HM Government

Beyond the Ice

UK policy towards the Arctic

Beyond the Ice

UK policy towards the Arctic

Polar Regions Department

Foreign and Commonwealth Office,
King Charles Street,
London

SW1A 2AH

This publication is available for download at www.gov.uk/government/publication.

Any enquiries regarding this publication should be sent to us at polarregions@fco.gov.uk.

Contents

Foreword **2**

Introduction **3**

What is the Arctic? **5**

Projecting global influence **7**

Governance and Global Britain **7**

Arctic Council 7

Bilateral Relations with the Arctic States 8

Multilateral Engagement 8

Science **11**

Support for UK Research 11

International engagement 13

Protecting people and the environment **15**

Climate **15**

People **17**

Environment **18**

Marine Conservation 18

Marine Litter 19

Pollution 20

Migratory Birds 21

Defence **21**

Safety **22**

Promoting prosperity **23**

Trade Routes 23

Energy and extractives 27

Fisheries 27

Connectivity 29

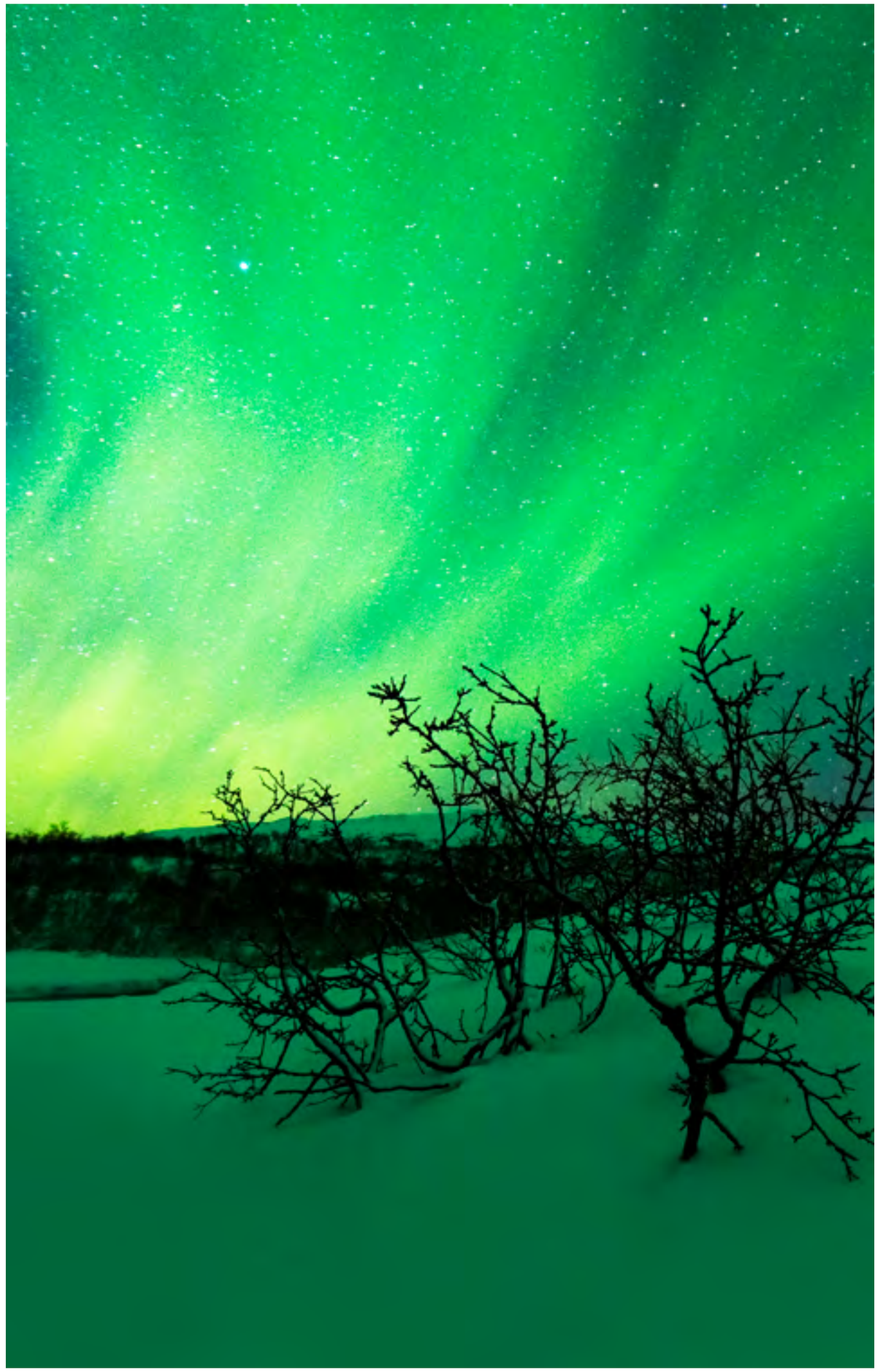
Financial Services 29

References and endnotes **31**

Acronyms **32**

The Arctic States **33**

Arctic Council **35**



The Rt Hon Sir
Alan Duncan MP,
Minister of State for
the Polar Regions

Foreword

"With its vast scale and diversity, the Arctic defies definition, but its influence on the environmental well-being of the rest of the world – and our influence on the Arctic – is now beyond doubt."

We have all heard how greenhouse gases produced elsewhere on the planet are causing Arctic temperatures to increase, which are in turn causing sea ice to melt and sea levels to rise. This is just one example of the interdependence between the Arctic and the rest of the world.

This mutual influence means that what happens in the Arctic matters to Arctic and non-Arctic states alike.

Although the UK is not an Arctic State, we are its nearest neighbour, with Lerwick in the Shetland Islands closer to the Arctic Circle than it is to London. We have always been a world leader in Polar affairs where British views have long held sway in the fields of polar science, exploration, diplomacy, business and environmental protection.

In 2013, the UK Government published its first Arctic Policy Framework to set out the UK's approach to the region. We undertook to update the Framework on a regular basis, and, in response to the House of Lords Select Committee Report on the Arctic in December 2015, the Government also committed to keep our approach under review.

This second iteration of our framework, *Beyond the Ice: UK policy towards the Arctic*, meets both of our commitments.

This report demonstrates our continuing interest in the region and our desire to share our Arctic experience and expertise for the benefit of all. This is consistent with the UK Government's vision of a Global Britain; indeed, the UK's role in the Arctic reflects the very best of what Global Britain has to offer, from world-leading science, and business investment, to our commitment to environmental protection, international cooperation, and the rules-based system.

As we set our course to exit from the European Union, this Framework reaffirms our intention to remain a significant player in Arctic affairs. It recognises the essential need to protect the Arctic environment while also enabling its peoples to flourish. In other words, it sets out the UK's commitment to remain a good neighbour to the Arctic, as a responsible steward of its interests.

Introduction

In 2013, the UK Government published its first Arctic Policy Framework: *Adapting To Change*. It set out the UK's approach towards the Arctic, based upon the three principles of respect, cooperation and appropriate leadership.

It both noted that the UK is not an Arctic State and our respect for the sovereign rights of those States, the indigenous peoples and the environment of the region.

The rate of change in the Arctic has accelerated since that point. Scientists reported in January 2016 that the Arctic was 5°c warmer than the 1981-2010 average for the region. Meanwhile, the decline in sea-ice continues. A record low sea ice extent occurred in summer 2012 and a record low maximum sea ice extent occurred in winter 2016[1]. The Arctic may become effectively ice-free in the summer sooner than predicted, perhaps as soon as the late 2030's. In addition, the Arctic is becoming increasingly polluted and increasingly visited, while a growing number of non-Arctic nations are looking toward the Arctic as a place for commerce.

Given the rapid environmental changes happening in the region, it was always the intention of the UK Government that the Framework would receive regular updates. There have also been significant geopolitical changes in respect of the countries engaged in the region, the effects of these are reflected in this new Framework.

We believe that the three core principles of *Adapting To Change* remain the right ones and are central to our approach in the Arctic. It also advocated supporting the Arctic States efforts to ensure a sustainable future for the region. This ambition remains and will be achieved by projecting appropriate leadership to support good governance, by protecting people, the environment and vital ecosystems, and by promoting prosperity in the region, ensuring the people whose livelihoods rely on the Arctic can do so for generations to come and encouraging UK companies to explore opportunities in the Arctic.

Figure 1: Arctic Sea ice extent, 17 March 2018

National Snow and Ice Data Centre, University of Colorado Boulder

Our second iteration of the Framework outlines how the UK has remained, and will continue to be, one of the most active and influential non-Arctic States. It will set out what we have achieved since the publication of *Adapting To Change* and what our plans are to ensure we remain in this preeminent position.

Perhaps the biggest change to the UK's Arctic position since 2013 was the decision by the people of the UK to leave the European Union. While the exact nature of the UK's relationship

with the EU has still to be determined, the UK Government is confident that this presents new opportunities to develop pioneering policies that will meet our needs for generations to come. In some areas, the UK Government is already seeking to articulate its future policies. The 25-year environment plan (see page 16), published in January 2018, is a clear articulation of the UK Government's commitment to the environment, both at home and abroad. For other policy areas, it is still too soon to commit to post EU exit policies, nevertheless the UK will continue to display the same strong leadership shown when we became the first country in the world to set legally binding emission reduction targets through the 2008 Climate Change Act or became one of the first Arctic Council Observer States. It will not diminish our cooperation with EU nations but will enhance the possibility for forging even closer ties with non-EU nations.

Beyond the Ice: UK policy towards the Arctic focuses on UK actions and priorities across three key areas:

Protecting global influence – The UK holds fast to a vision of a Global Britain that is respected abroad, engaged in the world and working with our international partners to advance prosperity and security around the world. Integral to this in the Arctic is the UK's world leading science and innovation, which helps to advance global understanding of how changes in the Arctic have global consequences and helps to find new solutions to the challenges.

Protecting people and the environment – When the United Nations set the Global Goals for Sustainable Development in 2015, it recognised the importance of taking urgent action to combat climate change and its impacts; to conserving and sustainably using marine resources; and of life on land. The UK is firmly committed to delivering the Goals at home and around the World.

Promoting prosperity - Promoting the Arctic as a place where economic and commercial development occurs in a sustainable and responsible manner. Where the people of the region benefit from the prosperity that a changing Arctic may bring. Supporting UK companies investing in the Arctic; making them aware, and connecting them to, the opportunities available.

What is the Arctic?

You could be forgiven for thinking of the Arctic as purely a vast and hostile landscape but there is no single Arctic and no universally agreed definition of the Arctic. Those that exist range from the area within the Arctic Circle (66° 34' North); the area within the July 10°c isotherm; and the area within the Arctic tree line, which is the northern limit of tree growth. Different descriptions result in a variation in the number of people who are defined as living in the Arctic; estimates range from four to ten million people.

Regardless of technical definitions, the Arctic is a vibrant mix of communities and cultures, languages and traditions; a place where people live, trade and visit. The region comprises Canada, Finland, Greenland and the Faroe Islands (The Kingdom of Denmark), Iceland, Norway, Russia, Sweden and the United States (Alaska). Its panorama consists of the Arctic Ocean and adjoining seas plus wildly different landscapes, from the frozen tundra of North America and Russia, to vibrant cities across the region.

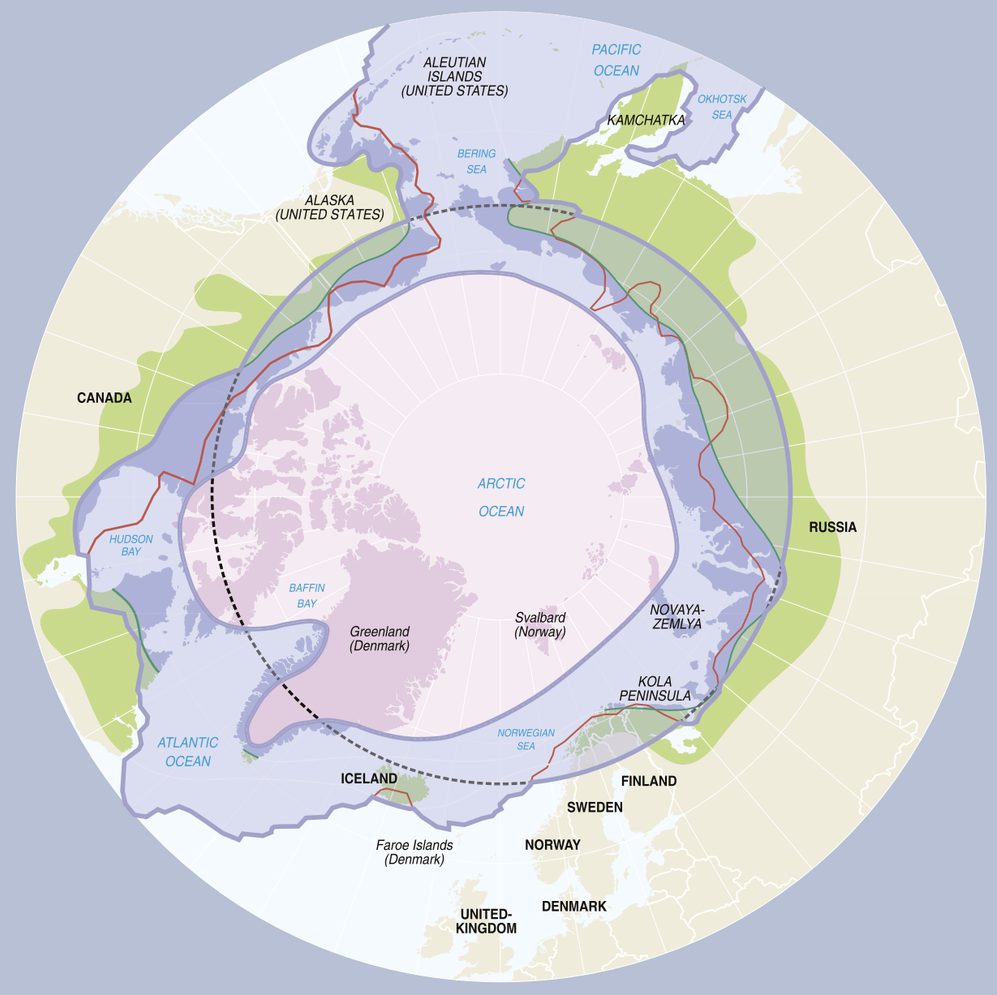
Encouraging a new generation of Polar researchers and champions

The Arctic is an area of fascination for many people who first learned about the region from the stories of the early explorers. For others their passion develops from a desire to protect the landscape and its wildlife. To continue increasing awareness and understanding of this beautiful region we must encourage from an early age the next generation of polar researchers and champions.

By providing educational tools and learning materials, schools can engage their pupils on a wide range of issues that affect the Arctic. The award-winning education resource 'Discovering the Arctic', tells the story of the people and the place. It provides an online platform, www.discoveringthearctic.org.uk, that contains the tools that teachers and school pupils need to learn about Arctic. A curriculum-based resource, it hosts interactive content and downloads aimed at GCSE level in England and Wales but is suitable for other age groups. Initially funded by the FCO, the site is hosted and developed by the Royal Geographical Society with IBG, in partnership with NERC, BAS and SAMS. The platform will relaunch in Spring 2018, with new content and mobile device capability.

In addition, the UK has participated in the Model Arctic Council initiative, taking part in events hosted in Greenland, Italy and the UK. The initiative enables students between 15 and 19 to learn about the Arctic through mock Arctic Council meetings that also enable them to develop their negotiating and consensus building skills.

Figure 2: Arctic Definitions[2]



Sources :
AMAP, 1998. AMAP Assessment Report: Arctic Pollution Issues.
AMAP, 1997. Arctic Pollution Issues: A State of the Arctic Environment Report.
CAFF, 2001. Arctic Flora and Fauna: Status and Conservation

Projecting global influence

The UK holds fast to a vision of a Global Britain that is engaged in the world and working with our international partners to advance prosperity and security in the Arctic. UK science and innovation helps advance global understanding of how changes in the Arctic have global consequences and helps to find new solutions to the challenges.

Governance and Global Britain

Since *Adapting To Change*, the UK Government have taken the important step of formally appointing a Minister responsible for the Polar Regions, based within the Foreign and Commonwealth Office (FCO). This is currently Minister of State, the Rt Hon Sir Alan Duncan MP. The Minister is supported by the Head of Polar Regions Department, a senior FCO official who oversees the development and implementation of the UK Government's policy towards the Arctic, Chairs the regular cross-government Arctic Network meetings, and ensures that the UK has appropriate representation at the Arctic Council and in other international Arctic fora.

This approach supports the UK's ability to consider Arctic matters in a cross-government, cross-region and multi-discipline way given our diverse interests and established engagement across the Arctic States and within the Arctic Council. We believe that this is the right approach for the UK.

Arctic Council

The UK's primary foreign policy objective remains maintaining the Arctic as a peaceful and stable region. Integral to this is recognising that the vast majority of the Arctic region falls within the sovereign jurisdiction of the eight Arctic States. Their leadership is vital to sustain a safe, secure and peaceful region. Given the UK's close proximity to the Arctic and its connection with the global systems, we reaffirm our commitment to support and work in partnership with the eight Arctic States and the region's indigenous peoples, to uphold this position.

Adapting To Change made clear that the Arctic Council is the pre-eminent intergovernmental regional forum for discussing sustainable development and environmental protection in the Arctic and this firmly remains the UK Government's view. The Council, with its vision for peace, stability and constructive cooperation in the Arctic, is rightly heralded for its role in promoting cooperation and coordination between the Arctic States and for ensuring that the indigenous peoples are central to their discussions. The recent nomination of the Arctic Council for the Nobel Peace prize underlines the success of these efforts. The UK offers its sincere congratulations.

The UK Government confirmed its continued commitment to the Arctic Council when we made our case to the Council to remain as an Observer State in 2016. We were pleased that the UK's observer status was reaffirmed at the Ministerial Meeting of the Arctic Council held in Fairbanks Alaska in 2017.

As an original observer state, the UK has continued to influence Arctic Council policies by providing scientific analysis and evidence in its working and expert groups. We were a prominent voice in the Protection of the Marine Environment Working Group (PAME), during the development of the Polar Code. UK experts were also actively involved in the development of the 2015 Black Carbon framework, produced by the Arctic Council Taskforce on Black Carbon and we remain close to this group's work.

Consistent calls from the UK and other leading Observers have led to recent enhancements to inclusivity and shared working between Arctic Council Members and Observers. We believe that this will further strengthen evidence-based policymaking and will help Observers make an important contribution to the work of the Council. We also welcome the decision to develop an Arctic Council strategic plan. We hope that the views of Observer states will be taken into account in the development of this plan.

Most importantly, the UK will continue to send appropriate representation to all future political and official level meetings of the Arctic Council and to contribute to its work in areas of mutual interest.

Bilateral Relations with the Arctic States

Our relationship with the Arctic States is strong and multidimensional. We work with them bilaterally and within a multitude of international fora.

Our bilateral relationships with individual Arctic States bring greater depth to our Arctic engagement. Diplomatic relationships long pre-date the Arctic Council and most other multilateral organisations discussed here. It is natural that these relationships will differ according to the relative priorities of those countries. When Finland acceded to the chair of the Arctic Council in 2017, British Embassy Helsinki bolstered their team to enhance bilateral engagement. This approach recognises the priority that Finland is giving to its Chairmanship and we will consider replicating this step in future Arctic Council Chair countries.

In 2017, the UK and Norway updated their 2011 High Level Agreement on the *Strengthening of United Kingdom-Norway cooperation on polar research and cultural heritage* by extending and enhancing our existing bilateral memorandum of understanding (MoU). The two countries have a strong mutual interest in ensuring that collective decisions about the future of the Arctic are made in light of the best science available. As part of the UK-Norway MoU, the parties have commissioned *The Polar Oceans: status and change report*, which will be available in 2018 and will help us understand the impacts of climate and environmental change on the crucial Polar Oceans.

In September 2017, the UK and Canada signed a 10-year MoU that will enhance bilateral cooperation in complementary areas of research, technology and innovation. This will strengthen ties between our governments, knowledge based institutions and businesses who are vital to understanding and finding solutions to the challenges faced across the Arctic.

Such agreements can be important catalysts for international cooperation and collaboration. The UK is interested in exploring similar arrangements in areas of mutual interest, with other Arctic and non-Arctic nations, particularly as the Arctic Council Agreement on Enhancing Scientific Cooperation is implemented.

Multilateral Engagement

As strong advocates of the international rules based system, we recognise the importance of negotiated and consensus driven agreements through multilateral organisations, treaties and conventions such as the United Nations Convention on the Law of the Sea (UNCLOS), International Maritime Organisation (IMO) (page 20) and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) (page 18). Such arrangements continue to provide an additional platform for cooperation and collaboration between the Arctic States and with the wider international community.

For example, UNCLOS defines the rights and responsibilities of Arctic coastal states, providing an overarching agreement that regulates the various uses of Arctic waters. Continuous decline in Arctic sea-ice will necessitate negotiated agreement to ensure that claims to Continental Shelf under the Arctic Ocean are conducted within international norms and that there is continued cooperation in areas of the Arctic Ocean that are beyond national jurisdiction. In this respect, the UK has been supportive of efforts to develop an Agreement to prevent unregulated high seas fisheries in the Central Arctic Ocean and foster international cooperation on relevant research.

Some Arctic issues have purely regional implications. Where this is the case, it is appropriate for regional organisations such as the Barents Euro-Arctic Council and the Northern Dimension to discuss issues at a regional level. We encourage such organisations to be transparent and inclusive in order to build trust and confidence between partners and beyond. The UK Government will examine its relationship with these bodies in the context of its exit from the European Union.

In addition to formal multilateral bodies, the growth of interest in the Arctic has led to a significant interest in the region from both governments and civil society. This has resulted in the development of a number of international conferences focused on the Arctic, aimed at sharing expertise and experience. Prominent amongst these are the Arctic Circle Assembly and Arctic Frontiers, which have become significant annual events that bring together academics, civil society, scientists, businesses and governments.

Due to the importance of these meetings both as platforms for information sharing, but also in demonstrating UK interest in the region, the UK Government has sought and remains committed to regularly sending delegations to such meetings. In 2015, Professor Robin Grimes, the FCO Chief Scientific Adviser, led a delegation to the Arctic Circle Assembly to highlight the breadth and depth of UK engagement in the Arctic and the enduring nature of our scientific research. The UK's Science and Innovation Network (SIN) teams in the Arctic States and the Natural Environment Research Council (NERC) Arctic Office have continued to foster the UK's profile and reputation for high quality scientific research and international cooperation at all subsequent events.

At the 2016 Arctic Circle Assembly in Reykjavik, Nicola Sturgeon, the First Minister of Scotland, set out the steps that the Scottish Government is taking to tackle climate change and to promote climate justice.

Due to its proximity to the European Arctic, Scotland enjoys a long history of shared economic, social and cultural links. Northerly parts of Scotland lie on similar latitudes and have similar geographies to Arctic countries, resulting in synergies between their remote communities and the socio-economic issues they face.

The Scottish Government announced that it would develop its own Arctic Strategy on devolved matters at the Arctic Circle Forum in Edinburgh in November 2017.

In collaboration with Euro-Arctic states, Northern Ireland and Scotland work through the *Northern Periphery and Arctic Programme* to help generate vibrant, competitive and sustainable communities, using innovation and entrepreneurship to seize the unique growth opportunities of the northern and Arctic regions. The UK Government supports these relationships and is keen to work with all the devolved administrations and organisations across the UK to develop appropriate connections in their region.

The UK Government has also been involved in supporting discussions related to a changing Arctic. The FCO's world leading conference facility, Wilton Park, hosted a meeting in 2016 to explore what the Arctic might look like in 30 years (see page 10).

UK-Canadian Arctic Partnership

Bursaries Programme

Now entering its second year, this UK Government programme has funded over 30 bursaries to support UK-based researchers in the Canadian Arctic, this provides them with access to a wide range of logistical support, including Canada's £85mn Cambridge Bay High Arctic Research Station.

These bursaries enable UK-based researchers to undertake high quality research in partnership with the best Canadian researchers across a wide range of marine terrestrial and other fields. This work helps to further our collective understanding of this rapidly changing region, the threats and opportunities, as well as the innovative responses that will be increasingly required in future.

The Arctic in 2045: A long-term vision

To further understand the impact of the evolving Arctic climate and explore the policy options available to the international community, the UK, Norwegian and Canadian Governments jointly funded a Wilton Park round-table discussion to explore alternative scenarios for the environmental, political, economic and social challenges faced by the Arctic, looking ahead to 2045.

The February 2016 meeting and subsequent report The Arctic in 2045: a long-term vision found that:

- While there were areas where rules and collaborative mechanisms could be further developed, no major governance gaps exist at present.
- The Arctic appears to be geopolitically insulated at present, but there are risks that this could change
- While the Arctic region consist of many different geographies it is not about to become a national park, but will continue as a lived in, and managed, environment.
- Conservation is of high importance but that this will be maintained alongside the utilisation of Arctic resources.
- The need for coordinated, long-term, science programmes, sustained over a large area and a long time scale to understand changes as they happen.
- Science collaboration on the Arctic should be global, involving stakeholders beyond the Arctic states.
- Development in the Arctic will take investment. Greater collaboration between public and private investment is needed.

These findings support the UK's approach to the Arctic[3].

Science

Cooperation and collaboration, whether sharing research capability such as icebreakers or collaborating on research projects, helps to deliver better solutions and help to build confidence between nations.

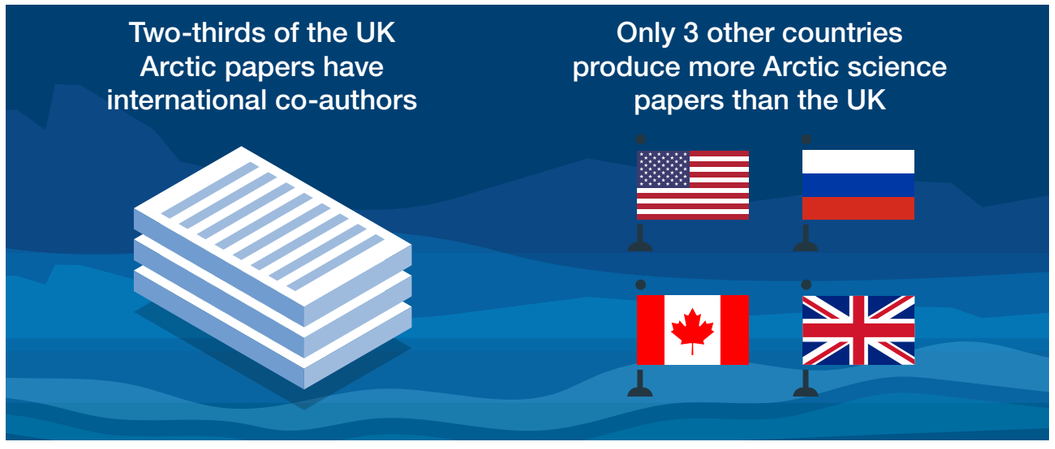
The UK research community has a strong record of collaborating internationally and delivering high impact Arctic research – nearly two-thirds of UK Arctic papers have international co-authors, while only three other countries – the US, Russia, and Canada – produce more Arctic science papers than the UK[4]. High-level agreements, with Arctic States such as those previously mentioned (Norway and Canada) and the one between NERC and the US National Science Foundation, provide strong frameworks for collaborative research. We will explore options for agreeing other such arrangements with Arctic States once the Agreement on Enhancing Scientific Cooperation is implemented.

Support for UK Research

The NERC Arctic Office, which is hosted by the British Antarctic Survey, plays an integral role in: promoting and enabling UK research; providing advice to policy-makers; and seeking out new opportunities for the UK-based researchers to join international research collaborations. The important role of the Arctic Office was noted in the response to the House of Lords Select Committee inquiry in 2015 and the Office has since expanded its work. It now delivers across an enhanced range of areas, including new funding initiatives, a strengthened international and national profile and work to promote closer bilateral links with Arctic States.

The UK has maintained a summer research station at Ny-Ålesund on the high Arctic archipelago of Svalbard since 1972. In 1991, NERC established the UK Arctic Research Station when Ny-Ålesund became the focus of an international research community. The station is open from March to September and is available for use by UK-based researchers across a wide range of fields. As members of the European Commission's INTERACT initiative, the station is also available for use by an extremely broad range of international researchers. It has consistently been one of the most active of the research stations in Ny-Ålesund, supporting a variety of research including: glaciology; hydrology; terrestrial and marine biology; geology; and, atmospheric physics. In addition, the station is able to support innovative engineering and design research, including the testing of new technology for polar and cold-weather applications.

NERC recently committed to funding the operation of the station until at least 2028, providing important long-term platform for UK presence and science in the Arctic region.



Science and Innovation Network

The UK Science and Innovation Network (SIN) operates across the eight Arctic States in support of both UK Government Arctic policy and UK-based scientists and research bodies. SIN teams build the connections necessary to enhance UK research collaborations and provide advice and guidance on UK Government engagement with international partners. This included support for the UK's attendance at the Arctic Ministerial in the US in 2016 and for UK contributions in its observer capacity to attend Arctic Council Working Group meetings.

SIN also contributes to bilateral and multilateral research and innovation collaborations by helping identify opportunities for expanding and deepening these relationships and supporting projects and programmes during implementation. Such practical support includes the facilitation of academic exchanges, the organisation of events highlighting examples of UK-based science and technology and assisting with local capacity-building that enhances the future scope for collaboration.

SIN Russia

In 2017-2018, the SIN team in Russia scaled-up its support for UK-based Arctic science, proactively building on the Agreement on Enhancing International Arctic Scientific Cooperation signed by the Arctic States in May 2017 to identify opportunities for increased UK/Russia collaboration. The number of Arctic-related projects has increased from just one to five, with additional funding secured from BEIS, the NERC Arctic Office and the FCO's Global Britain Fund. SIN Russia is now working with multipliers such as the NERC Arctic Office, the UArctic consortium and the UK Polar Network to implement these projects. It has also joined forces with some of the UK's leading Arctic research centres to deliver targeted workshops in Russia to increase both practitioner-to-practitioner links and raise the profile of UK-based Arctic science capability.

In order to further highlight and promote this capability, SIN Russia designed a global Arctic science digital campaign to complement its own local Arctic media work. The campaign was launched during the run-up to the October 2017 Arctic Circle meeting in partnership with the NERC Arctic Office. UK missions in Arctic Council countries and multiple UK organisations are supporting implementation of the campaign. The aim is to highlight UK-based Arctic science and infrastructure excellence to enhance the UK's Arctic research reputation and develop greater collaboration in the Arctic, both through bilateral links and multilateral fora. This will facilitate the UK's access to the relevant Arctic facilities, data and existing programmes and partnerships and maximise the benefits to the UK from enhanced research collaboration while also building confidence and trust between the parties.

The entry into service of the ice-strengthened research vessel the *RRS Sir David Attenborough* in 2019 will see a significant increase in the capability for polar marine research, including through the operation of remotely piloted and autonomous underwater and airborne vehicles. The UK's 'blue-water' ships the *RRS James Cook* and *RRS Discovery* will also continue to work in the Arctic. NERC is also able to deploy a fleet of seven specially equipped aircraft capable of carrying out scientific measurements and logistical support in the Arctic.

International engagement

In September 2016, representatives from the UK and 24 other countries, including the EU and representatives from Arctic Indigenous peoples' organisations attended the first Arctic Science Ministerial meeting in Washington. The aim of the meeting was to increase capacity to respond to major societal challenges in the Arctic and encourage further scientific cooperation among a large number of countries and representatives of the indigenous peoples. Jo Johnson MP, then the UK Government's Minister of State for Universities, Science, Research and Innovation, led a UK delegation focussed on UK technology in Arctic observation vehicles, remote sensing and modelling. The UK-Canada Arctic Bursaries Programme (page 9) and the UK's involvement in the MOSAiC Project (page 14) are just two examples of the valuable collaborations resulting from the meeting. We look forward to sending a high-level delegation that will build on the legacy of the first meeting, to the next Ministerial meeting in Berlin, hosted jointly by the European Commission, Finland's Ministry for Education and Culture and the German Federal Ministry of Education and Research, Germany, in October 2018.

The UK is already an active member in many international scientific organisations, notably the International Arctic Science Committee and the Forum for Arctic Research Operators. It is also a member of the European Polar Board, which includes all European polar research institutes and polar operators in both the Arctic and Antarctic. The UK station in Ny-Ålesund and the Centre for Ecology and Hydrology in the Cairngorms are two of 83 stations that make up INTERACT a circumpolar network of field stations that contribute to identifying, understanding, predicting and responding to varied environmental changes throughout the Arctic, with trans-national access funded by the EU. Moreover, the UK science community has a strong reputation for leadership and many research organisations in the UK have particularly strong reputation for science programme management.

The UK led participation amongst the 12 countries in the EU-funded Ice, Climate, Economics – Arctic Research on Change programme (ICE-ARC) a four year, €12 million programme uniting researchers and scientists from 24 institutions to assess current and future changes in Arctic sea ice both from changing atmospheric and oceanic conditions. UK-based researchers are active in a range of other EU-funded initiatives, including EU-PolarNet, optimising the use of polar infrastructure and identify key science questions; APPLICATE, predicting weather and climate in the Arctic and beyond; and Blue-Action, forecasting climate extremes. The UK will also be working with a small group of other countries, including seven Arctic States in the ARICE programme to offer trans-national access to the new generation of polar research vessels, including the *RRS Sir David Attenborough*.

The UK Government has guaranteed funding for all successful bids made by UK participants for Horizon 2020 projects that are submitted before EU exit. This includes bids that are submitted before exit and are successful afterwards. We would welcome an agreement to continue to collaborate with our European partners on major science, research and innovation initiatives, including in the Arctic.

UK funded science programmes - Case Studies

Climate change can alter natural processes and amplify the impacts of anthropogenic activities in the Arctic region and wider world. This coupled with the rate of change, leads to a multitude of stressors on Arctic ecosystems of which the environmental, social and economic impacts are not always understood.

To address these uncertainties the UK Government, through NERC, is investing in research programmes that aim to increase our understanding and predictive capacity of numerical models so that we can better forecast the impacts and consequences of change in the Arctic. For example:

Changing Arctic Ocean Programme

NERC is investing £16 million in the 5-year (2017-2022) research programme known as the Changing Arctic Ocean: Implications for marine biology and biogeochemistry, coordinated at the University of St Andrews.

The Arctic Ocean is a vastly complex system with poorly understood interactions between the physical environment, defined by the presence of sea-ice and extreme annual seasonal cycles, and the ecosystem and biogeochemical cycles. To model this system in any meaningful way necessitates a solid understanding of key aspects of the ecosystem and the biogeochemical cycles that operate in the Arctic Ocean. This is an inherent component of the projects in the Programme, which are generating the data to test and further develop the numerical models.

The focus of this programme is to understand the changes in the Arctic Ocean in a quantifiable way. This will allow numerical models to better predict the consequences of these changes on, for example, surface ocean productivity, species distributions, food webs and ecosystems, and the ecosystem services they provide. These future projections are important because they help refine decision-making processes.

The programme has a core of four large projects (Arctic PRIZE, ARISE, ChAOS, DIAPOD), and a further 10 smaller projects co-funded by NERC and the German Federal Ministry for Education and Research.

Multidisciplinary drifting Observatory for the Study of Arctic Climate (MOSAiC)

The UK is an active member of the €63mn MOSAiC project, led by Germany, the United States and Russia. This will be the first expedition of this scale and capacity to go to the Central Arctic Ocean. It will see the German research vessel, the *MV Polarstern*, frozen into the advancing winter sea ice and drift for a year in 2019-20, enabling her to operate as a drifting research platform.

This expedition will contribute to our understanding of the regional and global consequences of Arctic climate change and sea-ice loss and collect data on climatic processes. It will also provide valuable access to the Arctic in the middle of the polar night. As a result, it will help us to improve weather and climate predictions and support science-informed decision making and policy development. Together the UK Government and NERC have contributed £2.3m towards funding the UK research community participation in this truly international collaboration.

Protecting people and the environment

When the United Nations set the Global Goals for Sustainable Development in 2015, it recognised the importance of taking urgent action to combat climate change and its impacts; to conserving and sustainably using marine resources; and of life on land. The UK is firmly committed to delivering the Goals at home and around the World.

Climate

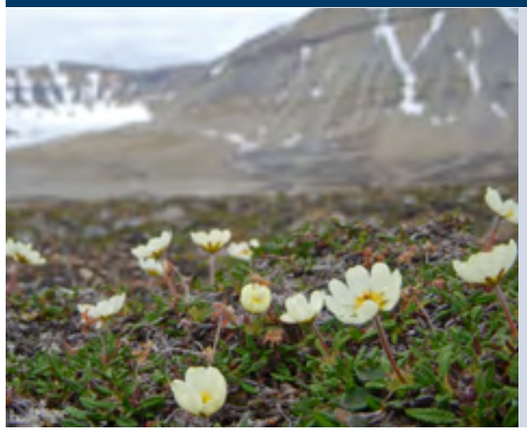
For the last fifty years, Arctic temperatures have risen more than twice as fast as the global average[5]. A warmer climate is accelerating the decline of Arctic sea-ice extent – minimum extent decreasing by 12% every decade – and thickness – 65% decline between 1975 and 2012.

Older ice that has survived multiple summers is disappearing: most sea ice in the Arctic is now 'first year' ice that grows in the autumn and winter but melts during the spring and summer. Experts expect that the Arctic Ocean could be ice-free – that is down to 1 million km^2 – in the summer by mid-century. Snow cover has also continued to decline in the Arctic with its annual duration decreasing 2-4 days per decade. The loss of land-based ice has also accelerated in recent decades. Since at least 1972, the Arctic has been the dominant source of global sea-level rise, most of which is due to meltwater from Greenland.

The white surface of snow and ice in the Arctic reflects the sun's radiation. Less sea-ice results in more of the sun's radiation being absorbed by the sea creating a self-reinforcing loop of warmer water and less sea ice. Similarly, thawing permafrost leads to more warming and emissions of methane and CO_2 increase as soil microbial activity increases as well as potential damage to infrastructure built on it. These processes, known as 'Arctic amplification', may create profound implications for the regional and global climate, as well as for the people who live in and around the Arctic.

Thawing permafrost changes the landscape, creating warmer, wetter and more densely vegetated land mass, which in turn caused difficulties for humans and animals orienting areas once so familiar.

UK-Arctic Science: The rapidly changing Arctic environment



The Arctic Research Programme, funded by the NERC, ran from 2011 to 2016 and made £15 million available for research into changes in the Arctic and their possible future consequences worldwide.

The programme focussed on understanding and predicting climate change in the Arctic, both from a local and global perspective. Researchers covered many Arctic habitats, including oceans, lakes, wetlands, tundra and forest.

To supplement the resulting analysis, a policy report was developed to facilitate dialogue between scientists and decision makers. Aspects of the report informed this document.

Over several decades, fragments of plastic has accumulated in the world's oceans. Large quantities have emerged in the Arctic and have become frozen into the sea ice. The accelerated melting of sea ice could release 1,000 billion plastic particles in the coming years. That's 200 times the amount of plastic currently found in the ocean [6]. The heat trapped by increasing levels of greenhouse gases therefore has a damaging impact on the Arctic environment.

The UK addresses our impact on the global climate in several ways at both an international and domestic level. We played a major role when the world came together in Paris in 2015 to reach an ambitious deal to reduce global greenhouse gas emissions. Having ratified the landmark Paris climate agreement on 18 November 2016, we are fully committed to it. The Paris negotiations set us on an irreversible route towards low-carbon growth.

While the UK would have preferred the US to remain in the Paris Agreement, we will continue to work closely with the US, and other international partners, on energy and climate change issues.

The 2008 UK Climate Change Act is the basis of our approach to tackling and addressing global climate change, which enshrines emission reduction into UK law. The UK Government launched the Clean Growth Strategy in October 2017 [7], which sets out how we will meet our climate targets while securing the economic benefits of clean growth for the UK.

The Committee on Climate Change provides independent advice to the UK Government and the devolved administrations on preparing and adapting for climate change. The UK Government also works with the devolved administrations and regulators as part of UK-wide implementation mechanisms that ensure regulatory consistency across the UK for business and industry.

The UK has a strong record of implementing policies that mitigate the release of harmful emissions into the atmosphere. As part of our plans to tackle air pollution, the UK Government has confirmed that it will end the sale of all new conventional petrol and diesel cars and vans by 2040 in England. While effective use of tax and regulation on landfill has successfully achieved a 78 percent reduction of landfill methane from 1990 levels [8].

Legislation and action plans developed by the devolved administration complement the UK's emission reduction ambitions. The Scottish Government has announced plans to encourage an uptake of electric vehicles by phasing out new petrol and diesel cars by 2032. By focusing on how energy is used rather than generated, the Welsh government aims to reduce greenhouse gas emissions in Wales by 3% every year and achieve a 40% reduction by 2020, compared with 1990 figures.

A Green Future: Our 25 Year Plan to Improve the Environment

On 8 January 2018, the UK Government launched *A Green Future: Our 25 Year Plan to Improve the Environment*. As well as setting out a long-term commitment to protect and enhance the natural environment at home for future generations, it described a desire to bring the United Kingdom's influence to bear in the pursuit of a cleaner and safer world.

From reducing our carbon emissions and building resilience against extreme weather associated with climate change, to leading international action to protect endangered species, the UK remains an international champion for the protection of our planet.

The UK will be at the forefront of global efforts to protect and improve the natural world, driving the international community to adopt higher standards. We are party to more than 300 treaties and agreements, each with an important role in protecting and improving the natural world.

We will continue to lead by example on the crucial environmental challenges. We will take a leading role in developing an ambitious post-2020 international biodiversity strategy and play an active role in securing a new international agreement for the conservation and sustainable use of marine areas beyond national jurisdiction.[14]

People

In the same way as the Arctic is not one homogenous landscape, neither are the people who live there. The traditions and cultures of the indigenous people differ between each group, as much as they do between the indigenous people and those who live in the cities.

We recognise this diversity and strongly support that it continue. Sustainable and thriving local economies will help to ensure a future for the people who choose to live there. High quality education is fundamental to the future economy and to a range of social indicators in particular life expectancy and mental health.

The UK Government will respect the views, interests, culture and traditions of the Arctic indigenous people. Hearing directly from the people whose lives are most impacted by changes in the Arctic is a powerful motivation to support sustainable development there. This was exemplified by the World Wildlife Fund event hosted by the All Party Parliamentary Group on Polar Regions in December 2017.

We welcome the inclusion of indigenous peoples in the Arctic Council. Researchers in the UK are committed to listening to, and working with, indigenous communities, to ensure the best outcomes for local communities and for science. It is increasingly recognised that only by learning about the use of traditional and local knowledge from the indigenous and local communities themselves can changes be properly understood and genuinely sustainable responses proposed. The UK has a dynamic social science community with experience of working in these ways. Projects involving such exchanges of knowledge are part of the UK-Arctic Bursaries Programme (page 9), while the Nordics SIN teams have encouraged the voice of indigenous participants in the major Arctic forums by fostering collaboration between indigenous peoples and researchers.

At the end of 2017, researchers from across the UK took part in the latest in a series of multi-day events, involving local community and indigenous representatives from the Yamal-Nenets region in Northern Siberia with the aim of building capacity to monitor, understand and predict extreme weather events in the Arctic. The event was facilitated by the SIN team in Moscow.

The UK's strong history in polar exploration means that our people to people links are deep and enduring. In the worst tragedy in the history of Arctic exploration, the British explorer John Franklin perished with his 128-crew as *HMS Erebus* and *HMS Terror* sank while charting the North West Passage in the 1840s. Despite Inuit legend reporting a large wooden ship had sunk in the area of Queen Maud gulf, extensive searches failed to trace the wrecks or missing seafarers for over 150 years. In 2008, the Canada government launched a multi-million pound search programme. A combination of traditional Inuit knowledge and state-of-the-art technology discovered the wrecks of *HMS Erebus* and *HMS Terror* in the relatively shallow waters south of King William Island in 2014 and 2016 respectively, just as Inuit legend had recorded. In 2017, the UK Government agreed to transfer ownership of the wrecks and the majority of their contents to the Government of Canada. This exceptional arrangement recognised the historical significance of the Franklin expedition to the people of Canada and will conserve the wrecks and artefacts for future generations.

Environment

The UK Government recognises the importance of the Arctic environment for a wide variety of species and for the livelihoods of the people who live there. The world-renowned BBC programme Blue Planet II opened the eyes of millions of people to the problems facing our oceans and the effects on the fragile ecosystem. Safeguarding the environment from unnecessary pollutants and chemicals is essential if we are to ensure a healthy, safe and productive Arctic.

Given the vast majority of litter and pollutants impacting the Arctic originate outside of the region it is essential for us all to take action. The UK has consistently been at the forefront of international regulatory developments that aim to protect the Oceans and we will continue to be so.

Marine Conservation

Conserving the Arctic's biodiversity remains a UK priority, for example, the nutrient-rich waters of the Arctic are critically important for as many as 17 different species of whale. The UK Government considers that the best way to ensure the protection of those species reliant on the Arctic environment is to continue our active involvement with international agreements. Two such agreements, the International Whaling Commission and the Conservation of Migratory Species work to mitigate the major threats facing these species and their habitats. The UK Government continues to support strongly the global moratorium on commercial whaling.

The UK Government considers that the best way to deliver universally accepted marine protected areas in areas beyond national jurisdiction would be through the new Implementing Agreement under the UNCLOS. In support of this, the UK will continue to work with other Contracting Parties and the Arctic States through OSPAR to improve and extend the protection offered by marine protected areas in the Arctic region.

Through its commitment to create a Blue Belt around the UK Overseas Territories and Antarctica the UK has access to a growing body of information relating to management and enforcement capability in marine protected areas. As individual Arctic States and the Arctic Council consider a pan-Arctic network of marine protected areas, we will share our knowledge and experience to help support effective project implementation.

Ocean acidification is another significant impact of climate change. Since the beginning of the industrial period the oceans have absorbed about 30% of carbon dioxide emitted from the burning of fossil fuels. This has caused the ocean pH to drop by 0.1 over the past 100 years, equivalent to a 26% increase in acidity. This current rate of ocean acidification is unprecedented and 10 times faster than anything seen in the last 65 million years and perhaps even 300 million years[9].

Increasing ocean acidity decreases the concentration of carbonate ions which, in combination with ocean warming, presents risks to marine ecosystems including the productivity of fisheries and aquaculture. In particular marine calcifying organisms such as corals, which use carbonate ions to form their skeletons are at high risk. In European seas cold-water corals provide nursery grounds for endangered species such as deep-sea sharks. However, the majority of this habitat is expected to be lost under a high emissions scenario. If we follow a low emissions scenario consistent with the Paris Agreement the majority of cold-water corals would be saved from extinction.

The five year, £12million UK Ocean Acidification Research Programme funded by NERC, Department for Energy and Climate Change (now BEIS) and Defra provided valuable information to increase our understanding of the processes, reduce uncertainties in estimating future impacts, and improve policy advice.

Together with the United States, the UK leads the GOA-ON, an observatory initiative that involves 30 countries, including five Arctic States. The programme provided an extremely successful collaborative science partnership across the UK

and at an international level. Highlights included the EU European Project on Ocean Acidification and the German Biological Impacts of Ocean Acidification programme.

There is a limited understanding of the distribution of noise in our seas and its impact on vulnerable species. For both impulsive and continuous sound, the UK Government is working with the EU and OSPAR to establish indicators and potentially thresholds for the effects of noise on the marine environment. OSPAR coordinates the Intersessional Correspondence Group on Underwater Noise, a group of technical and policy experts who work together to develop and implement policy and action on underwater noise. One aspect of this work has been to develop a European Noise Registry, hosted by ICES, to record the location and dates of impulsive low to mid frequency noise generating activities. In 2017, OSPAR published an assessment of the status of our seas in relation to underwater noise[10].

There is no systematic recorded information on noise events or ambient noise in the Arctic, despite concerns on the potential vulnerability of species and impacts of noise from shipping and seismic surveys. Potential further reduction in sea ice in the region may lead to increases in both sources of noise.

Understanding when and where noisy activities take place will help define a baseline level for impulsive noise in our seas and will inform our research on the impacts of noise, particularly on vulnerable species like cetaceans.

The UK Government also engages with other international forums on underwater noise to review and propose monitoring methods, share best practice and recommend further research or action. For example the IMO has also issued guidelines for the reduction of underwater noise from commercial shipping to address adverse impacts on marine life[11], which will apply to newly built ships.

Marine Litter

Marine litter, particularly marine plastic pollution is a serious and growing threat to our environment. An estimated 12 million tonnes of plastic enter our oceans every year[12]. Larger items can entangle animals and smother habitats, while marine animals can consume smaller items, including micro plastics, reducing their growth and reproduction. However, the impacts at the ecosystem level and the potential impacts on food security are largely unknown.

Momentum for positive change is growing across governments and the public. The UK has committed to improve the situation through domestic and international action.

The UK Government and the devolved administrations have introduced litter reduction strategies, such as reducing the volume of single use plastic bags. A ban on microbeads in cosmetics and personal care products – stopping billions of tiny pieces of plastic from entering our seas every year – came into force on 9 January 2018. We want to go further to encourage responsible practices, using appropriate incentives and regulation. As such, the UK Government's 25-year Environmental Plan commits us to achieve zero avoidable plastic waste by the end of 2042.

OSPAR coordinates the Intersessional Correspondence Group on Marine Litter, a group of technical and policy experts who work together to develop and implement policy and action on marine litter. Through OSPAR, the UK and other Contracting Parties have developed and are implementing a Regional Action Plan on Marine Litter. In 2017, they published an assessment of the status of our seas in relation to marine litter[13]. The UK engages with other international forums on marine litter, such as the G7 and the UN Environment Programme to review and propose monitoring methods, share best practice and recommend further research or action.

There is a growing body of research on the sources, distribution and impacts of this plastic, particularly at an individual level. Monitoring and further research into marine litter is underway; our evidence will be available to the Arctic Council and its working groups to help inform future policies on marine litter in the Arctic Ocean.

Pollution

There are a range of chemicals and pollutants that are having a harmful effect on the Arctic environment. For example, the contamination of the environment from mercury is not new, for thousands of years mercury has been used in various human activities. It enters the global systems through natural sources and human activities. Recent research has determined that mercury presents risks to Arctic wildlife and humans.

The UN Minamata Convention on Mercury is an important global treaty to protect human health and the environment from the adverse effects of mercury. Action includes a ban on new mercury mines, reduction in mercury use in several products and processes, and control measures on emissions into the atmosphere and on releases to land and water. The UK is working on domestic mercury legislation in order to ratify the Convention in early 2018.

In maritime, the UK Government maintained a strong involvement in finalising the environmental aspects of the Polar Code, through the IMO and PAME. Lloyd's Register will continue its strong association with the Arctic maritime industry by hosting the Arctic Shipping Information Best Practice Forum for the second time in May 2018.

We have also long implemented the Anti Fouling Convention and were strong proponents of recent proposals to extend the Convention to include additional products. We are developing the necessary legislation to incorporate the Ballast Water Convention into UK law and strongly supported the reduction of the global cap on the sulphur content of fuel used by shipping, we are ready to implement this cap in 2020.

In a clear indication of our intent, the UK Minister for Shipping has announced a commitment to develop low and eventually zero emissions shipping, to address the environmental impact of this sector. We continue to work proactively in the current IMO negotiations on reducing greenhouse gas emissions from shipping.

We participate in discussions regarding the impact on the Arctic of emissions of black carbon from international shipping. We also intend to be a prominent voice in the discussion at the IMO on the development of measures to reduce risks of use and carriage of heavy fuel oil as fuel by ships in Arctic waters.

Migratory Birds

The links between the UK and the Arctic are not limited to our climate systems and marine. Due to its proximity to the Arctic, our shared biodiversity includes many migratory birds. The Joint Nature Conservation Committee (JNCC) through the Wetland Bird Survey has been monitoring breeding arctic waterbird populations in the non-breeding seasons. The 70 years of data and information collected by this scheme are available for research use and have been used in a large number of research projects and publications over the last five years.

JNCC has also contributed technical input to the work of the Seabird Working Group, and the Arctic Migratory Birds Initiative (AMBI). It also contributes actively to the work of the African-Eurasian Waterbird Agreement – a multi-lateral environmental agreement whose mission overlaps significantly with that of AMBI and other Conservation of Flora and Fauna initiatives. JNCC continues to promote and encourage the full implementation of international species action plans for relevant arctic-breeding waterbirds such as Greenland White-fronted Geese and plans to participate in the upcoming Biodiversity Congress in Rovaniemi, Finland in October 2018.

Defence

Securing a peaceful, stable and well-governed Arctic underpins all UK Government policies in the Arctic. While security is not within the remit of the Arctic Council, the cooperative and collaborative approach it promotes builds confidence between the Arctic States and their international partners. This is particularly true between the various coastguard agencies of the Arctic States and through the Arctic Coast Guard Forum, which provides a useful arena for cooperation. In May 2017, Arctic State Foreign Ministers reaffirmed their commitment to maintain peace, stability and constructive cooperation in the Arctic.

Nevertheless, increased interest and commercial activity in the region provides potential for heightened tension. The Arctic States are well within their rights to protect and defend their area of national jurisdiction, and Arctic nations may want to enhance their security presence in the region to protect their own territorial and commercial interests.

However, the build-up of Arctic military capabilities by several Arctic States makes the future less certain. The UK remains committed to preserving the stability and security of the Arctic region. We will work with our international partners and allies through defence engagement, bilateral and multilateral security cooperation. This will include essential cold weather training exercises and participation in the Arctic Security Forces Roundtable. NATO also remains a central plank for cooperation among its Arctic State members.

Safety

All forms of tourism to the Arctic have increased in recent years. As the Arctic's climate changes and people's appetite for the unique travel experiences the region has to offer increases, so does the number of visitors.

The geography across the Arctic differs considerably, from the frozen tundra of Alaska and Canada, popular with on-shore adventurers, to the icy waters around Greenland, through the North West Passage and beyond that are becoming more popular for navigation by vessels ranging from small expedition ships to large conventional cruise liners. While the majority of visits to the region are trouble-free, more visitors put greater strain on modest search and rescue capability, and increase the potential for harm to the fragile environment. We support the work of the Association of Arctic Cruise Operators and its goal of "managing responsible, environmentally friendly and safe tourism in the Arctic and strive to set the highest possible operating standards".

When visiting the Arctic, we want British nationals to be safe and to ensure that all international travellers and operators refrain from harming the Arctic environment. The UK therefore supports safe, responsible and sustainable tourism in the Arctic that enables visitors to experience the uniqueness of the region, which respects the preserve of local communities while supporting their economy and protects the fragile environment for future generations.

The FCO supports British nationals around the world. Consular support in the Arctic falls to the Embassy or High Commission in whose jurisdiction a British national is travelling. For travellers considering a visit to the region the FCO has developed specific Arctic travel advice, in consultation with representatives of the travel industry, which is available via the GOV.UK pages.

The Arctic is also an area of increasing importance for maritime transport. The number of voyages between NSR ports and transits have rapidly increased as climate change has accelerated the melting of ice that had limited access to the area. Although there were only 19 transits across the entire NSR in 2016, there were more than 1700 voyages. This increase in shipping in the Arctic has implications for navigational safety.

On 1 January 2017, the IMO adopted the mandatory Code for Ships Operating in Polar Waters, commonly known as the Polar Code. Related amendments make it mandatory under both the International Convention for the Safety of Life at Sea and the International convention for the Prevention of Pollution from Ships. The binding international framework sets standards for safe and environmentally sound shipping in Polar waters.

Under the auspices of the Arctic Council, the Arctic States signed an agreement on aeronautical and marine search and rescue (SAR) in the Arctic. The agreement strengthens SAR cooperation and coordination, including joint SAR exercise and training. Despite this commitment and the legal regimes in place, extra caution is required when planning all tourism activities and maritime operations in the Arctic.

Promoting prosperity

Promote the Arctic as a place where economic and commercial development occurs in a sustainable and responsible manner. Where the people of the region benefit from the prosperity that a changing Arctic may bring. Support UK companies investing in the Arctic; make them aware, and connect them to, the opportunities available.

There is a long history of economic and commercial activity in the Arctic region. As well as being a place of fragile beauty, many people in the Arctic rely on it for their livelihoods. As anywhere in the world, the people who live in the Arctic have the right to pursue prosperity and economic stability for their families and future generations. The UK supports that right. However, care should be taken to ensure that commercial development does not damage the natural environment that is fundamental to the prosperity of many Arctic communities.

Changes in the Arctic have led to growing interest in the Arctic both from an increased number of industries and from a growing number of countries around the world. We already enjoy excellent economic ties with each of the Arctic States. These ties are enhanced by Mark Prisk MP's role as the Prime Minister's Trade Envoy for the Nordic region as well as the presence of established and knowledgeable DIT teams, who provide professional and authoritative assistance in each Arctic State, augmenting the UK's ability to help UK-companies succeed in the Arctic.

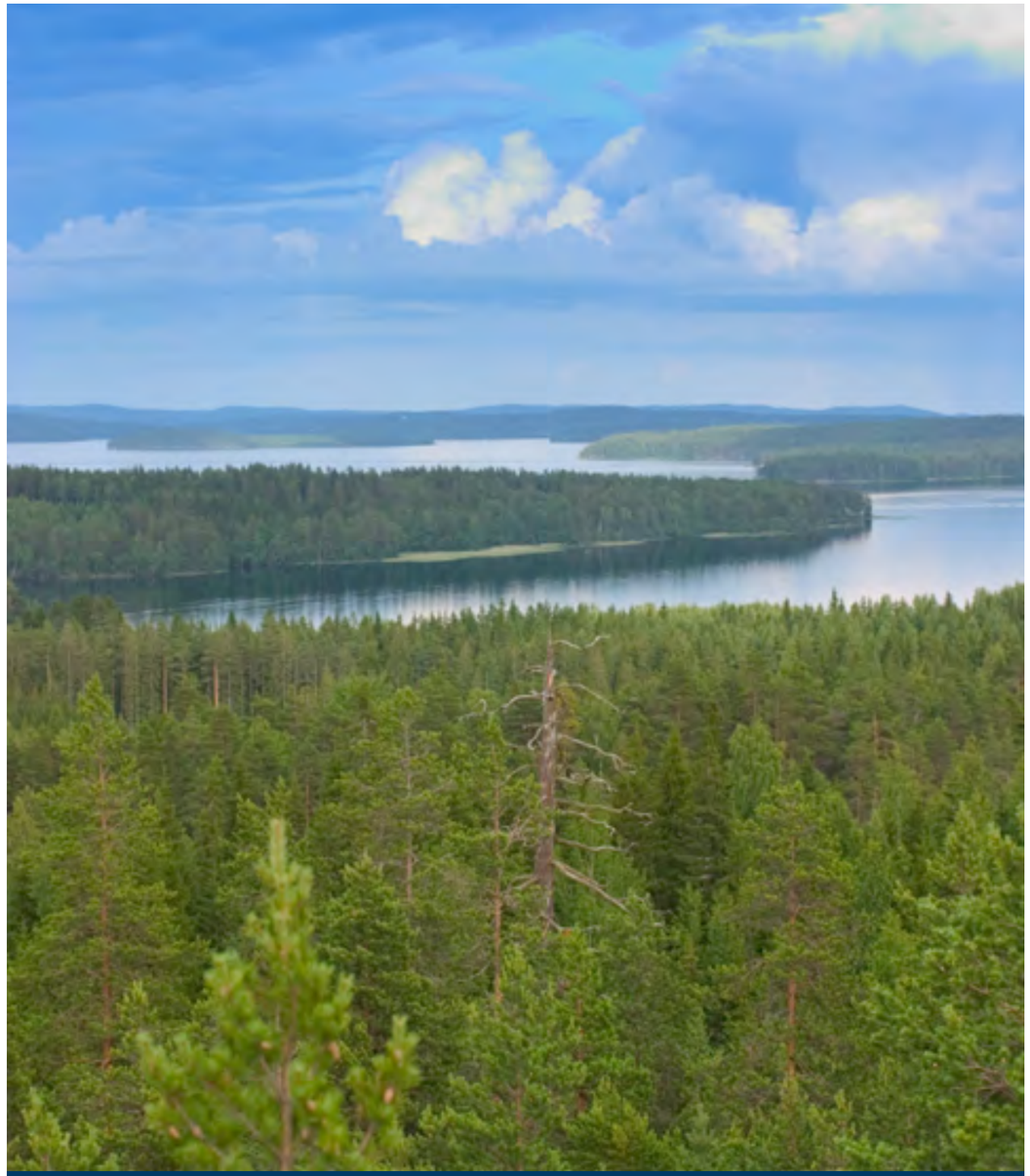
The decision to invest in commercial projects in the Arctic is a matter for individual companies and, as appropriate, the national authority of the Arctic State in whose jurisdiction they will take place.

The Arctic Council established the Arctic Economic Council in 2014 as an independent organisation to facilitate business and responsible economic development through sharing best practices, technological solutions and standards. They work across the Arctic states to strengthen market connections, encourage private-public partnerships for infrastructure investments and facilitate knowledge and data exchange between industry and academia. Membership of the Arctic Economic Council is open to any business, trade association or indigenous group that have an economic interest in the Arctic; membership is not limited to companies in the Arctic States. We will encourage UK companies to engage through the Arctic Economic Council.

Trade Routes

Currently, half of the world's volume of trade travels through the South China Sea. A reduction in summer sea ice cover in the Arctic has potential to open up new shipping routes. Estimates report that transporting goods between Asia and Northern Europe through the Northern Sea Route could significantly reduce travel time, making the journey as much as 10 days shorter than the Suez route, thereby reducing costs, the amount of fuel utilised and consequently pollutants emitted into the environment[15]. Transportation through Arctic waters may become cheaper and less impactful on the global environment in the long run.

However, while it is conceivable that declining Arctic sea-ice could in future open new shipping routes, hostile conditions and a lack of infrastructure will make commercial operations difficult for some considerable time. According to modelling, transit will always be easiest in September when ice cover is at a minimum but to be viable, Arctic routes will need to be open for a longer season. Researchers concluded that after 2050, there would be very little sea ice left each summer. While the decision to invest in commercial projects in the Arctic is a matter for individual companies and the relevant Arctic State, the UK should be prepared to take advantage of opportunities to reduce costs and speed up the transportation of its exports to markets in Asia.



Case Study: Finland: Mapping business opportunities for the UK in the Arctic

Prior to Finland assuming the Chairmanship of the Arctic Council in May 2017, the British Embassy in Helsinki ran a project to map UK prosperity opportunities afforded by the Finnish chairmanship programme. Finland had identified the four priority areas of: environmental protection, connectivity, meteorological cooperation and education.

The subsequent 2017 report has since informed the British Embassy's engagement with their Finnish hosts. It found that opportunities for cooperation existed in several sectors where both Finland and the UK have strong expertise. These included Arctic environmental research, sustainable solutions, maritime, tourism, financial services, smart solutions and digitalisation, to name just a few.

The report and follow-up events in Helsinki and London generated considerable interest. As a result, the Embassy has facilitated several new connections between UK and Finnish organisations, particularly in meteorology. The project also allowed the British Embassy Helsinki to strengthen its policy relationships with Finland on Arctic affairs. This is an important area for Finland's government and they greatly appreciate our increased engagement in this policy area[17].

China recently announced the Belt and Road initiative to extend into the Arctic as an additional economic corridor. Also known as, the Polar Silk Road, it will comprise of road, rail and port infrastructure built in partnership with the Arctic States. We recognise that the potential implementation risks that could be involved in delivering the Belt and Road Initiative. It is important that projects meet international standards and best practice, such as responsible lending, sustainability and alignment with the objectives of the Paris Agreement, appropriate project design, and transparent procurement. As the Initiative develops, we advocate an approach that minimises negative impact on the Arctic environment while maximising the economic benefit for communities, which will also suffer the most disruption.

Shipping in the Arctic is already increasing, especially shipping originating from a destination within the Arctic itself. Figures from the Association of Russian Sea Ports show that the Russian Arctic seaports in 2017 handled a total of 74.2 million tons, an increase of 49.1% compared with 2016. The growth is rooted in a major general increase in Russian Arctic shipments.

The opening up of the route to increased amounts of shipping is not risk free. The development by the IMO of the Code for Ships Operating in Polar Waters, commonly known as the Polar Code was a landmark moment for shipping in the hostile waters around the north and south poles. The UK played an active and influential role in the development of the Polar Code and as Arctic shipping routes becomes more open we continue to advocate for the highest possible shipping standards and adherence to the Polar Code.

The UK Hydrographic Office, as a global leader in producing charts and publication services to support international maritime navigation, continually develops its publications to take account of changing shipping patterns and new trading routes. To do so, UKHO maintains strong links with Arctic nations to ensure access to the best available data to serve the needs of the international mariner. Furthermore, the UKHO is developing marine capability in geospatial information management to support the UK's Arctic interests. Such capability will ensure that UK expertise, scientific research, hydrographic surveying, marine cartography and nautical information is suitably integrated to provide comprehensive and efficient information management.

The UK will continue to seek Associate Member status of the Arctic Regional Hydrographic Commission for the UKHO, in order to maintain close links with other nations in the region and to share the UK's knowledge and expertise of Arctic hydrography.

CLEAN ENERGY

The impact of climate change on the Arctic is already marked and expected to become more pronounced, underlining the need for international agreement and action to reduce greenhouse gas emissions.

In addition to greenhouse gas emissions, the effects of climate change in the Arctic are accentuated by the impact of black carbon.

European Marine Energy Centre (EMEC)

Established in Orkney in 2003, EMEC is the world's first and only centre providing developers of both wave and tidal energy converters – technologies that generate electricity by harnessing the power of waves and tidal streams – with purpose-built, grid-connected open-sea testing facilities.

An archipelago off the north coast of Scotland, Orkney provides an ideal base for the world-leading test facility with its excellent oceanic wave regime, strong tidal currents, close proximity to sheltered harbour facilities, and a wealth of renewable, maritime and environmental expertise within the local community.

Orkney already generates around 120% of its electricity requirement from renewables each year, mostly from wind. However, the regional infrastructure is threatening to constrain the development of these innovative marine energy technologies on the Island. The grid connection to mainland Scotland is at capacity restricting future generation and export opportunities. Some wind energy generation on the islands is already being constrained with economic consequences for the remote community.

As one solution, EMEC has invested in a rapid response hydrogen electrolyser. The Centre can now generate hydrogen, an energy storage medium, from excess tidal and wind energy on the northern island of Eday. The first hydrogen was generated on Eday in 2017; the world's first hydrogen generated from tidal energy. This will help EMEC to respond to the cyclical nature of tidal energy generation and for community wind projects to deal with the variability of wind turbines. EMEC is involved in innovative international, national and community projects assessing different applications for hydrogen, including directly fuelling the island's ferries and onshore vehicles; providing heating to local schools; and enabling the use of fuel cell technology to generate power for 'cold-ironing' the existing ferries. These examples illustrate the potential for hydrogen to decarbonise the Orkney energy system. Hydrogen produced from Orkney's sustainable and renewable resources is already in use as an energy carrier and will be used in future both as a fuel and in the manufacture of valuable chemicals.

Innovation on Orkney is driving forward the transition to a global low-carbon economy, demonstrating that climate action is compatible with economic growth.

Energy and extractives

Even as it moves to decarbonise its economy, projections show the world will continue to rely on oil and gas for decades to come. Supplying this demand will require exploration of new potential resources, with the Arctic, with its significant hydrocarbon reserves, potentially playing a major role. While decisions on how to regulate oil and gas activities are matters for relevant national authorities to determine, the UK Government supports the use of the highest possible standards. We welcome the steps taken by the Arctic States through the Arctic Council on pollution prevention, preparedness and response and the role of research, technology and community participation. The UK Government will continue to support moves that promote collaboration to ensure to ensure robust pollution response arrangements are in place across the Arctic.

Successful mining operations that meet the needs of customers, investors and local communities require strong governance frameworks and clear human rights policies. Underpinning this governance is the need for effective communication at a local, regional and national level to ensure that the 'Social Licence to Operate' can be maintained throughout the life of mine and beyond. The UK Government plays a leading role in shaping much of these governance frameworks through participation in initiatives such as the Voluntary Principles on Security and Human Rights in the Extractive Industries; and the Extractives Industries Transparency Initiative, which apply to mines in the Arctic and elsewhere.

Fisheries

The UK Government will continue to adopt a science-led, precautionary and ecosystem-based approach to the establishment and management of any new and emerging fisheries in the Arctic region. In this respect, the UK Government has been supportive of efforts to develop an Agreement to prevent unregulated high seas fisheries in the Central Arctic Ocean and foster international cooperation on relevant research. Upon leaving the EU it will be important for the UK to have a cooperative relationship with the EU and other coastal States to ensure the sustainable management of fish stocks. As such, the UK will consider joining relevant Regional Fisheries Management Organisations including any that have competence for managing fish stocks in the Arctic region.

We will take opportunities to learn from the Arctic coastal states as we develop new policies and ways of managing our fisheries once we leave the EU. Iceland for example has built a world-class fisheries industry using efficient, integrated high-tech solutions to ensure the sustainability of its fish stocks, enhance the productivity of its fisheries and maximise the value of its catches. We will study and build on good practice, wherever it exists.

The RRS Sir David Attenborough

The UK's new Royal Research Ship the Sir David Attenborough is part of a major UK Government polar infrastructure investment programme, designed to keep Britain at the forefront of world-leading research in the Polar Regions. The new polar ship is commissioned by NERC, built by Cammell Laird to a Rolls-Royce design in line with the requirements of the International Code for Ships Operating in Polar Waters (Polar Code), and will be operated by British Antarctic Survey.

From 2019, the UK research community will have year-round access to state-of-the art facilities on this floating, multidisciplinary, research platform. This new research platform will transform how ship-borne science is conducted in the Polar Regions. This £200m commitment represents the Government's largest investment in polar science since the 1980s.

Enhanced scientific capability

The *RRS Sir David Attenborough's* design optimises her ability to support science in extreme environments. A wide range of specialist scientific facilities, instruments and laboratories will enable scientists to conduct a wide range of multi-disciplinary sciences to study the ocean, seafloor and atmosphere.

Data from the deep ocean and under-ice inaccessible locations will be captured using robotic and remotely operated devices. She is the first British polar research ship to feature a moon pool – a vertical shaft (~4 x 4 m) running through the vessel and open to both the air (at deck level) and sea (at the hull). Using the moon pool, enables scientific equipment to be deployed and recovered through the centre, and thus most stable part, of the hull. This is both easier and safer than deploying equipment over the side or stern, particularly in the rough seas characteristic of the polar oceans.

While the ship will have a number of laboratories on board, the increased space for containerised laboratories introduces a new level of flexibility in science support. As technologies and techniques change, the containers can be reconfigured to ensure research teams have what they need to conduct world-leading science.

The ship will also have the capability to deploy, operate and control a range of airborne and marine remotely operated vehicles and autonomous platforms at the same time in Polar Regions.

Connectivity

Digital connectivity through increased internet fibre cables and good broadband coverage already benefits developed parts of the Arctic. In the underdeveloped and remote parts of the Arctic, the technological challenge is greater. Facilitating research and development into innovative technical solutions, which have the views and needs of the indigenous people and those in remote communities at their heart will bridge this gap.

European Arctic States are prioritising improved transport links through cooperation between Sweden, Finland and Russia in the Barents Sea Transport Plan. We will encourage UK companies to explore opportunities for them as these projects develop.

Financial Services

The UK is a global financial centre and world-leader in financial and professional services, including insurance, risk management, financial and legal services. Our financial institutions have a reputation for developing innovative products. Their significant expertise covers a range of sectors operating in the Arctic including, maritime, hydrocarbons and mineral extraction, and are well placed to provide bespoke services.

The UK maritime business services sector provides services to international shipping industry vital to enabling the world to trade and the global economy to function. Shipbrokers in the UK operate at the centre of the international shipping business. Shipbrokers are represented at the Baltic Exchange, which has the world's only independent source of maritime market information for trading and settlement of physical and derivative contract[16].

As implementation of global climate commitments grows, green finance will form an increasingly important part of the UK's financial services sector. The falling cost of renewable energy, fossil fuel diversification, increased industry and financial competition and high demand for green finance products are all driving growth. We continue to be a world leader in Green Finance because the UK has the world's most open and international financial services centre with a historical tradition for innovation.

In the absence of an international standard for green finance products and services, the British Standards Institute (BSI) is developing a set of voluntary green and sustainable finance management standards to promote responsible investment practices globally and encourage the growth of the sector. BSI hopes to have the first standard in production in 2018.

Through the DIT offices in the Arctic States, the UK Government will continue to promote the UK as a centre of commercial expertise.

References and endnotes

1. Snow, Water, Ice and Permafrost in the Arctic Report 2017, Arctic Monitoring and Assessment Programme, https://www.amap.no/swipa2017

2 Credit Hugo Ahlenius, UNEP/GRID-Arendal available at http://www.grida.no/graphicslib/detail/states-organizations-and-strategical-issues-in-the-arctic-people-across-borders_39d8#

3 https://www.wiltonpark.org.uk/wp-content/uploads/WP1453-Report.pdf

4 Arctic Research publication trends: A pilot Study, August 2016 https://www.elsevier.com/__data/assets/pdf_file/0017/204353/Arctic-Research-Publication-Trends-August-2016.pdf

5. Snow, Water, Ice and Permafrost in the Arctic Report 2017, Arctic Monitoring and Assessment Programme https://www.amap.no/swipa2017

6. Obbard, R.W., et al., (2014). Global warming releases microplastic legacy frozen in Arctic Sea ice. Earth's Future, 2(6), 315–320

7. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf

8. Expert Group on Black Carbon and Methane: Summary of progress and recommendations report 2017 https://oaarchive.arctic-council.org/handle/11374/1936

9. Hoegh-Guldberg, O., R. Cai, E.S. Poloczanska, P.G. Brewer, S. Sundby, K. Hilmi, V.J. Fabry, and S. Jung, 2014: The Ocean. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part B: Regional Aspects. Contribution

10. https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017

11. International Maritime Organization, MEPC.1/Circ.833, 7 April 2014

12. Eunomia, 2016

13. https://oap.ospar.org/en/ospar-assessments/intermediate-assessment-2017

14 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/673203/25-year-environment-plan.pdf

15. NERC Arctic Research Programme: the rapidly changing Arctic environment

16. The City UK: Key Facts about the UK as an international financial centre 2017

17 https://www.gov.uk/government/news/british-embassy-helsinki-explores-arctic-opportunities

Acronyms

BAS	British Antarctic Survey
BEIS	Department for Business, Energy and Industrial Strategy
Defra	Department for Environment, Food and Rural Affairs
DIT	Department for International Trade
EU	European Union
FCO	Foreign and Commonwealth Office
GOA-ON	Global Ocean Acidification Observing Network
ICES	International Council for the Exploration of the Seas
JNCC	Joint Nature Conservation Commission
IMO	International Maritime Organization
INTERACT	International Network for Terrestrial Research and Monitoring in the Arctic
NERC	Natural Environment Research Council
NSR	Northern Sea Route
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
PAME	The Protection of the Arctic Marine Environment
SAMS	Scottish Association for Marine Science
SDGs	UN Global Goals for Sustainable Development
SIN	Science and Innovation Network
UKHO	UK Hydrographic Office
UNCLOS	United Nation Convention on the law of the Sea

The Arctic States
(the Member States of the Arctic Council):

Canada

Kingdom of Denmark
(including the dependencies of
Greenland and the Faroe Islands)

Finland

Iceland

Norway

Russian Federation

Sweden

United States of America

Arctic Council

Working Groups

ACAP
Arctic Contaminants Action Program

AMAP
Arctic Monitoring and Assessment Programme

CAFF
Conservation of Arctic Flora and Fauna

EPPR
Emergency Prevention,
Preparedness and Response

PAME
Protection of the Arctic Marine Environment

SDWG
Sustainable Development Working Group

Expert Groups

EGBCM
Expert Group on Black Carbon and Methane

EBMEG
Ecosystem-Based Management Expert Group

Task Forces

TFAMC
Task Force on Arctic Marine Cooperation

TFICA
Task Force on Improved
Connectivity in the Arctic

HM Government

Polar Regions Department

Foreign and Commonwealth Office,
King Charles Street,
London

SW1A 2AH

This publication is available for download at www.gov.uk/government/publication.

Any enquiries regarding this publication should be sent to us at polarregions@fco.gov.uk.