



GREBE

Generating Renewable Energy
Business Enterprise



Northern Periphery and
Arctic Programme
2014-2020



THE INFLUENCE OF ENVIRONMENTAL

CONDITIONS IN NPA AND ARCTIC REGIONS

REPORT ON SPECIFIC CHALLENGES OF ARCTIC AREAS

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As the Arctic changes, so does the world.

(IACE Institute of Arctic and Environment Research, JAMSTEC)

As the Europe Northern Periphery regions changes, so does the society in Northern Europe.

(GREBE Norway)

Introduction

The GREBE Project

What is GREBE?

GREBE (Generating Renewable Energy Business Enterprise) is a €1.77m, 3-year (2015-2018) transnational project to support the renewable energy sector. It is co-funded by the EU's Northern Periphery & Arctic (NPA) Programme. It focuses on the challenges of peripheral and arctic regions as places for doing business and helps develop renewable energy business opportunities in areas with extreme conditions.

The project partnership includes the eight partners from six countries: Western Development Commission (Ireland), Action Renewables (Northern Ireland), Fermanagh & Omagh District Council (Northern Ireland), Environmental Research Institute (Scotland), LUKE (Finland), Karelia University of Applied Sciences (Finland), Narvik Science Park (Norway) and Innovation Iceland (Iceland).

Why is GREBE happening?

Renewable Energy entrepreneurs working in the NPA area face challenges including a lack of critical mass, dispersed settlements, poor accessibility, vulnerability to climate change effects and limited networking opportunities.

GREBE will equip SMEs and start-ups with the skills and confidence to overcome these challenges and use place based natural assets for renewable energy to the best sustainable effect. The renewable energy sector contributes to sustainable regional and rural development and has potential for growth.

What does GREBE do?

GREBE supports renewable energy start-ups and SMEs:

- To grow their business, provide local jobs and meet energy demands of local communities.
- Supporting diversification of the technological capacity of SMEs and start-ups so that they can exploit the natural conditions of their locations.
- Providing RE tailored, expert guidance and mentoring to give SMEs and start-ups the knowledge and expertise to grow and expand their businesses.
- Providing a platform for transnational sharing of knowledge to demonstrate the full potential of the RE sector by showcasing innovations on RE technology and strengthening accessibility to expertise and business support available locally and in other NPA regions.
- To connect with other renewable energy businesses to develop new opportunities locally, regionally and transnationally through the Virtual Energy Ideas Hub.
- Conducting research on the processes operating in the sector to improve understanding of the sector's needs and make the case for public policy to support the sector.

For more information visit our website: <http://grebeproject.eu/>

Follow our Blog: <https://greberenewableenergyblog.wordpress.com/>

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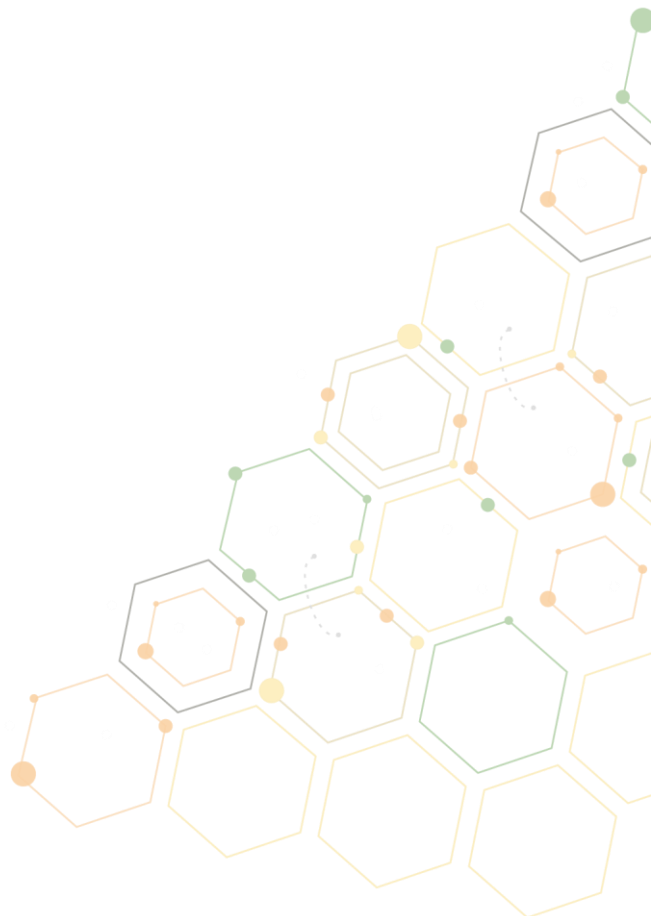
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Work Package 4 The influence of environmental conditions in NPA and arctic regions

There are significant climate challenges in the partner regions with different types of harsh weather. Low temperature, hard winds, and rain/ snow conditions can be extreme in the NPA regions. This work package will consider how to find the best process conditions for business in remote NPA communities, where harsh climate and other geographically related issues often bias knowledge transfers and business models.

Work package 4 will be guided by the following objectives:

- Gain a thorough understanding of the unique climatic and physical conditions including the infrastructure of NPA regions, particularly arctic regions, and how these influences the success of local SMEs and start-ups.
- Identify existing deficiencies of renewable energy businesses and related technologies, business models and infrastructure that arise as a direct result of the climatic environment and operating conditions of the NPA regions, particularly the arctic and high north regions.
- Identify how NPA regions can harness the physical and climatic conditions of the sparsely populated areas in which they are located, so that these assets are utilized more effectively in order to support the delivery of smart business and technology solutions.
- Review local specific (particularly coldness, precipitation and windy climate) innovations from technology providers and facilitate knowledge transfer from these providers to potential providers and new entrants to the renewable energy markets in other regions of the NPA.



1. Background to the review the specific climate and physical challenges of remote areas of the NPA

The harsh climatic conditions experienced in many NPA regions, particularly high north and arctic regions, present significant challenges to SMEs and start-ups that can seriously impact on the viability of their businesses. Winter storms regularly occurring in the high north, known as polar lows or arctic weather fronts, can bring about sudden and extreme drops in temperatures, with debilitating ice and snow conditions developing quickly. Also, in the North West Europe the influence from the North Atlantic Oscillation give rise to storms, resulting in high winds and precipitations.

These conditions frequently give rise to unsafe working conditions and suspension of business operations, particular in the case of technology installations. Operational environments in these areas are often vulnerable irrespective of climatic conditions, given their isolated, remote locations, far away from technical maintenance staff, and which are often difficult to access by road, air or sea. Businesses located in these areas must compensate for fragile and less robust parameters, in order to cope with unforeseen sudden disturbances (for instance, climate change effects). This activity will seek to develop a thorough understanding of the challenges facing NPA regions, particularly those in arctic and high norths regions, and will document them as important baseline considerations for further research in later WP4 activities.

There are significant climate challenges in the partner regions with different types of harsh weather. Low temperature, hard winds, and rain/ snow conditions can be extreme in the NPA regions. This work package will consider how to find the best process conditions for business in remote NPA communities, where knowledge transfer is an important aspect. A harsh local/regional climate, sparsely populated areas together with rural geographic related issues and poor infrastructure have a tendency to bias the company's business models.

Work package 4.1 will be guided by the following objectives:

- Gain a thorough understanding of the unique climatic and physical conditions of NPA regions, particularly GREBE regions, and how these will impact on the society.
- Identify the present situation caused by weather conditions in the GREBE regions.
- Show the challenging climate effects on societal and business operations.
- Identify how NPA regions can harness the physical and climatic conditions of the sparsely populated areas in which they are located.

Narvik Science Park in Norway are the lead partner for Work Package 4. Each partner region provided information from their meteorological offices with details of weather warnings. This information can be found in the appendix.

2. Weather systems in NPA region

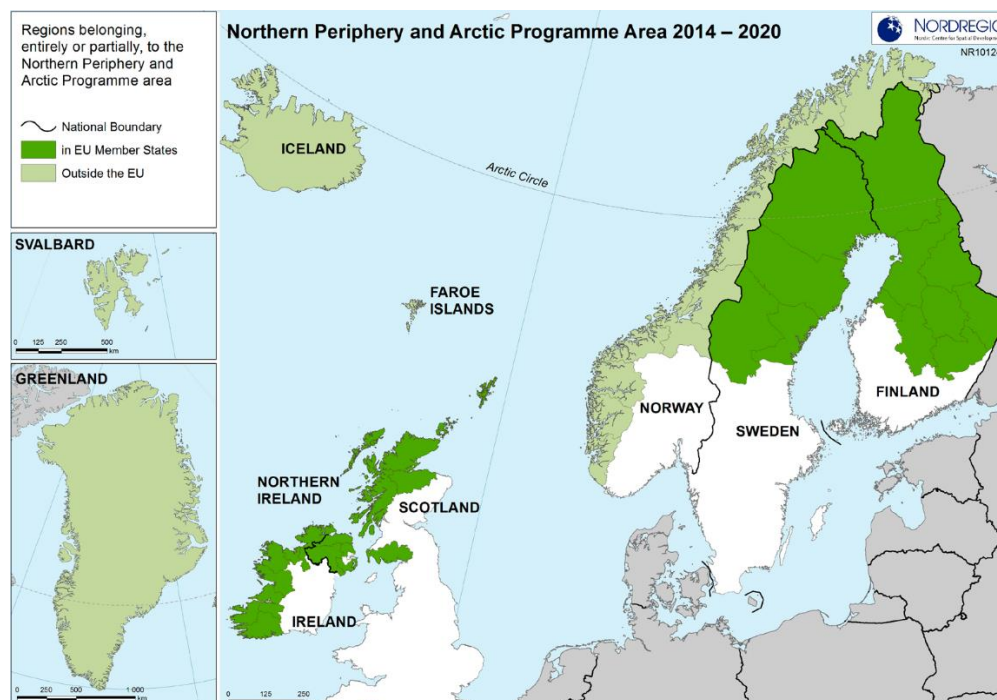


Figure 1. The NPA locations in EU (Source: http://www.interreg-npa.eu/fileadmin/Programme_Documents/NPA_FactSheet_upd_Dec15.pdf)

The climate in the GREBE regions are strongly conditioned by the Gulf Stream, as can be seen in figure 1. The climate of Western Europe is milder in comparison to other areas of the same latitude around the globe. This is due to the influence of the Gulf Stream, which keeps mild air (for the latitude) over Northwestern Europe in the winter months, especially in Ireland, the UK and coastal Norway. In addition, Iceland and Finland climate is also indirect influenced by the Gulf Stream.

Also, the North Atlantic Oscillation (NAO) is a weather phenomenon in the North Atlantic Ocean of fluctuations in the difference of atmospheric pressure at sea level between the Icelandic low and the Azores high. Through fluctuations in the strength of the Icelandic low and the Azores high, it controls the strength and direction of westerly winds and storm tracks across the North Atlantic pathway. The Icelandic Low and Azores High fluctuate in strength and position over a period of months and years, and their variations have a strong influence on weather in Northern Europe by shifting the location of the jet stream, which affects temperature and precipitation patterns over the GREBE regions. It is a part of the Arctic oscillation, and varies over time with no particular periodicity.

The NOA phenomenon has a sharp dividing line between the weather systems of Icelandic low and the Azores high in the atmosphere. The jet stream consists of narrow bands of very strong winds in the upper levels of the atmosphere, which move weather systems around the globe. The winds blows from west to east in jet streams but the flow often shifts to the north and south. Jet streams follow the boundaries between hot and cold air.

Since these hot and cold air boundaries are most pronounced in winter when air masses create a stronger surface temperature contrast, which can result in a strong jet stream. However, during the summer months, when the surface temperature variation is less dramatic, the winds of the jet streams are weaker.

Jet streams are found in the atmosphere 9-16 km above the surface of the Earth, just below the tropopause, and can reach speeds of 320 km/h. Waves or ripples along the jet stream can cause Atlantic depressions to deepen fast when they are directed towards the Ireland and UK, and may give serious disturbances in the infrastructure.

3. Climate affects in Northern Europe

Global climate change impacts Europe in many ways, including: changes in average and extreme temperature and precipitation, warmer oceans, rising sea level and shrinking snow and ice cover on land and at sea. These weather phenomena have led to a range of impacts on ecosystems, socio-economic sectors and human health and safety.

There is no doubt that the changes in climate will have a strong impact in our daily life, whether we accept extreme weather conditions as a new phenomenon or not, as illustrated in figure 2. Adaptation to the past history data, present observed and future predicted impacts will in the coming decades be needed, as well as be complementary to global climate mitigation actions.



Figure 2. The path of severe weather condition is changing in northern Europe. (Source: Avis Nordland/an.no)

There is a trend in weather phenomenon that higher average temperatures have been observed across Europe, as well as a decreasing precipitation in southern regions and a corresponding increase precipitation in northern Europe. The Greenland ice sheet, Arctic sea ice and many glaciers across Europe are melting, snow cover has decreased and most permafrost soils are evidently in a process of warming up.

Extreme weather events such as heat waves, floods and droughts have caused rising damage costs across Europe in recent years. It has now reached the level of human safety, since these weather phenomenon's will actively affect our way of using the infrastructure while they are significantly restricting our daily way of living, as exemplified in figure 2.

While more evidence is needed to discern the part played by climate change in this trend from natural long or short variations, there is an obvious trend that growing human activity in hazard-prone areas has been a key factor for safety in population, infrastructure and business. Future climate change is expected to add to this vulnerability, as extreme weather events are expected to become more intense and frequent. If European societies do not adapt to the present situation, damage costs are expected to continue to rise, according to the report.

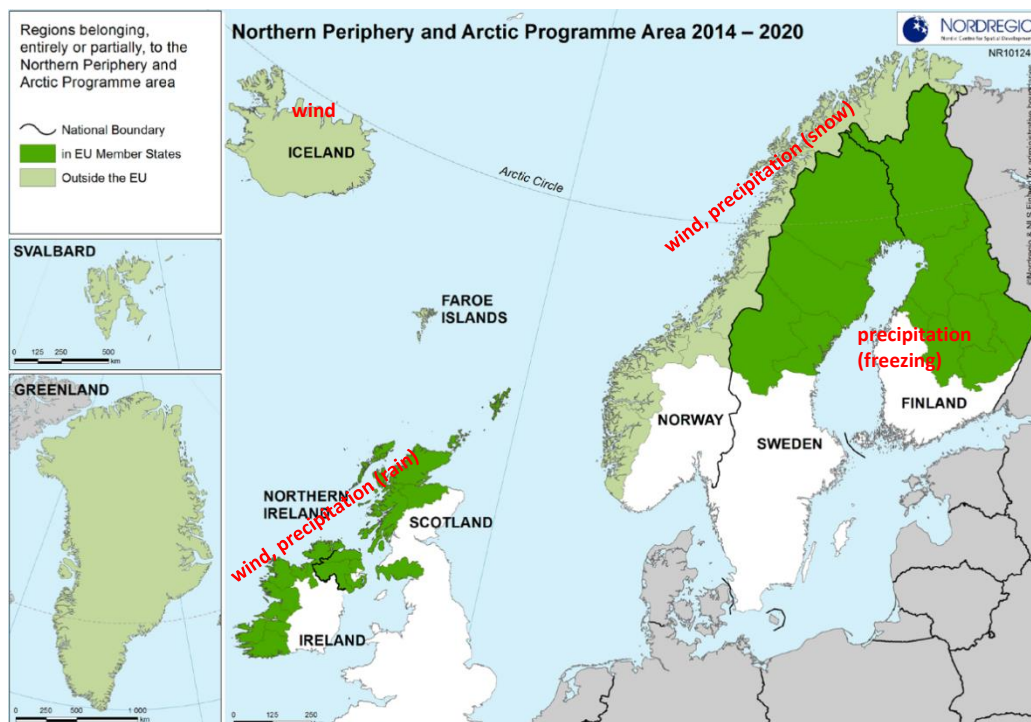


Figure 3. The weather trends in Northern Europe (Source: http://www.interreg-npa.eu/fileadmin/Programme_Documents/NPA_FactSheet_upd_Dec15.pdf)

4. Effects on GREBE regions in Northern Europe

The readiness from the society to handle harsh weather and local “extreme” conditions varies from country to country in northern Europe. In the northeastern part of Europe there is a high societal disturbance caused by wind, rain and in some sense also freezing rain, as can be seen in figure 3.

Since the occurrence of harsh weather conditions are not frequent, the effect will be more palpable. In comparison the northern part of Europe, i.e. Iceland has a frequent presence of high wind conditions that in this case will be more of a “normal” continuous state in daily weather. In the northeast coastal regions of Europe, the weather is more unpredictable with suddenly arising storms, i.e. polar lows, delivering both rain/snow and windy conditions. In the mainland northeast regions there are precipitation and in conjunction with this often cold climate.



Figure 4. Business were affected by devastating heavy downpours. (Source: <http://www.mirror.co.uk/news/uk-news/uk-weather-scotland-faces-flood-7115240>)

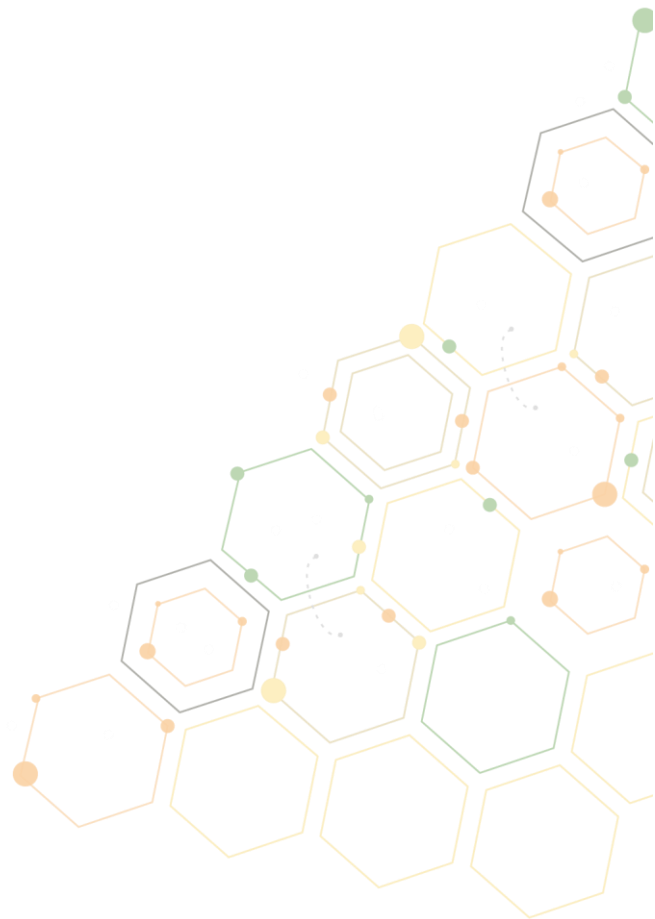
The weather impact on societal infrastructure in the different NPA regions is considered to be affecting the business activities, as shown in figure 4. The phenomenon of “local extreme weather” is serious for the single business when affects and may have serious consequences to compete in an open market. The economic outcome is then a vulnerable factor in these NPA regions that gives a negative bias for local business and a non-favourable competitive disadvantage compared to similar businesses in other EU regions.

The regional readiness in local “extreme weather conditions” should be an important measure when establishing new enterprises and a serious risk analysis should be made before each activity starts, by taken in account the possibility for weather disturbance. Based upon the description below from each GREBE partner region, an indicative regional or even local perception has to be defined. The overall measure that indicates some connection between local “extreme weather frequency” and a corresponding indication of society readiness can be of great value.

This opens for a discussion and action plans or even a business strategy plan, concerning suddenly weather extremes that are changing in a fast manner, like for example in frequency and behaviour. This will also reflect the current climate change in coherence with business activities that we are experiencing and specifically when it is expected to make the biggest noticeable effect on the environment in the Arctic and sub-arctic regions. The regional readiness in society is of great importance when considering time loss of energy, restriction in transportations or not operational production.

However, the impact of “local extreme weather” is considered manageable and moderate in most of the northern EU regions. The frequency of these weather phenomena can be severe when an indirect impact occurs, e.g. avalanches, coldness, strong winds and flooding will also in the future cause disturbances in the society.

These occurrences mainly affect the accessibility to production plants and the mobility of staff. Nevertheless, there is always a high risk that the safety aspect will in each situation not be fully understood. The “local extreme weather” is always important to relate to for both personnel and business operations.



5.1 Ireland

In the above map in figure 1, the parts of Ireland that is included in the NPA region is shown. In the map illustrated in figure 5 below, describes more in detail the location of the Western Development Commission region in the west and northwest of Ireland. The west northwest part of the country has a coastline that is specifically exposed to the Atlantic wind and storm systems.



Figure 5. Regions in Ireland connected to the measured weather data. (Source: Western Development Commission)

During the winter period from November to March the North Atlantic Oscillation (NOA) is affecting the changeability in weather in the North Atlantic region. This weather phenomenon is then creating a variability of weather types in Ireland that gives different, intense and changing scale of storm with wind and precipitation tracking for the mainland of Ireland.



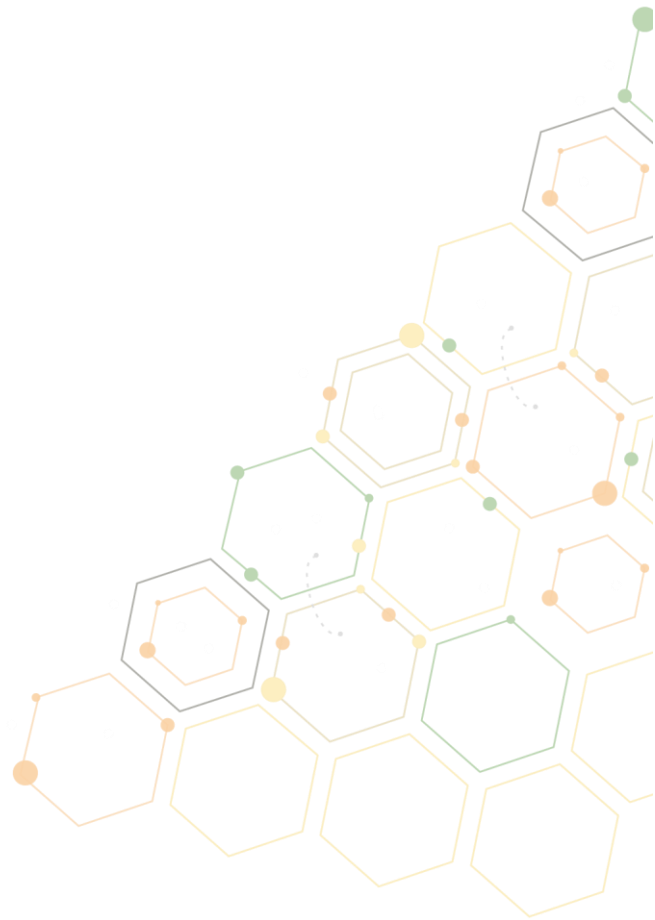
Figure 6. results from harsh weather conditions in Ireland. (Source: Steve Rodgers Photography)

The weather phenomenon can also be verified from the detailed data in the attachment for Ireland that the western and northwestern parts of Ireland involving the NPA regions that 50% or more is allocated to wind conditions in the warnings. In addition, one third of the warnings 2015 were allocated to precipitation warnings in the form of rainfall or snow /ice conditions.

From the data there can be seen that wind and rainfall is the vast majority of weather warnings in the months of November and December 2015, while in January and February 2015 there was instead wind and snow/ice conditions in the weather warnings for Ireland.

The climate and warning issued is following the trends in the rest of the North Atlantic regions exhibit the pattern of the North Atlantic weather system. Figure 6 exemplifies the weather in *Aughris* is a coastal townland in County Sligo, in the west of Ireland

The statistical information from 2015 can be seen in the appendix.



5.2 Northern Ireland

From the above map in figure 1, we can see how Northern Ireland is included in the NPA region. However although the picture is not very clear, Belfast is just situated outside the NPA region, as shown in figure 7, has for example a marine west coast climate that is mild with periods of no dry season, and warm summers. Heavy precipitation occurs during mild winters which are dominated by mid-latitude cyclones.



Figure 7. Regions in Northern Ireland related to the weather data. (Source: www.discovernorthernireland.com)

During the winter period from November to March the North Atlantic Oscillation (NOA) is affecting the changeability in weather in the North Atlantic region. This weather phenomenon is then creating a variability of weather types in Northern Ireland that gives different, intense and changing scale of storm with wind and precipitation tracking for the mainland similar that of Ireland.

There are mostly weather warnings in the winter period from November to March in conjunction to the weather data attached from Irish NPA regions. There is shown that in the months of November and December 2015 there were 27 rain and snow warnings and 18 wind warnings indicating that these types of weather conditions were dominating the warnings from UK Met Office.

There can be seen when comparing the winter data with Ireland the wind and rain conditions is more changing to rain and snow in Northern Ireland. This seems reasonable when the weather systems going in a more northern track. In the months, January to March 2015 there seems to be a majority of snow and ice warnings although in a lesser extent than for Ireland.



a. 10 December 2014, Sea water flooding at Portstewart, located in the coastal north region of Londonderry. (Source: Chris Gordon)

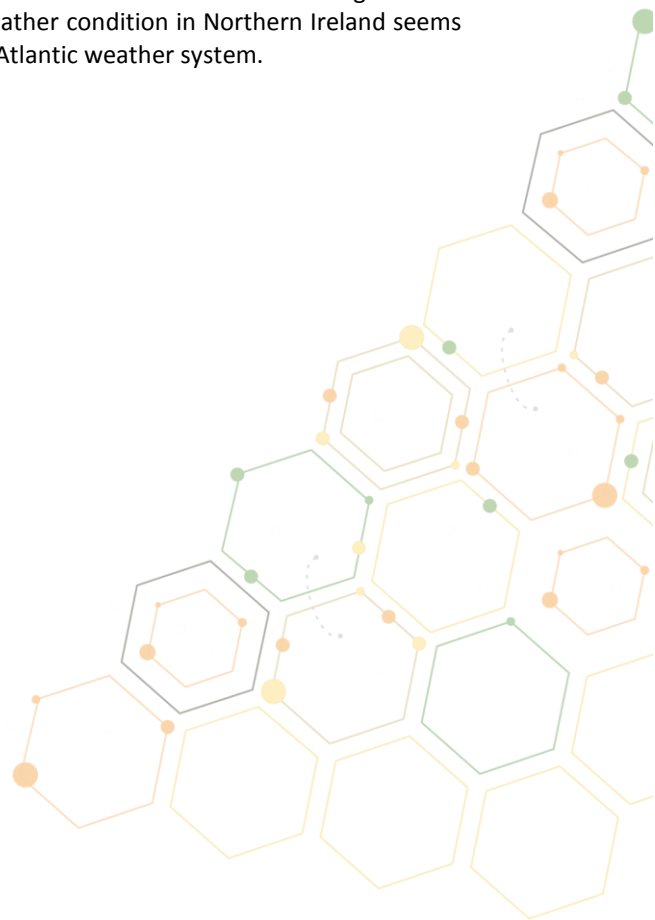
b. 2010–2011 – Cushendall, located in the coastal northeast region of Antrim (Source: Reuters)

Figures 8 a. & b. Typical results from extreme weather conditions in Northern Ireland.

As noticed in figure 8, the winter of 2010–2011 was a weather event that brought heavy snowfalls, record low temperatures, with travel chaos and school disruption. It included the UK's coldest December since Met Office records began in 1910.

The weather models can be seen also in the detailed data in the attachment. The climate and warning issued is following the trends in the rest of the North Atlantic region. The weather condition in Northern Ireland seems during 2015 similar to Ireland as it exhibits the pattern of the North Atlantic weather system.

The statistical information from 2015 can be found in the appendix.



5.3 Scotland

Figure 1 shows that Scotland has certain areas included in the NPA region. Figure 9 shows that two rural areas, the Highlands and Islands and the South Western Scotland (Drumfries and Galloway), are included in the NPA area, however the more populace central belt and urban areas are not. These Scottish NPA areas have a marine west coast climate that is mild and wet with cold summers, much the same as the situation in Northern Ireland. Figure 9 illustrates the regions of Scotland connected to the NPA.

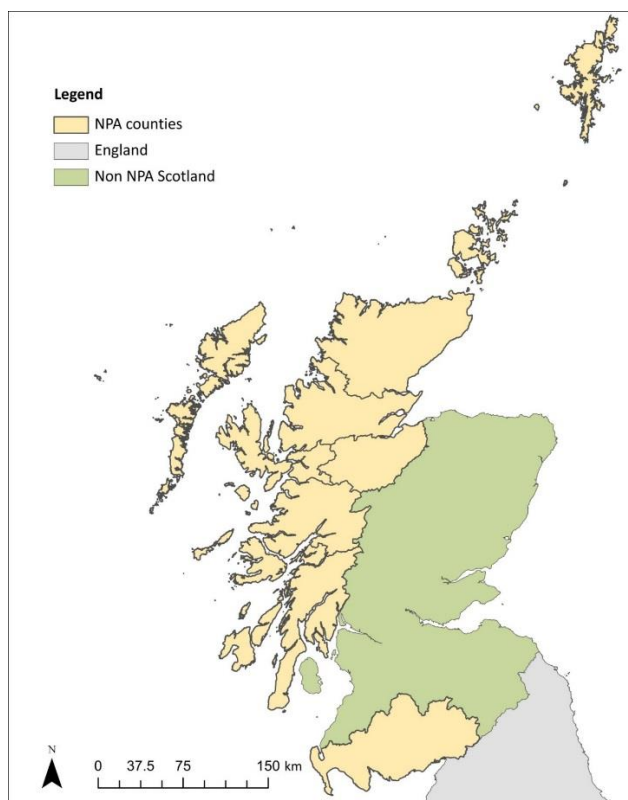


Figure 9. Regions in Scotland connected to NPA. (Source: Crown Copyright ©)



Source: Oliver Clarke through the flickr Creative Commons

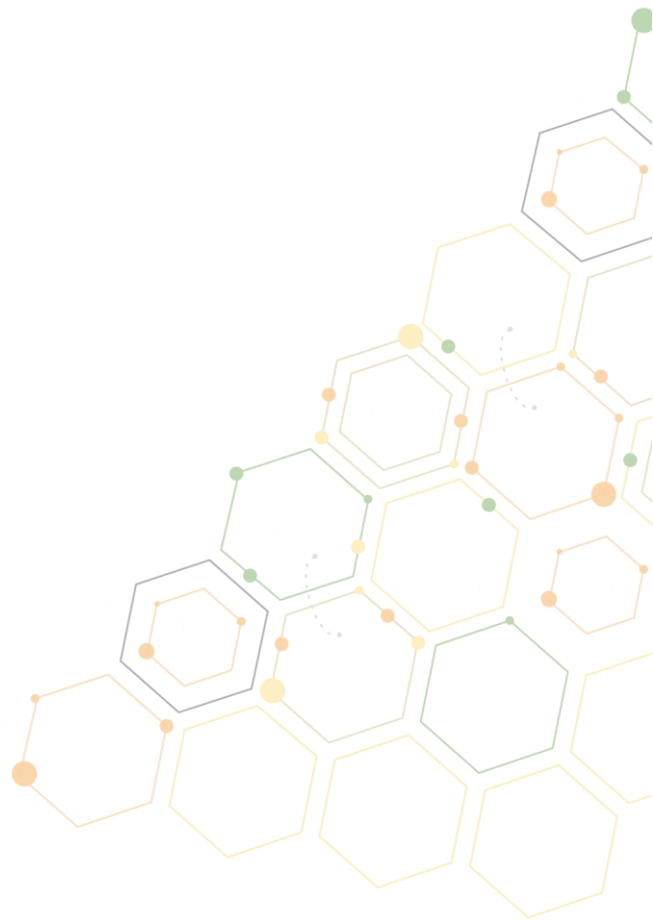


Source: Dave Connor through the flickr Creative Commons

Figure 10 a and b. Typical results from extreme weather conditions in Scotland.

Figure 10 shows images of extreme weather that can be typical of changeable weather in the North Atlantic Region. This weather phenomenon is caused by the Atlantic North Atlantic Oscillation (NOA) creates a variability of weather types in Scotland. This is similar to Irish and Northern Irish conditions due to their respective geographic locations. The NOA gives a more intense scale of storm with wind and precipitation tracking for the western parts of Scotland.

The climate and warning issued as specified in the appendix, show similar trends in Ireland and Northern Ireland. This is a due to the weather systems following a path from west to east which is influenced by the Gulf Stream. Extreme seasonal variations are rare, but especially in the Scottish Highlands there can be harsh weather conditions consisting of gale force winds, heavy rainfall and blizzard conditions on higher ground.



5.4 Iceland

Iceland is not a part of European Union and therefore not belonging to the Northern Periphery and Arctic Programme area 2014-2020 as seen in the map in figure 1.

The Icelandic partner of GREBE is located in Ísafjörður in the north west part of Iceland and therefore a number of regions allocated in the close vicinity thereof was illustrated in the weather statistics from Iceland as shown in figure 11 below.

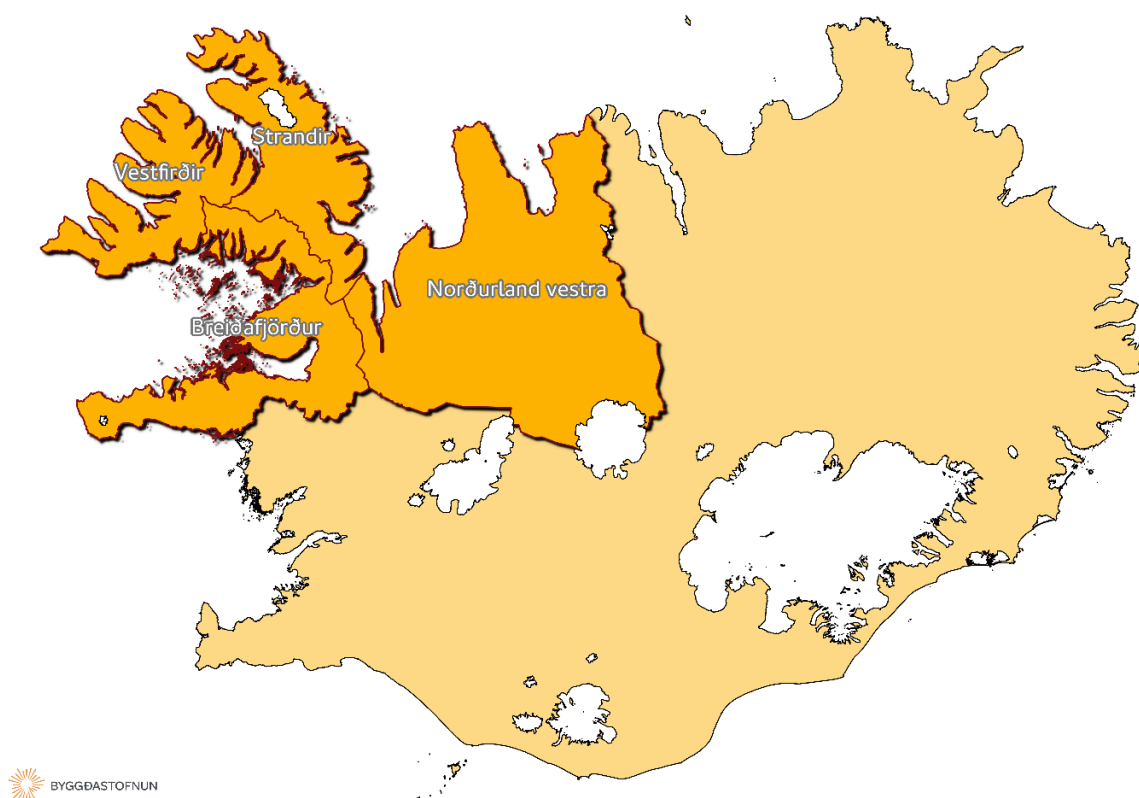


Figure 11. Regions in Iceland that have been measured in the attachment. (Source: Byggdastofnun)

As seen in figure 12, the combination of different weather conditions, like wind and snow can result in severe societal effects on the access of energy. The loading of snow or ice on infrastructure networks is a serious impact on the society and especially the business activities.



Figure 12. Exemplifying results from harsh weather conditions in Iceland. (Source: Westfjord Power Company)

The often manually demanded repair of the energy lines is often occurring in remote areas which may be shut down in periods for days or in severe cases up to weeks before operating properly again.

Iceland's weather is significantly related to wind warnings. These storms are very frequent on Iceland. In 2014 the Icelandic Met office announced 2120 warnings for the 10 regions of Iceland. The table in the appendix shows the warnings in four regions in 2014.

The regions Breiðafjörður, Vestfirðir, Strandir and Norðurland Vestra are located in the Northwest part of Iceland, as illustrated in the map, figure 11.

The weather specified for the year 2014 and specified in the appendix, shows that the weather warnings are present during the whole year, with more activities in winter period and less in the summer months. However, the high frequency of storms on Iceland is a major weather factor. For example, the region of Breiðafjörður, the national meteorological institute (Icelandic Met office) has issued 252 warnings all of them as storms. This indicates that during 2014, there were more storm days than no weather warning days. The "normal state" of weather in these regions seems to be a warning situation which indicates risk for infrastructure disturbances. For business, the working precaution in these weather conditions is obvious as well as safety issues for operating personnel.

5.5 Norway

Norway is not a part of European Union and therefore not belonging to the Northern Periphery and Arctic Programme area 2014-2020, as seen in the map in figure 1.

The Norwegian partner of GREBE is located in the northern part of Norway and therefore the three northern counties (fylke) of Nordland, Troms and Finnmark is represented in the weather illustrations below. The coastal arctic weather systems, with polar lows is often suddenly appearing and is in some cases affecting the society in a different way than for example the rest of northern Europe. The examples below illustrate the effect on important infrastructure when the weather systems hit the coastal areas of the three northern counties of Norway.

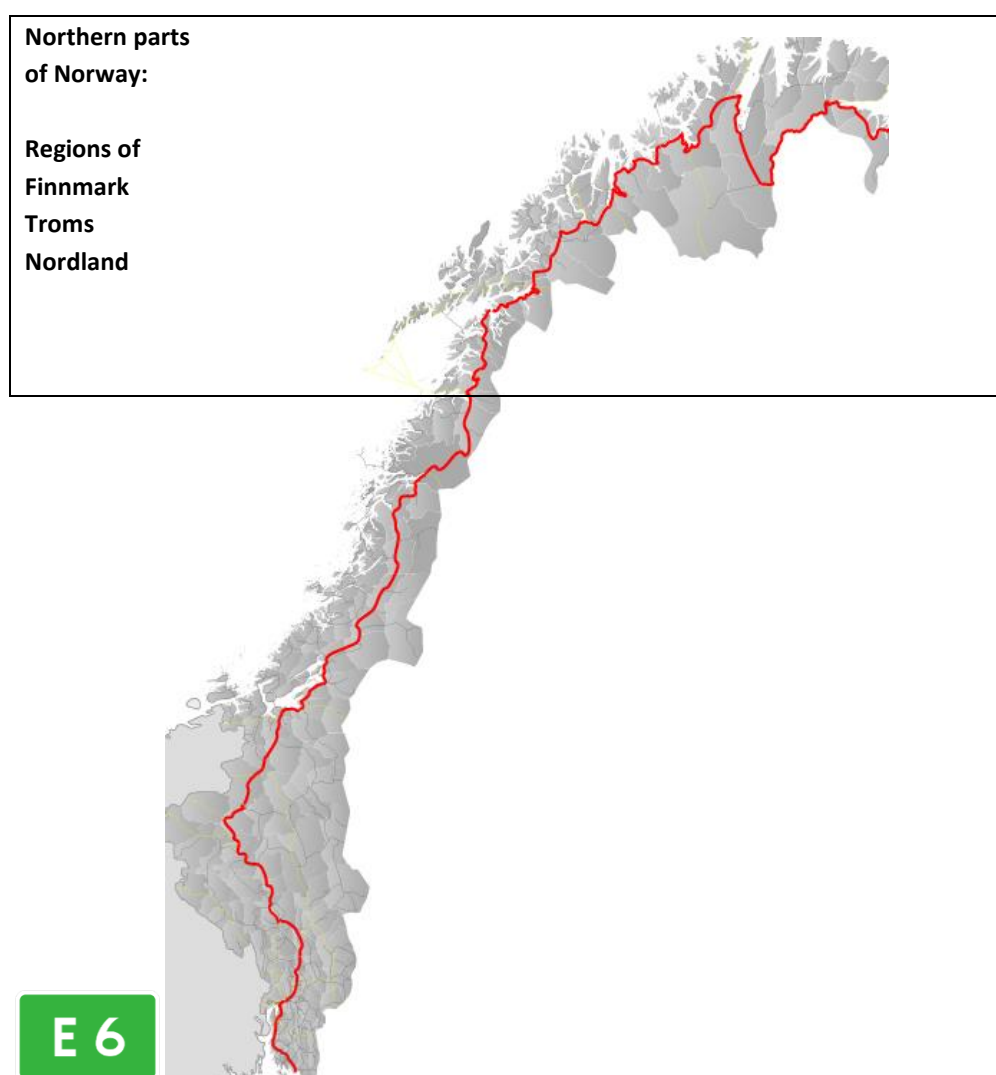


Figure 13. Regions in Norway affected by weather systems (Source: [https://en.wikivoyage.org/wiki/Driving_in_Norway#/media/File:Map_E6\(Norway\).svg](https://en.wikivoyage.org/wiki/Driving_in_Norway#/media/File:Map_E6(Norway).svg))

European route E6 (in [Norwegian](#) : Europavei 6 or simply **E6**) is the main north-south road through [Norway](#). E6 is a route connected to the European main network and in Norway entering in Svinesund in the south from Sweden and ending in the high north town of Kirkenes close to the Russian boarder. The Norwegian part of the route has a length of 2,630 km, as illustrated in figure 13.

Considering the three northern counties Nordland, Troms and Finnmark there is a substantial societal disturbance due to weather conditions. The table 1 below shows the disturbances in different sections of the transport route in northern Norway during 1.5 years (2015.01.01 – 2016.06.30) related to weather.

Closed part of route E6 due to:	No. of disturbances
Storms or clearing up after bad weather	60
Danger of falling stones or clearance of road	18
Avalanche (snow)	2

Table 1. Disturbances from harsh weather conditions in Europe route 6, in the tree northern counties in Norway during 01.01.2015 – 30.06.2016.

The weather disturbances can also be experienced in rural areas, as illustrated in figure 14, where higher demands for having related strategies in business is highly recommended. The figures below shows the actual closing of regional roads in the most northern county (fylke) of Finnmark during beginning of 2015 until 30 June 2016 and the reason for the closure.

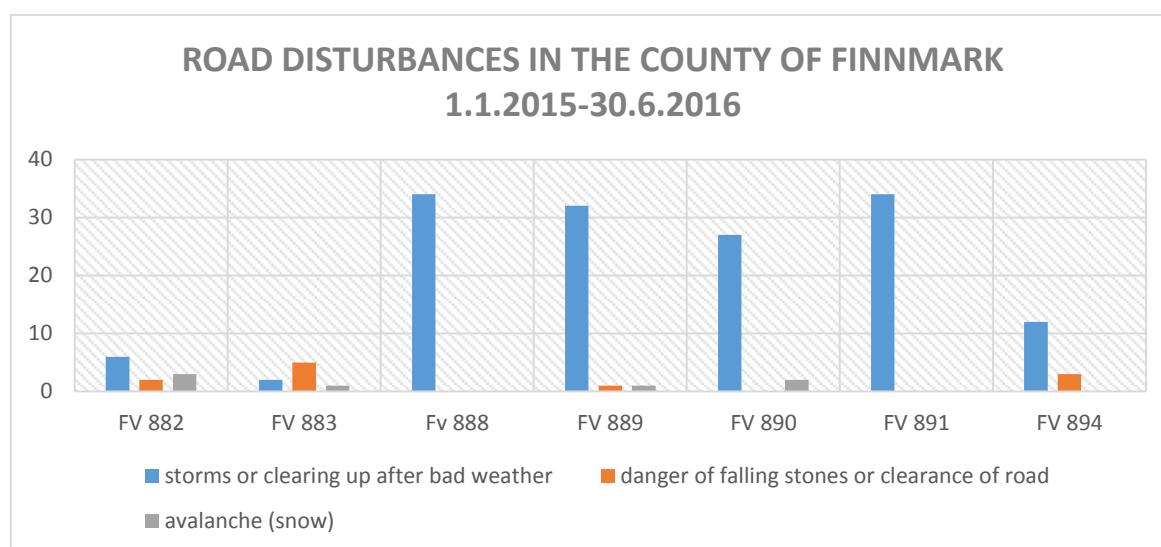


Figure 14. Closure of seven regional roads in Finnmark due to harsh weather.

5.6 Finland

The above map in figure 1, shows that most of Finland is included in the NPA region. The northern and in many areas rural parts of the Finnish NPA regions are characterized by many lakes and a large areas of forest. The northern European inland climate is causing the cold often dry conditions in winter and precipitation, that origin both from North Atlantic and Russian weather systems.



Figure 15. Typical results from extreme weather conditions in Finland. (Source: Erkki Oksanen/Luke')

Selected number of warnings in Finland 2014:

There are warnings given several times per day, so there can be several warnings considering the same day. The list consists of warning types relevant for the regions of North Karelia in Eastern Finland, therefore for example sea related warnings are excluded from the list below. The numbers include warnings within parts of the whole country.

Weather Warning Type	Number of warnings
Rain warnings:	200
Forest and grass fire warnings:	769
Traffic warnings:	965
Heat and cold warnings:	26
Other warnings (consist warnings for land areas, like wind or thunder but there seems to also wind warnings for lakes):	728

Table 2. Weather warnings in Finland

The climate in Finland is much milder than many other regions located as far north. There were in the year of 2014 issued 26 temperature warnings indicating cold or heat alerts. However, the high warnings of fire warnings indicate dry and warm conditions. The traffic warnings indicate in some sense a relation to the other warning types. The indication shows for 2014 that Finland has a high part of warnings caused by precipitation.

5.7 Northern Europe

Another weather phenomenon in northern Europe is “atmospheric icing” on construction materials when ice is growing on coastal or offshore installations, ships or flying vehicles. This affect is caused by a combination of specific weather conditions that can be challenging issue in safety. Ice molecules is built upon material surfaces attached to mechanical structures, as for example fixed installations as buildings, windmills or transportation vehicles, e.g. ships, helicopters and cars. Sensitive areas, in for example offshore installations, skips and blades on helicopters or windmills that have an exposed risk for icing can be protected with different types of heating systems that can be installed in conjunction with the material. However, there is a risk that weather challenges due to icing can affect business, e.g. energy companies located mainly in or in connection to coastal areas in the GREBE regions.

Another weather scenario in northern parts of Europe that has been more frequent the recent year is flooding, which have serious impact on businesses in coastal areas. This phenomenon has an impact on infrastructural part of the society. The disturbances in transportation and business operations are in severe cases affecting production in long time. This is illustrated in figure 16 below.



Figure 16. Flood: A car drives through a flooded bridge on the A39 in Perthshire. (Source: <http://www.mirror.co.uk/news/uk-news/uk-weather-scotland-faces-flood-7115240>)

The conclusion of the increasing weather extreme conditions in northern Europe in combination with the additional current climate change will affect the societies in the NPA regions. To what extent it will affect the society however is hard to predict. On the other hand we may conclude that even if we always have experienced harsh weather in coastal regions, the new situation in some sense will affect us more distinct as a society.

The society of today is not built with the preferences of handling the extreme weather conditions, and it seems that the business operations that are established in coastal areas is built in a vulnerable infrastructure and with minimal strategic planning to minimize the disturbance from harsh weather conditions.

The challenges are as always to find a proper level of preparedness and to learn from experience in these specific “local extreme” situations. A type of preparatory action can be to establish a Strengths, Weakness, Opportunities and Threats (SWOT) analysis for the business operation, as illustrated in figure 17.

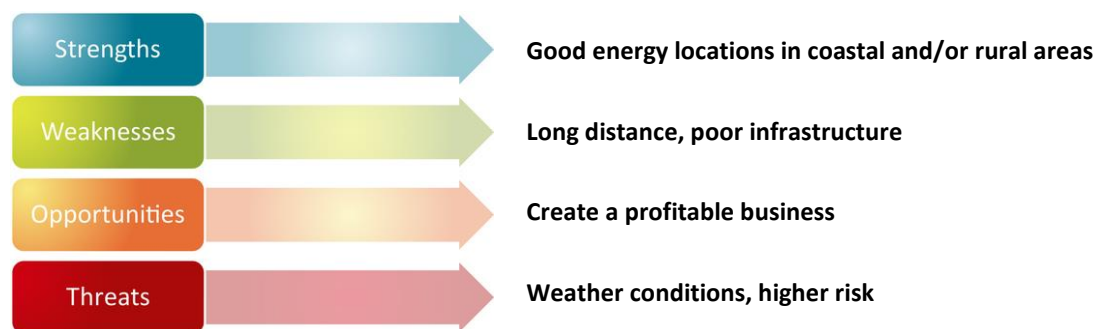


Figure 17. A SWOT analysis for operating business.

The weather phenomenon containing **precipitation** and / or **wind** parameters that is involving a weather warning from the regions national metrological institute will of course create business challenges in keep continuous operations containing maintenance, repair and local monitoring of installations.

These installations are often located in rural places with poor infrastructure and a common procedure is to close down the operation while the harsh weather is ongoing. The safety of personnel, equipment and property is always causing a higher risk even if there is a strategic risk document available.

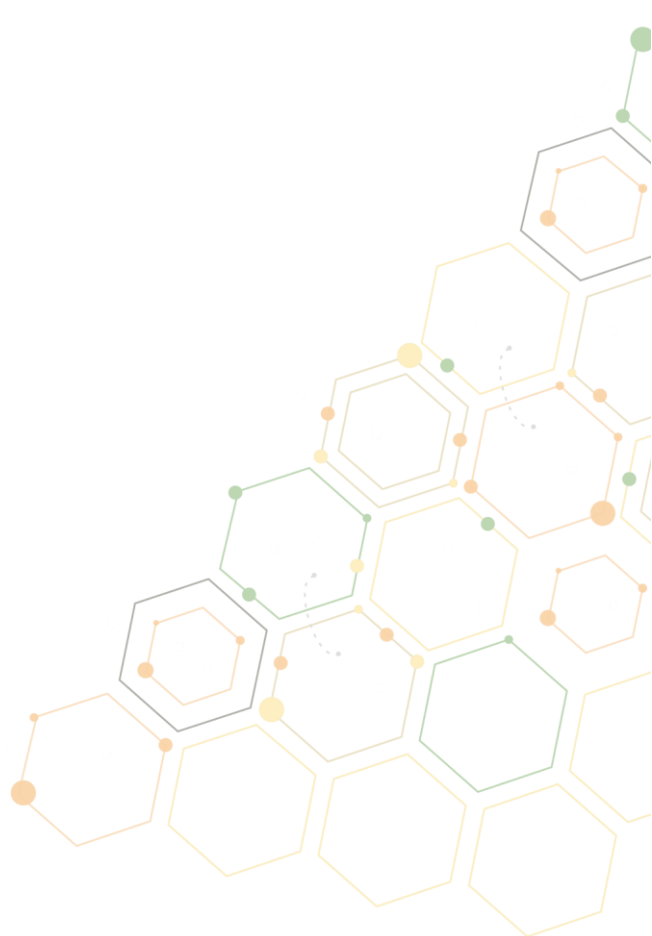
However, despite these drawbacks there seems in many cases that there is a profitable business. Even with an additional budget cost in energy business related to specific weather conditions the result from e.g. windmills, water plants or wave/subsea generating energy plants are in most cases positive.

6. Conclusion climate effects on society business

The widely spread geographical areas of northern Europe, is experiencing a number of joint challenges in relation to its location, but also possible opportunities that can be overcome and realized by regional cooperation. The experience from each region may be introduced to other Northern European areas and innovations from different parts in society can be used to create specific growth initiatives and common efficient business opportunities of the European Northern and Arctic regions in a climate efficient way. One major impact of challenges and initiatives in business operations is the influence of weather conditions on society and in the extension also SME business operations and productivity located in these areas.

Today, many operators in society refer to weather as a restriction in budget and argue that it is a phenomenon that has an actuable impact on business. However, the weather can be a strong benefit for the business when an updated insight into the specific local conditions is available and by using a strategic handling document based upon regional knowledge and experience from other businesses. Even national weather organizations are today providing companies this service. More about this type of commercial segment will be described in part II of this report.

The final implication is that a change in weather pattern will result in a variety of weather phenomenon that can affect the NPA regions in a different matter, as been described in this report. The introductory sentence *“As the Europe Northern Periphery regions changes, so does the society in Northern Europe.”* shows that this phenomenon seems to be in coherence with the presented data in this report. However, there are different effects on the society, depending upon the specific region, i.e. flooding, wind, and disturbance on roads by fallen trees and avalanche.



Appendix

Ireland 2015

Colour of warnings	Clare	Donegal	Galway	Leitrim	Mayo	Roscommon	Sligo
Total Red warnings	6	6	7	5	7	3	7
Total Orange warnings	38	43	46	38	44	21	42
Total Yellow warnings	109	103	103	93	104	89	96
Total all warnings	153	152	156	136	155	113	145

Elements for warning	Clare	Donegal	Galway	Leitrim	Mayo	Roscommon	Sligo
Fog	7	5	6	6	6	7	6
Low temperature	3	3	3	3	3	3	3
Rainfall	35	24	33	22	29	24	23
Snow-ice	18	29	22	26	25	24	25
Thunder	1	1	0	0	0	0	0
Wind	88	89	91	78	91	54	87
Total	153	152	156	136	155	113	145

Northern Ireland 2015

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Ice	Warning	17.01.2015 20:50	18.01.2015 11:00	Low	Medium
Yellow	Ice	Alert	19.01.2015 21:00	20.01.2015 10:00	Low	Medium
Yellow	Snow and Ice	Warning	20.01.2015 17:00	21.01.2015 10:00	Low	Medium
Yellow	Ice and Fog	Warning	21.01.2015 20:10	22.01.2015 11:00	Low	Medium
Yellow	Ice	Warning	23.01.2015 18:00	24.01.2015 10:00	Low	Medium
Amber	Snow	Warning	28.01.2015 17:00	29.01.2015 11:00	Medium	Medium
Yellow	Snow and Ice	Warning	29.01.2015 10:30	30.01.2015 11:00	Medium	Low
Yellow	Snow	Warning	31.01.2015 00:15	31.01.2015 23:45	Low	Medium
Yellow	Ice	Warning	31.01.2015 02:15	31.01.2015 11:00	Low	Medium
Yellow	Snow and Ice	Warning	31.01.2015 14:00	01.02.2015 12:00	Low	Medium
Yellow	Snow and Ice	Warning	20.02.2015 20:00	21.02.2015 10:00	Low	Medium
Yellow	Snow and Ice	Warning	23.02.2015 11:05	23.02.2015 13:00	Low	Medium
Yellow	Wind	Warning	23.02.2015 15:00	24.02.2015 12:00	Low	Medium
Yellow	Ice	Warning	26.02.2015 18:00	27.02.2015 10:00	Low	Medium
Yellow	Wind	Alert	28.02.2015 17:00	01.03.2015 04:00	Low	Medium
Yellow	Wind	Warning	28.03.2015 07:00	28.03.2015 18:00	Low	Medium
Yellow	Wind	Warning	31.03.2015 07:45	31.03.2015 18:00	Low	Medium
Yellow	Rain	Warning	05.08.2015 13:00	05.08.2015 22:00	Medium	Very Low
Yellow	Rain	Warning	23.08.2015 09:30	23.08.2015 19:00	Low	Medium
Yellow	Rain	Warning	26.08.2015 02:00	26.08.2015 08:00	Medium	Low
Yellow	Rain	Alert	11.09.2015 14:00	12.09.2015 13:00	Medium	Low
Yellow	Rain	Warning	11.09.2015 17:00	12.09.2015 13:00	Medium	Very Low
Yellow	Rain	Warning	11.09.2015 17:00	12.09.2015 13:00	Medium	Very Low
Yellow	Fog	Warning	02.10.2015 01:25	02.10.2015 11:00	Low	High
Yellow	Rain	Warning	14.11.2015 14:00	15.11.2015 18:00	Low	High
Yellow	Rain	Alert	16.11.2015 12:00	17.11.2015 23:59	Medium	Very Low
Yellow	Rain	Warning	18.11.2015 05:00	18.11.2015 11:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 12:00	19.11.2015 03:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 12:00	19.11.2015 03:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 14:00	19.11.2015 03:00	Low	Medium
Yellow	Wind	Warning	20.11.2015 17:00	21.11.2015 15:00	Low	Medium
Yellow	Wind	Warning	20.11.2015 21:00	21.11.2015 15:00	Low	Medium
Yellow	Wind	Warning	20.11.2015 22:40	21.11.2015 15:00	Low	Medium
Yellow	Ice	Warning	21.11.2015 03:00	21.11.2015 10:00	Low	Medium
Yellow	Wind	Warning	29.11.2015 07:00	29.11.2015 20:00	Low	Medium
Yellow	Wind	Warning	29.11.2015 10:10	29.11.2015 18:00	Low	Medium
Yellow	Snow	Warning	30.11.2015 07:00	30.11.2015 14:00	Low	Medium
Yellow	Snow	Warning	30.11.2015 07:00	30.11.2015 14:00	Low	Medium
Yellow	Wind	Warning	04.12.2015 12:00	05.12.2015 07:00	Low	High
Yellow	Wind	Warning	04.12.2015 12:00	04.12.2015 23:55	Low	High
Yellow	Rain	Alert	04.12.2015 21:00	05.12.2015 23:00	Low	Medium
Yellow	Rain	Warning	04.12.2015 21:00	06.12.2015 03:00	Medium	Low
Yellow	Wind	Warning	05.12.2015 00:05	06.12.2015 06:00	Medium	Low

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Rain	Warning	05.12.2015 11:20	06.12.2015 03:00	Medium	Low
Yellow	Wind	Warning	05.12.2015 11:40	06.12.2015 06:00	Medium	Low
Yellow	Rain	Warning	07.12.2015 13:00	07.12.2015 18:00	Low	Medium
Yellow	Rain	Warning	07.12.2015 13:00	07.12.2015 18:00	Low	Medium
Yellow	Rain	Warning	09.12.2015 13:00	09.12.2015 19:00	Low	Medium
Yellow	Rain	Warning	12.12.2015 04:00	12.12.2015 11:00	Low	Medium
Yellow	Rain and Snow	Warning	12.12.2015 08:10	12.12.2015 13:00	Low	Medium
Yellow	Ice	Warning	12.12.2015 17:00	13.12.2015 10:00	Low	Medium
Yellow	Rain	Warning	13.12.2015 11:00	13.12.2015 19:00	Low	Medium
Yellow	Rain	Warning	22.12.2015 00:05	22.12.2015 09:00	Low	Medium
Yellow	Rain	Warning	28.12.2015 18:00	28.12.2015 23:45	Low	Medium
Yellow	Wind	Alert	29.12.2015 09:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Alert	29.12.2015 09:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Alert	29.12.2015 15:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Alert	29.12.2015 15:00	30.12.2015 07:00	Medium	Low
Yellow	Wind	Warning	29.12.2015 15:00	30.12.2015 08:00	Medium	Low
Yellow	Rain	Warning	29.12.2015 19:00	30.12.2015 15:00	Medium	Low
Amber	Rain	Warning	29.12.2015 21:00	30.12.2015 07:00	Medium	Medium
Amber	Rain	Warning	29.12.2015 21:00	30.12.2015 07:00	Medium	Medium
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Yellow	Wind	Warning	30.12.2015 10:00	30.12.2015 14:00	Low	Medium
Yellow	Rain	Warning	30.12.2015 11:30	30.12.2015 15:00	Medium	Low
Yellow	Snow and Ice	Warning	31.12.2015 18:00	01.01.2016 12:00	Low	Medium
Yellow	Snow and Ice	Warning	31.12.2015 18:00	01.01.2016 12:00	Low	Medium

Scotland 2015

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Ice	Warning	17.01.2015 20:50	18.01.2015 11:00	Low	Medium
Yellow	Snow and Ice	Warning	18.01.2015 22:00	19.01.2015 10:00	Low	Medium
Yellow	Snow and Ice	Warning	20.01.2015 05:00	20.01.2015 15:00	Low	Medium
Yellow	Snow and Ice	Warning	20.01.2015 17:00	21.01.2015 10:00	Low	Medium
Yellow	Ice	Warning	23.01.2015 18:00	24.01.2015 10:00	Low	Medium
Amber	Snow	Warning	28.01.2015 17:00	29.01.2015 11:00	Medium	Medium
Yellow	Snow and Ice	Warning	29.01.2015 10:30	30.01.2015 11:00	Medium	Low
Yellow	Snow	Warning	31.01.2015 00:15	31.01.2015 23:45	Low	Medium
Yellow	Ice	Warning	31.01.2015 02:15	31.01.2015 11:00	Low	Medium
Yellow	Snow and Ice	Warning	31.01.2015 13:00	01.02.2015 12:00	Medium	Low
Yellow	Snow and Ice	Warning	31.01.2015 14:00	01.02.2015 12:00	Low	Medium
Yellow	Snow and Ice	Warning	20.02.2015 20:00	21.02.2015 10:00	Low	Medium
Yellow	Snow	Warning	22.02.2015 11:55	22.02.2015 17:00	Low	Medium
Yellow	Snow and Ice	Warning	23.02.2015 11:05	23.02.2015 13:00	Low	Medium
Yellow	Wind	Warning	23.02.2015 15:00	24.02.2015 12:00	Low	Medium
Yellow	Ice	Warning	23.02.2015 18:00	24.02.2015 11:00	Low	Medium
Yellow	Ice	Warning	26.02.2015 18:00	27.02.2015 10:00	Low	Medium
Yellow	Wind	Alert	28.02.2015 17:00	01.03.2015 04:00	Low	Medium
Yellow	Snow	Warning	26.03.2015 00:05	26.03.2015 10:00	Low	Medium
Yellow	Wind	Warning	28.03.2015 07:00	28.03.2015 18:00	Low	Medium
Yellow	Ice	Warning	29.03.2015 21:00	30.03.2015 08:00	Low	Medium
Yellow	Ice	Warning	31.03.2015 01:00	31.03.2015 09:00	Low	Medium
Yellow	Wind	Warning	31.03.2015 07:45	31.03.2015 18:00	Low	Medium
Yellow	Ice	Warning	31.03.2015 20:00	01.04.2015 09:00	Low	Medium
Yellow	Ice	Warning	26.04.2015 18:00	27.04.2015 06:00	Low	High
Yellow	Rain	Warning	21.06.2015 13:40	21.06.2015 19:00	Low	Medium
Yellow	Rain	Warning	07.07.2015 11:00	07.07.2015 19:00	Medium	Very Low
Yellow	Rain	Warning	17.07.2015 00:00	18.07.2015 20:00	Low	Medium
Yellow	Rain	Alert	17.07.2015 02:00	17.07.2015 14:00	Low	Medium
Yellow	Rain and Wind	Warning	17.07.2015 17:00	18.07.2015 12:00	Low	Medium
Yellow	Rain	Alert	13.08.2015 23:05	14.08.2015 22:50	Medium	Very Low
Yellow	Rain	Warning	22.08.2015 20:00	23.08.2015 06:00	Low	Medium
Yellow	Rain	Warning	22.08.2015 20:00	23.08.2015 06:00	Low	Medium
Yellow	Wind	Alert	22.10.2015 00:00	22.10.2015 17:00	Low	Medium
Yellow	Wind	Warning	22.10.2015 00:00	22.10.2015 17:00	Low	Medium
Yellow	Fog	Warning	03.11.2015 16:30	03.11.2015 23:00	Low	Medium
Yellow	Wind	Warning	09.11.2015 05:00	09.11.2015 13:00	Low	Medium
Yellow	Rain	Warning	09.11.2015 15:00	09.11.2015 23:59	Low	Medium
Yellow	Rain	Warning	09.11.2015 21:00	10.11.2015 12:00	Low	Medium
Yellow	Wind	Warning	12.11.2015 18:00	13.11.2015 14:00	Medium	Low
Yellow	Wind	Warning	12.11.2015 18:00	13.11.2015 23:00	Medium	Low

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Wind	Warning	12.11.2015 18:00	13.11.2015 23:00	Medium	Low
Yellow	Wind	Alert	12.11.2015 18:00	13.11.2015 14:00	Medium	Very Low
Amber	Wind	Warning	12.11.2015 18:00	13.11.2015 12:00	Medium	Medium
Amber	Wind	Warning	12.11.2015 21:00	13.11.2015 12:00	Medium	Medium
Amber	Wind	Warning	12.11.2015 21:00	13.11.2015 12:00	Medium	Medium
Amber	Wind	Warning	13.11.2015 09:00	13.11.2015 12:00	Medium	Medium
Yellow	Rain	Warning	14.11.2015 15:00	15.11.2015 22:00	Medium	Low
Yellow	Rain	Alert	14.11.2015 15:00	15.11.2015 22:00	Medium	Low
Amber	Rain	Warning	14.11.2015 17:00	15.11.2015 18:00	Medium	Medium
Yellow	Rain	Warning	15.11.2015 11:15	16.11.2015 04:00	Medium	Low
Amber	Rain	Warning	15.11.2015 12:30	16.11.2015 03:00	Medium	Medium
Yellow	Rain	Warning	15.11.2015 15:30	16.11.2015 04:00	Medium	Low
Yellow	Wind	Warning	16.11.2015 09:00	16.11.2015 23:45	Low	Medium
Yellow	Wind	Warning	16.11.2015 11:00	16.11.2015 23:55	Low	Medium
Yellow	Rain	Alert	16.11.2015 12:00	17.11.2015 23:59	Medium	Very Low
Yellow	Rain	Warning	17.11.2015 12:10	17.11.2015 21:00	Low	Medium
Yellow	Rain	Warning	18.11.2015 05:00	18.11.2015 11:00	Low	Medium
Yellow	Rain	Warning	18.11.2015 06:00	18.11.2015 12:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 12:00	19.11.2015 03:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 12:00	19.11.2015 03:00	Low	Medium
Yellow	Wind	Warning	18.11.2015 14:00	19.11.2015 03:00	Low	Medium
Yellow	Snow	Warning	20.11.2015 16:00	21.11.2015 10:00	Low	High
Yellow	Snow	Warning	20.11.2015 17:00	21.11.2015 10:00	Low	High
Yellow	Wind	Warning	20.11.2015 17:00	21.11.2015 15:00	Low	Medium
Yellow	Wind	Warning	20.11.2015 21:00	21.11.2015 15:00	Low	Medium
Yellow	Wind	Warning	20.11.2015 22:40	21.11.2015 15:00	Low	Medium
Yellow	Ice	Warning	21.11.2015 03:00	21.11.2015 10:00	Medium	Very Low
Yellow	Ice	Warning	21.11.2015 03:00	21.11.2015 10:00	Low	Medium
Yellow	Snow and Ice	Warning	21.11.2015 20:00	22.11.2015 10:00	Low	Medium
Yellow	Rain	Alert	27.11.2015 00:05	27.11.2015 15:00	Low	Medium
Yellow	Rain	Warning	27.11.2015 00:05	27.11.2015 15:00	Low	Medium
Yellow	Rain	Warning	27.11.2015 00:05	27.11.2015 15:00	Low	Medium
Yellow	Ice	Warning	28.11.2015 21:00	29.11.2015 10:00	Low	Medium
Yellow	Snow	Warning	29.11.2015 07:00	30.11.2015 10:00	Low	Medium
Yellow	Wind	Warning	29.11.2015 07:00	29.11.2015 20:00	Low	Medium
Yellow	Wind	Warning	29.11.2015 10:10	29.11.2015 18:00	Low	Medium
Yellow	Snow	Warning	29.11.2015 10:45	30.11.2015 10:00	Low	Medium
Yellow	Snow	Warning	30.11.2015 07:00	30.11.2015 14:00	Low	Medium
Yellow	Snow	Warning	30.11.2015 07:00	30.11.2015 14:00	Low	Medium
Yellow	Snow and Ice	Warning	01.12.2015 04:00	01.12.2015 12:00	Low	Medium
Yellow	Snow and Ice	Warning	01.12.2015 09:00	01.12.2015 12:00	Low	Medium
Yellow	Rain	Warning	03.12.2015 11:30	03.12.2015 23:50	Low	Medium

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Snow and Ice	Warning	03.12.2015 18:00	04.12.2015 23:55	Low	Medium
Yellow	Snow and Ice	Warning	03.12.2015 18:00	03.12.2015 23:55	Low	Medium
Yellow	Wind	Warning	04.12.2015 12:00	05.12.2015 07:00	Low	High
Yellow	Wind	Warning	04.12.2015 12:00	04.12.2015 23:55	Low	High
Yellow	Wind	Alert	04.12.2015 12:00	04.12.2015 23:45	Low	Medium
Yellow	Rain	Warning	04.12.2015 14:00	04.12.2015 23:55	Low	Medium
Yellow	Wind	Warning	04.12.2015 17:00	06.12.2015 06:00	Low	Medium
Yellow	Wind	Warning	05.12.2015 00:05	06.12.2015 06:00	Medium	Low
Yellow	Rain	Warning	05.12.2015 00:05	06.12.2015 09:00	Medium	Low
Yellow	Rain	Alert	05.12.2015 00:05	06.12.2015 06:00	Medium	Very Low
Yellow	Wind	Alert	05.12.2015 00:15	06.12.2015 09:00	Low	Medium
Yellow	Wind	Alert	05.12.2015 00:15	06.12.2015 09:00	Low	Medium
Amber	Rain	Warning	05.12.2015 02:00	06.12.2015 06:00	Medium	High
Amber	Rain	Warning	05.12.2015 11:15	06.12.2015 06:00	Medium	High
Yellow	Wind	Warning	05.12.2015 11:40	06.12.2015 06:00	Medium	Low
Amber	Rain	Warning	05.12.2015 22:05	06.12.2015 07:00	Medium	High
Yellow	Rain	Alert	07.12.2015 00:10	07.12.2015 23:50	Medium	Very Low
Yellow	Rain	Alert	07.12.2015 06:00	07.12.2015 23:50	Medium	Very Low
Yellow	Rain	Warning	07.12.2015 17:00	08.12.2015 05:00	Medium	Low
Yellow	Rain	Warning	07.12.2015 17:00	08.12.2015 05:00	Low	Medium
Yellow	Rain	Warning	09.12.2015 06:00	10.12.2015 03:00	Medium	Low
Yellow	Rain	Alert	09.12.2015 06:00	10.12.2015 09:00	Medium	Low

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Rain	Alert	09.12.2015 06:00	10.12.2015 18:00	Medium	Very Low
Yellow	Rain	Warning	09.12.2015 11:00	10.12.2015 03:00	Medium	Low
Yellow	Wind	Warning	09.12.2015 11:00	09.12.2015 20:00	Low	Medium
Yellow	Wind	Warning	09.12.2015 12:00	09.12.2015 23:50	Low	Medium
Yellow	Wind	Warning	09.12.2015 12:00	10.12.2015 23:50	Low	Medium
Yellow	Wind	Warning	09.12.2015 12:00	09.12.2015 23:50	Low	Medium
Yellow	Wind	Warning	10.12.2015 09:50	10.12.2015 13:00	Low	Medium
Yellow	Snow	Warning	11.12.2015 09:00	11.12.2015 23:00	Low	Medium
Yellow	Rain and Snow	Warning	12.12.2015 09:00	12.12.2015 20:00	Low	Medium
Yellow	Rain and Snow	Warning	12.12.2015 14:05	12.12.2015 18:00	Low	Medium
Yellow	Ice	Warning	12.12.2015 17:00	13.12.2015 10:00	Low	Medium
Yellow	Snow	Warning	13.12.2015 19:00	14.12.2015 11:00	Low	Medium
Yellow	Snow	Warning	13.12.2015 21:00	14.12.2015 11:00	Low	Medium
Yellow	Snow	Warning	13.12.2015 21:00	14.12.2015 11:00	Low	Medium
Yellow	Rain	Alert	18.12.2015 15:00	19.12.2015 13:00	Low	Medium
Yellow	Rain	Warning	18.12.2015 15:00	19.12.2015 10:00	Low	Medium
Yellow	Rain	Alert	18.12.2015 21:00	19.12.2015 15:00	Medium	Very Low
Yellow	Rain	Warning	22.12.2015 00:15	22.12.2015 18:00	Low	High
Yellow	Rain	Alert	23.12.2015 18:00	24.12.2015 08:00	Low	Medium
Yellow	Rain	Warning	23.12.2015 21:00	24.12.2015 08:00	Low	Medium
Yellow	Wind	Alert	23.12.2015 21:00	24.12.2015 15:00	Low	Medium
Yellow	Wind	Alert	23.12.2015 21:00	24.12.2015 15:00	Low	Medium

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Rain	Alert	25.12.2015 15:00	26.12.2015 23:45	Medium	Low
Yellow	Rain	Alert	25.12.2015 15:00	26.12.2015 23:45	Medium	Low
Yellow	Rain	Warning	25.12.2015 15:00	26.12.2015 23:45	Medium	Low
Yellow	Rain	Warning	25.12.2015 15:00	26.12.2015 23:45	Medium	Low
Yellow	Rain	Warning	25.12.2015 16:05	26.12.2015 23:45	Medium	Low
Yellow	Rain	Warning	26.12.2015 00:15	26.12.2015 22:00	Low	Medium
Yellow	Rain	Warning	26.12.2015 11:15	26.12.2015 23:45	Medium	Low
Yellow	Rain	Warning	26.12.2015 12:00	26.12.2015 22:00	Low	Medium
Yellow	Ice	Warning	27.12.2015 03:00	27.12.2015 11:00	Low	Medium
Yellow	Wind	Alert	29.12.2015 09:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Alert	29.12.2015 09:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Alert	29.12.2015 15:00	29.12.2015 23:45	Medium	Low
Yellow	Wind	Warning	29.12.2015 15:00	30.12.2015 08:00	Medium	Low
Yellow	Wind	Alert	29.12.2015 15:00	30.12.2015 07:00	Medium	Low
Yellow	Rain	Warning	29.12.2015 19:00	30.12.2015 15:00	Medium	Low
Yellow	Wind	Warning	29.12.2015 19:00	30.12.2015 11:00	Low	Medium
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Yellow	Rain	Alert	30.12.2015 00:15	30.12.2015 23:45	Medium	Low
Amber	Rain	Warning	30.12.2015 00:15	30.12.2015 15:00	High	Low
Amber	Rain	Alert	30.12.2015 00:15	30.12.2015 18:00	High	Low
Amber	Rain	Alert	30.12.2015 00:15	30.12.2015 18:00	High	Low

Warning level	Weather type	Warning class	Valid from	Valid to	Likelihood	Impact
Yellow	Rain	Alert	30.12.2015 03:00	31.12.2015 03:00	Low	Medium
Yellow	Rain	Alert	30.12.2015 03:00	31.12.2015 03:00	Low	Medium
Yellow	Rain	Alert	30.12.2015 03:00	31.12.2015 03:00	Low	Medium
Yellow	Rain	Alert	30.12.2015 03:00	31.12.2015 03:00	Low	Medium
Yellow	Rain	Alert	30.12.2015 03:00	31.12.2015 03:00	Low	Medium
Yellow	Wind	Alert	30.12.2015 06:00	30.12.2015 15:00	Low	Medium
Yellow	Wind	Warning	30.12.2015 08:00	30.12.2015 13:00	Low	Medium
Yellow	Wind	Warning	30.12.2015 10:00	30.12.2015 14:00	Low	Medium
Amber	Rain	Warning	30.12.2015 11:05	30.12.2015 15:00	High	Low
Yellow	Rain	Warning	30.12.2015 11:30	30.12.2015 15:00	Medium	Low
Yellow	Rain	Warning	30.12.2015 14:15	30.12.2015 18:00	Medium	Low
Yellow	Snow and Ice	Warning	31.12.2015 18:00	01.01.2016 12:00	Low	Medium
Yellow	Snow and Ice	Warning	31.12.2015 18:00	01.01.2016 12:00	Low	Medium

Iceland 2014

Breiðafjörður 252 warnings. (all storm warnings)	
Month	Number of warnings
January	33
February	18
March	52
April	15
August	6
September	28
October	15
November	35
December	51

Vestfirðir 237 warnings. (8 precipitation warnings, other were storm warnings)	
Month	Number of warnings
January	37
February	21
March	48
April	15
July	8
September	10
October	24
November	28
December	46

Strandir og Norðurland vestra, 209 warnings. (8 precipitation warnings, other were storm warnings)	
Month	Number of warnings
January	21
February	11
March	34
April	10
July	8
September	15
October	32
November	27
December	51



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Project Partners

GREBE will be operated by eight partner organisations across six regions:



About GREBE

GREBE is a €1.77m, 3-year (2015-2018) transnational project to support the renewable energy sector. It is co-funded by the EU's Northern Periphery & Arctic (NPA) Programme. It will focus on the challenges of peripheral and arctic regions as places for doing business, and help develop renewable energy business opportunities provided by extreme conditions.

