



*Mapping Opportunities for the UK in the Arctic*

*Study Report for the British Embassy in Helsinki*

10.2.2017

# *Mapping Opportunities for the UK in the Arctic*

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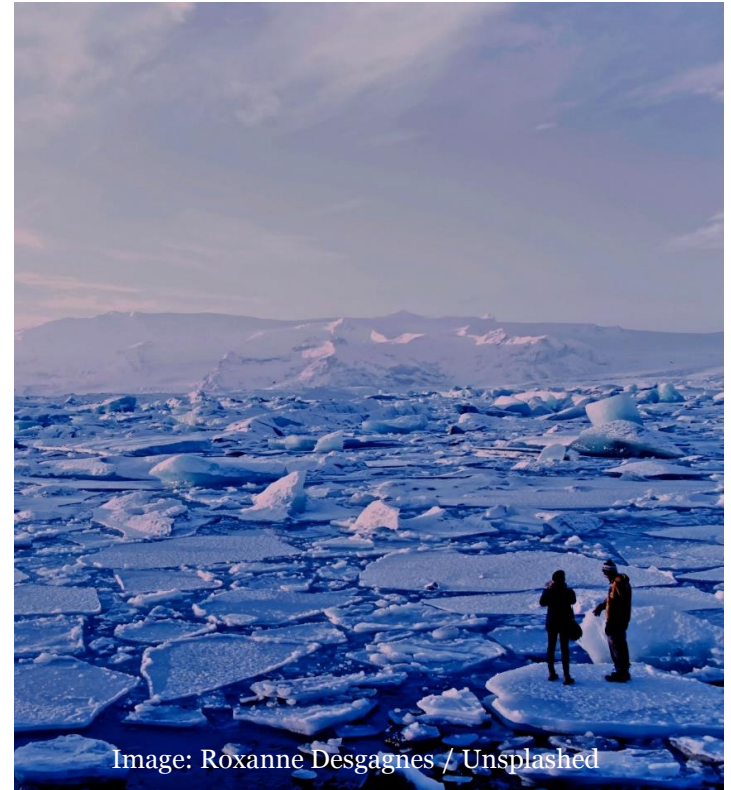
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An aerial view from the deck of a ship, looking out over a vast, flat, icy landscape. The terrain is a mix of dark blue water and white ice, creating a complex, textured pattern. The ship's deck is visible in the foreground, with various pieces of equipment and a red flag on a mast. The sky is filled with soft, white clouds, and the overall atmosphere is serene and expansive.

# *1. Introduction and Overview*

# Summary: The Arctic is a seesaw of Economy, Environment and Security

The Arctic market has attracted the attention of decision makers and businesses across the globe



Political Stability & Security  
National Interests  
Necessity of dialogue  
East vs. West  
Indigenous peoples

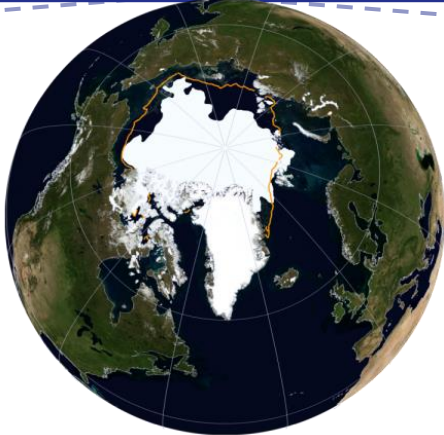


Business activities in the Arctic must address sustainability

WWF Arctic Programme

Temperature in the Arctic region is rising twice as fast as global average

Leave the Arctic alone (Greenpeace)



Daily sea ice extent Sep. 17 2014  
National Snow and Ice Data Center

Significant natural resources

Opening of Northern Sea Routes

Currently planned Arctic infrastructure projects estimated at 400 Billion USD

Arctic market is a great reference platform for global business leads

# *Recent developments in the Arctic and High North*

*– US, Canada ban drilling on Arctic while Norway boosts Barents exploration*



## **Sea Passage**

Opening of sea ice is a question of when, not if. Still, usage of the North-passage is moderate, due to conditions and shallow waters.

2016 record year for shipments in the Russian Arctic sea route.

China issues navigation guidelines for North-passage and builds its first ice-breaker.

Finland builds world's first LNG ice breaker and plans for arctic  
*g a i a* railroad.

## **Political Atmosphere**

The Arctic is a communication platform between East and West

US and Canada formed a joint statement on Arctic leadership and climate.

The EU released a joint communication of Arctic aims.

Founding of the Arctic Economic Council & Coast Guard Forum.

Around 20 new applicants for Arctic Council observers. China and Germany increase presence.

## **Resource extraction**

Low oil prices and recent trends (e.g. Paris agreement) decrease interest for Arctic drilling.

US and Canada banned arctic oil drilling, but Trump causes uncertainty. Norway continues active drilling.

Major oil and gas companies (e.g. Shell and Gazprom) have put Arctic drilling on hold. E.g. BP and Rosneft continue.

Chinese companies have entered arctic drilling.

# *Recent developments in the Arctic and High North*

*– Russia invests in Arctic infrastructure and increases military presence*



Image: Lewis Pratt / Unsplash

## **Security**

Crimea crisis has some effect on Arctic relations.

Russia has enforced its military presence in the Arctic and taken more control of air-space.

Denmark has increased defense spending in Greenland, which has independence aims and desires to take use of its resources.

*g a i a*

## **Russia's Arctic Interest**

Russia is actively increasing its Arctic transportation infrastructure.

2 LNG terminals in North-Russia.

Siberia is home to world's largest unused forestry resources.

Rosatom is preparing a floating Nuclear Power Plant.

## **Climate Change**

2015 was the warmest of recorded history.

New research stresses the harmfulness and speed of Climate Change.

Research for Climate Change in the Arctic is insufficient, especially the effects of permafrost melting and resulting SLCFs are largely unknown.

## **Other**

### **Developments**

Russia, Sweden and Norway increasing Arctic wind generation. Major players (Shell, Statoil) shifting focus to wind.

Arctic tourism competes with resource extraction.

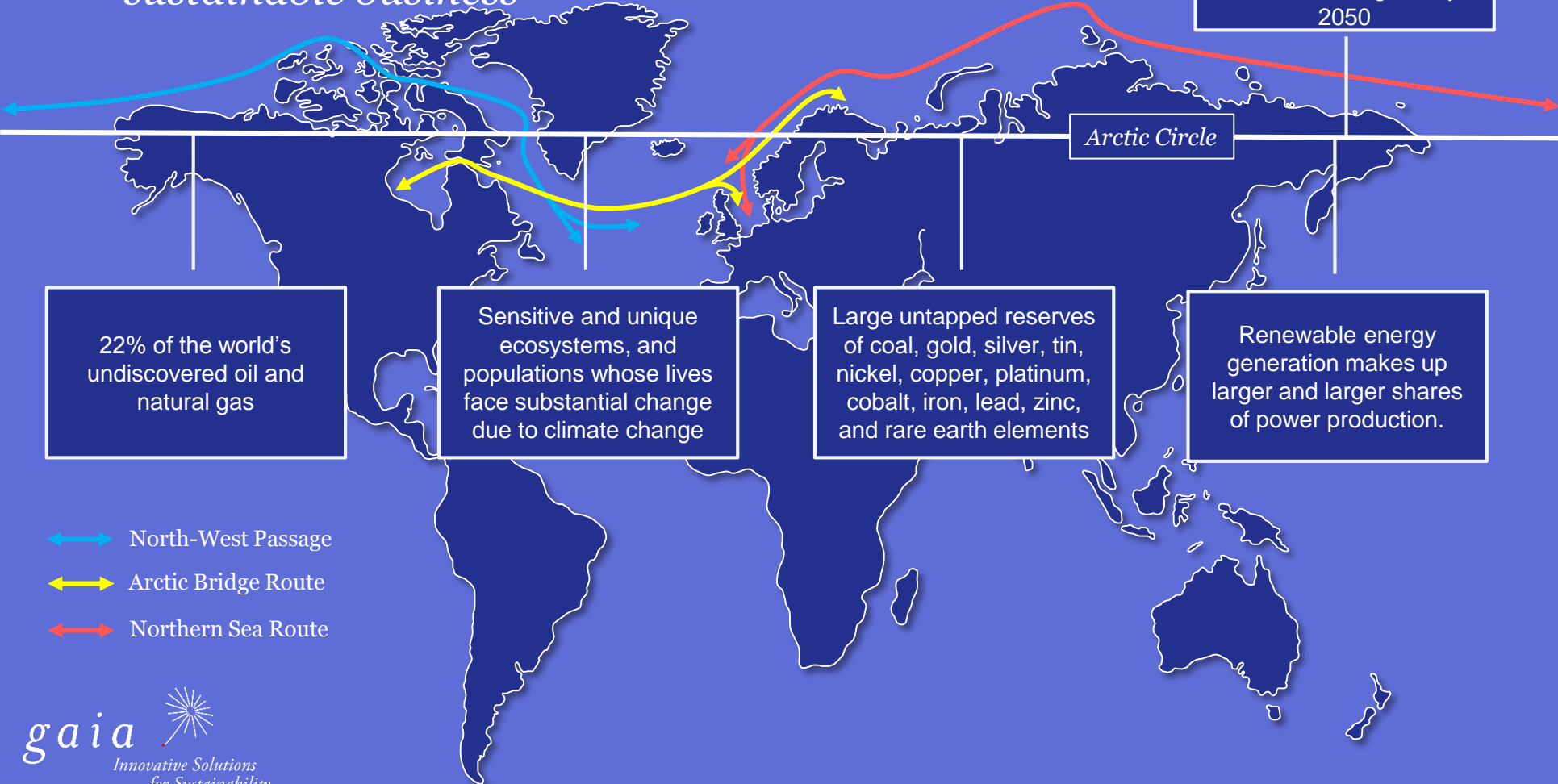
No agreement on a fishing moratorium in the Arctic.

Finland continues plans for trans-Atlantic cable.

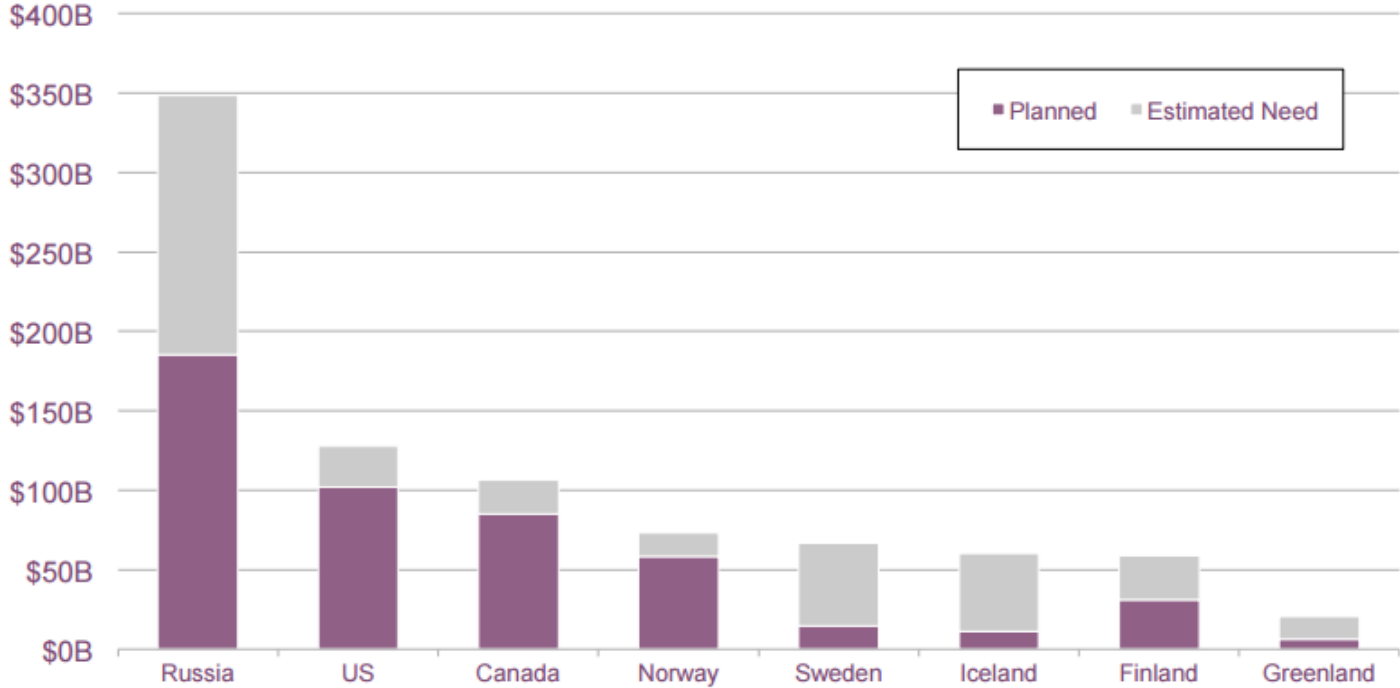


# The Arctic provides tremendous potential for sustainable business

According to The Arctic Institute, 2% of global shipping could be diverted to the Arctic by 2030, reaching 5% by 2050



*It is estimated that 15-year investment needs add up to a market of \$1tn, with some \$400-500bn in current planned projects*



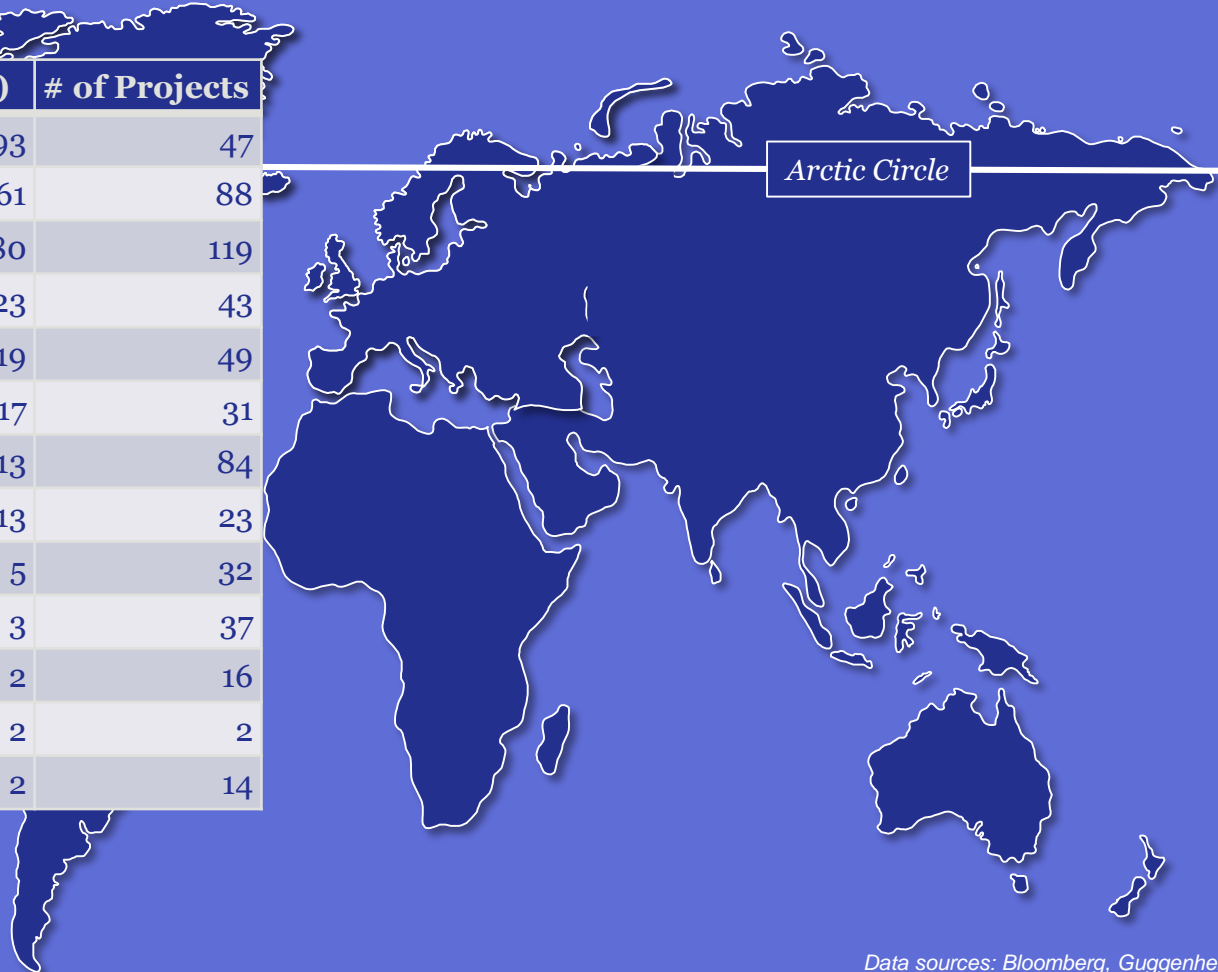
VALUE OF POTENTIAL ARCTIC INFRASTRUCTURE PROJECTS BY COUNTRY





# Energy and mining are the largest sectors requiring investments

	Value (\$bn)	# of Projects
Energy	193	47
Renewables	61	88
Mining	80	119
Rail	23	43
Industry	19	49
Maritime	17	31
Road	13	84
Power	13	23
Tourism	5	32
Aviation	3	37
Social	2	16
Telecom	2	2
Trade	2	14



# *Finance in the Arctic is especially challenging for hydrocarbons and in the Russian market*



## **Policy**

Economic sanctions against Russia represent a key barrier for Arctic finance.

Tightening political atmosphere, might pose security threats.

Large financial institutions are currently unable to finance Russian companies or large activities in Russia.

## **Oil & Gas**

Uplift cost in the Arctic significantly higher than elsewhere

Many argue that Arctic resources should be left buried to reach the 2<sup>o</sup>-goal (guardian\*)

Arctic drilling exposes to image risk. (Obama, Greenpeace)

Large banks pulling capital from fossils (Deutsche, IBRD, EIB, IBRD, IMF, NIB)

**Arctic drilling requires significantly higher margins**

## **General**

Subject to tighter DDs due to challenging conditions. Higher transportation, environmental and general costs.

Major investments in remote areas require political support or large banks for private lending

No finance institutions in the Nordics that specialize in Arctic finance.

**Favors large & experienced players' access to capital**

## *Six main themes for investments can be identified*

1. **Energy** is the biggest driver of the Arctic development – it is largely governed by fossil fuels (oil, gas) and lead by large investors. Renewable energy sector is an opportunity due to several reasons: public opinion and political climate, low price of oil (but rising) and energy efficiency requirements.
2. **Mining** is the 2nd biggest driver for infrastructure development and investments. However, the sector has been suffering from low prices.
3. **Infrastructure** provides huge business potential, but clustering and cooperation among constructing companies may be challenging.
4. Melting Arctic sea ice attracts **maritime** interest as the Northern Sea Route can shorten cargo routes by as much as 30% during the summer months. However, development is likely to be slow as shipments have actually declined in the past few years, with only 40 000 tons shipped in 2015 (fluctuating heavily each year) – strong business cases are still in the future.
5. **Telecommunication and ICT** is a vital part of the infrastructure for Arctic development. Its development is highly dependent on the energy and maritime industries.
6. **Travel and tourism** industry is growing as northern lights, snow and Nordic nature attract visitors especially from the UK, Germany and Asia. UK visitors in Finnish Lapland grew by more than 10% from 2015 to 2016, and new air routes have been initiated for winter season (Manchester-Kittilä, London-Kittilä, London-Rovaniemi)



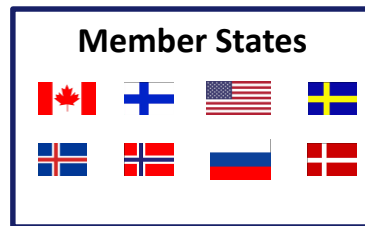
Image credits:  
visitarticeurope.com

# AC & AEC are the high-level forums of Arctic cooperation: --Finland in the spotlight 2017-2019

## Political – Arctic Council

High level intergovernmental Arctic forum,  
with 6 Working Groups in

1. Biodiversity
2. Environmental Protection
3. Sustainable development
4. Emergency prevention and response







## Economic – Arctic Economic Council





1. **Market Connections\***
2. Public-Private Partnerships
3. Promoting stable regulation
4. Knowledge and data exchange
5. Traditional knowledge



**Current working groups:**

 Stewardship	 Marine transportation	 Responsible resource development	 Telecommunications
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**Goal to establish future working groups in:**

 Tourism	 Fishing & other marine resources	 Aviation	 Investment & infrastructure
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## *EU has its own Arctic Policy in supporting successful Arctic cooperation and helping to meet the challenges*

- The Arctic is an area of growing strategic importance. The European Union has an important role to play in supporting successful Arctic cooperation and helping to meet the challenges now facing the region.
- The EU is the world's strongest proponent of greater international efforts to fight climate change. Moreover, it has three Arctic Council states amongst its members.
- The EU is also a major destination of resources and goods from the Arctic region. Many of its policies and regulations therefore have implications for Arctic stakeholders.
- The EU wants to engage more with Arctic partners to increase its awareness of their concerns and to address shared challenges in a collaborative manner.
- The EU Arctic policy has 3 main policy objectives:
  - protecting and preserving the Arctic in cooperation with the people who live there
  - promoting sustainable use of resources
  - international cooperation.
- Finnish former prime minister Paavo Lipponen has prepared a memorandum to European Commission President “for an ambitious EU Arctic and Northern Policy”



## *Finland in a broad Nordic and international Arctic cooperation*



### **Barents Euro-Arctic Council**

The objective is to promote stability and sustainable development in the Barents region that covers the northern parts of Finland, Sweden, Norway and the northwestern parts of Russia



### **Barents Regional Council**

The Barents Regional Council works on the level of regions. In Finland the regions of Lapland, Kainuu, Oulu and North Carelia participate in the cooperation.



### **Northern Forum**

Brings together decision-makers on a regional level to discuss their shared interests and to promote business contacts. The Northern Forum has the position of an observer in the Arctic Council.



### **Northern Dimension**

Cooperation between four equal partners: the European Union, the Russian Federation, Norway and Iceland. Aims at supporting stability, well-being and sustainable development.



### **Conference of Parliamentarians of the Arctic Region**

Members from the national parliaments of the Arctic states and the European Parliament. Permanent participants include key organisations of indigenous peoples in the region.



### **Nordic Council**









The parliamentary organ for official Nordic cooperation. The council has a total of 87 elected members from Finland, Sweden, Norway, Denmark and Iceland as well as from the Åland Islands, the Faroe Islands and Greenland.



### **Nordic Council of Ministers**

Official body for inter-governmental cooperation in the Nordic Region. The organ for cooperation aims at finding common Nordic solutions that have clear positive effects on the citizens.

## *Economic interests are emphasized in Arctic Strategies*

	<b>Main Themes</b>	<b>Economic</b>	<b>Environment</b>	<b>Research</b>
	Sovereignty, Environmental heritage, Social and economic development, Governance	✓	✓	✓
	Environment, Cooperation, Peace and Security, Self-sustaining growth, Economy	✓	✓	✓
	Cooperation, Sustainable development, Environment, EU's Arctic Policy, Business	✓	✓	✓
	Resources, Environment, Navigation, Social Development, Cooperation, Arctic recognition	✓	✓	✓
	Cooperation, Business, Knowledge, Infrastructure, Environment, Resources, Safety, Indigenous people	✓	✓	✓
	Social and Economic development, Peace, Science, Cooperation, Environment, Transportation	✓	✓	✓
	Environment, Economic and Social development, Cooperation, Security, Transport	✓	✓	✓
	Security, Stewardship, Cooperation, Infrastructure, Environment, Economy, Indigenous peoples	✓	✓	✓

## Research and Environment are on the top of the observers' agenda

Observer in the AC	Arctic Strategy/ Roadmap	Main Themes	Priorities			
	Application submitted	<u>An integrated European Union policy for the Arctic</u>	Environment and Social Protection, Cooperation, Research			
	2000	<u>The Great Challenge of the Arctic</u>	Research, Security, Conservation			
	1998	<u>Assume responsibility, seize opportunities</u>	Economy, Environment, Research, Indigenous peoples, Cooperation			
	2013	<u>Towards an Italian Strategy for the Arctic</u>	Environment, Human, Scientific, Economy			
	2013	<u>Japan's Arctic Policy</u>	Research, Environment, Cooperation, Indigenous people, Economy			
	2013	<u>Arctic Policy of the Republic of Korea</u>	Cooperation, Research, Business			
	1998	<u>Adapating to Change</u>	Research, Environment, Economy, Security			



## *A number of agreements and regulations dictate how companies can operate in the Arctic*

- The United Nations Convention of the Law of the Sea (UNCLOS)
  - Defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources
- International Maritime Organization (IMO)
  - Source of some 60 legal instruments that guide the regulatory development of its member states to improve safety at sea, facilitate trade among seafaring states and protect the maritime environment, one of the most important being the International Convention for the Prevention of Pollution from Ships (MARPOL)
- Other agreements include:
  - Convention on the Prevention of Marine Pollution by Dumping of Wastes & Other Matter
  - The Stockholm Convention on Persistent Organic Pollutants (POPs)
  - The Antarctic Treaty System (ATS)
  - The Kyoto Protocol and the Paris Agreement
  - Binding agreements by the AC (e.g. Search&Rescue, Marine Oil Pollution Preparedness and Response)



## 2. Issues to Consider

## 2.1. Background for cooperation initiatives



Polaris 2016 is stated to be the most powerful icebreaker ever to fly the Finnish flag and the first icebreaker in the world to feature environmentally friendly dual-fuel engines capable of using both low-sulfur marine diesel oil (LSMDO) and liquefied natural gas (LNG).

# *UK is an advanced nation of innovations, and it has an increasingly active role in Arctic policy and research*

- The UK has an impressive innovation record, and it is securing its position as the world's second-most innovative nation in the world.
- The UK's innovation heritage is in areas such as the oil and gas industry, pharmaceuticals and high-value engineering is an asset worth mentioned when one is seeking world-class innovation partners
- The UK is the Arctic's nearest neighbor
- The UK is dedicated to limiting global climate change to 2°C
  - The window of opportunity is now to examine whether oil & gas extraction in the arctic can be sustainable.
- The UK is increasingly involved in Arctic research
  - Strong expertise in e.g. polar ecology and ecosystems, oceanography and marine biology, climate modelling, atmospheric sciences and sea ice predictions.
  - Seeks observer status in Arctic Regional Hydrographic Commission
  - British Antarctic Survey (BAS) has a leading role in Polar View

## **UK's Arctic Policy Process**



*Arctic Policy 2013  
House of Lords report 2015  
Government Response 2015  
Updated Arctic Policy*



*UK has strong expertise in research and innovation, as well as economic issues, offering a good contact point for mutually beneficial relationship with Team Finland*

- UK has particular expertise in areas that have a strong synergy with Arctic issues, e.g. energy, renewable, maritime, tourism, finance, insurance and risk management, environmental research, mining and oil spill prevention.
- Department for International Trade's (DIT) Trade and Investment Teams are the first point of contact for UK businesses looking for international expansion.
- In general, embassy networks both in the UK and Finland provide an excellent contact network for international cooperation, covering a range of areas from the Arctic to education to science and beyond.



Department for  
International Trade



Department for  
Business, Energy  
& Industrial Strategy

*Team*  
**FINLAND**

# Finland in the Arctic Spotlight

-- Chairmanship of AC and AEC during 2017-2019 – Main themes in AC

- Environmental protection
  - Diversity, Pollution prevention, CC mitigation
- Connectivity
  - Regional economic development, Cooperation with AEC, Arctic communication technology
- Meteorological knowledge
  - Safe land, sea and air transportation, Cooperation between Arctic countries and WMO
- Education
  - Diversity of cultures and languages, Sustainable development, Supporting educational experts
- "If it works in Finland, it works anywhere"



# Finland in the Arctic Spotlight

## -- Chairmanship of AC and AEC during 2017-2019 – Main themes in AEC

- During its AEC chairmanship, Finland will drive:
  - Advancing the the five overarching goals of AEC with special emphasis on “establishing strong market connections between the Arctic States and to bigger actors in each branch of the AEC working groups”
- Finland has particular expertise in e.g. maritime (ice-breaking and special vessels), service industry, mining and mining technology, construction and infrastructure, floating structures, transportation, travel & tourism, digitalization, “Snow-how”, advanced technology, innovations and research
- Finland is in a prime position to promote Nordic cooperation and influence the EU’s Arctic Policy and has long history of trade and commerce with Russia – Finland could build bridges and a fruitful dialogue and, thus, improve the challenging international trade atmosphere



# Global opportunities and challenges in cooperation



## Summary: The Arctic is a seesaw of Economy, Environment and Security

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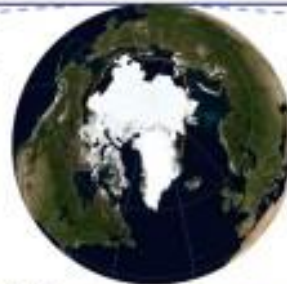
Business activities in the Arctic must address sustainability

WWF Arctic Programme

Temperature in the Arctic region is rising twice as fast as global average

Leave the Arctic alone (Greenpeace)  
Moratorium

gaia



Daily sea ice extent Sep. 17 2014  
National Snow and Ice Data Center

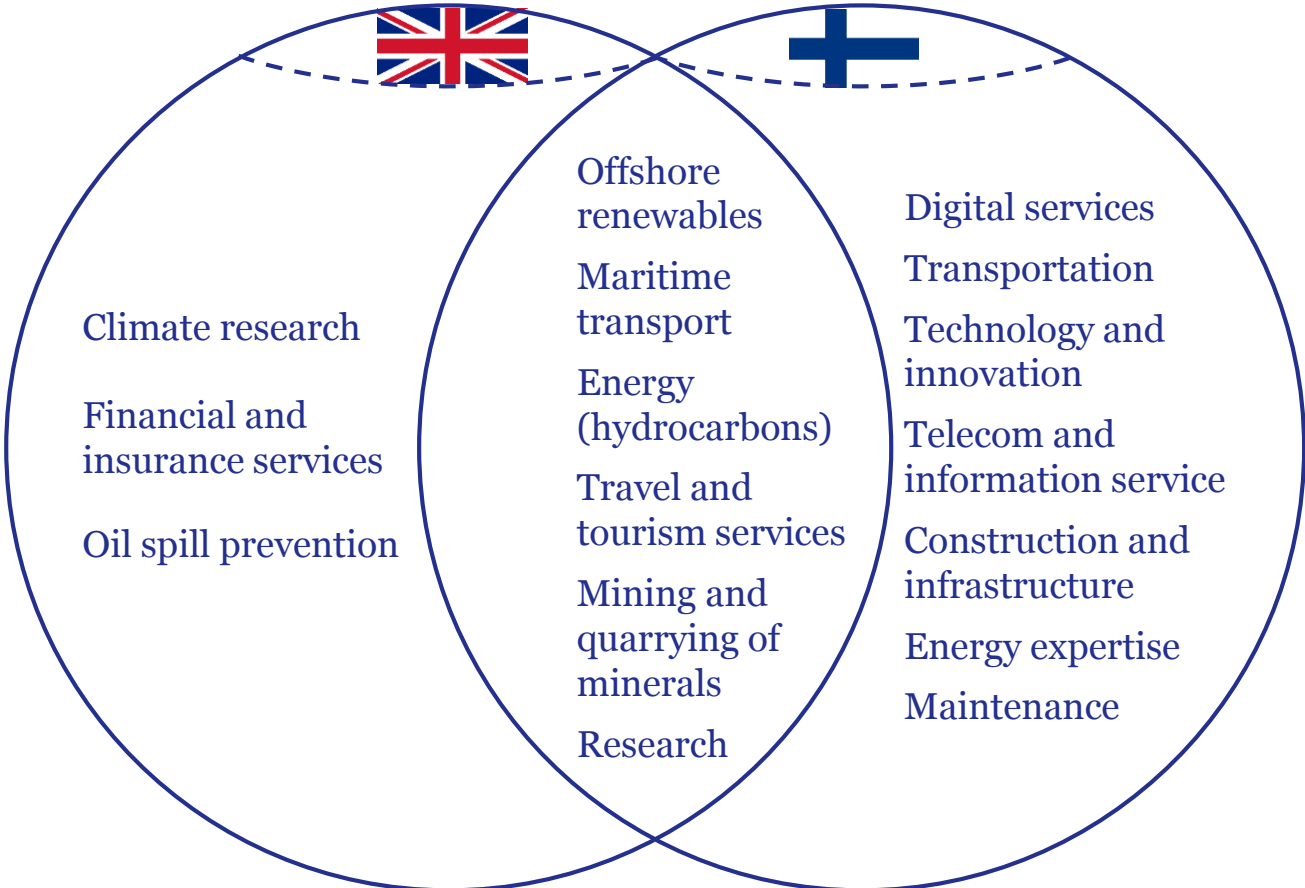
Significant natural resources

Opening of Northern Sea Routes

Currently planned Arctic infrastructure projects estimated at 400 Billion USD

Arctic market is a great reference platform for global business leads

*Several overlapping areas of focus in UK/FIN Arctic strategies:*



Other: Emergency response and rescue services, Manufacturing, Defense, Forestry, Hunting and fishing



# *Finnish expertise and clusters in maritime, ice management, industrial infrastructure and blue growth are strong and international*

- **Finland** has over 100 years of expertise in maritime ice management solutions. Some 60 percent of the world's operating ice breakers have been built in Finland, including the world's first liquefied natural gas (LNG) icebreaker.
- **The Finnish Marine Industries** is the co-operation forum for high-technology maritime solution providers, leading marine equipment manufacturers, turn-key suppliers, designers, software and system providers as well as shipbuilding, ship repair and offshore yards.
- **Finpro's Maritime and Offshore from Finland** programme is targeted to Finnish companies operating in shipbuilding, offshore and in maritime technologies and building. It is Finpro's internationalization program carried out in cooperation with Team Finland.
- **Gaia** coordinates **Team Arctic Finland** consortium in cooperation with the Finnish Marine Industries.



# 2.2. Northern Sea Route Development



## *Sustainable growth in the Scandinavian Arctic*

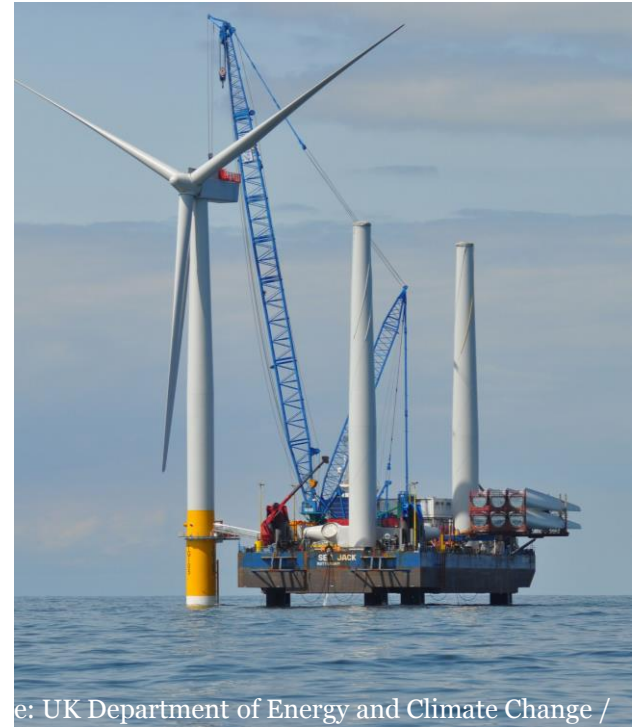
- Norway, Sweden and Finland share common economic, environmental and social interests in the Arctic which results several cooperation reports, e.g. Growth from the North 2015). Accordingly, the drivers being Clean energy from LNG and renewables, Greener Mining, Increased tourism, Ice and cold climate solutions.
- Finland actively promotes a discussion in Scandinavia and internally:
  - Finland's former Prime Minister Paavo Lipponen has made a study on Finland's prospects for economic growth in Arctic and northern regions
  - A study carried out by Paavo Lipponen and Reijo Svento stated that a telecommunication cable between Europe and Asia via the North-East Passage would be politically and technologically feasible, benefitting the national economies in Europe, Russia and Asia.
  - A recent study promotes the development of the Trans-European Transportation (TEN-T) core network aiming to build an "Arctic Corridor" to the Arctic Sea.



image: Jacques Desclotres /Wikipedia

## *Offshore wind in High North and Scandinavia*

- UK, Germany and Northern Europe form the hotspot of offshore wind.
- >100% increase in European offshore wind capacity from 2014 → 2015.
- Wind turbines are increasing in size and are being sited further from shore in remote locations and deeper waters.
- Several alternatives exist for offshore logistics solutions all of which require maritime know-how.
- Europe as a leading continent for offshore wind is gradually having competitors from US (Icebraker Windpower Inc., Shell) and China – is there a need to join forces (investors, technology providers, partners) in Europe?



# *Northern Russia import/export corridor for Siberian resources*

## *– Infrastructure Military, Maritime, Forestry, Oil, Nuclear Power*

- Significant development of infrastructure is taking place in Russia; diminishing natural resources have set a long term need to build up Northern infrastructure.
- Diminishing ice cover along the Siberian coast and new technologies allow development of maritime fairways.
- Opening up the big rivers for marine transit purposes: Pechora, Ob, Yenisei, Khatanga and Lena → Better and more economical access to Siberia's giant forest resources.
- New roads, railroads, air strips, telecommunication networks are already under construction.
- Four modern oil export terminals, with year-round shuttle, already opened up in the river estuaries: Kola Bay, Varandei, Sabetta, Mys Kamenny.
- New opportunities already identified for other resources.
- Russia is installing a floating NPP in Pevek in 2018
- In the recent years, Russia has opened six new military bases in their Arctic zone, e.g. in Kara Sea, Laptev Sea.

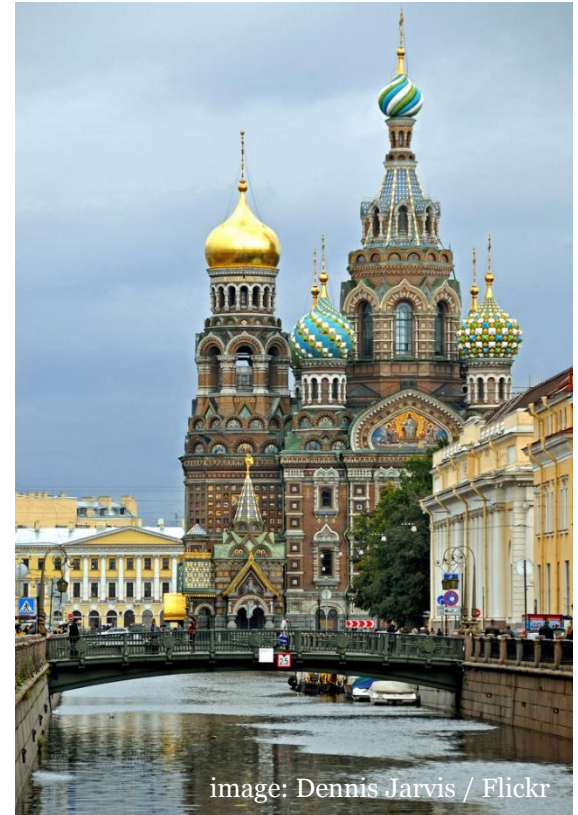


image: Dennis Jarvis / Flickr



# Huge Arctic development plan integrates major Russian Arctic ports, railways, infrastructure, terminals, vessels and cargo ships



## *Shipments along the Russian Arctic sea route on the rise, transit shipments between Europe and Asia fluctuate highly year-on-year*

- 2016 showed a record high for Northern Sea Route in terms of shipments to ports along the Russian Arctic sea route, i.e. for Russian internal shipments
- **Transit shipments** along the Northern Sea Route in 2016 remained on a low level. By mid-September 2016 only about 210,000 tons of goods had made it across the Russian Arctic, from the Bering Strait in the east to the Barents Sea in the west
- The EU is currently considering banning the use and carriage of heavy-fuel oil (HFO) from all ships Arctic waters. Such a ban would increase the costs of sailing between Europe and Asia, as light fuel oil is considerably more expensive
- The Northern Sea Route as a seafaring connection between Europe and Asia is highly unlikely to become economically viable for commercial shipping for a (very) long time, and its impact on global shipping is expected to remain (very) marginal



## *2.3. Science and Arctic Environmental Research*



Image: NASA Ice / Flickr

## *Nordic Innovation Ecosystem and instruments – Denmark, Norway, Sweden*

Denmark	<ul style="list-style-type: none"><li>• The Polar Secretariat coordinates Arctic research funding (no earmarked funding programmes).</li><li>• Forum for Arctic Research unites Danish universities in cross-disciplinary centres.</li></ul>
Norway	<ul style="list-style-type: none"><li>• Approx. £173 million used on polar research in 2014</li><li>• Polar Research Programme (POLARPROG) within climate, environment, natural resources, industrial activity, policy and management (annual budget ~ £ 10 million)</li><li>• Other relevant programmes: Climate (~£13M annually), Environment (~£ 8.5 M annually), and Petroleum research (&gt; £20M annually)</li><li>• Research stations at Svalbard main focal point for international Arctic research cooperation</li></ul>
Sweden	<ul style="list-style-type: none"><li>• Polar research secretariat coordinates e.g. Abisko Scientific Research Station and icebreaker Oden.</li><li>• Funding provided jointly by Swedish Research Councils and the Polar research secretariat.</li></ul>

All Nordic countries **prioritise Arctic research in public R&D funding** through strategies and earmarked programmes

“**Arctic centres**” have been established at multiple universities in all five Nordic countries. Research of Arctic relevance is conducted at most universities.



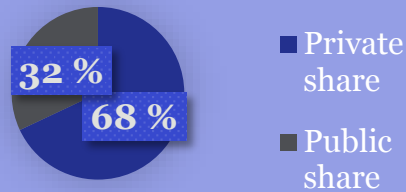
## *Examples of channels for UK-Nordic R&D cooperation in the Arctic*

- **European Joint Programming Initiatives** (JPI) within Climate, Ocean and Urban Development, prioritises Arctic research topics.
- **Belmont Forum**, a group of global environmental change research funders. Funds research on *Transformations to Sustainability* together with the European programme **NORFACE** (€ 13 million in Spring 2017).
- The **Nordic Council of Ministers** (the body for Nordic governmental cooperation) runs an Arctic cooperation programme (budget £ 1 million in 2016) and prioritises Arctic cooperation in most other activities e.g. through the organisation **NordForsk**.
- **University of the Arctic** promotes access to research infrastructures across the Arctic region, funds networks, and runs the Northern Research Forum (NRF) - an international platform for dialogue between members of the research community and a wide range of stakeholders.
- **INTERACT** is a circumarctic network providing access to terrestrial field stations, in which the NERC (the National Environment Research Council) of UK is a partner.



## *Nordic Innovation Ecosystem and instruments - Finland*

**R&D in Finland**  
**€ 6,5 Billion**  
**(2.8 % of GDP)**



**Public R&D funding € 1.8 billion**

(0.97% of GDP)

**Finnish Innovation Fund Tekes**

€ 381 million

**Academy of Finland** (research funding)

€ 439 million

### **Arctic R&D Programmes in Finland:**

#### **Arctic Seas (Tekes 2014-2017):**

- New solutions in cleantech, energy technology and digitalisation for the maritime industry and shipping
- > 100 R&D projects (continuously open call)
- Budget € 100 M (Tekes share € 45 million)

#### **ARKTIKO (Academy of Finland 2014–2018):**

- New knowledge on changing Arctic region (life quality, economic activity, infrastructure, climate and environment, cross-border policies)
- 20 national projects + international collaborative joint research projects (funding already awarded)
- Academy share of funding € 15.7 million

## *Environment & Climate Research*

- There is an urgent need to improve climate and ocean monitoring around the poles.
- Such monitoring programs and facilities should be based on international joint efforts and facilities.
- British Antarctic Survey's new polar research vessel RRS Sir David Attenborough is a good tool in this work and would give the UK a credible basis to take an initiator role.
- The UK has historically a strong knowledge base for submarine, offshore and subsea technology which may provide an interesting arena for subsea research and development: underwater ecosystems, blue bioresources and Blue Growth



Image: Official U.S. Navy Page / Flickr

## *Examples on meteorology, geology, climate & environmental studies*

- Arctic research is conducted in several Finnish universities: The universities of Lapland and Oulu, as well as the Lapland University of Applied Sciences, all have an arctic focus in their strategy.
- **University of the Arctic** (UArctic) is a consortium of various universities operating in the Arctic countries, including Finnish universities of Lapland, Oulu, Turku and Eastern Finland.
- **Finnish Meteorological Institute** (FMI) provides world leading analyses on weather and ice conditions using the best numerical forecasting models, observations and meteorological expertise with direct access to satellite data and own reception facilities.
- **The Geological Survey of Finland (GTK)** is a European center of excellence in assessment, research and sustainable use of Earth's resources. Its mission is to produce and disseminate geological information and promote viable economic activity based on natural resources.

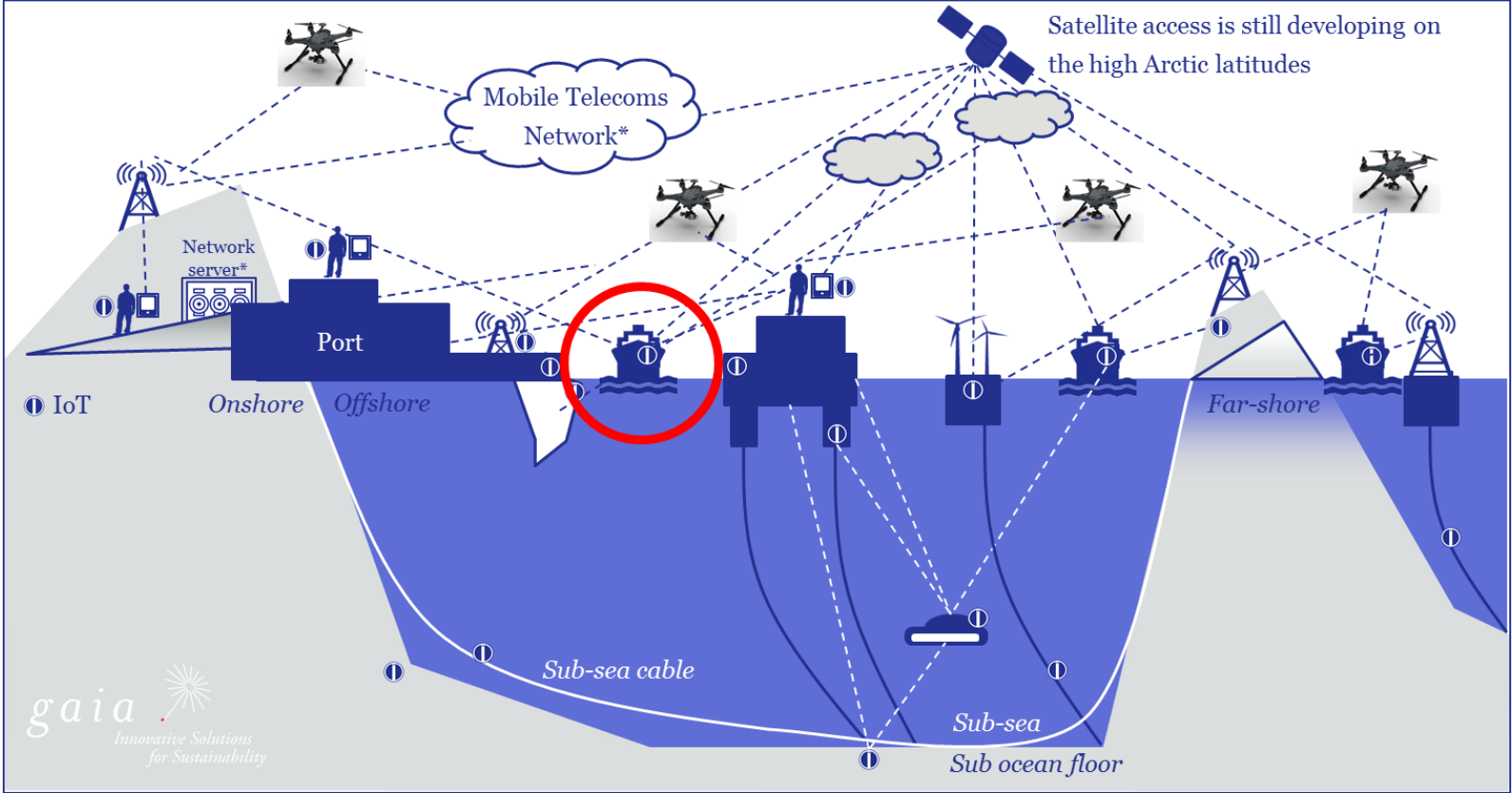


## *Examples on meteorology, geology, climate & environmental studies*

- **Finnish Environment Institute (SYKE)** is both a research institute, and a centre for environmental expertise. SYKE forms part of Finland's national environmental administration.
- **Natural Resources Institute Finland (LUKE)** is a research and expert organisation. The institute promotes bioeconomy and sustainable use of natural resources.
- **Finnish Institute of Occupational Health** is a specialist in well-being at work, which carries out research, and provides services and training for safe working in extreme conditions.
- **VTT Technical Research Centre of Finland Ltd** is the leading research and technology company in the Nordic countries.



# 2.4. Arctic Development and Digitalization





## *Scandinavian countries are front-runners in smart solutions, such as autonomous ships and health & safety technologies*

- A new autonomous maritime ecosystem kicked off in Finland in 2016. The new business ecosystem, coordinated by the Finnish Funding Agency for Innovation (Tekes), brings together global forerunners and agile ICT start-ups to develop first autonomous shipping solutions in the world.
- Norwegian Maritime Authority and the Norwegian Coastal Administration have signed an agreement which allows for testing of autonomous ships in the Trondheim fjord.
- **The Team Finland Health** growth programme focuses on attracting health sector investments to Finland and supporting the growth of exports in the entire sector. The programme is based on the joint growth strategy for research and innovation activities in the health sector.
- Team Finland's **FinlandCare** programme is designed for companies providing healthcare and well-being services as well as related technologies, education and consultations.



Image credit: Maritime Robotics



Image credits and source:  
exportfinland.fi

## *The High North is a hub for advanced telecommunications and ICT solutions, as well as a pioneer in arctic offshore wind power*

- **Lapland's** geographic location is ideal for satellite reception, and may serve investments in the Arctic.
- The world's first wind turbine foundation for heavy sea ice conditions, **Tahkoluoto offshore wind park**, is being built outside of Pori in Southern Finland
- Team Finland's **Connectivity from Finland** programme brings together Finnish connectivity expertise delivering innovative solutions and value adding digital services for operators.
- Team Finland's **Industrial Internet** programme has competitive companies across all parts of the Industrial Internet and Big Data value chain, from data acquisition, integration and management to analytics and applications
- R&D projects and research infrastructures may also provide concrete platforms for experiments, piloting and testing purposes



## *Mobility as a service and intelligent transport systems are tested in extreme conditions*

- E8 – Aurora: The Aurora test ecosystem is designed for verifying and validating new ITS solutions and innovations in real extreme weather conditions. Situated above the Arctic circle, Aurora offers a unique test location for validation, marketing and assessment of impacts and performances of intelligent transport automation.
- Team Finland's **Mobility as a Service - Intelligent Vehicle and Traffic Growth Program (MaaS)** promotes Finland's role in smart mobility.



Image credit: Team Finland





### *3. Summary and Conclusions*

## *Window of opportunity is open, business prospects are huge but challenging – what is the right timing?*

- Arctic cooperation bodies like the Arctic Council and the Arctic Economic Council can provide an interesting platform for global dialogue and cooperation as international politics is of great concern
- Especially the Arctic Economic Council is still under development and Finland is paving the way for global economic collaboration in the Arctic with its chairmanship during 2017-2019
- Interesting investment opportunities can be found in Northern Norway, Sweden and Finland with a low risk profile, also looking at the Arctic Corridor as a part of TEN-T development
- Huge investments along the Russian Northern Sea Route and transportation provide an interesting scenery for finance, investments and business cooperation with high risk profiles for the time being.
- Finland has long relations with Russia in various levels and may be building bridges between the east and the west. Finnish maritime, infrastructure and construction clusters with advanced arctic expertise could provide added value for shipping and offshore industry as well as offshore wind as they are moving towards High North and Arctic
- Tourism and travel in the Arctic is growing fast among UK and Asian citizens – is there an opportunity for interconnecting, art and amusement activities, branding or creative service business (service design, marketing, product design etc.)?



## *Environment and climate research must be developed and Blue Growth realized as the climate change continues to fill headlines*

- Changes in the Arctic affect the nature and frequency of extreme weather events and other natural hazards which threaten the globe
- Arctic research needs strong international partnerships, resources and intelligence to improve the understanding of environmental changes, climate change and global warming
- The environmental effects of human activities are most pronounced in the polar regions, making Arctic an excellent environment for environmental research
- Nordic international research programmes, funding instruments, and a broad scope of institutions, research networks and competencies form an easy access to Arctic cooperative research
- Blue Growth and subsea technologies are themes where synergies are evident between the UK and the Arctic countries. Here, the advances can be utilized both in environmental research and e.g. telecommunications and expertise in floating structures while preserving the scarce Arctic underwater ecosystems
- Sustainable fishery in the Arctic is a challenge as abundant natural resources, new trade routes and increasing human activity are bringing new opportunities. Some species may replace traditional Arctic species but there are no exact information on how these changes will develop

## *Need for autonomous shipping, transportation and advanced security and resource efficiency boost digital innovations*

- Artificial intelligence, robotics, and remote connections will play an important role in the maritime industry's targeting for increasing efficiency, safety, security and lowering operating costs. This will provide interesting opportunities for the finance, insurance, classification and compliance services related to maritime shipping
- The Nordic countries have been pioneers in developing state of the art telecommunications systems and networks for mobile applications and smart solutions. As a result of this development the ecosystem is experienced in several applications relevant to the Arctic and High North: personal security and health, automation in transportation, traffic handling equipment
- As globalization progresses, the need for seamless processes, cybersecurity, resource efficiency and maximum safety increases and produces new applications and solutions for transportation, renewable energy production and e.g. subsea mining
- Distributed energy systems – especially renewable energy production units – need smart grid solutions, sensors and automated optimization solutions as well as reliable connectivity
- Along with the development of digitalization of ships and vessels and autonomous shipping it is of primary importance to study new approaches for safety standards and marine insurance policies and concepts

## *Concluding words*



- ***SIMILARITIES WITH VALUES AND APPROACHES***
- ***SYNERGIES WITH ROLES AND RESOURCES***

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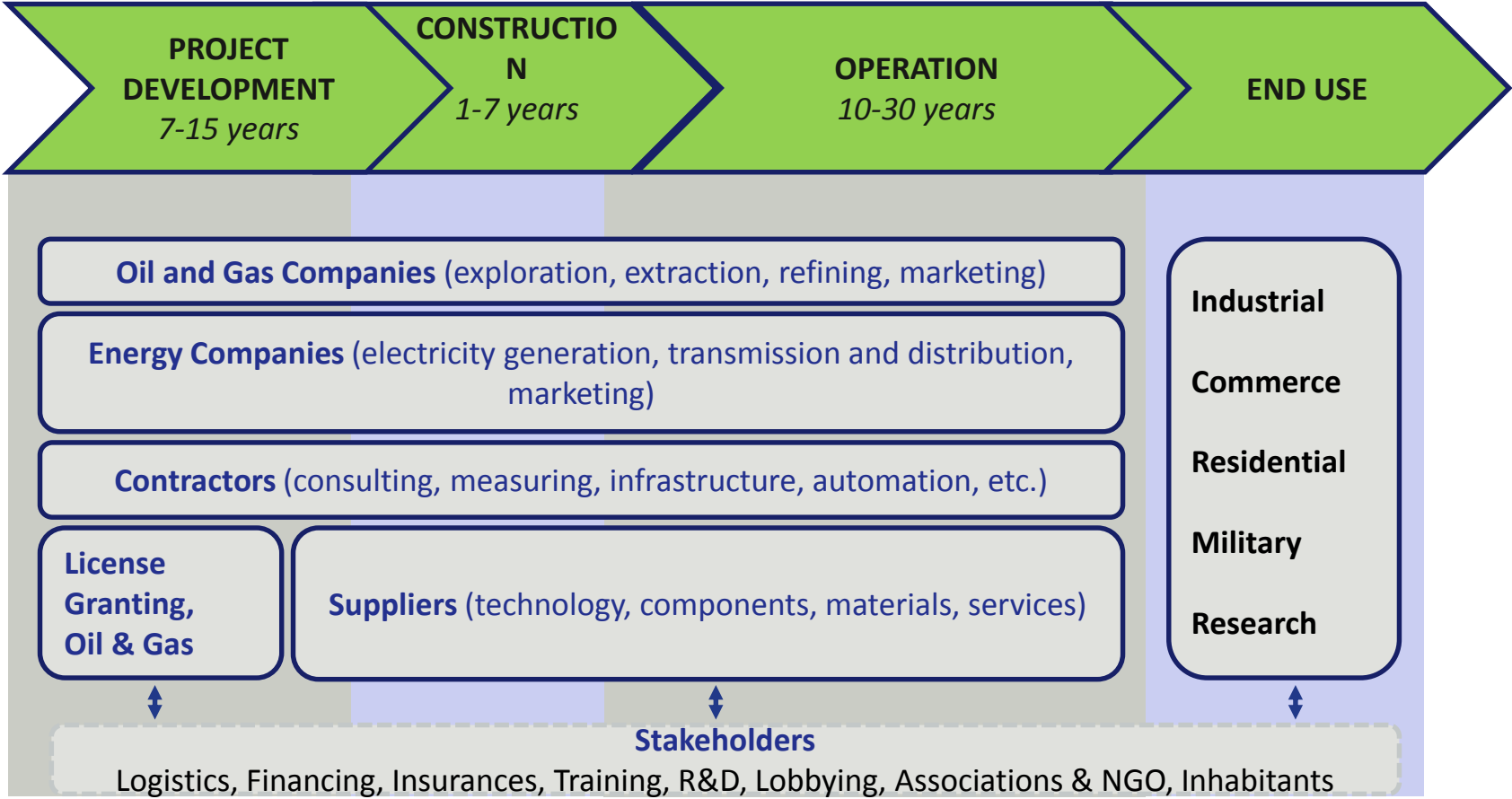
With funding from the  
British Embassy Helsinki



# *Appendixes*

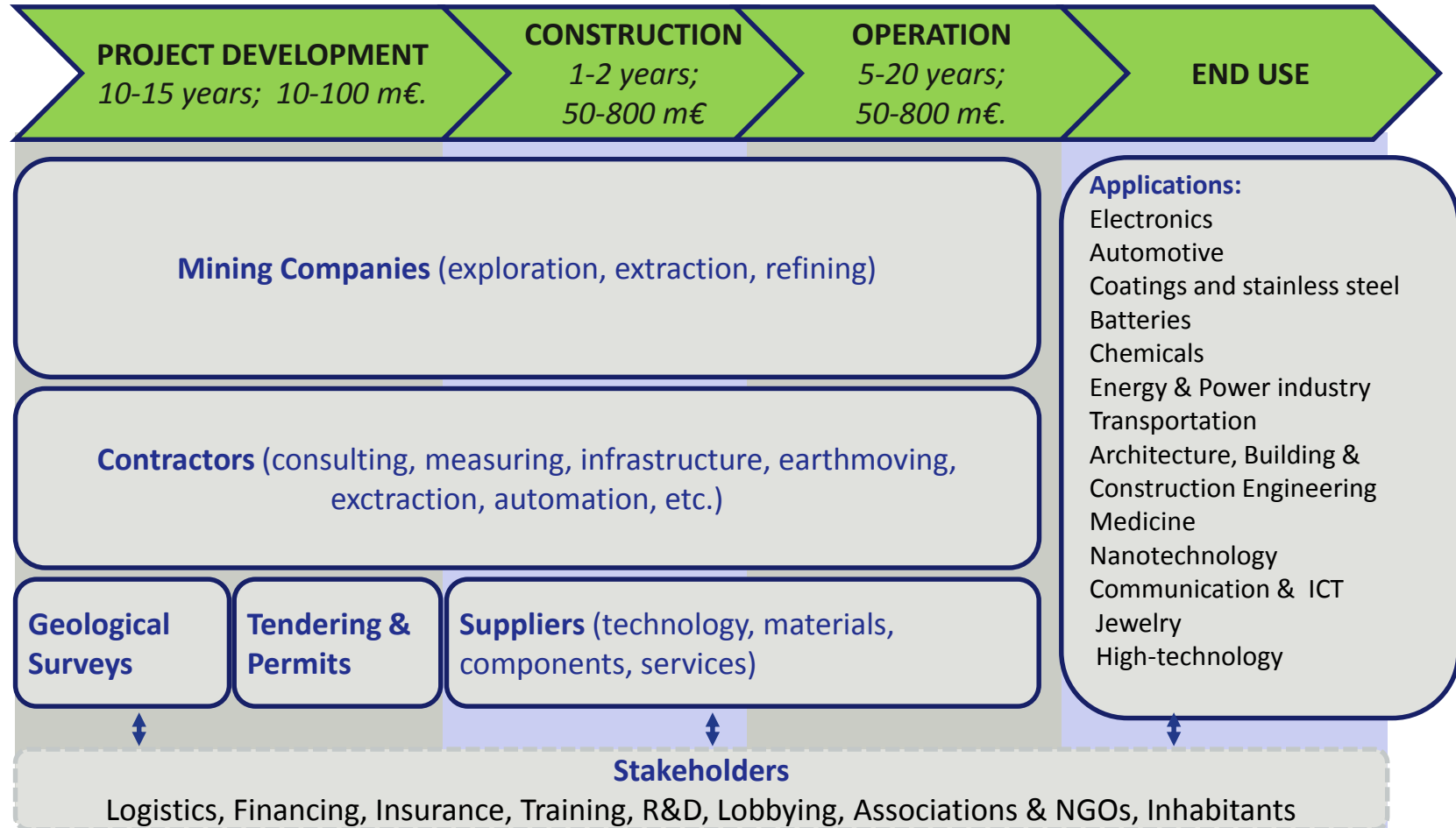


# Energy: Value chain and key sectors

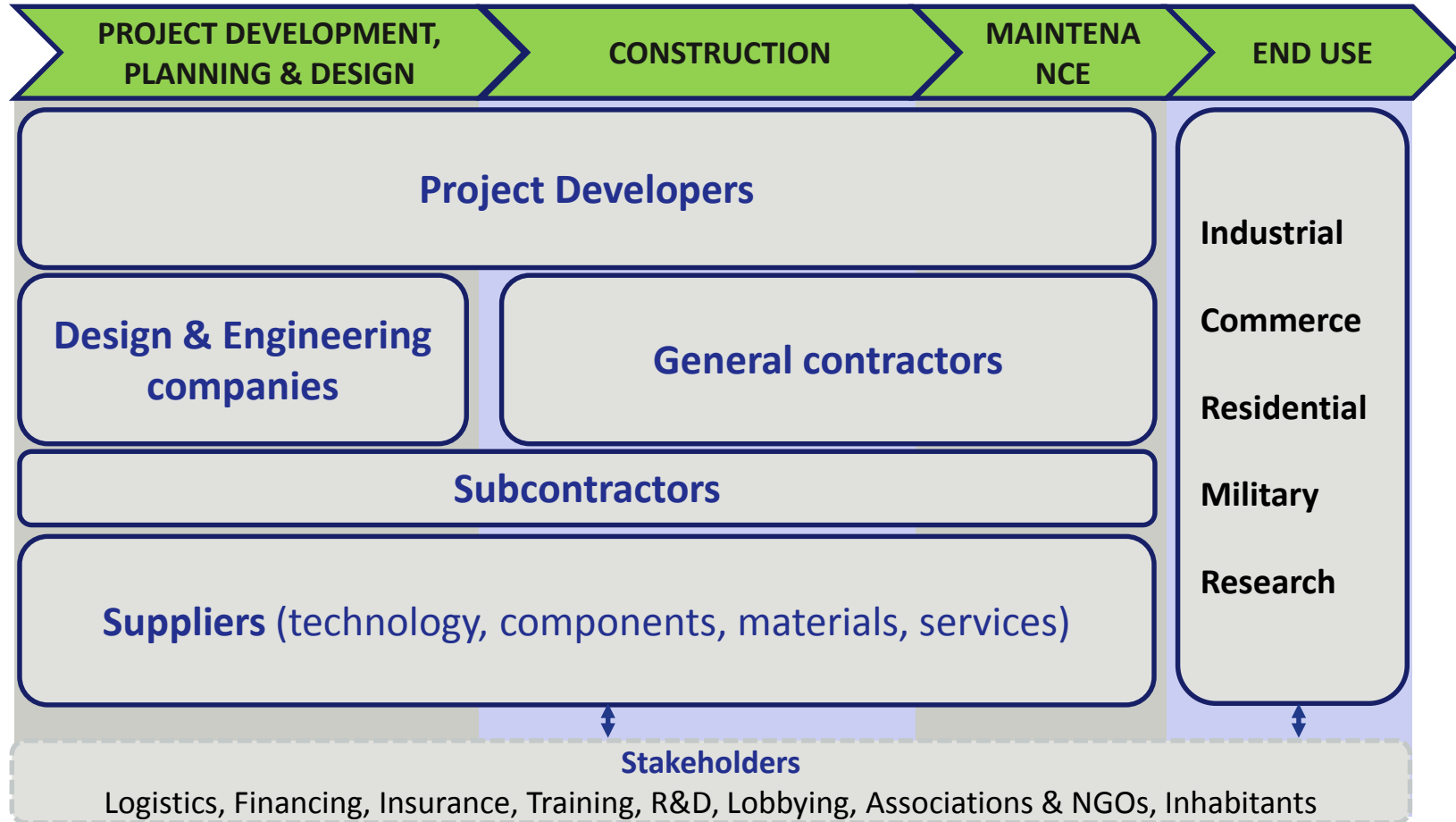


Sources: CEE 2006, Subsea 2013, NPD 2013

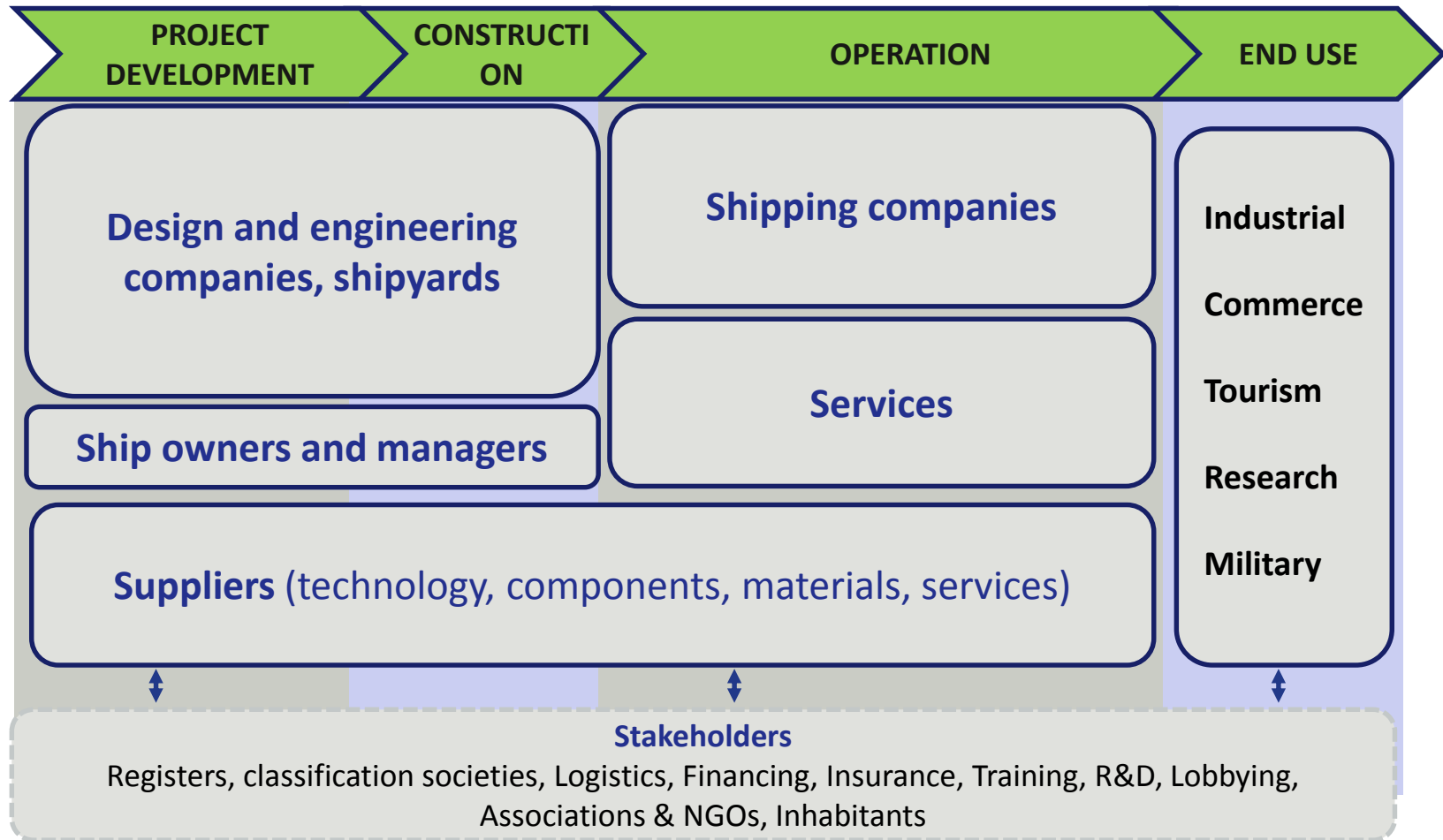
# Mining: Value chain and key sectors



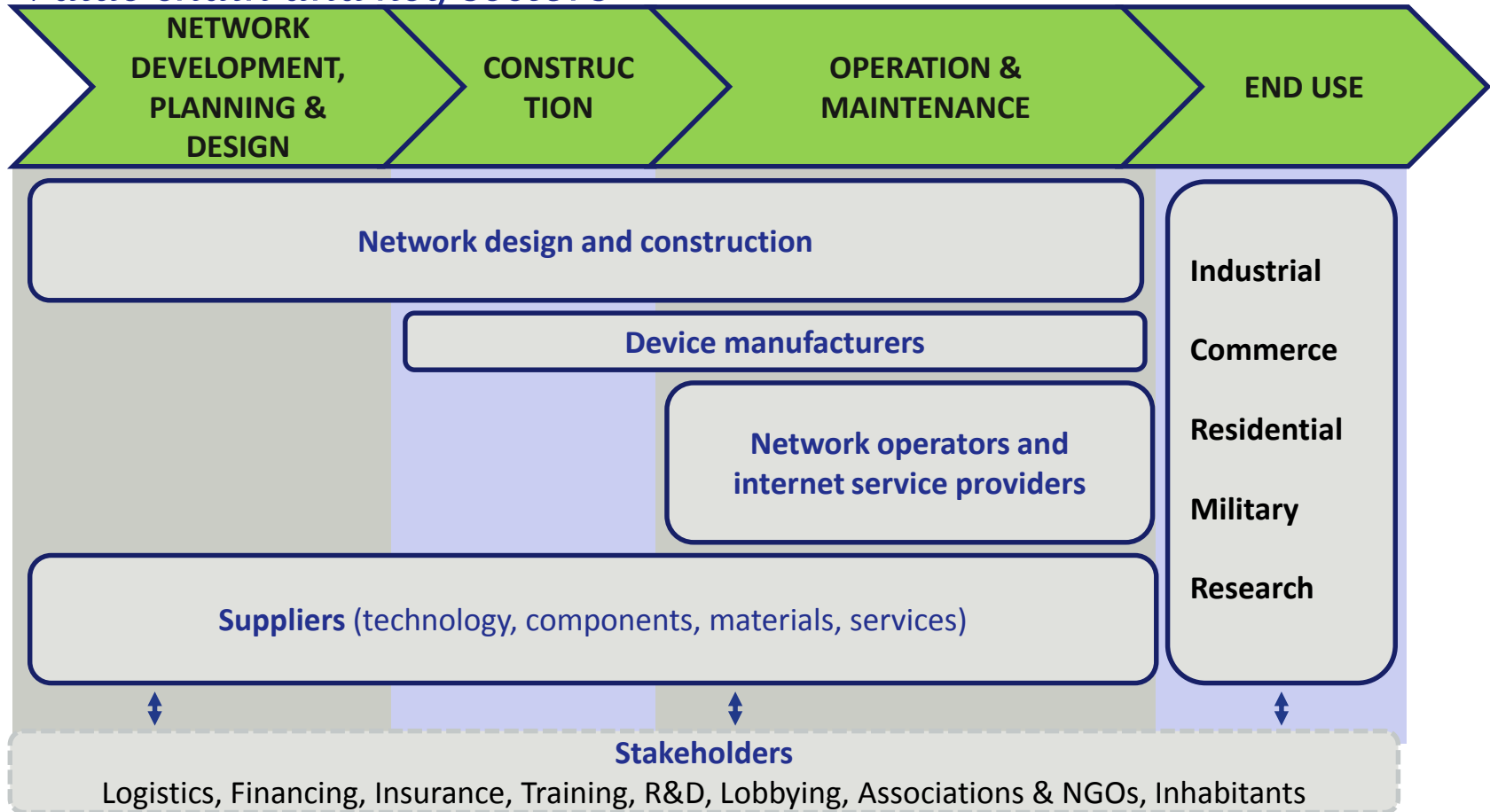
# Construction and infrastructure development: Value chain and key sectors



# Maritime transport: Value chain and key sectors

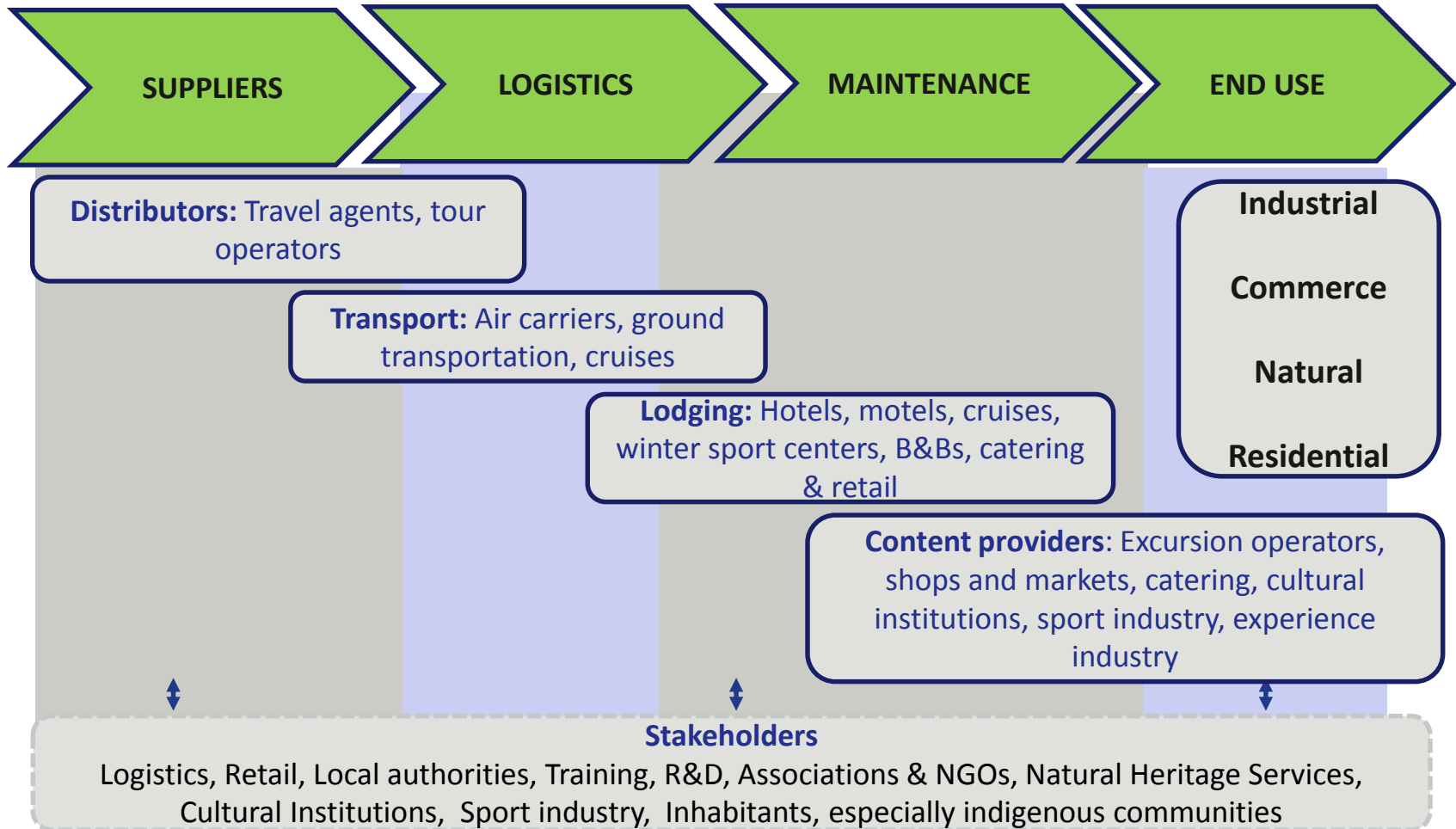


# Telecommunications and information services: Value chain and key sectors





# Tourism: Value chain and key sectors



# Solutions provided by the Finnish Maritime Industry and Team Arctic Finland







**1.**  
Marine logistics, fleet and special vessels



**2.**  
Offshore systems and solutions



**3.**  
Industrial port infrastructure and facilities



**4.**  
Offshore wind modules and facilities

## *Paris climate agreement set a negative atmosphere for fossils*

- The Arctic operating environment presents many challenges to companies – not only the insufficient infrastructure, but political power play, a rapidly changing natural environment, relatively strict conservation requirements and lack of research on e.g. permafrost
- Former US President Barack Obama and Canada PM Justin Trudeau designated the bulk of US and Canada owned waters in the Arctic Ocean as indefinitely off limits for Arctic Drilling. Current US President Donald Trump unlikely to be able to reverse Obama’s plan, at least without Congress’s help.
- Offshore renewables are gaining momentum as oil giants Statoil and Shell start shift towards wind power. Moreover, the US has granted first permits for offshore windfarms in their East Coast.
- Meanwhile, Norway awarded Arctic exploration licenses to 13 oil companies in May 2016 with additional exploration licenses to 29 companies in January 2017, including in a hitherto unexplored part of the Barents Sea, provoking condemnation from environmental groups.
- However the lack of infrastructure and long distances affect the “time-to-market” from extraction to sales, which increases costs.

## *Recent developments have decelerated the “cold” rush*

- The majority of oil, gas and mineral resources are located within Exclusive Economic Zones of coastal states – ongoing disagreements are unlikely to have a major impact.
- The narrative of Arctic boom was to some extent exaggerated and dramatized (e.g. erecting a Russian flag in the seabed of the North Pole), in reality actions have not been as aggressive. However, since 2015, Russia has opened six new military bases in their Arctic zone, e.g. in Kara Sea, Laptev Sea in the Western Arctic.
- Although the Northern sea route is opening, the process takes time and ice-conditions change from year to another. Also lack of infrastructure and the unpredictability of Russian foreign policy influences the use of the North Passage (Crimea crisis, reinforcement of Russia’s Northern armies). Furthermore the Northwest passage is much shallower than the Suez canal, thereby making it inaccessible for some vessels.
- According to a recent UK study, this breathing space is a good opportunity to enhance the Arctic rules and standards (House of the Lords 2015)

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