

# CO<sub>2</sub> neutral Waddensea Region

## Final report



## **CO<sub>2</sub> neutral Waddensea Region**

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### **Final report**

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All responsibility for the content of this publication is assumed by the author:

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## 1. Introduction

### a) Political framework

It has been stated at the 11th Trilateral Governmental Conference for the Protection of the Wadden Sea that the Wadden Sea Region (WSR) shall develop into a CO<sub>2</sub>-neutral region. § 24 reads as follows: *"... support the global and national efforts to mitigate causes of climate change at the regional level, by calling especially upon local and regional competent authorities and stakeholders, to work towards developing the Wadden Sea Region into a CO<sub>2</sub>-neutral area by 2030 or before, putting the focus on the special threats for coastal zones by global warming and sea level rise."*

In February 2014 the Tønder Declaration referred to that statement by addressing the following in §47: *"Appreciate the ongoing efforts, especially at the local and regional levels, to work towards developing the Wadden Sea region into a CO<sub>2</sub>-neutral area, and reconfirm the Sylt Declaration §24."*

Also the work of the WSF was appreciated in the Tønder Declaration:

*"Take into account the activities and recommendations by the Wadden Sea Forum on sustainable development and participatory processes, in particular with regard to... efforts and recommendations of the WSF to contribute working towards a CO<sub>2</sub>-neutral Wadden Sea Region as envisaged by the governments."*

The trilateral Wadden Sea Board, the political decision-making body of the Trilateral Cooperation, sought the support of the WSF and its stakeholders to better reach the political objectives. On this basis, the WSF decided to initiate a project that contributes to a climate-friendly development of the coastal region.

### b) Wadden Sea Forum

The Wadden Sea Forum is an independent forum of stakeholders, NGO representatives and representatives of the municipalities and districts of the Danish, German and Dutch Wadden Sea region. The forum was founded in 2002 by decision of the Intergovernmental Conference in 2001 in Esbjerg. Since July 2008, the Forum has established its own secretariat in Wilhelmshaven. Since March 2011, the WSF is a nonprofit society whose chairman is currently the Dutchman Henk Staghouver. The WSF aims to elaborate advice for the Trilateral Wadden Sea Cooperation with regard to sustainable and environmentally friendly use of resources. This unique structure and cooperation across national borders created a valuable flow of information and knowledge exchange as well as possibilities for a necessary harmonization of land uses in the Wadden Sea Region, policies and EU regulations.

The most recent examples here are joint efforts in shipping safety, harmonization in Goose Management (damage control and compensation measures), development of sustainability indicators for regional development as well as enhancements in Integrated Coastal Zone Management (ICZM) that includes all the stakeholders and the local population.

### c) Background

To develop the Wadden Sea region by 2030 into a CO<sub>2</sub>-neutral region is an ambitious goal, which needs the support of the entire region with their industry associations, environmental and conservation organizations and social institutions as well as the local and regional politicians. In order to reach the aim of the project, elaborating recommendations and advice on measures for the development of climate-friendly Wadden Sea Region (WSR), regional characteristics and development options had to be analyzed first. Regional CO<sub>2</sub> emissions are also due to national and even global economic processes as well as to national economic obligations, which needs to be considered in

the implementation of the target. This goes for many other regions as well and therefore, the WSR can be used as a model region how to reach emission reduction and to adapt to climate change.

The effects of climate changes concerns not only economic interests, but also in particular society and nature conservation. A vital society is dependent on an intact nature with its rich biodiversity. A rising sea level and changes in precipitation patterns have a direct impact on nature and landscape. Therefore, prevention of emissions and adaptation to a changing climate are essential to preserve our precious environment and nature. In the course of climate change with rising average temperatures and rising sea levels, a reduction of greenhouse gases is essential to conduct effectively adequate adaptation measures.

#### d) Project approach

The project concretely followed the principles of Integrated Coastal Zone Management. It was aimed at a comprehensive perspective that includes the ecosystem approach and economic activities with impact on the Wadden Sea Region. This perspective is designed for a long term and binds the precautionary principle by avoiding emissions. The project considered also the characteristics of the region, both in terms of the Wadden Sea World Heritage as well as in terms of energy transition and the further expansion of renewable energies offshore. A special aspect was the involvement of all stakeholders in order to reach a possible conflict-free, long-term acceptance of policies and measures. In workshops with all stakeholders developments were discussed and analyzed. The focus was laid on risk management with regard to climate change as well as on causes and consequences of impacts. The project co-operated with the scientific community to get valuable inputs of experts' in-depth knowledge. The cooperation with the political level was considered necessary to examine the feasibility of the implementation of necessary measures.

## 2. Objectives

The aim of the project was to elaborate measures, which contribute to the development of climate-friendly WSR, including the preservation of natural and cultural landscape. The conservation of the natural dynamics of the Wadden Sea as well as the conservation of biodiversity behind the dikes were and still are important aspects in the objectives of climate change adaptation. The measures should get acceptance in society and among the various stakeholders, so these groups should be closely involved. Furthermore, the project should provide a basis for detailed analyses and concepts at the transnational level.

The project should also contribute achieving the policy objectives of the Trilateral Cooperation on the Protection of the Wadden Sea and form a basis for political decisions on the regional level. Similarly, the regional economic sectors should be addressed in order to implement climate-friendly measures in agriculture, tourism, and port industries.

The tasks of the project were divided into the following steps:

- Analysis of the sources of greenhouse gas emissions with a focus on CO<sub>2</sub>
- Definition of CO<sub>2</sub> neutrality for the Wadden Sea Region
- Development of concrete measures to reduce CO<sub>2</sub>
- Recommendations for the political level

### 3. Implementation and Results

#### 3.1 Project results

For the elaboration of the objectives some basic documents and instruments were of particular importance. First of all, the fifth assessment report of the "Intergovernmental Panel on Climate Change" (IPCC) should be noted. It provides a current overview of scientific, technical and socioeconomic aspects of climate change and takes a scientific evaluation. The report was prepared by three working groups: I. Scientific fundamentals, II. Impacts, adaptation, vulnerability and, III. climate change. Especially the report of the Working Group II of the IPCC, focusing on to regions and sectors, taking into consideration an integrated approach, was an important basis for this project.

Furthermore, the scenarios of HZGs Wadden Sea Climate Atlas were used as another basis for the project. The scenarios are tailored to the Wadden Sea region and illustrate impressively the potential changes with impact on society and the sectors, especially for agriculture. The Climate Atlas can be viewed on the WSF website <http://www.waddensea-forum.org/index.php/wsr-climate-atlas>.

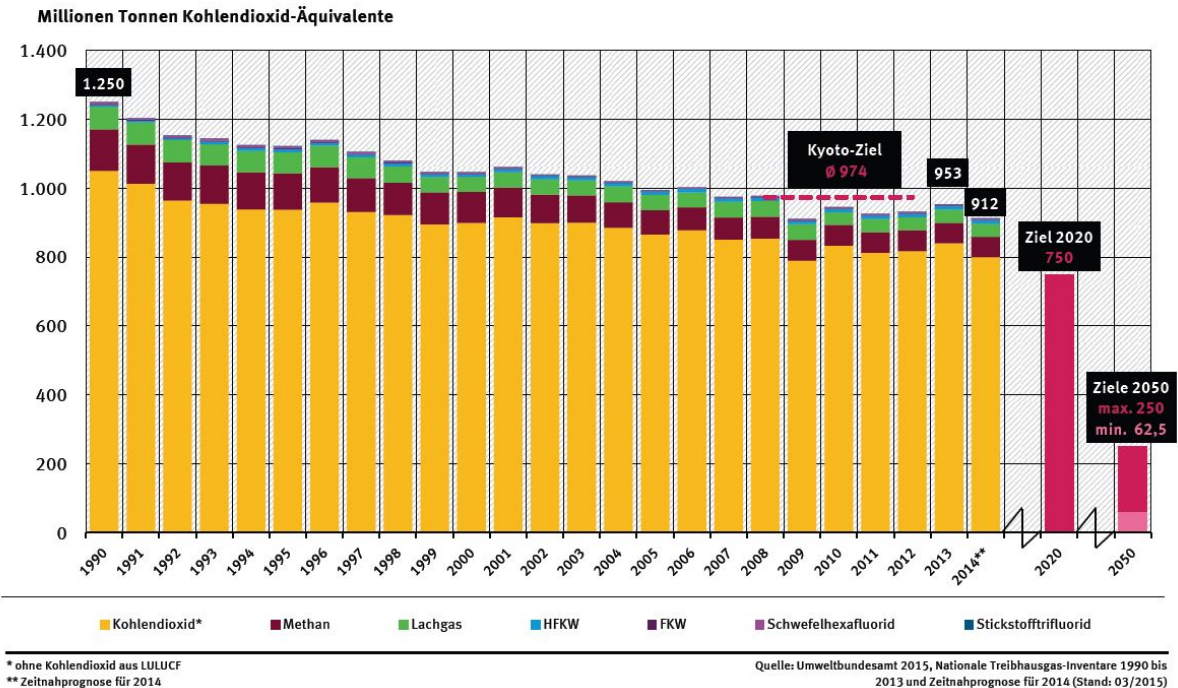
In addition, many other reports have been discussed and analyzed. These are listed in the bibliography in chapter 6.

##### 3.1.1 Analysis of greenhouse gas emission sources focusing CO<sub>2</sub>

First, it was necessary to analyze the relevant sources of emissions of greenhouse gases in order to discuss reduction measures. Within the WSF working group the importance of emission sources was discussed at the beginning of the project in order to allocate reduction measures. Emissions can be allocated e.g. to processes, regions, fuels or sectors. In any case, consumer and producer levels should be considered differently. In order to strive for CO<sub>2</sub> neutrality, respectively for climate-friendly development in a region, it is useful to look at the consumer level. Many regions are hosting industries with a production chain, which aims at national or even global markets. This concerns, for example, energy production in the Wadden Sea Region. Power plants, located in coastal regions as well as wind energy production in coastal areas and off-shore, produce energy for the whole Germany or even European market. But emissions occur regionally and therefore, must be taken into account when developing the Wadden Sea Region CO<sub>2</sub> neutral. It is more practical and valuable to analysis emissions on the consumer level in order to reach the aim.

A good overview of the development of the CO<sub>2</sub> emissions is given by the following illustration of UBA. The emissions are still at a high level, only in 2050 a significant reduction should be achieved. Also a closer look at the emissions from the transport sector make clear that CO<sub>2</sub> emissions barely decrease over time while emissions of nitrogen, volatile organic compounds and sulfur dioxide have decreased over the past decade (UBA 2014).

## Treibhausgas-Emissionen in Deutschland seit 1990 nach Gasen sowie Ziele für 2008-2012 (Kyoto-Protokoll), 2020 und 2050 (Bundesregierung)

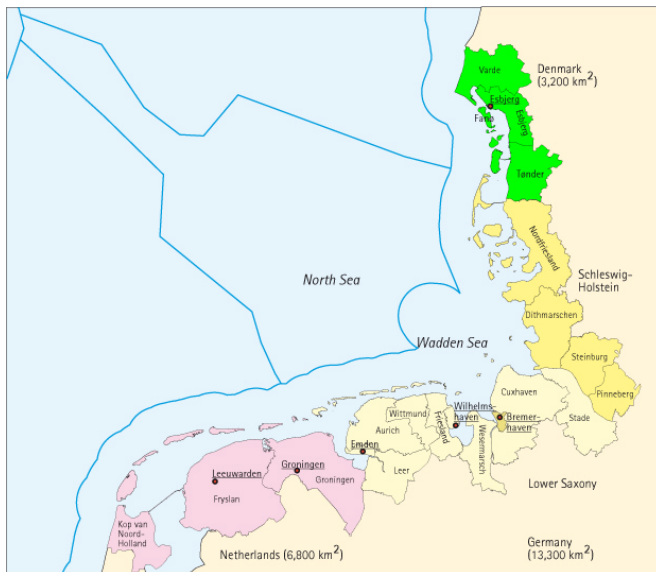


The emission sources are multilayered. For the Wadden Sea Region, especially the energy, manufacturing and transport sector as well as industrial processes and agriculture can be named. Within the project, a large number of companies have been included in an inventory with regard to their emissions. In addition to power plants (eg Wilhelmshaven, Emden, Papenburg, Glückstadt, Wedel ...) and refineries (Heide) and chemical industry (Wilhelmshaven, Stade, Brunsbüttel), paper industry and dairies were analyzed.

While all sectors have experienced a decline in emissions since 1995, the CO<sub>2</sub> emissions in agriculture of 2.1 million tons in 1995 have increased to 2.65 million tons in 2013, according to UBA (Umweltbundesamt 2015 National Trend tables for German reporting of atmospheric emissions).

### 3.1.2 Definition CO<sub>2</sub> neutrality for the Wadden Sea Region

CO<sub>2</sub> neutrality in the strict sense means that, for example, energy production and human activities do not affect the CO<sub>2</sub> concentration of the atmosphere. In this sense, energy production by wind or solar energy would not be CO<sub>2</sub> neutral, since the greenhouse gases are generated during the production of those energy plants. Besides the debate on this fact, compensation measures as tool to achieve climate neutrality were also discussed in the project. These include e.g. CCS (Carbon Capture & Storage), but this can only contribute partly, because not 100% of the carbon dioxide can be separated and stored in the origination processes. Other compensations could be reached by CO<sub>2</sub> binding, for example, through reforestation; but it should be considered where these measures are implemented. Further, is it creditable to carry out the measures outside the region? This question also arises in connection with emission trading.



In the opinion of the WSF a CO<sub>2</sub> neutral Wadden Sea Region in a strict sense cannot be reached and thus, the term is unfair and confusing. It is therefore recommended to talk about climate-friendly development, to which for example renewable energy generation, low or zero-energy buildings, energy-efficient economies, adaptation of transport systems as well as changing attitudes in society can make important contributions. As a result of the complex discussions and analyses it should be noted that all measures, that are economically viable, socially acceptable and nature conservation, contribute to a climate-friendly Wadden Sea Region.

In the Wadden Sea Region many regions, counties and municipalities have started to work on being an energy-neutral (Dutch provinces) or climate-friendly (counties, island communities but also companies) area.

### 3.1.3 Integration of the economic coastal location and development of concrete measures for CO<sub>2</sub> reduction

With the development of measures regarding a climate-friendly Wadden Sea Region, the involvement of the regional economic sectors were of great importance. Contributions to the reduction of emissions should not only be achieved by the society and the regional authorities, but also by economy. Available sustainability indicators provided valuable basic knowledge, so that the development of sustainability could be measured and analyzed at the regional and municipal levels. A focus was on the compilation and analysis of "best practice" examples, which developments contributed to a CO<sub>2</sub> reduction and thus to a climate-friendly development of the Wadden Sea Region.

In the following, examples of individual regions are described, followed by a description of contributions of industries.

#### Example: County of Nordfriesland

The county had set itself the goal of becoming the most climate-friendly district of Germany and being a role model for other districts.

Nordfriesland has divided his Climate Action Plan in five key parts:

- Preparation of an energy- and CO<sub>2</sub>-balance for the base year
- Analysis of the CO<sub>2</sub> reduction potential by 2020
- Estimation of the regional added value in Nordfriesland and exposition of a cost-benefit analysis (creation of value through expansion of renewable energy and the development of energy end-used efficiency potential)
- Development of policy recommendations (e.g. funding programs and financing programs, communication- and qualification measures, technical measures, organizational and infrastructure measures and voluntary commitments)
- Developing a concept for controlling and monitoring

The elaboration of the concept was carried out with professional support by the Wuppertal Institute for Climate, Environment and Energy.



#### Example: County of Friesland

In Lower Saxony, the district of Friesland started as early as 2010 with a Climate Action Plan, with emphasis on the analysis of CO<sub>2</sub> emissions and energy consumption as well as with the preparation of an action-oriented catalog of measures to achieve the desired objective of "carbon neutrality". A significant factor in the CO<sub>2</sub> emissions was the energy consumption for heating needs, mobility, food and production. For this, possible savings were calculated and added to the catalog of measures. These are broken down into thematic priorities: electrical energy, buildings, development of renewable energy, housing, businesses, tourism, mobility and education. The goal of the district is to achieve "climate neutrality" in the field of electrical energy and heat by 2025 and together with the mobility by the year 2030.

In order to achieve the goals, a climate change management was implemented (as in other regions) to coordinate the implementation and to ensure cooperation with all stakeholders.

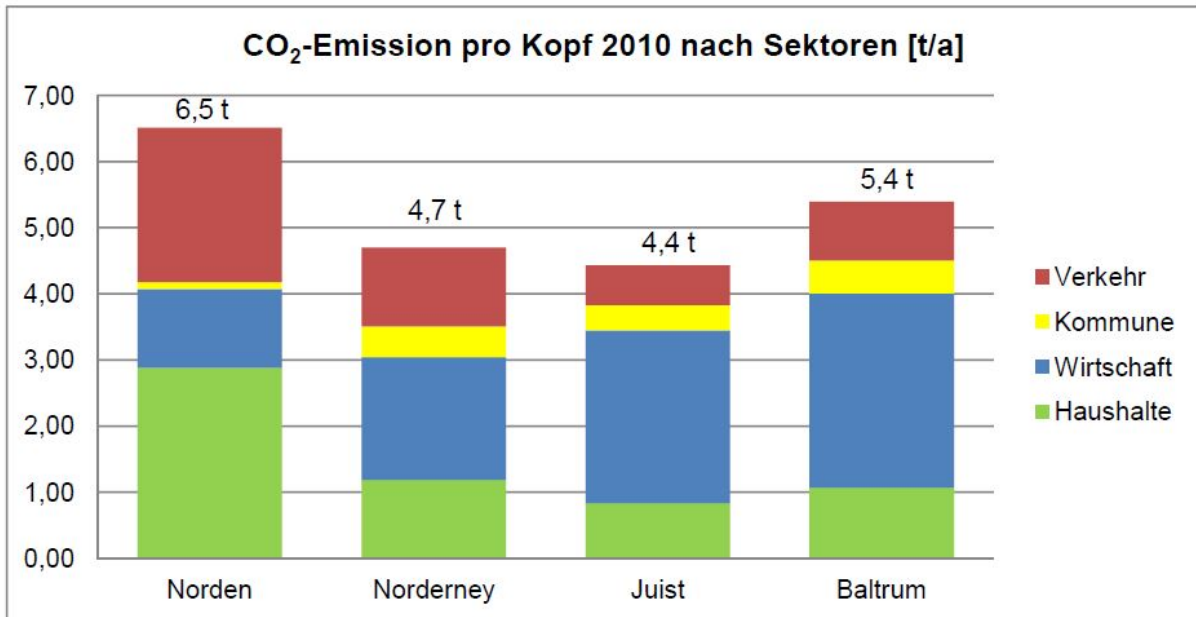
#### Example: County of Wittmund

The Climate Action Plan for the County of Wittmund was developed in a year-long process in close coordination with many actors and it stands for a significant step towards the establishment of climate protection in different themes. This approach is intended to strengthen measures for energy saving and CO<sub>2</sub> reduction. Besides compiling the current energy consumption and the resulting CO<sub>2</sub> emissions, the theoretical economic and social practicable reduction potential was analyzed. Following, scenarios for the future development were elaborated. In a collaborative process with stakeholders and citizens in the district of Wittmund, an action plan was finally carried out. It encompasses concrete projects and activities, which should contribute to a climate-friendly development. For the implementation an environmental management with financial and human resources has been established.

#### Example: East Frisian Islands

The Climate Action Plan for the islands Baltrum, Juist and Norderney as well as for the city of Norden comprises a tourism triangle in East Frisia. A catalog of measures as a key element of climate protection has been developed in a series of workshops and through interviews with various actors. An important focus was on the analysis of CO<sub>2</sub> emissions, due to energy sources as well as to the different sectors for each municipality. This showed a very diverse picture, which was taken into account in the subsequent analysis for action taking.

Overall, a very comprehensive analysis was prepared, which culminated in a detailed concept for measures to develop a climate-friendly region.



(Source: City of Norden, Economic Development and City Marketing, Integrated Energy and Climate Protection Concept for Juist, Norderney, Baltrum and Norden. 2012.)

#### Example: Island of Ameland

In the Netherlands, the island of Ameland is a pioneer in climate-friendly development. Already in 2007 the Dutch island communities launched a concept to become energy independent by 2020. Ameland has then realized many projects over the years, which contributed to the pursued aim. Fuel cells on methane base were installed; public buildings were rebuilt energy-neutral (pellet heating, insulation, hot water installation) and hydrogen was introduced as fuel for some households and the entire island lighting system was changed by installing nature friendly "green light". The most important project was the construction of a solar park at the airfield of the island. The generated average of 6MW power supplies the island completely with electricity, so that there are no CO<sub>2</sub> emissions anymore.

In the following, two examples from the economic sector are described to visualize different important contributions to an advanced climate-friendly development.

#### Example: Food

Food production and consumption play an important role in the emission of greenhouse gases. The plenary session of the WSF in May 2015 on the island of Ameland, supported by a scientific presentation, discussed consumption patterns and eating habits in the region. It became clear that high meat consumption results in significant CO<sub>2</sub> emissions, which has to be changed in the future. According to a study from the UK, food production and consumption make 1/5 of the total emissions. The study stated that 7.2 kg greenhouse gas per day for a meat-rich diet and 3.8 kilograms for a vegetarian or 2.9 kilograms for a vegan diet were emitted. The change in eating habits of a high-meat diet (from 100g meat per day) to a little-meat diet (daily under 50g) would reduce the individual footprint by 920 kg CO<sub>2</sub> per year and person. The complete renunciation of meat or animal products reduces the footprint of a person (who eats a lot of meat) so far by 1.2 and 1.6 tons per year.

Such a proposed change would of course impact the main industry in the Wadden Sea region, agriculture. But even this sector is aware of the problem and sees opportunities in production change: more quality rather than quantity. In cooperation with tourism, supermarkets and restaurants, agriculture could promote local products, avoid transports and supply high quality products. This would provide an important contribution to a climate-friendly Wadden Sea Region.

#### Example: Shipping traffic

For a climate-friendly development of the coastal region, the coastal ship traffic also has to take responsibility. The daily ferry service to the islands and ferries on the rivers in the region contribute to emissions that could be significantly reduced. The project has discussed alternative ship propulsion systems with port operators, shipping companies and maritime organizations as MARIKO from Leer and Maritime Cluster in Elsfleht. There are now some examples where ferries have converted to LNG (liquefied gas) as an energy source, e.g. the ferry from Harlingen to Texel and from Cuxhaven to Helgoland are now saving on CO<sub>2</sub> emissions. A LNG-car-ferry across the river Elbe between York and Wedel is before the start.

In Lower Saxony, the "LNG-Initiative-North-West" has been established in order to increase the capacity for innovation in the maritime industry in terms of gas-powered ships. This initiative is the largest national network to support the maritime industry in the transition to the gas-powered seafaring.

The WSF is in good contact with the mentioned organizations in order to support the initiatives "Green Shipping" and "Greenport".

#### 3.1.4 Recommendations for the political levels

Due to the political decision of Sylt in 2010, the project is aimed to serve the political levels nationally and regionally to initiate measures for a CO<sub>2</sub> neutral region on the basis of the project results. The integration of the WSF in the "Task Group Climate" of the Trilateral Wadden Sea Cooperation (Wadden Sea Board, WSB) fosters cooperation and the implementation of policy objectives.

To develop recommendations for policy-makers from the perspective of society and economic sectors, different workshops were conducted with stakeholders. Also involved were representatives from municipalities and counties. The recommendations, which still have to be communicated with the political level (Wadden Sea Board, Wadden Sea Council Conference, country representatives) are briefly outlined below.

- Instead of using the term "CO<sub>2</sub> neutral Wadden Sea Region", the concept of "climate-friendly Wadden Sea Region" should be used, because CO<sub>2</sub> neutrality in our region cannot be achieved.
- For the delimitation of the geographical area the administrative boundaries of the provinces (Netherlands), counties (Germany) and municipalities (Denmark) of the coastal region should be used.
- One of the key measures is the reduction of CO<sub>2</sub> emissions in the region. For this, the discussed approaches of counties and municipalities should serve as an example: development of renewable energies, promoting sustainable tourism, supporting regional production and introduction of controlling and monitoring.
- Reduction of emissions in coastal ship traffic by introduction of alternative fuel technology such as LNG and expanding the "Green Port" concept.
- Providing incentives for the conversion of agriculture to organic management and the promotion of quality products. Reducing the cultivation of energy crops and promoting pasture farming.
- Involvement of stakeholders in climate change adaptation measures and risk management in relation to climate change.

### 3.2 Outcome of the project

Emission reduction and climate adaptation should be considered in a wider geographical context since emissions have more global and national impacts. The developed regional concept is quite applicable to other regions, so that the outcome of the project reaches beyond the region.

The geographical focus of the project was in the coastal region of Germany. But the approaches are transferable to the coastal regions of Denmark and The Netherlands. During the project it became clear that the exchange of information, knowledge and practical examples have inspired various stakeholders and community representatives to implement promising measures to reduce emissions in their areas. Furthermore, the results are also addressed to the Trilateral Cooperation on the Protection of the Wadden Sea and discussed due to feasibility and application. Since the progress and results of the project are widespread through various means of communication (workshops and conferences are especially named), additional external effects are ensured. In conclusion it should be noted that the project will also broadcast beyond regional aspects.

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