



UK Hydrographic
Office

Blue economy: Autonomous vessels

UK Hydrographic Office report
September 2020

Introduction

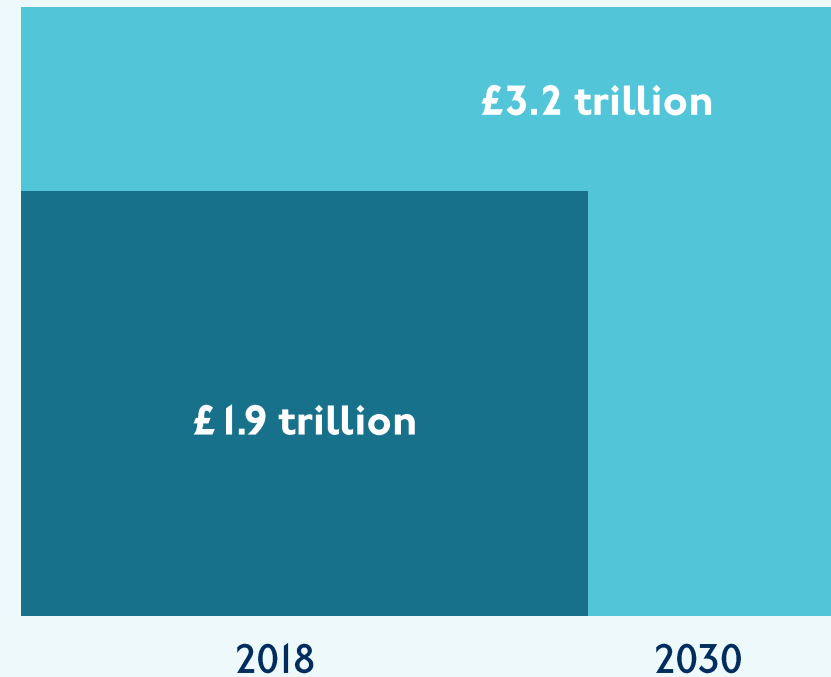
The Blue Economy, referring to all ocean-related activities, is experiencing a series of transformations under the combined influence of rising populations, increasing incomes, scarcer natural resources, a changing climate and rapidly evolving technologies

A 'new' Blue Economy is developing as established economic sectors are being disrupted and new economic sectors emerge, paving the way to a smart, sustainable and resilient use of ocean ecosystems.

'A sustainable ocean economy, where economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy'

Economist Intelligence Unit 2015, quoted by the World Bank 2016

Blue Economy Value (GVA)



The Blue Economy opportunity

Combined, the following four markets of the Blue Economy are expected to reach £3.2 trillion total GVA by 2030:



Finance & Insurance

Financing and insuring of marine and maritime economic activity



Marine

Commerce and trade in and around the ocean



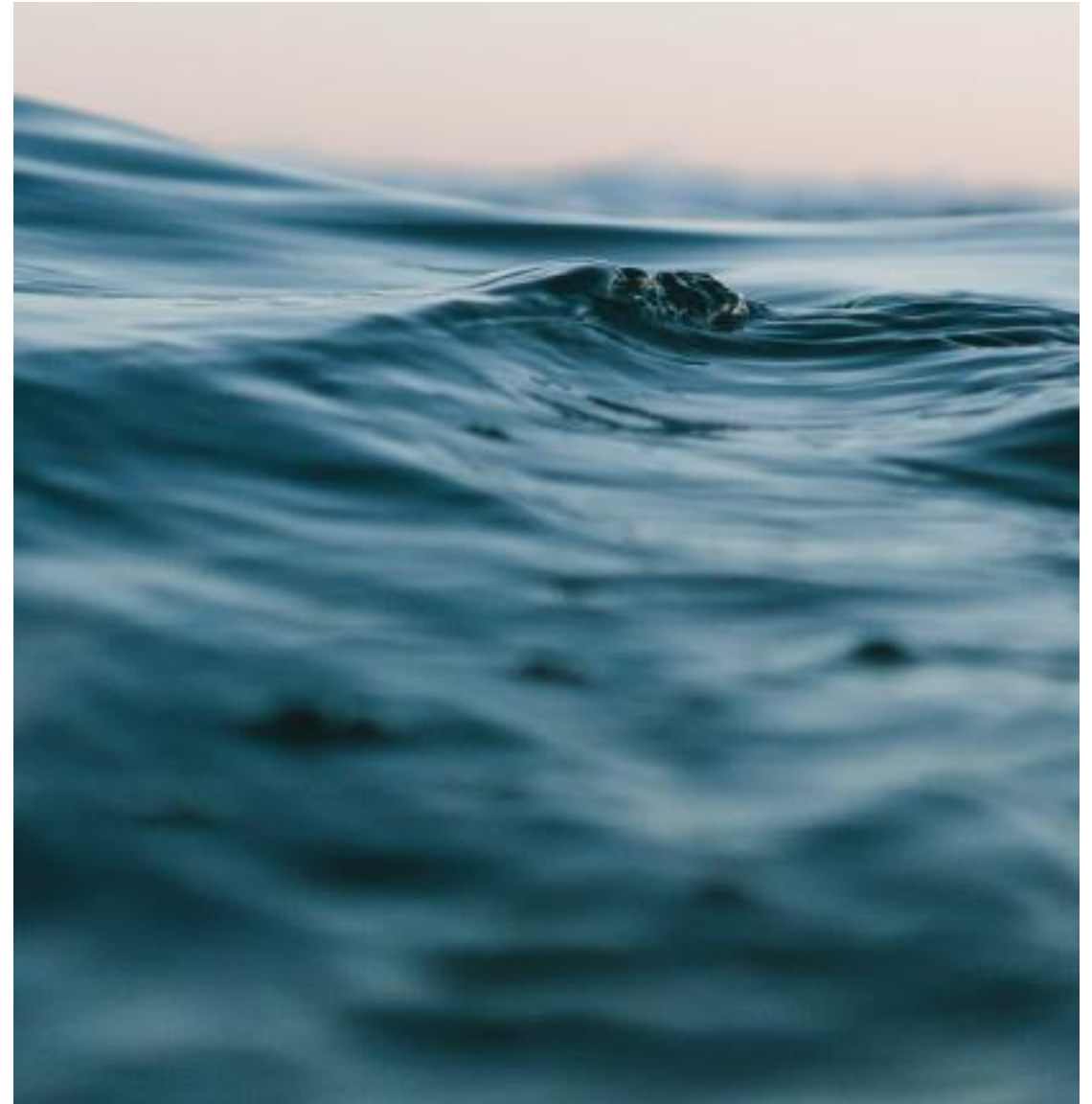
International Development & Aid

Response to ocean health challenges, economic development



Ecosystem Services

Harvesting of living resources and extraction of non-living resources



Sectors in the changing Blue Economy

Established sectors

-  Shipping insurance
-  Waste disposal
-  Shipping and shipbuilding
-  Ports: infrastructure and services
-  Maritime transport
-  Border security & defense
-  Tourism (incl. eco-tourism)
-  Coastal development
-  Fisheries (incl. sustainable fisheries)
-  Seabed mining
-  Oil & gas

Emerging sectors

-  Blue finance & capital
-  Ocean monitoring and surveillance
-  Coastal habitat protection and restoration (incl. Blue Carbon)
-  Maritime surveillance & safety
-  Autonomous vessels & navigation
-  Aquaculture
-  Marine biotech (pharmaceuticals, chemicals)
-  Renewables
-  Desalination

Market overview: Marine

Powered by smarter technologies in existing and emerging sectors alike, the Marine market will undergo radical change. As the second largest market within the Blue Economy, Marine is established at 44% of the total GVA – this will slightly decline as other markets increase in proportion.



Economic value
(2018 GVA)



Employment
(2018)



Key sectors



1. Tourism (incl. eco-tourism)

Tourism is continuing to grow as a sector and is expected to be worth £691 bn by 2030



2. Ports: infrastructure & services

At £369bn by 2030, marine GIS and digitisation expected at ports



3. Autonomous vessels & navigation

The standout growth sector in the marine market

Autonomous vessels and navigation

Driven by developments in autonomy, connectivity and digitisation, autonomous vessels present a disruptive technological advancement in shipping. As the standout sector within the marine market, the industry is set to grow at 11.7% year on year.

The industry is at the early stages of growth, but it is becoming increasingly likely that, over the coming years, a significant number of vessels will be entering service around the world navigated by computers and sensor – with or without remote human supervision. Legalisation and information requirements will also change so that automated systems are able to interpret and act on data to operate these vessels safely and efficiently.



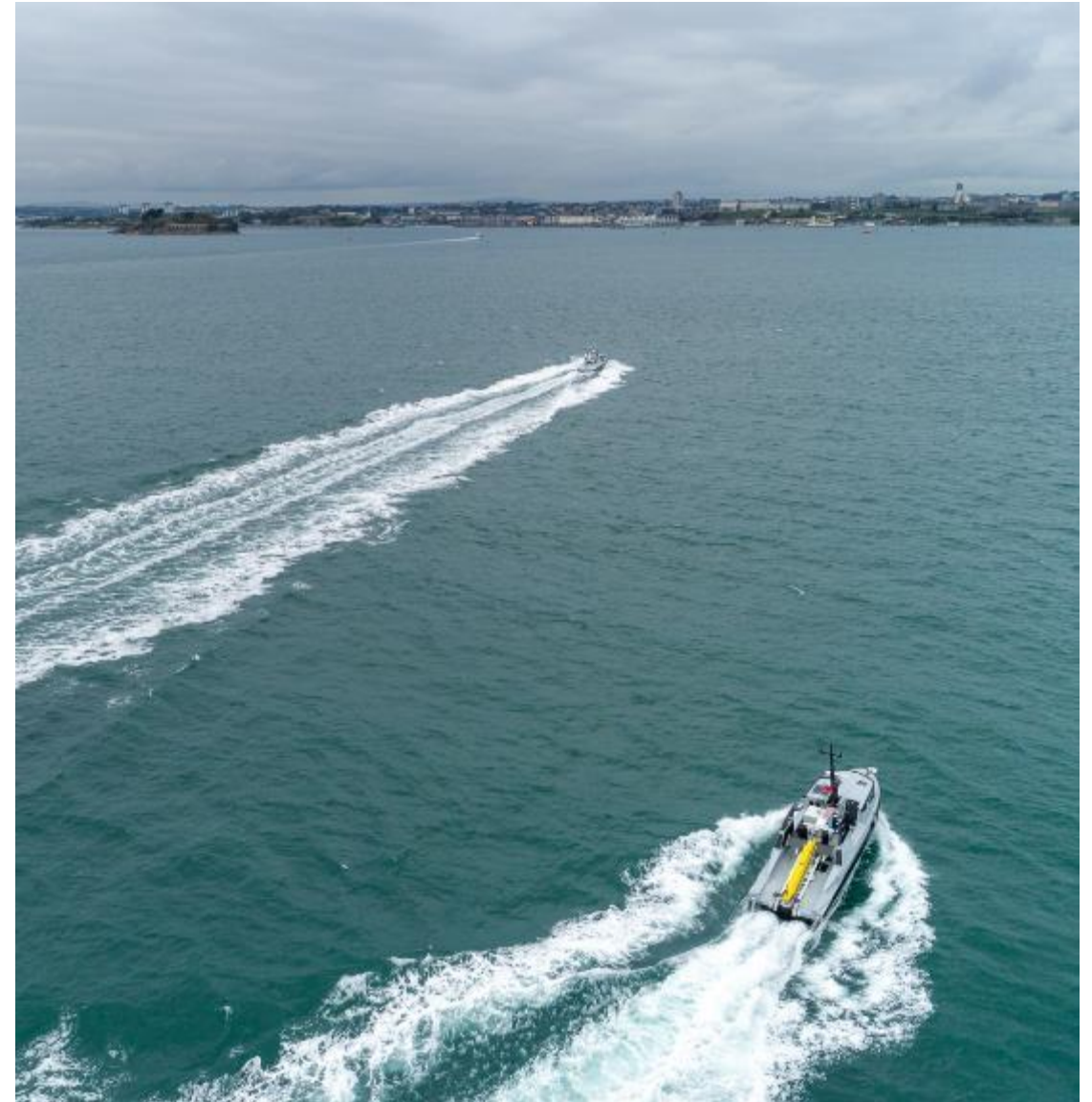
Developments in
automation



On-board
intelligence

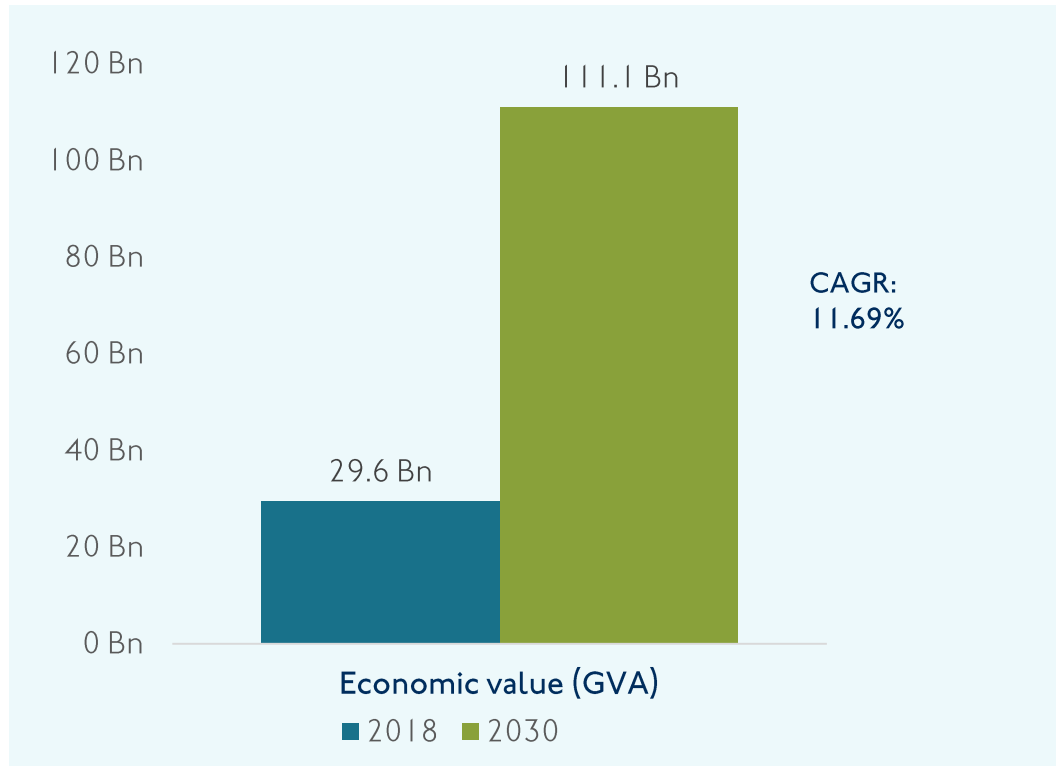


Increased
connectivity

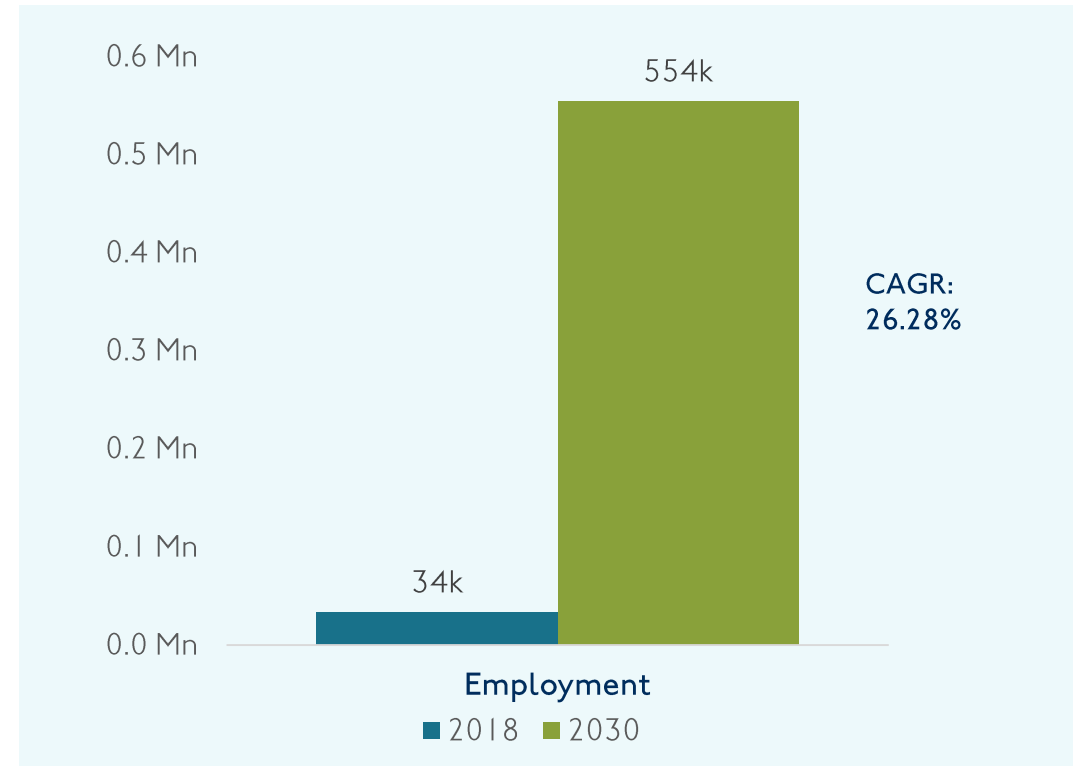


Growth of autonomous shipping by 2030

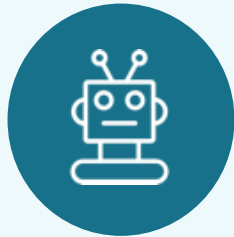
As the race to create a commercially viable autonomous vessel continues, the sector is expected to grow 3.75x to £ 111 bn by 2030.



This growth will bring employment opportunities, with the sector employing over 554k within the next 10 years.



Autonomous shipping technologies and trends



Automation

To be able to navigate autonomously, ships need:

- › Acoustic sensors
- › Optical Sensors
- › Radar
- › Satellite data

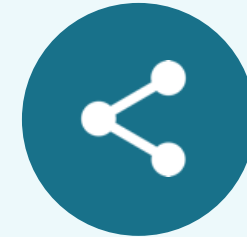
Local computers interpret and act on this data, operating the vessel. Humans can also take over by operating remotely.



Intelligence

On-board computers must have the intelligence to be able to react to dynamic marine scenarios like a human would – the programming and testing for this is currently underway.

Moving and docking are today's priorities, but advanced scenarios like trawling or data collection will be on the horizon soon.



Connectivity

One day, ships may be able to coordinate traffic or seamless arrivals and departures from ports.

They will also share data on local conditions with other data collection devices.

Building this will create an 'Internet of Things' for which no standard exists – leaving space for new competitors to take the lead.

Setting the foundations for autonomous shipping

The possibility of partially or fully autonomous ships promises to be nothing short of transformative for the maritime industry. But how can such vessels begin to navigate safely without a full crew on board?

To help meet this challenge, the UK Hydrographic Office has been working with a range of partners across the industry to provide bespoke data sets and support vital testing and research in this area.

This work builds on [ground-breaking research conducted for the Department of Transport in 2018](#), where we worked closely with the Maritime & Coastguard Agency and leading autonomous systems manufacturer L3Harris to scope future data requirements for autonomous shipping. This included the concept of a 'smart chart' system – bringing together data such as radio signals, regulations, tides and bathymetry into a machine-readable format to support safe navigation for smart and unmanned autonomous vessels.

As we move closer to realising the opportunities of autonomous shipping, we are continuing to support these new data requirements and emerging standards, to support safe and efficient navigation for the autonomous vessels of tomorrow.

