Department for Transport

Maritime 2050
Call for Evidence

Navigating the future

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Foreword

Secretary of State for Transport

The Rt. Hon. Chris Grayling MP

The future of UK maritime is an exciting one. A future full of opportunities that we can grasp if we are ambitious in our vision, if we are prepared for change and if we are bold in taking the decisions that will ultimately shape the sector's long-term success.

We need to think strategically and ask ourselves what we need to change now to ensure we have a world-class maritime sector in the future.

I said when I launched Maritime 2050 in February that this must be a strategy for the whole industry, one which looks ahead, not just to the coming years but into the second half of the 21st century.

Maritime 2050 will be a blueprint to harness the UK's strengths, understand how we can reach our full potential and demonstrate our ambition to continue to be a world maritime leader. It is the opportunity for us to position the industry to meet the challenges ahead and create a sustainable long-term future for UK maritime.

We must, and will, challenge ourselves to think differently and radically. We will, of course, look to those of you working within the sector - or who are directly linked to it as, for example, professional advisors or through research and development - to help us do that. I also want to cast our net wider. We need to take into account the views of those of you who rely on the maritime sector for success in your own businesses that need ships and ports to keep your products moving efficiently and productively.

This call for evidence will provide a framework for engagement and I encourage you to take this opportunity to influence how we approach maritime in the future.

Secretary of State for Transport,
The Rt. Hon. Chris Grayling MP

1. Introduction and summary

1.1 Maritime is crucial to the United Kingdom. The industry plays the key role in enabling international trade in goods, and makes important contributions to the economy in its own right. Its role will be fundamental as we forge a UK that is both forward-thinking and outward-looking, so developing a new strategy to navigate the future is essential.

1.2 The UK has always been dependent on the sea for its prosperity. Around 95% of British imports and exports of goods are moved by sea[1], and our heritage and our traditions through the centuries have made us the home for all forms of maritime business, whether for trade or to utilise the sea's resources. Over the years we have built a strong and attractive business hub with extensive expertise and experience in numerous places across the UK and attracting many investors and entrepreneurs. This thriving sector contributes £14.5 billion to the UK economy, and directly supports an estimated 186,000 jobs[2].

Why a strategy now?

1.3 For as long as the UK has been a great trading nation, the maritime industry has been the jewel in its crown. Despite the many challenges we have faced, **the UK remains in the front rank of leading maritime nations**. The 21st century is opening up new horizons for trade and global interconnectedness; our industry has the opportunity to be a world leader, to continue to enrich the UK as it meets the challenges of the years ahead and to reinforce its competitive offer to the rest of the world.

1.4 To take full advantage of these circumstances, and **to ensure we remain on the front-foot on the global maritime stage, a long-term strategy is essential**. As a sector we need to create a shared vision and aims. Only when government, industry and customers pool our expertise together will we be able to successfully navigate the journey to 2050 and beyond.

1.5 A long range strategy will not be straightforward, but we will maximise our chances of success if the work is thorough and radical, and **the partnership between government and the sector is deep and genuine**. This document initiates the first formal part of that process, and poses questions to frame discussion over the coming months. Evidence and views on how the UK maritime sector can respond, and take advantage of, the challenges of the future are necessary to support quality of dialogue we are seeking.

[1] DfT estimate based on DfT (port freight), ORR (rail freight) and CAA (air freight) data for 2016
[2] Maritime UK, Value of the Maritime Sector https://www.maritimeuk.org/value/

1.6 **A failure to act now will leave the UK lagging behind its competitors.** This Call for Evidence asks for your views, centred around six overarching and forward-looking key themes which we believe will shape our future success. If we do not embrace the challenges of disruptive technology, new trading relationships, and long-term environmental and security risks, the UK's status as a leading maritime nation will be under threat. We want to establish clear trajectories against which government and business can plan for the long-term. Completing this work before the end of the year will give us a strong platform as the UK implements its decision to leave the European Union.

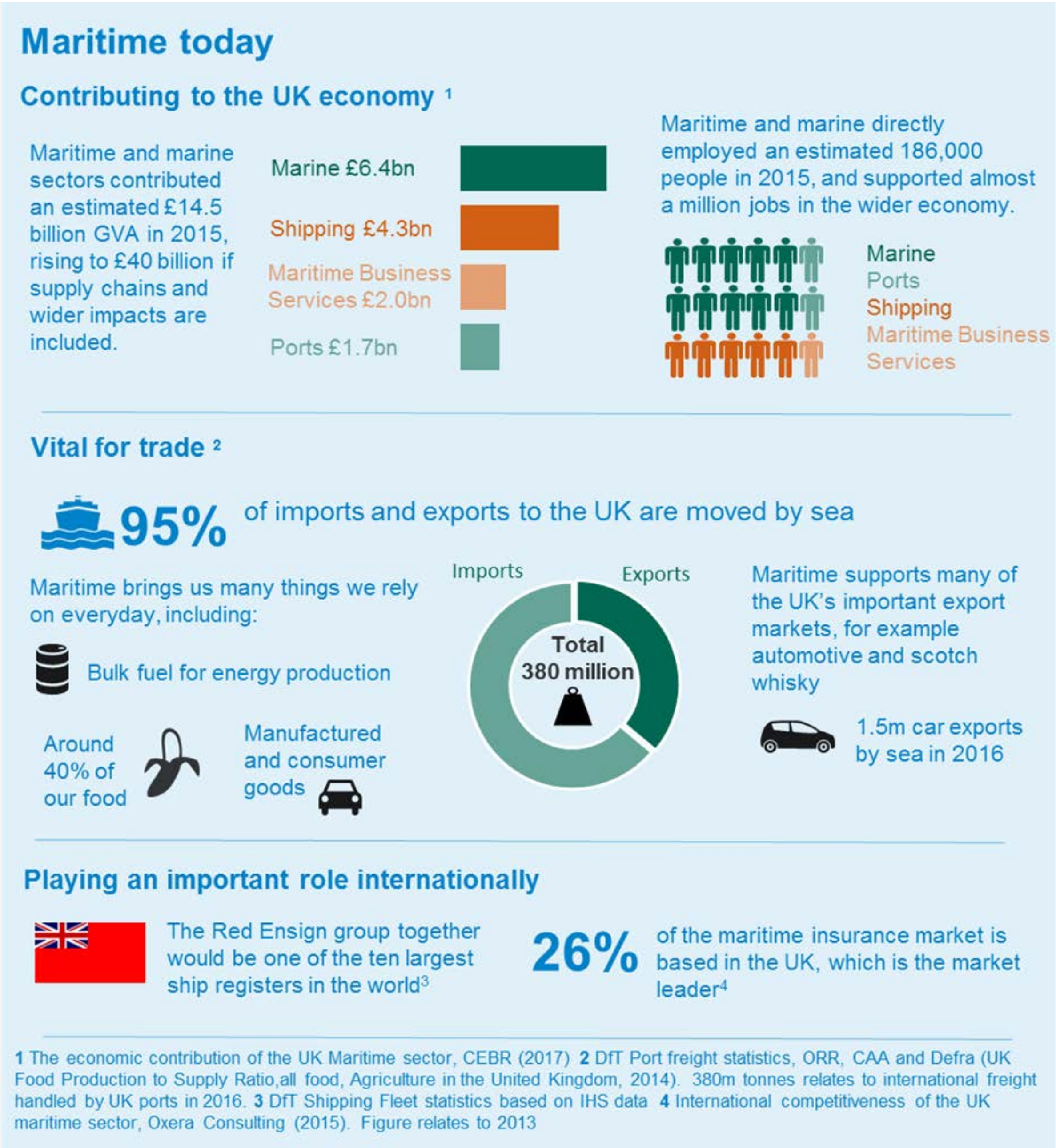
1.7 It is imperative that we come together to revolutionise our great industry. **This is a pivotal moment for the maritime sector in the UK**, and we must continue to adapt as we have throughout this country's long maritime history.

The UK maritime sector

1.8 The UK's maritime sector is at the forefront of the international maritime community. We have a world-leading maritime business services sector which is the go-to place for those seeking high quality legal, insurance (including protection and indemnity), ship-broking and finance services. It has been estimated that the number of arbitrations conducted in London between 2011 and 2015 totalled more than the rest of the world combined[3], just one example of the UK's prowess in maritime services.

[3] London Arbitration, Maritime London, 2016, http://www.maritimelondon.com/wp-content/uploads/2016/09/London-Arbitration-Lo.pdf

1.9 We can add to this offer; a professional ship register and respected flag, an attractive tonnage tax regime, a well-regarded and active presence in international meetings, strong competitive ports, cutting edge and innovative maritime research and development and a quality training programme for maritime professionals that is the envy of the world.



1.10 The UK has a world-class maritime sector, and is a natural home for maritime business, but we must recognise that to maintain and build on this we must do more. We should not rely on our past achievements to keep us relevant on the world stage, and instead be mindful that the UK's advantage could easily slip away. We must embrace new technology and innovation as it becomes available and remain committed to investing in a continually outward-looking, high-quality and leading industry.

Themes and process

1.11 The UK, with the government playing a key leadership role, needs to look at the long-term strategic direction of our maritime sector. We have to answer questions on how the sector can best meet the challenges and opportunities, both global and domestic, which may arise over the next 30 years. We have identified six key themes to guide your thinking: trade, environment, technology, infrastructure, people and security. Our commitment to underlying principles such as safety will of course be drawn out throughout these themes. With your help, we plan to create a long-term UK maritime strategy, Maritime 2050, which will map out the likely shape of the sector over the coming decades and set out a routemap[4] against each theme. Only by taking action will we maintain, and further, the UK's status as a leading maritime nation.

1.12 This Call for Evidence asks questions of you. The main list of questions for this Call is at page 34. Some additional supplementary questions are included to stimulate your thinking at the end of each thematic section. If you want to feed in any specific line of thinking provoked by these questions to this Call for Evidence, please enter your responses at question 11. The process for developing this strategy is not limited to this Call for Evidence. Over the coming months we will also be proactively reaching out to industry through workshops, interviews and further discussions to ensure this strategy is informed by a wide spread of evidence.

Prosperity, Sustainability and Security

1.13 Maritime 2050 will be an important component of a suite of strategy and policy documents that will together establish the framework for marine and maritime matters in the UK. The Government will publish a high-level International Oceans Strategy in the summer, which will outline our commitment to balance trade, environment and security within the context of international frameworks. Beneath that, Maritime 2050 will sit alongside the Government's 'Green Future' 25-year environment plan and the National Security Strategy to frame our strategic objectives. These in turn will be supported by more specific sectoral plans including the National Shipbuilding Strategy, the Port Connectivity Study and various Sector Deals under the Industrial Strategy. Taken together, the Government will present a coherent and ambitious story about the future of the seas, and Maritime 2050 will ensure that the maritime sector has a central place in that.

[4] By routemap we mean a flexible planning document, that illustrates the journey, and course of action, that the industry could take in order to achieve the short-term and longer-term goals of Maritime 2050's strategic vision.

2. The future UK maritime sector

2.1 This strategy aims to maintain the UK's position as a global leader by examining the breadth of the maritime sector and imagining the industry as it needs to be for future generations. Forward planning thirty years into the future requires a commitment to thinking broadly, innovatively, and remaining flexible. It is only by challenging ourselves and being innovative in our thinking that we can move to develop some productive ideas, setting the pathway through to 2050. We need to think collectively about what the UK should do to get there. The starting point is where we are now and determining what makes this a strong basis.

Our maritime heritage

2.2 The UK's maritime journey has spanned many centuries and overcome many challenges which in many ways has defined its place in the world. This heritage has stood the test of time with many global maritime landmarks. The UK's legacy and ongoing influence are embedded within maritime common practice today. Our long history of innovation, and commitment to safety, includes many examples. In the mid-19th century, the British MP Samuel Plimsoll led the call for a load line to indicate safe loading levels for ships. More recently, in 1989, the Marine Accident

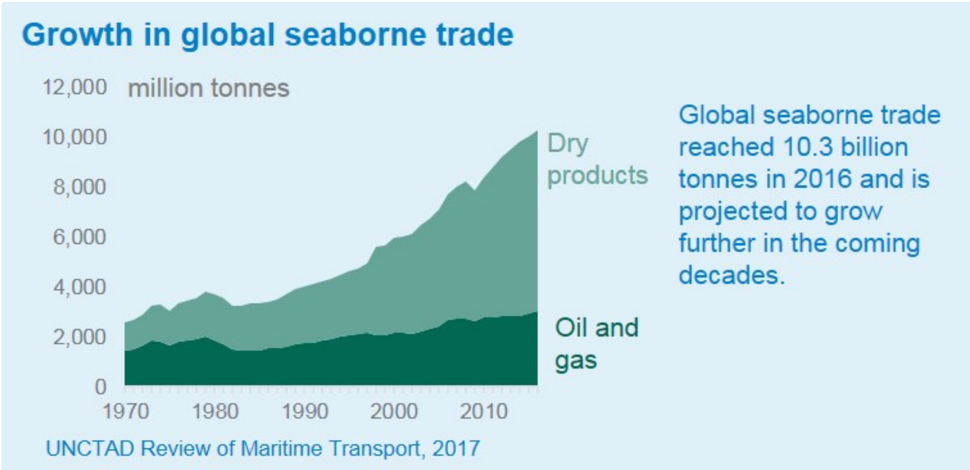
Investigation Branch was established to ensure lessons are learnt from tragedy and similar incidents avoided. In 1999, the creation of the Secretary of State's Representative for Maritime Salvage and Intervention role (commonly known as SOSRep) was an innovative move to reduce the risks arising from accidents at sea that has proved an effective measure to deal with maritime incidents and prevent pollution. This tradition of seeking innovation and maintaining high standards to ensure future safe practice is still current.

Maritime today

2.3 Today, the UK is world-renowned as a global leader in maritime, with centres of excellence from the north of Scotland, all the way down to the south coast of England. From Aberdeen to Plymouth, across to Southampton and Portsmouth and around to Dover, as well as the westward centres of Belfast, Milford Haven and Liverpool, and the eastern hubs of the Humber and Felixstowe, the maritime industry encompasses, and upholds, the economy of the UK. We are also the largest provider of maritime training in the world. The UN's International Maritime Organization is based in London, and brings many people from across the world to carry out their maritime business in the UK. The UK is also host to world leading companies in the shipping world, including Lloyd's Register and the Baltic Exchange.

2.4 One of the UK's strengths is its strong and developing partnership between government and industry. Government has shown its intent to move into the 21st-century with strong leadership by establishing the Ministerial Working Group. This group with industry input, now considers challenges, identifies solutions and provides direction on crosscutting maritime issues. The Maritime and Coastguard Agency has also delivered a more customer focussed UK ship register fit for the future following requests from industry. Equally, industry has proved that it can work through Maritime UK to co-ordinate disparate views and drive forward solutions that benefit the whole of the sector and the UK brand.

2.5 Despite these strengths, the UK is facing growing competition from other maritime hubs around the world, such as Singapore, Hong Kong and Dubai, as well as rapidly growing flag states. Other nations are cementing their reputations by promoting well-regarded maritime agendas. By implementing training of the highest standard, many nations now offer the global market officers and ratings who are valued worldwide, a useful resource as trade increases. Although still a leader in this area, the consequence of this competition is that the UK's dominance is being slowly eroded.



2.6 The sector has changed almost beyond recognition over the past 50 years. Perhaps the biggest change in recent decades has been the rise of containers as a means of transporting goods more cheaply. This has led to a dramatic reduction in time for goods to pass through a port as the loading and unloading of ships has become far quicker and more efficient. This has allowed ships to become larger and larger, while still remaining practical. The largest container ships can now carry over 21,000 containers, up from around 9,000 at the turn of the millennium. Global containerised trade has increased from just over 40 million twenty-foot equivalent units (TEUs) in 1996 to 140 million TEUs in 2017[5]. This increasingly globalised world has presented opportunities for rapidly developing export led economies, such as China, to trade on an enormous scale and transform the geography of world trade. In 2016 the UK traded 2.5 million TEUs with China, up from 1.5 million in 2009[6]. China is now the UK's 8th largest export market and the 4th largest source of imports.

2.7 Keeping up with this pace of change has required large investment in new infrastructure around the world. In 2016, having cost $5.4bn to build, the expanded Panama Canal opened, tripling the size of ships that can use the canal. This has contributed to knock on effects at ports, which have since invested in larger facilities to accommodate the larger ships. China's One Belt One Road initiative[7] aims to upgrade ports and other infrastructure around the world with a reported $900bn of planned investments. In future the UK will need to anticipate and respond to global changes in sea shipping routes and radical innovative investments such as these. Maritime 2050 aims to explore these future trends so that the UK remains at the forefront of innovation and change.

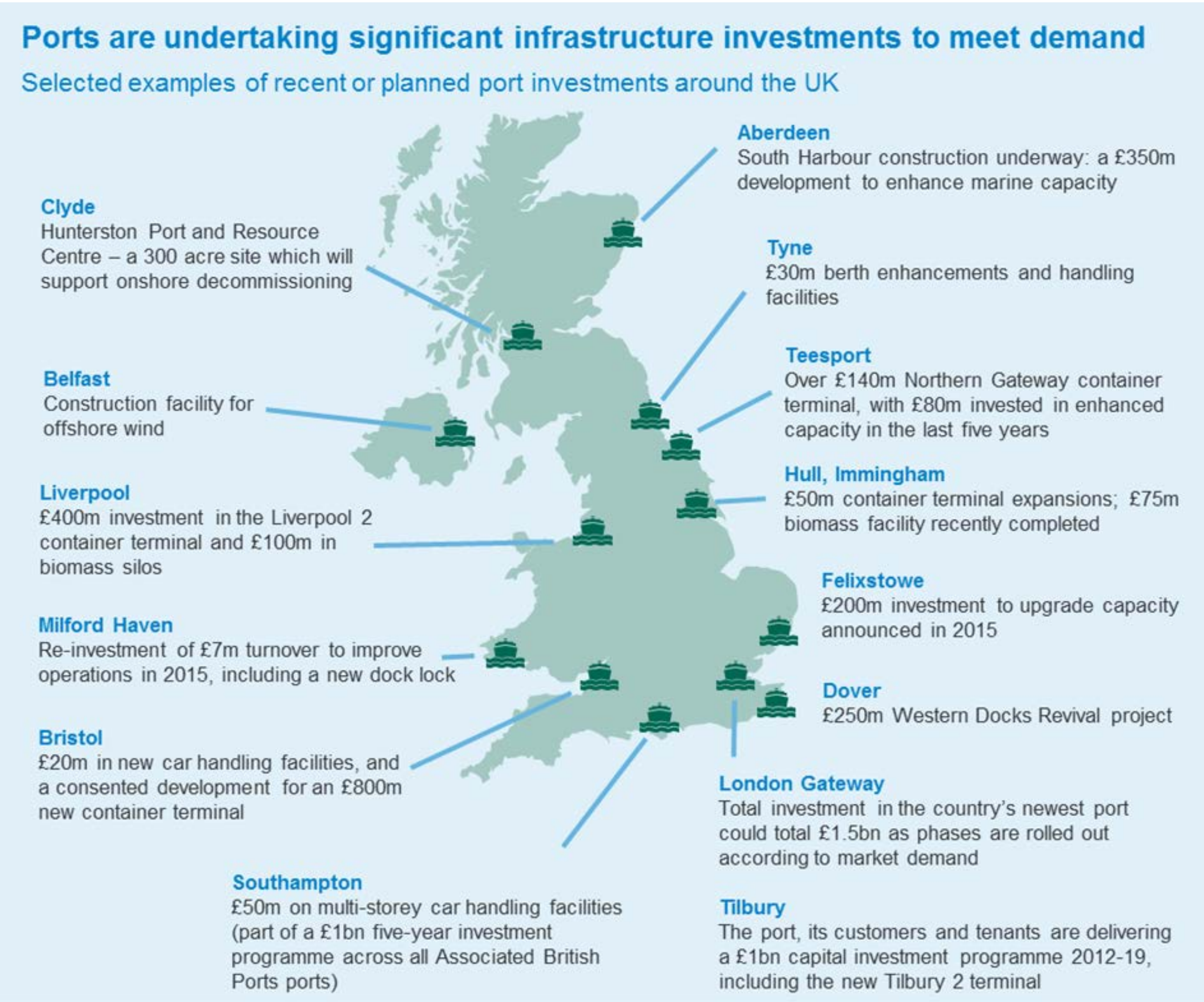
2.8 Closer to home, the UK maritime sector has also been responding to industry-wide innovation and change:

a. With the ability to accommodate Ultra Large Container Ships, the London Gateway container terminal was opened in 2013 at an estimated cost of £1.5bn.
b. The UK's desire to decarbonise the energy industry over the last 15 years and into the future has changed the commodities passing through ports. 12 million tonnes of coal passed through UK ports in 2016, a 79% reduction on 2006, while crude oil port traffic fell by 39% over the same period[8]. In addition, increased used of biomass as a source of energy presents an opportunity for ports to change their infrastructure and accommodate this growth market. For example, the Port of Immingham, originally a coal dock, now boasts the world's largest dedicated biomass handling facility and recently handled the world largest ever single shipment of biomass for the Drax power station.[9]

[5] UNCTAD Review of Maritime Transport 2017, http://unctad.org/en/PublicationsLibrary/rmt2017_en.pdf
[6] DfT Maritime Port Freight Statistics 2016 (revised) – Table PORT0207
[7] A development strategy proposed by China that focuses on connectivity and cooperation between countries, and includes the ocean-going Maritime Silk Road
[8] DfT Maritime Port Freight Statistics 2016 (revised) – Table PORT0104
[9] ABP, world's largest single shipment of biomass discharged at port of Immingham http://www.abports.co.uk/newsarticle/216/

c. The number of UK cruise passengers was nearly nine times greater in 2016 than in 1996[10]. Southampton is the leading port in Europe for cruise passengers[11] and completed a multi-million pound refurbishment of its Mayflower cruise terminal in 2015.

d. The number of motor vehicles imported or exported through UK ports increased to a record high of 4.3 million vehicles in 2016[12]. The UK ports industry has been investing in specialised facilities and equipment to speed up loading and unloading vehicles onto car carrier ships and improving port efficiency.



[10] DfT Sea Passenger Statistics 2016 (final) – page 7
[11] Eurostat, Popularity of sea cruises in the EU
[12] DfT Port Freight Statistics 2016 - Table PORT0212

2.9 These examples from around the world illustrate how the global economy can fluctuate. This is also demonstrated by how demand for goods or energy fuels has changed and will continue to change in the future. World trade routes and various maritime actors continually adapt to match both global, and UK trading patterns. Consequently, UK infrastructure - including ports and freight service - needs to demonstrate flexibility in order to meet demand, which historically it has managed with considerable success.

The future of UK maritime

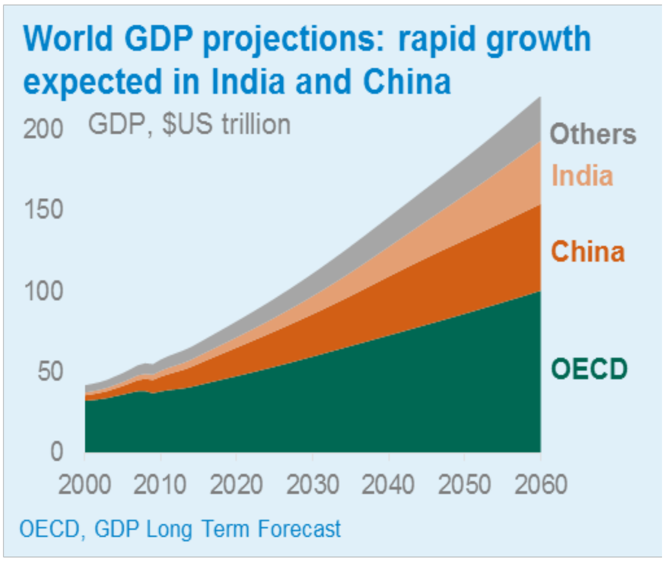
2.10 In the future, one of the only things we can be certain of is that the world will continue to change - economically, politically, sociologically, technologically, legally and environmentally. The UK must recognise the challenges this poses and be prepared to seize new opportunities. We must harness our talent and expertise to meet the demands that will be required of any nation seeking to be at the forefront of maritime development in the long-term.

2.11 As a global industry, maritime needs to adapt to global trends, including those in technology, trade and population, and energy and climate change.

Technology

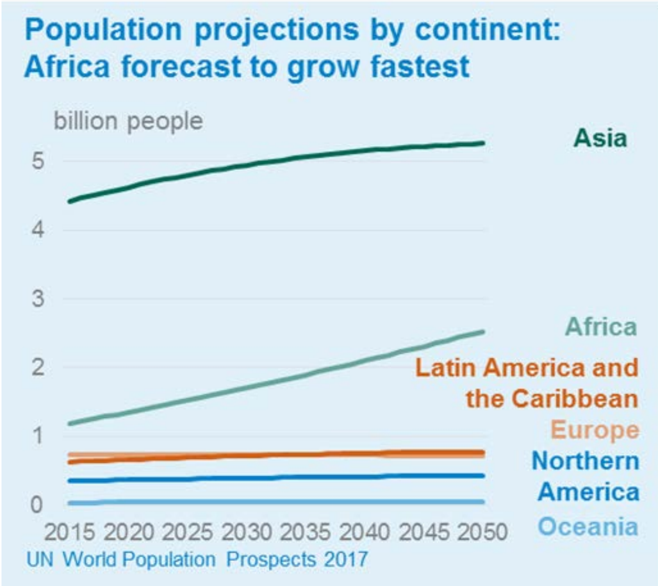
2.12 The maritime sector has seen significant technological progress over the past few decades, with a range of new safety, efficiency and information systems being introduced on ships and in ports around the world. By 2050 the sector could look very different and possible outcomes could include:

- Increased digitalisation presents the industry with opportunities to streamline processes and improve its services to customers, but which could also increase its vulnerability to cyber-attacks.
- Additive manufacturing presents new opportunities for marine manufacturers, yet also reduces the need for trade in some goods that would previously have been transported from a factory to the end-user.
- Alternative maritime fuels and propulsion systems transform not only the way that ships look, but also their requirements for refuelling or the way their voyages are planned and their environmental impact.
- Increasingly automated vessels affect maritime operations across the industry in ways that are not yet fully understood. There could be significant opportunities for those who stay ahead of the curve, and the industry must also be prepared for the knock on effects on related sectors like insurance and professional services.



Trade and Population

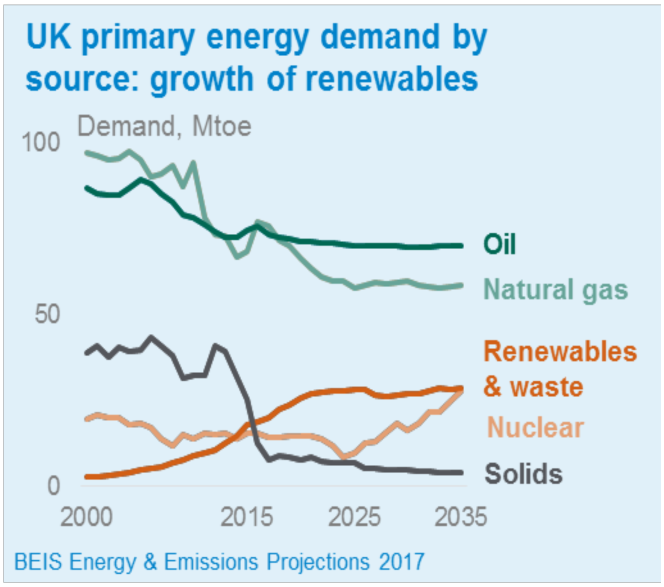
2.13 The UN project that the world population will grow by 2.2 billion people by 2050, with Africa as a whole expected to account for more than half of the increase in world population and Asia accounting for more than a third. As the world population continues to grow, global seaborne trade is projected to grow by 3.2% per year up to 2022[13], a rate that would see global trade doubling every 23 years. Some logistics systems in Africa currently struggle with many current facilities at ports and hinterland infrastructure[14], yet it is projected that port throughput in Africa will need to rise from 265 million tonnes in 2009 to 2 billion tonnes in 2040[15].



2.14 The global shift in economic power from the west to the east is expected to continue. At the turn of the millennium, OECD countries accounted for over 75% of global GDP; by 2050 that is projected to have fallen below 50%, while China's economy will make up 25% of global output, up from 8% in 2000.

Energy and Climate Change

2.15 UK demand for gas, and to a lesser extent, oil, is expected to decline over the coming decades, while use of renewables, waste energy and nuclear power is expected to increase. This will affect the maritime sector, which plays a key role in transporting oil and gas, yet will need to adapt to an evolving market. There is already growing demand for maritime services in support of offshore wind installations, and we may see the energy sector shift from demanding oil and LNG (liquefied natural gas) tanker operations to requiring workboats to support construction and maintenance of offshore energy installations. The maritime sector itself will also need to reduce its emissions, with new international standards on maritime fuel being implemented by the end of this decade.



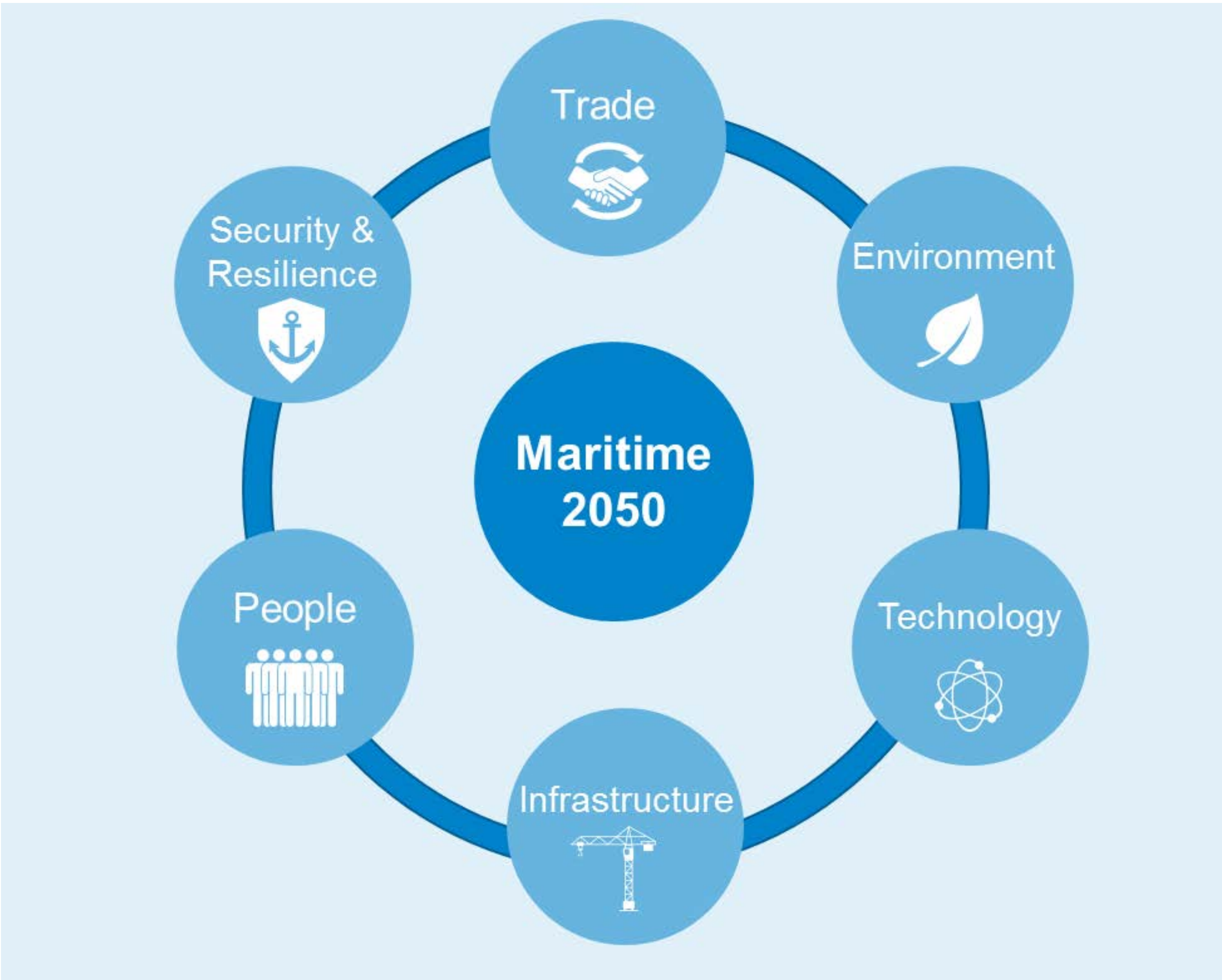
2.16 Despite the ongoing decarbonisation of energy in the UK we must also be prepared for the effects of climate change, particularly on vulnerable coastal areas. Rising sea levels, coastal erosion and increasingly intense weather events have the potential to

[13] UNCTAD, Review of Maritime Transport 2017
[14] UN, World Population Prospects, 2017 Revision
[15] http://repository.uneca.org/bitstream/handle/10855/21046/Bib-19598.pdf?sequence=1

disrupt both port operations and coastal communities. The maritime sector will have to respond quickly to these changes, and Maritime 2050 can help to set a vision for a holistic response, to prepare the UK for the flexibilities of a more volatile environment, and ensure we remain a world-leader well into the future.

3. Themes

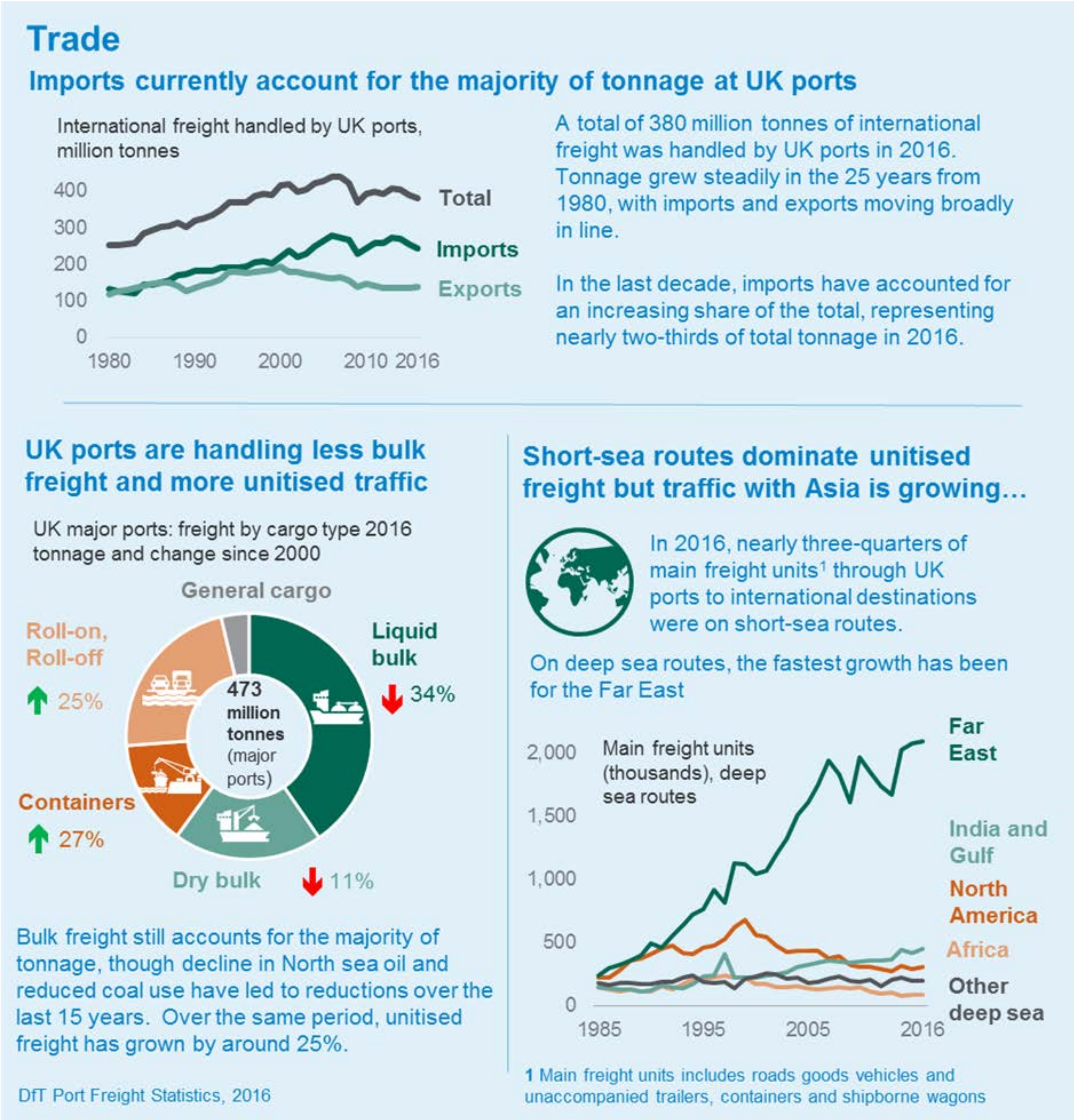
3.1 We have identified six key interconnecting themes that are already at the forefront of many leading industry initiatives and discussions about where the UK will need to be and what the future will look like through to 2050. The Maritime 2050 discussion will also shape how the UK, both government and industry, can take the right steps to achieve the aim of securing the future of the UK maritime sector.



Trade

3.2 International trade and investment is a force for good - generating wealth, creating jobs, increasing consumer choice, and improving efficiency both for the UK and our key international maritime partners. We are determined to continue to demonstrate we are open for business and to build an even more global, outward-looking UK.

3.3 We are confident that the UK can continue to expand its trading links after our departure from the EU and that the maritime sector will thrive and strengthen, as it harnesses the opportunities that exit brings. It is now that, as we prepare to leave the EU, the UK has to grasp the opportunity to shape a new and ambitious maritime trade policy which supports our businesses to trade across the globe.



Future

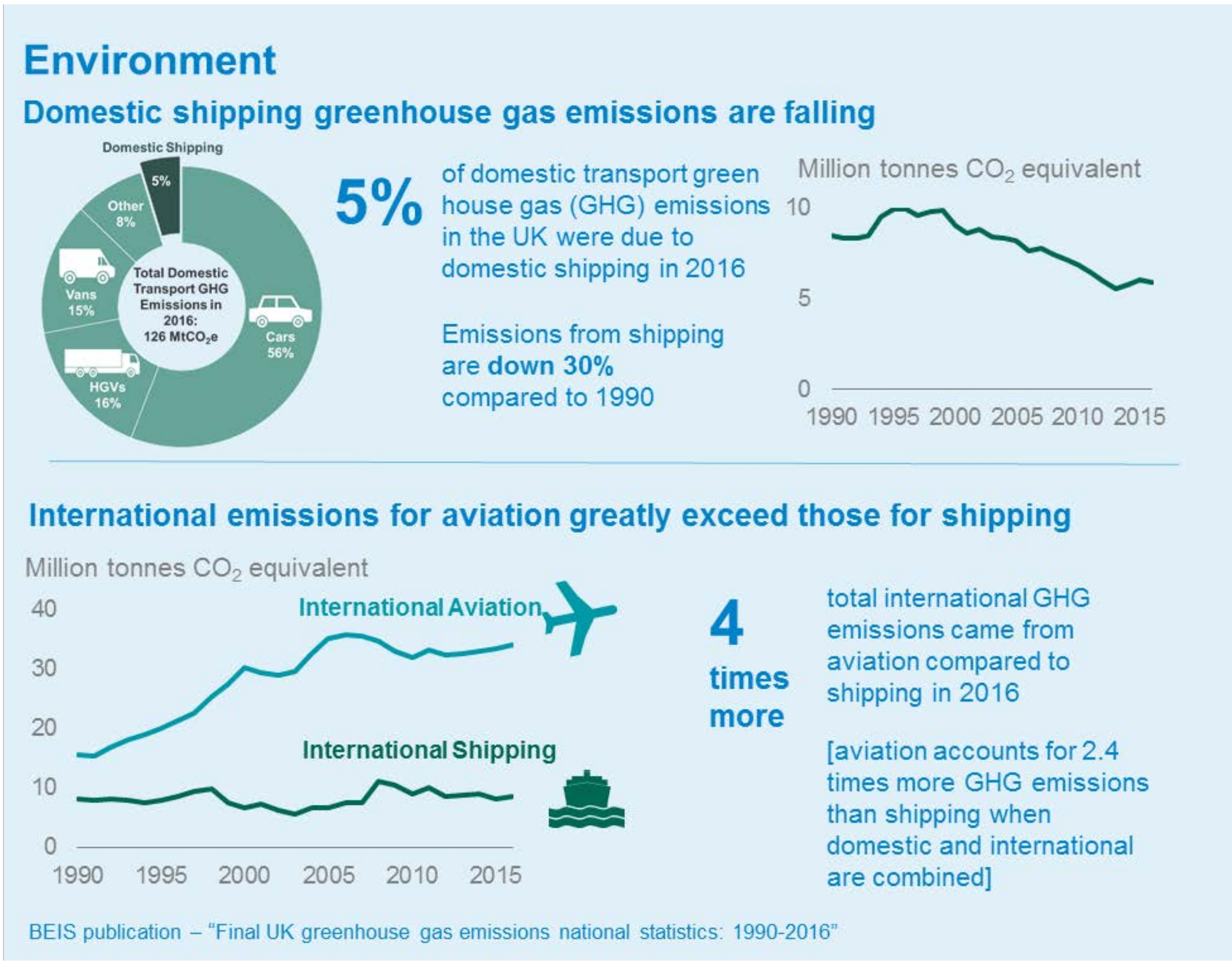
3.4 Looking ahead toward 2050, maritime trade will be inextricably linked to technological, environmental, social, and economic developments at home in the UK and throughout the world. These developments will determine not only what maritime goods and services are traded internationally, but also how and where this trade takes place. Advances in technology will almost certainly lead to increased automation of shipping and port operations and will likely change the types of goods and services which are traded internationally. Consumer demand in the UK and overseas will influence the volume of goods transiting our ports, and the composition of those goods. Global economic, political, and security developments will also influence where trade takes place. As we look toward 2050 it is clear that there will be many changes in the way we trade and, crucially, many opportunities to influence those changes to the benefit of the UK maritime sector.

Some questions to prompt your thinking:

- **What factor/s currently affect the UK's international trade in goods and services by sea? How, if at all will this change by 2050?**
- **What factors will affect the UK's export of maritime services over the period to 2050?**
- **What factors will affect the UK's export of goods over the period to 2050?**
- **What factors will affect the UK's export of maritime goods over the period to 2050?**
- **What factors will influence UK port traffic levels over the period to 2050?**
- **What might a strategy need to contain to address these issues?**

Environment

3.5 The ocean is a fragile and vulnerable ecosystem as well as an important resource for, among other things, transport, energy and leisure. With the numerous acute pressures placed upon it, it is important to continue to press hard towards making maritime activity sustainable. Our coastlines and coastal communities are also vulnerable to environmental impacts from shipping, such as litter and noise, and emissions from ships have the potential to harm human health and the environment inland. The UK wants to take a holistic approach to effectively tackling environmental challenges within the maritime world at both international and domestic levels.



3.6 On the international stage the UK has played a key role in developing environmental regulations in Europe and in the International Maritime Organization (IMO) negotiations to tackle, among other things, pollutant emissions, the disposal of waste at sea, the poor provision of port waste reception facilities and the treatment of ballast water to minimise the introduction of non-native invasive species.

3.7 We firmly believe that international shipping must also play its part in global efforts to reduce greenhouse gases in line with the Paris Agreement on Climate Change under the United Nations Framework Convention on Climate Change. We are currently pushing for an ambitious and credible strategy to reduce greenhouse gases from shipping at the IMO and will continue to press for international action that will enable the uptake of new low and zero emission technologies.

3.8 At a domestic level, recognising that pollutant emissions from ships and port activity are a significant contributor to national emissions, we are focussing on what more can be done to further reduce pollutant emissions from ships in UK waters in order to lessen the environmental impact. Improving air quality and protecting public health is a key Government policy priority and we are considering how the maritime sector can contribute to the Government's pollution targets for 2020 and 2030.

Future

3.9 Government and industry have duties as to how they safeguard the world's natural environment and the UK is already working to effect changes in use and behaviour, although this may take time. In the next 30 years, social pressure and new international environmental agreements will drive further change in behaviours, adoption of new technologies and alternative fuels. Further controls will include the implementation of a global sulphur cap in 2020, and the application of NOx emissions control areas to new ships operating in the North Sea and English Channel in 2021. Furthermore, in 2018 the IMO will adopt an initial strategy to reduce greenhouse gases, which will set a framework for the future agreement of specific emissions reduction measures. Environmental issues will be continue to be influenced by international developments, including the opening up of polar sea-routes created by climate change. We want the UK to maintain its leading role as a global initiator in this area even if it means setting stringent targets. As we look into the future then what does this mean for the UK? Are we being ambitious enough to set the pace the world needs?

3.10 Environmental concerns, particularly around emissions, are expected to drive significant change in the design, operation and management of ships. The current IMO-led drive for energy efficiency is already having an impact on the sector but the need for low and eventually zero emissions vessels will have a transformational effect on shipping and related services in coming years.

3.11 New technologies and energy sources are already in development, with more work needed to bring them to widespread deployment. These include ‘future fuels’ such as hydrogen, battery and fuel cell systems as well as technologies such as Carbon Capture and Storage (CCS), Flettner rotors and advanced waste heat recovery. Additionally, the demand for highly optimised hull, propeller and rudder forms will grow creating demand for even more innovative thinking in naval architecture. This drive for innovation represents an opportunity for the UK maritime and research sectors to capitalise on an international trend and build on their existing reputations. New technology, design and new fuels are in development but need to be brought into production taking advantage of opportunities and in compliance with international regulations.

Some questions to prompt your thinking:

- **How do the activities of the maritime sector cause and/or contribute towards key environmental impacts?**

- **What developments between now and 2050 might affect the scale of these environmental impacts?**

- **What might a strategy need to contain to counteract or mitigate these impacts?**

- **Which low or zero emission fuels or technologies of the future have the greatest potential for commercial deployment? What barriers might hinder the commercialisation of these and is there a role for Government in mitigating these and ensuring benefits are realised within the UK? Explain why.**

- **How can the UK’s maritime sector position itself to take advantage of these trends? Can the UK be a/the centre of excellence for low/zero emissions shipping?**

- **Should the UK flag be positioned as the flag of choice for low/zero emissions ships? What could be done to make this happen?**

Technology

Driverless autonomous cargo ship concept: Reprinted with the kind permission of Rolls Royce

3.12 New and emerging technologies have the potential to transform the maritime world beyond recognition and bring enormous benefits for the industry and customers alike. The UK holds some advantage as a culture of innovation. It is embedded in our maritime sector, driving us to challenge existing norms, create new solutions using new technology and deliver progress. Yet the pace of innovation is rapid with some countries having taken the initiative by setting up exciting, global maritime projects which are delivering cutting-edge products.

3.13 The government's focus in this area is currently on smart shipping. This emphasis considers how technology and innovation, particularly maritime autonomy and digitalisation, will impact the sector and how government can support these changes.

Future

3.14 The UK needs to look ahead and grasp the demanding opportunities the future presents. Other maritime nations are already forging ahead in this area. Singapore, for instance, is positioning itself as a global maritime "living lab", investing in resources to pilot ideas in a live port environment which is one of the world's busiest container hubs.

3.15 Innovation can be empowering, but we first have to accept the potential of new technologies. Welcoming these as the enablers the maritime sector needs to develop, the UK must then ensure it is well-placed to exploit the opportunities they present. Only with a dynamic and future-focused approach can the UK retain its reputation and status as a global maritime leader. Technological advances will transform the sector and the wider economy, and the UK must be ready to harness this change to its benefit, developing and deploying innovative technologies to ensure a safe and secure maritime world in 2050.

3.16 We are aware that much of the technology for remotely-operated or autonomous shipping exists today. What is needed now is to demonstrate that the technology can be used effectively and economically. This will help generate appetite to move the technology forward and trigger its wider adoption. The long lifetime of ships makes retrofitting of new technology costly and unattractive in a difficult global shipping market. As newer ships are constructed there is greater potential to make use of these technologies from the start.

3.17 It is not just vessels that will change. Across the sector rapid and complex developments will alter the very nature of business, transforming transactions and processes. We already know of the change that digital revolution can bring, and its impact on the maritime industry today. We stand on the brink of a fourth industrial revolution, one which will likely play out over the next few years. Our maritime industry must adapt to capitalise upon the efficiencies this will bring in order to compete in this global sector. The question is - are we ready?

3.18 There are a host of interlocking drivers at play when promoting new technology. These include cost, the necessary skills, safety, and effective operation. Traditional skills shortages could drive smart shipping, as the sector struggles to attract and retain personnel, particularly officers. Smart Shipping technologies will also require new skills, and can foster UK job creation from the conceptual to the operational stages of a vessel's life-cycle. Consequently, it is important to consider the human impact of technological changes in the maritime sector, in particular the future of work. Safety is another potential driver, with great advantages for maritime as autonomous systems could perform ‘dull, dirty, and dangerous’ work, such as inspections or mooring, thereby removing some danger to the safety of human crew.

Some questions to prompt your thinking:

- **What innovative changes (in equipment, structure, processes etc) are likely to arise in the maritime sector between now and 2050?**

- **What challenges and opportunities could arise as a result of these innovations?**

- **In which areas (if any) might existing policies, regulation or legislation risk acting as a barrier to innovation?**

- **What might a strategy need to contain to counteract or mitigate these effects?**

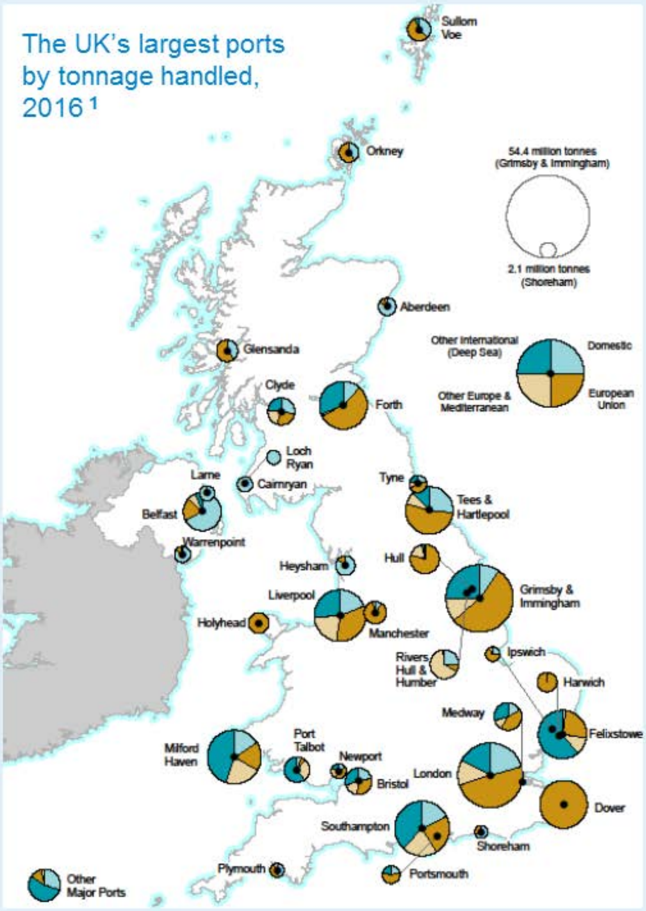
- **What are the short, medium, and long-term measures needed to deliver a programme on innovation and technology?**

- **How can maritime autonomy, blockchain, and other relevant technologies affect supply chains and logistics?**

Infrastructure

3.19 Successful ports are an essential factor in the economic health of the UK. They have invested billions of pounds in modern infrastructure to handle 95% of the freight that either enters or leaves the UK's borders. This commitment in turn ultimately benefits the wider economy. It is also notable that UK ports do so on a fully commercial and competitive basis.

Infrastructure



Over 100 UK ports[2] together currently handle nearly 500 million tonnes of freight each year.

120,000 cargo vessels arrived at UK ports in 2016 [1]

Liquid bulk - of which crude oil in the biggest subgroup - accounts for the majority of tonnage (40%) [1]

In total nearly 14 million freight carrying units (containers, lorries and trailers) were handled by UK ports in 2016 [1]

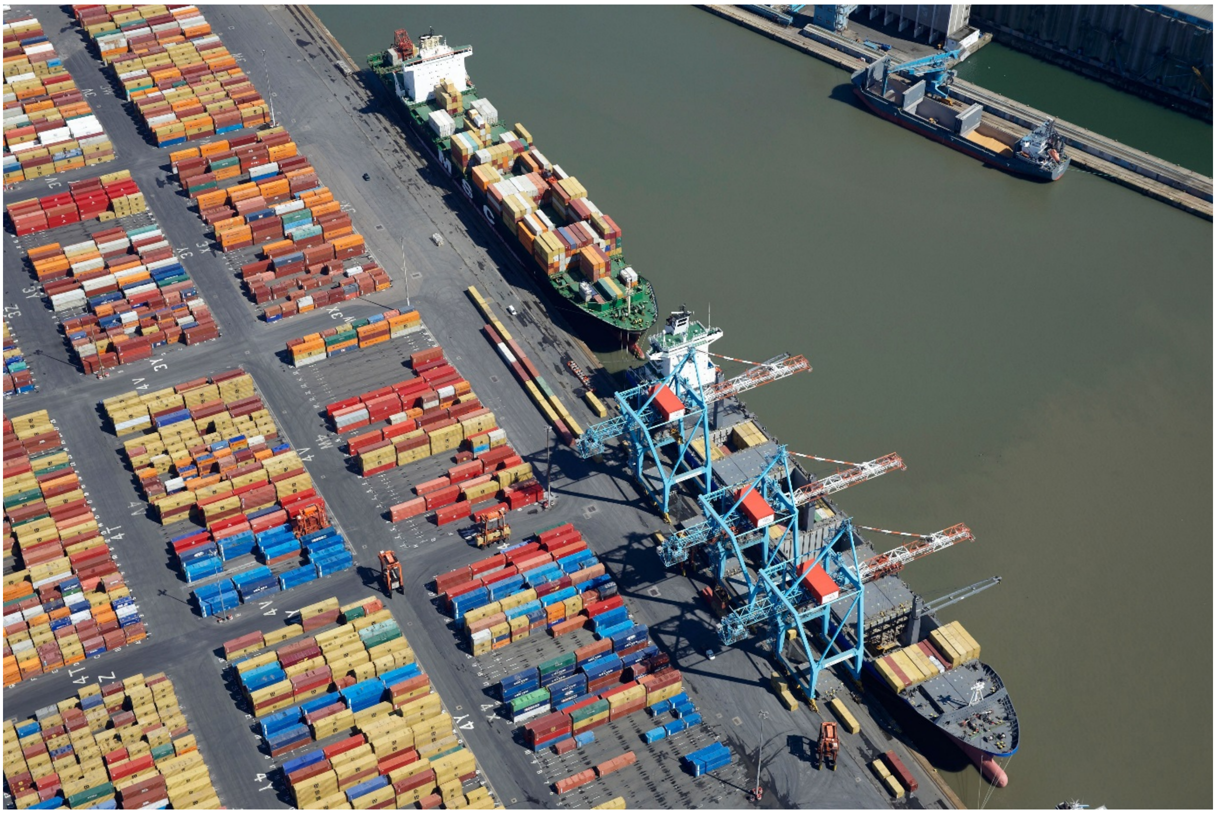
2 million twenty-foot equivalent (TEU) containers arrived at Felixstowe alone, for destinations across the UK [1]

Around 3 million roads goods vehicles travel to Europe from British ports each year[3]. An estimated 7,000 lorries pass through Dover on an average day, making it one of the top EU ports for lorry traffic.

1 DfT Port Freight Statistics, 2016. Map shows ports handling over 2m tonnes of cargo. **2** As defined for statistical reporting purposes 3 DfT Statistics – Roads Goods Vehicles travelling to Europe

3.20 Although ports are the vital conduit for a significant proportion of trade entering and leaving the UK, they are only one part of a wider supply chain. The effectiveness of a port operation, and the movement of freight to and from them, is closely linked to the efficiency of the wider transport infrastructure. The quality of this connectivity touches every household and business and while it is working, it is frequently taken for granted. It is when it goes wrong that headlines are made and public awareness raised.

3.21 The Department has undertaken the Port Connectivity Study to examine whether current port access and connectivity in England is sufficient. This study, developed collaboratively between government and industry aims to ensure the importance of and need for port and freight access is recognised and, where appropriate, factored into government policy and investment processes. This is the initial phase of ongoing work that will be progressed under the Maritime 2050 banner, with the aim to improve access to ports and bring about a more cohesive approach on cross-modal freight topics relevant to ports.



3.22 External factors can impact on the internal development and operation of port infrastructure. Current port policy, as set out in the National Policy Statement for Ports, is to encourage sustainable growth to accommodate increased freight volumes, which in turn contribute to economic growth and prosperity.

3.23 Within this policy framework, ports make commercial decisions about when and where there should be new developments, taking account of market demand and government policy (for example in relation to energy generation). On this basis effective planning and consenting frameworks can facilitate new investment. However, all proposed developments should meet the relevant legal, environmental, social constraints and objectives.

Future

3.24 Ports are likely to continue to invest in infrastructure to meet changes in:

- the volume of demand and
- the mix of goods being exported and imported.

3.25 In some ways issues for ports are likely to remain similar to today, in terms of deciding what to invest in and when to invest in light of changing patterns of demand for imports and exports, reflecting wider economic factors as well as changes to shipping vessels and services. These factors are generally outside of ports' direct control.

3.26 Ports will also continue to require access to commercial funding to allow them to finance significant long-term investments. If, for example, a port wishes to provide access to the largest container vessels or indeed to accommodate increased traffic it will need to provide enhanced facilities at the quay side in terms of equipment and may also need to deepen and possibly widen shipping channels and berths.

3.27 Like any business in the UK, ports will have to consider how they can continue to maximise all new opportunities as well as the tools and sources of either support, innovation or capital that make these possible. This includes technological changes in the maritime industry as well as those in connected industries. Ports are part of global and domestic supply chains, so where there are developments in those supply chains, then it is likely that ports will need to adapt to remain an effective part of the chain. Advances in information technology such as blockchain, big data, autonomy, and how these will connect sectors and companies could make huge differences to the way business competes to make itself more efficient and cost effective.

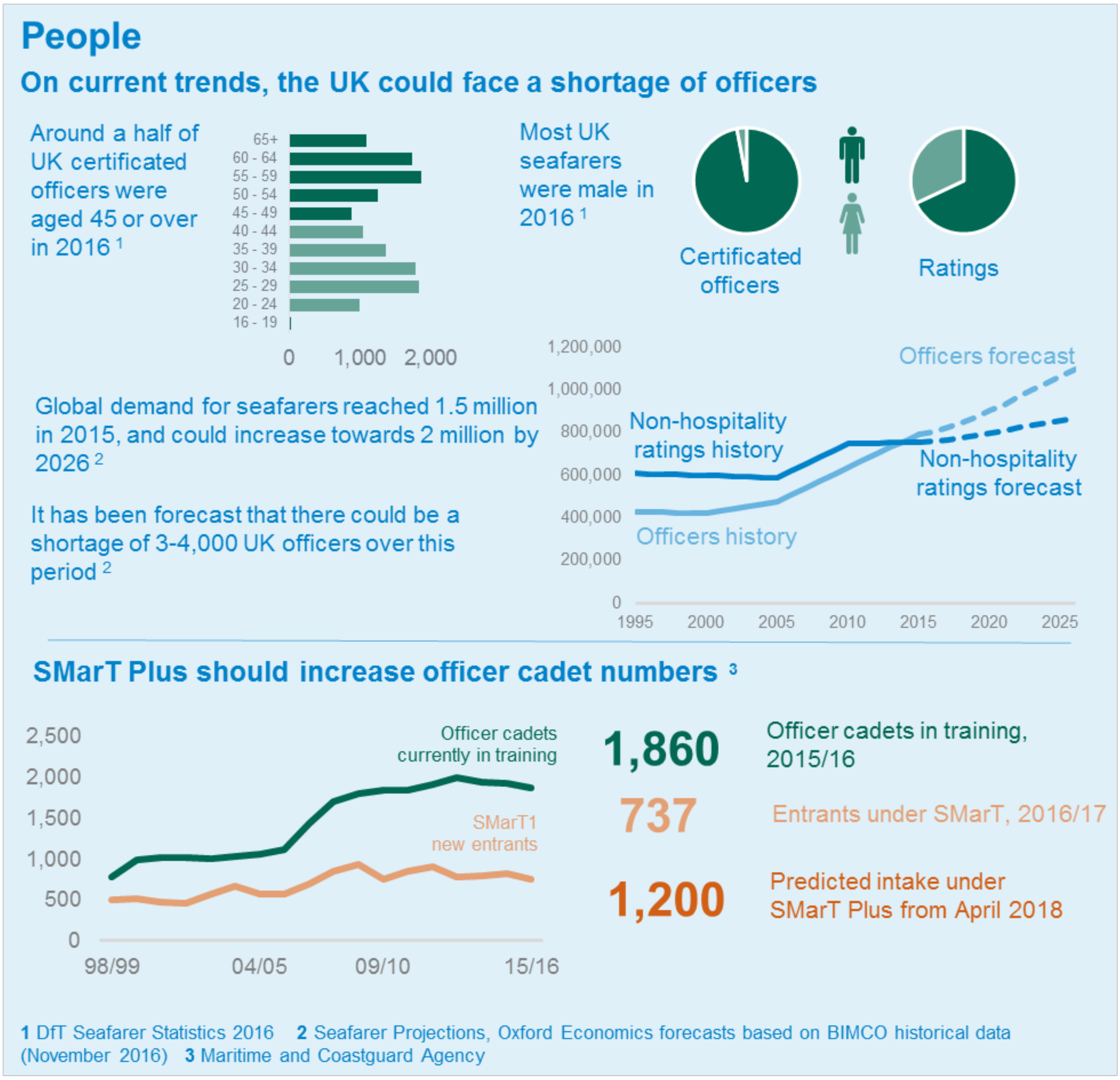
3.28 There may also be wider strategic trade issues about the location of certain ports in the event of major changes in trade flows, for example as a result of EU exit. This could result in a need to integrate more closely with wider international trade systems in order to ensure that UK ports continue to meet the needs of the global market. Similarly changes in trade patterns (e.g. if more deep sea services choose to dock in Europe, and tranship to the UK from there) may result in altered physical connectivity needs. UK ports, supported by the wider national economy will need to ensure they remain an attractive global destination for shipping routes in future.

Some questions to prompt your thinking:

- **What changes might be needed to port infrastructure over the period to 2050?**
- **What is needed to ensure the right planning and regulatory framework is in place to facilitate investment in port infrastructure?**
- **How can a strategy help ports and their associated maritime clusters to continue and strengthen their role in supporting national, regional and local economies?**
- **What are the likely social, economic and environmental changes that could impact on ports?**

People

3.29 The UK's maritime strength is underpinned by its British officers and ratings who are respected and sought after across the world. Our plans must ensure the UK maritime sector has the skilled staff it needs to maintain our position as a leading maritime nation. The importance of this has been emphasised through the government commitment to creating a world-class maritime training workforce for today and the future. That is why seafarer training is supported through SMarT and the recently announced SMarT Plus, which increases funding for training cadets from £15m to £30m.



3.30 Government and industry are also providing a fresh impetus to feed into the maritime apprenticeships development programme which will provide a wider and highly qualified maritime skills base at sea and on shore for the UK. Along with the wide range of skills required for harbourmasters, pilots, ports technicians and ports operations, there is a need for lawyers, and financial experts in shipping companies and brokering firms. Further career opportunities in academia and the marine industries are also available and can only increase as technology advances. A commitment to learning is therefore necessary across this global industry both from those who run it as well as those who work within it. An example of another approach comes from the Netherlands which has introduced the principle of ‘lifelong learning’ to the Dutch maritime cluster, recognising the importance of permanent vocational training and retraining opportunities in modern IT systems to retain a skilled workforce.

3.31 There is still work to be done. We are keen to see more people at all levels entering the industry and being trained to the highest standards. Too long maritime has been male dominated. So how can this diverse and interesting sector be made more attractive to women? We are driving increased diversity in the maritime workforce and the Women in Maritime Taskforce has been set up to make recommendations with the aim of increasing the number of women working in the maritime sector. We also recognise the importance of trained seafarers in supporting the wider industry when returning to shore-based careers and we are using campaigns such as the Year of Engineering to raise awareness of career opportunities across the maritime sector.

Calmac apprentices: Reprinted with the kind permission of Calmac Ferries

3.32 The welfare and wellbeing of our people must be of topmost concern as they are one of our most valuable resources. As a result we are currently working in a number of employment areas that will improve the working conditions and reward of personnel. Among these are actions to:

- extend the National Minimum Wage for seafarers in territorial waters and one port voyages;
- deliver greater certification and recognition of other countries training certificates.
- provide easier access to visas / ID documents for seafarers
- extend international agreements on social welfare and protection to seafarers and fishermen
- continue to be at the forefront globally of tackling modern day slavery issues, working with relevant bodies to ensure that going forwards there are no instances of such practices in British waters and worldwide.
- implement the seafarers' directive by amending employment legislation to give seafarers same protection as employees on land (TUPE, redundancy, insolvency, information on consultation, EU works council).

3.33 There is a responsibility to see employment and welfare walk hand in hand throughout the sector. Historically the UK has been at the forefront of seafarer welfare rights and has been a key player in the Maritime Labour Convention (MLC). Our aim should be for the actions taken in maritime to be an exemplar to the rest of UK industry.

Future

3.34 There may be some big changes in the skills and expertise needed in the future. Even those entering the current workforce will likely face many changes in how they operate either at sea or on shore. With a move to autonomous shipping particularly, there could be demands not identified at present that are likely to mean changes in the skills profile needed for the industry. It is likely the jobs that are automated will be replaced with higher skilled jobs. Autonomous shipping and the skills set needed will be a key area in the future. In particular the number of electrical engineers and IT staff needed are already increasing in the industry and are likely to continue to increase. This will require even more young people to study STEM subjects to keep pace with need. Keeping the education system and the qualifications up to date and in line with technological change may present a challenge but even now plans should be drafted to meet the need.

3.35 Similarly, addressing the gender balance and attracting and retaining more women in maritime may take enormous effort and drive, but it would pay dividends as it would open up a new resource to maritime and new opportunities for a largely untapped talent field who could deliver so much for the sector.

3.36 Those with particular specific skills could become more prized and retention of personnel in UK companies may become a greater issue as better opportunities present themselves elsewhere. We have therefore to seek ways to retain or even increase sufficient seafarers to serve at officer and rating levels throughout the period 2030-2050.

Some questions to prompt your thinking:

- **How might the skills required in the maritime sector change from now to 2050?**

- **Are there any potential gaps in skills provision in the maritime sector? If so, what are the key area/s that need to be addressed in producing a strategy?**

- **How do we address diversity and attract more talent, particularly women, in the maritime sector?**

- **What changes, if any, will be needed in the provision of education and training to ensure future entrants into the sector are gaining the skills the industry needs up to 2050?**

- **How do we provide the right levels of social care for our seafarers in 2050?**

- **How could the UK influence raising employment conditions across the global maritime sector up to 2050?**

- **With increases in digital technology and the potential development of autonomy, how might this shape employment in the maritime sector?**

Security and Resilience

3.37 The UK plays a strong, positive global role in maritime security. We project our power, influence and values to help shape a secure, prosperous future for the UK and to build wider security, stability and prosperity. The government set out its strategy for this in 2014 in “The UK National Strategy for Maritime Security” (NSMS). This still underpins current maritime security policy across government and is focused primarily on the 2014-19 period but adopting a 20-year outlook where appropriate. The NSMS has five core objectives:

- promoting a secure international maritime domain and upholding international maritime norms;
- developing the maritime governance capacity and capabilities of states in areas of strategic maritime importance;
- protecting the UK, our citizens and our economy by supporting the safety and security of ports and offshore installations and Red Ensign Group (REG) flagged passenger and cargo ships;
- assuring the security of vital maritime trade and energy transportation routes within the UK Marine Area, regionally and internationally; and

- protecting the resources and population of the UK and the overseas territories from illegal and dangerous activity, including serious organised crime and terrorism.

3.38 We are assisted by a comprehensive network of global security partners and we work closely with shipping and port operators to enhance the resilience of the sector to a range of hazards as identified in the National Risk Assessment.

Future

3.39 The NSMS points out that the world is changing rapidly and fundamentally. As a consequence we live in a complex security environment with threats coming from both traditional state and non-state actors. Among the current drivers to our security response are terrorism, geo-political forces, international conventions / regulations, disruption to trade routes, organised crime and conventional and unconventional attacks on shipping and maritime infrastructure.

3.40 Added to these are future shifts in geo-political forces coupled with advances in technology which also present a challenging future security environment that requires agile and innovative solutions. Future drivers may include cyber security, disruption to trade routes, technological developments, developments in international law, relationships and trading patterns and climate change. This changing climate poses a significant challenge to how resilient our maritime sector is.

Some questions to prompt your thinking:

- **What are the potential risks (threat and hazard) to the UK's national and international maritime interests over the period to 2050?**
- **What should a strategy contain to counteract or mitigate risks?**
- **What new safety considerations could arise over the period to 2050?**
- **What should a strategy contain to address these considerations?**
- **What are the potential risks to the end-to-end journeys of the key products and commodities that are imported and exported via UK ports over the period to 2050?**
- **What should a strategy contain to counteract or mitigate these risks?**

4. Call for Evidence questions

About the questions

4.1 This chapter is divided into four sections. The first is an opportunity for you to give us as much information as you wish about yourself and any company or organisation you represent. We are trying to canvas opinion from as wide a base as we can as this will enable us to identify where the main challenges and opportunities are likely to emerge for the maritime sector.

4.2 The second section then forms the main part of the evidence gathering process. It first asks about the aim and objectives and then in a third section specifically asks questions on the themes. While we would like you to answer as many as you can we do appreciate that you may not feel you are in a position to provide meaningful responses to all of them. The sector is extremely broad and we realise that not all questions will apply to everyone.

4.3 The fourth section is more open and wider than the earlier questions we have asked of you. This then is for you to let us know if there are areas you believe would add value to the general discussion or where we are in danger of missing some critical area.

4.4 It should take about 15-20 minutes to complete the questions although if you answer each one it may take longer. Please provide us with any relevant evidence or analysis to support your comments in all sections. The closing date for this call for evidence is 16 May 2018. Please see **Annex A** about how to respond to the Call for Evidence.

Section 1 – About you

Q1. Please tell us in what context you are responding:

a. As an individual
b. As a representative of a business or firm
c. As a representative for a trade body
d. As a representative of an academic or research organisation
e. Other (please specify)

Q2. Please tell us about your area(s) of particular expertise:
Mark all that apply in order of priority, with 1 being the highest/most important

a. Shipping (including shipbroking)
b. Ports and their hinterland
c. Maritime law, insurance or finance
d. Marine engineering and manufacturing
e. Technological development and innovation
f. Maritime education, training and employment
g. Passenger and other customer services
h. Maritime supply chain and connectivity
i. Other (please specify)

Q3. If you are responding on behalf of an organisation please give us an indication of the following:

a. The size of the organisation or if more applicable the number of people or companies you are responding on behalf of.
b. The main business or activity of the organisation
c. The region(s) of the UK in which your activity is predominately based (if you are active across the whole country then please answer 'National', if not based in the UK please let us know in which country you are based)

Section 2 – Building a strategy that works for the UK

4.5 The first step towards building a strategy that works is to have a clear understanding of what the overall aim should be. We suggest the following:

"The UK enhances its areas of strength as a great maritime nation by meeting the challenges of the long-term future and exploiting the opportunities that arise."

Q4. What are your views on this aim?

4.6 To support this aim we have identified three aspirations for the sector as follows:

- To continue to act as the main enabler and facilitator for trade in and out of the UK;
- To continue to significantly contribute in real terms to the UK economy; and
- To be a world leader in contributing to the continued maintenance and further development of a safe secure global maritime environment.

Q5. What are your views on these aspirations? Are there others that the UK needs to take into account?

4.7 The maritime sector is driven by consumer demand and consumption which allows it to adapt its flows and capacity accordingly. The sector is rightly proud of its ability to meet those needs and we must ensure that our future strategy allows this to continue. This short section looks at the sector and its relation to its customers in general terms.

Q6. What developments (for example technological) in other sectors of the UK economy could influence user demand for maritime services in the future?

Q7. What do you think are the current and potential weaknesses in the UK maritime sector?

Q8. What will our strategy need to contain to enable us to identify and address potential and existing market failures effectively?

Section 3 - Specific themes

4.8 In this call for evidence we identified the six themes of trade, technology, environment, infrastructure, skills and security. We see these as key drivers for a long-term strategy for the maritime sector and build on its existing strengths.

Q9. Are these the right priorities to concentrate on as we develop the strategy? Are there any specific aspects of these themes that you wish to see developed? If you were devising a routemap to 2050 what steps would you take?

Q10. Are there any other themes that should be included?

Q11. Do you have any evidence or analysis you wish to offer us in relation to the questions at the end of each theme in Chapter 3 of the Call for Evidence. Please reference the question for us, enter any views and provide additional evidence and comments in supplementary documents if necessary.

Section 4 - The strategy in practice

4.9 These questions allow you to comment on what you feel may not have been adequately covered previously. Our target is a strategy that sets out a framework that is practical and effective so these questions are necessarily open ended to allow you to think to add anything as well as picking up on anything you think we may have missed or not fully addressed.

Q12. What top three (if any) additional practical factors should be taken into account when developing the strategy?

Q13. What top three suggestions do you have to help us ensure that we have the widest range of evidence upon which to base the strategy given the overall timeframe?

Q14. What top three (if any) additional issues that we have not covered would you like to see included as part of the development/ input to the strategy?

Annex A: How to Respond

Consultation principles

The consultation is being conducted in line with the Government's key consultation principles which are listed below. Further information is available at https://www.gov.uk/government/publications/consultation-principles-guidance

If you have any comments about the consultation process please contact:

Consultation Co-ordinator
Department for Transport
Zone 1/29 Great Minster House
London SW1P 4DR
Email consultation@dft.gsi.gov.uk

Consultation period

The consultation period on this call for evidence began on 27 March 2018 and will run until 16 May 2018. Please ensure that your response reaches us before the closing date. If you would like further copies of this consultation document, it can be found at https://www.gov.uk/dft#consultations or you can contact Maritime.2050@dft.gsi.gov.uk or telephone 0300 330 3000 if you need alternative formats (Braille, audio CD, etc).
Please use the response form included with this consultation at gov.uk to respond to this consultation. Responses can be emailed directly to: Maritime.2050@dft.gsi.gov.uk
If responding by post please send to:

Call for Evidence Response
Maritime 2050
Department for Transport
Great Minster House
33 Horseferry Road
London SW1P 4DR

Freedom of Information

Information provided in response to this consultation, including personal information, may be subject to publication or disclosure in accordance with the Freedom of Information Act 2000 (FOIA) or the Environmental Information Regulations 2004.

If you want information that you provide to be treated as confidential, please be aware that, under the FOIA, there is a statutory Code of Practice with which public authorities must comply and which deals, amongst other things, with obligations of confidence.

In view of this it would be helpful if you could explain to us why you regard the information you have provided as confidential. If we receive a request for disclosure of the information, we will take full account of your explanation, but we cannot give an assurance that confidentiality can be maintained in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not, of itself, be regarded as binding on the Department.

The Department will process your personal data in accordance with the Data Protection Act (DPA) and in the majority of circumstances this will mean that your personal data will not be disclosed to third parties.