



National
Shipbuilding
Office

National Shipbuilding Strategy

A refreshed strategy for a globally
successful, innovative and
sustainable shipbuilding
enterprise





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A refreshed strategy for
a globally successful,
innovative and sustainable
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Presented to Parliament
by the Secretary of State for Defence
by Command of Her Majesty
March 2022



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Contents

Foreword from the Prime Minister	7
Foreword from the Defence Secretary and Shipbuilding Tsar	8
Executive Summary	9
Chapter 1 – Strategic Context	12
Chapter 2 – Organisation	16
National Shipbuilding Office	16
Delivering with Industry	17
Governance	17
Chapter 3 – Demand Signal and Policy	19
30 Year Cross-Government Shipbuilding Pipeline	19
The Cross-Government Fleet	19
Devolved Administrations	26
The Royal Navy Fleet of the Future	29
Shipbuilding Policy for Defence Vessels	32
Shipbuilding Policy Objectives	33
Government Procurement	34
Chapter 4 – Technology and Innovation as Enablers of Productivity and Competitiveness	36
UK Research and Innovation	38
Centres of Excellence	40
The Shipyard of the Future	40
The Green Maritime Revolution	41

UK Shipping Office for Reducing Emissions	44
Building Shipbuilding Opportunity into Clean Energy Developments	49
Home Shipbuilding Credit Guarantee Scheme	50
Place-Based Initiatives	50
Foreign Direct Investment in the Supply Chain	54
Royal Navy Technology Roadmap	54
Chapter 5 – Exports	58
Maritime Capability Campaign Office	59
Export Success Criteria	59
Export Prospects	60
Green Global Shipbuilding Initiative	61
UK Export Finance	62
Chapter 6 – Skills	65
UK Shipbuilding Skills Taskforce	65
Maritime Skills Commission	66
Employer-Led Skills Across the UK	66
Next Steps	71
Glossary	72
Directory	74
Doing Business with Government	74
R&D Support	74
Skills Support	75



Foreword from the Prime Minister



I have long been clear about my ambitions to bring shipbuilding home. As an outward-looking, global trading island nation, shipbuilding is woven into the fabric of the UK's industrial identity. Shipbuilding touches every part of the Union and a successful shipbuilding sector will play an important role in achieving our levelling up missions across the country, boosting productivity, research and development, and skills. But bringing shipbuilding home is not about a nostalgic or romantic view of the past. It is about looking forward and seizing all the opportunities available to us.

In the Integrated Review, published last year, I set out my vision for the UK in 2030: a stronger, more secure, prosperous and resilient Union. I see the UK shipbuilding sector right at the heart of that vision. In 2030, I see UK businesses right across the shipbuilding sector with full order books, whether that is designing battle-winning warships for the Royal Navy, refitting vessels with cutting-edge green technology to help us meet our net zero target, or building components and sub-systems for ships around the world. I see businesses using the latest manufacturing techniques, trusted by their customers to deliver high quality products on time and on budget. I see our National Flagship hosting the final negotiations for yet another British export contract and showing off the prowess of UK shipbuilding. And I see thousands of highly skilled workers across Scotland, England, Northern Ireland and Wales making all of this happen.

I can already see the potential that our shipbuilding industry holds. From the RRS Sir David Attenborough to HMS Queen Elizabeth, it is clear that UK shipbuilding is going from strength to strength. However, to achieve our vision of a globally successful, innovative and sustainable shipbuilding enterprise, we must double down on our efforts. Our new National Shipbuilding Office is already leading the charge, working closely with industry to boost skills and research and development and ensuring that all parts of Government are working towards this goal. Our investment in commercialising green shipping technologies will bring the green maritime revolution to the seas and help position the UK at the forefront of this growing market as we build back greener. Our support for competitive finance packages will level the playing field and encourage domestic customers to build their ships in the UK. And our ambitious shipbuilding pipeline creates a host of opportunities for UK businesses, from warships to lighthouse vessels, not to mention our new National Flagship which will act as a beacon of British values and demonstrate our global leadership on the world stage.

This strategy sets out a significant level of commitment from Government. Our ambitions are high and we expect industry to rise to them. I want to see industry taking the leap and making the most of the comprehensive level of support this Government has provided. With this strategy Government has put the wind in the sails of UK shipbuilding, but it is industry whose hand is now firmly on the tiller. It is up to you to steer your sector to success. Achieving the vision will take all parts of the enterprise working together to build upon our maritime heritage and grasp the opportunities ahead of us to build back better. Because when we talk about bringing shipbuilding home, we have our sights set firmly on the future.

Foreword from the Defence Secretary and Shipbuilding Tsar



2021 will be remembered as the year HMS Queen Elizabeth – the most powerful surface vessel ever built in Britain – embarked on her first operational deployment. Assembled by a cast of more than ten thousand highly skilled workers in six iconic dockyards – Appledore, Birkenhead, Govan, Portsmouth, Rosyth and the Tyne – the carrier is the very best of British engineering and she is a floating showcase for the world class talents of our nation's finest shipwrights. With this vessel, and everything she represents, as our inspiration, 2022 will be remembered as the year that we bear down on our shipbuilding ambitions.

Ambition, however, is not enough. So this strategy sets out our plan to stoke the flame of the renaissance in British shipbuilding across our great Union.

We are starting by extending our scope well beyond the purely naval to commercial shipbuilding. The focus is looking beyond the hulls to the systems and sub-systems. And we are going to do more to focus on the factors critical for future success: skills, technology and access to finance.

Next, we will give industry a much clearer demand signal about what we are trying to achieve with our procurement programmes. For the first time we are releasing a 30-year pipeline of all Government vessel procurements. As well as Ministry of Defence vessels, this will include ships such as those procured by the Home Office; the Department for Transport; the Department for Environment, Food & Rural Affairs; UK Research and Innovation; and the Devolved Administrations. Our new National Flagship will be the trailblazer of our strategy, as a beacon of British technology, ingenuity, and trade. This strategy will give UK firms a thorough understanding of our policy and technology priorities. The maritime sector will know the value we place on regional growth, skilled jobs and thriving supply chains, and how they can help us to level up across the UK.

Finally, we are going to make sure Government, industry and academia are more integrated than ever before. Realising our aspirations means working together across our Union. This strategy builds on those proud traditions of shipbuilding in England, Scotland, Wales and Northern Ireland to deliver for all parts of the UK.

The strategy amounts to a significant level of Government investment in shipbuilding over the next ten years, including funding for vessels, research and development, and access to finance.

So, over the next decade, we will further increase the productivity of yards throughout the nation, strengthen local manufacturers in the supply chain, blaze a trail in technological and environmental innovation and drive up our global competitiveness. But I hope we will do more – restoring the local reputations of our shipwrights up and down the land. The label that says made in Belfast or Birkenhead should mean as much to our overseas admirers as the stamp that says made in the UK.

Executive Summary

As a global trading island nation with a proud maritime heritage, shipbuilding is an important part of the UK's industrial identity. The shipbuilding industry supports 42,600 jobs¹ right across the country and adds £2.8 billion to the UK economy². It supports a vast supply chain and skilled jobs around the country in both the civil and defence sectors and delivers world-leading capabilities for the Royal Navy. Given its footprint right across the UK, the shipbuilding industry already makes a significant contribution to levelling up, strengthening the Union, and Building Back Better. This Government is therefore determined to support the shipbuilding enterprise to grow and thrive.

In 2017, the Ministry of Defence (MOD) published the National Shipbuilding Strategy which set out a vision for a productive, competitive, innovative naval shipbuilding sector. There have been some significant achievements since the 2017 strategy was published, including the successful placing of the Type 31 contracts and the export of the Type 26 design to Canada and Australia. Much of the 2017 strategy remains extant, however since its publication there has been a significant strategic shift. Spurred on by the appointment of the Defence Secretary as the Government's Shipbuilding Tsar our ambitions for the shipbuilding sector have grown and there has been a renewed drive across Government to reinvigorate the sector.

In light of this shift, this strategy refresh will set out how the Government intends to set the conditions for success and work with industry to

create lasting transformation. This refresh builds upon the approach of the 2017 strategy and broadens its scope to encompass the wider shipbuilding enterprise. We recognise that the value of the shipbuilding sector goes well beyond just building hulls and is spread throughout the entire supporting supply chain. We therefore define the shipbuilding enterprise in its broadest sense. The term includes the design; build; integration; test and evaluation; repair; refit; conversion; and support of warships; commercial vessels; workboats; leisure vessels; systems and sub-systems. As with the 2017 strategy, we do not include submarines, although we recognise that there are some overlaps, particularly in terms of skills and the supply chain. Our approach to the submarine industry is set out in the Defence and Security Industrial Strategy³ (DSIS). The wider maritime sector – including shipping, ports, and marine and maritime business services industries – is covered by the Department for Transport's (DfT) Maritime 2050 strategy⁴.

This strategy refresh sets out the vision, endorsed by both Government and industry, to create a globally successful, innovative and sustainable shipbuilding enterprise that works for all parts of the UK. Based on extensive consultation across the enterprise, the strategy refresh will address the most important enablers of success:

- Organisation;
- Demand signal and policy;
- Technology and innovation as enablers of productivity and competitiveness;
- Exports; and
- Skills.

¹ ONS, GDP output approach – low-level aggregates, December 2021.

² ONS, GDP output approach – low-level aggregates, December 2021.

³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/971983/Defence_and_Security_Industrial_Strategy_-_FINAL.pdf

⁴ <https://www.gov.uk/government/publications/maritime-2050-navigating-the-future>

There are various dependencies between each of these themes. To realise the vision, Government must use all of the levers at its disposal, working closely with stakeholders across the enterprise including industry, trade bodies and the Devolved Administrations. The strategy refresh will therefore set out the long-term opportunities provided by Government shipbuilding programmes, which provide a baseline level of stability. This will provide the confidence for industry to invest in Research and Development (R&D), people and facilities, which in turn generates the capacity and capability to exploit new and emerging markets, particularly those created by the shift to green shipping. With increased competitiveness, the UK shipbuilding sector can win global export orders, creating further opportunities for investment. The investment in efficiency, R&D, skills and supply chains will also improve value for money for Government programmes, ensuring that we can continue to provide a continuous and stable pipeline.

More specifically, the strategy refresh therefore sets out how we will:

- Put in place the optimum organisational and governance structures to ensure a coherent, joined-up approach through the establishment of an empowered National Shipbuilding Office (NSO);
- Provide clarity on future orders by setting out a 30 Year Cross-Government Shipbuilding Pipeline including the new National Flagship and the policy objectives which will underpin Government procurement programmes. We have already set out the revised MOD shipbuilding procurement policy in DSIS;
- Develop a model for a Home Shipbuilding Credit Guarantee Scheme to level the playing field for domestic shipbuilding orders, which

will complement the working capital and buyer credits provided by UK Export Finance (UKEF);

- Enable the commercialisation of critical shipbuilding technologies, particularly green technology by investing £206 million to establish a UK Shipping Office for Reducing Emissions (UK-SHORE) in DfT;
- Support the shipbuilding sector to develop new technologies, including manufacturing and production technologies through UK Research and Innovation (UKRI) and Innovate UK programmes;
- Proactively pursue export opportunities through a coordinated approach with Government and industry, underpinned by the Maritime Capability Campaign Office (MCCO) within the Department for International Trade (DIT) which will act as the exports arm of the NSO; and
- Work with industry to better understand the demand and supply of skills by creating a UK Shipbuilding Skills Taskforce reporting into the NSO.

This strategy is the first step towards transforming the shipbuilding enterprise, but it will not be the end of the journey. The coming chapters will set out the steps that Government will take to set the conditions for success and, in return, what we expect from industry to support this transformation.



OUR VISION FOR THE SHIPBUILDING ENTERPRISE

Our Government and industry shared vision is for the shipbuilding sector to be a **globally successful, innovative and sustainable UK shipbuilding enterprise**.

By 2030, we will be at the forefront of the **technological and environmental innovations** driving our sector and **globally competitive** in the design, build, integration, test and evaluation, repair and conversion of warships; complex commercial vessels; workboats; green shipping and autonomous technologies; and leisure vessels.

Our domestic and export success will be built on **high quality, innovative, value for money** designs, equipment and services and enabled by a **highly skilled and talented workforce; advanced infrastructure and production techniques; and coherent cross-Government policies**. The shipbuilding enterprise will be an **integrated and collaborative community**, united by a clear purpose and ambition to **drive growth and prosperity** in all four nations of the Union.

OUR AMBITIONS FOR THE SHIPBUILDING SECTOR



Green Technology

By 2025 all new vessels for UK waters are designed with zero emission capabilities

By 2035 bunkering of zero emission fuels is widely available across the UK

By 2050 the UK domestic shipping sector is net zero



Productivity

UK civil shipyards achieve productivity equivalent to Northern European shipyards by 2030 helping them to win commercial business

UK naval shipyards achieve international upper quartile levels of productivity by 2030



Skills

By 2024, complete skills fore-sighting for the shipbuilding sector and update in 2027 and 2030

By 2024, complete modelling of skills shortages. Reduce skills shortfalls by 35% by 2027 and 50% by 2030

Employers reporting improvements in skills availability and quality increases by 25% in 2024, 50% in 2027 and 75% in 2030



Autonomy

Develop a domestic regulatory framework for maritime autonomy, so the UK can lead the way within the International Maritime Organization

Reduced crewing and autonomy will be a starting principle for all new Royal Navy vessels designed after 2030



Exports

By 2030, shipbuilding, boat building and marine engineering exports increase by 45%

WE WILL ACHIEVE THIS BY:

Launching an empowered and independent **National Shipbuilding Office** to ensure strategic alignment across Government activity

Providing transparency on our future orders and a stable baseline of work through a **30 Year Cross-Government Shipbuilding Pipeline**, including the new National Flagship

Establishing a **Maritime Capability Campaign Office** to ensure the coherent pursuit of export opportunities

Developing a model for the **Home Shipbuilding Credit Guarantee Scheme** to level the playing field for domestic orders

Investing £206 million in a **UK Shipping Office for Reducing Emissions** to fund R&D in zero emission vessels and infrastructure, ensuring our place as global leader in green technology

Engaging with industry to deliver the **Royal Navy Technology Priorities** to provide battle-winning capabilities to the Royal Navy

Creating a **UK Shipbuilding Skills Taskforce** to help ensure a pipeline of skilled workers into the future

Identifying **Centres of Excellence** to optimise the production of key systems and shipbuilding processes

Optimising our approach to naval shipbuilding by developing **bespoke strategies** and plans for the key shipbuilding elements

Strategic Context

Chapter 1

As a maritime trading nation, the UK shipbuilding enterprise directly supports UK security and prosperity. This Government recognises its inherent strategic value. It was for this reason that the Government published the National Shipbuilding Strategy in 2017, following an independent review conducted the previous year by the leading industrialist Sir John Parker. The 2017 strategy accepted all of Sir John's recommendations as they applied to Government. It set out a vision for a growing Royal Navy fleet which would be modern and interoperable, with exportable vessels, underpinned by greater agility, pace and grip from the MOD. This would in turn give industry the confidence to invest for the long term in its people and assets to improve productivity, competitiveness and innovation.

There have been some significant successes in delivering on the 2017 strategy and Government has made progress on the majority of Sir John's recommendations.

Following a competitive tendering process, the MOD successfully placed a contract for five Type 31 frigates in 2019. This marked a significant change in how the MOD procures ships in recent years, reintroducing competition and a set budget. BAE Systems, working in partnership with UK Government, also secured the export of the Type 26 design to both Canada and Australia. The company estimates that this 32-ship endeavour will create or sustain 5,000 export-led jobs in the UK and will enable c.£6 billion of potential export contracts to flow to UK suppliers.

The UK Shipbuilding Enterprise in Numbers

It was estimated that in 2020 ship and boat building, repair and maintenance contributed £2.8 billion in value added to the UK economy⁵, from a turnover of around £6.1 billion⁶ and accounted for around 42,600 jobs⁷. There were 1,685 registered business in this industry, 99% of which were Small and Medium Enterprises (SMEs)⁸.

In 2019/20, the MOD spent £3.8 billion on shipbuilding and repair, directly supporting 27,100 jobs across the UK, plus a further 19,400 indirect jobs. This includes 7,500 direct jobs in Scotland⁹.

The UK is the number two exporter of floating structures such as rafts, tanks, cofferdams, landing stages, buoys and beacons with a 15% global market share and the seventh largest share of the global yacht and leisure vessel sector at 5%¹⁰.

⁵ ONS, GDP output approach – low-level aggregates, December 2021.

⁶ ONS, Monthly Business Survey turnover in production industries, January 2022.

⁷ NSO estimates based on ONS, Industry (2, 3 and 5 - digit SIC) - Business Register and Employment Survey (BRES): Table 2, November 2021.

⁸ ONS, UK business: activity, size and location, October 2021.

⁹ MOD regional expenditure with UK industry and supported employment: 2019/20

¹⁰ ITC Trade Map, last accessed 1 February 2022

The UK shipbuilding sector has many strengths, including the design and integration of warships, complex vessel design, leisure vessels, and vessel conversion, not to mention our systems and sub-systems suppliers. However, the sector is at a turning point, with several opportunities on the horizon which Government and industry collectively must seize.

This Government's ambition to bring shipbuilding home is not about recreating an idealised version of an imagined past. It is about building upon our heritage, reputation and proud traditions of shipbuilding throughout the UK, and exploiting areas of expertise. Government and industry must look forward and make the most of the opportunities offered by a shifting strategic context and changing global market to ensure the UK shipbuilding enterprise has a long-term sustainable future. Our new National Flagship will be the vanguard of this approach. It will be built in the UK, exemplifying the best of British engineering and manufacturing ingenuity and championing green technology.

The global shift towards decarbonisation means that a significant market opportunity for green maritime technology is unfolding. Research commissioned by the Government estimates that the elements of the global market for alternative maritime fuel production technologies in which the UK has a particular competitive advantage (for example, upfront design), could rise to around £11 billion per year by approximately 2050. If the UK maintains its current export market share (which is estimated to be around 5% of the relevant global markets), this could result in economic benefits to the UK of up to £0.5 billion per year by around 2050¹¹. Technological advances in autonomy and digital manufacturing also create opportunities for vessel design and manufacture. Following the UK's departure from the EU, the Government is building on trading relationships with partners around the world and

championing Global Britain. Meanwhile, this Government has made clear the priority it places on levelling up, strengthening the Union and Building Back Better and greener following COVID-19. The shipbuilding sector is well placed to deliver against each of these objectives.

This strategic shift requires a change in the Government's approach. While much of the 2017 National Shipbuilding Strategy remains relevant, our strategy will now encompass the entire shipbuilding sector, both naval and civil, to ensure that opportunities, best practice and benefits are shared across the enterprise. An indicative representation of how we define the UK shipbuilding enterprise is set out in Figure 1.

In September 2019, the Prime Minister appointed the Secretary of State for Defence as the Government's Shipbuilding Tsar. Since then, Departments have worked with industry to better understand and address the issues facing the shipbuilding enterprise.

In developing this strategy, there has been wide consultation across the sector. The Government recognises that the UK shipbuilding industry is operating in a challenging market, with many of its global competitors benefiting from significant government intervention and sponsorship. To ensure UK industry can compete more effectively there is more that this Government can do to support the long-term sustainability of the enterprise.

Success requires this to be a joint endeavour; Government cannot reinvigorate the enterprise alone. It can set the conditions for success, but industry must capitalise on these if the enterprise is to realise its shared ambitions.

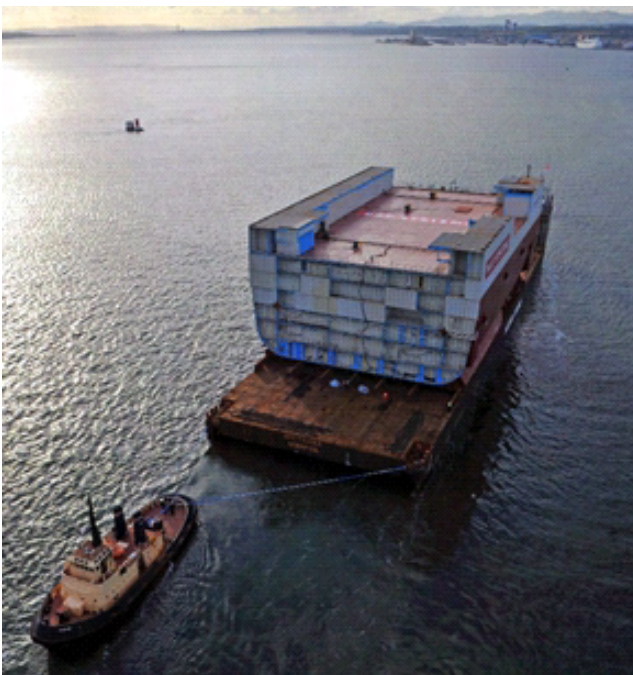
The first step to achieve transformation is having a clear vision. Working in partnership, Government, industry and the wider enterprise have defined a vision for the future of the sector.

¹¹ Frontier Economics, E4tech and UMAS (2019) Reducing the Maritime Sector's Contribution to Climate Change and Air Pollution. Economic Opportunities from Low and Zero Emission Shipping. A report for the Department for Transport. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815666/economic-opportunities-low-zero-emission-shiping.pdf. Note - This assessment covered hydrogen, ammonia, methanol and Bio Liquid Natural Gas (LNG) production technologies only.

Our shared vision is for the shipbuilding sector to be a **globally successful, innovative and sustainable UK shipbuilding enterprise.**

By 2030, we will be at the forefront of the technological and environmental innovations driving our sector. We will be globally competitive in the design, build, integration, test and evaluation, repair and conversion of warships; complex commercial vessels; workboats; green shipping and autonomous technologies; and leisure vessels.

Our domestic and export success will be built on high quality, innovative, value for money designs, equipment and services and enabled by a highly skilled and talented workforce; advanced infrastructure and production techniques; and coherent cross-Government policies. The shipbuilding enterprise will be an integrated and collaborative community, united by a clear purpose and ambition to drive growth and prosperity in all parts of the UK.



With its focus on prosperity and green technology, this vision statement aligns to the Prime Minister's vision for the UK in 2030, as set out in the Integrated Review of Security, Defence, Development and Foreign Policy¹². The themes in this vision statement are present throughout this strategy: technology and innovation, competitiveness, skills, policy and domestic and export success. Addressing any of these themes in isolation will not deliver on this ambition. Government and industry must understand the dependencies between them and act across multiple lines of activity in parallel. Likewise, no one part of the enterprise can single-handedly break down all of the barriers the sector faces. Industry cannot transform without Government setting the conditions for success, but Government does not hold all of the solutions to improving the competitiveness of the sector.

Government (national, devolved and local), industry, academia, trade bodies and other local stakeholders must therefore operate as an integrated and collaborative enterprise, working together to achieve our shared vision. The Government is clear that the implementation of this strategy will be based on collaboration outside of any competitive processes. The Government will play its part in overcoming barriers to innovation and investment, but we also expect to see industry demonstrating clear leadership. The enterprise approach is about identifying opportunities where Government, industry and wider stakeholders can work together to deliver benefits to the sector as a whole, while maintaining value for the UK taxpayer.

¹² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/975077/Global_Britain_in_a_Competitive_Age_the_Integrated_Review_of_Security_Defence_Development_and_Foreign_Policy.pdf

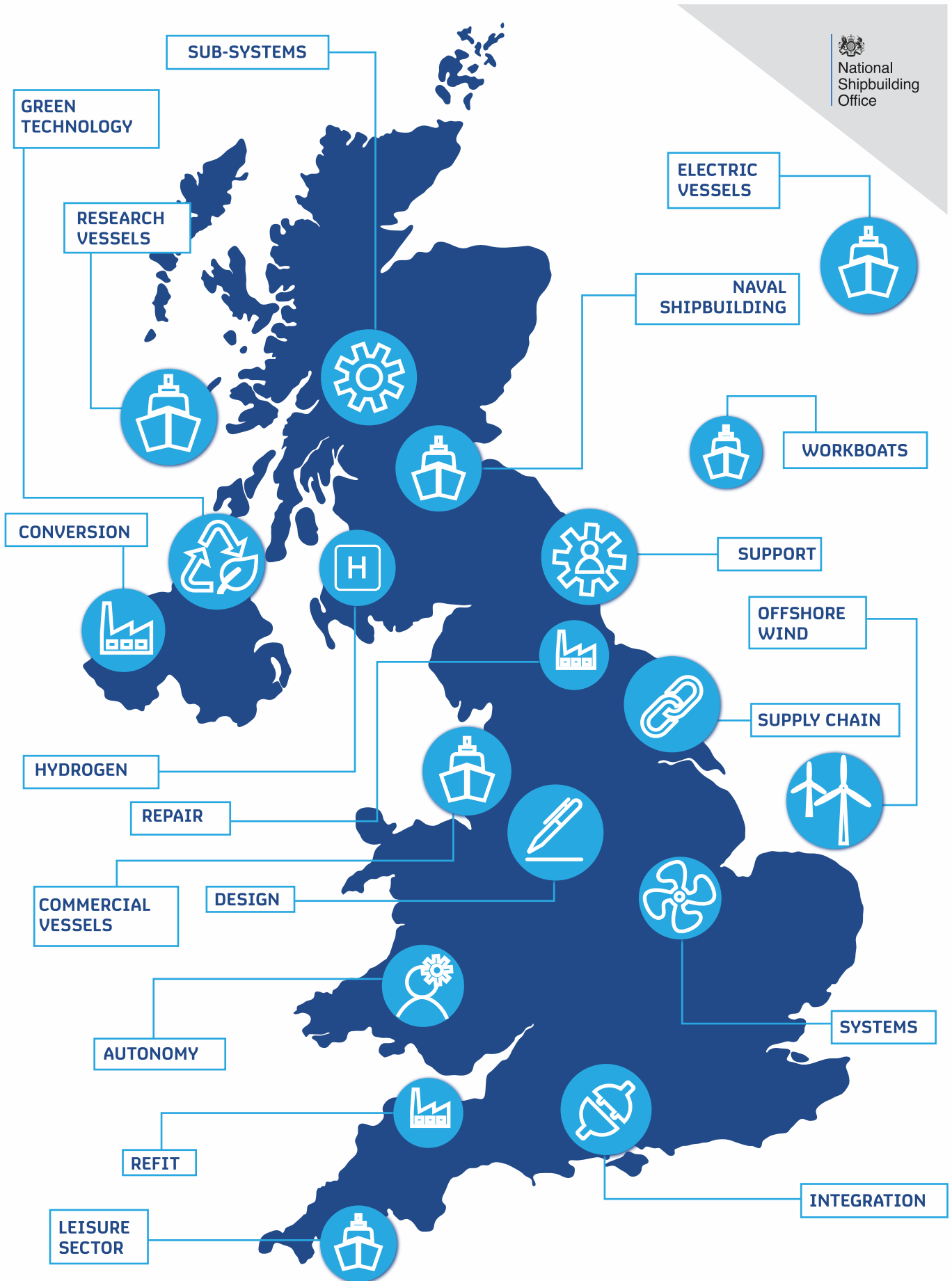


Figure 1 Depiction of our definition of the UK shipbuilding enterprise. This graphic is intended to represent the geographical breadth of the UK shipbuilding enterprise, and the range of sub-sectors and activities that fall within our definition of the term 'shipbuilding enterprise'. It is not intended to be a comprehensive overview of all companies involved in the sector.

Organisation

Chapter 2

To deliver the shared vision requires the right constructs and governance in place across the enterprise. Government must be joined-up in its activity to support the shipbuilding sector, so that it can develop coherent policies and interventions aligned to our strategy and policy objectives. Likewise, given the diversity and complexity of the shipbuilding ecosystem, industry needs to understand how it can operate more effectively to share best practice and represent its interests to Government with one voice.

The 2017 National Shipbuilding Strategy set out a new governance approach for naval shipbuilding. It established a Sponsor Group chaired by the Deputy Chief of Defence Staff (Military Capability) to own the strategy and a Client Board chaired by the First Sea Lord to own the 30 Year Naval Ship Acquisition Master Plan. These have helped to provide senior oversight and clear direction to the naval shipbuilding programme. However, now that the Government's focus has broadened to incorporate the wider enterprise, there is a need to ensure the right governance and organisational structures are in place.

An independent review conducted by the Infrastructure and Projects Authority into the governance and structures surrounding the shipbuilding agenda found that activity across Departments was fragmented with a lack of alignment and empowerment and without clear lines of accountability. We will therefore revise the current organisational structures and governance to ensure more coherence and strategic oversight of Government activity, more streamlined governance and a more purposeful Government-industry forum to drive growth.

National Shipbuilding Office

To ensure our renewed ambition is backed up by bold and coherent action we have established an empowered **National Shipbuilding Office** to provide strategic oversight of all Government activity across the shipbuilding enterprise.

The NSO has a mandate to drive transformative change across the shipbuilding enterprise, creating a strategic focus in Government to champion our shipbuilding ambitions and deliver on this strategy.

The NSO will enable Government to optimise its approach to growing the industry, realising the benefits of coordinated procurement, investment and engagement across the shipbuilding enterprise. The NSO will oversee all of Government's interests in UK shipbuilding, from coordinating the long-term pipeline of Government vessels to ensuring skills priorities are aligned across the enterprise. The NSO takes ownership of the National Shipbuilding Strategy and is empowered to align Departmental activity with the ambition and approach herein.

The NSO is hosted within the MOD but reports directly to the Secretary of State for Defence in their role as Shipbuilding Tsar and chair of the Inter-Ministerial Group on Shipbuilding. It is staffed by officials from across Government alongside experts from industry to ensure it captures the best thinking and can generate a common view to help drive coherent and impactful decision making. The NSO is also planning to open an office at the new UK Government hub in Edinburgh to ensure there is a direct link to the shipbuilding enterprise in Scotland.

The NSO will be supported by the National Shipbuilding Strategy Board and Shipbuilding Enterprise for Growth (SEG) to challenge assumptions and expand our thinking. The NSO will use its strategic viewpoint and evidence base to support Government decision making, the development of future strategy and the holding to account of both Government Departments and industry for their role in delivering our shared vision for the sector.

Delivering with Industry

The 2017 National Shipbuilding Strategy established the Maritime Enterprise Working Group to undertake a long-term programme of improvement. Its priorities were improving productivity and developing an in-depth understanding of the domestic and export market opportunities for the sector.

In his 2019 review of the implementation of the National Shipbuilding Strategy¹³, Sir John noted that the Maritime Enterprise Working Group was making good progress, but needed more resource from both industry and Government. We are clear that delivering the shared vision for the shipbuilding enterprise cannot be achieved by Government alone. With Government activity being driven forward by the NSO, an industry-led forum is required which can demonstrate the same strategic leadership and ensure coherent, aligned activity. We will establish a **Shipbuilding Enterprise for Growth**, learning from similar approaches taken in sectors like defence, aerospace and space. This will be an empowered interlocutor which can make decisions and drive action to ensure industry is seizing opportunities to transform.

It will be co-chaired by the CEO of the NSO and a senior industry executive, with membership from

across the shipbuilding sector, supply chain and Government, including the Devolved Administrations.

The SEG must understand the complex challenges facing the shipbuilding sector and be clear-sighted about the steps industry needs to take to help address these. It must be able to articulate the specific industrial outcomes the sector wants to achieve, the development of the industrial base required to achieve this, and what support is required from Government. The SEG will be an integrated and collaborative community. It will identify opportunities for members to work together, outside of any competitive procurement processes, to take action which will deliver tangible improvements to the shipbuilding enterprise.

Informed by a number of "task and finish" working groups, with membership from across the UK shipbuilding enterprise, the SEG will support Government and industry joint working to implement the National Shipbuilding Strategy and determine what further action is required to tackle barriers to growth, boost exports and grow high-value skilled jobs across the enterprise. Its initial priorities will be identifying actions to improve productivity and competitiveness through technology, supply chain and skills development.

Governance

With the NSO and SEG working together to deliver the shared vision, both parties must be able to hold the other to account where this is not happening. To ensure appropriate challenge and oversight, the SEG will be fully integrated into the shipbuilding governance model.

¹³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/B44073/Sir_John_Parker_s_Independent_Review_of_the_National_Shipbuilding_Strategy_2019.pdf

A Shipbuilding Inter-Ministerial Group will agree priorities, ensure strategic alignment and hold to account both the NSO and SEG. It will be chaired by the Shipbuilding Tsar and will report into relevant Cabinet Committees and the Prime Minister. The CEO of the NSO will chair the

National Shipbuilding Strategy Board with membership from across Departments and close engagement with shipbuilding sector stakeholders to monitor delivery and implementation of the strategy.

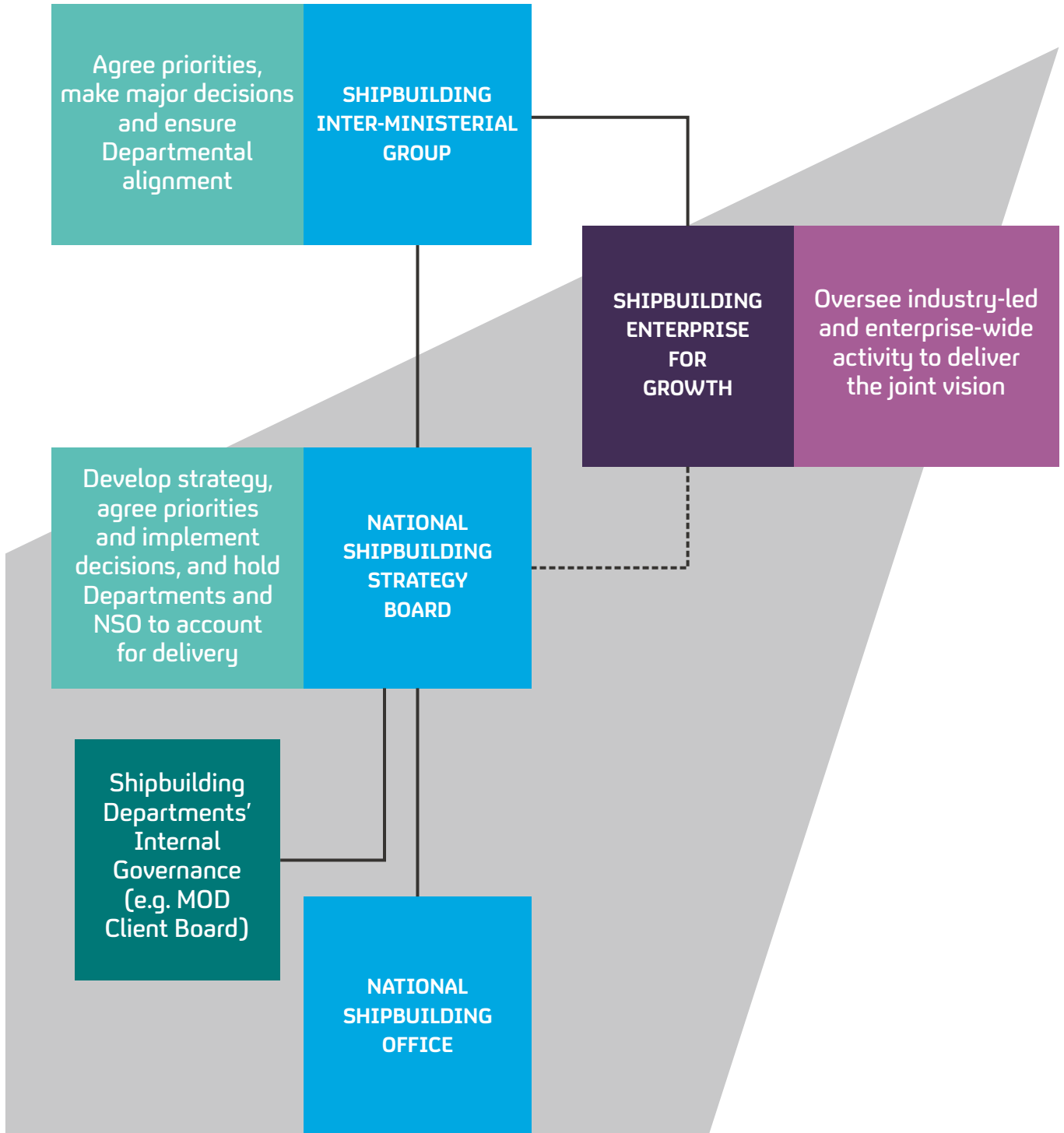


Figure 2 Shipbuilding governance structure

Demand Signal and Policy

Chapter 3

One of the most significant mechanisms available to Government to shape the shipbuilding sector is the demand signal we set through our procurement programmes. Through the Government pipeline, there is an opportunity to create a baseline of volume to encourage industry investment in facilities, infrastructure, innovation and skills. However, for Government shipbuilding spend to drive the transformation we seek, we must be clear about what we will value from our procurements and the effect we wish our spend to have. We must deliver long-term value for money for the taxpayer and competition will remain an important mechanism to achieve this, but this does not mean that we are driven to choose the lowest price. In line with the HM Treasury Green Book guidance and the Cabinet Office Social Value Model, the NSO will work with procurement teams and decision makers to manage the Government pipeline and ensure our choices align with the strategic policy objectives set out in this chapter.

30 Year Cross-Government Shipbuilding Pipeline

As Sir John Parker highlighted in his 2019 review, volume is an important efficiency driver and Government shipbuilding opportunities may help to insulate yards against the volatility of a challenging global market.

While the overwhelming majority of the value of the Government shipbuilding portfolio comes from MOD vessels, there are opportunities for UK industry across a range of vessel types in the Government portfolio. To provide greater transparency of these forthcoming opportunities, we have updated the 30 Year Master Plan and developed a 30 Year Cross-Government Shipbuilding Pipeline (Figure 3).

The NSO will oversee this pipeline, working with Departments to manage this against UK industrial capacity. As the pipeline spans a 30 year period, it is subject to change and will be agreed through future Spending Reviews. The NSO will update this pipeline at each multi-year Spending Review, however we will be reliant upon industry delivering programmes to cost and time so that we can minimise changes to the pipeline and provide greater certainty.

The Cross-Government Fleet National Flagship

Our new National Flagship will showcase cutting-edge British shipbuilding, engineering and technology, particularly clean maritime technologies. The Flagship will be a visible demonstration of the UK's commitment to enhance and strengthen trade with our key export markets around the world. It will provide a unique convening power to UK exporters and a secure sovereign hub for diplomatic events.

30 Year Shipbuilding Pipeline



Figure 3 30 Year Cross-Government Shipbuilding Pipeline

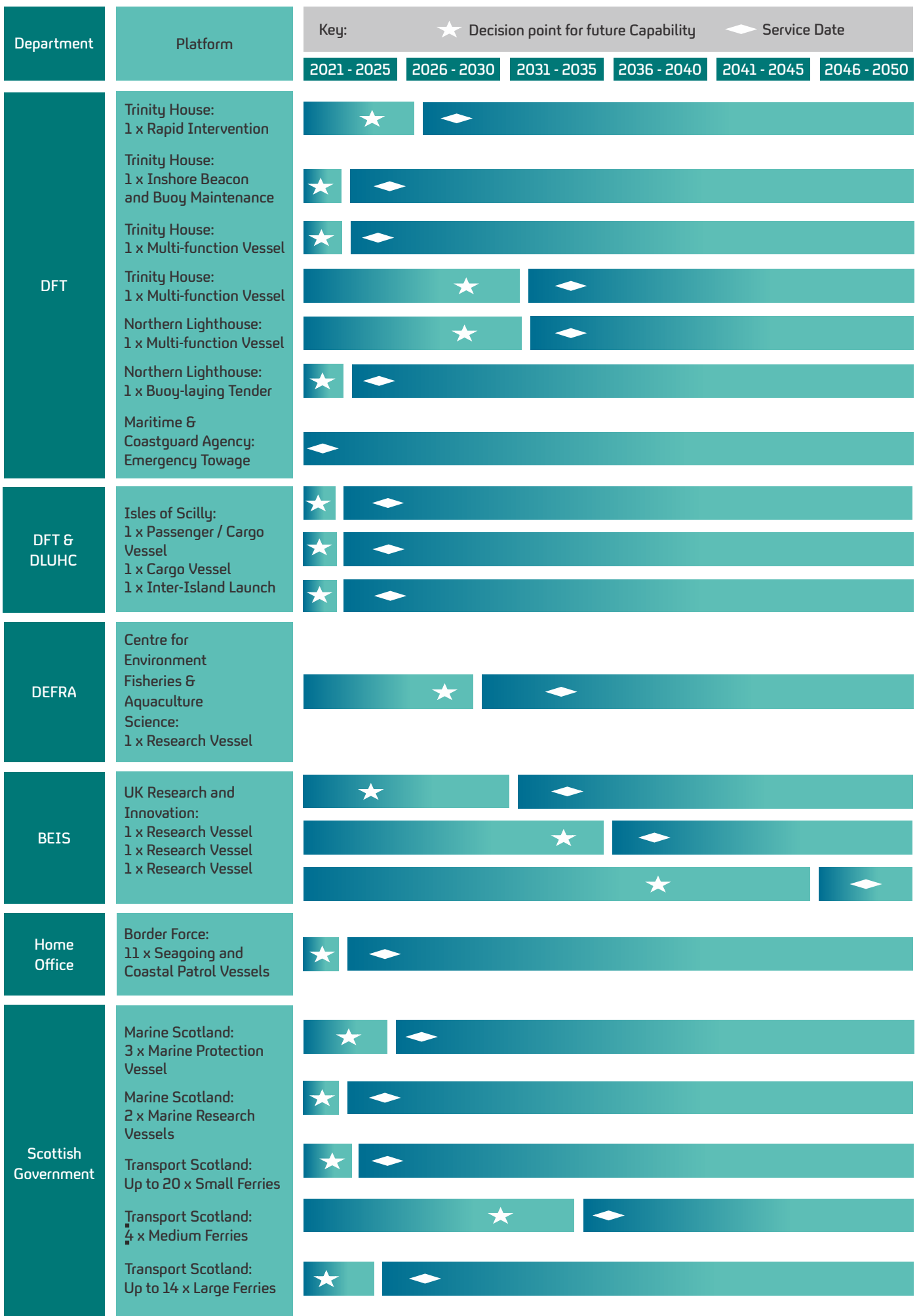


Figure 3 continued



Figure 3 continued

The National Flagship will be a tangible representation of the vision statements set out in the Integrated Review and in this strategy refresh. It demonstrates Government using our spend to support prosperity, jobs and skills within the UK shipbuilding sector while setting high standards for delivery. It will encourage the development of green technology, supporting our net zero target and ambition for the UK to become a science superpower. The National Flagship will be environmentally and ecologically advanced, maximising the use of sustainable fuels and materials wherever possible through its operating life, while assuring reliability. The National Flagship will not only showcase the best of UK shipbuilding, engineering and ingenuity around the world, but will be a platform from which to promote UK businesses across sectors. By encouraging international trade and investment, it will therefore be a flagship for UK values.

As the 2017 National Shipbuilding Strategy set ambitious parameters for the Type 31 programme, we have set an ambitious timescale for the development and delivery of the National Flagship. A National Flagship Taskforce has been set up within the MOD to take this procurement forward, working closely with Departments across Government including the Foreign, Commonwealth and Development Office (FCDO) and DIT. The design competition is underway and we are working towards a design announcement in spring 2022. The build competition will commence later this year and our intention is to cut metal by the end of 2022. It will be built in the UK and offers an opportunity for the UK shipbuilding industry and supporting supply chain to rise to the challenge and demonstrate their ability to deliver to cost and time. The design and construction of the new National Flagship will be a national endeavour and a chance to show off the very best of UK shipbuilding.

The General Lighthouse Authorities

The General Lighthouse Authorities manage a fleet of seven vessels ranging from multi-function tenders to smaller rapid response vessels. They also hire local boats in their areas of operation to complete work as necessary. Their fleet is reviewed on a regular basis to ensure that they have the optimum number of vessels with the capabilities necessary to deliver their statutory duties in the most cost-effective manner.

The last fleet review was completed in 2018¹⁴. This confirmed the seven-vessel model remained the most appropriate going forward and that vessels would be considered for replacement on a case-by-case basis as they approached the end of their service lives. DfT is currently working with the General Lighthouse Authorities on two vessel replacement programmes, the Trinity House vessel *Patricia*, which operates around the coast of England, Wales, the Channel Islands and Gibraltar, and the Northern Lighthouse Board vessel *Pole Star*, which operates around Scotland and the Isle of Man. These procurements will seek to ensure maximum value for the UK, taking account of social value in line with Government policy. These vessel replacement programmes will ensure that our General Lighthouse Authorities have the modern vessels and equipment they need to continue delivering a world-class maritime safety service.

Uniquely among the General Lighthouse Authorities, Trinity House also operates a fleet of eight light vessels¹⁵. These are essentially empty hulls with large lights on deck which are towed to locations where larger aids to navigation are necessary, but waters are too deep or otherwise unsuitable for lighthouse construction.

¹⁴ www.gov.uk/government/publications/general-lighthouse-authorities-fleet-review

¹⁵ See www.trinityhouse.co.uk/lighthouses-and-lightvessels?type=lightvessel#filters

Replacement of these light vessels, which may not be like for like, will take place on a case-by-case basis during the next 30 years and will provide further shipbuilding opportunities.

As well as these vessel programmes, the General Lighthouse Authorities support UK shipyards and the wider UK economy through the current vessel maintenance regime and vessel survey work conducted in the UK and through their work in local coastal communities. The General Lighthouse Authorities undertake regular, routine maintenance tasks to ensure that their ships are always available for emergency response. During their long service lives, they also require regular dry docking for classification and other surveys, replacement of life-expired equipment and other upgrades to assist the General Lighthouse Authorities in delivering their statutory functions. This work is regularly undertaken in UK shipyards.

Centre for Environment, Fisheries and Aquaculture Science

The Centre for Environment, Fisheries and Aquaculture Science (Cefas) is the UK Government's marine and freshwater science expert. They have one offshore Research Vessel (RV), RV Cefas Endeavour, which is used to assess the health of UK fish stocks to enable fish quotas to be set sustainably. It also carries out a wide range of marine environmental research and surveys, including to support the designation and management of offshore marine protected areas.

Outside the EU, the need for high quality, independent, UK-wide fisheries science has significantly increased as the Government ensures it has the data and evidence necessary to manage UK fish stocks sustainably as an independent coastal state. There are also increasing demands for marine environmental science to understand the impact of climate change on the sea and to ensure there is sufficient protection for our most valuable marine habitats.

RV Cefas Endeavour is approaching the end of its life and work will start this year to prepare to commission a new research vessel which can make use of the latest scientific and technological advances.

UK Research and Innovation

UKRI is an executive non-departmental public body, sponsored by the Department for Business, Energy and Industrial Strategy (BEIS). UKRI is the national funding agency investing in science and research in the UK. It convenes, catalyses, and invests in close collaboration with others to build a thriving, inclusive research and innovation system.

UKRI owns three research ships that undertake multi-disciplinary science. RRS Discovery and RRS James Cook provide the latest cutting-edge blue-water research capability. The polar-capable RRS Sir David Attenborough provides access to ice-covered waters and supports terrestrial science in Antarctica and the Southern Atlantic. As well as owning and running some of the most well-known research ships in the world, UKRI provide access to a range of other marine facilities and equipment.

UKRI and the Natural Environment Research Council (NERC) are developing a net zero Oceanography Programme with the dual aims of creating the next generation of research capability and eliminating its carbon footprint. The decision of how to approach the future capability currently provided by RRS James Cook will be taken in 2023. The replacement of RRS Discovery will look to encompass a zero-carbon design, with a decision point to proceed between 2030 and 2035. The decision to procure a replacement of RRS Sir David Attenborough with zero carbon design is expected to take place between 2045 and 2050.

UKRI-NERC is also currently seeking to appoint a partner to conduct ship refit, repair, and technology refresh for all three of its UK research ships. Procurement is now underway for the five-year fleet-wide contract, estimated at £45 million. This is expected to come into service in March 2022.

Border Force

Border Force is a law enforcement command within the Home Office. Border Force secures UK borders and promotes national prosperity by facilitating the legitimate movement of individuals and goods, whilst preventing the movement of those that would cause harm by entering the UK.

The security of the maritime border is critical to the safety of the UK's borders and local communities. It prevents, deters and detects illegal migration, criminality and wider threats to the UK. The UK's maritime border is a unique intervention point in the fight against crime, enhancing national security and controlling immigration, whilst enabling economic prosperity.

Border Force's Maritime Command operates the only national maritime law enforcement capability and ensures the security of the UK maritime border by providing an effective, enduring at sea capability. This currently comprises a fleet of five Cutters and six smaller Coastal Patrol Vessels. These vessels are all reaching the end of their lives and will require replacing over the next five years. The 2021 Spending Review announced additional funding to renew this fleet and a strategic business case for the procurement of new vessels for Border Force is in development.

The fleet of Cutters and Coastal Patrol Vessels will also require maintenance, service, and equipment recertification support. Subject to funding, Border Force also intends to procure two larger Rigid Hulled Inflatable Boats (RHIBs), the timing of which will be set out in due course.

Isles of Scilly Ferries

The air and sea links between the mainland and the Isles of Scilly are the lifeline for the communities and businesses of Scilly. Connectivity to the mainland is fundamental to every aspect of island life. Three vessels provide transport for the majority of freight and around 55% of passengers to the Islands. The existing passenger ferry and freight vessels will soon come to the end of their economic lives and therefore require replacement to maintain a sea link.

The Government announced the winners of the first round of the £4.8 billion Levelling Up Fund on 27 October 2021. As part of this, the Isles of Scilly are set to receive significant investment to contribute to the replacement of the current passenger and freight vessels. This will sustain

the long-term future of the sea link between the Isles of Scilly and the mainland, protecting access to work, education and health services for islanders.

Harbour improvements are also required so that the new vessels can operate safely and efficiently. These cover the provision of an electrical supply to allow hybrid and full electric vessel operation, essential freight storage works required for the new vessels at St Mary's Quay and New Grimsby Quay, and essential harbour works to enable passenger accessibility. The funding for these necessary improvements is included in the Levelling Up Fund allocation. DfT will work with the Council of the Isles of Scilly and other key stakeholders to develop a detailed business case for the proposals.

Devolved Administrations Vessels

Marine Scotland



Paul Warriner (via Marine Scotland)

Marine Scotland is responsible for the integrated management of Scotland's seas, working closely with delivery partners Scottish Natural Heritage and the Scottish Environment Protection Agency. Marine Scotland has five vessels within its fleet: three Marine Protection Vessels (MPVs) and two Marine Research Vessels (MRVs). These vessels deliver regulatory science and compliance activities across the Scottish coastline and over 800 islands.

The MPVs deliver fisheries monitoring, control and surveillance, requiring them to patrol in and around Scottish waters on a 24/7 basis throughout the year. The MRVs underpin UK marine scientific programmes of research, sampling and data collection. Marine Scotland vessels also play a crucial role in emergency resilience, such as oil spill response or supporting wider resilience, as evidenced in logistical planning during the COVID-19 pandemic.

Marine Scotland commenced a long-term process for managed fleet replacement in 2019 to coincide with planned out of service dates across the fleet. The Scottish Government funded a three-year £1.25 million contract beginning in late 2020 to deliver specialist MPV and MRV designs. Marine Scotland hope to commence procurement of its first replacement ships by the end of 2022 and begin the build in the following two to six years. The remaining three vessels will be procured, subject to capital funding, via a rolling procure and build programme.

Transport Scotland

Transport Scotland, an agency of the Scottish Government, is responsible for policy and guidance relating to Scotland's ferries on the Clyde and Hebrides Ferry Services network and the Northern Isles Ferry Services network. Transport Scotland works closely with the contracted ferry service operators, CalMac Ferries Ltd and Serco NorthLink Ferries, and also with the Scottish Ministers' asset owning company Caledonian Maritime Assets Ltd (CMAL). CMAL currently owns 37 ferries: 15 major vessels, four intermediate sized vessels, and 18 small vessels. 31 are chartered to CalMac Ferries Ltd and deployed on the Clyde and Hebrides Ferry Services network. These are all roll-on/roll-off vessels of a range of sizes, carrying passengers, vehicles and freight.

Five are chartered to Serco NorthLink Ferries and deployed on the Northern Isles Ferry Services network: three roll-on/roll-off passenger/vehicle vessels and two freight roll-on/roll-off vessels. Finally, the recently purchased MV Utne will be chartered to CalMac Ferries Ltd once modifications have been completed. Three additional passenger-only vessels are currently deployed by CalMac Ferries Ltd, and their replacements are intended to be procured and owned by CMAL.

Transport Scotland procures and manages contracts for the delivery of the Clyde and Hebrides Ferry Services network and Northern Isles Ferry Services network services and maintains an ongoing Vessel Replacement and Deployment Plan, a programme looking at least ten years ahead. The Scottish Government announced investment of £580 million in port and vessels to support and improve Scotland's ferry services over the next five years, as part of its wider Infrastructure Investment Plan, in February 2021. The replacement plan is primarily based on vessel age. Investment decisions for a series of programmes and projects are planned for various points in the coming decades.

Northern Ireland Executive

The Northern Ireland Department of Agriculture, Environment and Rural Affairs (DAERA) Fisheries Inspectorate operates a 26 metre Fisheries Protection Vessel (FPV) in Northern Ireland's Marine Waters to enforce commercial marine fisheries and aquaculture regulations. The vessel also carries out survey and research work for the Department and on behalf of other agencies. The procurement of a replacement vessel is expected in the late 2020s. The DAERA Fisheries Inspectorate also operates a RHIB in Northern Ireland's Marine Waters to enforce commercial marine fisheries and aquaculture regulations under a variety of domestic, national and retained EU statutes. The procurement of a replacement vessel is expected to take place between 2025 and 2030.

The DAERA Monitoring and Assessment Team currently have a build in progress for a 15 metre Survey Catamaran which will require replacement around 2042 to meet its statutory requirements. The DAERA Monitoring and Assessment Team also operate two small survey RHIBs for deployment in estuarine and coastal roles. The procurement of replacement vessels is expected between 2025 to 2030, and 2030 to 2035 respectively.



The Water Management Unit within the Northern Ireland Environment Agency has a duty to promote the conservation of the water resources of Northern Ireland and the cleanliness of water in waterways and underground. The department will look to replace its 12 metre Pollution Response Vessel within the next 15 to 20 years.

The DAERA Inland Fisheries team operates a small fleet of three FPVs deployed in Lough Erne, Lough Neagh and coastal areas of Northern Ireland. To ensure statutory requirements continue to be met, one 11 metre RHIB will likely require direct replacement and a 6 metre RHIB will require replacement or refit, both in the next five years. The third vessel was procured in 2013 and replacement is currently expected in the early 2040s.

DAERA Marine Conservation operates two coded vessels in Northern Ireland's Marine waters, a 12 metre RHIB with cabin and a 7 metre RHIB. The 12 metre RHIB underwent full re-fit in 2019/20 and the estimated date for further works will be 2030 to 2035. The 7 metre RHIB was built in 2007 and the estimated date for further works, which will likely be a re-fit rather than replacement, is 2025 to 2030.

The Northern Ireland Department for Infrastructure owns and operates two ferries that service the Strangford Lough crossing and owns one passenger vessel that services the Rathline Island crossing via a contract. The Department will look to procure a replacement vessel for its 38 metre single deck ferry which was refitted in 2015/2016. Timings for this are yet to be confirmed. The 40.5 metre single deck ferry and the 28 metre passenger vessel with a bow loading deck both came into service in 2017. The decision point on whether the vessels will be refitted or replaced is currently expected in the early 2050s.

The RV Corystes replacement will be owned by the Agri-Food and Biosciences Institute (AFBI) and will operate out of the Port of Belfast. The vessel is expected to be in service in 2024 and will have a year-round capability, enabling AFBI to conduct an integrated marine science programme in Northern Ireland's coastal waters, the Irish Sea and adjacent sea areas.

Welsh Government

The Welsh Government is responsible for the control and enforcement of the Welsh Zone, some 32,000 square kilometres in total. The Welsh Government runs a fleet of three FPVs, two of which carry daughter craft RHIBs, and two short-launched RHIBs capable of assisting with the patrolling of 1,680 kilometres of Welsh coastline.

The primary role of the FPVs is control and enforcement, with two of the three larger vessels having the capability to undertake a range of scientific tasks.

Welsh Government Marine and Fisheries undertook a review of its marine assets during 2015 which resulted in a £6 million procurement and build project delivering three new FPVs. This capability will need to be maintained and it is expected that replacements for these assets will be re-procured in the future.

The Royal Navy Fleet of the Future

"If there was one policy which strengthens the UK in every possible sense, it is building more ships for the Royal Navy."

Prime Minister

The Royal Navy is integral to the preservation of global security, from the seabed to space. It ensures UK resilience and prosperity through global activity, enabling the flow of global maritime trade. To deliver the fleet of the future, the Royal Navy will upgrade its capabilities and modernise, developing the next generation of warships throughout the 2020s. This will bring about a generational shift in UK naval technology, as well as growing the fleet at pace. UK industry will build ships and develop systems that deliver innovative and battle-winning capability, bolstering the UK global influence and preserving the security of our nation for the future.

The settlement for Defence announced as part of Spending Review 2020 provides the MOD with additional funding of over £24 billion over the next four years. This will allow the Royal Navy to deliver an ambitious programme of shipbuilding, including:

- Eight **Type 26 frigates**, the first three of which are currently being built by BAE Systems on the Clyde and supporting 4,000 jobs across the UK;
- Three replacement **Fleet Solid Support ships** to support the Queen Elizabeth Class aircraft carriers in operating anywhere in the world;
- Five **Type 31 frigates**, on which the steel was cut for the first vessel, HMS *Venturer*, at Babcock in Rosyth in September 2021;
- A new class of up to five **Type 32 frigates** to extend the Royal Navy's forward presence around the world;

- New **mine countermeasures systems and support ships**;
- **Multi-Role Ocean Surveillance** capability to protect the UK's critical undersea cables; and
- As we move into the early 2030s up to six **Multi-Role Support Ships**, to enable powerful global littoral strike and amphibious capability with the Future Commando Force.

This generation of ships will pave the way for the future of anti-air warfare, the Type 83 future air defence system, which will replace the Type 45 capability in the late 2030s. This will see another technological shift to ensure the UK remains at the forefront of carrier strike capability development into the future.

Just as important as the vessels the Royal Navy buys are the innovative, battle-winning technologies, systems and sub-systems which underpin them and the through-life support to sustain them. In Chapter 4, we set out the Royal Navy technology approach.

In December 2022, the Royal Navy will take ownership of a fleet of vessels which currently provide In-Port towage, transportation of passengers, and harbour movements of commodities such as stores, ammunition, waste, fuel and other liquids for the UK Naval Bases in Devonport, Faslane and Portsmouth. An estimated 37 vessels from the current fleet will require replacing from 2025 to ensure these critical services continue to be provided safely and effectively to the Royal Navy. The vessels will be Government owned but contractor operated. Subject to approved funding, the replacement vessels will be purchased on behalf of the MOD, with it being the responsibility of the contractor to identify the shipyard(s) that best meet the requirement in respect of design, delivery time, and value for money.

The MOD is also rationalising and modernising its RHIB fleet, with the aim of ensuring the boats, which are key enablers for many defence outputs, have the capability to adequately support operations. As part of this, a common-class approach is being investigated for RHIBs, presenting an opportunity for both national and international markets over the next 30 years.

As the Royal Navy continues its modernisation, it will look to update specific capabilities which will present further shipbuilding opportunities. This includes the procurement of Future Landing Craft, as the current Landing Craft fleet is slowly retired from service. Industry will be engaged once analysis regarding the exact fleet mix has been undertaken.

The Pipeline Approach

Since the publication of the 2017 strategy a considerable amount has been achieved. The delivery and subsequent entry into service of the Queen Elizabeth Class aircraft carriers was truly the physical embodiment of a grand national endeavour and a visible reminder, to the entire world, of the technical prowess of the UK shipbuilding industry. However, lessons must be learned from both the successes and challenges of the Queen Elizabeth Class.

The MOD's enormous investment in the development of the cutting-edge Type 26 frigate was rewarded with export sales to Australia and Canada.

Type 31, the pathfinder project of the 2017 strategy, got to contract on schedule and for the headline price demanded, with the capability exceeding many expectations. The project is remarkable for the speed and innovation shown in its procurement, including valuing UK prosperity and adaptability for export. The investment made in new facilities, processes and skills in Rosyth underpins the fundamental value of this approach and the confidence in the Type 31's long-term export potential. We must build upon these successes and continue to evolve and adapt our approach in light of the changing strategic context described in Chapter 1. As set out in DSIS, the Government is aiming to establish a more productive and strategic relationship with the defence and security industries. The MOD is one of the most significant customers of the UK shipbuilding enterprise and the naval

shipbuilding industry is an important strategic asset, critical to ensuring the operational independence of the Royal Navy. The MOD understands that a boom and bust approach to naval shipbuilding will only create damaging volatility and uncertainty for industry and by extension harm productivity. This is damaging to economic growth and prosperity and to industry's ability to deliver the capabilities necessary to protect our national security. The MOD has therefore actively managed its programme to create a continuous shipbuilding pipeline.

The shipbuilding opportunities that the MOD will bring to the UK market have the potential to be genuinely transformative for UK shipyards and the wider enterprise. With build having begun on the Type 31 frigates in Rosyth, alongside build on the Type 26 on the Clyde, there are now two classes of frigate simultaneously under construction in UK shipyards for the first time in 30 years.

A new Fleet Solid Support procurement was launched in May 2021, with four consortia having been taken forward for the Competitive Procurement Phase in September 2021. These warships will be integrated in the UK and will build upon the success of the Type 31 programme. Re-capitalising UK industry will be a prominent feature of the programme, focusing on growing capacity and capability and enabling a competitive industrial end state in line with the joint vision. International partners will be encouraged to work with UK firms to develop the relationships and mutual learning that will be essential to drive improved productivity, competitiveness and exports across both civilian and naval programmes. The Fleet Solid Support ships will also be a pathfinder for the MOD's new sustainability strategy, as outlined in Chapter 4.

To deliver on this ambitious pipeline requires an industry able to fulfil the demand signal to time, cost and performance and to support the Royal Navy to respond to the threats of the future. We

are clear that we need industry to play their role to deliver the pipeline on genuinely competitive terms. The MOD will not be able to commit to a continuous shipbuilding pipeline into the future without demonstrating that it will be delivered consistently on a value for money basis. For this to be achieved, industry must improve its efficiency and productivity.

However, the MOD recognises it has a significant role to play in shaping the market. As the Royal Navy moves from a platform-based approach to a more systems-based one, the MOD's approach to the shipbuilding sector must adapt too. Rather than treating the naval shipbuilding sector as a whole, we intend to adapt our approach across six main segments:

- Project Initiation: naval architecture, design, R&D, production engineering and strategy;
- Shipbuilding: fabrication, project management, supply chain management, and the development and maintenance of shipbuilding facilities;
- Commissioning: setting to work, integration, and proving and validation of the ship and its systems;
- Mission Systems: complex systems and components including modularity and autonomy;
- Propulsion and green shipping technologies, including waste treatments; and
- Through-life support, including sustainability.

Using the Type 32 programme as a pathfinder, the NSO and the MOD will work with industry and stakeholders across Government to develop more nuanced and bespoke strategies and plans that will allow the sector and its constituent elements to flourish. We will consider whether the volume and spending on the Government's shipbuilding portfolio is sufficient to sustain a competitive market or whether a more collaborative approach will generate better value for the taxpayer and better industrial outcomes. In particular, we will focus on improving global

competitiveness in these segments by stimulating investment in advanced production techniques and working with industry and the UK Shipbuilding Skills Taskforce to ensure the right skills are in place to support each segment.

The Royal Navy needs industry to deliver beyond the initial ship build; industry must sustain and develop these platforms throughout their lives with maintenance, repair, refit and upgrades. Ship support is a significant portion of the through-life cost of a platform and the Royal Navy will increasingly value supportability from its acquisitions to enable effectiveness and economy from vessel support. The MOD has awarded £5.2 billion worth of contracts as part of the Future Maritime Support Programme for services to support the UK HM Naval Bases. The Royal Navy will also publish a Naval Enterprise Support Strategy to give clear guidance on the Royal Navy's approach to support into the future. This will define the principles and plans for future ship support and provide clear guidance to industry on the Royal Navy's assumptions about workforce and skills, infrastructure, competition, technology and innovation. Across the enterprise, workforce, skills and infrastructure are interchangeable between build and support, creating opportunity to broaden the supply base for support to Government shipping. Digital information and innovative support technologies are critical enablers of productivity and will be central to all future support solutions. UK industry can capitalise upon the naval export programme to use its comparative advantage in key areas of support specialism to scale outputs globally.

Shipbuilding Policy for Defence Vessels

All Royal Navy ships and Royal Fleet Auxiliaries are operated by the UK in support of our national defence and security requirements. From frigates to naval auxiliaries, they contribute to the wide range of defence tasks, in peace or conflict; and it is entirely logical to view them as component parts of a broad maritime defence capability. For national security reasons, the UK needs to maintain a maritime enterprise with the industrial capabilities to design, manufacture, integrate, modify and support current and future naval ships (both Royal Navy and Royal Fleet Auxiliary). DSIS therefore updated review therefore updated the MOD's shipbuilding policy:

The procurement approach for each class of ship will be determined on a case-by-case basis. As well as considering the specific capability requirements, the MOD will consider the long-term industrial impact of different options, including delivering value for money for the overall programme and maintaining the key industrial capabilities required for operational independence. These considerations will determine whether the optimum approach would be a single source procurement, a UK competition, an international competition or a blended competitive approach. The chosen procurement approach will be communicated with industry as early as possible to allow for forward planning.

Overall, the MOD considers that a regular drumbeat of design and manufacturing work is needed to maintain the industrial capabilities important for UK national security and to drive efficiencies which will reduce longer-term costs in the shipbuilding portfolio.



OBJECTIVES TO INFORM SHIPBUILDING PROGRAMMES

DELIVERING THE CAPABILITY

Delivering to budget, both upfront and through-life

Delivering to the required timescales

Adaptability of design for concurrent or future roles

Protecting assured capabilities, where applicable

DELIVERING THE NATIONAL SHIPBUILDING STRATEGY VISION

Incentivising investment in productivity, processes, facilities and infrastructure

Creating and supporting UK jobs

Developing a pipeline of skilled workers

Creating opportunities for UK suppliers where possible

Exceeding our legal requirements on low carbon vessels and technology to reduce UK fleet emissions and encourage green growth

Investing in emerging technologies

Exportability

Figure 4 Shipbuilding policy objectives

Shipbuilding Policy Objectives

In line with the HM Treasury Green Book, when making appraisal decisions, public spend needs to support the Government's strategic priorities. At the same time, in line with the Cabinet Office Social Value Model, outlined below, we will take account of the additional social objectives which are aligned to these priorities.

To provide clarity on what Government intends to achieve through our shipbuilding procurement programmes, our strategic policy objectives for shipbuilding procurements across Government are set out in Figure 4.

The evaluation criteria for each procurement programme will vary to ensure they deliver against the specified time, cost and performance envelope, whilst aligning with the

Green Book and total ownership cost principles, and will include Social Value criteria. All shipbuilding procurement decisions will be informed by these objectives from the outset and throughout. The NSO will work with Departments to identify opportunities to deliver these policy objectives across the commissioning cycle. Departments will be held accountable for delivery against these policy objectives by the Shipbuilding Tsar and Shipbuilding Inter-Ministerial Group.

Procurement strategies must aim to generate competition and innovation in the market and be framed to encourage participation from the UK supply chain (where procurement law and international obligations allow), compliant international players and new entrants, with appropriate use of pre-procurement activities.

Government Procurement Procurement Reform

The Cabinet Office is leading reform of the UK's public procurement regime. The Cabinet Office green paper, launched in December 2020, set out the proposals, including:

- Combining the current regulations (including the Public Contracts Regulations (PCR) and Defence and Security Public Contracts Regulations (DSPCR)) into a single framework, while retaining suitable flexibilities for DSPCR where appropriate;
- Simplifying processes, including cheaper participation, a single digital platform for supplier registration and making opportunities easier to find;
- Overhauling procurement procedures to be more modern and flexible; and
- Opening up public procurement to a more diverse supply base.

Both the green paper and the changes to acquisition set out in the DSIS review identify the need for a modern, flexible and adaptable procurement system. Reforms to procurement regulations governing defence and security will be important to sustaining and growing the industrial capability required to meet the UK's national security interests.

Social Value Model

Social value is the consideration of all significant impacts of Government projects and programmes, for example the relevant social, economic and environmental impacts. Government shipbuilding programmes are well-placed to contribute to UK prosperity and social value across a range of areas, where procurement law and international obligations allow. These include supply chain competitiveness, skills development, increased representation of under-represented groups,

strengthening local communities, encouraging exports, inward investment and reducing environmental impact. The Social Value Model articulates the areas of current priority focus for social value delivery in the form of the following policy themes and outcomes:

- COVID-19 recovery, including helping local communities manage and recover from its impact;
- Tackling economic inequality, including creating new businesses, jobs and skills, as well as increasing supply chain resilience;
- Fighting climate change, effective stewardship of the environment;
- Equal opportunity, including reducing the disability employment gap and tackling workforce inequality; and
- Wellbeing, improving health and wellbeing and community integration.

The themes and policy outcomes within the Social Value Model must be considered at pre-procurement and where relevant to the procurement. As of 1 January 2021 for PCR and 1 June 2021 for DSPCR and those exempt from the Regulations, a minimum 10% social value weighting should be applied to evaluations in new competitions. To ensure fairness and effective focus, the key social value themes and policy outcomes that are relevant to each procurement will be determined early in the development of the acquisition strategy. We will use social value to maximise opportunities for UK suppliers wherever procurement law and international obligations allow. For MOD shipbuilding competitions, a minimum 20% weighting for social value will be applied.

SME Opportunities

The Government is committed to supporting SMEs and start-ups through its procurement programmes, including shipbuilding. By increasing spend with SMEs, the Government aims to develop

a more diverse supplier base for Government contracts and drive value for money through increased choice and competition. As set out in the Transforming Public Procurement green paper¹⁶, the Government's goal is to speed up and simplify procurement processes; place value for money at their heart; and create opportunities for small businesses, charities and social enterprises to innovate in public service delivery.

The Government is also supporting SME procurement by disaggregating contracts into smaller chunks where appropriate; transparently publishing contract pipelines; allowing below threshold contracts to be reserved for SMEs in certain circumstances; and removing complexity from the bidding process.

The new social value approach will also create opportunities for SMEs and social enterprises to demonstrate the full extent of the value they can generate.

Early market engagement on the programmes within the 30 Year Cross-Government Shipbuilding Pipeline will allow procurement teams and the NSO to build greater knowledge and understanding of the shipbuilding supply chain and how SME participation can be encouraged.

Steel

The Government recognises that global economic conditions continue to be challenging for the steel sector and it is working closely with the industry, the Unions and Devolved Administrations to develop a long-term viable solution for the UK steel industry. The joint industry and BEIS Steel Procurement Taskforce was launched in March 2021, with the aim of working with the sector to promote the unique selling points of UK steel and explore how best to support and position the industry for success in forthcoming major public contracts.

The Government has introduced public procurement guidance for steel, which ensures that Government and the wider public sector take into account broader social and environmental benefits when procuring and designing their major projects.

BEIS also publishes the annual Steel Pipeline of upcoming national infrastructure projects, to enable steel businesses to plan ahead for future demand. This includes major shipbuilding programmes, like Type 31 and Fleet Solid Support ships.



Case Study: RRS Sir David Attenborough

The most recent example of the UK government procuring a non-naval ship is the RRS Sir David Attenborough. Procured by the BEIS-funded National Environmental Research

Council, through an international competition, this impressive ship was built in the UK by Cammell Laird. This iconic shipyard has delivered one of the world's most advanced research vessels and has demonstrated that UK shipyards can compete for and build specialist vessels, and support regional jobs and skills:

1,300

local people employed directly and through the supply chain on the RRS Sir David Attenborough and other contracts within the yard.

250

additional local people recruited.

50

additional people recruited in the supply chain.

70

apprentices gaining experience by working on the new polar research ship. Cammell Laird runs one of the biggest apprentice programmes in the region, recruiting around 22 apprentices a year.

¹⁶ <https://www.gov.uk/government/consultations/green-paper-transforming-public-procurement>

Technology and Innovation as Enablers of Productivity and Competitiveness

Chapter 4

Rejuvenating the UK shipbuilding sector is not a matter of Government buying more naval vessels or adopting protectionist policies. To achieve a future where UK shipyards and suppliers are prospering, with full order books, requires businesses to be winning commercial shipbuilding contracts in the specific market areas we are aiming to target, as well as public sector orders, and winning business in domestic and overseas markets. In turn, this depends upon concerted action across a range of factors simultaneously. Government can send a demand signal through procurement opportunities, but investment is needed by both industry and Government to improve the productivity and competitiveness of our shipyards.

A range of factors contribute to productivity and overall competitiveness. These include volume and throughput (covered by demand signal in Chapter 3 and exports in Chapter 5) and skills (Chapter 6). Technology and innovation have a significant role to play, both in terms of manufacturing technology to improve productivity and product innovations which will help to ensure UK industry is at the forefront of the market sectors where it is best placed to compete. Both are reflected in the missions set out in the Levelling Up White Paper.

As set out in the Government's Maritime 2050 Strategy¹⁷, published in 2019, future changes in technology will change the way in which the maritime sector operates, driving performance enhancements and creating opportunities for maritime businesses to take better decisions. The Government is determined that the UK should be world leading in the design, manufacture, uptake, and use of smart shipping technologies. The UK shipbuilding industry will also be able to build on the recent progress across a wide range of zero emission technologies, from battery technology developed within the UK automotive industry to its competitive advantage in hydrogen and ammonia fuel technologies¹⁸, to support the achievement of the Government's ambitious climate change targets whilst delivering value to the UK economy. That is why technology and innovation are at the core of our vision for the future of the UK shipbuilding enterprise.

We recognise the role that Government must play in the adoption of zero emission technologies. Government will explore options to incentivise the take-up of these technologies and cooperate with industry to turn their innovations to market-ready offerings, with the objective of meeting our carbon net zero target by 2050 and ensuring that industry is at the forefront of a burgeoning global market.

¹⁷ <https://www.gov.uk/government/publications/maritime-2050-navigating-the-future>

¹⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815664/clean-maritime-plan.pdf

Technology and innovation also matter to Government as a customer. To ensure the UK shipbuilding enterprise is prepared to deliver the battle-winning capabilities the Royal Navy needs, we must also set clear technology priorities for Royal Navy vessels. These will underpin the Royal Navy elements of our 30 Year Cross-Government Shipbuilding Pipeline.

To deliver the shared vision, UK industry must build upon its areas of strength. This is particularly true at a local level. The shipbuilding enterprise spreads across the length and breadth of the UK, supporting communities around the nation. These communities are already building expertise in particular technologies and demonstrating how industry, academia and Government (both local and national) working together with an enterprise approach can deliver real benefits.

BEIS is leading the drive across Government to grow the economy through a renewed focus on R&D and innovation. Following the publication of the R&D Roadmap¹⁹, the Government is taking forward an ambitious programme of work to achieve our ambition of becoming a global science superpower and meeting the target of

total UK investment in R&D reaching 2.4% of GDP by 2027.

The UK Innovation Strategy²⁰, published in July 2021, sets out the Government's vision of making the UK a global hub for innovation by 2035. The strategy commits to an ecosystem of support for private sector innovation by making the most of the UK's research, development and innovation system. It brings together businesses, government, R&D-performing organisations, finance providers, funders, international partners and others to deliver productivity gains and greater levels of international competitiveness within high growth sectors. The Levelling Up White Paper will help to ensure the R&D system is able to contribute to the levelling up agenda to benefit all parts of the UK.

In the shipbuilding context, BEIS has been working with the Maritime Enterprise Working Group to promote opportunities for supporting R&D across the shipbuilding sector. This work has been particularly focussed on research and innovation which will support the adoption of advanced manufacturing techniques to improve productivity, efficiency and therefore competitiveness.



19 <https://www.gov.uk/government/publications/uk-research-and-development-roadmap>

20 <https://www.gov.uk/government/publications/uk-innovation-strategy-leading-the-future-by-creating-it>

UK Research and Innovation

The Government has long recognised the importance of growing our research and innovation base as a foundation for economic growth. UKRI's vision is for an outstanding research and innovation system in the UK that gives everyone the opportunity to contribute and to benefit, enriching lives locally, nationally and internationally.

UKRI supports the underpinning research, innovation and technologies that are required for a thriving shipbuilding industry and wider maritime sector. It helps industry to develop and harness new technologies to capture emerging market opportunities and, in particular, solutions that put the UK on the path towards its net zero ambitions. UKRI achieves this through its investment in key institutions, competitive funding programmes and targeted business support. Place-based programmes such as the Strength in Places Fund support innovation in clusters while open competition calls provide an opportunity for innovative ideas that sit outside of prescribed challenges.

UKRI and Innovate UK deliver a range of programmes that support manufacturing productivity improvements and offer competitive advantage in the marketplace. This support includes the **Catapult network**²¹, such as the High Value Manufacturing Catapult which provides centres of excellence in locations including Coventry, Liverpool, Rotherham, and Renfrewshire, through which developments can be explored and piloted.



There are a number of projects already underway in this space.

For example:

- The Driving the Electric Revolution challenge has provided support to the Centre for Clean Mobility at Exeter University to develop hybrid and electric powertrains for marine vessels.
- Babcock are developing fuel cell and battery technologies for marine applications working with the High Value Manufacturing Catapult centre at Warwick University manufacturing group.

²¹ Catapults are physical centres with cutting-edge R&D infrastructures including hubs, laboratories, testbeds, factories and offices, as well as technical experts that prove and adopt breakthrough products, processes, services and technologies - <https://catapult.org.uk/>

Case Study: Zelim

Zelim, a marine technology start-up founded in Wales, develops uncrewed search and rescue vessels servicing the offshore wind, commercial shipping and oil and gas sectors. The service operates around the clock to protect pioneering personnel in these hostile environments whilst minimising the need for in-field standby vessels.

Zelim is on course to launch their first commercial offering in 2022. It is the first step in their vision to make uncrewed search and rescue the new standard globally across marine sectors. Zelim's flagship autonomous vessel, Survivor One, was trialled at the QinetiQ Haslar Ocean Basin Test and Evaluation facility and achieved the world's first uncrewed casualty recovery performed in open water in autumn 2020, conducted under the Maritime Autonomous Surface Ships Code of Practice.

As a company founded in Wales, Zelim have been the recipient of two SMARTCymru grant schemes and an innovation voucher. The company has also been awarded three separate Innovate UK project grants, as well as grant support from the Offshore Wind Growth Partnership and support from the UK Government funded Offshore Renewable Energy Catapult. These funds have accelerated Zelim's growth, with the company attributing their achievements, in part, to this support.

Building on these examples and leveraging the innovation and R&D programmes provided by Government support will be essential as the shipbuilding sector works with Government to invest in their productivity and competitiveness.

The Government will continue to work with the SEG to promote existing opportunities and develop new ones, to ensure the shipbuilding sector can achieve maximum benefit. Government will work to target awareness of Innovate UK and UKRI opportunities to the marine engineering community. Alongside Innovate UK, we will engage with developing regional clusters to identify where they could access or apply for specific programme support to enable their growth.

As well as the UK-wide support available through UKRI and Innovate UK, the Devolved Administrations also offer a range of additional

support for R&D. Scottish Enterprise is Scotland's national economic development agency. It is committed to growing the Scottish economy for the benefit of all, helping create more quality jobs and a brighter future for every region. In Northern Ireland, Invest NI offers a range of support for innovation and R&D, including Innovation Vouchers and funding for businesses which are new to R&D or seeking support for follow-on R&D.

The Welsh Government, in line with their Economic Action Plan and Wellbeing of Future Generations Act, is committed to supporting inclusive and sustainable business growth. The Business Wales 'Innovation Zone'²² provides a link to a suite of innovation support for businesses with a footprint in Wales, looking to become more competitive, increase sales and enter new markets. This support is structured to reduce both the technical and financial risks of investing in R&D and innovation. It provides

²² <https://businesswales.gov.wales/innovation/>

tailored advice from technical specialists, access to SMARTCymru funding and facilitates opportunities for collaborations with industry and/or research organisations within Wales, the wider UK and internationally.

Centres of Excellence

As part of its work to improve the competitiveness of the UK shipbuilding sector, the Maritime Enterprise Working Group has explored whether Centres of Excellence could help to improve productivity. Maritime Research and Innovation UK (MarRI-UK) has carried out investigations into this option to understand where there are opportunities for collaboration around Centres of Excellence and where investment can be shared and coordinated. Centres of Excellence could be transformative for the UK shipbuilding enterprise, offering the opportunity to consolidate elements of the shipbuilding value chain to focus on quality and efficiency. These centres would support domestic shipbuilders, but by building renowned expertise they could also support the export market.

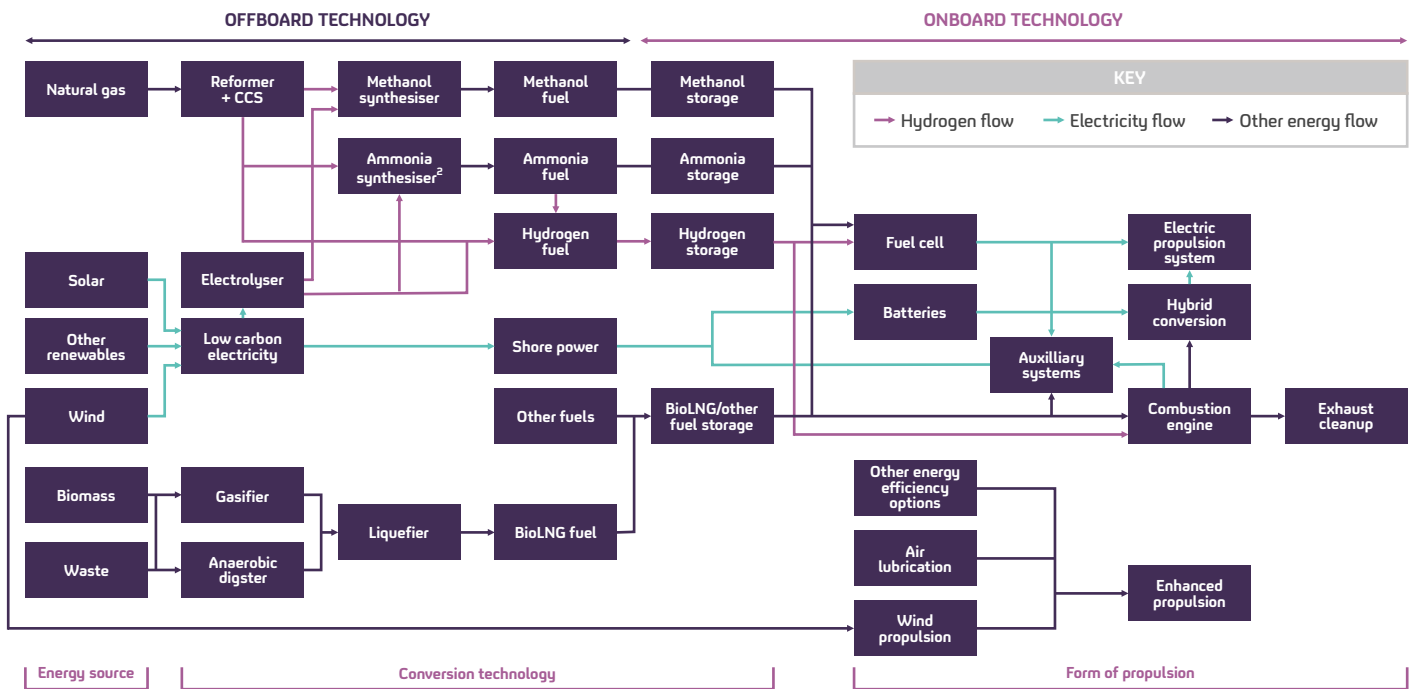
Building on the work of MarRI-UK, one of the initial priorities for the SEG will be to identify

priority aspects of the shipbuilding value chain where Centres of Excellence would be expected to deliver benefits. These should focus on areas where the UK shipbuilding enterprise already has particular strengths, as well as areas where consolidation would help to improve overall competitiveness. This will report to the SEG Steering Board to allow industry to work with the NSO to develop business cases for investment in those which industry wish to progress.

The Shipyard of the Future

To play its role in achieving the jointly agreed vision for the future, UK industry must have a clear understanding of where investment and action is required within their businesses to achieve global competitiveness for their market segment. Industry must be able to recognise what international best practice looks like, not just for today but for the future. The SEG will therefore develop a model for the Shipyard of the Future. This will be a modern, efficient shipyard which draws on advanced manufacturing technologies, like robotics and automation, and is digitally integrated with the broader supply chain. The model will set out in detail what other technologies, processes and





1 Steam Methane Reformer (SMR) + Carbon Capture & Storage (CCS) 2 Equipment used for Haber Bosch process Source: Frontier Economics for DfT

Figure 5 Technologies and fuels on a pathway to zero-emission shipping

practices will define the shipyard of the future. This will provide a benchmark for UK shipyards to understand where investment should be prioritised. The NSO will then work with shipyards and potential investors to understand how Government procurement programmes can support the realisation of the Shipyard of the Future.

The Green Maritime Revolution

With the global transition to clean shipping underway, commercial ship construction is becoming increasingly hi-tech. Countries which can master new and cleaner forms of propulsion – ammonia, hydrogen and battery – will have the edge. Climate change is pressing the reset button and the UK, with our technological and skills base, is set to capitalise on this revolution. The UK has the opportunity to become the high-end shipbuilder of choice.

In 2018, the International Maritime Organization (IMO) agreed an initial strategy to reduce emissions of greenhouse gases from shipping by

at least 50% by 2050 compared to 2008, while pursuing efforts to phase them out entirely. The UK was a leading voice in the negotiation of that strategy. Ahead of the strategy's revision in 2023, we will work together with other Member States to ensure the strategy is fit for purpose to stay on a 1.5°C pathway²³. As part of this, we will be championing a target of zero emissions from international shipping by 2050. On domestic shipping emissions, the UK has published our own national action plan on shipping emissions, the Clean Maritime Plan²⁴. This outlined the UK's commitment to ambitious action on domestic shipping emissions, in line with our world-leading commitment to reduce emissions of greenhouse gases across the economy to net zero by 2050.

Acting on maritime decarbonisation is a key step to achieve the Government's net zero target, as the UK domestic shipping sector is a significant source of greenhouse gases. In 2019 it accounted for 5% of the UK's transport emissions, more than the bus and rail sector combined²⁵. In the absence of Government intervention, it is estimated that the total greenhouse gas emissions from UK domestic and international shipping could rise by around 80% between 2016 and 2050²⁶.

23 Limiting global warming to no more than 1.5°C more than pre-industrial levels.

24 <https://www.gov.uk/government/publications/clean-maritime-plan-maritime-2050-environment-route-map>

25 <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2018>

26 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/816018/scenario-analysis-take-up-of-emissions-reduction-options-impacts-on-emissions-costs.pdf

The challenge of climate change is faced by countries around the world and the global transition to zero emission transport is now shaping international markets. This will involve a transformation of the shipping industry, as well as port and bunkering infrastructure. While certain fuels would be phased out, the transition will bring opportunities through new technology and fuel sectors and related supply chains. New vessel types, designs, components and accompanying supply chains will be required to take the industry to a sustainable future. Figure 5 summarises a range of technologies and fuels which may have the potential to play a part in the global transition to zero emission shipping.

The Clean Maritime Plan set out the Government's expectation that by 2025, all new vessels being ordered for use in UK waters will be designed with zero emission propulsion capability, recognising the fleet turnover lead times to achieve the net zero target by 2050²⁷. However, Government-commissioned research identified a series of market failures and other barriers to the commercial deployment of emission reduction options, making an industry-led transition to zero emission shipping more challenging²⁸.

The sector has begun to decarbonise, but with new technologies only now reaching the stage of mass testing and initial deployment, customers and industry must increase the pace to enable significant fleet-wide emissions reductions in the 2030s. Shipping can achieve net zero through a transition to alternative fuel powered vessels using energy from renewable sources (notably hydrogen and ammonia created by low carbon production methods such as electrolysis with renewables or methane reformation with carbon capture, utilisation and storage) or highly efficient batteries, and through the integration of ports into the decarbonised energy network²⁹.

Case Study: Artemis Technologies

The Decarbonisation of Maritime Transportation project in Belfast, delivered through the UK Government's Strength in Places Fund, will build on Belfast's maritime heritage and world-leading expertise in advanced manufacturing and renewable energy. A 13-partner consortium led by Artemis Technologies was awarded a £33 million grant to develop zero emissions ferries in Belfast. With further investment from consortium partners, the total project investment will reach close to £60 million over the next four years, creating an initial 125 R&D jobs, and leading to more than 1,000 in the region over the next ten years. It will also help make Belfast Harbour one of the world's most environmentally friendly regional ports.

Utilising Belfast's advanced manufacturing clusters, the Belfast Maritime Consortium, working with the local supply chain, will produce the world's first autonomously controlled fully submerged electric hydrofoiling vessel and develop the technical and operational requirements for a maritime transport system of the future.

The Artemis Technologies eFoiler Propulsion-System, which combines ultra-high density electric propulsion from F1 with autonomously controlled carbon fibre hydrofoils from the America's Cup, will provide the first solution for the early adoption of high-speed zero-emissions maritime transport.

27 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815664/clean-maritime-plan.pdf

28 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815671/identification-market-failures-other-barriers-of-commercial-deployment-of-emission-reduction-options.pdf

29 <https://www.gov.uk/government/publications/clean-maritime-plan-maritime-2050-environment-route-map>

The Government is firmly committed to achieving net zero as soon as possible. There is evidence that the maritime sector may be able to achieve net zero earlier than 2050, with modelling undertaken for DfT suggesting such a transition may be possible in the 2040s. The Government will actively explore the possibility of achieving early decarbonisation. The Transport Decarbonisation Plan³⁰, published in July 2021, set out the policies and plans needed to tackle transport emissions, including from the maritime sector.



In April 2021, through its sixth Carbon Budget, the UK Government set in law the world's most ambitious climate change target, cutting emissions by 78% by 2035 compared to 1990 levels. This would bring the UK more than three-quarters of the way to net zero by 2050.

For the first time, this will incorporate the UK's share of international aviation and shipping emissions. These emissions are an important part of our overall decarbonisation efforts and this change allows for these emissions to be accounted for consistently with other emissions included within the sixth Carbon Budget.

The Government remains committed to multilateral action on international shipping emissions through the IMO process. We will continue to play a leading role, working through the IMO and with our international partners, to develop and agree global solutions for international shipping emissions.

The UK is also working closely with industry, other states, and non-state actors to explore opportunities for green shipping corridors – a specific route between two or more ports on which zero-emission shipping solutions are demonstrated and supported – to deliver on our commitments under our COP 26 initiative, the Clydebank Declaration. Green corridors are widely seen as a means to accelerate the tipping point for maritime decarbonisation, which can complement our domestic and international efforts.

In March 2021, the MOD published its Climate Change and Sustainability Strategic Approach. This set out the intent for the MOD to exploit low carbon technological opportunities from across industry and integrate sustainability and emissions requirements into future procurements.

Markets for many of the technologies in Figure 5, which depicts the sole alternative fuel technologies, are in early development and there remain opportunities for countries to build up expertise or dominance in wide parts of the zero-emission shipping supply chain. Research commissioned by the Government has assessed the UK's competitiveness across 11 key maritime emission reduction options, and found that the UK has strengths which may allow it to compete in a range of markets, particularly in those which relate to low or zero carbon fuels³¹. This represents a significant opportunity for the UK to carve out its place within the future global shipbuilding market. The export opportunity created by this global shift and how Government intends to support industry to seize this are covered in Chapter 5.

Given the complex stakeholder and regulatory environment associated with maritime decarbonisation, a joined-up and comprehensive approach is required across Government. The NSO will establish a dedicated Green Maritime Technology Forum that will help to identify,

30 <https://www.gov.uk/government/publications/transport-decarbonisation-plan>

31 Frontier Economics, E4tech and UMAS (2019) Reducing the Maritime Sector's Contribution to Climate Change and Air Pollution. Economic Opportunities from Low and Zero Emission Shipping. A report for the Department for Transport

analyse, plan and execute the steps required to reach maritime decarbonisation targets, with a particular focus on how the 30 Year Cross-Government Shipbuilding Pipeline can support this.

As the birthplace of the transition from sail to steam, the UK has a long and deep history in the development of ships and maritime technologies. Once again there exists the opportunity for the UK to be at the forefront of a technological revolution in innovation in ship design and technology.

UK Shipping Office for Reducing Emissions

The Government fully recognises the opportunity created by the green maritime revolution and is committed to working with industry to ensure the UK is best placed to capitalise on it and secure economic benefits from the transition to net zero.

In March 2021, DfT launched a £23 million Clean Maritime Demonstration Competition (CMDC), which aims to accelerate the design and development of zero emission vessels in the UK and support cleaner, greener ports.

The CMDC builds on the vision set out in Maritime 2050 and the Clean Maritime Plan and underlines the Government's commitment to addressing emissions from this sector. Announced as part of the Prime Minister's Ten Point Plan for a Green Industrial Revolution³², this competition match-funds UK industry's feasibility studies and technology trials, laying the groundwork for further Government and private investment to accelerate the sector's decarbonisation.

The CMDC was significantly oversubscribed with quality submissions, demonstrating the UK industry's capabilities and appetite to invest in clean maritime technologies. The Government announced the winners of the CMDC at London International Shipping Week in September 2021³³, with funding allocated to 55 projects

supported by 208 organisations across the UK. These include shipbuilders, ship operators, ports, the advanced manufacturing supply chain, and academia. These consortia demonstrate the breadth and width of the maritime sector's capabilities and its ability to deliver innovation through collaborations, breaking traditional silos. A UK map of the organisations supporting CMDC projects is provided at Figure 6, showing the significant level of industry engagement in this programme.

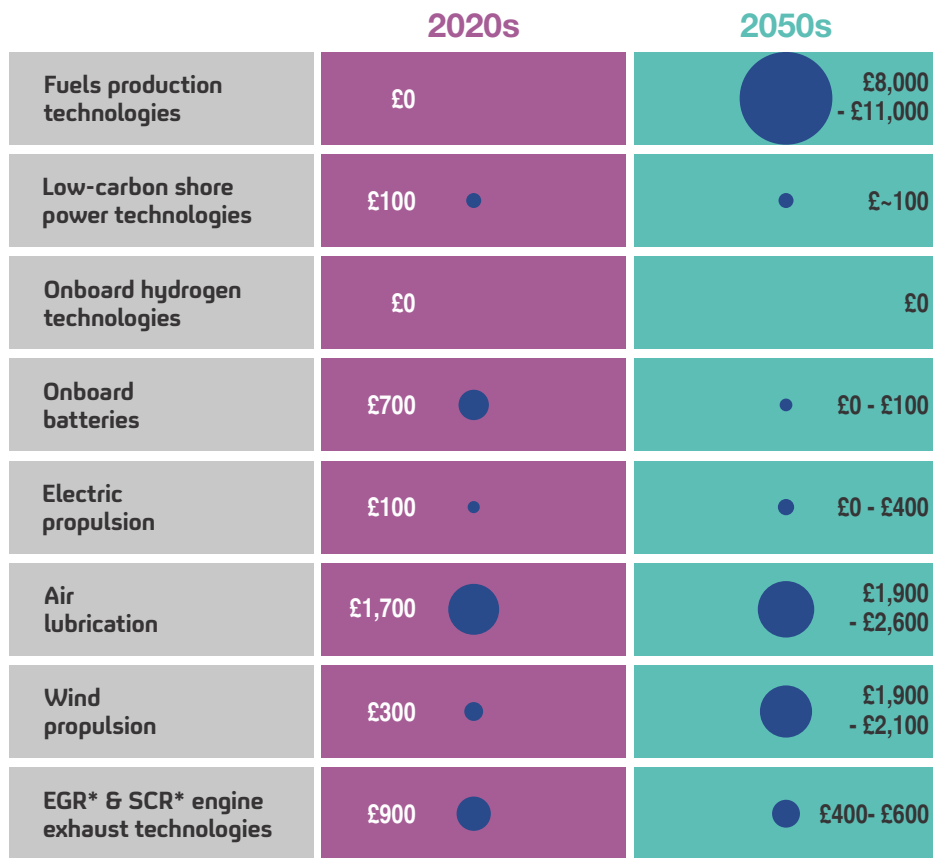
The Government will extend the CMDC to a multi-year programme. This was announced in the Net Zero Strategy³⁴, published in October 2021, which set out policies and proposals for decarbonising all sectors of the UK economy. The multi-year CMDC, confirmed in the Autumn Budget and Spending Review 2021³⁵, will deliver real-world demonstrations and technology trials of clean maritime vessels and infrastructure to decarbonise the maritime sector.



Figure 6 Map of Clean Maritime Demonstration Competition Winners

³² <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution>

³³ <https://www.gov.uk/government/publications/clean-maritime-demonstration-competition-cmdc>



Source: Frontier Economics for DfT
Exhaust Gas Recirculation & Selective Catalytic Reduction

Annual global market potential in GBP million per year, 2016 prices

Figure 7 Potential annual future global market for maritime emission reduction options

DfT has also announced the establishment of a maritime future technology function within the Maritime and Coastguard Agency (MCA). This will act as a non-regulatory centre of technical expertise in the research and development of zero emission and autonomous vessel technology. It will facilitate the implementation of emerging technologies on a case-by-case basis, acting as an interface between industry and the policy function by guiding innovators through the regulatory process, supporting both the UK flag and UK maritime businesses. Learning from these projects will enable the MCA to guide and support regulatory change, scanning future requirements to adapt and evolve regulation to support the market uptake of zero emission technologies.

The creation of this maritime future technology function implements and builds upon the commitment in the Clean Maritime Plan to establish an emission advisory service supported by the Maritime and Coastguard Agency to provide dedicated support to innovators using zero emission propulsion technologies, assisting them through the regulatory process. The Maritime and Coastguard Agency is also one of the founding members of the Maritime

Technologies Forum, a group of Flag States and Classification Societies which will provide technical and regulatory research, expertise and leadership to help the maritime industry address technology challenges like energy efficiency, alternative fuels and autonomy.

Building on the success of the CMDC, the Government will further increase our level of ambition by investing £206 million to establish a **UK Shipping Office for Reducing Emissions**. This is a unit within the Department for Transport focused on decarbonising the maritime sector.

UK-SHORE will deliver a suite of interventions inspired by our experience of decarbonising other transport modes. It will look at programmes such as the Office for Zero Emission Vehicles and the Future Fuels for Flight and Freight Competition, transforming the UK into a global leader in the design, manufacture and operation of clean maritime technology.

UK-SHORE will manage the implementation of the multi-year CMDC and will work in partnership with industry to tackle supply and demand side barriers, as well as developing infrastructure and consumer confidence in zero emission technologies.

Case Study: Decarbonisation Roadmaps

In 2020, the FCDO, working with DfT, commissioned two roadmaps to drive decarbonisation in maritime industry subsectors in which the UK holds competitive advantages. Produced in collaboration with industry experts, the reports offer solutions for policymakers and industry to overcome barriers to the supply and demand of zero carbon recreational craft and offshore wind operations and maintenance vessels in the UK and Europe.

Recreational Craft

The UK is a significant recreational craft boatbuilder. These vessels, used for sporting and recreational purposes with hull lengths between 2.5 and 24 metres, contributed almost £1.6 billion to UK exports in the year to September 2020. Produced by the Carbon Trust, the report:

- Shows the pathway to decarbonising part of the domestic maritime sector, which is included in the UK's legally binding 2050 net zero target;
- Helps the UK gain an early-mover advantage in zero emission boatbuilding, as the industry transitions; and
- Develops the UK's new trading relationship with individual European states, to grow our boatbuilding industry's exports.

This report can be found at:

<https://www.gov.uk/government/publications/decarbonising-recreational-vessels-in-the-uk-and-europe-roadmap>

Offshore Wind Operations and Maintenance

Following rapid growth, the UK and the wider North Sea region lead the world in offshore wind energy production, supporting over 7,000 jobs in the UK. However, windfarm operators rely on Crew Transfer Vessels and Service Operation Vessels for the operation and maintenance of these windfarms, the vast majority of which use heavily polluting Marine Gas Oil. The report, produced by the Offshore Renewable Energy Catapult and Workboat Association:

- Illustrates the potential of these vessels to be a 'springboard' industry, providing examples of early adoption of technologies and market models that can assist broader maritime decarbonisation, as well as serve as an example as offshore wind picks up pace worldwide; and
- Promotes wider sustainability in the offshore wind sector as it continues to grow to meet our clean energy needs.

The report can be found at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/991319/decarbonising-maritime-operations-in-north-sea-offshore-wind-o-and-m.pdf

Through R&D investment via UK-SHORE, the Government will tackle the technical barriers that innovators, shipbuilders, their supply chain, as well as port and ship operators face in adopting clean propulsion technologies and advanced materials, helping to bridge the gap between these and conventional solutions, driving the UK towards our domestic net zero targets.

The Government's multi-year intervention under UK-SHORE will have a direct impact on our domestic ferries and lifeline services, reducing emissions while contributing to Government efforts to level up across the UK. It will bring jobs and opportunities to the shipbuilding and manufacturing sectors, and direct economic benefit to our coastal communities.

UK-SHORE will help overcome market failures that delay an industry-led transition to zero emission shipping. Government-commissioned research set out that, among other things, market failures and other barriers to the commercial deployment of maritime emission reduction options include³⁶:

- Split incentives to invest: ship owners have little incentive to invest in fuel efficiency or emissions abatement options because, if chartering costs remain the same, it is likely to be the charterer that benefits primarily from the fuel savings.
- Coordination failure: ports are unlikely to invest in the refuelling infrastructure for zero emission shipping until the demand can be credibly demonstrated. Shipowners are unlikely to invest in zero emission vessels until the infrastructure is readily available.
- Long life of existing assets: ships have long lifespans of perhaps several decades, which could delay fleet renewal and the introduction of zero emission vessels.

Through UK-SHORE, DfT will continue to work with industry to unlock the necessary private investment in clean maritime technologies. The

coordinating function of UK-SHORE will help industry to capitalise on the emergence of new clean maritime markets. UK-SHORE will liaise closely with the NSO to ensure that a strategic approach is adopted to accelerate the transition to zero emission shipping across the enterprise. It will also work with the MCCO to help channel sectoral investment into existing maritime infrastructure and networks, revitalising UK shipyards and enabling local regeneration programmes.

Relaunching our shipbuilding hotspots across all parts of the UK will create new jobs and opportunities across these communities, levelling up local economies and helping to secure a more prosperous future for generations to come. A green industrial revolution will transform the shipbuilding enterprise into a technological powerhouse, building the UK industry's competitiveness.

We will deliver on this ambitious programme in parallel with regulatory changes and other levers, ensuring a strategic approach to the transition to zero emission shipping. DfT is working actively at both the IMO, and domestically, on regulatory interventions to support and direct the decarbonisation of the shipping industry, with a particular near-term focus on energy efficiency measures to improve the performance of conventionally fuelled ships as a way to peak and reduce emissions from the sector before cleaner options become commercially viable.

In 2021, DfT published a Transport Decarbonisation Plan, setting out the policies needed to tackle transport emissions, including from the maritime sector. In particular:

³⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/815671/identification-market-failures-other-barriers-of-commercial-deployment-of-emission-reduction-options.pdf

Following consultation, we have made renewable fuels of non-biological origin used in shipping eligible for incentives under the Renewable Transport Fuels Obligation.

We are consulting on the appropriate steps to support wider deployment of shore power, including potential regulatory interventions, for both vessels and ports.

We will establish, after public consultation in 2022, an ambitious 'Course to Zero', helping the UK domestic maritime sector to reach net zero through indicative targets from 2030 and helping the UK meet its net zero by 2050 target.

Following the conclusion of the current CMDC and the Course to Zero consultation, we will consult in October 2022 on the potential for accelerated decarbonisation through carefully designed, well-signposted measures to phase out the sale of new, non-zero emission domestic vessels in the UK.

Building on Maritime 2050, the Clean Maritime Plan and our published research, we will further investigate how economic instruments could be used to accelerate the decarbonisation of the domestic maritime sector.

The development of zero emission technology and infrastructure in the UK through the CMDC and UK-SHORE alongside regulatory and direct intervention from Government form part of a coherent strategy to decarbonise the maritime sector, fast-tracking the transformation of the

enterprise and the wider maritime sector. The Government intention is to bring all this together as part of a refresh of the Clean Maritime Plan, to be published in 2023. This new Plan will identify clear milestones and actions to spark the transition to net zero maritime, as we lead the industries of the future.



Building Shipbuilding Opportunity into Clean Energy Developments

Alongside the Prime Minister's Ten Point Plan for a Green Industrial Revolution and Energy white paper³⁷, in August 2021 the Government published the UK's first ever Hydrogen Strategy³⁸.

This sets out a comprehensive approach to achieving our ambition for five Gigawatts of low carbon hydrogen production capacity by 2030, and to building a UK hydrogen economy that is fit for purpose to deliver the level of low carbon hydrogen essential to meet net zero by 2050.

The UK Government is exploring all options for low carbon hydrogen transport across freight, buses, trains, maritime, and aviation – alongside use in other sectors including industry, heat and power – to ensure that the UK can lead the world in its deployment and use across the economy. BEIS and DfT are working together to explore the possibilities hydrogen can offer in the maritime sector.

The findings of research commissioned by the Government suggest that the use of hydrogen or hydrogen-based fuels (such as ammonia) will be essential to achieve deep reductions in the greenhouse gas emissions from UK shipping, and that a major switch to hydrogen-based fuels has the potential to contribute significantly to reducing the greenhouse gas emissions from UK shipping to close to zero by 2050³⁹.



Case Study: Hydrogen vessels in the Orkney Islands

The HyDIME (Hydrogen Diesel Injection in a Marine Environment) project in Orkney involves the design and integration of a hydrogen diesel dual fuel injection system on board an existing commercial ferry. The ferry operates between Kirkwall and the island of Shapinsay and will use hydrogen produced from renewable energy by the Orkney-based European Marine Energy Centre (EMEC).

HySeas III is the final development stage of a programme to deliver what the team hopes will be the world's first sea-going vehicle and passenger ferry that will employ carbon-free hydrogen as its energy source. The vessel is planned to operate in and around Orkney and will use hydrogen which is currently being produced on the islands from renewable energy.

Case Study: Tees Valley Hydrogen Transport Hub

The Tees Valley Hydrogen Transport Hub is envisioned as a large-scale, long-term initiative, to make the region and the UK a world leader in hydrogen powered transport R&D. The hub will bring together Government, industry and academia to focus future hydrogen research and development, real world testing and demonstrations. The hub will act a living lab to understand green hydrogen's role in transport decarbonisation including shipping, and in the coming year residents of the Tees Valley are likely to see a number of hydrogen powered vehicles on public roads, along with at least one hydrogen refuelling station, as small-scale pilots are launched as part of the Hub's first year of activity.

A masterplan for the hub has been completed which sets out a vision and a blueprint for the infrastructure and types of trials required to deliver against that vision. The blueprint can be applied to other areas of the UK.

³⁷ <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

³⁸ <https://www.gov.uk/government/publications/uk-hydrogen-strategy>

³⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/816018/scenario-analysis-take-up-of-emissions-reduction-options-impacts-on-emissions-costs.pdf

Home Shipbuilding Credit Guarantee Scheme

Another important element of the competitiveness of the UK shipbuilding enterprise is the ability to access finance. The Government is committed to helping to address potential gaps in access to finance in order to support a globally successful, innovative and sustainable shipbuilding industry, particularly focussing on the construction of high value, low carbon, complex vessels. From our engagement to date with the ship and boat building sector, ship buyers and owners, intermediaries, and banks, we understand there is an appetite to re-establish a credit guarantee scheme for domestic building for domestic operation.

BEIS will engage further with stakeholders to develop a more detailed model for a Home Shipbuilding Credit Guarantee Scheme, which could guarantee up to 80% of the purchase price of UK built ships. We intend to announce and launch the scheme in May 2022. This further engagement will focus on how the scheme will operate, how we maximise the opportunity of such an intervention for UK industry and how we deliver greatest value for the UK taxpayer. If this engagement provides a need or opportunity to, we would also consider if other options might better achieve the same outcome.

Place-Based Initiatives

Maritime 2050 set out how close collaboration in clusters of industry and academia, working with Government, can create dynamic and innovative synergies. These attract highly skilled and ambitious people, thereby bringing economic opportunities to the global maritime sector. Clustering is a prime example of how a unique and attractive business environment can be created amongst small and large businesses, academia and Government and the shipbuilding enterprise has an important role to play as part of these maritime clusters. Clusters create a critical mass of expertise and skills. Their partnership and close working drive innovation and ambition. For global companies

considering where to locate their businesses, a cluster is a highly attractive one-stop shop where efficiencies in their operations can be realised. The cluster has a multiplying effect: the more it fosters innovation and expertise the more that it attracts the brightest and best from the workforce.

Strong, lively clusters across the UK will deliver a breadth of expertise, resilience, and thought exchange, bringing a range of maritime resources that can be used to support business and the UK economy and ensure we maintain a strategic advantage. Further enhancing cooperation and linkages between all elements of the maritime sector and with Government and its agencies will create an even more powerful and innovative clustering effect. UK clusters will be crucial to driving our response to new technologies. Clusters will be key to identifying where improvements to performance can be made from new digital tools. Equally, the UK will take advantage of other new opportunities, such as the continued drive towards renewable energy where clusters of businesses will support the research, construction, and installation of renewable energy infrastructure at sea. The Clean Maritime Plan included the commitment for Government to undertake a study to identify and support potential UK zero emission shipping clusters⁴⁰.

With the geographic spread of the shipbuilding enterprise spanning the whole of the UK, growing a thriving shipbuilding sector will undoubtedly contribute to levelling up the UK economy by building on the technological strengths of our local areas throughout the supply chain; current examples include cyber expertise in Wales to marine fit-out in Northern Ireland.

Regional and local collaboration is already allowing the Solent and the South West of England to build a reputation for expertise in marine autonomy. The South West is home to a range of UK vessel producers including BAE Systems, Autonaut Ltd., M-Subs and Atlas Elektronik, while testing and development assets at Smart Sound Plymouth and the Atlas Elektronik UK Portland facility allow for trialling and validation of technology for the future.

⁴⁰ <https://www.e4tech.com/resources/247-e4tech-identifies-potential-uk-clusters-of-clean-maritime-activity.php>

Case Study: Port of Tyne

The UK's first 2050 Maritime Innovation Hub is an exciting partnership with Port of Tyne, PD Ports, Nissan, Connected Places Catapult, Accenture, Royal HaskoningDHV, Ubisoft and DfT.

The Maritime 2050 strategy articulated an ambition for the UK to become a world-leader in the development and use of new maritime technologies and a set of regional Innovation Hubs will be a key part of realising this aim.

The 2050 Maritime Innovation Hub aims inspire partners to collaborate to develop solutions to technological challenges facing the maritime sector and the wider logistics industry both nationally and globally. The Hub acts as a catalyst for sharing ideas, harnessing research and development, advancing technology and tackling shared challenges.

In its first year, the Innovation Hub hosted 50 events bringing together hundreds of participants to tackle issues facing the maritime sector and bringing new organisations into the sector for the first time.

Our ambition is to see a series of Maritime 2050 Innovation Hubs, committed to working collaboratively to tackle maritime challenges and promoting growth both regionally and across the UK. It is through this collaboration between Government, industry and academia, that the UK will become a global centre for research and development in innovative maritime technologies, such as autonomous and clean shipping.

The Solent region of Southern England is another home to leading operators in maritime autonomous systems, such as the National Oceanography Centre which has the most marine unmanned autonomous systems in Europe.

Place-based initiatives demonstrate how an enterprise approach, bringing together industry, academia, Government and other local partners can help foster innovation and deliver local prosperity. The Solent Maritime Enterprise Zone (case study overleaf) is a testament to this approach.

Scotland is also renowned for its rich shipbuilding heritage, spanning hundreds of years. Scotland

has given the world some of its best known maritime names and remains the location of a significant proportion of the UK's shipbuilding capacity. Much of this can be found around the river Clyde in central Scotland. The Clyde and its immediate environs have a strong maritime cluster with significant infrastructure, skills, training and academic resources creating expertise in both naval and civil shipbuilding and engineering. The Clyde Mission initiative is seeking to leverage these strengths by working with key shipbuilding partners such as BAE Systems to bring together industry, academia and the public sector to develop the wider potential of the area.

Case Study: South West

The South West region is enriched by its renewable energy resources including wave, wind, tidal and solar. It is home to multiple sites which are greatly supporting the technology development, including the Wave Hub, which is the world's largest and most technologically advanced open access site for the testing and development of offshore renewable energy technology, and the FabTest facility which is in within Falmouth harbour. Both of these sites will drive clean growth, whilst the offshore windfarm market is becoming a focus for the region due to the bathymetry and depth of the seafloor. The Heart of the South West Local Enterprise Partnership has awarded £1.8 million to the Marine Business Technology Centre, based at the Oceansgate Enterprise Zone in Plymouth, to support the development of Smart Sound Plymouth, a 5G marine testbed.

The South West education institutes are supporting a range of marine specific courses and world-class research centres including the University of Plymouth, Exeter, Bournemouth and Falmouth. In addition, the world leading marine science produced by the Plymouth Marine Laboratory helps to better illuminate the complex physical, chemical and biological processes of the ocean. The Met Office are quantifying the meteorological atmospheric processes to help support a range of activities from day to day weather forecasts, to optimising complex shipping routes to reduce fuel consumption. The South West is also home to the UK Hydrographic Office, specialising in marine geospatial data that helps others to unlock a deeper understanding of the world's oceans and support safe navigation.

Shipbuilding is also thriving in Rosyth where Babcock are building the Type 31 frigates. Babcock are leading an initiative to develop a Campus for Advanced Manufacturing and Technology at Rosyth. As part of this initiative the BEIS-funded Engineering and Physical Sciences Research Council have invested £4.1 million in the Babcock and University of Edinburgh FASTBLADE facility to develop a state of the art composites testing facility. This will provide rapid cyclic testing for new composite blade designs.

Given the significant links between the Royal Navy and shipbuilding and support industry in Scotland, the Royal Navy has committed funding to support a comprehensive cross-sectoral

analysis of the maritime enterprise in Scotland. The aim of the study is to identify shared challenges, priorities and ambitions in the maritime sector in Scotland and to identify options for future Royal Navy and MOD participation and investment. This may include shared funding for a Maritime Enterprise Scotland Centre as a physical showcase for world-leading maritime training, education, innovation, technology and industry in Scotland. Maritime Enterprise Scotland will link diverse centres of excellence for maritime research, innovation, energy, manufacturing, education, skills and training across Scotland to grow a sustainable, thriving and world-leading maritime sector, which is vital to the UK and Scotland's prosperity and to the UK's role in the world.

Case Study: Solent Maritime Enterprise Zone

The Solent has a rich history in the design, manufacture, maintenance and repair of a variety of commercial and defence vessels, boats, hovercraft, leisure craft, green and smart vessels, submersible platforms and autonomous systems. The Solent Maritime Enterprise Zone (Solent MEZ), established in December 2019, is an umbrella organisation comprising a consortium of the Royal Navy, industry (including SMEs), the Government and academia working collaboratively to create a centre of excellence for maritime research, innovation, education, skills and training. Through an enterprise approach it collaborates with other regions, maritime clusters and across sectors to benefit maritime businesses and institutions. The Solent MEZ INSPIRE agenda is ambitious, cross-cutting and directly supports the delivery of Maritime 2050, regional industrial strategies and this National Shipbuilding Strategy:

- Innovation and Technology
- Skills, Careers and Apprenticeships
- Prosperity and Growth
- Infrastructure development to support the renaissance of coastal communities
- Research and Academia
- Enterprise approach

With a sharp focus on future skills, the Solent MEZ has developed and launched the concept of 'apprenticeship clearing', aimed at retaining talent in the maritime sector by providing alternative apprenticeship opportunities should applicants be unsuccessful at their first attempt. This is only achievable through collaboration across the enterprise. In addition, Solent MEZ members are leading in setting national apprenticeship standards in areas such as the Uncrewed Marine Vehicle Specialist. Maritime careers are promoted at all levels across the education system and the enterprise is working to create a consolidated list of roles across the maritime industry to support a maritime portfolio career.

Within the Innovation, Technology and Research themes, the Solent MEZ priorities are marine autonomy, digital and clean maritime. The Solent MEZ's 'Connected and Autonomous Maritime' initiative has enabled cross-sector, cross-region collaboration supported by the Catapult network. This initiative is benefitting from the Solent's strengths in marine autonomy, robotics, remote operations, innovative engineering solutions, sensor design, advanced manufacturing and smart port initiatives. It is also improving cross-sector access to a wealth of expertise in marine science and maritime research, development and education, available through the National Oceanography Centre, Southampton, Solent and Portsmouth universities.

To cohere and optimise the wealth of innovation within the region and the opportunities presented by Solent Freeport, the Solent MEZ, Maritime UK Solent and the Connected Places Catapult have collaborated to form a 'one stop shop' for customers, collaborators, and innovators through the Solent Maritime Innovation Gateway.

Foreign Direct Investment in the Supply Chain

The Government continues to ensure the UK retains its leading position in attracting and retaining investment and maximising its impact on the economy. DIT is well-positioned to attract investment that will power current and future growth, promoting opportunities across the UK through the High Potential Opportunities programme, targeting dedicated investment missions through the Office for Investment and continuing our work globally to attract high value investment from well-established and emerging markets.

Sector capability mapping will inform the development of an investment strategy which will target capacity-enhancing Foreign Direct Investment, in turn helping to grow the shipbuilding sector. This will allow investment to be strategically positioned to develop technology and capacity in the UK, including the design and development of zero emission vessel technologies which can be exported globally. Particular focus will be given to investment that provides knowledge transfer to the UK.

However, we recognise not all foreign investment is beneficial. The Government has therefore expanded its powers to make targeted and specific intervention in limited areas of the

economy where there are national security risks. The National Security and Investment Act introduced civil and criminal powers to enhance our ability to tackle hostile investment. Nevertheless, legitimate market participants can be confident that we continue to welcome investment in the UK.

Royal Navy Technology Roadmap

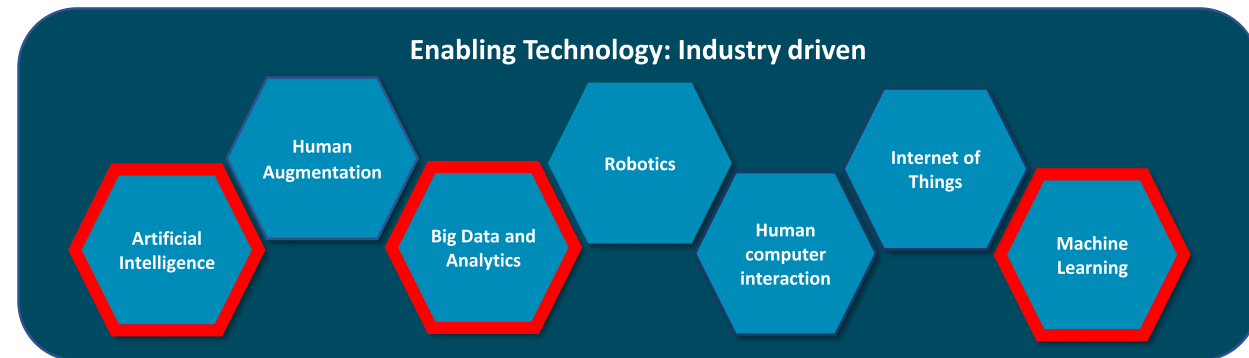
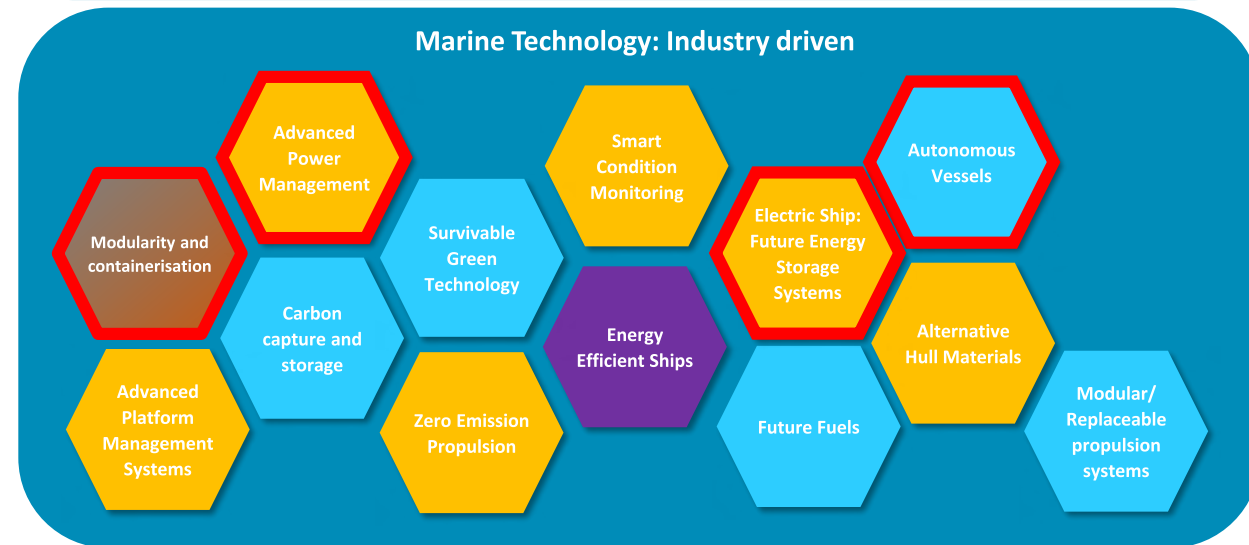
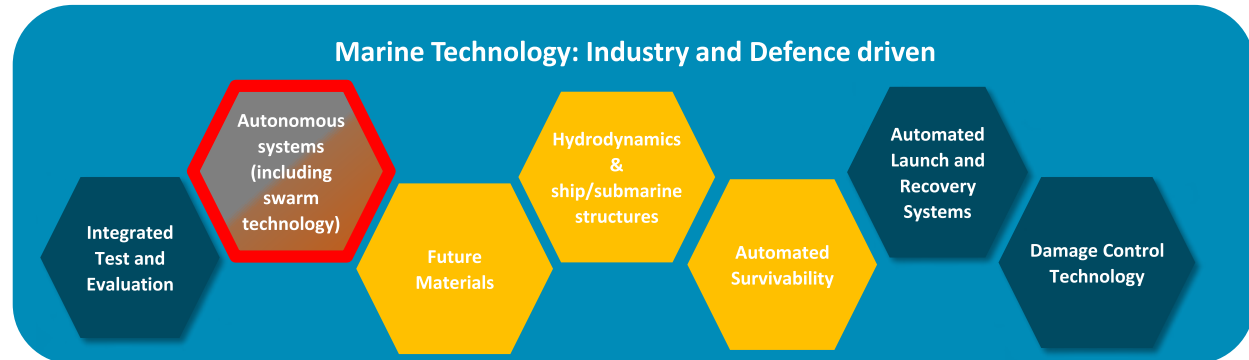
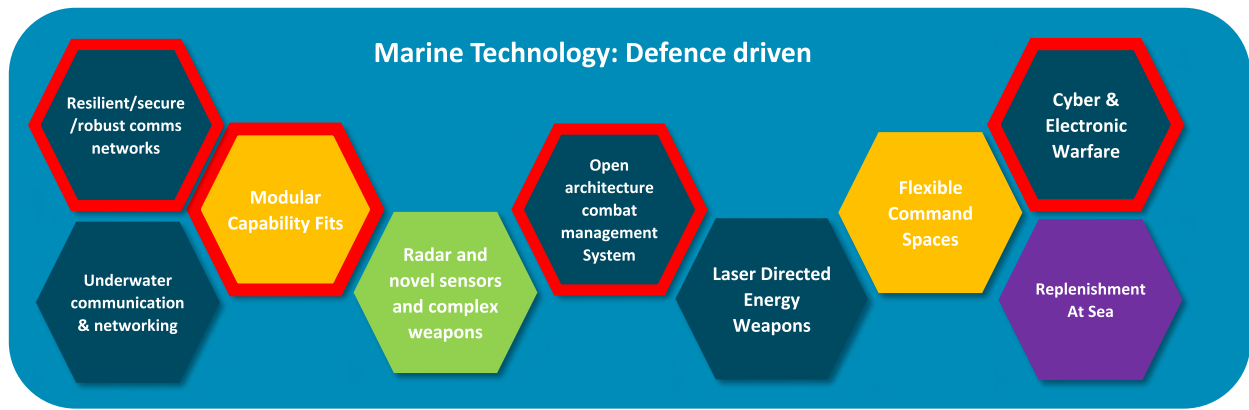
As technological advances accelerate and the threats to the UK's security and economy continue to grow and diversify, the Royal Navy will have to evolve quicker than ever before. The battle winning edge will go to the swiftest and most agile nations that are best able to adapt to the pace of technological change, not necessarily those with the most capability.

In line with the DSIS approach, providing transparency and clarity on our future plans will give industry the confidence to invest in cutting-edge R&D and innovation. The Royal Navy has established a successful mechanism to experiment with emerging technology at high technology readiness levels through its NEMESIS team. Other mechanisms exist to investigate lower technology readiness level, as detailed in the MOD Science and Technology Strategy 2020⁴¹.



⁴¹ <https://www.gov.uk/government/publications/mod-science-and-technology-strategy-2020>

Royal Navy Technology Roadmap



Largely platform agnostic
Largely platform driven
All
Type 83
Type 32

Royal Navy priority technology
Fleet Solid Support
Multi-Role Support Ship

Figure 8 Royal Navy Technology Roadmap

This strategy includes the Defence R&D 'Ecosystem', which shows the route from science and technology-led R&D across the technological readiness levels through to commissioning and delivery. It signposts the existing routes by which the MOD pulls through science and technology, from generation after next technology to that which can bring about transformation now.

Figure 8 outlines the Royal Navy and MOD's future technology plans and clearly demonstrates our continued commitment to cutting-edge R&D and innovation. It is not intended to be complete, as the Royal Navy is open to developing requirements in line with emergent technologies, but rather illustrates the breadth of the Royal Navy's future requirements. It breaks technologies down into categories, showing:

- Maritime technologies which may require a MOD lead;
- Maritime technologies that have some elements that will be MOD-led and some industry led;
- Maritime technologies which are likely to always be led by industry; and
- Enabling technologies that are not specific to the maritime domain.

A full understanding of the potential benefits of these technologies in the naval domain will be critical to ensuring that they align with future requirements.

The Type 32 programme will be the first of a new generation of warships with a focus on hosting and operating autonomous offboard systems that add mass and a cost of complexity upon our adversaries. Many of these autonomous capabilities and other complex systems will be delivered in a modular manner, which offers the potential to simplify the host platform whilst retaining the flexibility to optimise it for a range of specific tasks. It also provides a route to delivering the adaptability that will be essential for all future Royal Navy ships to enable them to outpace evolving threats and capitalise on emerging technology.

This bold and iterative approach will develop learning and artificial intelligence tools and enable

human-out-of-the-loop autonomy for a force multiplying effect. This should also assist in reducing both the crew size and the cost of future Royal Navy platforms whilst maintaining effectiveness and the battle-winning edge against adversaries.

The Royal Navy has set the ambitious target that reducing crewing levels and pursuing opportunities for autonomous systems within appropriate safeguards will be a starting principle for all new platforms designed after 2030 to accelerate and demonstrate trust in emerging machine development of crewless and autonomous systems.

The Royal Navy's future shipbuilding programmes will also make best use of emerging green maritime technology. This includes power and propulsion, hydrodynamics and energy management. By adopting a fast follower approach to proven technological advancements, the Royal Navy will ensure it contributes to the Government's net zero target. This will be underpinned by commercial and acquisition practices that incentivise a net zero acquisition cycle and supply chain.

The Fleet Solid Support ship is at the forefront of this approach, having been nominated as a maritime environmental sustainability pilot programme. It is supported by an environmental sustainability strategy that identifies goals and incentivises the shipbuilder to ensure that the ships are as energy efficient as possible at the start of their life and designed to be adaptable. This means they can be readily modified to incorporate emerging carbon-reducing and energy-saving technologies through-life. This may include alternative propulsion machinery and fuels.

The Royal Navy is globally engaged and increasingly operating at reach, which will put more pressure on supply networks. This means that its technology strategy must focus on supporting platforms at range. The use of technology and the effective management of data and assets can help to increase resilience and availability and improve cost-effectiveness, while sustaining forward presence.

The Royal Navy will exploit end-to-end technology and use the full spectrum of data analytics to maintain insights across the naval enterprise, for example anomaly detection and predictive maintenance. Designing technology or adaptability pathways into vessels early will reduce through-life costs and improve reliability and availability. Off-the-shelf and automated technologies will be common amongst platforms where possible to enhance the Royal Navy's ability to support them. Optimising maintenance and reducing repetitive, dull, dangerous, dirty roles as much as practicable allows the Royal Navy to release people to focus on key warfighting capabilities.

This approach makes the most of advances as a result of the automation and digitisation of manufacturing, such as digital dockyards and digital twin technology. This Fourth Industrial Revolution will not only result in more effective, efficient and competitive shipyards, but more effective and efficient support solutions. Fundamentally, the Royal Navy requires naval vessels and systems that provide innovative and battle-winning capability, that are available at the right time and delivered in the most efficient and cost-effective way. Technology is likely to be the differentiator.

Case Study: Autonomous Mine Hunting Capability Development

The rapidly evolving and prevalent mine threat demands a disruptive new approach to Mine Counter Measures (MCM) which is significantly more effective than legacy systems, while reducing the risk to personnel by taking the operator out of the threat area. This is achieved by deploying a range of Maritime Autonomous Systems to conduct the 'dull, dirty and dangerous' tasks at range and with persistence.

The main element of the UK's mine hunting capability is the joint UK and French Maritime Mine Counter Measures system. Autonomous surface vehicles are operated remotely from a containerised mission management system which provides tactical situational awareness. These Autonomous Surface Vehicles are capable of launching, operating and recovering various payloads, such as sonars and other remotely operated vehicles with mine neutralisation systems. They can be used in combination for operating in deep water to provide clear sea-bed imagery to enable accurate classification. Recent trials provided image quality far superior to current in-service equipment and allowed areas to be cleared far faster.

In addition to this system, the UK SWEEP system consists of an Autonomous Surface Vehicle towing off-board components. The off-board components create acoustic, magnetic and electric underwater influence and are effective against low target mines, disguised mines and mines in difficult environments.

Both modular systems are fully containerised, can be transported by air, sea or land, and operated from a range of ships, including warships or from a well-equipped port.

These systems are now in production and from late 2022 will begin to deliver autonomous mine hunting capability within the UK and, in due course, the Gulf.

Exports

Chapter 5

Chapter 3 set out how the backbone of the UK shipbuilding pipeline will be generated from Government demand. However, the UK shipbuilding enterprise requires a strong export pipeline to ensure long-term sustainability. Against the backdrop of a competitive global market and increasing challenges for securing market share, the Government is committed to ensuring that UK industry secures its own increased global share of the maritime export market. This approach is entirely in line with this Government's ambition to promote Global Britain. We will seize the opportunities provided through the increasing numbers of Free Trade Agreements and the alignment of our overseas networks, including Trade Commissioners and Defence Attachés, to ensure the UK maintains its standing on the world stage.

Increasing UK shipbuilding exports will amplify delivery of the National Shipbuilding Strategy in two complementary ways:

1. Increased overseas revenue feeds directly into the UK national shipbuilding enterprise and encourages foreign direct investment in the UK shipbuilding industry. This flows from all aspects of the enterprise, including platforms, systems, sub-systems, supply chain and skills amongst others.

2. Success creates a virtuous circle of improved export performance. Improved awareness of global requirements enables them to be factored into UK requirement setting. This increases the exportability of UK-developed capabilities which spreads the cost of development of new capabilities. This in turn reduces the cost of UK orders, thereby supporting future sustainability of the national shipbuilding enterprise.

Increased export market share can only be achieved if Government and industry work together. This applies equally to naval exports, where Government has a particularly critical role in working with potential customer governments, and to civil shipbuilding and the associated supply chain. With growing market opportunities for green shipping technologies, as highlighted in Chapter 4, we are committed to working with UK industry to capitalise on our expertise in this area and make the most of this opportunity.

Industry needs to ensure that competitive and appropriately focussed offers are made where they are most likely to achieve success. In a post-COVID environment, already stiff competition is growing stiffer. Governments are taking an increasingly nationalistic approach to procurement and investing heavily in supporting their domestic industries to export. UK Government and industry must respond more than just in kind – we must outpace and outmanoeuvre the competition.

Maritime Capability Campaign Office

To support these aims, DIT has established a **Maritime Capability Campaign Office**. The MCCO is the exports arm of the NSO. It is a strategic planning organisation which seeks to drive maximum coherence and effectiveness into the pursuit of UK defence, security and civil maritime export prospects. In so doing, it will help deliver our commitment to maximise exports and enhance Government's approach to working with industry. It will work closely with the NSO to ensure coordinated activity across the stakeholder community and optimised support to the national shipbuilding enterprise.

Working with industry and across Government, the MCCO will take a portfolio view of opportunities and campaigns to ensure the systematic coordination of export development and delivery activity. It will use robust analysis based on shared industry and Government data to generate improved understanding about global markets. This understanding will be used to coordinate and develop Government-industry approaches that overmatch our competitors and increase the UK market share.

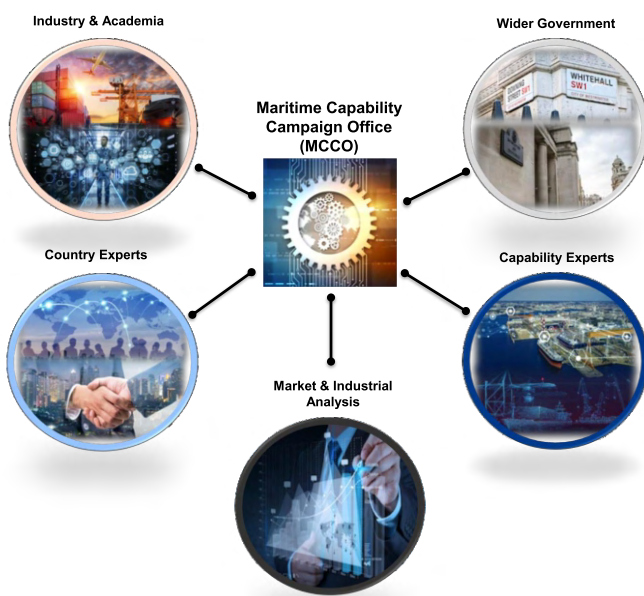


Figure 9 Maritime Capability Campaign Office inputs

The MCCO's responsibilities span the entire maritime ecosystem, from platforms to the supply chain. It will also explore non-traditional opportunities where the UK can offer bespoke solutions to help smaller and medium sized enterprises flourish on the global stage.

On the civil side this work will be led by industry with the formation of a civil export focus group within the SEG. This will initially build on the civil maritime team's current campaign of working with a small group of export-ready yards to access international builds, refit, repair, and repurposing work on a project-by-project basis, with UKEF support in many cases.

Export Success Criteria

The Key Success Criteria for the MCCO will be:

- Industry and UK Government working together to build and share understanding of the market, identifying long term opportunities to strategically position the UK for improved success and matching shorter-term opportunities for requirements to UK capabilities.
- Coordinated development of Government-industry campaigns. These will incorporate communication and influencing plans from the earliest stage to ensure that UK companies have secured strategic relationships in advance of competitors in pertinent markets, and that perceptions of the UK, and a UK offer, are improved in those markets.
- Agile export campaign development and cross-Government decision-making.
- UK Government lending its reputation and credibility to industry's export ambition and to specific export opportunities through coordinated cross-Government support. This includes political, military and official engagement and the exploration of Government-to-Government support for export deals.

- UKEF used where possible and appropriate to support deals and reinforce Government-to-Government arrangements.
- National shipbuilding programmes informed by global market requirements, taking exportability into consideration.
- UK defence industrial capabilities demonstrably proven by successful UK military deployment.

Case Study: Type 26/Global Combat Ship

The seed corn of a Type 26/Global Combat Ship export campaign was sown at a G20 Summit in 2014. The then Prime Minister mentioned the world's most advanced anti-submarine warfare frigate, the Type 26/Global Combat Ship, as a possible contender for future frigate programmes in Australia and Canada. In 2018, the Australian Government announced that they would procure nine Type 26/Global Combat Ships (the Hunter Class) to replace their Anzac class frigates. Then in 2019, the Canadian Government awarded a contract for 15 Type 26/Global Combat Ships for its Canadian Surface Combatant programme. BAE Systems estimates that this 32-ship global endeavour will create or sustain 5,000 export-led jobs in the UK and will enable c.£6 billion of potential export contracts to flow to UK suppliers.

The UK Government took a lead convening role through an Integrated Campaign Team that brought together cross-Government and industry parties to share market insight and enable coordination. The Type 26/Global Combat Ship campaign was one of the first maritime export campaigns to fully develop the Integrated Campaign Team concept to deal with the breadth of stakeholders and dynamic operating environment of both campaigns.

This ensured that industry and Government were able to provide the specific information needed for the two frigates' competitive evaluation processes. It also provided Australia and Canada with a comprehensive view of the Government-to-Government offer of sharing lessons on the UK's build experience and supply chain management, alongside the commercial offer from industry. This built understanding of the totality of the 'Team UK' offer, while underlining our respect for Australia and Canada's need to make the decisions that were right for their countries. This success is testament to the high regard held for the UK's professional, evidence-based approach to supporting partner nations to make informed sovereign decisions.

Export Prospects

Naval

The Defence shipbuilding pipeline was set out in Chapter 3. Drawing on the Royal Navy's reputation, including the success of the Queen Elizabeth Class carrier programme, and the UK's proven platforms, systems and sub-systems, UK Defence and Security Exports is currently managing over 70 maritime prospects spanning more than 20 countries, with an estimated value of over £20 billion.

Civil

On the civil side, DIT has identified export prospects worth potentially £600 million over the next five years. Extensive market assessment will build the detail on the scale of the opportunity and support market prioritisation in relation to build, refit and repair opportunities globally across a range of high-value vessel types.

International agreements to reduce the environmental impact of shipping create a growing opportunity. Significant investment in the global fleet will be required in the next 20 years to meet the terms of these agreements. UK expertise in green shipping technologies creates a strong offer for both export and domestic customers matched to this opportunity. The DIT civil maritime team is working with Departments across Government, industry stakeholders and our world-leading marine ecosystem to position the UK as the green marine partner of choice for the high-value complex vessel builds that will meet the regulatory, environmental, and commercial challenges facing owners and operators in the future, in line with the UK-SHORE approach. Active market assessment is currently being undertaken which will identify:

- UK green marine capability and capacity across design, build, technologies, components, and infrastructure, as well as competitor analysis;
- The scale of build opportunities in Europe for offshore wind vessel builds, refit and repair over the next decade; and
- Future opportunities in a range of other vessel types relevant to developing UK build capability, as well as refit, repair and conversion opportunities.

Offshore Wind vessels in Europe are expected to present a sizable opportunity with a significant investment expected by the sector in green propulsion. To meet decarbonisation targets, the global maritime industry expects an annual investment of \$35-50 billion over the next 20 years⁴², including on vessels and marine assets. A focus on clean technology will serve to secure UK market share more quickly while aligning with our climate ambitions to achieve net zero carbon by 2050.

Green Global Shipbuilding Initiative

A Green Global Shipbuilding initiative was launched at London International Shipping Week in September 2021. This campaign will focus on high-value, complex vessels in the specialised series sector below 5,000 gross tonnage and under 150 metres, as well as high-value refit and repair work. This may include green offshore wind workboats, eco-friendly fast ferries and research and survey vessels. UKEF will be an important part of the offer.

The initial focus for offshore wind vessels will be Western and Northern Europe. UK industrial capability will be driven by the Government's ambitious commitments to develop domestic UK offshore wind capability and ensure UK content in future developments. Prospects include around 1,000 barges and semi-submersibles to support future offshore wind developments, as well as other types of offshore wind vessels. Vessels of this type are largely built outside the UK at present, but DIT will examine which prospects could be secured for UK build. Success could swiftly generate volume into the sector to help promote and sustain competitiveness.

To support the UK commercial shipbuilding sector to win orders, DIT will:

- Promote a joint UK Government and industry approach where larger shipbuilders are encouraged to collaborate with smaller yards, sharing build capability and expertise to compete for more complex vessels.
- Support strategic partnerships and joint ventures between UK and

international firms to build consortia and compete for larger projects for export. This may include some overseas build with finishing, secondary fabrication and installation in UK yards.

- Support a more coordinated and dynamic UK Government approach to trade promotion including offset, alignment with UK Official Development Assistance and Government-to-Government frameworks where appropriate. All of this will be supported by campaign material to outline the UK offer, sustained by the GREAT campaign.
- Acknowledge the specific requirements of the UK's world-leading leisure sector with the creation of a leisure forum which will provide this important sub-sector with a regular platform through which to engage Government.
- Engage with UK shipbrokers to promote the UK offer to the global market. This will be complemented by identifying effective financing options alongside the use of UKEF and green finance.
- Work across Government to support an R&D strategy which focusses on commercial outcomes and positions the UK at the heart of the next generation technologies that will drive global shipbuilding including autonomy, green shipping and digitalisation. This is reflected in Chapter 4.
- Work with industry to consider if carbon transparency on shipbuilding and freight would further support the drive for green maritime.

UK Export Finance

UKEF is the UK government's export credit agency and a Government department strategically and operationally aligned with DIT.

Its mission is to ensure that no viable UK export fails for lack of finance or insurance from the private sector, while operating at no net cost to the taxpayer. UKEF exists to complement, not compete with, the commercial sector and works with around 100 private credit insurers and lenders.

UKEF helps to make exports happen which otherwise might not, helping UK exporters and their supply chains grow their business overseas. UKEF helps UK exporters access finance and insurance when there is a lack of private sector risk appetite or capacity. This keeps them exporting, boosts business and protects jobs. In 2020/21, UKEF provided £12.3 billion of support to 549 UK companies, exporting to 77 countries around the world (79% of these companies were SMEs).

Shipyards and maritime focused exporters can access UKEF support to help them compete for international business. UKEF can offer the shipbuilding and maritime industry a package of support to help them:

- 1) **Win** contracts by offering attractive financing for overseas buyers of UK goods and services;
- 2) **Fulfil** export contracts by supporting working capital loans and contract bonds; and
- 3) **Get paid** for export contracts by providing insurance against buyer default.

UKEF's buyer finance products (Buyer Credit and Direct Lending facilities) help businesses **win** contracts by making their offering more competitive. Through the Buyer Credit facility UKEF provides a guarantee to a bank making a loan to an overseas buyer so that capital goods, services and/or intangibles can be purchased.

Under the Direct Lending facility UKEF provides direct loans to overseas buyers at a fixed rate of interest during the life of the loan. These facilities enable the exporter to receive payment up-front as though it was a cash contract, while

The buyer can access extended repayment terms. UKEF has a £2 billion Direct Lending facility dedicated to clean growth projects in addition to a £1 billion Direct Lending facility dedicated to defence and security related opportunities.

To help UK companies **fulfil** contracts, in July 2020 UKEF launched its Export Development Guarantee (EDG) to help UK exporters access high value loan facilities for general working capital or capital expenditure purposes. UKEF provides a partial guarantee of up to 80% of the risk to lenders on commercial loans worth more than £25 million with a repayment period of up to five years. Its General Export Facility (GEF) followed in December 2020 and, similarly to the EDG, is a flexible export guarantee providing partial guarantees to banks to help UK exporters to gain access to trade finance facilities up to the value of £25 million.

In November 2021, UKEF enhanced its EDG to:

(I) Offer UK exporters in the clean growth sectors access to increased lending capacity and extended repayment terms; and

(II) Offer an EDG to companies who do not currently qualify for the EDG because they do not export enough from the UK or do not currently operate from the UK, if that company can demonstrate that it will operate from premises and employ staff in the UK, and export from the UK in significant volumes in the future.

With an EDG and GEF, finance does not need to be tied to an individual export contract and can be used to support a company's general export activities or where it can be demonstrated that the activity is conducive to supporting or developing UK exports.

To help UK companies **get paid**, UKEF's export insurance cover (EXIP) helps companies to export with confidence by offering insurance that can cover up to 95% of the value of an export contract. EXIPs are open to businesses of all sizes, and there is no minimum contract size for an EXIP. UKEF's EXIP offers cover against the risk of not being paid under an export contract and/or not being able to recover the costs of performing that contract because of certain events which prevent its performance or lead to its termination.

Case Study: Silverstream

Silverstream Technologies is a UK manufacturer of a revolutionary air lubrication system which improves vessel efficiency. DIT have supported Silverstream to successfully export their products to China by helping them to navigate the commercial culture in a relationship-based business environment and build confidence with the right decision-makers.

With the support of DIT and the input from DIT's marine engineering specialist, the company recently secured an initial £3 million export win and signed a Memorandum of Understanding with leading shipbuilding group, Hudong-Zhonghua, part of the China State Shipbuilding Corporation Group. Further to this, Silverstream, with DIT assistance, is engaging with a range of other key decision-makers in the market from shipping owner-operators to yards and other orders are pending.

Case Study: Parkol Marine Engineering

Family-owned Parkol Marine Engineering has been building, renovating, and repairing ships for nearly 50 years from their boatyards in Whitby and Middlesbrough. Concentrating largely on fishing vessels, until recently Parkol only did business within the UK.

In early 2020, Parkol was commissioned by Irish fishing company D&N Kirwan to build a new 27-metre-long motorised trawler at their Middlesbrough site. To fulfil this deal, worth over £3 million, Parkol needed the capital stage payments to be guaranteed to the full value of the contract. The COVID-19 pandemic then struck during the design stage of the project. Parkol were forced to furlough staff at both its sites until measures could be introduced to safeguard the workforce.

To secure the guarantees needed to build the boat, Parkol's bank put them in touch with their local UKEF representative, who worked with NatWest to put in place a series of Government-backed advance payment guarantees in two currencies that enabled the deal to go ahead.



Skills

Chapter 6

One of the most critical enablers of a thriving UK shipbuilding enterprise will be a highly skilled and motivated workforce who will support our industry to become more innovative, productive and ultimately more competitive. Ensuring the UK shipbuilding sector has access to the skills it needs is a priority for both the immediate and the long term. While many of the workers who will be building the ships in the latter part of our 30 Year Cross-Government Shipbuilding Pipeline have not yet been born, Government and industry must act now to ensure these future skills will be in place to deliver against our shared ambitions to grow and transform the sector in the coming years.

While numbers of students studying science, technology, engineering and mathematics (STEM) subjects are rising, employer groups

continue to point to an unmet demand for higher-level STEM skills. The Institute of Engineering and Technology estimates that there is an annual shortfall of 59,000 new engineering graduates and technicians⁴³.

As set out in the Maritime 2050 Strategy, the skills profile of the maritime sector will change significantly over the next 30 years. The importance of STEM subjects will only increase as jobs become more skilled and data driven in response to new technology. Industry roles will be multidisciplinary, potentially requiring the ability to create, operate and maintain autonomous and technological systems.

There is an opportunity to build on the UK's existing advantage, developing and expanding our high-quality training programmes to meet new requirements, exploring ways to bolster our offer at home and abroad. Upskilling our workforce to take advantage of emerging technologies such as robotics and artificial intelligence; the agility to adapt training packages in a timely way; and regular reviews of our skills needs will allow the UK to capitalise on its skilled workforce. This will also help to deliver the mission, set out in the Levelling Up White Paper, to increase the number of people successfully completing high-quality skills training in every area of the UK.



UK Shipbuilding Skills Taskforce

To deliver our ambitious cross-Government pipeline as well as growth across the sector,

industry will need a pipeline of skilled workers to meet the demand. This skilled workforce will be vital to developing world-leading products and adopting the manufacturing technologies of tomorrow. Industry therefore needs to be able to attract, develop and retain workers with the right skills in the right place at the right time.

The Maritime Skills Commission noted in its 2020 Labour Market Intelligence Report⁴⁴ that engineering skills are frequently raised as a problem area, but the 'exact nature of the problem is seldom defined with much precision.' The shipbuilding enterprise must pull together to understand and articulate industry's skills needs.

Working with the NSO, the Department for Education (DfE) will therefore establish a UK Shipbuilding Skills Taskforce. This taskforce will work collaboratively across Government, the Devolved Administrations, industry and training providers to develop and implement a future-focussed skills strategy. It will build a picture of industry's skills needs and provide solutions to skills shortages, particularly those related to new and emerging technologies. By catalysing and leveraging the existing skills system, the UK Shipbuilding Skills Taskforce will ensure providers are best placed to meet these requirements. It will draw on the best practice from other sectors and national skills approaches and it will optimise the available skills funding and opportunities for shipbuilding. It will also work with industry to promote varied and exciting career opportunities in the shipbuilding sector.

With the shipbuilding workforce spread across all parts of the UK, the UK Shipbuilding Skills Taskforce will work jointly with the Devolved Administrations in Scotland, Wales and Northern Ireland to ensure the shipbuilders and the supply chain in all parts of the UK can access the skills they need.

Maritime Skills Commission

People were a key theme of DfT's Maritime 2050 strategy. The Maritime 2050 People Route Map⁴⁵ led to the establishment of a Careers Taskforce to better coordinate maritime careers promotional activity; a Diversity in Maritime Taskforce with networks for Women, Ethnicity, Pride and Mental Health; and, most relevant to shipbuilding, a Maritime Skills Commission. These three bodies were established in 2020 and work collectively to deliver the Maritime 2050 vision for a diverse workforce.

The Maritime Skills Commission brings together leading experts to assess the sector's current and future skills needs. It leads the maritime sector's work in ensuring that it has a pipeline of talented people to serve all parts of the sector covering shipping, ports, leisure marine, engineering (including shipbuilding), science and professional services. It is comprised of Commissioners from across the maritime sector, including the Royal Navy. It reports to the Maritime Minister and the Maritime UK National Council and produces an annual report each year.

Employer-Led Skills Across the UK

Fundamental to ensuring that the right skills are available to meet the ambitions for shipbuilding across the UK is the continued direction, through policy and practice, of putting employers at the heart of the skills system. Doing so ensures that education and training lead to jobs that can more effectively improve productivity and fill skills gaps.

Skills provision must meet skills needs for employers in the shipbuilding sector, particularly as the industry adopts more advanced manufacturing technologies. Each Devolved

⁴⁴ <https://www.maritimeuk.org/priorities/people/skills-commission/reports/labour-market-intelligence-scoping-report-august-2020/>

⁴⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/872270/Maritime_2050_-_People_route_map.pdf

Administration has developed a strategy to achieve the aim of meeting the emerging needs of its evolving workforce, including the skills required to respond to the green industrial revolution.

England

In England, this will be achieved by aligning the majority of post-16 technical education and training to employer-led standards by the end of the decade, building on the UK Government's apprenticeships and T Level reforms and on the recommendations of the Sainsbury Review⁴⁶. This will allow staff to be trained at different points in their career towards the same final goal of occupational competence, whether the training is on-the-job or off-the-job.

To deliver a vibrant and productive shipbuilding enterprise, prepared to meet innovation opportunities such as those from green shipping technologies, people must be able to access training and learning flexibly throughout their lives. In England the Lifetime Skills Guarantee, outlined in the Skills for Jobs⁴⁷ white paper, brings investment in top-quality provision, funding upgrades to further education colleges across the country and improvements to build on the success of our apprenticeships programme. As the shipbuilding sector responds to growth opportunities and changes its re-skilling and upskilling needs, the existing workforce will benefit from access to Skills Bootcamps, free targeted qualifications for any adult without an existing full level 3 (A Level equivalent) qualification and apprenticeships at all levels, including degree. We will also continue to explore how the 'Skills Value Chain' approach to supporting the provision and diffusion of cutting-edge skills can be embedded in the shipbuilding sector.

The Skills for Jobs white paper describes how employers in a local area will be able to take a central role working with further education colleges, other providers and local stakeholders to develop new Local Skills Improvement Plans which shape technical skills provision so that it meets local labour market skills needs. This will be important for the shipbuilding sector, given the varied and often coastal locations of shipbuilding employers.

In England, DfE is taking forward a range of initiatives which will help to provide the skills which are particularly important to the shipbuilding enterprise. The Institutes of Technology programme is spearheading the increase in higher-level technical skills in STEM areas and the roll-out of T Levels will prepare students for entry into skilled employment or higher levels of technical study, including in Engineering and Manufacturing sectors such as shipbuilding. For Higher Technical Qualifications (those at levels 4 and 5) which are provided by awarding organisations, higher education providers, and professional bodies, a new approval system will send a clear message to prospective students about which Higher Technical Qualifications are high-quality and really valued in the labour market.

The shipbuilding sector will also benefit greatly from the opportunity for employers to attract young people into their business who are not yet ready for an apprenticeship, employment, or further study. Traineeships offer a first step towards these by providing work experience and sector-based occupational skills. Flexibilities in the programme now mean employers in the sector can offer work experience places to young unemployed people who have gained up to and including an advanced (level 3) qualification, over a flexible period between 70 and 240 hours to a maximum duration of 12 months.

⁴⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/535046/Report_of_the_Independent_Panel_on_Technical_Education.pdf

⁴⁷ <https://www.gov.uk/government/publications/skills-for-jobs-lifelong-learning-for-opportunity-and-growth>

The Institute for Apprenticeships and Technical Education is working closely with the National Green Jobs Taskforce and has convened a Green Apprenticeship Advisory Panel. This will help the Institute determine which occupations require new apprenticeships to reflect the green economy. The Green Apprenticeship Advisory Panel comprises employers and interested stakeholders from across a range of sectors with a keen interest and depth of understanding in all matters green. The panel is supported by a wide-ranging Green Apprenticeship Advisory Community to ensure that all aspects of the Government's Ten Point Plan for a Green Industrial Revolution are given appropriate consideration by employers and stakeholders with "on the ground" expertise.



The Institute is also producing a Sustainability Framework to help employers understand the impact of net Carbon Zero and the sustainability agenda when they build or revise their apprenticeships. This will help to ensure that apprenticeship standards reflect the right knowledge, skills and behaviours to enable employers to get what they need to support the growth of the green economy.

Scotland

In Scotland there is a strong tradition of regional colleges supporting the shipbuilding sector through apprenticeships. At present there are four colleges which provide specialist skills training in this area. West College Scotland, Fife College, City of Glasgow College and the NAFC Marine Centre⁴⁸ at Shetland College (part of the University of the Highlands and Islands) all work with key employers in the sector to provide a skilled workforce. Between them they support a range of employers including BAE Systems, Babcock, Ferguson Marine and Dales Marine.

Skills Development Scotland will work with employers and regional partners through the Developing the Young Workforce strategy to strengthen early career activity and build awareness of and connections to the shipbuilding sector and the growing supply chain. Activity will highlight the range of existing careers opportunities and encourage greater diversity in new entrants to the sector.

In the university sector, the University of Strathclyde is home to the Department of Naval Architecture, Ocean & Marine Engineering. They work closely with the shipbuilding sector, as well as partners including the National Manufacturing Institute for Scotland, the University of Edinburgh and regional colleges, on sectoral training needs. The University of Strathclyde is also the hub for MarRI-UK, which is a collaborative vehicle for UK

⁴⁸ Formerly the North Atlantic Fisheries College

industry and academia to jointly tackle maritime technology and innovation challenges. The University of Glasgow also delivers significant research capacity in this field.

Skills Development Scotland's Climate Emergency Skills Action Plan remains central to its ambitions to create a future workforce that can support the transition to a net zero economy. An agile, aligned and responsive skills system will be vital to the delivery of a green recovery. Scotland already has many of the skills required to facilitate the transition to net zero, including in sectors that support shipbuilding such as engineering and construction.

A Green Jobs Workforce Academy has been established to support existing employees, and those who are facing redundancy, to assess their existing skills and undertake the necessary upskilling and reskilling they need to secure green jobs. A Green Jobs and Skills Hub will also cascade intelligence into the skills system on the numbers and types of green jobs that will be needed over the next 25 years.

Wales

In Wales, apprenticeships are being designed to improve productivity and meet strategic skills needs. Apprenticeships are also being delivered in Welsh and/or bilingually. The Welsh Government is prioritising investment to address skills shortages by developing apprenticeships in growth sectors and emerging occupations in line with priorities determined by Regional Skills Partnerships and labour market information. Where appropriate, the Welsh Government is also utilising sector reviews carried out by Qualifications Wales.

The Welsh Government launched the Personal Learning Account programme in September

2019. It is designed to help businesses across priority sectors to recruit new talent and overcome current and future skill shortages, as well as responding to their upskilling requirements. It offers flexible courses and qualifications to allow businesses to adapt to the changing economy. It also helps employers to access individuals who wish to switch careers and enter a higher level of employment.

As engineering and manufacturing become increasingly digitised, the Welsh Government has developed degree-level digital apprenticeships to support the drive to higher level skills. With a full suite of digital frameworks from level 2 to level 6, learners and employers can both benefit from the new skills an employee can gain whilst progressing through the different framework levels.

The Welsh Government is also adapting apprenticeships for the green economy, focussing on those sectors which directly support the transition to net zero emissions – including those related to shipbuilding, such as energy, transport and manufacturing – as well as more generic requirements across all sectors.

Northern Ireland

Advanced Manufacturing and Engineering (AME) is one of the key priority sectors in the Northern Ireland Executive's draft Skills Strategy, with initiatives and policies being considered as part of the Strategy Action Plan for 2021 and beyond. The Northern Ireland Executive is fully aware of the importance that STEM education and skills play in helping maintain and develop specific sectors such as shipbuilding. Through the Skills Strategy, they are working to increase the number of people with relevant STEM skills through education (including further and higher education), business development programmes and apprenticeships. These will be developed

through collaboration with industry, education and government and will be vital to ensuring the pipeline of skills needed in key sectors.

As businesses place increasing emphasis on digital skills, the Northern Ireland Executive is developing a digital skills action plan. This will include initiatives to build the digital knowledge and skills which will be a necessity for increasing digital capacity throughout the workforce.

Upskilling and reskilling opportunities have also been made available through the Flexible Skills Fund to support those furloughed and made redundant into key economic priority sectors, including AME.

The Northern Ireland Executive's suite of ongoing and future training and development opportunities will help provide a backbone of assistance for Northern Ireland companies within the AME sector, including those relevant to shipbuilding, helping them to develop the skills needed to make them more economically progressive.

Next Steps

This strategy refresh sets out this Government's significant ambition for the shipbuilding enterprise and the commitments we will make to deliver it, from our future shipbuilding programmes to the investments we will make to support R&D, skills and competitiveness. However, we know that achieving the vision of a globally successful, innovative and sustainable shipbuilding enterprise cannot be achieved by Government activity alone. This vision has been jointly agreed by industry and Government and requires shared commitment to ensure success. This strategy is a clear statement of Government's commitment to the sector; to achieve success, we need to see industry respond in kind.

The first step to delivering this strategy will be putting in place new organisational structures to enable a coherent, joined-up approach. As announced by the Shipbuilding Tsar during London International Shipping Week 2021, the NSO has stood up, with its CEO in place. The NSO has responsibility for ensuring the successful delivery of this strategy and will develop a comprehensive implementation plan to monitor progress across the enterprise. We are clear that delivering the vision we have set out will require all parts of Government (UK and devolved) and industry to work in tandem. One of the NSO's initial priorities is to develop strong relationships with the relevant Government Departments and stakeholders across the sector, from shipyards to the supply chain, to ensure activity aligns with the strategic ambition. The NSO has assumed ownership of the 30 Year Cross-Government Shipbuilding Pipeline and is already working with Departments to ensure procurement programmes support the policy objectives we have set out.

Likewise, the MCCO, the NSO's exports arm, has been established and is already bringing greater coherence to export support activity. The NSO will ensure strategic alignment across the Departments delivering the significant projects set out in this strategy refresh, like the UK Shipbuilding Skills Taskforce, UK-SHORE and the Home Shipbuilding Credit Guarantee Scheme. The NSO will also work with the SEG to agree its initial priorities, including exploring proposals for Centres of Excellence and developing the model for the Shipyard of the Future. We need industry to set out its future priorities and to clearly articulate the case for Government support, as well as identifying where joint working between industry and Government can achieve the greatest effect. The NSO will work with the SEG to monitor industry's contributions to implementing this strategy, including identifying metrics and gathering data to evaluate progress.

We expect to see industry demonstrating leadership through the SEG and proactively identifying opportunities where collaborative working (outside of any competitive tendering exercises) can have a positive effect for the enterprise as a whole. Where support from Government is required, the SEG will provide the forum for industry to speak with one voice, propose solutions and help to generate the evidence for intervention.

Overall, we expect to see the UK shipbuilding industry embrace the ambition we have set out and engage positively and proactively with our shipbuilding procurement programmes; the R&D support available; the skills initiatives we have highlighted; and the emerging export opportunities. It is only with all stakeholders engaged, committed and working cooperatively that we will be able to truly reinvigorate UK shipbuilding.

Glossary

AME	Advanced Manufacturing and Engineering	EU	European Union
AFBI	Agri-Food and Biosciences Institute	EXIP	Export Insurance Cover
BEIS	Department for Business, Energy and Industrial Strategy	FCDO	Foreign, Commonwealth and Development Office
CEO	Chief Executive Officer	FPV	Fisheries Protection Vessel
CEFAS	Centre for Environment, Fisheries and Aquaculture Science	GDP	Gross Domestic Product
CMAL	Caledonian Maritime Assets Ltd	GEF	General Export Facility
CMDC	Clean Maritime Demonstration Competition	HM Treasury	Her Majesty's Treasury
DAERA	Department of Agriculture, Environment and Rural Affairs	HyDIME	Hydrogen Diesel Injection in a Marine Environment
DfE	Department for Education	IMO	International Maritime Organization
DfT	Department for Transport	LNG	Liquefied Natural Gas
DIT	Department for International Trade	MarRI-UK	Maritime Research and Innovation UK
DLUHC	Department for Levelling Up, Housing and Communities	MCCO	Maritime Campaign Capability Office
DSIS	Defence and Security Industrial Strategy	MOD	Ministry of Defence
DSPCR	Defence and Security Public Contract Regulations	MPV	Marine Protection Vessels
EDG	Export Development Guarantee	MRV	Marine Research Vessels
EGR	Exhaust Gas Recirculation	MV	Marine Vessel
EMEC	European Marine Energy Centre	NERC	Natural Environment Research Council
		NSO	National Shipbuilding Office
		PCR	Public Contracts Regulation
		R&D	Research and Development

RHIB	Rigid Hulled Inflatable Boat
RV	Research Vessel
RRS	Royal Research Ship
SCR	Selective Catalytic Reduction
SEG	Shipbuilding Enterprise for Growth
SME	Small and Medium Enterprise
Solent MEZ	Solent Maritime Enterprise Zone
STEM	Science Technology Engineering Mathematics
UKEF	UK Export Finance
UKRI	UK Research and Innovation
UK-SHORE	UK Shipping Office for Reducing Emissions

Directory

DOING BUSINESS WITH GOVERNMENT

Find a Tender

(high value tenders, usually above £118,000)

<https://www.gov.uk/find-tender>

Contracts Finder

<https://www.gov.uk/contracts-finder>

MOD

<https://www.gov.uk/government/organisations/ministry-of-defence/about/procurement>

UK Shipping Concierge

<https://www.gov.uk/guidance/uk-shipping-concierge>

R&D SUPPORT

UK-wide

High Value Manufacturing Catapult

<https://hvm.catapult.org.uk/>

Defence and Security Accelerator

<https://www.gov.uk/government/organisations/defence-and-security-accelerator>

Offshore Renewable Energy Catapult

<https://ore.catapult.org.uk/>

Maritime UK Support and Funding Opportunities Portal

<https://www.maritimeuk.org/priorities/innovation/funding-opportunities/>

MarRI-UK

<https://www.marri-uk.org/>

SCOTLAND

Scottish Enterprise

<https://www.scottish-enterprise.com>

NORTHERN IRELAND

Invest NI

<https://www.investni.com/support-for-business>

<https://www.investni.com/support-for-business/funding-for-innovation-and-research-and-development>

WALES

Business Wales Innovation Zone

<https://businesswales.gov.wales/innovation>

SKILLS SUPPORT

ENGLAND

Education and Skills Funding Agency

<https://www.gov.uk/guidance/support-for-employers-on-education-and-skills>

The Skills Toolkit

<https://theskillstoolkit.campaign.gov.uk/>

Institute for Apprenticeships & Technical Education

<https://www.instituteforapprenticeships.org/employers/>

SCOTLAND

Skills Development Scotland

<https://www.skillsdevelopmentscotland.co.uk/>

Green Jobs Workforce Academy

<https://careers.myworldofwork.co.uk/green-jobs-workforce-academy>

NORTHERN IRELAND

Invest NI

<https://www.investni.com/support-for-business/skills-development>

<https://www.investni.com/support-for-business/develop-your-leadership-abilities>

Skills to Succeed

<https://www.nibusinessinfo.co.uk/content/skills-succeed>

WALES

Apprenticeships in Wales

<https://businesswales.gov.wales/skillsgateway/skills-and-training-programmes/apprenticeships>

Apprenticeship Vacancy Scheme

<https://gov.wales/employers-manage-apprenticeships>

Qualifications and National Occupational Standards

<https://businesswales.gov.wales/skillsgateway/skills-development/qualifications-and-learning>

Personal Learning Account

<https://businesswales.gov.wales/skillsgateway/recruitment-support/personal-learning-account>

Employability Skills Programme

<https://businesswales.gov.wales/skillsgateway/skills-and-training-programmes/staffing/employability-skills-programme>

