factors include reducing nutrient inputs to the sea to acceptable levels, reducing the use and impact of hazardous substances, preserving natural zones and biodiversity (including fisheries), reinforcing sustainability of agriculture, forestry and fisheries, becoming a model region for clean shipping, and improving the access to, and the efficiency and security of, the energy markets. Relevant horizontal action includes sustainable development and bio-economy.

Arctic Strategy

Aware of the need for international cooperation on Arctic issues, the European Parliament approved a resolution on Arctic governance in 2008, and the Commission adopted its first communication on the Arctic in the same year, setting out EU interests and proposed actions around three main policy objectives:

- protecting and preserving the Arctic in unison with its population;
- promoting the sustainable use of natural resources; and

¹⁴ European Commission (2012) *IMPACT ASSESSMENT Accompanying the document Proposal for a Decision of the European Parliament and of the Council on a General Union Environment Action Programme to 2020 "Living well, within the limits of our planet"* SWD(2012) 397 final.

¹⁵ Commission Of The European Communities (2009) *Communication From The Commission To The European Parliament, The Council, The European Economic And Social Committee And The Committee Of The Regions concerning the European Union Strategy for the Baltic Sea Region* {SEC(2009) 702} {SEC(2009) 703} {SEC(2009) 712} Brussels, 10.6.2009 COM(2009) 248 final.

- contributing to enhanced governance in the Arctic through implementation of relevant agreements, frameworks and arrangements, and their further development.¹⁶

More recently, in 2012 the Commission and the High Representative of the EU for Foreign Affairs and Security Policy published a joint communication highlighting areas where the EU is making a contribution to the protection and development of the Arctic. Specific environmental aspects include: fighting climate change; research on the Arctic environment that highlights the EU environmental footprint; and investing in sustainable development in the North to develop environmental potential. Proposals for further policy development include supporting research and channelling knowledge to address the challenges of environmental and climate changes in the Arctic, and ensuring that economic development in the Arctic is based on the sustainable use of resources and environmental expertise.¹⁷

The Northern Dimension policy also encompasses Arctic issues and is looking to expand its involvement. Environment-related themes in the Northern Dimension that are complimentary to the NPA programme include partnerships in environmental protection, energy efficiency and the use of renewable energy.¹⁸

¹⁶ European Commission (2008) Communication from the Commission to the European Parliament and the Council, The European Union and the Arctic region, COM(2008) 763, 20 November.

¹⁷ EC and High Representative of the European Union for Foreign Affairs and Security Policy (2012) Joint Communication to the European Parliament and the Council, Developing a European Union Policy towards the Arctic Region: progress since 2008 and next steps. SWD (2102), 182.

¹⁸ McMaster (2012), p.37.

3. ENVIRONMENTAL BASELINE AND TRENDS

3.1 Introduction

The purpose of this section is to provide environmental information that describes the current environmental conditions in the NPA area, supports the identification of environmental issues or problems, and contributes to a baseline against which the programme's environmental effects can be assessed. This comprises both quantitative and qualitative data. It does not present an exhaustive list of every possible environmental parameter, but is selective in choosing topics considered relevant to the scope and potential influence of the programme.

Data and information have been gathered through a combination of desk-based research and direct consultation with a network of environmental contacts or intermediaries in each of the participating countries. The following organisations were involved in this interaction:

- Department of the Environment, Greenland;
- Land-Use Consultants, Scotland;
- Environmental Protection Agency, Republic of Ireland;
- Northern Ireland Statistics and Research Agency;
- Environmental Protection Agency, Sweden;
- Icelandic Regional Development Institute;
- Norwegian Ministry of the Environment;
- Finnish Ministry of the Environment;
- Environment Agency, Faroe Islands.

3.2 Regional Environmental Characteristics/Baseline Information

GREENLAND

Greenland is the world's largest island. Its surface is about 80 percent ice-capped, but the Arctic area is biologically rich, with a significantly large prevalence of birds and mammals that include red-listed (endangered) species and numerous animal communities on the seabed. The economy relies on fishing and fish exports, but tourism also plays an important role in generating capital.

Climate change in Greenland means that the nine million people who live in the Arctic must contend with coastal erosion, thawing permafrost, warmer temperatures, and changes in the animal and plant species that some traditional lifestyles depend upon. There will be an additional sea level rise, impacting on people living on the coast and on coastal infrastructure. The two regions most sensitive to rising surface temperatures are south-western Greenland, where raging meltwaters damaged infrastructure in 2012, and north-western Greenland, where substantial parts of icebergs have detached in the past two years. While summers are warmer, with predictions that an island-wide thaw

could happen within the decade, there is also less rain, and some experts anticipate that Greenland could soon need irrigation works.

Nevertheless, while sea rise and coastal erosion threaten communities, the warming of the Arctic also provides new opportunities. Longer and warmer summers already mean that the country is able to grow the kind of crops unheard of years ago. In the south, some farmers now produce hay, sheep farms have grown in size, and some supermarkets in the capital, Nuuk, sell locally grown vegetables in the summer. Major commercial crop production is still in its infancy, but Greenland's government has set up a commission to study how a changing climate may help farmers increase agricultural production and replace expensive imported foods. In 2012, potatoes grown commercially in southern Greenland reached over 100 tons, which was double the yield of 2008. According to government data, vegetable production in the region may double in 2013 compared with 2012.

As well as an interest in agriculture, the thawing of its ice sheets has seen a boost in mining and oil exploration, as global warming makes it easier to recover precious metals from glacial surroundings. The US Geological Survey projects that 22 percent of the world's untapped oil, natural gas and natural gas liquid reserves lie in the Arctic, as well as abundant deposits of minerals, including rare earth metals essential for modern technology. As oil and gas licenses for exploration are being issued, local communities will benefit from these new economic opportunities, as will oil companies. Though mining may bring economic opportunity, however, more oil and gas exploitation will also mean more fossil fuel burning, and greenhouse gas emissions. The pursuit of oil has begun particularly in western Greenland, which now faces significant environmental challenges arising from the extraction of oil in such a vulnerable and harsh environment.

In the considerations and negotiations associated with the recent inauguration of the Greenland self-government, a central element was that it would receive all revenue from mineral resource activities in Greenland, and thus it would have new sources of revenue available to keep pace with the diminishing revenue from the fishing industry. However, there is also speculation that, as the permafrost thaws, fish species such as cod and herring might move north because of warming oceans further south, and the growth in phytoplankton might also support new fisheries.

Other opportunities involve shorter sea routes that represent a boon for commerce, saving time and fuel. In August 2007, the Northwest Passage, a sea route through the Arctic Ocean which connects the Atlantic and Pacific Oceans, opened up to ships for the first time since 1972 when record keeping began. The passage provides a trade route thousands of miles shorter than trade routes through the Panama Canal. Icebreakers are also finding it easier to navigate through the thinner ice of the Northern Sea Route between East Asia and Europe, which is 40 percent shorter than crossing the Indian Ocean and going through Egypt's Suez Canal. With regard to protection, the International Maritime Organization (IMO) is currently developing the Polar Code, and it can be expected that there will be a sharp environmental focus on activities in the Arctic area in the years ahead regarding the navigation of oil tankers within international Arctic waters. The Polar Code will cover the full range of design, construction, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles. Although many environmental protection measures are already operational in Antarctica, they are not yet in effect in the Arctic.

SCOTLAND

The NPA programme area in Scotland includes Ramsar sites, Special Areas of Conservation, National Nature Reserves, Sites of Special Scientific Interest, Special Protection Areas and National Scenic Areas. Scotland's rich biodiversity is a major part of the country's identity, and many of its species and habitats are of international and European importance. A range of pressures have the potential to impact on Scotland's wildlife and biodiversity. Key issues include land-use pressures (i.e. loss or damage of natural habitats), nutrient deposition, exploitation of natural resources, pollution of air, water and land, increases in invasive non-native species, and the effects of climate change. Nevertheless, climate change may also favour certain species, potentially creating new opportunities for Scottish fisheries.

Agriculture remains the dominant land use in Scotland, covering 5.6 million hectares, equating to around 75 percent of the land area. However, agriculture is also a key source of diffuse pollutants, potentially impacting on the quality of rivers, lochs, coastal and transitional waters. Scottish soils are generally of good quality, and there is little evidence to suggest that serious soil erosion, compaction or other problems related to land management are occurring widely. Scotland contains a much higher proportion of organic soils than the rest of the UK.

Over half of Scotland's administrative territory is marine, for which the key pressures include climate change and acidification, source and diffuse pollution (particularly coastal and transitional waters), marine litter and invasive species. Work is currently ongoing to identify new Marine Protected Areas (MPA) in the seas around Scotland, which will protect important marine habitats and wildlife, geology and geomorphology, as well as features of cultural importance.

Trends in emissions in Scotland show that there was an overall decrease (-22.8 percent) in total greenhouse gas emissions from 1990 to 2010, but that between 2009 and 2010 there was an increase of 5.8 percent. The energy sector is one of the largest contributors to greenhouse gas emissions followed by transport, agriculture and related land use, and the domestic sector. With regard to reducing greenhouse gas emissions mitigation is required across a range of sectors and through changes in individual behaviour, including renewable energy generation, energy efficiency and changes in travel choices. The Scottish Government has the target of producing 100 percent of gross electricity and 11 percent of heat demand from renewable energy sources by 2020.

Scotland's water environment is in a good condition overall, but a wide range of problems exist at local levels. In terms of trends, environmental effects from industry are declining, whereas effects from urban development are increasing, in particular placing greater demands on urban drainage systems. Air quality in Scotland has improved considerably over the last few decades, though there are persistent issues with pollution from traffic and congestion in cities. In recent years concentrations of harmful pollutants in the atmosphere have fallen, achieved through tighter controls on pollutant emissions from industry, transport and domestic sources.

Flood risk is presented from numerous sources including pluvial, groundwater, rivers and coastal inundations. Flooding due to loss of floodplains from agriculture is manageable under current and new policies, but an increase in frequency and severity of flooding is likely as a result of climate change. With regard to sea-level rises, the land surface in most of Scotland is rising due to post-glacial rebound, but this is not expected to be sufficiently rapid to negate sea-level rise, which is anticipated

for almost the whole coastline, with the lowest levels of change on the Inner Clyde and sea lochs of Argyll, and the highest levels of change on Shetland, Orkney and the Western Isles.

Changes to landscape character in recent years is seen by some stakeholders as an important issue, principally resulting from a concentration of wind farms in certain areas, as well as continuing land abandonment. Changes in land use that can create direct or indirect pressures on biodiversity include energy generation, infrastructure enhancement, land and flood management, agricultural and forestry practices and expansion.

Future development is expected to prioritise sustainable locations for new development, seek to avoid flood risk, promote access to services, and provide good public transport links. Improvements to environmental quality should include providing good quality greenspace, remediation of derelict and vacant land and in relation to air quality avoid increases in or reliance on the private car. Climate change mitigation can also be supported through the development of renewable energy resources, reduced reliance on fossil fuels and wider support for the transition to a low-carbon economy.

IRELAND

There have been substantial reductions in Ireland's greenhouse gas (GHG) emissions in recent years, due in significant part to the economic downturn, and Ireland is on track to meet its Kyoto commitment. Air quality in Ireland continues to be good and remains among the best in Europe, due largely to prevailing clean Atlantic air and a lack of large cities and heavy industry. In 2010, measured values for key pollutants were below the limit and target values set out in legislation. Over the past decade, levels of particulate matter have decreased in cities and large urban areas, arising principally from improvements in vehicle engine technology. In comparison with other EU Member States, Ireland's water quality is above average.

In terms of biodiversity, the status of many habitats and some species is judged to be poor or bad in Ireland, and although progress has been made in the designation of EU protected areas, but the European Commission still considers Ireland's list of designated Natura 2000 sites as incomplete. More concerted effort is required to meet international commitments and integrate biodiversity across all sectors. The relative lack of heavy industry in Ireland means that Ireland has had fewer land contamination problems than most other EU countries. In recent years, Ireland has made significant progress in meeting most of the EU waste recycling and recovery targets, but the country is still over-reliant on landfill for the disposal of municipal waste and is also too dependent on external markets for disposal of hazardous wastes.

The principal cause of water pollution in Ireland is nutrient enrichment resulting in the eutrophication of rivers, lakes and tidal waters from agricultural run-off and discharges from municipal wastewater treatment plants. There is evidence of an overall improvement in water quality, but Ireland faces major challenges to achieve water quality targets set for 2015, 2021 and 2027 as required by the Water Framework Directive (WFD). Ensuring good quality in Ireland's water resources is vital for public health, the agri-food industry, tourism, and for inward investment.

Ireland faces considerable challenges in developing cost-effective and environmentally effective policies for the transport and agriculture sectors, which are predicted to account for 75 percent of non-ETS (emissions trading scheme) emissions in 2020. Technical opportunities to mitigate against

increasing emissions from agriculture (Teagasc, 2012) require behavioural and cultural changes at farm level, and therefore educational tools and advisory programmes will need to be established to realise their full potential. Ireland needs to refocus as a low-carbon economy while also ensuring that development is resilient to the impending consequences of climate change.

A central plank of Ireland's economic recovery centres on the development of a green economy that recognises the opportunities for investment and employment creation in sectors such as renewable energy, energy efficiency and waste and water management, and how this sustainable approach to economic development can complement the core strengths of the economy in the use of natural resources (DECLG, 2011). Key sectors that are usually identified with the green economy include renewable energy, energy-efficient products and services for buildings, lower-carbon transport, water/wastewater treatment, waste management, and green tourism. This sector of the overall economy is projected to grow strongly into the future providing opportunities for Irish-based companies to export relevant goods and services and also for Ireland to attract growing volumes of foreign investment.

Clean energy from renewable sources will be a critical pillar of the green economy. In 2011, the Sustainable Energy Authority of Ireland (SEAI) unveiled three energy roadmaps to 2050 focusing on the potential benefits of Ireland moving to a future energy system where electricity, managed via a smartgrid, and increasingly generated by wind, meets more of the country's energy needs, in particular for heat and transport. In parallel, a successful green economy will require a more environmentally sustainable approach to production and consumption, with a major focus on resource efficiency. Accordingly, resource efficiency is to be embedded across all sectors of the economy in Ireland. This will allow the economy to create more with less, deliver greater value with less input, and utilise resources in a way that minimises pressures on the environment.

Irish businesses are also becoming increasingly aware of the financial savings and competitive advantages that arise from adopting an environmentally sustainable and resource-efficient approach to their activities. This advantage comes by focusing on reducing energy costs, raw material costs and supply, and waste management costs. The most recent report of the National Waste Prevention Programme shows that in many cases resource-efficiency projects are resulting in significant commercial gains and savings for participants as well as positive outcomes for the environment.

NORTHERN IRELAND

Northern Ireland's first report on the State of the Environment provided new understanding of the overall pressures, identifying climate change, social and economic growth and rural land-use as significant issues for the future. The main pressures for land-use and land-take are developments related to housing, industry and recreation, infrastructure, mineral extraction industries, and tourism. A combination of agricultural intensification and expansion of urban areas (construction sites, roads and rail-building) in Northern Ireland have contributed to a reduction in diversity of vegetation cover, leading to an increase in soil erosion.

In 2009, 28 percent of all water bodies in Northern Ireland were classed as good or better, and by 2015 this will be 64 percent. Water bodies are affected by diffuse source pollution impacts from agriculture, forestry, and land drainage and urbanisation. In comparison, air quality in Northern Ireland has shown substantial improvement in recent years, but a number of pollutants continue to exceed air

quality objectives in some parts of the country. Air Quality Management Areas in Northern Ireland mostly relate to coarse particulate matter (PM₁₀) or nitrogen dioxide (NO₂) from domestic fuel combustion or road transport. There is a general shift from single sources to linear/nodal sources including transport.

In the effort to ensure clean, safe, productive and biologically diverse seas, mechanisms are being established for the protection of priority sites for marine conservation, robust monitoring and scientific advice will support the implementation of new marine legislation, and a network of protected marine sites will fully integrate with marine planning for balanced and sustainable use of resources.

Sustainable economic growth in Northern Ireland is intended to create a green economy that reflects the value of the environment and builds prosperity. Investment in the natural and built heritage should realise its full potential, ensuring that development decisions and business practices are guided by sound environmental principles and apply a risk-based approach. To generate a common understanding of the role the environment plays in health and wellbeing, the NI Environment Agency works with NGOs, educators and others to increase awareness of environmental issues and to encourage behavioural change.

To ensure sustainable practice that realises environmental and economic benefits, sector-specific guidance is being prepared on business resource efficiency, product design guidance so that less waste is generated, and pilot demonstration schemes that show local businesses how to minimise environmental impacts and promote best practice. The government is working in partnership with key stakeholders, land owners, NGOs and others to identify and develop strategic priorities. Other aspects include that businesses send less waste to landfill, that more waste is fully recovered to standards defined in quality protocols, that business uptake of accredited environmental management systems (EMS) standards is increased. In addition, strong sustainable agriculture is expected to deliver economic benefits while securing environmental protection.

With regard to the tourism sector, the value of Northern Ireland's natural and built assets for the economy should be fully realised through support for sustainable tourism, investment in a portfolio of properties of the most significant nature conservation or historic interest, encouragement of sustainable use and re-use of the historic environment and local materials, increasing sustainable tourism built on sound environmental principles, and increasing awareness of the benefits and contribution of places to sustainable economic growth.

SWEDEN

The overall goal of Swedish environmental policy is to provide the next generation with a country in which the major environmental problems have been solved, without increasing environmental and health problems outside Sweden's borders. This goal has been adopted by the country's parliament, along with 16 environmental quality objectives addressing themes such as clean air, a healthy living environment, and opportunities to enjoy nature.

Of the country's total land area of 45 million hectares, forest land is overwhelmingly the most common category, accounting for 53 percent, a share that has not changed significantly since 2000. However, the scope of agriculture has been changing over time, with a gradual reduction in the acreage of arable land, the greatest decline being in Norrland (and in southern Sweden's forested districts).

There is also an abundance of lakes and watercourses, with about 96,000 lakes greater than one hectare in size and about 300,000 kilometres of brooks, streams and rivers. Traditionally, the economy has been dependent on natural resources such as forests and ore, which continue to be of major importance. Most people – almost 85 percent of the population – live in towns and cities, which are generally located along the coast.

The major challenges for the environment include limiting climate impacts, dealing with marine eutrophication and stopping the loss of biological diversity. By the 2080s, the mean temperature in Sweden is expected to rise by 3-5° C as a result of climate change. At the same time, precipitation will increase, particularly in winter, and there will be a considerably greater risk of flooding, landslides and avalanches. In terms of its contribution, Sweden's national emissions are low, whether calculated per person or per unit of GDP, compared with most other developed countries. These relatively low emissions are largely due to the use of hydroelectric and nuclear power in electricity production and a significant use of biofuels, as well as an active climate and energy policy.

Between 2011 and 2012, emissions of greenhouse gases in Sweden fell by 5 percent to reach 58.3 million tonnes carbon dioxide equivalents.¹⁹ This is the lowest figure since the base year of 1990. Overall, according to preliminary data, emissions have decreased 20 percent since 1990, which is equal to 14 million tonnes carbon dioxide equivalents. In sectoral terms, emissions from the energy sector (production of electricity and district heating, solid fuels and refineries) decreased by 5 percent between 2011 and 2012, whereas emissions from industry decreased by 8 percent over the same period. The latter decrease is primarily due to reductions in the iron and steel industry, the pulp and paper industry and the chemical industry due to the weak economy and declining export figures. Emissions from road transport decreased by 4 percent between 2011 and 2012 due to the fact that new cars are more fuel-efficient than older ones, as well as a higher proportion of bio-fuels and a reduction of the total amount of traffic on the roads in 2012.

With regard to the marine environment, over 6 percent of the territorial sea off Sweden's coasts and 3.5 percent of the exclusive economic zone are protected, and many marine areas are included in the Natura 2000 network. However, eutrophication, heavy fishing and the emission of pollutants have had a major impact on the seas. A large, efficient fishing fleet is a drain on a finite resource, and illicit cod fishing also takes place, estimated at 10 percent of reported Swedish catches. The vast majority of emissions come from other countries, such as the nitrogen emissions of the international shipping industry. Swedish emissions of phosphorus and nitrogen primarily come from sewage and industries, and diffuse leakage from arable land. A large proportion of nitrogen also comes from transport, combustion and animal husbandry. Although emissions of the eutrophying substances of nitrogen and phosphorus have declined, there is no noticeable change in the marine environment, and concentrations of persistent organic environmental pollutants in fatty fish are still higher than the threshold for the sale of fish for consumption that the EU has adopted.

Other environmental trends include reductions in the acidification of Swedish lakes, watercourses and forest land, which is a good example of the positive effects of international agreements and purposeful environmental initiatives. Although sulphur and nitrogen fallout has been reduced, acidifying fallout must decline further to reach a level that does not damage land and water.

¹⁹ Press release 4/18/2013.

With regard to biological diversity, Sweden has a long history of nature conservation, including being the first country in Europe to create national parks. Following the requirements of the EU habitat and species directives, Sweden's network of Natura 2000 areas is now almost complete. However, despite significantly increased initiatives, the loss of species, natural habitats and ecosystem services continues to increase. The intensive exploitation of the landscape has led to impacts on crucial environments, and it is difficult to reverse this trend. One example of this is farming land, parts of which are used increasingly intensively, while others become overgrown or are planted with forest. Nevertheless, there are also instances of nature conservation efforts having positive effects on biological diversity in lakes, watercourses and certain wetlands, measured by reductions in emissions of acidifying substances and the establishment of new wetlands.

ICELAND

Iceland has an area of 103,000 kilometres and is the second largest island in Europe after Great Britain. Situated just south of the Arctic Circle, the climate is characterised by relatively mild winters and cool summers, and the mean temperature is considerably higher than one might expect at this latitude. Glaciers cover more than 11 percent of the area, and glacial erosion has played an important part in giving the valleys their present shape, and in some areas the landscape possesses alpine characteristics. Regular monitoring has shown that all glaciers in Iceland are presently receding.

There are numerous rivers and lakes in Iceland, covering about 6 percent of the total land area. Freshwater supplies are abundant, but the rivers flowing from the highlands to the sea also provide major potential for hydropower development. Soil erosion and desertification is a problem, and more than half of the country's vegetation cover is estimated to have disappeared due to erosion since the settlement period. This is particularly due to clearing of woodlands and overgrazing, which have accelerated erosion of the sensitive volcanic soil, and remnants of the former woodlands now cover only about 1 percent of the surface area. Systematic re-vegetation began more than a century ago, and reforestation projects have been numerous in the last decades, with active public participation.

Iceland has access to rich marine resources in the country's 758,000 km² exclusive economic zone. The abundance of marine plants and animals results from the influence of the Gulf Stream and the mixing of the warmer waters of the Atlantic with cold Arctic waters. Approximately 270 fish species have been found within the Icelandic 200-mile exclusive economic zone; about 150 of these are known to spawn in the area. A comprehensive fisheries management system based on individual transferable quotas has been developed to manage fish stocks and promote conservation. In 2010, emissions from fisheries were 18 percent below the 1990 level and 10 percent below the 2009 level.

Approximately one-fifth of the total land area of Iceland is suitable for fodder production and the raising of livestock. Production of meat and dairy products is mainly for domestic consumption. The principal crops have been hay, potatoes and other root vegetables, but cultivation of other crops, such as barley and oats, has increased rapidly in the last 10 years. Emissions from agriculture are closely coupled with livestock population size. Since 2005, emissions from agriculture have increased by 6 percent due to an increased in livestock population size but still remain 8 percent below 1990 levels.

During the past 20 years, increased emphasis has been placed on conserving diversity and threatened habitats in Iceland, especially through protected areas but also for example by influencing practices used in agriculture, afforestation, road construction, power plants and reservoirs. At present,

birch forests and shrub-land cover approximately 1 percent of Iceland. The primary threat to terrestrial flora is overgrazing and consequent loss of vegetation cover by erosion. Soil and vegetation conservation has been one of the conservation priorities in Iceland for several decades, with extensive recovery programmes in eroded areas. Natural wilderness areas and high biological diversity are important ingredients for recreation and enhanced tourism. About 72 bird species nest regularly in Iceland. The arctic tern is one of Iceland's most common seabird species, with colonies in all parts of the country and especially in coastal regions.

Per capita waste has steadily increased in the last decade. Growing consumption seems to be the main explanation for this trend. The increase is greater among companies than households. Waste was responsible for 5 percent of the total greenhouse gas emissions in Iceland the year 2010.

Geothermal heat and hydropower account for more than 70 percent of the country's primary energy consumption. Emissions from geothermal energy utilisation accounts for 4 percent of the total greenhouse gas emissions in Iceland in 2010. The use of fossil fuel for stationary energy is almost non-existent but fossil fuels are used for transport on land, sea and in air.

Three features stand out that make the Icelandic greenhouse gas emissions profile unusual. First is the high proportion of renewable energy of the total amount of energy used. Second, emissions from the fishing fleet are about one-fourth of total emissions. Third, individual sources of industrial process emissions have a significant proportional impact on emissions at the national level, due to the small size of the economy.

In Iceland's obligations according to the Kyoto Protocol for the first commitment period, from 2008 to 2012, greenhouse gas emissions should not increase by more than 10 percent from the 1990 level. Since 2008, emissions have decreased by 5 percent in 2009 and by 3 percent in 2010. The largest contributor of greenhouse gas emissions in Iceland in 2010 was the energy sector, accounting for 41 percent (fuel combustion 37 percent and geothermal energy 4 percent) of the total national emissions, industrial processes, accounting for 40 percent, and agriculture for 14 percent. The waste sector accounts for 5 percent and solvent and other product use for 0.1 percent.

According to the Environment and Food Agency's emissions forecasts up until the year 2020, it is very likely that Iceland will remain within its Kyoto obligations. The Icelandic Government has set long-term goal to reduce net GHG emissions by 50-75 percent from net 1990 levels by the year 2050.

It is uncertain what impact climate change will have in Iceland. Natural fluctuations in temperature are greater in the North Atlantic than in most other oceanic areas, so the impact of increasing temperatures due to the greenhouse effect will differ depending on the direction of the short-term natural fluctuation. An increase in temperature could have some positive effects on marine resources and fish stocks, but more insects could increase risks of disease in both plants and humans, which would be a negative impact. A worst-case scenario for Iceland would be if climate change led to major disruption in ocean circulation that had negative impacts on fish stocks.

NORWAY

Whereas income from the Norwegian oil and gas industry has resulted in a considerable increase in living standards in the last 20 to 30 years, and it is the main reason for Norway's favourable economic position, oil and gas production has been the main cause of increased carbon dioxide emissions in

Norway since 1990. Total greenhouse gas emissions increased by nearly 6 percent from 1990 to 2011, with emissions from the oil and gas industry increasing by 73 percent and emissions from road traffic increasing by nearly 30 percent. Emissions from manufacturing industries fell by almost 38 percent, and emissions from agriculture and landfills also decreased. Up to 2020, emissions from the oil and gas industry are expected to remain at about the current level, and then to decline towards 2030. However, emissions from the transport sector from manufacturing industries are expected to continue to grow.

Many changes caused by climate change have already been observed in the Norwegian natural environment, and major changes are expected to occur in future. Traditional recreational opportunities, such as skiing, may disappear in some areas. In some instances, climate change can reinforce the negative consequences of other pressures resulting in the destruction of habitat, the spreading of alien species, pollution and overuse of natural resources. As the climate warms up, indigenous species and ecosystems may be negatively affected, especially those that are already vulnerable and threatened. Large parts of the mountains will develop forest cover in the long run, and the growing season will be considerably longer. More frequent and intense precipitation can cause problems for agriculture and may cause erosion. In general, floods are expected to increase in extent, but with great local variations. Sea acidification is also likely to accelerate.

With regard to waste volumes generated by economic growth, in recent years more waste has been recovered and emissions from the waste sector have been reduced. Twenty years ago, it was common to landfill most of the waste in Norway. Since then, the proportion of the waste that is landfilled has decreased, while the proportion that is recovered has increased correspondingly. In 2011, approximately 87 percent of all waste was recovered. Material recovery and biological treatment account for 39 percent of the waste recovered, and about 30 percent is incinerated with energy recovery.

The Norwegian coastline, including the fjords and islands, is more than 57,000 kilometres long. About 80 percent of the population live in the coastal areas. The coastal zone and the coastal resources have played, and still play, a major role for settlement, employment and the national and regional economy. Significant activities in the coastal zone include fisheries, aquaculture, sea transport, tourism and recreation, and this spatial concentration creates a range of environmental pressures. In response, Norwegian land-use planning has developed Integrated Coastal Zone Management (ICZM), which promotes a holistic, collaborative and bottom-up approach involving all relevant stakeholders. The main objective is to ensure sustainable development of the coastal resources, both for the benefit of the coastal communities and for the nation as a whole.

Eutrophication in coastal waters and fjords in Norway is caused by discharges of nutrients particularly from fish farming, but also through runoff from agricultural areas and inputs from industry and municipal wastewater treatment. In addition, there is long-range transport of nutrients with ocean currents from more southerly parts of Europe. The latter process has particularly marked effects along the Skagerrak coast, but also influences the coastal waters of Western Norway. The input of nutrients to coastal waters are expected to rise with climate change, which will entail higher erosion rates and more leaching of nutrients from soil, because precipitation is expected to rise, especially in winter; and winter temperatures are expected to fluctuate more, resulting in repeated freezing and thawing of

agricultural areas. Both of these factors are likely to increase the amounts of nutrients leached from soils and transported to coastal waters.

Norwegian coastal waters can be divided into four main areas: the Skagerrak, the North Sea, the Norwegian Sea and the Barents Sea, with different levels of nutrient inputs. Fish farming is the largest source of nutrient inputs to the Norwegian Sea, the Barents Sea and the North Sea. Discharges are highest in the Norwegian Sea, where fish farms account for almost half of Norway's total phosphorus releases. The absolute rise in inputs has also been highest in the Norwegian Sea, as phosphorus inputs have tripled since 1998. The situation in the Skagerrak is different, with agriculture and municipal wastewater being the largest sources of nutrient inputs, and they have been fairly stable since 1990.

Norway's marine areas cover approximately 2 million km², including areas surrounding the Svalbard archipelago and the island of Jan Mayen. In addition to this the Norwegian coastline is among the longest of any country in the world. The coastal waters are rich in flora and fauna, and the adjacent marine areas are some of the most productive in the world. The state of Norway's marine areas is generally good, but they are under growing pressure from human activities such as aquaculture, extensive fishing and oil and gas production. Climate change and ocean acidification are emerging threats, but so far little research has been done on the possible impacts of these changes. Norway has developed an integrated and ecosystem-based approach to the management of marine areas, addressing the Norwegian part of the Barents Sea/Lofoten area (presented in 2006 and updated in 2011), the Norwegian Sea (2009) and the Norwegian part of the North Sea/Skagerrak area (to be finalised in 2013).

Because Norway is a long and narrow country, it has extensive transport needs. The use of private cars has increased fivefold over the past 40 years. Journeys by public transport only accounted for 8 per cent of the population's travels in 2005. Norwegians also fly more frequently and further, especially abroad. Emissions from journeys abroad are not included in the Norwegian emission inventory. Because of global warming, which results in more fairways, there is an increased risk of oil spills along the Norwegian coast.

The Arctic environment is under growing pressure from human activity. Tourists are heading deeper into the wilderness, and more and more people wish to experience the untouched nature that can only be found in polar regions. Commercial and industrial activities are also expanding further into the Arctic, and new technology is giving access to areas and resources that were once out of reach. Because the Arctic environment is so vulnerable, it is increasingly important to investigate the Arctic ecosystems and the impacts of these developments. Norway has set ambitious goals for its management of the Arctic environment, one of which is for Svalbard to become one of the best-managed wilderness areas in the world.

FINLAND

The programme area within Finland is characterised by high-quality Arctic scenery, encompassing unique nature and a wide range of natural resources. Given the environmental endowments, there is considerable scope for the promotion of renewable energy resources in accordance with nature protection (the area is self-sufficient in energy), and there is scope to operate on the basis of a bio-

based economy. It also provides a safe environment that could be developed for recreational purposes.

Potential and actual threats result from the tendency to utilise natural resources without a sustainable development (ecological, social and economic) perspective, climate change multiplier effects and unforeseen effects (such as flooding), conflicting interests associated with land-use, unforeseen environmental risks for business, and declining population in sparsely populated areas. There is also inadequate information on environmental resources, inefficient use of resources, and a lack of opportunities to develop alternative methods for environment-friendly practices. Multi-objective environmental impact assessments have been few in number and they have generally been of poor quality, and existing environmental damage is not being treated.

In Lapland, where the cornerstones of the economy are tourism, the steel and metal industry, the mining industry, reindeer husbandry and forestry, as well as the emerging energy sector, the role of mineral prospecting and mining has become more prominent in the last few years. The ore resources in Lapland are considered to be among the richest in Europe, new mines have been opened and new ones are currently being planned. A particular threat is represented by mining for gold, nickel and other minerals, for example in the area of Viiankiaapa, which is part of the Natura 2000 network of ecological sites. This region contains exceptional biodiversity, including 21 endangered birds and 9 endangered plant varieties amongst the marshy reserve's flora and fauna. Whereas the Finnish Government anticipates new jobs and investment, periodic accidents during the extraction process are damaging the area's fragile wetland ecosystem. In addition, in towns such as Sodankylä and Kusamo, toxins from tailings are seeping into surrounding lakes and rivers, and test-drilling for gold mining – which is associated with radioactive (uranium) residues – has commenced adjacent to a popular ski resort.

With regard to the Arctic's unique species, sensitive ecosystems and cultural biotopes, there is a need for restoration, preservation and improvement, alongside the restoration of water bodies and their catchment areas, preservation and fostering the world's northernmost agriculture and forestry with species that are genetically adapted to cold and long winters and short but long-daylight growing seasons. There is also a need for proactive promotion in landscape management of conditions for recreation and sustainable tourism, as well as coordination of overlapping forms of land-use, promotion of the ecologically sustainable use of renewable natural resources and enhancement of its social acceptability, enhancement of Arctic environmental knowledge and increased information and awareness-raising activities, enhancement of environmental research and application of the results in business and innovation, promotion of the low-carbon economy in all sectors, avoiding and preventing environmental damage from mining and conflicts with other activities, and improving the quality of environmental, social and regional economic impact assessment in Arctic conditions.

FAROE ISLANDS

For the Faroe Islands, global climate models have projected an increase in the mean annual temperature of approximately 3°C for 2071-2100 compared to 1961-90, with only small differences in temperature rise between winter and summer. Precipitation levels in the region are generally expected to increase, with a small increase in precipitation of around 4 percent in the Faroe Islands.

Fisheries and fish farming constitute the most important economic sectors in the Faroe Islands. The dominance of these sectors makes the impact of climate change on fisheries and fish farming especially important to understand and, where possible, plan for. Many coastal and marine ecosystems are already under pressure from various human activities that result in pollution, overfishing and damage and loss of habitats. The potential effects of climate change, along with other pressures, render marine ecosystems particularly vulnerable.

Climate change in terms of severe weather, a rise in sea levels, coastal erosion, increased precipitation and runoff could also affect energy production and potentially damage existing sites. Sea level rise will also affect existing harbours. Nevertheless, climate change could also have positive effects on the production of energy. As electricity production in the Faroe Islands is substantially based on hydropower (34 percent in 2012), the increased precipitation and a substantial increase in runoff during winter in large parts of the hydropower production areas could yield higher potential for hydropower production.

The exceptional natural environment is an important asset for the tourism sector in the Faroe Islands. In 2007, the *National Geographic* declared the Faroe Islands to be the most appealing and unspoiled islands in the world. Given the region's fragile environment, tourism development must be carried out under sustainable conditions. The Faroe Islands have made efforts to develop the tourism industry as a way to diversify the economy, but it still represents a small share of economic activity. There is scope to develop tourism further, based largely on local resources, and to create new job opportunities and supplement tourism-related activities. However, the development of tourism is constrained by factors linked to the peripheral location.

3.3 Summary Environment SWOT

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> • Abundance of natural resources • Unspoilt environment • Quality of life and wellbeing • Biological diversity • Existing and potential scope for recreation and tourism • High-quality raw materials (forests, minerals etc) • Wide range of sources for renewable energy production (e.g. biomass, wind, wave, hydro, geothermal) 	<ul style="list-style-type: none"> • Inadequate information on environmental resources • Inefficient use of resources • Limited quality of environmental impact assessments • Untreated environmental damage • Eutrophication • Greenhouse gas emissions (in some countries and sectors) • Inadequate biodiversity protection (in some countries)
OPPORTUNITIES	THREATS
<ul style="list-style-type: none"> • The green economy • New employment opportunities by investing in renewable energies and environmental technology • Recycling and energy efficiency • Sustainable tourism/Eco-tourism • Green products and services development, including public goods • Capitalising on the opportunities from climate change, such as new agricultural opportunities and new sea routes • Unexplored natural resources (e.g. the ocean and minerals) 	<ul style="list-style-type: none"> • Failure to exploit natural resources in a sustainable manner • Slow transition to a low-carbon economy • Increasing energy costs • Pollution of air, water or land • Natural disasters and extreme weather • Coastal erosion • Rising sea levels and flooding • Rising surface temperatures • Reduced/increased precipitation • Acidification • Oil and mineral extraction processes

4. STRATEGIC ENVIRONMENTAL ISSUES

4.1 Introduction

This section identifies environmental issues considered to have a strategic dimension in the context of the Northern Periphery and Arctic Programme for 2014-2020. In particular, these issues illustrate existing conditions as well as trends that will occur or continue to occur without implementation of the NPA programme. The following sub-sections highlight concerns, challenges and pressures, in addition to on-going mitigation measures.

The range of themes, which reflects the environmental factors reviewed in the previous section, is categorised under four headings:

- Climate and Arctic change
- Land-use management
- Energy and resource efficiency
- Marine pollution.

The potential for the NPA programme to impact on these issues is addressed in Section 5, reviewing the scope for significant effects that require investment to prevent or mitigate negative impacts or to support and secure positive impacts.

4.2 Climate and Arctic Change

Across the NPA programme area, a range of impacts is anticipated from continued climate change. These include drier summers, changes in species migration patterns and more pressure on biodiversity, changes in sea temperatures, more extreme weather events, and increased coastal and inland flooding. Flooding is particularly highlighted as likely to increase in frequency and severity, for example in Scotland as rises in sea level are expected to affect almost the whole coastline, some areas worse than other, in Greenland as sea-level rises threaten coastal infrastructure, and in Sweden as greater precipitation sees increasing risks of flooding, landslides and avalanches. By contrast, less rain in Greenland might require irrigation works in future to sustain the anticipated levels of commercial crop production.

These challenges highlight the need for capacity-building and a better understanding of the process of climate change as well as its economic impacts. Evidently, a more integrated and pro-active response is required, with better-developed risk prediction methodologies that incorporate multiplier effects. Consideration should also be given to the scope for future-proofing new development from climate change through location, layout and building design.

Climate change mitigation can be supported through the development of renewable energy resources, reduced reliance on fossil fuels, and wider support for the transition to a low-carbon economy (a theme which is addressed here as a separate issue). Furthermore, there is already evidence of positive outcomes from climate change, such as the increased scope for agriculture in

Greenland, and projects could orient their focus to encompass the potential to be derived from currently unfolding and future scenarios.

In the last 40 years, the planet has warmed about 0.8° C, but the Arctic has been warming twice as fast due to the Gulf Stream's warmer waters, 24-hour sunlight in summer, and more exposed ocean that absorbs the sun's radiation. In September 2012, the extent of the Arctic Ocean's ice cap reached a new low, shrinking to 1.32 million square miles, 300,000 square miles less than the previous record low set in 2007. Some scientists believe that, at this rate, the Arctic could be ice-free by 2030 or even earlier.

As the sea ice melts, the Arctic's reflective white cover is replaced by dark ocean water that absorbs more of the sun's heat, warming the ocean and contributing to further melting. Even when ice remains, if it is thin, sunlight penetrates it and warms the water. Melting sea ice does not directly contribute to sea level rise (because the ice is floating and displaces its weight in water), but the expansion of warmer waters does. Moreover, the warmer water and air are accelerating the melting of the 1.9-mile-thick ice sheet that sits atop most of Greenland, which also adds to sea-level rise. In July 2012, 97 percent of the ice sheet experienced some degree of melting, and as it melts, the exposed land absorbs more sunlight. If the ice sheet melts completely, global sea levels could rise 20 feet.

Much of the Arctic is covered by permafrost, soil at-or-below the freezing point of water for two or more years. Permafrost stores carbon from dead plants, and the cold prevents microbes from decomposing the organic matter. It is estimated that Arctic permafrost holds 1.7 trillion tons of carbon — more than all human activity has generated since the start of the Industrial Revolution. As warmer temperatures thaw the permafrost, the organic matter will decay and releases carbon dioxide and methane, a heat-trapping gas 23 times more potent than carbon dioxide.

Reflecting the issues described above, the Arctic Biodiversity Assessment published by the Arctic Council in 2013 highlighted the impact of climate change amongst its key findings, describing it as by far the most serious threat to Arctic biodiversity and one that exacerbates all other threats. The total loss of some key habitats such as multi-year pack ice is expected within a process of rapid change and transition in which new combinations of species are already altering Arctic ecosystems. Greater accessibility is also bringing other stressors to the region, and pollution from both long-range transport and local sources threatens the health of Arctic species and ecosystems. Significantly, the study also concluded that the transboundary challenges facing Arctic biodiversity are interconnected, requiring comprehensive solutions and international cooperation to conserve biodiversity in a holistic fashion.

Nevertheless, there are benefits as well as challenges from climate change impacts on the Arctic environment. Greenland already has new opportunities related to the growth of crops and vegetables, which can increase agricultural production and sustainability by allowing the consumption of own locally-grown produce, so requiring fewer imports and consequently less transportation. Shorter sea routes already offer savings in time and fuel, generating the need for observation of the environmental aspects of the Polar Code for oil tankers in international Arctic waters as well as support for environmental protection measures.

In addition, the Arctic's new accessibility will bring more trade, tourism and scientific research, and greater accessibility of natural gas and minerals with the associated increased revenue from exploitation and the issue of commercial licenses. Ultimately, however, from a global perspective, the

latter extraction activity will mean more emissions from fossil fuel consumption, creating a larger footprint and undermining elements of sustainability.

Care will be needed in the extraction process to avoid man-made disasters such as pollution and oil spills, and shipping accidents. The challenge will be to find a balance between the threats to the Arctic that warming represents and the opportunities it provides. There is a need for preservation of the Arctic's unique species and sensitive ecosystems in the programme area, to increase Arctic environmental knowledge and to strengthen awareness-raising in this field. Impact assessments (environmental, social and regional) are required to maintain and improve quality in the Arctic conditions.

4.3 Land-Use Management

Management of the wider landscape is important for maintaining biodiversity levels, particularly relevant for dominant land-use types such as agriculture and forestry. The wide range of issues to consider includes maintaining wild lands, retaining traditional buildings, reducing the dominance of single land-use types in the landscape (such as renewable energy and forestry) and retaining the distinctiveness of mixed agricultural landscapes and upland areas.

In practice, land-use pressures on biodiversity continue to result in loss or damage to natural habitats. In Scotland, for example, threats to biodiversity include, inter alia, the exploitation of natural resources, invasive non-native species, energy generation, infrastructure enhancement, and agricultural and forestry practices. In Iceland, clearing woodlands and overgrazing have resulted in soil erosion and desertification, creating a need for re-vegetation projects that emphasise the conservation of biodiversity and threatened habitats. In Sweden, where stopping the loss of biological diversity has been identified as a main challenge, the exploitation of the landscape has led to direct and negative impacts on vulnerable environments. Nevertheless, there have also been positive impacts in Sweden, as nature conservation efforts have improved biodiversity in lakes, watercourses and wetlands.

Agriculture has proved to be a key source of diffuse pollutants, with nutrient enrichment from agricultural run-off and discharges from wastewater treatment plants resulting in the eutrophication of rivers, lakes and coastal and transitional waters in Scotland and Ireland, for example. There is also the danger that groundwater may also be polluted by agricultural use of fertilisers, manures and slurries. In comparison, the agricultural intensification and urban area expansion (construction, roads, railway-building) in Northern Ireland have reduced the diversity of vegetative cover, leading to increased soil erosion. Overall, behavioural and cultural changes are needed at farm level, which requires educational tools and advisory programmes.

There are concerns about the impacts of mining (and any extractive industry in general) on water resources, soil, the landscape and biodiversity in general. These issues relate particularly to Lapland, Northern Sweden and potentially large areas of Greenland. For instance, interest in mining and oil exploration has increased in Greenland following the thawing of ice-sheets, with a view to recovering oil, gas and minerals from glacial surroundings. Mineral extraction industries also exert pressure on the environment in Northern Ireland, and in Finland, where mining for gold, nickel and other minerals is taking place within the Natura 2000 network of ecological sites. Another aspect concerning extractive industries is the threat of radioactive materials (mainly uranium) remaining in the mine

areas for decades after the closure of the mine. Some observers consider these threats to be as significant as the immediate threats of agriculture, wind farms, or oil drilling. As a consequence, it is important that the future programme should not support initiatives that would promote these threats.

Landscape character is also being threatened by a number of factors. These potentially include intensive farming, infrastructure improvements, land and flood management, forestry practices, the concentration of wind farms, and land abandonment. There is also evidence that the pressures on soil have been increasing through more intensive land management and changes in land use. Conditions in Finland, where a sustainable development methodology has been lacking and environmental impact assessments have been of limited quality, have highlighted the need for proactive promotion in landscape management conducive for recreation and sustainable tourism, as well as coordination of overlapping forms of land-use, promotion of the ecologically sustainable use of renewable natural resources and enhancement of its social acceptability, and the enhancement of Arctic environmental knowledge.

Future perspectives in Scotland include the need to provide good quality green space, and remediate derelict and vacant land, whereas future investments in the natural and built heritage in Northern Ireland are expected to emphasise sound environmental principles. There is also an impetus in Northern Ireland to invest in properties of most significant nature conservation or historic interest, to have sustainable re-use of the historic environment and local materials, and to increase sustainable tourism.

4.4 Energy and Resource Efficiency

The drive towards the low-carbon economy comprises a key theme for investment. The energy sector is one of the major contributors to greenhouse gas (GHG) emissions, and in some countries it makes the greatest contribution of all sectors. Recent trends in emissions indicate that countries within the NPA programme area have recorded significant improvements in relation to 1990 levels, but further behavioural change is required. For example, there have been substantial reductions in Ireland's GHG emissions in recent years, and in Scotland there was an overall decrease from 1990 to 2010, but an increase between 2009 and 2010. In Sweden, emissions of GHGs fell by 5 percent between 2011 and 2012 to reach the lowest figure since the base year of 1990 (from which there has been a total reduction of 20 percent), and in Iceland emissions decreased by 5 percent in 2009 and by 3 percent in 2010. However, in Norway, GHG emissions increased by nearly 6 percent from 1990 to 2001, and emissions from the oil and gas industry are only expected to decline towards 2030, while manufacturing and transport emissions are expected to continue to grow.

There is a clear need and considerable scope to develop renewable natural resources, promote ecological sustainability and gain social acceptability for these activities. Overall, with effective promotion of low-carbon activities in all sectors, countries that take a pro-active role in developing a sustainable green economy are more likely to be successful in the future global economy. For example, Ireland's strategy for the development of a green economy recognises opportunities for investment and employment-creation in sectors such as renewable energy and energy efficiency, low-carbon transport, waste management and green tourism. Clean energy from renewable sources will be critical to this vision, currently outlined in energy roadmaps illustrating the potential benefits of future alternative energy systems. In comparison, in the Faroe Islands, increased precipitation from climate change may lead to opportunities for increased electricity production based on hydropower.

Resource efficiency is an area of European policy that has significantly increased in importance during the current programming period, and the focus on using resources in a sustainable manner while minimising impacts on the environment is at the heart of the Europe 2020 Strategy. Resource efficiency is a powerful driver for mainstreaming environmental considerations across the range of economic sectors. By focusing on raw materials such as fuels, metals and biomass, as well as the air, water and soil ecosystems that support them, resource efficiency reduces inputs – creating more for less – and minimises waste in economic activities while also addressing environmental objectives. This approach extends equally to the public and private sectors. Businesses in Ireland are generating financial savings and competitive advantages from adopting an environmentally sustainable and resource-efficient approach to their activities, focusing on reducing the costs of energy, raw materials and waste management. Similarly, in Northern Ireland, sector-specific guidance addresses business resource efficiency and product design, while pilot projects promote best practice and demonstrate how businesses can minimise environmental impacts.

Awareness-raising activities may highlight the potential benefits for individual companies through the adoption of environmental management systems, as well as broader benefits through implementation of the waste hierarchy (reduces, reuse, recycle) within relevant sectors and the protection of finite resources such as soil.

4.5 Marine Pollution

A number of pressures are impacting on the marine environment, with pollution as the major outcome. Source and diffuse pollution, particularly in Scotland's coastal and transitional waters, constitutes a key pressure, alongside marine litter and invasive species. In comparison, in the Republic of Ireland, nutrient enrichment is the principal cause of water pollution, as agricultural runoff and discharges from wastewater treatment plants result in the eutrophication of tidal waters. In Sweden, although many marine areas are included in the Natura 2000 network, tackling marine eutrophication is also regarded as a major challenge, and the emission of pollutants has had a major impact on the seas. Whereas the vast majority of emissions come from other countries, such as the nitrogen emissions of the international shipping industry, Swedish emissions of phosphorus and nitrogen primarily come from sewage, industry and diffuse leakage from arable land, and a large proportion of nitrogen also comes from transport, combustion and animal husbandry. Emissions of these eutrophying substances have declined, but there is no noticeable change in the marine environment, and concentrations of persistent organic environmental pollutants in fatty fish are still higher than the permitted EU threshold.

Norway's marine areas are under growing pressure from human activities, and eutrophication in coastal waters and fjords in Norway is caused by discharges of nutrients particularly from fish farming, but also through runoff from agricultural areas and outputs from industry and municipal wastewater treatment. The input of nutrients to coastal waters is expected to rise with climate change, which will entail higher erosion rates and more leaching of nutrients from soil, because precipitation is expected to rise, especially in winter, whereas winter temperatures are expected to fluctuate more, resulting in repeated freezing and thawing of agricultural areas. Both of these factors are likely to increase the amounts of nutrients leached from soils and transported to coastal waters. With regard to the seas, fish farming is the largest source of nutrient inputs to the Norwegian Sea, the Barents Sea and the North Sea. Discharges are highest in the Norwegian Sea, where fish farms account for almost half of

Norway's total phosphorus releases. Phosphorus inputs in the Norwegian Sea have tripled since 1998.

In the Faroe Islands, coastal and marine ecosystems are under pressure from various human activities that result in pollution, overfishing and damage and loss of habitats. The potential effects of climate change, along with other pressures, render marine ecosystems particularly vulnerable.

To address this issue, work is on-going to identify new Marine Protected Areas (MPA) in the seas around Scotland, which will protect important marine habitats and wildlife, geology and geomorphology, as well as features of cultural importance. Mechanisms are also being established for the protection of priority sites for marine conservation in Northern Ireland, in an effort to ensure clean, safe, productive and biologically diverse seas. In that national context, robust monitoring and scientific advice will support the implementation of new marine legislation, and a network of protected marine sites will fully integrate with marine planning for balanced and sustainable use of resources. Norway has developed an integrated and ecosystem-based approach to the management of marine areas, addressing the Norwegian part of the Barents Sea/Lofoten area, the Norwegian Sea and the Norwegian part of the North Sea/Skagerrak area. The development of marine strategies in EU member countries, in accordance with the EU Marine Strategy Framework Directive, provides practical opportunities for transnational cooperation.

5. ENVIRONMENTAL ASSESSMENT

5.1 Introduction

At this stage in programme development, the exact locations, nature and impacts of actions cannot be identified, as this depends on specific projects that will support the delivery of the programme strategy. Accordingly, the approach of this report is to provide an indication of the range of potential impacts and highlight ways in which positive impacts can be generated and negative impacts minimised.

The methodology of environmental assessment divides the task into several components. Following a description of how environmental objectives formed an integral part in the programme's evolution, the vision and priorities are assessed for environmental conformity with the Europe 2020 Strategy and the proposed EU Seventh Environmental Action Programme. This extends into an appraisal of the programme objectives within the priorities, in each case reviewing a range of effects from positive impacts resulting in environmental gain through to negative outcomes requiring mitigation.

Thereafter, consideration is given to likely significant effects, the scope for mitigation measures, and corresponding indicators that would facilitate the monitoring of environmental effectiveness.

5.2 Alternatives

The consideration of alternative scenarios was facilitated within the programming process through interaction between the ex-ante evaluators and the Programme Planning Group. This included an appraisal of the appropriateness of the 11 thematic objectives proposed by the European Commission, in the effort to identify the best fit through a combination of the four most relevant objectives for the Northern Periphery and Arctic Programme.

The evaluative process of weighing the options resulted in the selection of objectives 1, 3, 4 and 6, the latter two being environment-related: objective 4, on supporting the shift towards a low-carbon economy, and objective 6, on protecting the environment and producing resource efficiency. With regard to objective 4, the programme area was considered to have high potential for the further development of renewable energy. In particular, the programme could be active in focusing on how remote communities and businesses can work to address the issue, while also supporting actions under thematic objectives 1 and 3. With regard to objective 6, the programme area was acknowledged to contain unique environments and numerous primary resources to be handled in a sustainable and sensitive manner. However, as the reality is complex and large-scale, the required interventions would be beyond the capacity of local and regional authorities. In this context, the NPA programme can contribute by fostering the exchange of experience and capacity-building among public actors.

Objective 5, which relates to promoting climate change adaptation, risk prevention and management, was also considered. The programme area is facing the immediate and direct impacts of climate change, but this is also a field in which the area holds specific expertise. However, many of the significant and substantive measures required to respond to climate change are beyond the scope of the programme, and the programme goals must be set in line with its resources. It was concluded that interventions that address this issue and which meet the programme's resources and rationale could be funded through thematic objective 1. Furthermore, seen in relation to the proposed investment

priorities within the EU guidance (mainly direct investments in relation to climate change adaptation), this thematic objective was assessed as having minor relevance for the NPA programme.

For objective 7, which relates to sustainable transport, the NPA programme was assessed as having limited scope to address issues and deliver results in this area, due to the small number of large urban areas and the relatively modest financial resources available to the programme.

In a further initiative, a horizontal principles workgroup was set up to explore the meaning and application of sustainable development for the new programme. Reviewing the region's natural resources, it identified considerable opportunities for activities based on synergies between different resources in areas such as the green economy, renewable energy and eco-tourism. Objectives proposed for the programme included: pursuing a better quality of life through investment in, and the sustainable use of, natural, human, economic and manufactured resources; and contributing to a better consideration of the environmental, societal and economic interdependence of operations, so that they impact positively on each other and generate win-win outcomes. In September 2013, following a focus group consultation, the Programme Planning Group took the decision to re-name the horizontal principle of sustainable development to become 'environmental sustainability'.

5.3 Appraisal of Programme Elements

Table 8: NPA Programme Environmental Conformity and Potential Impact

PROGRAMME ELEMENT	CONFORMITY WITH EUROPE 2020 STRATEGY & 7 th ENVIRONMENTAL ACTION PROGRAMME (EAP)	POTENTIAL IMPACT ON STRATEGIC ENVIRONMENTAL ISSUES
<p>Vision</p>		
<p>The NPA Programme 2014-20 aims to expand regions' horizons, building on concrete outcomes, and enabling the NPA area to be a first-class region in which to live, study, work, visit and invest.</p> <p>The programme will generate vibrant, competitive and sustainable communities by harnessing innovation, expanding the capacity for entrepreneurship, and by seizing the unique growth initiatives and opportunities of the Northern and Arctic regions in a resource-efficient way.</p>	<p>Conforms with the Europe 2020 strategy for smart, sustainable and inclusive growth, facilitating a greener, resource-efficient and competitive economy, appropriate for a low-carbon scenario, and offering scope to prevent environmental degradation, biodiversity loss and the unsustainable use of resources. Links directly with EU 2020 Flagship initiatives for Innovation Union, Resource-efficient Europe, and Industrial Policy for the Globalisation Era.</p> <p>Supports the 7th Environmental Action Programme's pursuit of an inclusive green economy and the regional dimension of cooperation between neighbouring countries, including international, regional and bilateral processes that increase EU effectiveness in addressing regional and global environmental and climate challenges. Also contains scope to ease pressures on the environment while introducing increased competitiveness and new sources of growth and jobs through improved efficiency, commercialisation of innovation, and better management of resources.</p>	<p>The programme vision of generating vibrant, competitive and sustainable communities allows wide scope for addressing the identified strategic environmental issues.</p> <p>Climate and Arctic change can be addressed through pursuing a low-carbon economy, reducing the reliance on fossil fuels and avoiding the unsustainable use of natural resources, and supporting the development of renewable energy resources and appropriate innovations within technology transfer.</p> <p>Land-use management can prevent environmental degradation and the loss of biodiversity, secure the sustainable exploitation of natural resources, discourage projects associated with environmentally-damaging extractive industries, be proactive in promoting landscape management, and integrate nature conservation principles into regional economic development.</p> <p>Energy and resource efficiency can be attained through projects that support a green economy, realising opportunities for investment and employment-creation for example in renewable energy and energy efficiency, low-carbon transport, waste management and green tourism. Promoting business-resource efficiency can generate financial savings and competitive advantage for entrepreneurs, while minimising environmental impacts.</p> <p>Marine pollution can be addressed through better management and by specific measures to reduce impacts on marine and coastal waters, lessening and preventing eutrophication by focusing on issues within industries and industrial practices, and through supporting transnational cooperation in coastal zone management and the development of effective marine strategies.</p>

Priorities and associated Objectives		
<p>1. Using innovation to maintain and develop robust and competitive communities</p>	<p>Reflects the Innovation Union Flagship in efforts to re-focus innovation and R&D on challenges facing society, including climate change, energy and resource efficiency, while turning innovative ideas into products and services that create growth and jobs. The Flagship also seeks to facilitate key enabling technologies to shape Europe's industrial future. The Priority also reflects the Industrial Policy Flagship's support for the development of a strong and sustainable industrial base able to innovate and compete globally. Furthermore, Horizon 2020, the financial instrument for the Innovation Union Flagship, is intended to focus research efforts and deploy Europe's innovation potential by bringing together resources and knowledge across different fields and disciplines within the EU and internationally.</p> <p>Innovation with regard to resource efficiency was highlighted in the consultation for the proposed 7th Environmental Action Programme. Addressing complex issues requires tapping into the full potential of existing environmental technology and ensuring the continuous development and uptake by industry of the best available techniques and emerging innovations. Innovation to improve resource efficiency is required across the EU economy to improve competitiveness in the context of rising resource prices, scarcity and supply constraints. Although the business sector is the prime driver of innovation, government action at EU and Member State levels is essential to provide the right framework conditions for eco-innovation, stimulating the development of sustainable business or technological solutions to environmental challenges.</p> <p>Emphasis is to be placed on public and private research and innovation efforts required for rolling out innovative technologies, systems and business models which will speed up and lower the cost of transition to a low-carbon, resource-efficient economy.</p>	<p>Addresses the issues of:</p> <ul style="list-style-type: none"> • <i>Climate and Arctic Change</i> • <i>Energy & Resource Efficiency</i>

	European companies already have a global lead in recycling and energy efficiency and should be encouraged to benefit from this growth in global demand, supported by the Eco-innovation Action Plan. For example, by 2020 the European renewables sector is expected to generate more than 400,000 new jobs.	
1.1 Increased innovation and transfer of new technology to SMEs in remote and sparsely populated areas		<p>Establishing and improving innovation systems allows scope to promote R&D and technology transfer that incorporate innovations that reduce the impacts of climate change and improve resource efficiency amongst SMEs. Accordingly, the NPA programme could support cooperation, innovation and transfer of knowledge and environmental technology, and address themes such as the sustainable use of non-renewable and renewable resources, which would be particularly significant for the Arctic territories.</p> <p>The scope for negative environmental impact is limited, with the most likely scenario being a missed opportunity to initiate useful technology improvements and losing the associated beneficial impacts in areas such as energy efficiency, recycling and resource use, slowing the transition to a low-carbon economy.</p>
1.2 Increased innovation within public service provision in remote and sparsely populated areas		<p>There is potential to utilise innovative technology that reduces environmental impacts while securing the viability of public services. Within this theme, the adoption of innovative models and technology-driven solutions can lead to more efficient use of limited resources, including energy for transport through the incorporation of green technologies.</p> <p>No direct negative environmental impacts would be envisaged from increased innovation within public sector provision. As in 1.1 above, however, programme implementation would need to ensure that favourable opportunities were realised to secure maximum environmental gain from supported initiatives.</p>
2. Promoting entrepreneurship to realise the potential of the programme area's competitive advantage	Europe 2020 seeks to improve the business environment, particularly for SMEs, by placing emphasis on production processes and products that support a low-carbon economy, realising opportunities within the green economy, supporting the transition to greater energy and resource efficiency, and investing in	<p>Addresses the issues of:</p> <ul style="list-style-type: none"> • <i>Climate and Arctic Change</i> • <i>Energy & Resource Efficiency</i> • <i>Land-use Management</i>

	<p>existing natural assets. The promotion of energy efficiency within the Resource-efficient Europe Flagship can further support the competitiveness of entrepreneurs and the programme area's competitive advantage.</p> <p>Within the 7th Environmental Action Programme, Priority Objective 2 envisages a competitive low-carbon economy, highlighting how reducing greenhouse gas emissions and enhancing resource efficiency will ease pressures on the environment and bring increased competitiveness and new sources of growth and jobs through cost-savings from improved efficiency.</p>	
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<p>2.1 Improved support systems tailored for start-ups in remote and sparsely populated areas</p>		<p>Business support strategies have the potential to emphasise and incorporate positive environmental perspectives and environmental management systems for new start-up companies, particularly in training initiatives. Such actions could support the transition to a resource-efficient, green and competitive low-carbon economy, reducing the environmental impact of business, reducing waste generation, and halting the loss of biodiversity and ecosystem degradation. Place-based opportunities offer scope to enhance protection and appropriate use of natural and cultural heritage, especially through informed (environmentally aware) entrepreneurship in the sustainable/eco-tourism and experience industries based on the high quality of nature in the programme area, while creating new employment opportunities.</p> <p>In addition to the scope for missed opportunities, for example if environmental management systems and enhanced awareness are not introduced to these companies, potential for negative impacts may lie in the tourism and experience industries, if the development of these functions within the natural and cultural heritage does not incorporate appropriate and adequate training on best practice development within these industries. Natural resources must be exploited in a sustainable manner, avoiding risks of further pollution. Appropriate monitoring and feedback would be required regarding the impacts of completed initiatives.</p>
<p>2.2 Greater market reach beyond local markets for SMEs in remote and sparsely populated areas</p>		<p>Positive environmental scenarios could include a sectoral focus for clusters of SMEs in the transfer and development of marketing concepts and models that specialise in sustainable development solutions or products that address environmental problems or integrated environmental management methodologies. Overall, there is scope to increase the positive impact of SMEs in terms of resource efficiency, waste recycling, energy, and green products and services, especially if participating companies are prepared to market their environmental strengths within their portfolio. This would accord well with SMEs operating in the realm of high-quality natural products, for example, as envisaged by the programme. Successful expansion of cruise tourism would need to be accompanied by greater awareness of sustainability thresholds and the capacity of various environments to accommodate greater loads, as traffic increased, to avoid threatening natural resources and habitats or polluting the air, water or land. In</p>

		<p>addition, support for major investments such as new mining projects or wind farms would require careful consideration to ascertain whether this action was appropriate, as well as determining the forms of impact assessment, safeguards and conditions to be imposed. Again, appropriate monitoring feedback would be required regarding the impacts of on-going and completed projects.</p>
<p>3. Fostering energy-secure communities through promotion of renewable energy and energy efficiency</p>	<p>This Priority reflects the Europe 2020 drive for a more resource-efficient, greener economy, and specifically the Resource-efficient Europe Flagship's aim of decoupling economic growth from the use of resources. That Flagship also stresses the need for an urgent and significant transition to a low-carbon economy, increasing the utilisation of renewable energy sources and the promotion of energy efficiency. In addition, the Industrial Policy Flagship supports the transition to greater energy and resource efficiency, promoting technologies and production methods that reduce natural resource use, whereas the Innovation Union Flagship facilitates a strategic agenda focused on challenges such as energy security.</p> <p>Within the 7th Environmental Action Programme, Priority Objective 2 addresses resource efficiency especially through meeting 2020 climate and energy targets, reducing the environmental impact of industry, increasing resource efficiency reducing waste generation, and limiting energy recovery to non-recyclable materials.</p>	<p>Addresses the issues of:</p> <ul style="list-style-type: none"> • <i>Climate and Arctic Change</i> • <i>Energy & Resource Efficiency</i>
<p>3.1 Increased use of energy efficiency and renewable energy solutions in housing and public infrastructure in remote and sparsely populated areas</p>		<p>Projects addressing higher energy efficiency and renewable energy will reduce consumption of natural resources and can promote the use of new technologies in renewable energy solutions for public sector infrastructure and housing. In addition to energy-efficiency in buildings, there is scope for the utilisation of by-products from economic activities as energy sources (symbiosis). Overall, there is potential for a direct contribution to the mitigation of climate change through reduced reliance on fossil fuels, reduced greenhouse gas emissions and broad support for the transition to a low-carbon economy. Other positive features include the scope to further the social</p>

		<p>acceptability of energy efficiency measures, promote ecological sustainability, and create employment in the renewable energy sector.</p> <p>The potential for negative impacts is very limited. Nevertheless, there is a general need to ensure long-term environmental conformity, so that projects addressing improvements in energy efficiency are based on realistic and sustainable renewable energy scenarios, preferably utilising local natural resources, and models for the construction of energy-efficient housing should use low-energy building materials based on natural products from the programme area.</p>
<p>4. Protecting, promoting and developing cultural and natural heritage</p>	<p>Europe 2020 acknowledges the global pressure on natural resources and the environment, and it supports increased investment in the EU's existing natural assets. Europe 2020 also identifies cultural diversity as a significant strength of the European Union, and, through the Digital Agenda for Europe Flagship, advocates the digitisation of Europe's rich cultural heritage.</p> <p>Within the 7th Environmental Action Programme, Priority Objective 1 seeks to protect, conserve and enhance natural capital, specifically halting the loss of biodiversity and ecosystem degradation, reducing impacts on fresh and coastal waters, reducing pressures on marine waters, protecting soil and remediating contaminated sites, and improving the resilience of forests to climate change and fires. In addition, Priority Objective 7 seeks to improve environmental integration and policy coherence, particularly through carrying out systematic ex-ante assessments of environmental, social and economic impacts; and Priority Objective 8 aims at enhancing the sustainability of cities through sustainable urban planning and design.</p>	<p>Addresses the issues of:</p> <ul style="list-style-type: none"> • <i>Climate and Arctic Change</i> • <i>Energy & Resource Efficiency</i> • <i>Land-use Management</i> • <i>Marine Pollution</i>
<p>4.1 Increased capacity of remote and sparsely populated communities for sustainable environmental management</p>		<p>Supporting capacity-building, knowledge-sharing, best practice models and tools in relation to protecting, promoting, and developing the cultural and natural heritage can generate considerable potential for empowering communities to perform</p>

		<p>systematic and balanced assessments of environmental, social and economic impacts. Pooling expertise and competence can facilitate appropriate management of the conflicting demands of the different elements, with more dynamic interpretations of sustainable environmental management enhancing the management of natural resources, resource efficiency, and protection of the environmental heritage. This Objective contains scope to protect the environment against pollution from economic activities such as mineral extraction, mitigate soil contamination, and reduce the impacts on marine and coastal waters through supporting coastal zone management.</p> <p>To ensure the viability of the approach within this Objective, there is a need to ensure a balanced consideration of the different dimensions of sustainable development, preventing the domination of one dimension over the others. To this end, the expertise, knowledge and methodologies must create a clear awareness of the significance and means of maintaining equilibrium between competing economic, social and environmental interests. Equally, care must be taken to prevent particular groups or authorities from gaining disproportionate knowledge or skills that would afford them scope to orient outcomes primarily in their favour, rather than benefiting the community as a whole.</p>
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5.4 Significant Effects

In general terms, environmental outcomes would be significant in scenarios where the momentum of activity generates positive cumulative impacts or alternatively where activities may generate negative unforeseen or mismanaged environmental impact.

The appraisal performed in Table 8 illustrates that the programme demonstrates a clear compatibility with the objectives of the Europe 2020 Strategy and the proposed Seventh EU Environmental Action Programme. Moreover, the programme has adopted environmental sustainability as a horizontal principle. Nevertheless, there are inevitably uncertainties in terms of the form and significance of potential impacts and how effective the programme will be in securing positive outcomes.

With regard to **significant positive environmental effects**, in a scenario where programme implementation is very successful, the potential environmental benefits could be long-term and cumulative in nature, for example as innovation systems promote R&D and green technology transfer, so reducing the impacts of climate change and improving resource efficiency amongst SMEs. In addition, business support strategies could support the transition to a resource-efficient and competitive low-carbon economy, reducing waste generation, halting the loss of biodiversity and ecosystem degradation. Place-based opportunities could enhance protection and appropriate use of the natural and cultural heritage, particularly through entrepreneurship in the sustainable/eco-tourism and experience industries, based on the high quality of nature in the programme area, while creating new employment opportunities. Other potentially significant positive impacts could include a sectoral focus for clusters in the development and transfer of marketing concepts and models that specialise in sustainable development solutions or products that address environmental problems or integrated environmental management methodologies.

In terms of specific energy-related impacts, there is potential for direct mitigation of climate change through reduced reliance on fossil fuels and corresponding reduced emissions of greenhouse gases, furthering the social acceptability of energy efficiency measures, promoting ecological sustainability, and creating employment in the renewable energy sector. In addition to energy efficiency in buildings, there is scope for the utilisation of by-products from economic activities as energy sources (symbiosis). Lastly, capacity-building to support an integrated approach to development in relation to protecting, promoting and developing the cultural and natural heritage, as well as empowering communities to perform systematic and balanced assessments of environmental, social and economic impacts, could considerably enhance resource efficiency, sustainable management of natural resources and the constructive use of wastes and residues, as well as reducing impacts on marine and coastal waters.

With regard to **significant negative environmental effects**, this would relate for example to a scenario in which programme implementation leads to unanticipated impacts, indirect effects or where projects are mismanaged or environmental conditions not fully observed. Risks to human health are anticipated as minimal, particularly since the partner countries have robust systems of environmental control and planning, so that projects with environmental implications would be subjected to other filters before obtaining approval. The transboundary nature of the cooperation is also likely to produce a better understanding and exchange of experience with regard to environmental control.

Nevertheless, in the business support category, there is potential for expanding industries such as the tourism and experience industries to generate negative environmental impacts, damaging the natural and cultural heritage through lack of awareness on how to manage this resource. In addition, cruise tourism contains potential risks for negative impacts, especially as increased traffic will bring associated environmental burdens that need to be estimated and prevented or appropriately managed. Achieving higher energy efficiency and greater security also could involve environmental impacts, depending upon the type of energy generated. For example, wind farms are increasingly associated with problems related to aesthetics, operational noise and social acceptability, and the construction of facilities can cause disturbance to habitats and local biodiversity. There is also a risk of failing to meet sustainability principles, for example if resources are drawn only from other areas and building materials are not based on natural products from the programme area.

These potential negative factors require careful management and control, and they are addressed in more detail in the following section.

5.5 Mitigation

Although the Priorities and actions in the NPA programme have a wide potential to achieve positive environmental impact, there are a number of ways in which projects could produce negative impacts, as described in Table 8. This section draws further attention to these potential impacts and suggests ways in which significant adverse effects could be prevented, reduced or offset.

Priority 1: Using innovation to maintain and develop robust and competitive communities

- *Increased innovation and transfer of new technology to SMEs in remote and sparsely populated areas*

Within this theme, there is a need to ensure that the interpretation of competitive communities is not associated with cutting environmental costs, for example by delaying environmental obligations or seeking minimum compliance with environmental standards. The programme must convey a clear message that positive environmental impact is a key element of the programme's approach, and that competitive communities should be based on high environmental standards. Similarly, innovation should be understood as including environment – and potentially prioritise environment – as a means of fulfilling the vision that the NPA programme is pursuing.

The scope for negative environmental impact is limited, with the most likely scenario being a missed opportunity to initiate useful technology improvements and losing the associated beneficial impacts in areas such as energy efficiency, recycling and resource use, and slowing the transition to a low-carbon economy.

- *Increased innovation within public service provision in remote and sparsely populated areas*

Again, there is a need to ensure that innovative models or solutions addressing the viability of public service provision, such as urban-rural cooperation and social enterprises, encompass positive environmental impacts, with an appropriate use of limited resources. Innovative and distance-spanning technologies should make a direct contribution to (renewable) energy efficiency and resource efficiency.

Although no direct negative environmental impacts would be envisaged from innovating public service provision, programme implementation would need to ensure that favourable opportunities were realised to secure environmental gain from supported initiatives.

Priority 2: Promoting entrepreneurship to realise the potential of the programme area's competitive advantage

- *Improved support systems tailored for start-ups in remote and sparsely populated areas*

There is a need to ensure that business support strategies for start-up companies contain environmental principles integrated into their thinking and approach that characterise the entrepreneurial climate, promoting themes such as environmental management systems, high levels of recycling, environmental criteria in procurement procedures, eco-efficiency (utilising longer-lasting materials etc), reducing supply chain length and CO2 emissions, and addressing efficiency beyond the market (by using open-source development software, shared knowledge environments etc). Other place-based opportunities would include locally-derived eco-products and new products based on natural resources such as fisheries, forestry and agriculture.

In addition to the scope for missed opportunities, for example if environmental management systems and awareness are not introduced to these start-up companies, there may be potential for negative impacts in the tourism and experience industries, if the development of these functions within the natural and cultural heritage does not incorporate the transfer and development of models and solutions containing appropriate and adequate training on best practice. Natural resources must be exploited in a sustainable manner, avoiding risks of further pollution. During implementation, appropriate monitoring feedback would be required regarding the impacts of completed initiatives.

- *Greater market reach beyond local markets for SMEs in remote and sparsely populated areas*

There is a need to ensure that marketing concepts and models adopt clear environmental principles in clustering products and services, especially in relation to high-quality natural products of the programme area, such as Arctic products. Emphasis should be placed on increasing the positive impact of SMEs in terms of resource efficiency, waste recycling, energy, and green products and services, especially if participating companies are prepared to market their environmental strengths within their portfolio. Securing ICT solutions such as e-commerce and use of social media should be emphasised, as these would clearly be environmentally beneficial.

Support for major investments such as new mining projects or wind farms would require careful consideration to ascertain whether such actions were appropriate, as well as determining the forms of impact assessment, safeguards and conditions to be imposed. In addition, successful expansion of cruise tourism would need to be accompanied by greater awareness of sustainability thresholds and the capacity of various environments to accommodate greater loads, as traffic increased, to avoid threatening natural resources and habitats or polluting the air, water or land. Again, appropriate monitoring feedback would be required regarding the impacts of on-going and completed projects.

Priority 3: Fostering energy-secure communities through promotion of renewable energy and energy efficiency

- *Increased use of energy efficiency and renewable energy solutions in housing and public infrastructure in remote and sparsely populated areas*

There is a need to ensure that models transferred to facilitate the utilisation of renewable energy solutions are sufficiently broad-based, for instance favouring symbiotic solutions, whereby the by-products of one activity provide energy for public infrastructure or housing, such as using cooling water to heat buildings. Efforts should also be made to ensure that concepts and models focusing on energy-efficient housing use low-energy building materials, recycle buildings and building materials, and promote low/zero-energy housing, especially in the Arctic.

The potential for negative impacts is very limited. Nevertheless, there is a general need to ensure long-term environmental conformity, so that projects addressing improvements in energy efficiency are based on realistic and sustainable renewable energy scenarios, preferably utilising local natural resources, and that models for the construction of energy-efficient housing use low-energy building materials based on natural products from the programme area.

Priority 4: Protecting, promoting and developing cultural and natural heritage

- *Increased capacity of remote and sparsely populated communities for sustainable environmental management*

In increasing protection and promoting interventions, there is a need to ensure that the best-practice models and solutions transferred, as well as the transnational pooling of competences such as knowledge and know-how, effectively combine economic, environmental and social interests. This Objective contains scope to protect the environment against pollution from economic activities such as mineral extraction, mitigate soil contamination, and reduce the impacts on marine and coastal waters through supporting coastal zone management. Particular care needs to be taken in the Arctic and sub-Arctic regions of the programme area, where the impacts of climate change are expected to be more severe than in other places.

To ensure the viability of the approach, there is a need to ensure a balanced consideration of the different dimensions of sustainable development, preventing the domination of one dimension over the others. To this end, the expertise, knowledge and methodologies must create a clear awareness of the significance and means of maintaining equilibrium between competing economic, social and environmental interests. Equally, care must be taken to prevent particular groups or authorities from gaining disproportionate knowledge or skills that would afford them scope to orient outcomes primarily in their favour, rather than benefiting the community as a whole.

5.6 Indicators for Monitoring Environmental Effectiveness

Under the SEA Directive, there is a requirement to establish a monitoring programme to gauge environmental effectiveness. The series of environmental indicators developed for the NPA programme should inform on the impacts of addressing the four strategic environmental issues, as well as on the overall effectiveness of the programme.

The following table provides examples of potential indicators that may be useful in monitoring different aspects of the programme performance, with suggestions for the division between the themes of the four Priorities.

Table 9: Potential Environmental Indicators

Using innovation to maintain and develop robust and competitive communities	<ul style="list-style-type: none"> • Uptake of new technology leading to improved resource efficiency and/or reduced climate change impact • Incidence of SME clusters with an environmental focus • Increased recycling • Decline in energy consumption • Reduction in greenhouse gas emissions • Evidence of eco-innovation in SMEs
Promoting entrepreneurship to realise the potential of the programme area's competitive advantage	<ul style="list-style-type: none"> • Adoption of green business models • Implementation of environmental management systems • Evidence of environmental training initiatives, especially in tourism industry • Growth in environmental sector – increases in sustainable/eco-tourism businesses, SME clusters with environmental specialisms, and green products and services • Reductions in pollution and environmental damage (air, water, land) • Lower waste generation, and percentage being recycled, recovered, composted and landfilled
Fostering energy-secure communities through promotion of renewable energy and energy efficiency	<ul style="list-style-type: none"> • Reduced consumption of natural resources • Evidence of energy saving • Greater use of renewable energy • Reduced greenhouse gas emissions • Uptake of new technology for renewable energy • Increased employment in energy sector • Evidence of symbiosis with waste products • Use of local energy resources • Use of low-energy building materials based on natural products from the programme area
Protecting, promoting and developing cultural and natural heritage	<ul style="list-style-type: none"> • Completed capacity-building and knowledge-sharing initiatives • Utilisation of environmental management tools or methodologies • Evidence of integrated environmental management in project management and implementation • Balanced appraisals of economic, social and environmental factors • Evidence of eco-efficiency (enhanced resource productivity, use of longer-lasting materials) • Changes in condition of protected coastal and marine waters • Incidence of coastal zone management initiatives • Changes (net loss/gain) in biodiversity

