



# Blue Economy Screener

## Thematic & Impact Investing

31 March 2017

# A deep-dive into the Ocean

### What's it all about?

Our in-depth assessment of the decline in ocean health shows that the tides are turning. The sectors that most jeopardise the resources provided by the sea, such as shipping, wild-catch fisheries, and offshore oil & gas, face mounting pressure to shift their model towards a more sustainable trajectory, which results in a new wave of risks and opportunities, paving the way to a potential recovery. Our blue economy framework looks to identify the best practices among fast-growing ocean-related industries and likely winners and losers across our universe. Offshore-wind, aquaculture and ship-equipment plays are well placed to provide resource-efficient and climate-friendly solutions, while emerging themes such as the reduction of plastic pollution are gathering steam.

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**IMPORTANT.** Please refer to the last page of this report for "Important disclosures" and analyst(s) certifications.

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# 360 in 1 minute

## **A sea change for the ocean**

The swift rise of innovation-driven and renewable resource-based sectors, such as offshore wind and aquaculture, coincides with a policy clampdown on the negative environmental impact of ocean-based industries, such as seaborne trade and wild-catch fisheries. This convergence of factors bolsters the case to examine the investment opportunities and risks linked to the “blue economy”, which refers to the transition to a sustainable use of ocean, sea, and marine resources.

## **Blue is the new green**

Our comprehensive mapping shows how environmental and social trends linked to the recovery of ocean health, notably resource efficiency pressure and the energy transition, could magnify the growth drivers of the most exposed companies in ocean-related sectors (fish & seafood, energy & resources, shipping lanes, coastal livelihoods). Based on our in-house blue economy framework, input from sector analysts as well as external insights (e.g. Rabobank, Carbon War Room/UCL Energy Institute, Ocean Assets Institute), we highlight the stocks at the vanguard of marine ecosystem protection and those lagging behind.

## **Twenty thousand million euros under the sea**

- Although still marred by biosecurity concerns, advances in aquaculture practices could foster the industry’s tremendous potential, benefitting Marine Harvest (salmon fish farming) and Benchmark (health and breeding solutions). Meanwhile, the broader sustainable seafood trend is reinforced by responsible sourcing commitments of leading food retailers (e.g. Ahold Delhaize).
- Tightening regulation finally implemented to reduce shipping pollution fuels the demand for solutions (e.g. marine scrubbers, ballast water), resulting in pockets of growth for leading ship equipment companies. Wärtsilä is the more obvious beneficiary.
- Pioneering offshore wind developers (DONG Energy) and wind equipment makers (Vestas, soon-to-be Gamesa-Siemens Wind Power, Sif) are driven by offshore double-digit growth while oil & gas companies step into the space. However, concerns remain about oil & gas deep-offshore pickup and decommissioning externalities.

## **The next wave: plastic, eco-tourism, impact funds**

Innovations to counter plastic pollution, tourism’s bolder sustainability ambitions, the demand for coastal protection, and private equity impact-investing funds are all other expanding marine-related segments.

## Forewords

We welcome the insights provided by leading responsible investment and marine industry experts in the introduction to this report.



### D. Michael Adams, President, Ocean Assets Institute

We at Ocean Assets Institute applaud Kepler Cheuvreux's vision in producing this timely report for responsible investors in ocean industries. I say "timely" because ocean issues have become mainstream headlines in the past year, with the crisis of plastic waste, demand for sustainable seafood, challenge of green shipping, emergence of marine energy and coastal resilience issues that - collectively - impact everyone on our Blue Planet. Yet with crisis comes opportunity. Here is a guide to help investors be part of the solution for healthy oceans, upon which all life depends.

For example, take the ocean plastics crisis. There is no shortage of shocking headlines: Dumping over 8mmt per year of plastics in the ocean will lead to more plastics than fish (by weight) by 2050. This leads to vast opportunities for those who are part of the transition from a Linear to Circular Economy. From design to manufacturing, from packaging to recycling, investors can identify the winners who embrace resource efficiency and closed-loop processes. And these allocations in every industry are indeed part of the solution to a planetary crisis.

Another example is the just-in-time arrival of Natural Capital Accounting for the investment community. By measuring the inputs from nature, investors can more accurately measure a company's exposure to a host of risks: supply chains, resource scarcity, demand for sustainable products, resource efficiency, product and director liabilities.

Why is this good news for the ocean? Because, as the classic example of "the tragedy of the commons", the ocean has suffered due to the collective illusion that its services are free. Impact investors know better and are ahead of the curve to benefit from smart allocations to marine conservation. Fishing alone loses over \$50bn per year due to unsustainable practices. Plastic waste can mean revenue for coastal communities with recycling projects. Tourists value clean beaches and vibrant reefs. Coastlines and cities depend on mangroves for protection against increasingly violent storms. And clean energy is offered by harnessing tides and waves.

All these revenue streams add up to a bright future for Marine Impact Investing, which we support with our new initiative, BlueCapital. So we welcome this report as a practical tool for investors on the cutting edge, and thank Kepler Cheuvreux for their leadership again in delivering fine research.

Ocean Assets Institute ([oceanassets.org](http://oceanassets.org)) supports healthy oceans with tools for Investor Engagement and Impact Investment. We are a Swiss-based NGO with global partners. Our team specialises in financial research, capital placement and communications. For Investor Engagement, we provide sponsored reports and events on Plastics, Seafood, Shipping and Marine Energy. For Impact Investment, we are pleased to launch BlueCapital ([bluecapital.org](http://bluecapital.org)), together with a team of experts, to source and promote investments in sustainable SMEs and marine conservation projects in Africa and Asia. Please join the Institute as a member, or get in touch to discuss how we may support your goals.

## **Mark Campanale, Chairman of Fish Tracker and Ben Metz, Project Director**

The Fish Tracker Initiative aims to investigate the role that financial institutions play in financing the trade in global fisheries, in particular the exploitation of wild fish stocks or their processing for entry into the commercial food chain.

Initial research has identified as many as 300 stock exchange listed fisheries businesses, many of which are focused on wild catch. Few, if any, reveal much about the sustainable management of the resource. Regionally, there are clusters of fisheries businesses listed in North American and Scandinavia as well as South Africa. The most active and by and large opaque capital market for wild catch fisheries is Asia.

The initiative aims to harness the power of financial markets as a positive force for the conservation of nature. This is already being done in the energy arena, through Carbon Tracker, with this methodology now being deployed to address increasingly depleted fish stocks.

Thus far, little is understood about company behaviour and where practices are linked to overfishing. From a fisheries management perspective, poor disclosure to investors of operational matters such as the health of fish stocks, permitting or quotas, volumes or species caught or geographies fished are problematic for accountability. Together, these practices are now endangering whole species. From a finance angle, these activities represent a looming supply problem and a risk to the sustainability of revenues as catch volumes rapidly decline. Fish Tracker is carefully analysing chains of custody for fish entering into the food processing chain. To date, of the 300 listed companies under analysis, their market cap is c. USD529bn. Of the initial 133 cohort of companies under detailed observation, we have discovered revenue data of USD382bn, of which transparent disclosures to market of fisheries revenue is approximately USD40bn, with fish-related revenues likely to be much greater than this. Of the initial companies under observation, less than 10% go on to disclose information about fish revenues. Very few disclose quantitative information about fish species.

Fish Tracker's goal is to stimulate change in investor behaviour and, through a more responsible approach to investing in the sector, encourage better practice. A current critical need is for more disclosure to investors of data about fish catch and species, as well as volume and revenues. Here, we believe market regulators and investors can play a key role. Over time, we hope to adjust how the sector is financed so as to ensure that the risk premium associated with fisheries activity is correctly priced. Fish Tracker will identify the companies, the regions, and fisheries where banks and investors should exercise caution. The business models of these companies depend upon a healthy sea and careful management of fisheries stocks. Yet more often than not, investors are not aware of the risks current fishing practices pose to the long-term viability of their investments.



## Dr Tristan Smith – Director UMAS (University College London (UCL) Energy Institute and MATRANS), Director Shipping in Changing Climates, Lead author Third IMO GHG Study

International shipping is the enabler of global trade and globalisation and a key component of modern economies. And yet it is comparatively late to join the discussions on GHG and decarbonisation. There is a strong preference for regulation to be developed at a global, UN level at the IMO – an organisation that to date has done little to prepare the sector for the coming decades.

The good news is that IMO is now discussing GHG in earnest. However, it is likely to be many years yet (2023) before there is good clarity on IMO GHG policy. This leaves firms owning shipping assets, using shipping services, or involved in the sector’s financing, with an unhelpful period of uncertainty to navigate. This is not helped by the sector’s relatively opaque nature – both technically/commercially, and in terms of data that could be used to characterize company and asset level GHG risks and opportunities.

What we do know:

Shipping, a sector that is currently dependent on fossil fuels as its primary energy source, and that is employed in moving significant quantities of fossil commodities (40-50% of cargos by mass), will change substantially over the next few years. The average ship’s carbon intensity (gCO<sub>2</sub>/tnm) will have to reduce by approximately 60-90% by 2050. Many ship types/sub-sectors could become further oversupplied or obsolete as fossil fuel trade flows reduce.

There are energy efficiency options - both technological and operational, but because of expectations of growth in trade these will not be sufficient. The sector will need to go through a transition to low carbon fuels (bio and synthetic). The use of LNG as a marine fuel may occupy a role in niches, but cannot be a longer-term solution because it is a high carbon fuel.

Given the long-term asset life of ships and their associated infrastructure (ports, harbours), responding reactively to these changes is unlikely to be a good strategy and will expose firms to stranded asset risks, and missed opportunities.

What we don’t know:

There will remain uncertainties on the speed and stringency of IMO introduced GHG regulation, and the technology and fuel “winners”.

What can be done:

1. Become familiar with the basic information that is in the public domain about the sector’s likely pathways (e.g. [DSA study](#)).
2. This can be used in analyses to test the robustness of decisions and investments under different scenarios (e.g. [Navigating decarbonisation](#)).
3. Encourage or invest in firms that are adopting science based targets, and use independent third-party data to assess, review the progress of that company relative to that target (e.g. [BetterFleet](#)).

# KECH research series on the SDGs

This report is part of a series on the Sustainable Development Goals (SDGs), including Climate Change, focusing on Sustainable Development Goal 14.

**Table 1: Sustainable development goals (SDGs)**

Goal 1	End poverty in all its forms everywhere
Goal 2	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Achieve gender equality and empower all women and girls
Goal 6	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Build resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation
Goal 10	Reduce inequality within and among countries
Goal 11	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Ensure sustainable consumption and production patterns
Goal 13	Take urgent action to combat climate change and its impacts
<b>Goal 14</b>	<b>Conserve and sustainably use the oceans, seas and marine resources for sustainable development</b>
Goal 15	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Strengthen the means of implementation and revitalise the global partnership for sustainable development

Source: UN

Recent reports on the SDGs and Climate Change, including co-writing with Julie Raynaud:

- SDG 15 (forest and land degradation): *Integrating landscape into investments* ([click here](#))
- SDG 13 (climate change):
  - *Climate change analysis: first aid kit* (Julie Raynaud, [click here](#))
  - *Green Impact Screener: Scouting 2° Opportunities* ([click here](#)),

**Chart 1: A large research series tackling climate change and the SDGs from a metrics and integration perspective**



Source: Kepler Cheuvreux

## **KECH contributors**

Kepler Cheuvreux ESG analyst Julie Raynaud (jraynaud@keplercheuvreux.com) contributed significantly to the natural capital and climate-related risks sections of this report (including Plastics, Oil & Gas, Shipping) along with equity analysts covering the companies mentioned throughout this report, including Johan Eliason (Shipping), Douglas Lindahl (Offshore Wind), Patrick Roquas, Fredrik Ivarsson (Aquaculture), Bertrand Hodee, Tristan de Jerphanion, Kevin Roger (Offshore Oil Exploration & Production), and Christopher Menard (Aerospace & Defence).

## **Acknowledgements**

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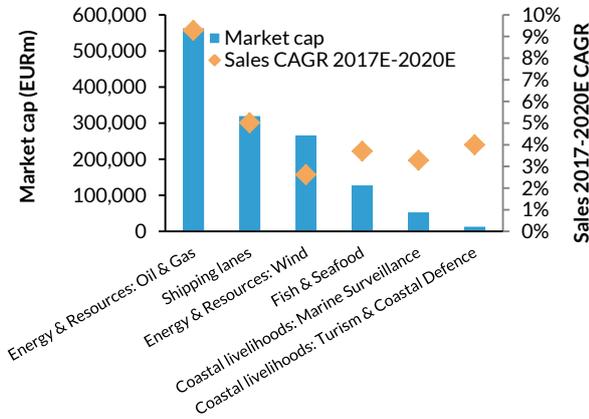
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## Introductory quote

“I really don’t know why it is that all of us are so committed to the sea, except I think it’s because in addition to the fact that the sea changes, and the light changes, and ships change, it’s because we all came from the sea. And it is an interesting biological fact that all of us have in our veins the exact same percentage of salt in our blood that exists in the ocean, and, therefore, we have salt in our blood, in our sweat, in our tears. We are tied to the ocean. And when we go back to the sea - whether it is to sail or to watch it - we are going back from whence we came.” John F. Kennedy’s remarks at the dinner held for the America’s Cup Crews on 14 September 1962.

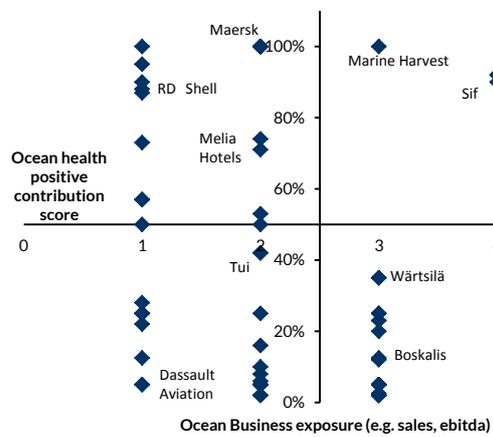
# Thematic context in six charts

**Chart 2: KECH ocean investment clusters market cap and sales CAGR over 2017-20E**



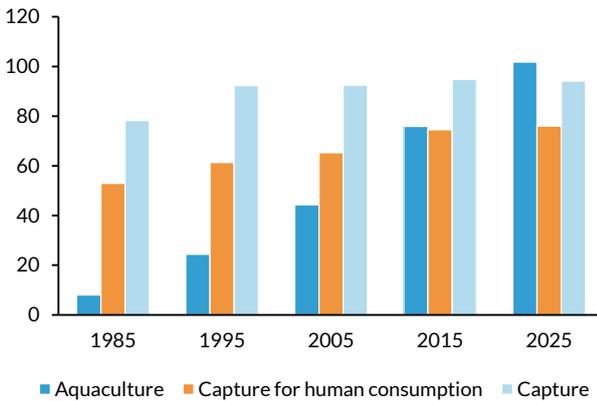
Source: Kepler Cheuvreux

**Chart 3: Crossing ocean activities exposure and ocean health Impact score (from 1=very low to 5=very high)**



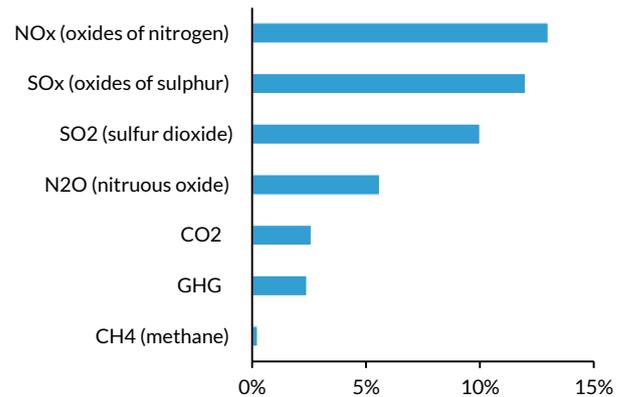
Source: Kepler Cheuvreux

**Chart 4: Global capture fisheries and aquaculture production to 2025 (Mt)**



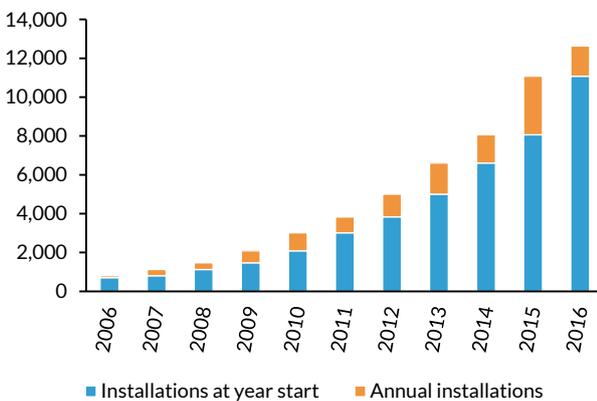
Source: OECD/FAO, Kepler Cheuvreux

**Chart 5: Shipping share of global emissions**



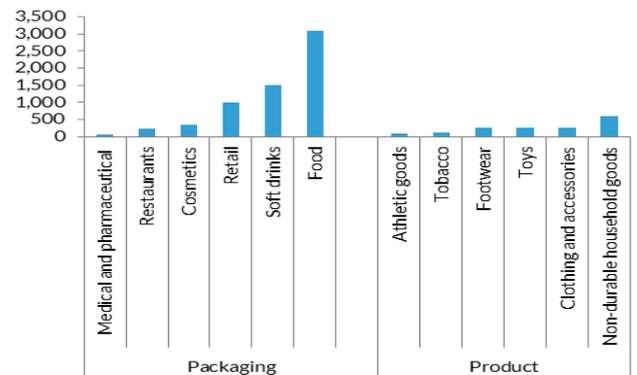
Source: IEA, IPCC, Kepler Cheuvreux

**Chart 6: Europe offshore wind installations growth (MW)**



Source: WindEurope, Kepler Cheuvreux

**Chart 7: Ocean plastic waste damage costs (USDm/ year)**



Source: UNEP, Kepler Cheuvreux

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## Executive summary

In this report, we take a deep-dive into “blue economy” investment opportunities. Our comprehensive navigator shows how environmental and social trends linked to the decline in ocean health, particularly resource efficiency pressure and the energy transition step-up, could catalyse key sector drivers for the most exposed companies. Based on a top-down and bottom-up assessment structured according to our framework that focuses on five main categories (Fish & Seafood, Energy & Resources, Shipping Lanes, Coastal Livelihoods, Pollution reduction), we highlight best practices among selected engagement themes and the stocks that stand to benefit from a recovery in ocean health.

### Supportive backdrop: a watershed moment

The global ocean economy is worth at least USD1.5-2.5trn (gross value added) and growing fast (3.5% 2010-30E CAGR). This momentum is even more evident when looking at marine linked-revenues (c. EUR1.5trn) in KECH’s universe, which are set to grow at an 8% CAGR in 2017-20E.

However, this expansion continues to be mainly driven by sectors that put considerable pressure on the goods and services provided by the ocean, such as oil & gas, tourism and shipping. Therefore, the bright prospects are tempered by trends such as overfishing, habitat destruction, pollution and acidification, which are set to be exacerbated by loose regulation and climate change.

### Staring at the sea

It is time to turn our attention to the investment opportunities and risks linked to the SDG 14 - a sustainable ocean - a theme otherwise referred to as “the blue economy” (where the ocean economy and sustainability meet). As ocean problems and solutions lie with land-based decision makers, innovation-driven industries are preparing to offer competitive alternatives to sectors that exhibit unsustainable trends.

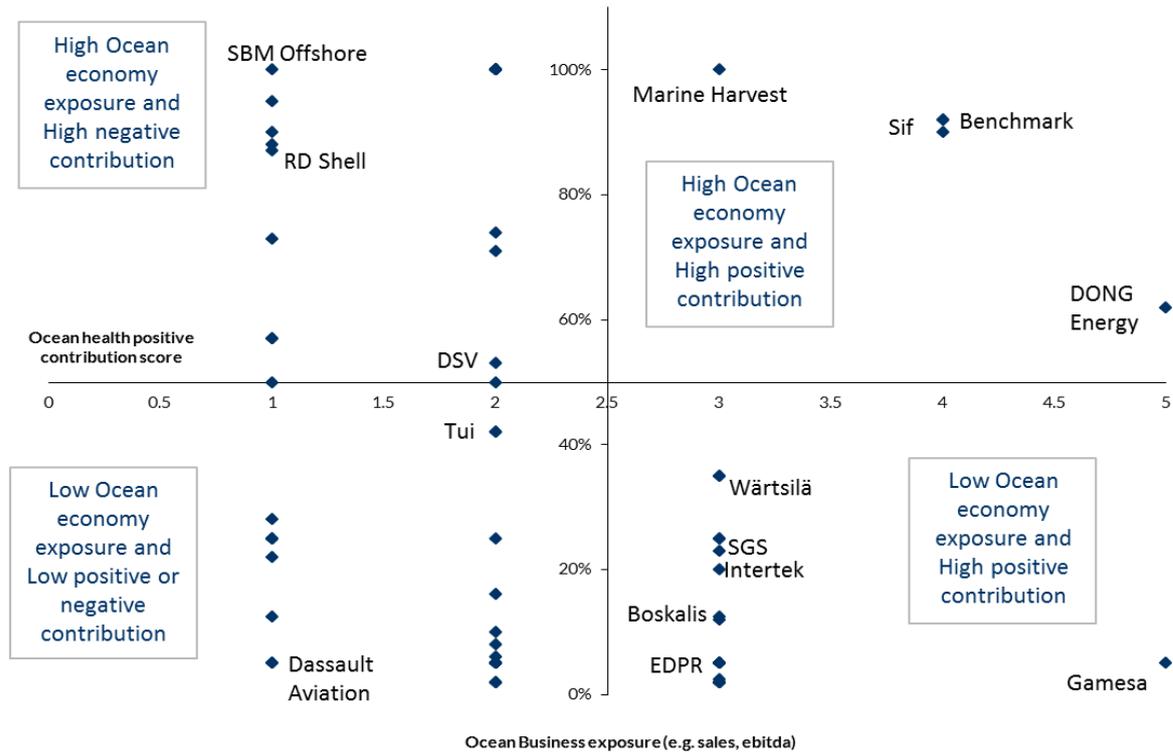
### Introducing our blue economy navigator

We group the companies in our coverage into four broad categories (shown in the following chart) based on their business exposure to marine activities and our assessment of their positive contribution to lower damage to the ocean or expand business that potentially contributes positively to ocean health. We see aquaculture and offshore wind at the vanguards of this shift, as both are rather resource-efficient and climate-friendly. Conversely, we see particularly acute environment-related risks and scope for engagement in other segments (e.g. shipping, oil & gas, wild-catch fisheries, tourism).

***Ocean as a new focal point***

***Offshore Wind and Aquaculture are the main blue economy investment themes***

Chart 8: Crossing ocean activities exposure (e.g. sales) and ocean health Impact score (from 1=very low to 1=very high)



Source: Kepler Cheuvreux

## #1 Fishery: the hidden gem

Aquaculture is the most dynamic segment, though not the panacea, given its past setbacks and present biosecurity challenges. The industry is undergoing a paradigm shift on the back of a strong pipeline of innovation, including in fish meal (e.g. new oils), which, compounded with tightening legislation and appropriate oversight (rising certification requirements), could gradually put the industry back on track.

As a result, the industry offers a growing pool of opportunities across the value chain, including for the two leading players in our universe: Marine Harvest (salmon farming, taking concrete steps to address biological challenges) and Benchmark (health and breeding solutions). Meanwhile, food retailers and catering companies' heightened focus on sustainable seafood sourcing (e.g. Ahold Delhaize, Sodexo) could also help to improve the current gloomy trends for wild-catch fisheries.

## #2 Offshore Energy: transition in earnest

Pioneering offshore wind developers (DONG Energy, E.ON and Innogy), wind turbine makers (Vestas, and the soon-to-be Gamesa-Siemens Wind Power) and offshore foundations (Sif) are well placed to capture the benefits from double-digit growth in offshore capacity, spurred by continuously falling costs and innovation. Oil & gas majors' exposure to offshore wind remains small and projects nascent (e.g. Statoil, Repsol).

Conversely, if we now turn our attention to the threats to marine ecosystems, the expected pick-up in deep offshore oil & gas exploration and decommissioning

**Aquaculture in the midst of a paradigm shift**

**Offshore energy transition in the making**

growth is likely put the downside from environmental and safety risks under the spotlight, while conservation-related KPIs are not reported.

### **#3 Sustainable shipping: time to move up a gear**

Although shipping is a relatively efficient mode of transport, its soaring CO2 emissions, high levels of air pollutants, and lax self-defined regulation raise legitimate concerns. Encouragingly, the demand for solutions to marine pollution-related environment legislation, including new standards for sulphur content and ballast water treatment, is set to gather pace in the next few years (over c. USD12bn market for both scrubbers and ballast water). Wärtsilä is the more obvious beneficiary, in our view.

Against a backdrop of consolidation, Maersk's attempt to lead the way on CO2 in the ocean carrier segment is hampered by its average fleet age and lacklustre industry energy efficiency record, although weak disclosure on the whole and from most peers hinders a thorough comparison. In shipping, we also highlight concerns linked to the use of facilities in India (Alang ship yards located on a beach) amid continuously high levels of vessel scrapping in the industry.

### **#4 Marine pollution reduction and other fringe industries**

Among the industries reviewed here that are considered to have relatively lower financial exposure to marine environmental concerns (infrastructure, plastics, and tourism), the increase in extreme weather events could propel growth for coast defence companies, as exemplified by Boskalis. In the same vein, an increased focus on reducing plastic waste (the leading cause of marine litter) is leading to innovation in biodegradable plastics, and we praise the food companies that have provided a roadmap to lower their plastic footprint (e.g. Danone). We also welcome big tourism's sustainability targets (e.g. Tui), although they look modest given the size of the challenge.

Finally, outside listed equities, a few impact-investing vehicles are blossoming, showing that a wave of credible businesses that address the top ocean health priorities can prove financially attractive (e.g. Althelia Ecosphere, Encourage Capital).

### **How this report is structured**

We highlight key market trends and our view on the impact on companies, from top-down to bottom-up, with an emphasis on the interplay between financial, environmental and social factors:

1. **Introducing our Sustainable Ocean Framework.**
2. **Macro outlook, including a focus on somewhat less significant or investable themes from a sustainability viewpoint:**
  - a. **Marine pollution reduction (plastic).**
  - b. **Coastal livelihoods, including tourism.**
  - c. **Ocean finance outside listed equities (impact investing funds).**
3. **Fish & seafood: aquaculture and wild-catch fisheries.**
4. **Shipping lanes, across the value chain.**

***Shipping industry  
clinging to a  
problematic model***

***A look at future  
industries and  
investment funds***

5. Energy & resources: offshore wind and oil & gas exploration & production.

Each thematic section comprises the following subsections: investment opportunities (universe), macro trends, key ESG issues (including peer comparison and our views) and valuation (investment recommendation).

Blue economy universe

Our broad ocean Investment universe can be found at the end of this report.

Top picks

The table below lists our preferred companies in terms of ocean health-related financial risks and opportunities.

Table 2: Ocean health-related financial risks and opportunities: our top picks

Cluster (Main dependence)	Theme	Financial significance (P&L Impact)	Intangible assets significance, incl. reputation	Drivers	Market opportunity	Preferred companies
<b>Ocean-based industries</b>						
Fish and seafood	Aquaculture farming	High (mixed)	High (mixed)	Customer shift, biological issues (fish mortality), salmon farming fish meal	Yes (aquaculture growing at 3% a year)	Marine Harvest
	Aquaculture breeding & genetics	High (positive)	High (positive)	Customer shift, biological issues (fish mortality), salmon farming fish meal	Yes (e.g. demand for vaccines)	Benchmark
	Catering	Medium to Low (mixed)	Medium to low (mixed)	Overfishing, lax environmental trends, customer shift	Yes (e.g. seafood represents about 8% of Sodexo purchasing spend)	Sodexo
	Retail food	Medium to Low (mixed)	Medium to low (mixed)	Overfishing, lax environmental trends, customer shift	Yes (e.g. 3-4% of food sales in France for Carrefour), backed up by certification	Ahold Delhaize and Axfood
Shipping & port	Container shipping	Medium to Low (negative)	Medium to Low (negative)	Environmental regulation (SO2, ballast water, scrapping)	No	Maersk
	Ship equipment	Medium to Low (positive)	Medium to Low (positive)	Environmental regulation (SO2, invasive species, scrapping)	Yes (scrubbers, ballast water)	Alfa Laval, Wärtsilä
Energy & resources	Offshore wind developers	High (positive)	Low	Climate regulation	Yes (offshore wind boom)	DONG Energy
	Offshore wind equipment manufacturers	High (positive)	Low	Climate regulation	Yes (offshore wind boom)	Vestas, soon-to-be Gamesa-Siemens Wind Power, Sif
	Offshore oil exploration and production	Medium to Low (negative)	Medium to Low (negative)	Environmental & Safety regulation	Not included	
	Offshore oil services	Medium to Low (negative)	Medium to Low (negative)	Environmental & Safety regulation	Not included	
Coastal livelihoods	Tourism	Low	Medium (mixed)	Customer shift	No	TUI
	Coastal protection	High (positive)	Low	Rising sea levels and extreme weather events	Yes (growth in coast defence construction)	Boskalis
	Marine surveillance	Low	Low	None	No	Not reviewed
<b>Pollution drivers</b>						
Marine pollution	Plastic	Low	Low	Tightening regulation on plastic and food waste reduction, customer shift	No	Danone, Ahold Delhaize

Source: Kepler Cheuvreux

## Engagement framework: a toolbox against bluewashing

The following table includes the criteria used to benchmark companies across peer groups based on their sustainability practices. Our most and least preferred companies appear in the last two columns. An overarching theme is the need for more widespread and meaningful natural capital reporting (the Natural Capital Protocol initiative is developing an Oceans Supplement).

**Table 3: Engagement criteria on ocean health by sector**

Cluster	Theme	Sector	Criteria	Preferred companies	Lack of disclosure
<b>Ocean-based industries</b>					
Fish and seafood	Wild catch fisheries	Food	Transparency and traceability e.g. dedicated report via relevant NGO partnership  Quantitative data on certification (including MSC) Risk assessment reporting e.g. current management status of wild stocks, geographical location of source fisheries, Resources for determining sustainable harvests, existence of improvement projects, environmental impact assessment Human rights e.g. focus on removal of slavery. The FAO Code of Conduct on social labour conditions in fisheries serves as an international voluntary reference (compliance has been deemed insufficient in the past) Contribution to illegal, unreported and unregulated (IUU) fishing reduction Approach to tenure Seafood operations' plastic reduction GHG emission reductions	Overall: Thai Union	Dongwon Industries, Maruha Nichiro Corporation, Nissui/Nippon Suisan Kaisha (none is covered)
	Food, retail, catering	Food	100% sustainable sourcing including specific certification share and local targets and progress  New risks assessment reporting based on the Red List of the International Union for the Conservation of Nature (IUCN Red List of Threatened Species)	Overall: Ahold Delhaize, Axfood, Sodexo, Jeronimo Martins	ICA Gruppen
	Aquaculture	Food	Animal welfare policy (certification, sea lice and fish mortality; see below)  Aquaculture antibiotics reduction: consumption of antibiotics (g of active ingredient per kg live salmon produced) Percentage of certified sites; evidence of improvement projects Number of escaped fish Sustainable sourcing policy and raw materials breakdown, including Roundtable on Responsible Soy (RTRS) and GMOs Fish mortality (12 months rolling) Sea lice treatment (g API per tonne): medicinal in-bath treatment and In-feed treatment	Overall: Marine Harvest, Bakkafrost, Cermaq	Cermaq, Norway royal salmon, SalMar, Grieg Seafood

Source: Kepler Cheuvreux, UNEP, SASB, Carbon War Room, Sustainable Fisheries Partnership, Ocean Disclosure Project

**Table 4: Engagement criteria on ocean health by sector (cont'd)**

Cluster	Theme	Sector	Criteria	Preferred companies	Lack of disclosure
Shipping & Port	Container shipping	Transport shipping	Climate change contribution reduction, including CO2 intensity status (CO2g/TEU/KM), science-based target	Overall: Maersk	MSC, COSCO, Evergreen, OOCL, UASC, CMA CGM, OOCL, Yang Ming, Hapag-Lloyd and Hamburg Süd (somewhat better)
			Companies' long-term plans to keep vessels competitive through vessel design (i.e. ensuring that vessels are being designed for ease of retrofit modifications) and capital availability (i.e. ensuring that capital is available to make these vessel modifications)		
			Air pollutant emission reduction plans		
	Ship equipment		Climate change contribution reduction (products)	Overall: Alfa Laval, Wartsila	n.a.
	Port equipment		Air pollutant emission reduction contributions (products) Products enabling third-party GHG emission savings	Overall: Cargotec	Shanghai Zhenhua Heavy Ind-B
Energy & Resources	Offshore oil exploration and prod. & Offshore oil services	Oil & Gas	Deep offshore projects (Incremental production by upstream segment)	Overall: none	
			Decommissioning projects environmental & social considerations	Shell (Brent field decommissioning disclosure)	
			Offshore wind projects	Repsol and Statoil (offshore wind)	
			Arctic exposure		All Integrated Oil & Gas majors reviewed
			Number and aggregate volume of hydrocarbon spills, volume in Arctic, volume near shorelines with ESI rankings 8-10, and volume recovered		All Integrated Oil & Gas majors reviewed
			Proved and probable reserves in or near sites with protected conservation status or endangered species habitat		All Integrated Oil & Gas majors reviewed
Coastal livelihoods	Tourism	Hotel & Leisure	Certification (GSTC) including breakdown by category	Overall: Tui	Melia Hotels
			Investments in environmental and social improvements/eco-tourism		
			Environmental impact indicators, including breakdown for ships and aviation fleet versus peers and science-based target for CO2		
<b>Pollution drivers</b>					
Marine pollution	Plastic	Food, retail	1) Recycling target	Overall: Ahold Delhaize (Retail); Danone (Food)	ICA Gruppen
			Estimated use (in tonnes) of plastic in the company's operations and supply chain,		
			Main types of plastic used in products and packaging, broken down by type and volume,		
			Percentage of the total material used that is recycled or bio-based content		
			Percentage of the plastic used that is biodegradable or recycled at end-of-life		
			Commitment to use only reusable packaging (share disclosure)		
			Percentage of plastic used for short-user-life products or packaging		
			Recycling policy target (including total waste)		
			Phase-out of free single-use shopping bags		
			2) Food waste reduction target		
			Phase-out of edible food waste		

Source: Kepler Cheuvreux, UNEP, SASB, Carbon War Room, Sustainable Fisheries Partnership, Ocean Disclosure Project

These criteria were derived from our mapping of sectors against their estimated business exposure to ocean-related industries, Sustainable Development Goals themes and targets presented in the following tables.

**Table 5: Sectors level of business exposure to ocean themes**

Cluster	Theme	Food	Food retail	Capital goods	Catering	Hotels & Leisure	Metals & Mining	Oil & Gas	Pharma	Retail	Support services	Transport	Utilities
<b>Sector exposure level</b>													
<b>Ocean-based industries</b>													
Fish and seafood	Aquaculture	High	Low		Low	Low					Low		
	Wild catch fisheries	High	Low		Low	Low					Low		
Shipping lanes	Shipping & Port			High				High			High	High	Low
Offshore Energy	Offshore wind			High			Low	Low					High
	Offshore oil & gas							High					Medium
Coastal livelihoods	Tourism												
	Coastal protection			Low								Medium	
<b>Pollution drivers</b>													
Marine pollution	Plastic	Low	Low		Low	Low			Low	Low			

Source: Kepler Cheuvreux

**Table 6: Themes mapping against their exposure to ocean-related SDGs and targets**

Cluster	Theme	Biodiversity and habitat loss (SDG 15)	Climate change (SDG 13)	Coastal livelihoods & economies (Target 14.2)	Food security (SDG 2)	Marine pollution (Target 14.1)	Ocean Acidification (Target 14.3)	Overfishing and Illegal fishing (Target 14.4)	Marine Invasive Species (Target 14.2)	Rising demand for resources (14.7)	Technological advances (14.A)	Tourism & recreation (17.7)
<b>Exposure to the SDG and Ecosystem services</b>												
<b>Ocean-based industries</b>												
Fish and seafood	Aquaculture	High	High	High	High	High	High	Medium	Medium	High	High	Medium
	Wild catch fisheries	High	High	High	High	High	High	High	High	High	Medium	Medium
Shipping lanes	Shipping & Port	Low	Medium	Medium	Low	High	Medium	Medium	High	Low	Medium	Low
Offshore Energy	Offshore wind	Low	High	Medium	Low	Low	Low	Low	Low	Low	High	Medium
	Offshore oil & gas	Medium	High	Medium	Low	Medium	Medium	Low	Low	High	High	Low
Coastal livelihoods	Tourism	High	High	High	Medium	High	High	Medium	Medium	Medium	Medium	High
	Coastal protection	High	High	High	Low	Low	Medium	Low	High	Low	Low	High
<b>Pollution drivers</b>												
Marine pollution	Plastic	High	Low	High	Medium	High	Low	Low	Low	High	High	High

Source: Kepler Cheuvreux

## Our Blue Economy Screener framework

Our broad ocean investment universe encompasses companies with significant exposure to our core ocean economy clusters, defined according to the dependence on goods and services supplied by the ocean (fish & seafood, energy & resources, shipping lanes, and coastal livelihoods) and contribution to the recovery of the ocean’s health (pollution reduction). Our core Sustainable Ocean Investment universe uses a more narrow definition to focus on the actionable investment themes potentially aligned with the “blue economy” (the intersection of the ocean economy and marine ecosystem services protection).

### Introducing our approach to map companies

#### First step: assessing the broad marine-related opportunities

Our broad definition of the ocean investment universe expands on the OECD Ocean Economy assessment (*The Ocean Economy in 2030* report) that we have adapted to reflect the full spectrum of investment risks and opportunities linked to:

1. Ocean-based industries (e.g. shipping, fishing and offshore wind), i.e. those that physically operate in the ocean or sea, or depend physically on the goods and services supplied by the sea.
2. Marine ecosystems; i.e. natural capital assets and non-market flow of services (fish, shipping lanes, CO2 absorption).
3. Marine pollution reduction (plastic, agriculture and chemicals, etc.).

#### Second step: focusing on sustainability-aligned investment themes

This breakdown leads us to define five marine ecosystem-based clusters: 1) fish & seafood; 2) energy & resources; 3) shipping lanes; 4) coastal livelihoods; and 5) pollution degradation.

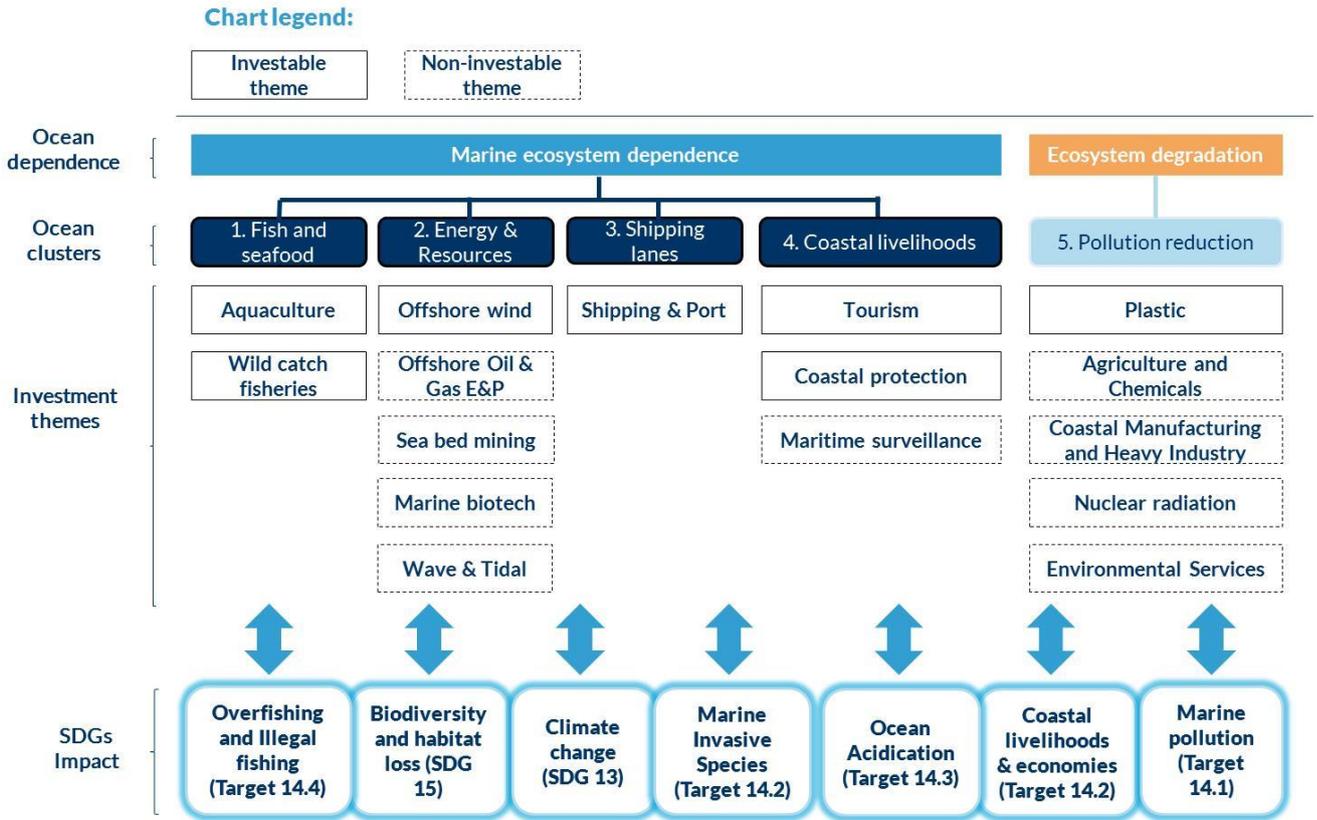
These categories include a total of 17 investment themes or market opportunities, among which we view only seven as investable from both a sustainability and financial perspective i.e. excluding the most contentious activities (e.g. offshore oil & gas, naval defence) and themes without significant revenues impact based on our review and universe (e.g. wave & tidal energy, marine biotech, marine desalination).

These seven themes (aquaculture, wild-catch fisheries, offshore wind, shipping & port, tourism, coastal protection, plastics reduction) constitute the backbone of our core blue economy universe. They highlight the companies that potentially contribute positively to the recovery of ocean health, and the blue economy definition as coined by the UN and WWF, derived from the green economy concept (“improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities”).

**Broad definition of the ocean investment universe: 1) ocean-based industries; 2) dependence on marine ecosystems; and 3) contribution to marine pollution reduction**

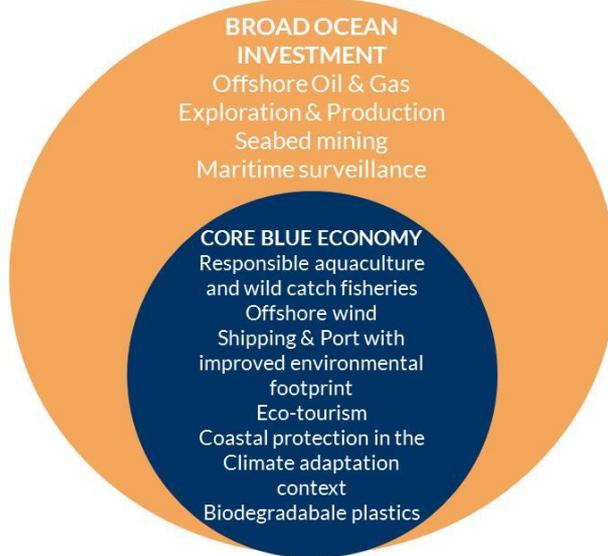
**Core definition: positive impact on ocean health recovery through actionable investment ideas (UN Blue economy definition)**

Chart 9: Sustainable Ocean Investment Framework (clusters and themes)



Source: Kepler Cheuvreux

Chart 10: Core Blue Economy (“Green” activities) vs Broad Ocean Investment (incl. “Brown”)



**Our ultimate objective is to select companies at the vanguard of the blue economy transition (“green” activities)**

Source: Kepler Cheuvreux

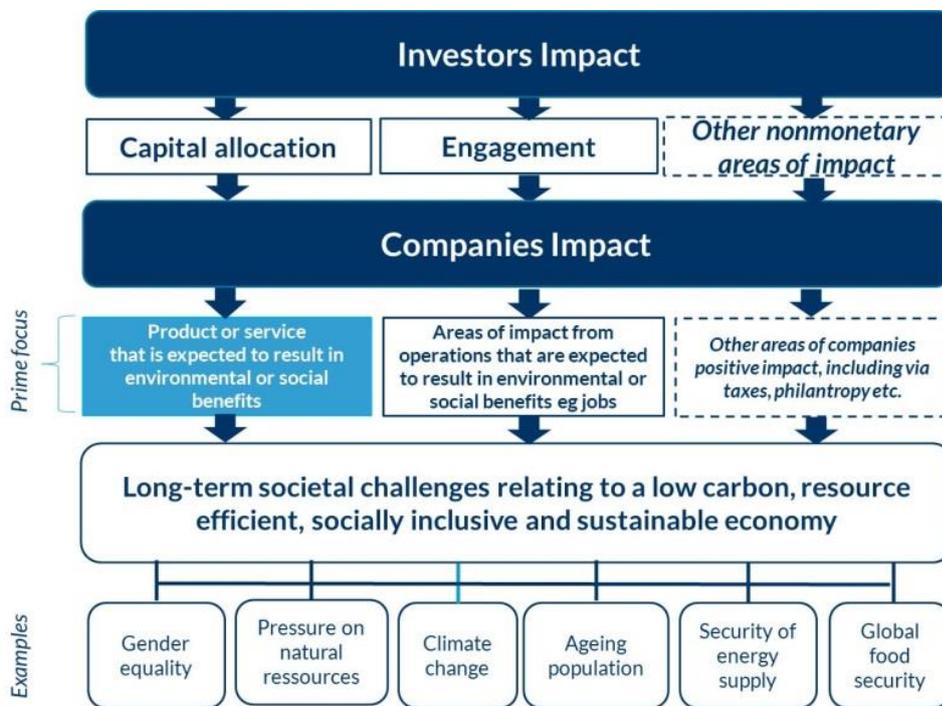
### Third step: rating of companies' contribution to ocean health

While we see numerous obstacles to creating a pure and perfect aggregate indicator that assesses companies' actual impact on ocean health, we still believe it is useful to group them into categories, partly for aggregation and harmonisation purposes, according to a simplified and partly subjective classification, factoring in:

1. **Macro evidence of activities' alignment** with ocean health decline or recovery, as well as relevant linked sustainability goals, especially climate change and resource efficiency.
2. **Companies' level of business exposure** to these areas: products or services (sales, EBITDA), and operations (e.g. procurement).

**Our approach to assess companies' positive impact credentials**

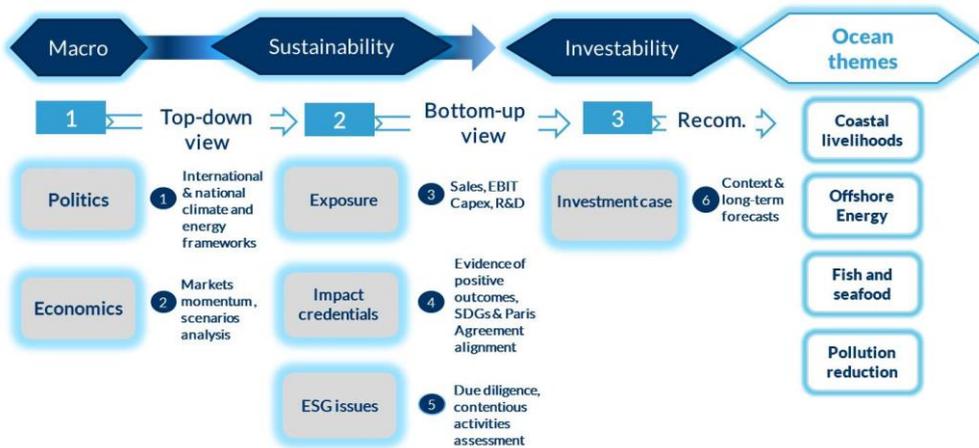
Chart 11: Our SDGs Impact Screener



Source: Kepler Cheuvreux

3. **Companies' sustainability trajectories** (e.g. investments, strategy, practices to lower the negative drivers of ocean decline and propel drivers of ocean recovery).
4. Company-level data showing evidence of positive **environmental and social outcomes**, whenever possible based on third-party assessments.

Chart 12: Our Blue Economy Impact Screener



Source: Kepler Cheuvreux

For instance, using a scale from 1 (very weak positive contribution or negative contribution) to 5 (very strong positive contribution), we would broadly rate offshore wind players with a 5 and offshore oil & Gas with 1. In our view, aquaculture ambitions justify a 3 (e.g. Marine Harvest), while food retailers and catering groups that source seafood and fish according to somewhat sustainable trajectories while reducing the use of plastic also deserve a 3.

Table 7: SDG 14 (ocean health) Impact conviction score - spectrum

"Ocean Health alignment" level category	Light blue Consensual exclusion					Dark Blue Consensual inclusion
Evidence of positive environmental and social impact credentials	Very weak					Very strong
Ocean Health Impact conviction score	Very low					Very high
Core Blue economy Impact universe inclusion	1	2	3	4	5	
Broad Ocean Investment Impact inclusion	No	No	Yes	Yes	Yes	Yes
Industry (examples)	No	Yes	Yes	Yes	Yes	Yes
		Freight/Logistics	Chemicals Food (diversified)	Food (aquaculture) Inspection & Certification	Offshore wind	
Companies (examples)	Dassault Aviation	Ocean carriers Port equipment & operators	Retail food			
	Eni	Boskalis	Ahold-Delhaize	Benchmark	DONG Energy (post Oil & Gas divestment)	
	Repsol	Cargotec	Corbion (not covered)	Intertek	Siemens-Gamesa (post merger)	
	Statoil	HHLA	Danone		Vestas	
	Thales	Kuehne + Nagel	Marine Harvest			
		Maersk	Sodexo			
		Melia Hotels				
		Wärtsilä				

Source: Kepler Cheuvreux

## Macro outlook

The global ocean economy is worth more than USD1.5-2.5trn (gross value added) and is growing fast (a 3.5% CAGR over 2010-30E). This momentum is even more evident when looking at marine linked-revenues (c. EUR1.5trn) in KECH's universe, which are set to post an 8% CAGR over 2017-20E.

However, this expansion continues to be mainly driven by sectors that put considerable pressure on the goods and services provided by the ocean, such as oil & gas, tourism and shipping, which suggests that this bright outlook is tentative in the long run if we consider the numerous trends that threaten ocean assets, such as overfishing, habitat destruction, pollution and acidification, which are set to be exacerbated by loose regulation and climate change.

As a result, there is a particular focus on levers to tackle high seas governance and issues that have been neglected (biodiversity loss), which are broadly encapsulated in the UN 2030 goal: *Sustainable Development Goal 14: Life below Water*.

There are also signs of potential action on specific factors that affect the ocean's health, for example a greater focus on reducing the use of plastic, which leads to innovation in biodegradable plastics, coupled with the focus of retailers and food companies, such as Danone, on reducing food waste and increased recycling. We also welcome big tourism's sustainability ambitions, although they look modest given the size of the challenge faced.

In terms of business opportunities, the increase in extreme weather events could generate business opportunities for coastal defence companies (e.g. Boskalis).

Finally, outside listed equities, impact-investing vehicles are blossoming, demonstrating that a wave of credible businesses that address the top priorities in tackling ocean decline can prove financially attractive.

### Sizing up the opportunities

#### Strong growth ahead

The OECD estimates that the global ocean economy is worth at least USD1.5trn (o/w about one-third in the EU), or 2.5% of the gross value added globally based on conservative estimates, and forecasts it to double by 2030 (3.5% 2010-30E CAGR), with tourism and shipping showing particularly strong momentum. Offshore wind, port activities and fish processing are other flourishing segments.

#### Benefits from marine ecosystems hugely inflate the total

Nonetheless, there are other more bullish estimates based on a broader definition of the blue economy which encompass other societal benefits that are typically subject to market imperfections (so-called ecosystem services, such as coastal protection enabled by coral reefs or carbon sequestration). In a ground-breaking report released in 2015, the BCG and WWF estimated the total annual gross marine

**Ocean economy worth at least USD1.5trn and soaring (a 3.5% 2010-30E CAGR)**

product (ocean’s annual economic value) at USD2.5trn, while global ocean asset value was assessed at USD24trn, including direct outputs, services facilitated, trade and transportation and indirect activities, e.g. carbon absorption, biotech.

Notably, the ocean-related share of the economy is particularly high in numerous markets, including in Asia (e.g. 10% of China’s and 20% of Indonesia’s GDP), while accordingly the level of policy scrutiny and action is at an all-time high, as evidenced by the growing number of “blue economy” policy objectives (e.g. the EU’s Blue Growth strategy) and broader emphasis on sustainability (e.g. the US, EU and Australia). In turn, this has fostered an ecosystem-based approach at both the regional (e.g. proposal to have Regional Ocean Management Organisations or ROMOs to promote this vision) and country level (with dedicated marine plans focused on ocean management improvement).

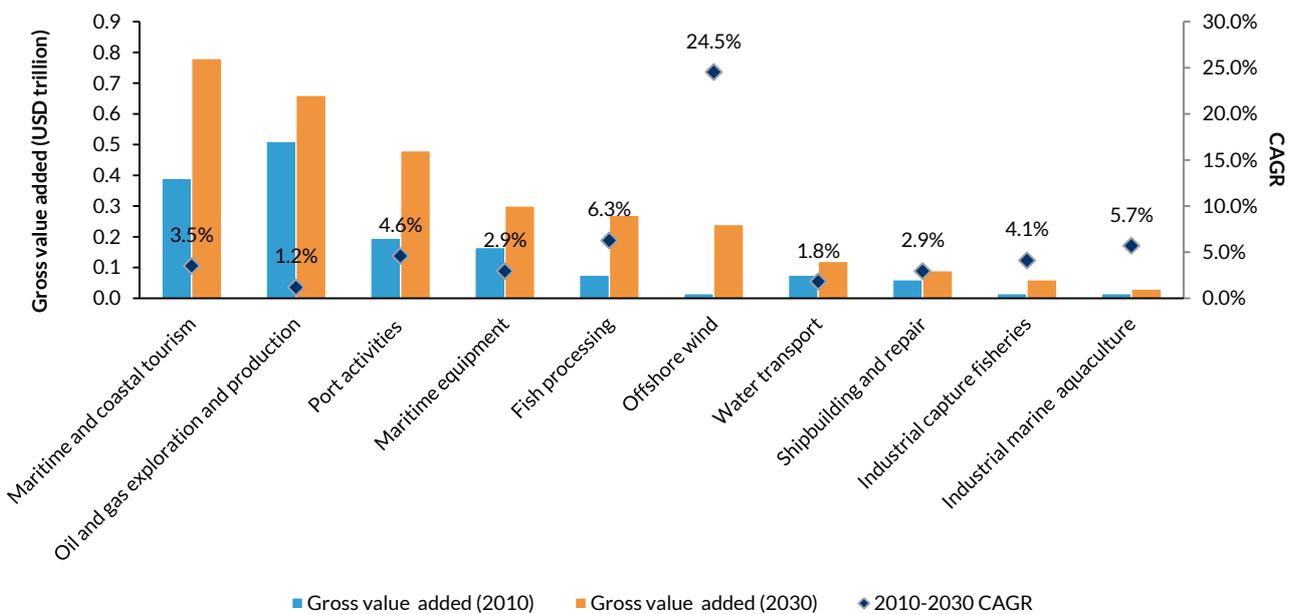
**Offshore energy transition gradually reshaping the landscape**

The evolving dynamics of the energy transition process are reflected in the sharp contrast between the fast growth expected in offshore wind (24.5% CAGR) and the modest increase foreseen for oil & gas (1.2%), although there are large differences between oil and gas production. Due to its considerable size (it represented one-third of the total blue economy as of 2010), this segment has been weighing on the expansion of the whole blue economy. This explains why the blue economy is set to grow at a slower pace than the global economy (a 3.64% CAGR vs. 3.45%). Other opportunities gaining momentum that are classified as emerging activities include marine biotech and mining.

**Growing policy focus e.g. EU’s Blue Growth strategy**

**Long-term uncertainties on offshore Oil & Gas contrast with momentum in the emerging industries**

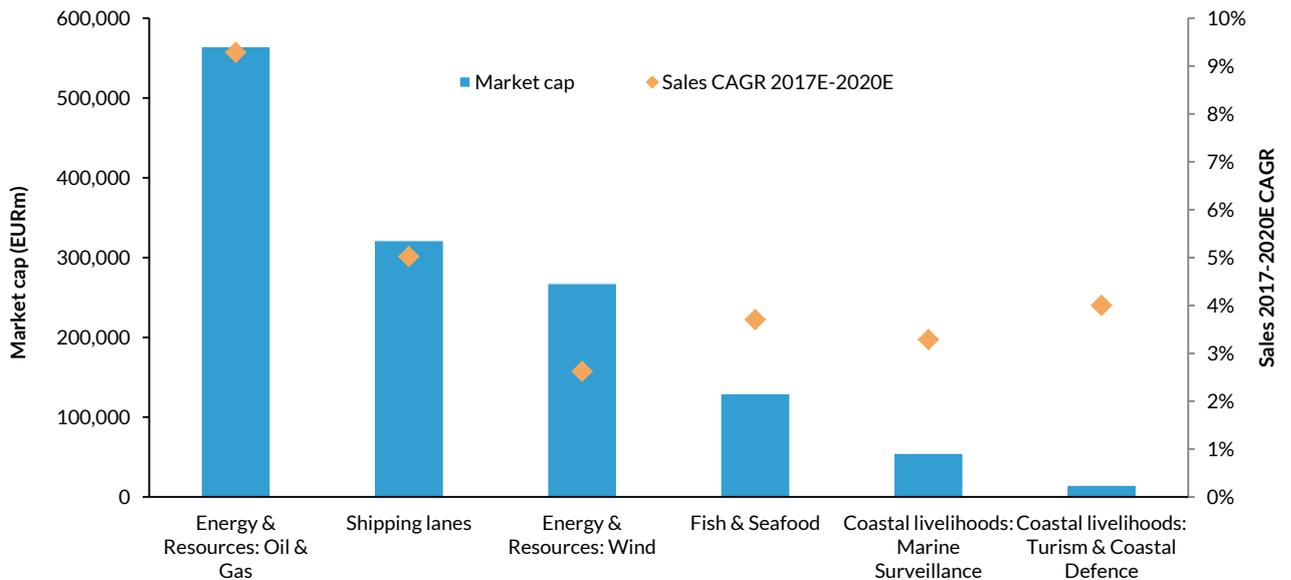
**Chart 13: Ocean economy market forecasts by industry (2010-30E)**



Source: OECD, Kepler Cheuvreux

However, the short-term dynamics and momentum for our universe differ greatly: offshore oil & gas companies are leading the pack in terms of revenue outlook, while stocks with offshore wind exposure are lagging behind. Overall, we estimate that the marine linked-revenues (c. EUR1.5trn) of the companies in our coverage universe are set to post an 8% CAGR over 2017-20E, mainly driven by sectors that tend to put pressure on ocean goods and services: oil & gas and shipping<sup>1</sup>.

**Chart 14:KECH ocean investment clusters market cap and sales CAGR over 2017-20E**



Source: Kepler Cheuvreux (full coverage universe detailed at the end of this report; 2020E sales include Bloomberg consensus estimates)

### Key drivers

Indeed, the main long-term drivers broadly coincide with rising economic activity in the sea, or next to it, with human activities exerting increasing pressure on ocean resources, driven by global trade, urbanisation, population, resource scarcity, food security, ageing science, technology and innovation, and economic growth.

We believe that technology and innovation are increasingly being used in ocean-related industries to boost competitiveness (e.g. declining costs for offshore wind, the use of electrics in port equipment to increase efficiency).

**Table 8: Selected innovations**

Sector	Technology
Extractives	Robotics for their subsea operations
Marine aquaculture	Biotechnology to stimulate fish health and welfare and lower dependence on wild fish catches for feed
Offshore wind	New materials and sensors
Shipping	Autonomous ships and greater use of new fuels, e-navigation, robotic systems
Port equipment	Shift from diesel-driven RTGs (rubber-tyred gantry (RTG) cranes towards hybrids or electric solutions
Wild catch fisheries	Satellite technologies (communications, remote sensing, navigation

Source: OECD, Kepler Cheuvreux

<sup>1</sup> Our ocean-related revenue estimates for our universe are intended to give an order of magnitude and are subject to several assumptions due to the lack of reporting, e.g. oil & gas major's offshore revenues.

## Emerging industries include deep seabed mining and marine biotech

New technology-driven industries focused on sea-based resources are emerging:

- Deep seabed mining is still in its infancy, with a pioneering project set to be launched in 2018-19, despite concerns about the apparent lack of regulation. At this stage, there is no evidence that this new activity would be feasible for the mass production of bulk commodities, as it is too expensive.
- Conversely, there is already a pure Spanish listed company called PharmaMar (EUR657m market cap as of 23 March) in operation. It is the world leader in the development and commercialisation of anti-cancer drugs of marine origin (not covered).

**Marine biotech business already in operation, while deep seabed mining still appears to be in the proof-of-concept phase**

**Table 9: Seabed mining and pharma**

Company		Market status	Main focus	Potential	Key ESG Issues
Nautilus Minerals	Canada	All offshore mining today is in shallow water. The first commercial deep seabed mining project is slated to open in 2018-19 off the coast of Papua New Guinea <sup>o</sup>	Gold and copper (first project). Three classes of mineral deposits are to be recovered via seabed mining: manganese nodules (mainly), cobalt-rich ferromanganese crusts and seafloor massive sulphide (SMS) deposits	Share of world's minerals from ocean floors: 5% in 2020E, 10% in 2030E	Release contaminated water and suspend downslope transmission of sediment-laden plumes, which would reduce light penetration and temperature through increased turbidity. A draft legislative framework for exploitation areas, was issued by the International Seabed Authority for industry comment in March 2015
PharmaMar	Spain	>USD2.8bn market	Oncology (marine-derived compounds with novel mechanisms of action)	USD4.6bn in 2017E	n.a.

Source: EC, Companies, Kepler Cheuvreux

## Threats to marine wildlife

Although still in the embryonic stage for now, the advent of deep seabed mining raises some important questions about the required environmental framework. Clearly, many factors are already compromising the health of our oceans, marine ecosystems and coastal communities.

This damage is evident amid the deterioration of the coral reefs, overfishing, habitat destruction, pollution, climate change, the rising sea level, ocean acidification, rising sea temperatures, changes in the ocean current, nutrient, chemical and plastics pollution, the spread of invasive species (e.g. American lobster threatening the local lobster in the Oslo fjord), and habitat destruction.

Overall, these trends tend to worsen and mutually reinforce each other, as the ocean is insufficiently protected (16% of global terrestrial area is protected vs. only 3% of our oceans), with the vast majority of these areas located beyond national jurisdictions (fisheries, oil) and thus subject to international governance loopholes. Moreover, climate change is set to broadly amplify these negative trends, with numerous uncertainties ahead (e.g. the impact of ice cap erosion on polar bears, and coral bleaching<sup>2</sup>).

**The ocean is insufficiently protected (16% of global terrestrial area is protected vs. only 3% of our oceans)**

<sup>2</sup> When water is too warm, coral expels the algae (zooxanthellae) living in their tissues causing the coral to turn completely white (NOAA).

**Table 10: Ocean health decline - key data**

	<b>Current</b>
<b>1. Basics</b>	
Surface of the planet	72%
Earth water	97%
Living space on the planet by volume	99%
Unexplored underwater world	95%
Population within 100km	40%
<b>Governance</b>	
Sea areas that lie beyond national jurisdictions ("high seas")	64%
Protected oceans in territorial waters	13%
Protected oceans globally	4%
Proportion of the ocean under full protection (marine protected areas)	2%
<b>2. Environment</b>	
Base economic value of the ocean produced by assets that rely on healthy ocean conditions	Two-thirds
Oceans heavily affected by human activities	40%
Marine living planet index drop 1970-2010	39%
<b>Ocean as a regulator of the concentration of oxygen</b>	
Production of the world's oxygen	50-60%
<b>Biodiversity decline</b>	
Coral reefs lost	20%
Coral reefs degraded	20% (could fully disappear by 2050)
Coral reefs under threat in southeast Asia	88%
Lost seagrass	29-30%
Species of marine fish and invertebrates listed as threatened in the IUCN Red List	>550
Mangrove forest reduction of their historical coverage	30-50%
<b>Acidification</b>	
Increase in the acidity since the industrial revolution	26-30%
<b>Climate change</b>	
Human-induced CO2 absorbed by the ocean	25-30%
Carbon deposits in coastal systems versus tropical forests	<5x
<b>Pollution</b>	
Land-based share of marine pollution	80%
De-oxygenated dead zones caused by the discharge of untreated wastewater	245,000 km
<b>3. Sectors</b>	
<b>Fish &amp; seafood</b>	
Overfished stocks	31%
Fully fished stocks	58%
Fish for human consumption coming from aquaculture	47% (two-thirds in 2030E)
Fisheries subsidies/year	USD30-35bn
Fish subsidies encouraging unsustainable, destructive and even illegal fishing practices	60%
IUU share of global annual catches	15-30%
MSC Certified global fisheries	10%
People depending on the oceans as their primary source of protein	2.6bn
All animal protein consumed coming from fish	16%
total agricultural food exports seafood share	10%
Average per capita fish consumption	19.2kg
<b>Shipping</b>	
Share of global trade	90%
<b>Oil &amp; Gas</b>	
Supply of hydrocarbons	32%
<b>Tourism</b>	
Tourism based near the sea	80%
<b>Plastics</b>	
Plastic waste dumped in the ocean each year	8Mt

Source: UN, OECD, WWF, IDDRI

## Policy drive to restore ocean health

Consequently, all eyes are on global efforts to tackle weak ocean governance, with numerous measures being explored which broadly converge with the Sustainable Development Goals or SDGs (UN 2030 agenda).

## **SDG 14: Life Below Water: what is at stake?**

The adoption of SDG 14 “Life Below Water” (among 17 other sustainable development goals announced in September 2015) should help boost awareness of the deterioration of our oceans. Although not legally binding, it sets out seven aspirational targets, neatly summing up a broad range of political and sector-specific issues, of which many are interdependent on other SDGs (two on Food Security, six on Water, 12 on Sustainable Consumption and Production), such as the continued fight against Illegal, unreported and unregulated fishing (IUU). Nonetheless, there are still concerns over the need to enhance the key international governance mechanisms, such as the UN Convention on the Law of the Sea (UNCLOS). It is of particular note that this includes efforts to extend the scope of this convention to encompass biodiversity.

### **High sea biodiversity a priority**

The next steps will be the UN Conference on Oceans and Seas to be held in Fiji in June 2017 to track SDG implementation and the forthcoming report by the Preparatory Committee (due by year-end) on a new legally-binding agreement governing the conservation and sustainable use of high seas marine biological diversity. In our view, this focus on biodiversity loss, a neglected time bomb, coincides with growing public awareness of marine pollution, of which plastics have become a key focal point (key theme for World Oceans Day 2017 to be held on 8 June).

### **Marine threats: focus on plastics pollution**

This section draws on input from our Climate Change and Natural Capital Risk analyst Julie Raynaud (jraynaud@keplercheuvreux.com); the author of Valuing Plastic: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry study (UNEP, Plastic Disclosure Project, Trucost, 2014).

### **Plastics crisis: projections worsening**

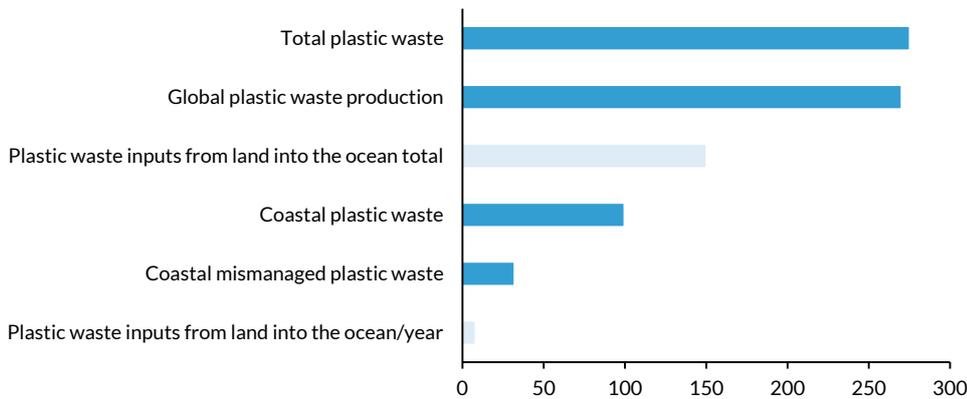
Within the economic context of marine litter (80%), the overwhelming majority (up to 95%) is estimated to be plastic-related (Galgani, Hanke, and Maes, 2015), spurred by the rocketing global use of plastics (311m tonnes in 2014). The presence of plastics in the ocean (leaked flows of plastics into the ocean) is expected to expand at a 5-7% CAGR over 2015-25E. Over time, it is estimated that there could be one tonne of plastic present in the ocean for every three tonnes of fish by 2025, and it is believed that plastics could outweigh fish by 2050 based on current trends i.e. rising from 150m metric tonnes currently (including 225,000 tonnes of additives) to 580-950m metric tonnes (Ocean Conservancy and McKinsey Center for Business and Environment).

**Concerns over the need to enhance the key international governance mechanisms, such as the UN Convention on the Law of the Sea (UNCLOS)**

**The focus on biodiversity loss coincides with growing public awareness of marine pollution**

**Marine litter consists mainly of discarded plastic materials**

**Chart 15: Plastic waste inputs from the land into the ocean (m metric tonnes)**



Source: UN, Ocean Conservancy and McKinsey Center for Business and Environment, Jambeck et al., Kepler Cheuvreux

### Key drivers and solutions

Geographically, this boom is being driven mainly by China and South-East Asia (Indonesia, the Philippines, Thailand, and Vietnam), with uncollected waste and leaks from the waste management systems in Asia accounting for 80% of the total leakage of plastic into the sea. In terms of products, the evidence suggests that packaging is the main source of pollution, followed by various other plastic products such as containers, bags, lids or cups. At macro level, this problem could be mitigated by reducing plastics in waste streams, enhancing waste management infrastructure and collecting more litter.

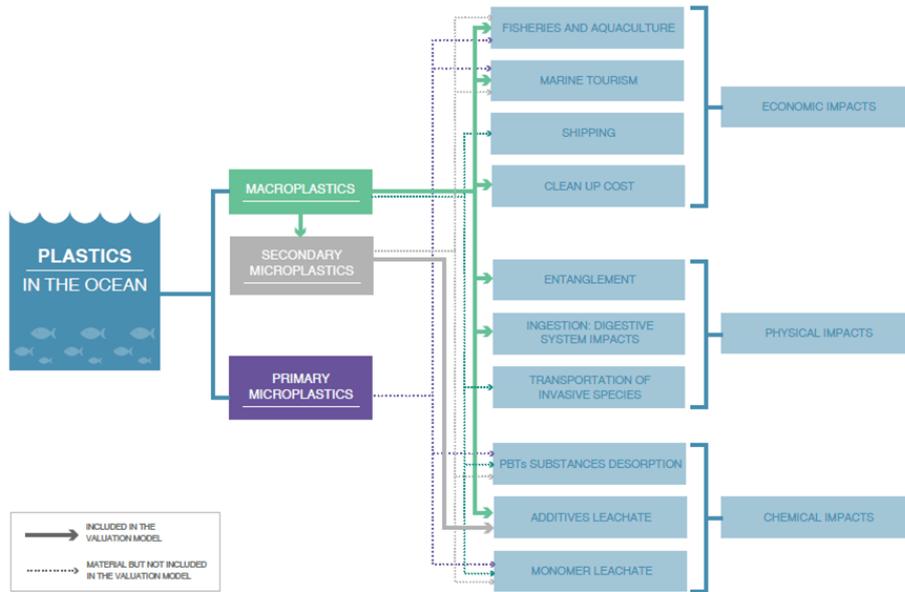
### Unanswered questions on links to food have raised awareness

Recent research has underlined the presence of microplastics in commercial fish and shellfish, including samples purchased from retail stores (source: Global Ocean Commission). This has added to the growing concerns about plastic fragments in the ocean, which over time turn into microplastics (small particles of plastic with a maximum diameter of less than 5mm), which can result in chemicals, including organic pollutants ending up in food ingredients after being ingested by marine organisms (there are also lingering uncertainties about the impact of nano-sized plastic particles). Microplastics break down into either primary microplastics (e.g. used in personal care and industrial products) or secondary plastics (typically bigger plastic chunks). Tyres are a prime example of secondary microplastics.

**China and South-East Asia are the main culprits**

**Growing body of evidence suggests that micro-plastics are entering the food chain**

Chart 16: Macro and micro impact of plastic pollution



Source: UNEP

### Preliminary estimate of economic cost: over USD13bn

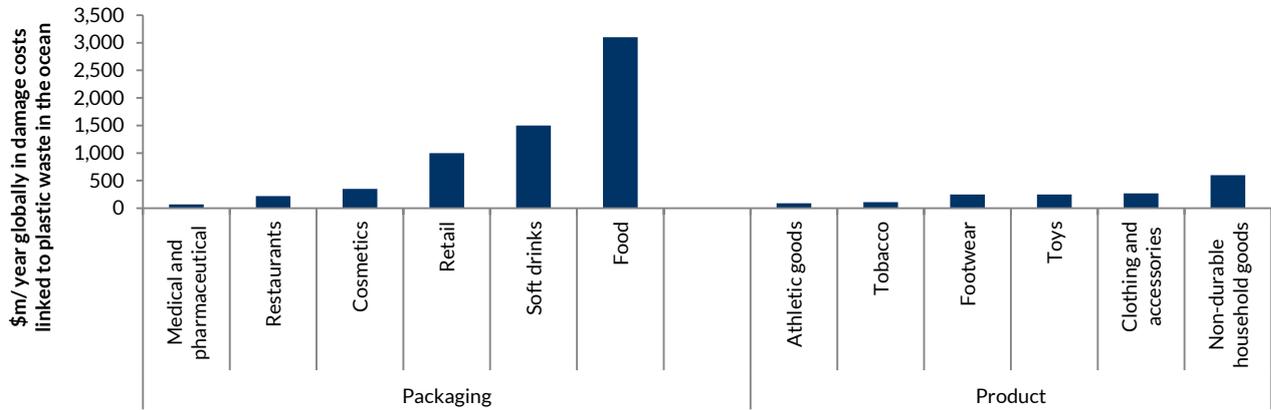
In response to growing interest in plastic waste in our oceans, and given most companies' lack of disclosure on this topic, researchers have attempted to quantify the overall damage caused by plastic pollution driven by companies and sectors, based on advanced modelling techniques and company disclosures.

For the first time, a 2014 UNEP-study assessed the total annual cost of plastic waste in our oceans, driven by 16 consumer goods sectors. It estimated that the total cost amounted to at least USD13bn. Food packaging is the biggest culprit (over USD300m a year), followed by soft drinks (c. USD1,400m a year), retail packaging (over USD900m a year) and non-durable household products (USD500m a year).

This figure was calculated based on economic flows modelling, company disclosures when available, and natural capital cost valuation techniques. The damage taken into account includes the impacts on marine wildlife through ingestion and entanglement, beach clean-up costs, economic losses to fisheries, aquaculture and tourism, and chemical pollution.

**The food packaging, soft drinks and retail industries contribute the most to the economic cost of plastic waste in the ocean**

Chart 17: Societal (“natural capital”) costs linked to plastic waste in the ocean (USDm)



Source: UNEP (2014 data), Kepler Cheuvreux (Trucost used secondary literature on the economic impact of plastic and on the quantity of marine species impacted by plastic entanglement and ingestion. Willingness-to-pay studies were used to assess the value that society places on marine species.

### Tightening regulation (microbeads, plastic bags, etc.)

On top of land-based waste disposal legislation (wastewater and solid waste collection and management), prevention-based regulations have been rolled out across the globe to tackle the colossal challenges of plastics waste further upstream. These measures include: laws banning certain types of products, especially single-use items (e.g., plastic bags in Bangladesh and Rwanda) and the regulation of non-recoverable items, such as plastic microbeads in personal care (e.g. toothpaste and cosmetics products). For example, the UK has committed to following in the footsteps of many other countries (the US, New Zealand, Canada) by banning microbeads from cosmetics by the end of 2017.

**Flurry of prevention-based regulations have been rolled out across the globe**

**Table 11: Plastics-related regulation**

Issue	Country/Jurisdiction	Level	Date	Description
Microbeads prohibition	US	Manufacturing of personal care products	2015	Legislation in seven states e.g. Maryland; Microbead-Free Waters Act (banning of rinse-off cosmetics that contain intentionally added plastic microbeads as of 1 January 2018, and bans manufacturing of these cosmetics effective 1 July 2017)
	Canada	Manufacturing of personal care products	June 2016	Addition to the List of Toxic Substances under the Canadian Environmental Protection Act
	UK	Manufacturing of personal care products	2017	Announcement that it plans to ban microbeads from cosmetics by the end of 2017
Prohibiting and disincentivising land-based sources of trash	US	Retail	n.a.	Banning so-called “biodegradable” plastics e.g. Los Angeles, California imposed a total ban on plastic bags that includes biodegradable bags less than 2.5mm thick, reasoning that such bags cannot be reused.
	Bangladesh, Eritrea, Somaliland, Bhutan, Haiti, Tanzania, Macedonia, and numerous subnational laws in, for example, India and the United States	Retail	n.a.	Plastic bag bans
	Ireland	Retail	2002	Taxes or levies on plastic bags. The EURO.22 levy caused a 90% reduction in plastic bag consumption.
	Haiti	Manufacturing and Retail	n.a.	Bans on expanded polystyrene (foam)
Regulation of bag thickness	China	Manufacturing and Retail	2008	China banned the “production, use and sale of ultrathin shopping bags”, defined as under 25 microns, and mandated that retailers impose fees on thicker bags
	Tamil Nadu, India	Manufacturing and Retail	n.a.	Banning of “plastic articles” distributed in food establishments, and covers “any non-reusable carry bags, cups, tumblers, plates, spoons, forks, knives, straws, boxes, string, cord, sheets, mats or other articles made of, or containing, plastic.”

Source: UNEP

### Best practices for companies

We focus on companies involved in plastic production, materials and product design, concentrating mainly on waste generation (i.e. not on waste management, litter capture and clean-up efforts). We also take a look at some of the main sectors involved (e.g. Beverages (soft drinks), food & retail).

In our view, the best practices include: 1) achieving greater efficiency, thus reducing the use of plastics and plastics waste; 2) engaging in “closed-loop” business developments e.g. Coca Cola’s focus on the collection and reuse of plastics, or companies using “ocean” plastics (although there is only anecdotal evidence at this stage); and 3) producing sustainable products, by increasing reusable packaging or adopting industrially compostable plastic packaging for targeted applications.

### Retailers aim to phase out single-use bags, recycle and avoid food waste

Based on our analysis of retailers (despite uneven reporting formats), we concluded that there has been a decline in the number of non-reusable carrier bags, a commitment to phasing out all free single-use shopping bags (e.g. Carrefour), quantitative recycling commitments (Carrefour, Ahold Delhaize), and food waste ambitions (Tesco).

**Food & Retailers  
waste generation peer  
comparison**

**Table 12: Plastics trends in key sectors**

Sector	Common plastics	Trends
Beverages (soft drinks)	Polyethylene terephthalate (PET) and polyethylene (HDPE)	Lightweighting, improving recycled content (PET bottles are one of the most recycled items), bio-based content integration into the material (raising concerns e.g. about the treatment of these materials in mainstream recycling streams)
Food	Low density polyethylene (bread bags, frozen food and grocery bags)	Increased use of other materials such as glass, driven by higher demands for packaged fresh food and ready-made meals. Food wrappers and containers are some of the main items collected during coastal clean-ups
Retail	Low density polyethylene (plastic bags), polyethylene terephthalate (synthetic fibres, salad trays and other food containers)	Reduction of plastic bags across their value chain

Source: UNEP

**Table 13: Food retail recycling and food waste strategies**

Company	Recycling target				Food waste reduction				
	Level	Date	Status	Scope and comments	Level	Date	Status	Scope	Comments
Ahold Delhaize	80%	2020	60%	Total waste that is recycled (diverted from landfills or incinerators), including cardboard, paper, plastic, food or other types of waste recycled from stores, warehouses and offices. Breakdown not provided	20%	2020	n.a.	Includes plastic on waste	Anecdotal evidence regarding specific market initiatives, such as investments in rolling containers with reusable seals, rather than using plastic-wrapped pallets. Data broken down by market is useful but aggregation and format could be clarified
Axfood	n.a.	n.a.	n.a.	Commitment to use only plastic that is compatible with recycling. Challenge: sorting plastic fragments and lower fees for recyclable plastics (not the case currently). Monetary benefits: for the plastic wraps from packing large deliveries to the stores and in the warehouse the company get paid.	n.a.	n.a.	n.a.	n.a.	Anecdotal evidence regarding programmes e.g. the use of perishables in ready-made meals
Carrefour	100%	n.a.	65% (2014)	Overall waste (waste recycled in stores). In November 2016 the chain committed to phasing out all free single-use shopping bags (as part of its <i>Consumer Goods Forum</i> )	n.a.	n.a.	n.a.	n.a.	n.a.
Jeronimo Martins	n.a.	n.a.	n.a.	Eco-design project (significant rise in stock-keeping unit), waste management and use of reusable packaging. use of reusable plastic boxes in the perishable food and dairy areas: 14% of the total boxes handled. Anecdotal programmes reported in Colombia and Poland. Plastic waste production slightly rose overall last year due to growing number of stores and increase in in waste sorting	n.a.	n.a.	n.a.	n.a.	Anecdotal evidence of programmes e.g. employee awareness
Tesco	n.a.	n.a.	n.a.	Vast majority of Tesco's plastic is recycled (share not disclosed). Measures include PVC and PS removal (nearly complete); the conversion of meat packaging from a dual layer material, which was a contaminant for recyclers, to a mono-material; plastic packaging sorting and re-bailing for sale (100% of plastic bags (for customer use) are made from Tesco's own waste materials).	100%	n.a.	n.a.	Food that is safe for human consumption	Commitment that no food that is safe for human consumption will go to waste from UK stores by end of 2017,

Source: Companies

Among the big food names (Nestlé, Unilever, Danone), Danone stands out as the only one to go beyond anecdotal evidence to disclose signs of a consistent ambition across our plastic waste reduction criteria listed below.

**Danone stands out**

**Table 14: Danone recycling strategy and status**

Sector/ company	Estimated use (in tonnes) of plastic in the company's operations and supply chain	Main types of plastic used in products and packaging, by type and volume	Percentage of the total material used that is recycled or bio-based content	Percentage of plastic used that is biodegradable or recycled at end-of-life	Percentage of plastic used that is for short-user-life products or packaging	Recycling policy target
Danone	>1m	n.a.	27% of total plastic is made from recycled materials. Water and beverages bottles: 25% RPET (recycled polyethylene terephthalate) targeted in water plastic bottles by 2020 and 33% in 2025 (vs. 7% now) in countries	Stated goal to encourage recycling rather than biodegradability which raises practical challenges in terms of heat and moisture conditions.	n.a.	Move from petroleum/virgin resources to recycled/sustainable packaging and also from landfill to packaging that is 100% recycled. Goal to develop a roadmap for top ten countries among the biggest waste emitters of Danone by the end of last year representing three-quarters of its volumes,

Source: Danone, Kepler Cheuvreux

### Tyres: recycling gather pace

Reporting is also provided by tyre makers. Michelin has a roadmap, while Continental, although lacking specific targets, is investigating alternatives to oil and natural rubber. However, in our view, all of the evidence remains anecdotal at this stage:

- Continental is developing a “hurricane machine” that facilitates the recycling of rubberised steel cord scrap by separating uncured rubber compound and steel cord. Around 3% of rubber compounds came from reclaimed materials in 2015, but Continental expects to increase this number to 6% with its combined recycling and retreading plant in Hanover.
- It is conducting research into the use of alternative materials, such as Taraxagum, made from dandelions, but we see barriers to scaling up this product line significantly (e.g. surface needed).

**Michelin has a recycling roadmap**

**Table 15: Michelin- tyre recycling target**

	Target	Share	Horizon	Measures
Michelin	Share of renewable or recycled materials in tires	30%	2020	Bio-sourced materials and used tyres recycling (Tire RECYcling)

Source: Michelin

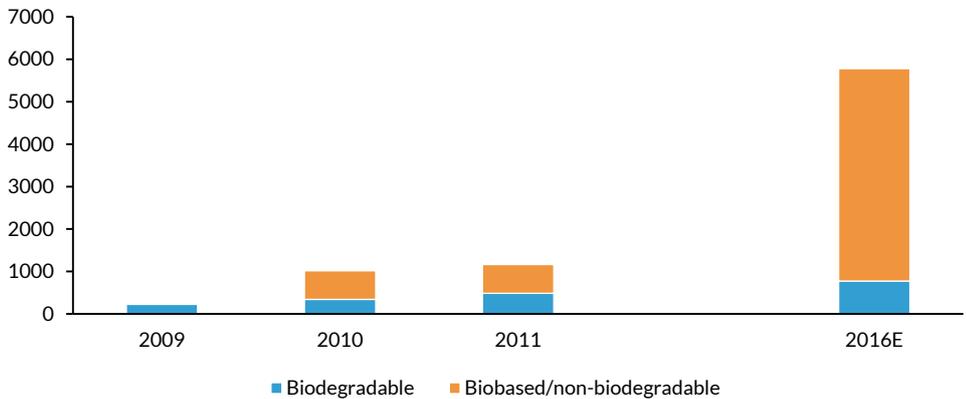
### Bioplastics ramp-up

The pressure to counter this alarming trend also opens up market opportunities, notably in the dynamic field of bioplastics (bio-based, biodegradable or both). Usage of these products is growing rapidly (at a 20-100% CAGR, according to *Plastics Europe*) with production estimated at nearly 6m metric tonnes currently. However, the overall share of biodegradable plastics is tiny in the bioplastics market (13%),

**Bioplastics: a buoyant market**

with the rest stemming from biobased/non-biodegradable plastics. Additionally, total bioplastics production still only accounts for a very small portion of total plastics production (c. 280m metric tonnes).

**Chart 18: Global production of bioplastics (1,000m tonnes)**



Source: European Bioplastics

### Investment opportunities in new biodegradable plastics

A growing number of companies are seeking exposure to the attractive bioplastics segment. For example, Corbion is active in bioplastics as well, and it plans to make materials that are used in the production of biodegradable plastics.

The company is involved in a JV with Total (Total Corbion PLA) dedicated to Poly Lactic Acid (PLA), which is a bio-based and biodegradable polymer. PLA can be reused in feedstock after the end of its life. The Luminy PLA portfolio, which includes both high heat and standard PLA grades, is an innovative material that is used in a wide range of markets from packaging to consumer goods, fibres and automotive. Total Corbion PLA, headquartered in the Netherlands, will start up a new production plant in Thailand in H2 2018.

### Coastal livelihoods

#### 1) Marine and coastal tourism: from “sun, sand and sea”...

Global tourism continues to expand on the back of an ageing population, global economic growth, and fairly affordable travel costs: 7% of exports of goods and services globally currently stem from international tourism, compared to 6% in 2014 (UNWTO). International tourists are set to grow by a 3% CAGR over 2015-30E. Although it is hard to isolate the share of marine tourism, some estimates (including OECD) suggest that this segment will be more dynamic (especially cruise tourism) than the rest of the industry, which is reflected in the momentum seen by the following companies:

- Melia Hotels is one of the best ways to play a strong tourism industry, including Spain (12% of Spanish GDP vs. c. 9% globally) and the Caribbean (Melia is the largest company in the area).

**Corbion in a JV with Total plans to produce biodegradable plastics**

- Tui is the largest fully integrated tourism group on a global basis. By FY 2022, it aims to add 1m new customers (c. 5%) and add sales of EUR1bn (c. 5.5%). This strong growth (3% for Hotels, a higher rate for Cruise) is expected to be achieved through the rollout of its scalable digital business under the global brand name TUI, and mainly relates to source markets like Brazil, China, Spain, and Portugal.

**...to “storms, plastics and biodiversity loss”**

The sector is a major contributor to biodiversity loss, marine pollution and climate change (air travel and cruises). Tourism accounts for 5% of carbon emissions worldwide, mainly through air transport. While we welcome Tui’s detailed plans to mitigate these externalities (compared to Melia Hotels) and its rising certification levels, the amount of investments involved in eco-tourism-related programmes and carbon reduction targets (not science-based, although significant via its cruise and air transport) indicate to us rather modest ambitions overall. On the positive side, we highlight Tui’s relatively efficient aviation fleet and cruise ships compared to peers.

**Modest sustainability ambitions overall**

**Table 16: Tourism ESG peer comparison snapshot**

Company	Country	Geo exposure	Activities	Ocean active-ties	Business exposure	Market growth momentum	Certification	Eco-tourism investments	Climate
Melia Hotels	Spain	Spanish and American business unit (Caribbean area, which is mainly Mexico, Dominican Republic and Cuba)	Meliá has 354 hotels (90,000 rooms) in 30 countries. It is diversified in terms of ownership (25% owned, 24% leased & 51% management & franchise), destination (60% resort-40% city) and segment (mid-scale 52%, upper segment 36% and luxury 12%). Spain accounts for 16% of EBIT (14% resort & 2% city)	Seaf-ront resorts (Spain and Caribbean area)	74% of EBIT	Strong e.g. resorts bookings continue growing by mid-single digits	150 seals (Earth-Check, Trevelife or Green-Leaders on Trip Advisor including Earth-Check)	n.a.	Lower footprint than TUI (no airlines or cruise exposure). Plan to set up a science-based target in the next two years
TUI	Germany	Western Mediterranean (26% of sales), Caribbean (20%), North Africa/Egypt (20%), Eastern Mediterranean (25%), Other countries (9%)	TUI Group is the world’s number one tourism business. The broad portfolio gathered under the group umbrella consists of strong tour operators, 1,800 travel agencies and leading online portals, six airlines with more than 130 aircraft, over 300 hotels with 210,000 beds, thirteen cruise liners and countless incoming agencies in all major holiday destinations around the globe.	Hotels & Resorts and Cruise	42% of EBITA (excl. tour operator business)	Strong: 3% for Hotels, much higher for Cruise	Objective to deliver 10m "greener and fairer" holidays by 2020 Global Sustainable Tourism Council (GSTC). Half of hotels certified currently overall (77% of those owned). Full list breakdown not found.	EUR10m a year by 2020 through foundation via philanthropic approach (c. 1% of next capex and investments. Does not include in-kind figures (i.e. by 2020 vs. 2014; colleagues engagement, flex time schemes for volunteering, provision of facilities and logistics etc.)	Aviation fleet carbon intensity (gCO2/ RPK or revenue passenger kilometre) 30% inferior to peers (most efficient in Europe). 10% targeted decrease by 2020 vs. 2014; Cruises: 10% per cruise passenger by 2020 vs. 2015. TUI cruises vessels being up to 30% more efficient than comparable ships (e.g. benefiting from advanced Exhaust Gas Purification Plant on Board). Not science-based

Source: Companies

## 2) Infrastructure opportunities: defensive infrastructure development

Rising sea levels and extreme weather events could amplify the risks faced by populations living on the coast. As a result, we foresee potential for growth in coast defence construction, which would benefit companies such as Boskalis, CFE, Van Oord (non-listed), and Jan de Nul (non-listed).

**Climate adaptation plays**

**Table 17: Coastal defence**

Company	Sector	Country	Market cap (EURm)	Analyst	Key ocean activities	Group ocean business exposure
Boskalis	Construction & materials	Netherlands	4339	Andre Mulder	Land reclamation and coastal defence	10-15% of sales
CFE	Capital goods	Belgium	3228	Not covered	Dredging	n.a.

Source: Kepler Cheuvreux

## 3) Marine surveillance market - Aerospace & Defence focus

*Input from Head of Aerospace & Defense Sector Research Christophe Menard, Kepler Cheuvreux (cmenard@keplercheuvreux.com)*

Aerospace & Defence maritime surveillance is focused on detecting submarine threats, which can lead to deterrence (manoeuvres) or torpedoes being fired. Thales and Ultra Electronics are the most exposed to this subsegment, with this activity representing 10-15% and 25% of sales, respectively, and strongly growing (4-5% for the latter). However, the main type of maritime surveillance is conducted through aircraft, with Dassault Aviation as a key player in this market (small business, as expensive to manufacture). In the US, Boeing produces the P8 (B737 derived), which was acquired by the UK government last year, notably to adapt to the Russian submarine threat.

**Submarine-threat detection is a sizeable business**

**Table 18: Maritime surveillance**

Company	Country	Market cap (EURm)	Sales (EURm; 2017E)	Analyst	Main Cluster	Main Ocean theme	Key Ocean activities	Group Ocean business exposure
BAE Systems	United Kingdom	25,799	22,812	Christophe Menard	Coastal livelihoods	Maritime surveillance	Naval ships and submarines	28% of sales
Dassault Aviation	France	8,970	3,440	Christophe Menard	Coastal livelihoods	Maritime surveillance	Maritime surveillance (Surmar) aircrafts	0-10% of sales
Thales	France	18,766	15,567	Christophe Menard	Coastal livelihoods	Maritime surveillance	Maritime surveillance systems (e.g. abnormal behaviour detection to support operators, Comprehensive Maritime Operational Picture based on networks of sensor sites and centres). DCNS (naval defence) manufactures ships, submarines and underwater weapons.	>10-15% of sales
Ultra Electronics	UK	1,689	961	Christophe Menard	Coastal livelihoods	Maritime surveillance	Undersea surveillance: towed sonar systems for ships and submarines; low cost, small form factor devices; submarine communications; Magneto Inductive (MI) communications and signalling for military, government and commercial applications.	25% of sales

Source: Companies, Kepler Cheuvreux

## Ocean finance outside listed equity: impact investments

The focus of Impact Investment<sup>3</sup> on long-term conservation and sustainability specifically is linked to a number of attractive business opportunities (mangroves, recycling, fishing, marine energy, dive tourism, coral reefs) to help bridge the gap with the estimated USD400bn Sustainable Ocean finance needs (source: BlueCapital).

### The ocean: the new target of private equity impact fund vehicles

Consequently, a few new vehicles have recently emerged to prop up sustainable fisheries, with a focus on emerging markets. The hope is that this could help to allocate capital to pressing needs beyond the large-scale commercial sector, such as small-scale fisheries (source: ISU). The challenges are huge in this fragmented sector: weak governance, lack of transparency in supply chains, secure tenure/fishing rights (rights-based management or catch shares), intermediaries and partial data.

**Small-scale but dynamic Impact Investment segments offering pockets of growth**

<sup>3</sup> Investments in companies, organisations and funds with the intention to have a social and environmental impact alongside a financial return (source: GIIN).

**Table 19: Ocean impact investing vehicles**

Organisation	Fund	HQ	Target	Update	Focus/Investments (e.g.)	Partner
Althelia Ecosphere	Sustainable Ocean	Luxembourg	USD100m by 2018	USD50m (loan guarantee from USAID); USD15m (Credit Suisse, creation of "ocean conservation notes"). First close expected in H1 2017	Support sustainable fisheries worldwide (coastal fisheries, aquaculture and the seafood supply chain)	Conservation International; Environmental Defense Fund
Encourage Capital	Pescador Holdings	US	n.a.	Backed by an initial USD10m from Zoma Capital (family office)	Chilean seafood producer Geomar, vertically integrated seafood company, which works with small fishers and then transports and cans the products for sale to retail distributors	Rockefeller Foundation; Bloomberg Philanthropies
Ocean Assets Initiative	Bluecapital	Switzerland	n.a.	To be launched soon	Target to structure impact special purpose vehicles (SPVs) in Asia and Africa, at USD5m each, with local partners and governments. Activities include seafood impact, eco tourism, ecosystem payments, plastics recycling	n.a.
Rare	Meloy Fund	n.a.	n.a.	USD20m. First investment made in December 2016	Sustainable small-scale fisheries in South East Asia.	Conservation International, GEF, The Grantham foundation, JPMorgan Chase & Co
NatureVest	Seychelles Conservation and Climate Adaptation Trust (Sovereign debt swap)	US	USD78m	USD20.2m for the actual trust (mix of loans and grant funding)	Marine conservation and climate adaptation	Government debtor: Seychelles; Official creditors: Belgium, France, Italy, the United Kingdom (under the Paris Club); Grant providers: Several philanthropic foundations and individuals

Source: Organisations mentioned, Kepler Cheuvreux

There are also several older fishery funds globally that combine public and private capital e.g. California Fisheries Fund (revolving loan fund) and The Sea Change Investment Fund (created in 2005), which focuses on the middle of the seafood value chain. Moreover, "SeaTech" is a booming niche, with seafood startups and aquaculture technology reaching USD193m in 2016 (+271% YOY; source: Impactalpha). This is reflected in the Dutch private equity fund, Aqua-Spark portfolio (USD400m targeted by 2025).

### When public sector spurs private investments

Regulatory changes and incremental funding support (e.g. grants) coupled with action programmes focused on a range of interventions have already helped prompt major sustainability-related public finance instruments in the past, such as the Global Ballast Water Programme, which led to the Ballast Water convention (an estimated USD35bn of funding spanning over ten years).

**Sustainability-related public investment catalysts**

**Table 20: Ocean Finance (restoration and protection; USDm) linked to the Global Environment Facility (GEF)**

Catalytic Ocean Finance Summary	Global Ballast Water Programme (GloBallast)	Danube/Black Sea Basin	Yellow Sea Large Marine Ecosystem	Rio de la Plata and Maritime Front	Partnerships in Environmental Management for the Seas of East Asia (PEMSEA)	West/Central Pacific Ocean Fisheries
Total GEF Grant Financing	14	52	15	9	36.1	15.1
Total Programme Co-financing	453	92	10	20	94	150
Catalysed Private Sector Financing	35,000	2983	10,863	262	9,000-10,000	3214
Catalytic Finance Ratio (total Catalysed Finance)	2,500:01:00	2	31	12	277:01:00	213:01:00

Source: GEF, UNDP.

## Fish & Seafood: at a crossroads

Awareness of the crucial importance of sustainability factors in the reversal of fish stock depletion is clearly rising amid a supply-demand gap (soaring demand vs. limited supply). While aquaculture has already become the main source of fish for human consumption, it is poised to play an increasingly pivotal role in seafood supply on the back of strong growth (a 3% CAGR over 2016-25E), supported by its status as the most efficient protein producer in terms of environmental footprint and gloomy trends for wild-catch fisheries. Accordingly, the industry offers a growing pool of opportunities across the value chain, including for the two leading players in our universe: Marine Harvest (salmon fish farming) and Benchmark (health and breeding solutions).

Nonetheless, a series of contentious issues has plagued the salmon farming industry over the past few years, especially related to biosecurity, raising questions about the sustainability of the current business model. Benchmark is structurally benefitting from a shift away from antibiotics and the need to improve yields and disease resistance through nutritional products.

By contrast, Marine Harvest is mired in disease-related controversies, notably in Chile, which are impacting supply growth. However, our review points to credible steps being taken to bring about improvements, through certifications, new treatment methods and, in the area of fish meal, innovations in non-fish feed (e.g. algae), showing the potential for improved sustainability practices to unlock huge growth opportunities amid a more favourable policy backdrop.

### Investment opportunities: aquaculture in the spotlight

This section draws on inputs from Fredrik Ivarsson (Marine Harvest; [fivarsson@keplercheuvreux.com](mailto:fivarsson@keplercheuvreux.com)), Patrick Roquas (Benchmark; [proquas@keplercheuvreux.com](mailto:proquas@keplercheuvreux.com)) and Rabobank Food & Agri seafood specialist Gorjan Nikolik.

We deal with wild-catch fisheries and farmed fish in turn, with a particular emphasis on the latter, due to both our universe coverage and the strong market momentum.

#### 1. Wild-catch fisheries

There is no pure player exposed to wild-catch fisheries in our universe, but we argue that retailers and catering companies spearheading best practices from a sourcing perspective can be part of a broad universe definition, although their exposure remains tiny (3-4% of food sales in France for Carrefour, for instance). Outside Kepler Cheuvreux's universe, there are companies in the US and Europe that seem to have taken credible steps towards tackling the sector's key concerns. For example, Lerøy recently acquired Norway's largest harvesting company and quota holder Havfisk ASA (Norwegian white fish fishing) and Norway Seafoods Group (also a whitefish specialist). Other companies we have spotted with a potentially supportive focus on sustainability are private and exposed to waters with fairly strong legislations, such as Austevoll Marine Group, Trident Seafood, SeaLord

**Retailers and catering companies spearheading best practices from a sourcing perspective can be part of a broad universe definition**

and Clearwater, which is the world's largest wild-catch harvester of lobsters and scallops, all from Canadian waters.

## 2. Farmed fish: aquaculture

Our universe contains two pure players that offer exposure to the whole aquaculture value chain (aquaculture farming, and breeding & genetics, respectively):

1. Marine Harvest: The world's fourth-largest seafood company in terms of revenues and the biggest Atlantic salmon producer, which has expanded to take control of the entire value chain.
2. Benchmark: Focused on upstream (genetics, health and nutrition); leader in Artemia (scarce brine shrimp dormant eggs) and dietary products for the shrimp industry.

Benchmark's broad peer group (including stocks not covered and products for terrestrial animals) include Nutreco, Cargill, Ziegler (nutrition) and Pharmaq, Elanco, Bayer and Merck (health). We also note growing interest from large chemicals companies in animal nutrition, such as DSM (dedicated JV).

## Macro outlook

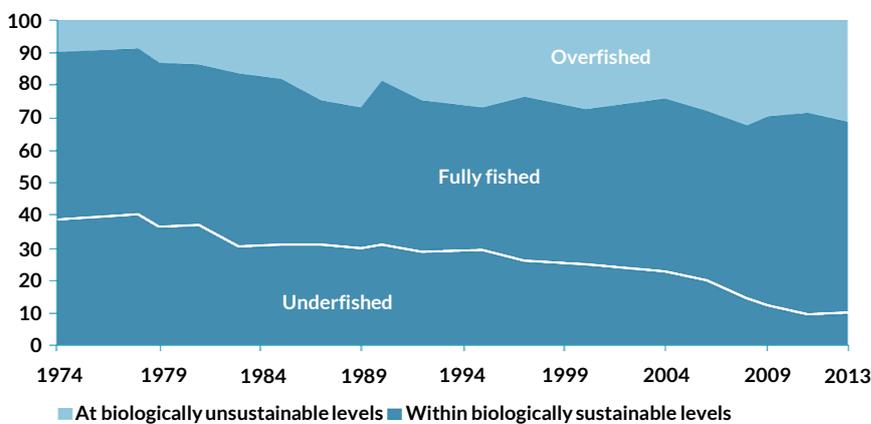
### 1. Wild-catch big picture: world's main protein source is under threat

According to the FAO, 3bn people consume close to 20% of their average per capita intake of animal protein from capture fisheries and aquaculture, while 16% of animal protein purchased stems from fish (OECD). However, the rapid increase in fish production (up to 3.2% on average a year recently) and unsustainable fishing practices have put global fish stocks under pressure, resulting in the portion of fish fully or overexploited gradually climbing to 90% (FAO), as illustrated by the collapse of stocks of the popular Pacific Bluefin tuna (tuna stocks threatened by overexploitation generally have gone up from 28% in 2010 to 36% currently).

**Two pure players offering exposure to the whole aquaculture value chain: Marine Harvest and Benchmark**

**A rapid increase in fish production (3.2% on average a year) and unsustainable fishing practices threaten global fish stocks**

**Chart 19: Global trends in the state of world marine fish stocks**



Source: FAO. Notes: Dark shading = within biologically sustainable levels; light shading = at biologically unsustainable levels. The light line divides the stocks within biologically sustainable levels into two subcategories: fully fished (above the line) and underfished (below the line).

### Main drivers: illegal fishing, lax regulation, environmental trends

Illegal and uncontrolled fishing (15-30% of global catches, EUR10-20bn in value), encouraged by inappropriate and poorly enforced regulation, including in terms of high seas governance (concentrating many ecological concerns such as bottom fisheries) and fish subsidies (60% of the USD30-35bn of annual subsidies), compounded by ocean acidification and climate change largely explain this deterioration. The general threat is that climate change jeopardises depleted stocks' potential for recovery.

Small steps have recently been taken to address these factors, such as the first global illegal fishing treaty, the FAO Port State Measures Agreement to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.

**Table 21: Illegal, Unreported and Unregulated Fishing policy developments (e.g.)**

Level	Legislation	Comments	Status
International	FAO Port State Measures Agreement (PSMA)	Objective to prevent, deter and eliminate IUU fishing. The Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing allows a country to block ships it suspects of illicit fishing, stopping their catches from entering local and international markets.	Entered into force in June 2016
International	None (WTO proposal)	Proposal for WTO members to phase out capacity-enhancing subsidies linked to harmful practice by 2020 and create a "Blue" fund	Contemplated
EU	EU Regulation to prevent, deter and eliminate illegal, unreported and unregulated fishing (IUU)	In the EU, violations of the rules on IUU (Illegal, Unregulated and Unreported) can lead to an import ban. Thailand has been in the spotlight, which subsequently drove the EU to threaten to ban imports should the country not undertake improvements. The so-called "yellow card" warning scheme is reportedly still in place.	In force

Source: Global Ocean Commission, EC, Kepler Cheuvreux

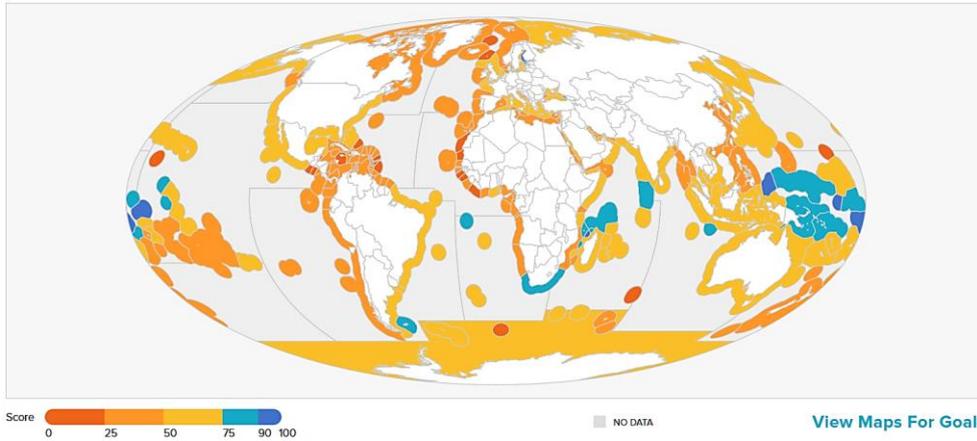
Progress towards high seas governance specifically depends on:

- The universal ratification and implementation of the United Nations Convention on the Law of the Sea (UNCLOS).
- Greater action from Regional Fisheries Management Organisations (RFMOs), clubs set up by the United Nations' Fish Stocks Agreement (UNFSA) that seek to regulate high seas fishing.
- A range of other levers to drive improvements, such as the promotion of Fishery Improvement Programmes or Marine Protected Areas, e.g. as used by President Obama before leaving office.

By region, the need for an overhaul of sustainability-related policy is arguably stronger in Asia and Africa, while among developed countries, Canada, Iceland, the US, Norway, parts of Australia and New Zealand have recently toughened their legislative frameworks, shown by the fall in the share of fish stocks that are above the overfishing threshold.

***The need for sustainability-related policy overhauls is arguably stronger in Asia and Africa***

Chart 20: Wild-caught fisheries ocean Index scores

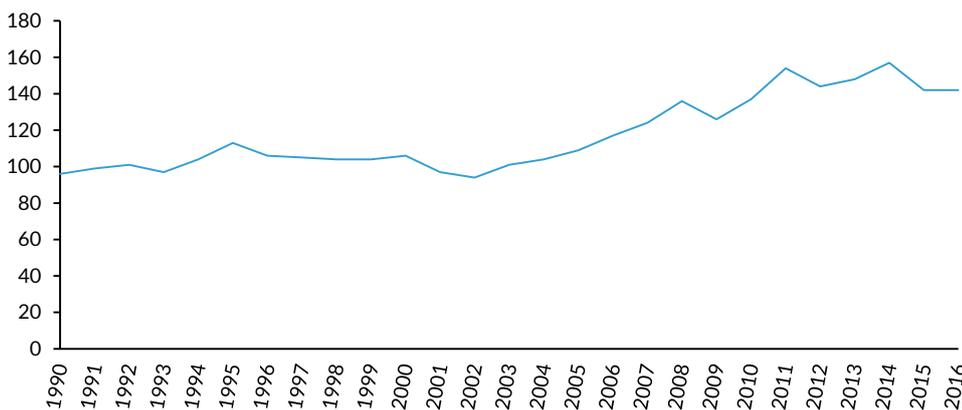


Source: Ocean Health Index

However, the vast majority of trends elsewhere (see Ocean Index scores in the chart above<sup>4</sup>) suggest potential financial risks for what has become a huge market segment valued according to some high estimates at USD430bn (marine capture fisheries and associated activities). Annual lost revenues due to the fishery crisis are massive (USD83bn) and increasing on the back of a global population surge and rising per-capital protein consumption. After an upward trend since 1990, seafood prices are set to rise modestly through to 2025, due to the supply-demand gap. Future fish prices are actually highly dependent on an array of environment-related risks, including climate change.

**Future fish prices depend on an array of environment-related risks**

Chart 21: FAO fish price index yearly average



Source: FAO

<sup>4</sup> The Index measures the global state of the world's oceans. The Index assesses the health of the high seas across three goals: Food Provision, Sense of Place and Biodiversity. In terms of policy review, the Ocean Health Index measures the effectiveness of the fisheries management governance of 15 Regional Fisheries Management Organizations (RFMOs) based on the presence of harvest controls or harvest monitoring measures (source: Ocean Health Index). Countries' governance assessment includes the Coastal Governance Index, which rates progress towards the integrated management of coastal areas around the world (source: Economist Intelligence Unit)

Conversely, restoring fishing stocks could yield USD50bn of annual benefits and potentially help ease adverse climate effects. Several project-specific studies have pointed to a meaningful increase in revenues, spurred by sustainability-related investments in areas such as secure tenure and monitoring and enforcement across regions (Tindall, 2012; MRAG, 2010; EDF).

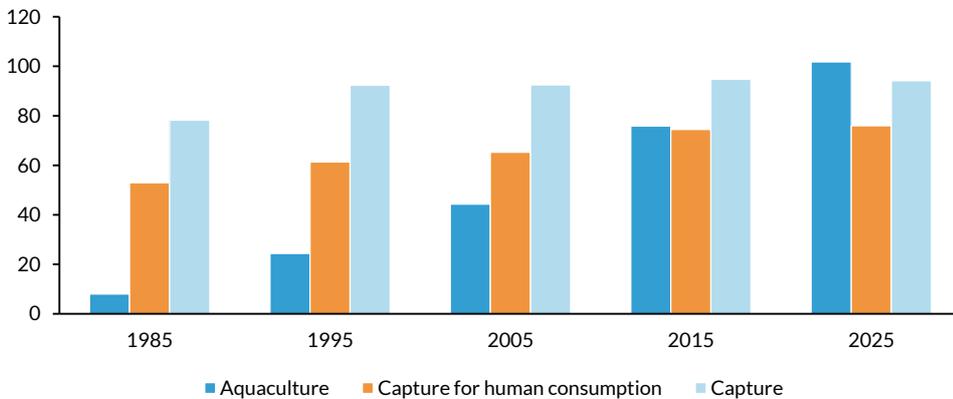
## 2. Aquaculture: seafood’s future mainstay

Aquaculture stands out as the fastest-growing food-producing sector and is clearly poised to play an increasingly pivotal role in seafood supply. It is seen as one of the three critical steps to boost fish production globally, alongside waste reduction and wild-catch growth.

### Favourable macro outlook

The industry is projected to grow by over 3% a year and to almost double production from 50m tonnes to 100m tonnes over 2016-25 (OECD), compared to 1.5% for world fish production. Aquaculture production has already surpassed fish capture for human consumption and is set to exceed total fish capture levels. The share of aquaculture in total fish capture production for human consumption has already risen sharply in the past few decades (from 15% in 1985 to 102% in 2015, with 134% projected in 2025).

Chart 22: Global capture fisheries and aquaculture production to 2025 (Mt)



Source: OECD/FAO (2016), "OECD-FAO Agricultural Outlook", OECD Agriculture statistics (database)

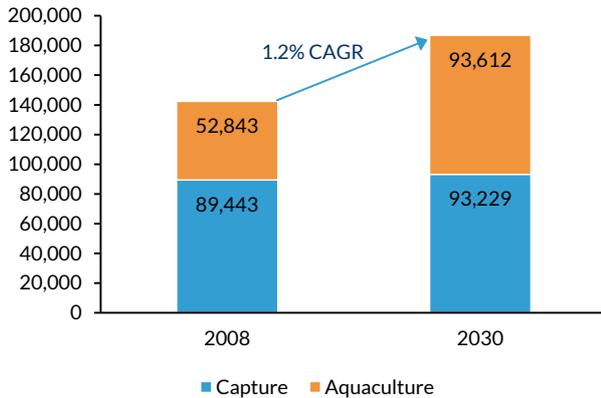
### A leading source of fish supply consumption

Looking ahead, capture and aquaculture are projected to be on par in terms of fish supply by 2030. Yet, according to the FAO, aquaculture could expand to represent 62% of fish food sold to consumers by then. Future growth is supported by health trends in the northern hemisphere and increasing purchasing power in the southern hemisphere, while the amount of capture fish is set to remain flat.

**Aquaculture stands out as the fastest-growing food-producing sector and is poised to play an ever increasing role in seafood supply**

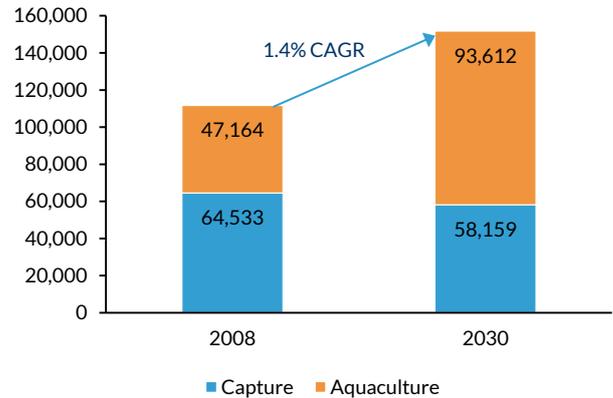
**Aquaculture share of world fish production rapidly rising**

Chart 23: Total fish supply forecasts ('000s tonnes)



Source: FAO

Chart 24: Total food fish consumption ('000s tonnes)



Source: FAO

Growth rates differ widely by region, species and product, as illustrated by the following:

1. The production of fish protein in Asia is set to grow by over 5% a year, outpacing growth in Europe of 2-3% (FAO), with China as the largest producer of aquaculture products. China leads by some distance, with 62% of total production, and is also the leading seafood exporter on top of being self-sufficient. In fact, developing countries' share (95%) of global aquaculture production is projected to keep increasing.
2. Shrimp production is estimated to grow by 50-60% by 2030 (FAO), with a 2-3% CAGR, dragged down by disease. Farmed salmon is estimated to grow by c. 5% on average a year, while growth of farmed tilapia and pangasius might be closer to 10% a year.
3. Zoetis, the largest global animal health company, estimates growth in aquatic health products of 7-8% a year.
4. Per capita consumption in China and the Republic of Korea is expected to grow by 20% and 10%, respectively, from already high levels.

**Developing countries' share (95%) of global aquaculture production is projected to keep increasing**

Table 22: Growth in per person fish consumption (kg)

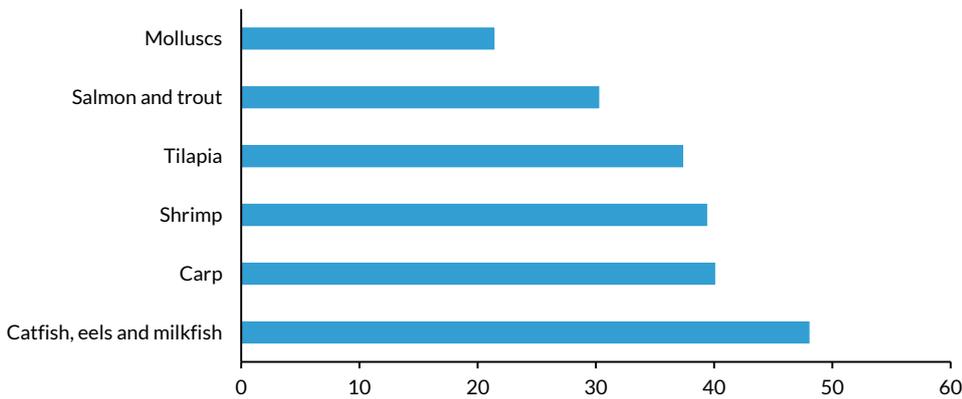
	2013-15	2025	Growth
World	20.2	21.8	7.90%
Developed countries	22.7	23.4	3.10%
North America	23.6	24.3	3.00%
Europe	20.8	22.2	6.70%
Oceania	27	31.7	17.40%
Developing countries	19.6	21.5	9.70%
Africa	10	10.2	2.00%
Latin America	10	12.2	22.00%
Asia	23.5	26.4	12.30%
China	39.5	47.2	19.50%
Rep of Korea	58.4	64.3	10.10%
Vietnam	35.4	37.7	6.50%
Least developed	13.2	13.6	3.00%

Source: FAO

**Worldwide per person fish consumption is on a long-term growth trajectory**

- The bulk of aquaculture production originates from freshwater species, such as carp, catfish (including pangasius) and tilapia, together representing 60% of total aquaculture production in 2025E. Salmonid (almost the whole production of the main species, Atlantic salmonid, is farmed) represents 4.3% of global food supply (less than 5m tonnes Live Weight or LW), far behind carp, barbels and cyprinids, molluscs (in the 20-30 mt LW range) and crustaceans.

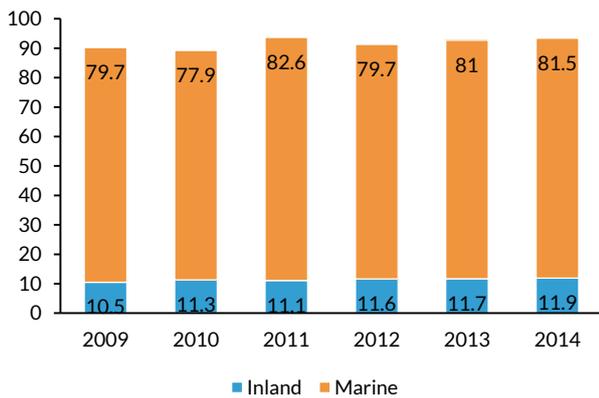
**Chart 25: Growth in world aquaculture production by species (2025 vs. 2013-15)**



Source: FAO

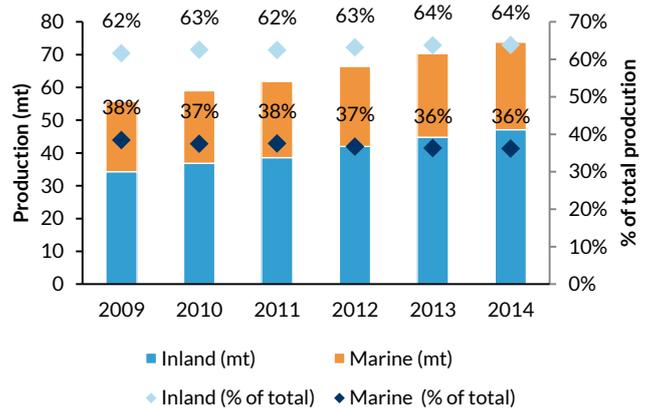
- The share of marine aquaculture in total aquaculture production has been roughly steady at 36-38%.

**Chart 26: Fish capture production (mt)**



Source: FAO

**Chart 27: Aquaculture production (mt)**



Source: FAO

### Robust long-term growth drivers

There are several factors supporting the long-term growth of aquaculture, including a growing global population and rising incomes, especially in emerging markets. Worldwide fish consumption per capita is on a long-term growth trajectory, increasing from an average of 9kg a year in the 1960s to an average 19kg in 2010 (FAO), still substantially below per capita consumption of 40kg a

**Fish represents 16% of animal protein consumed across the globe**

year in China. Other drivers include: 1) fish protein is superior to meat protein in terms of feed conversion ratios (FCRs, fish represents 16% of animal protein consumed across the globe), health, religion and the environment; and 2) stagnating volumes of captured fish.

**Table 23: Fish protein is superior to meat protein**

<b>Fish beats meat</b>
Fish have better feed conversion ratios, as they convert feed more effectively than animals as:
1. There is no need to stand on their feet.
2. Fish have a light bone structure.
3. Need limited energy to heat the body.
Fish is seen as healthier (low saturated fats, rich in omega 3) than meat.
Fish yields more meat and protein (c. 50% of its weight) than red meat and pork.
Expansion of Aqua is physically more doable (80% of the Earth's surface consists of water).
So far, fish and shrimp diseases have not had any impact on humans.
There are no/limited religious concerns related to fish.

Source: Kepler Cheuvreux

## Key ESG issues

### Certifications the most evident shift for both wild catch & aquaculture

There is good momentum for sustainable seafood certification (a 35% 2003-15 CAGR; IISD). For instance, the market penetration of the flagship Marine Stewardship Council (MSC) rose from 6% in 2006 to 10% in 2010. This rapid expansion is driven in part by retailers & regulation, including for aquaculture (x2 certified wild-catch growth). However, certifications are still fragile in terms of both business case (inconsistent evidence of premiums<sup>5</sup>) and environmental impact credentials (lack of data and penetration in general in developing countries, although credibility seems to be on the rise). What is more, penetration (14% of global production) compared to other edible commodities is fairly low, still well below coffee, cocoa, and palm oil.

### In tune with consumers' rising appetite for sustainability

Our review (see following table) shows clear signs of a growing appetite for certifications and generally sustainable seafood practices across the largest retailers and catering companies. In our view, although reporting overall can be improved, Ahold Delhaize and Axfood seem to be pioneering this trend.

Among somewhat innovative practices, we welcome Jeronimo Martins' latest vulnerability assessment report disclosure based on the Red List of the International Union for the Conservation of Nature (IUCN Red List of Threatened Species), which pointed to 8% of the total species purchased as exposed to vulnerability risks (endangered or threatened species). When it comes to catering companies, only Sodexo provides a defined target (80% green listed or orange listed meeting control measures per Sodexo Sustainable Seafood Sourcing Guide) by 2025, contrasting with peers' (Autogrill, Compass, and Elior) silence on this topic.

<sup>5</sup> One study found, for instance, that MSC certified frozen Alaska pollock fetched a 14.2% higher price in UK markets than non-certified pollock (Roheim, et al, 2011). However, evidence around sustainability seafood premiums is patchy, and does not come with poverty alleviation for the producer in any case.

**Good momentum for sustainable seafood certification (a 35% 2003-15 CAGR)**

**Ahold Delhaize and Axfood pioneer the full seafood sustainable sourcing target**

**Table 24: Retailers peer comparison (seafood sustainable sourcing)**

Carrefour	Target	Level	Date	Status	Comments
Ahold Delhaize	In-house definition	90%	2020	87%	Seems fairly high compared to peers. Specific certification share not disclosed. Local targets and progress reported e.g. Indonesia, Belgium and Luxemburg for MSC/ASC or equivalent.
Axfood	Only fish and shellfish that have been assigned a green light by WWF (including all MSC, ASC, KRAV certifications).	100%	2020	n.a.	Seems the most ambitious. Reportedly on course. Challenges: get enough green lighted salmon, since the demand for salmon is very high and there is limited green light salmon); fresh fish sold at manual service points (in Hemköp)
Carrefour	In-house definition	50%	2020	n.a.	Range of initiatives, including a commitment to not selling threatened species of deep-water fish or a “professionals” guide to tackling illegal fishing”. 33 stores MSC certified, suspended sales of endangered species (starting with France, expanding to Poland, Spain and Brazil), the majority of this share should be certified (MSC, ASC, and quality lines focused on specific producers and special claims e.g. non-GMOs).
Jeronimo Martins		n.a.	n.a.	n.a.	Expansion of the MSC label to new products (e.g. tuna loin and frozen sardines, the Vietnamese clam, and cod). New commitment to work towards MSC certification for branded tuna through in-house responsible sourcing requirements. Increase in the range of eco-labelled certified sustainable fish across fresh, frozen and grocery ranges from 15 to over 100. Eight references of private brand fish products with MSC certification (Biedronka achieved in 2016). New risks assessment reporting for fish sold in Portugal and Poland based on the Red List of the International Union for the Conservation of Nature (IUCN Red List of Threatened Species), which led to an action plan
Tesco		n.a.	n.a.	n.a.	Increase in the range of eco-labelled certified sustainable fish across fresh, frozen and grocery ranges from 15 to over 100 and introduction of MSC-certified fish to the 656 fish counters. Responsible sourcing requirements for branded tuna (MSC-related).

Source: Companies

### Is there even a business case?

On the business case side, premiums for certification broadly differ and can be similar to organic products (from zero to up to 50%), while there is no evidence of higher margins, and costs are marginal (royalty fee equivalent to 0.5% of the cost of goods to Tesco for qualifying products, for instance). However, we believe that the market for ethically sourced seafood could tighten, while reputational benefits keep growing.

### Seafood supply chain risks evidenced by controversies

Reputational credentials are even more important considering that several of the world’s biggest seafood companies have been embroiled in controversies over illegal fishing allegations or human rights abuses, such as Dongwon Industries, but also food giants e.g. Nestlé in relation to the Thai shrimp industry (social labour conditions). Nestlé subsequently publicly acknowledged having uncovered forced labour in its supply chain in Thailand in November 2015 as a result of an investigation undertaken by a labour rights specialised charity called Verité. We see such self-disclosure (increasingly common in cases of business ethics wrongdoing) as best risk mitigation practice.

Moreover, unsustainable seafood practices can have far-reaching effects, including for investors (e.g. “tuna bonds” scandal in Mozambique; a sovereign bond sold in 2013 was suspected to have been diverted from its official purpose to finance naval ships and security equipment instead of the local tuna fishing industry).

**No evidence of higher margins, and costs are marginal, but the market could tighten**

### **Big seafood companies: peer comparison**

We have focused on the largest seafood business's current disclosure and policies to mitigate these concerns and advance sustainable seafood, among the signatories of the "Joint Statement from the 1st Keystone Dialogue Seafood Business For Ocean Stewardship" ([link](#)); none are covered by Kepler Cheuvreux, but it is a relevant sample considering the high concentration of the sector.

Besides general risks disclosure, transparency and traceability, top selected criteria to screen progress include areas covered in the table below e.g. illegal fishing, human rights, and certification (MSC). Although the Marine Stewardship Council is the most widely used, we understand that MSC is not exempt from criticism, notably in terms of costs and scope for improvement.

Furthermore, fishery improvement programmes (FIPs) can back up and complement this move. FIPs bring together multiple fishery stakeholders - fishers, managers, researchers, funders and NGOs - to improve a fishery's practices and management ([link to the PRI, Aviva Investors, Sustainable Fisheries Partnership report](#) that provides recommendations for engagement with seafood companies).

### **Takeaway: Thai Union stands out in unimpressive crowd**

Amid weak - if not inexistent - disclosure, and although acute concerns about the country's seafood industry practices remain, we welcome Thai Union Group's steps towards transparency, traceability and tracking of progress towards sustainable sourcing (e.g. through the dedicated report via the WWF partnership, quantitative data on MSC certification, focus on slavery removal). Overall, this snapshot reinforces our concerns over Japanese seafood companies' practices, especially given their record.

***Focus on the largest seafood business's current disclosure and policies***

***Thai Union seems to be making progress***

Table 25: Big seafood companies' sustainability commitments

Company	HQ	Business	Ocean exposure	Scope	Our ESG View	Details	Certification/ Traceability target	Certification/ Traceability status
Dongwon Industries	South Korea	Fishing (salmon, owner of StarKist Tuna). 42 vessels.	50-100%	Global, including US, Ecuador, Pacific, Seychelles, Senegal	Lack of disclosure	Qualitative and unclear (rather unsurprising it ranks at the bottom of Greenpeace shopping guide)	n.a.	n.a.
Maruha Nichiro Corporation	Japan	Marine products (60% of 2013 sales): procurement of marine resources directly, mainly through longline tuna fishing, offshore and overseas "purse seining", aquafarming for fishes with high added value such as bluefin tuna and greater amberjack (fisheries and aquaculture unit represents 4% of total sales); and overseas joint ventures such as shrimp trawl fishing, food processing, chemical foods, overseas joint ventures, fish breeding, livestock feedstuffs, other areas	50-100%	Global	No disclosure	n.a.	n.a.	n.a.
Nissui/Nippon Suisan Kaisha	Japan	1) Marine Products (42% of sales): fishery (5% of divisional sales), aquaculture (including tuna, yellowtail buri, salmon and trout: 11% of sales), processing/trade (47%); 2) Food products (48% of sales) e.g. frozen prepared foods for households and food service, fish sausage, shelf-stable foods; 3) Fine chemicals (4% of sales) e.g. high purity Eicosapentaenoic acid or EPA as a pharma ingredients; an unsaturated fatty acid contained in fish oil; 4) Others, including marine-related e.g. marine survival training facility	50-100%	Japan (69%); N. America (14%); Europe (11%); Others (6%)	Lack of disclosure	n.a.	Pilot audit for first ASC certification in Japan undertaken in February 2016	n.a.
Thai Union Group	Thailand	Ambient seafood (57%): Tuna, Sardine & Mackerel, Salmon, Others; Frozen & Chilled Seafood & Related Product (Shrimp, Lobster, Salmon, Others); Pet Care & Value Added (Pet Care, Value Added, Ready to Eat, Marine, Ingredient, Others)	50-100%	Global	Some Relevant details (although mainly qualitative), relevant targets e.g. sustainable sourcing objective, disclosure reduction in IUU fishing; support to ProActive Vessel Register/monitoring of vessels sustainability progress; WWF/Thai Union Europe partnership involving IUU traceability risk assessment, third party audits or MSC Chain of Custody certification. Reported limitations for certain brands (Greenpeace assessment of "Chicken of the sea")	Research project focused on DNA barcoding. 2020 responsible sourcing goal: all tuna to be sourced from fisheries that either operate meet MSC standards or are engaged in a FIP or conservation project to bring them towards MSC standards	4.7% of tuna in the Netherlands MSC certified; 3.6% of total volume (John West)	

Source: Companies, Kepler Cheuvreux

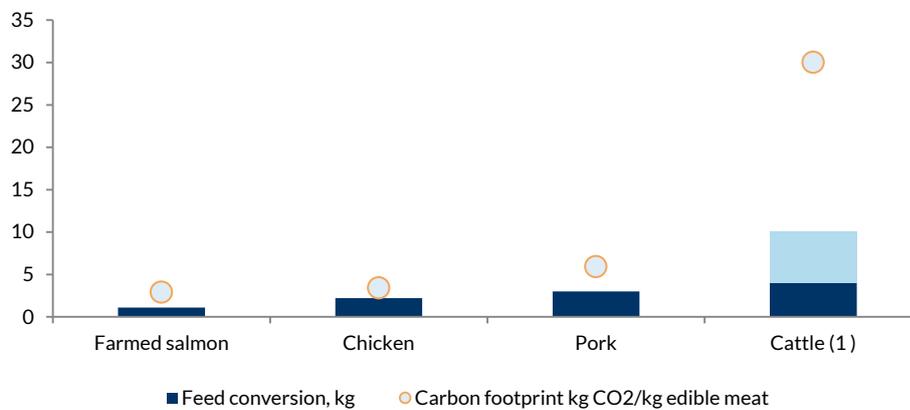
## 2. Farmed fish: Aquaculture

### The most efficient protein producer CO2-wise

The key challenge of the food value chain is to deliver more calories and better nutrition at higher levels of efficiency while conserving land, water and energy resources. Salmon is at the vanguard of this demand, with a contribution amounting to 4.2% of total seafood supply, and has been growing by an average of 84,000 tonnes a year since 1996. Farmed fish has a much lower environmental impact (including in terms of CO2, fresh water use intensity), which further plays in its favour compared to land-based protein sources. Farmed salmon, in particular, is deemed to have a lower CO2 intensity than some other farmed species such as sea bass or sea bream in France, for example (source: ADEME, Quantis).

**Farmed fish has a much lower environmental impact than land-based farming (the “Tesla of protein”)**

Chart 28: Feed conversion and carbon footprint



1 Depending on feed (finished on cereal or grass)  
Source: Marine Harvest, Kepler Cheuvreux

Table 26: Feed conversion and carbon footprint

	Farmed salmon	Chicken	Pork	Beef
Carbon footprint	2.9	3.4	5.9	30
Feed conversion <sup>1</sup>	1.1	2.2	3	4-10 <sup>5</sup>
Energy retention <sup>2</sup>	27%	10%	14%	27%
Protein retention <sup>3</sup>	24%	21%	18%	15%
Edible yield <sup>4</sup>	68%	46%	52%	41%
Edible meat per 100kg fed	61kg	21kg	17kg	4-10kg
Water consumption	1,400 litre <sup>6</sup>	4,300 litre	6,000 litre	15,400 litre

1. Feed conversion ratio measures how productive the different protein productions are. In short, this tells us the kilograms of feed needed to increase the animal's body weight by one kg. The main reason why salmon convert feed to body weight so efficiently is because they are cold-blooded and therefore do not have to use energy to heat their bodies, as well as not having to stand up, compared to land animals.
2. Energy retention = energy in edible parts / gross energy fed. Both cattle and Atlantic salmon have a high energy retention compared to pork and chicken.
3. Protein retention = kg protein in edible parts / kg protein fed. Atlantic salmon has the highest protein retention.
4. Edible yield is calculated by dividing edible meat by total body weight. As much as 68% of Atlantic salmon is edible meat, while other protein sources have a higher level of waste or non-edible meat.
5. Depending on feed (finished or on cereal or grass)
6. The figure reflects traditional smolt production in plants with water flow through. Recirculation plants, which are being implemented to an increasing extent, require significantly less fresh water (up to 99% of the fresh water is recycled).

Source: Marine Harvest's Industry handbook, Sintef

**Salmon biosecurity versus food security nexus**

Salmon, however, has attracted increased attention related to sustainability concerns, which can in part be explained by the location (consumption is primarily in developed western countries), price point (salmon is a premium protein at the top of the price range), and the fact that the sector is supplied by large listed and corporate companies (there is no backyard or smallholder salmon farming). A series of contentious issues has indeed plagued the salmon farming industry over the past few years, especially related to biosecurity (resulting in losses totalling USD6bn per year; source: World Bank), questioning the sustainability of the current business model.

**Sea lice: Chile as a case in point**

Biological issues correlate with some sustainability issues such as sea lice (small marine parasites), antibiotics and medication use.

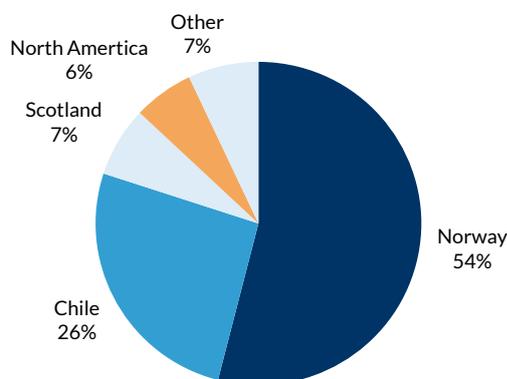
Back in 2008, the excessive growth of salmon production and lack of regulation in Chile (about a quarter of global supply) resulted in an outbreak of infectious salmon anaemia (ISA), a virus lethal to salmon. Although the virus was most likely imported from Norway (Norwegian eggs), part of the reason for the actual epidemic was the high levels of sea lice, caused by the unsustainable density of salmon farms.

More recently, the Chilean salmon farms have been suffering from the SRS bacterium (Salmon Rickettsial Septicaemia), a disease affecting salmon, causing a spike in usage of antibiotics. Nevertheless, according to Rabobank’s Food & Agri Research team, the adverse market dynamics in Chilean salmon farming are reversing, especially biological conditions. Farmers are returning to profitability, and the industry is set to recoup the 100,000 tonnes lost as a result of the algae bloom by the end of 2018, partly supported by new medication, such as Parmaq’s SRS vaccine as an alternative to antibiotics, and enhanced sea lice control. Among extreme scenarios, a new algal bloom appears less probable as we get closer to the end of El Niño.

**A series of contentious issues have plagued the salmon farming industry over the past few years**

**Adverse market dynamics in Chilean salmon farming are reversing**

**Chart 29: Global supply split, 2014**



Source: Kepler Cheuvreux

### Antibiotics

Antibiotics use for therapeutic purposes or to prevent disease varies largely per market, with many countries providing loose regulatory frameworks. In Norway antibiotics have not been used in Salmon farming since the 1990s, with vaccination favoured instead. Antibiotics are used in Chile, but no antibiotic residue remains in the body of the salmon by the time it is processed. This is due to the long production cycle of salmon and the fact that antibiotics stay in the body of the fish for only a certain amount of time. Still, misuse and resistance development remain significant concerns that underline the importance of appropriate legislation that emphasises and supports the industry in lowering unnecessary antibiotics use, especially in Chile, whose centralised model has faced huge issues.

### Biosecurity market impact

Fish farming may harm other marine life, as in some cases it triggers outbreaks in various diseases and sea lice. A sea louse is a parasite that feeds on salmon, causing severe damage to the fish's skin, which, in turn, causes bleeding, tissue necrosis, and loss of physical and microbial protective function. This results in reduced appetite and lower growth and feed conversion ratios.

Escaped farmed fish may also spread disease and harm ecosystems and natural reproduction. An array of major losses (e.g. the outbreak of infectious salmon anaemia (ISA), a virus lethal to salmon, in Chile, or amoebic gill disease (AGD) in Scotland) have helped fuel greater recognition of the business case for action. Furthermore, the aquaculture industry has also been criticised for polluting global waters with uneaten feed, for example.

The Norwegian market has been regulated for over 40 years, currently under The Norwegian Aquaculture Act. The act is based on a licensing system, prescribed by the Directorate of Fisheries. Hence, the regulatory authorities control the number of licences allocated each year, the geographical distribution of allocated licences, maximum allowed biomass produced per licence (MAB), and the selection of qualified applications to secure sustainable aquaculture. The government of Norway published a white paper during 2015, proposing to split the coastline into 11-13 production zones. Strict health and environmental standards related to sea lice in particular must be met in order to cap the increase in biomass produced at 6% every second year.

Due to a new regulatory framework in Norway and a shift in focus towards managing biological challenges among global salmon farmers, we expect supply growth to slow significantly in the coming years. Addressing these challenges is of great importance, not only for environmental and social reasons, but also in order to secure economic sustainability and food security in the context of climate change adaptation. The cost of salmon farming has increased steadily, primarily due to the high price of fish feed and intense sea lice pressure.

### Animal welfare

Although free space is arguably limited, in terms of land use and exposure to the environment, intensive farming of salmon, shrimp and tilapia, for example, is

**Norway contrasts drastically with Chile on antibiotics use**

**Key biosecurity challenges to impact supply growth**

**The cost of salmon farming has increased steadily, primarily due to the high price of fish feed and intense sea lice pressure**

comparable to that of free-range chicken or pork, but is much more intensive than carp or mussels.

**Salmon farming fish meal**

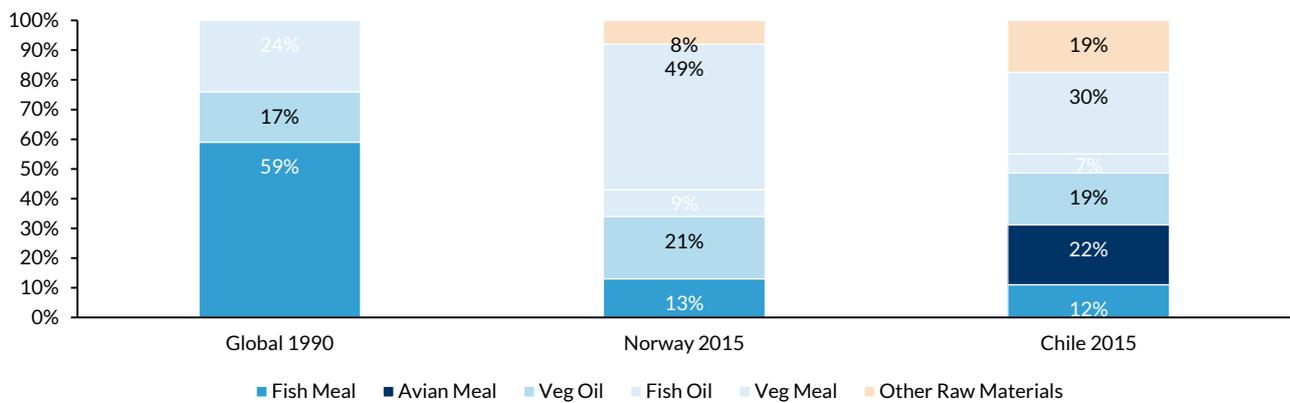
According to Rabobank analysts, there is an overall intensification of aquaculture production for nearly all farming systems, fuelled by remaining leeway to improve yield. As new premium aquaculture species are all carnivores, the high fish meal price (supply/demand gap) is holding back their development, while warnings were signalled due to overexploitation of forage fisheries supplying fish oil (fats) and fish meal (proteins) in a context whereby 17% of the global wild catch is consumed for the production of fish oil and fish meal.

However, salmon farming does not currently contribute to overfishing, or is diverting fish away from human consumption, as the ongoing shift in their meal is from fish oil (fishmeal and fish oil are produced mainly from small pelagic species, such as anchovy or menhaden) to plant-based alternatives e.g. reseeded oil:

- The use of marine ingredients (fish meal) has decreased dramatically since 1990 (from 59% of global salmon feed formula to c. 12-13% in Norway and Chile). Marine Harvest, for example, uses 15% of fish meal in its raw material sourcing, compared to 26% wheat, 22% rapeseed and 22% soya and maize.

**Overall intensification of aquaculture production raises questions around fish meal**

**Chart 30: Salmon feed formula breakdown**



Source: Rabobank, Kepler Cheuvreux

- About 30% of fish meal globally is made from fish trimmings<sup>6</sup>, not wild catch, and this percentage is increasing. However, it is debatable whether more or fewer trimmings will be available for fishmeal production in future.
- There are still some concerns associated with “reduction fisheries”, feed that is made out of wild-caught marine species (contradicting the FAO Code of Conduct for responsible fisheries that states that fisheries must directly contribute to food security and that the reduction of small pelagics into fishmeal and fish oil should be limited to non-edible species (such as boarfish); source: Bloom association).

**Focus on algae as an alternative to fish meal comes with sustainability and consumer health benefits**

<sup>6</sup> Fish trimmings consist of the parts of the fish that are not converted into fillets or steaks during processing (NOAA).

- Major aquaculture industry participants are focusing on algae, primarily for algae oil, which has attracted investments (e.g. DSM & Evonik's joint venture for omega-3 fatty acids from natural marine algae for animal nutrition, a USD200m investment, or Benchmark). Algae production uses only 3% of the land and 2% of the water used for land crops. Algae-based food would present a better ratio of Omega 3/Omega 6 oils in fish flesh compared with vegetable sources.
- The other technology platform that could reach scale in the near term is single cell proteins driven by Calysta and Cargill, still at a very early stage (the first facility is being developed in the UK and a world-scale plant is expected to open in the US).
- Insects have a lot of promise but need to show a path to scale and so far have not attracted investments from leading agro-industry players.
- Alternatives to fish meal and oil have gained momentum and some will achieve scale over the next 3-5 years. Those that do not achieve scale in this period have a high risk of having no role in the aqua feed formula.
- Many regions use GMO crops (mainly soy and maize) in fish feed. Some companies have taken action to tackle these concerns, e.g. Bakkafrost committed to not using GMO raw materials.

#### ESG peer comparison

Below, we assess Marine Harvest's and Benchmark's progress towards sustainable aquaculture practices and links with our investment case.

The table below sets out the top ESG issues in aquaculture farming alongside KPIs reviewed for the largest companies in the space, beyond those characterised by very limited disclosure based on publicly available sources e.g. Austevoll Seafood (investments in Lerøy Seafood Group ASA, Austral Group S.A.A, Foodcorp Chile S.A, and Br Birkeland AS Pelagia Holding AS).

**Table 27: Key aquaculture sustainability issues and KPIs**

Challenge	Description	Corporates KPIs
Animal welfare	Although the free space is arguably limited, in terms of land use and exposure to the environment the intensive farming of, for example, salmon, shrimp and tilapia is comparable with free range chicken or pork, but is much more intensive than for carp or mussels.	Animal welfare policy (certification, sea lice and fish mortality; see below)
Aquaculture antibiotics reduction	Overuse of antibiotics in farming or for human medical treatment (e.g. using antibiotics before a disease is diagnosed) speeds up the development of antibiotic resistance, which is when bacteria change and become resistant to the antibiotics used to treat the infections they cause. This is compromising our ability to treat infectious diseases and undermining many advances in medicine	Consumption of antibiotics (g active ingredient per kg live salmon produced)
Certifications	WWF-backed responsibly farmed seafood certification programme (the most stringent), including e.g. a reduction in antibiotics use. The ASC is developing a methodology for group certification as well as for a multi-site approach. An Aquaculture Improvement Project (AIP) is an alliance of producers, processors, suppliers, and buyers working together to address sustainability issues in a fish- (or shrimp-) farming zone. Global Aquaculture Alliance Best Aquaculture Practices and GlobalGAP are also deemed credible.	Percentage of certified sites; evidence of improvement projects
Escaped fish	Escaped fish from farms may impact biodiversity in several ways. Escaped fish are food for predators; escapees seldom prey on wild fish. The largest impact may be interbreeding with wild salmon and the potential spread of pathogens from farmed to wild fish. The ASC standard requires that the number of salmon escaped from a farm must be less than 300 to maintain the certification.	Number of escaped fish ; zero escape target
Fish meal	The extensive use of fish oil combined with a growing fish farming industry presents a sustainability challenge for the industry, while questions can be raised about alternatives e.g. salmon farming impact through soy	Sustainable sourcing policy and raw materials breakdown, including Roundtable on Responsible Soy (RTRS) and GMOs
Fish mortality	Elevated mortality in the later months of the cycle is normally related to outbreaks of disease, treatment of sea lice or predator attacks	Fish mortality (12 months rolling)
Sea lice (and other disease, such as pancreas disease or amoebic gill disease)	Lice occur naturally in the marine environment. There are two species of lice that affect farmed salmon: Caligus sp. and Lepeophtheirus salmonids. High levels of sea lice negatively impact the immune systems of farmed fish. It is also a priority to keep lice levels low to ensure there is no potential risk of negatively impacting wild salmon stocks.	Sea lice treatment (g API per tonne); Medicinal in-bath treatment and In-feed treatment

Source: Kepler Cheuvreux, WHO, IISD, GSI, Cermaq, Marine Harvest,

## 1) Marine Harvest: biosecurity-related risks

From a risk perspective, we argue that Chilean exposure can broadly be considered a proxy of greater exposure to environmental risks, while Norway on the other hand provides a shield due to its tougher regulatory framework, although sea lice remain prevalent there. With 11% of its production linked to Chile, in our view Marine Harvest is thus particularly exposed. However, our review points to encouraging steps taken towards best practices across several areas.

### Animal welfare

One of Marine Harvest’s long-term ambitions is to reduce losses at sea and achieve 99.5% generation survival by 2020 (vs. 99% currently). Recent trends in the number of escaped fish and fish mortality are negative, caused mainly by physical handling of the fish, and disease (e.g. because of a wound from damage because of bad weather), such as Salmonid Rickettsial Septicaemia. Yet 2015 was a difficult year, due to harsh winter storms, so it is difficult to extrapolate a pattern.

**Marine Harvest’s Chile exposure creates acute ESG concerns**

**Challenging trends in escaped fish and survival control...**

**Table 28: Escaped fish, survival rate, and fish mortality**

Company	Number of escaped fish				Marine-phase survival rate, from release to harvesting (last harvested generation)				Fish mortality (12 months rolling)*			
	2014	2015	Trend	Comments	2014	2015	Trend	Comments	2014	2015	Trend	Comments
Bakkfrost	47,403	n.a.	n.a.	Weather-related. Focus on stronger equipment next production cycle	n.a.	n.a.	n.a.	n.a.	4.86%	3.87%		-Atlantic salmon
Cermaq	n.a.	500	+	Norway, salmon	n.a.	n.a.	n.a.	n.a.	6.8%	6.3%		-Atlantic salmon
Grieg Seafood	24,479	0	+	zero escape target; past issues due to procedures	n.a.	n.a.	n.a.	n.a.	10.90%	6.60%	+	Atlantic salmon. <7% targeted
Marine Harvest	2,052	94,000	+	Significant rise in Norway, Scotland, Chile (human-induced); zero escape target	n.a.	n.a.	n.a.	Survival rate (%biomass) in seawater reported (99%)	4.76%	5.26%	+	Atlantic salmon
Norway royal salmon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	13.70%	n.a.	Overall mortality driven by the destruction of ISA infected fish.
SalMar	376	2	+	zero escape target; past issues due to procedures	89.9%	89.2%	n.a.	>95% targeted	n.a.	n.a.	n.a.	n.a.

Source: Companies (\* Source: Global Salmon Initiative; companies data may differ)

Moreover, issues raised in Chile sparked a sharp increase in the use of antibiotics .

**...as well as antibiotics and sea lice**

**Table 29: Antibiotics and sea lice treatment**

Company	Consumption of antibiotics (g active ingredient per kg live salmon produced)				Sea lice treatment (g API per tonne)			
	2014	2015	Trend	Comments	2014	2015	Trend	Comments
Bakkfrost	0	0	=	In Faroe Islands, no antibiotic has been used for the last 15 years in salmon farming	2.44	4.71		Medicinal in-bath treatment* Medicinal in-bath treatment went down; Focus on lumpfish,, lukewarm water, freshwater treatment equipment installed in fish carriers, decrease in costs
Cermaq	146.81	265.86	+	Chile and Canada	n.a.	n.a.	+	(Chile salmon, trout); - (Norway, Canada salmon) Varies per species/region
Grieg Seafood	0.01	0	+	Norway	2.74	3.16	+	(Norway). In-feed treatment went down
Marine Harvest	40	82	+	Chile sole driver	3.4	1.54	-	(Norway). In-feed treatment soared from 2.2 to 8.00. New method: sea lice removal "Hydrolicer" control
Norway royal salmon	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SalMar	0.000213	0.000167	-	n.a.	n.a.	n.a.	n.a.	n.a.

Source: GSI, Companies (\* The difference is that in-feed treatment are additives in the feed to avoid sea-lice. Bath treatments are additives put into a closed bath to remove the sea lice. The treatment in bath will normally take 30 minutes, while in-feed treatment is normally for a period of ten days).

**Will improvement plan counter the trend?**

Slowing the progression of sea lice is therefore a high priority for Marine Harvest and within the industry. Marine Harvest’s improvement programmes focus on cleaner fish (most preferred tool), enhanced management approaches, in-house genetic programme reduced medical usage and increased R&D investments (which rose by 80% YOY in 2015).

A fairly new treatment method that had proved successful is hydrogen peroxide bathing, which has a success rate of up to 100% in some cases. Unsurprisingly, the use of peroxide had increased massively, yet we understand that the use of peroxide has waned recently due to effectiveness issues, while there is a growing focus on

**Growing focus on mechanical lice treatment tools**

mechanical (non-chemical) lice treatment tools, such as “Hydrolicer” (lice flusher) or “Thermolicer” (criticised by animal welfare NGOs and involved in accidents). However, these tend to boost mortality rates. Generally, hopes in the industry centre on genetics, which could be the only way to quickly resolve the sea lice challenge.

Additionally, in July 2016 Marine Harvest decided to stop working with SalmonChile (industry association), as it had been calling for stricter legislation (similar to Norway, with, for example, biological indicators to control growth).

**Certification: paving the way**

In addition, Marine Harvest targets to be 100% Aquaculture Stewardship Council (ASC – an initiative created by the WWF and IDH that focuses on certification and labelling programmes for sustainable seafood and that we understand is the most stringent and a source of premiums) certified by 2020.

This might be seen as fairly ambitious considering current levels (24% of active sites as of 2015) and could help to drive the ambitions of peers that are not part of the Global Salmon Initiative, which targets 100% adoption by 2020, such as Salmar, which are reportedly also working on their respective certification agendas, although they do not seem to have set similar commitments (e.g. no quantitative reference to the ASC in Salmar’s latest (2015) sustainability report).

**Marine Harvest’s certification plan: encouraging and more extensive than peers**

**Table 30: Certification peer comparison**

Company	Activities	Geographical exposure (2015)	ASC* Quantitative target	Update
Bakkfrost	Producer of salmon from the Faroe Islands. Bakkafrost controls the value chain from the sourcing of raw material for fishmeal and oil to finished value added salmon products	Faroe Islands	100% by 2020	1-2 farm site(s), more underway
Cermaq	Seafood (including salmon, fjord trout) production and distribution company. World’s second-largest producer of Atlantic salmon	Sales: 20% Norway; 50% EU; 12% Asia; 6% US & Canada; 4% Rest of Europe	100% by 2020	2-4 in Canada. In total: 8 ASC certification achieved in 3 regions
Grieg Seafood	Fish farming company, specialising in Atlantic salmon	Sales: Norway, Canada, UK, USA, Russia, Asia	n.a.	2 sites ongoing
Marine Harvest	Fish farming - salmon. Marine Harvest is one of the largest seafood companies in the world and by far the largest producer of Atlantic salmon with a 21% market share. The company controls its entire value chain and has production sites in the six largest salmon producing countries in the world.	Production capacity estimates (2017E): Norway (62%), Scotland (13%), Canada (10%), Chile (11%), Ireland (2%), Faroes (1%)	100% by 2020	24% of active sites
Norway royal salmon	Fish farming company (Atlantic Salmon, Brown trout)	Norway	No	7 out of 12 sites in Finnmark
SalMar	Producers of farmed salmon, including offshore	Scotland, Norway, Japan	No	eight sites (four ongoing)

Source: Companies, GSI, Kepler Cheuvreux (\* there are other certifications widely used e.g. Best Aquaculture Practices (BAP) Certification)

**Market opportunities in ASC compliance solutions**

It is noteworthy that the certification boom (500 farms predicted in 2020 vs. 60 in 2015 or 60-70% vs. 7-10% of global feed) fuels opportunities for breeding and genetics companies that help comply through, for instance, vaccines to lower antibiotics use e.g. Benchmark, or new functional feeds to handle seal lice e.g. Cargill Aqua Nutrition/EWOS Group (part of Cargill).

### Conclusion: lingering questions

Bakkafrost, Marine Harvest, and Cermaq have the best levels of disclosure. Overall, although Marine Harvest is relatively comprehensive, we still see scope for improvements in the company's policy and reporting, for instance on its responsible feed policy data (e.g. responsible soy sourcing).

While there are considerable uncertainties regarding the future of sea lice treatment and biosecurity generally, making it hard to identify the best-placed companies, Bakkafrost seems to have a lower risk profile based on the current situation, due to its geographical exposure (Faroe Islands focus, no Chilean exposure) and based on the criteria reviewed (e.g. certification, fish meal and fish mortality). However, its lack of diversification could prove a challenge.

### 2) Benchmark: a winner of the food efficiency and sustainability nexus

We see Benchmark as an attractive play on solutions for sustainability and food efficiency (aquaculture). Examples of its activities to meet this challenge include:

1. Advanced feed, genetics and breeding to improve yields and disease resistance.
2. Vaccines and probiotics to replace antibiotics.
3. Diagnostics and consultancy services to improve husbandry and reduce fish mortality. Most activities focus on the immune and metabolism systems of fish and animals.

### Five divisions

1. The **Advanced Animal Nutrition division** (AAN, 60% of EBITDA) produces larval feed formulas and nutritional additives for aqua species. This feed helps prepare larvae, post-larvae, fingerlings and juveniles for proficient growth. Competitors are Nutreco, Cargill, Ziegler and local producers.
2. **Breeding & Genetics** (B&G, 20% of EBITDA): Benchmark offers genetic and breeding services for large-scale breeding of fish. It is a global leader in supplying salmon eggs and genetic material for tilapia, shrimp and several marine species. B&G is a key driver of efficient fish production and disease control. Its main competitor is Aquagen.
3. **Animal Health** (AH, 12% of EBITDA) develops health solutions for aquatic and terrestrial animals. It produces biocides, vaccines and parasiticides and provides veterinary, environmental and diagnostic services. The main competitors here are Pharmaq, Elanco, Bayer and Merck.
4. **Sustainability Science** (SC) provides sustainable food production consultancy, technical consultancy and assurance services.
5. **Technical Publishing** (TP) provides online news and insight for the agriculture and aquaculture, veterinary and food supply chain industries.

### Environmental and contractual risks and safety risks

Nonetheless, our review also pointed to two main ESG concerns: 1) uncertainties on Great Salt Lake brine shrimp harvests (environmental and contractual risks); and 2) safety risks, which look well in hand internally.

Yet, ultimately, the company's intertwined and complementary divisions essentially (Advanced Animal Nutrition and Breeding & Genetics) allow risks to be transformed into opportunities. Disease outbreaks, for instance, could boost the demand for

**Bakkafrost seems to have a lower risk profile**

**Benchmark: Intertwined and complementary divisions allow risks to be transformed into opportunities**

vaccines and health products, positively impacting the Animal Health division. Similarly, it could also increase farmers' appetite for more nutritional products (Advanced Animal Nutrition).

Table 31: Benchmark - key ESG risks

Issue	Value chain level	Exposure	Strategy	Financial impact	Transparency	Our view
Raw material risks (Advanced Animal Nutrition)	Supply chain	<b>High:</b> The Advanced Animal Nutrition activities (run by INVE), the most important division, depend on the supply of specialised raw material, especially brine shrimp or artemia cysts (c. 50% of INVE's sales). Artemia production is very localised (Great Salt Lake represents 40-50% of global production) and is heavily reliant on external environmental factors (e.g. the algae they eat tend to disappear when lake salinity increases due to rising temperatures and a drop in water levels),	<b>Strong:</b> Marketing agreement: INVE has developed various partnerships to access high-quality brine shrimp, particularly a membership in the Great Salt Lake Cooperative (COOP), which is allowed to harvest c. 86% of the lake's production; 2) sourcing/products diversification: INVE is improving its access to brine shrimp harvests in other locations (e.g. China, Siberia).	<b>Medium to high:</b> We have limited visibility on INVE's short-term potential earnings, partly due to uncertainty related to the harvest of artemia cysts and contract renewal. However, we note that both the COOP and INVE have built up strategic inventories in case of unsuccessful harvests or peak demand.	<b>Medium to low:</b> On artemia, we would welcome further information on the situation in other sourcing lakes in Asia. Apart from artemia cysts and rotifers, we do not have the breakdown of other raw materials used in food production or information on their quality (e.g. genetically modified?). We cannot exclude vegetable food such as soya or rapeseed also entering Benchmark's food portfolio and would need further information on how such raw materials are sourced (e.g. possible link to land degradation controversies).	The exposure to raw material swings is limited for now, as the COOP has built up strategic reserves in case of supply shortage or peak demand. However, we lack details on the sustainability of these inventories (e.g. stock size).
Safety and biosecurity (Breeding & Genetics)	Products & Services	<b>Medium to high:</b> 1) Sanitary risks and regulatory corrective measures: Disease outbreaks in breeding programmes could hamper revenues, while also harming the group's reputation and paving the way for product liability claims; 2) Ethical risks: Risks linked to the new regulations banning genetically modified egg imports would only affect AFGC and Spring Genetics ("genetically improved organisms"), as the rest seem to only rely on genomic selection.	<b>Medium:</b> The group's breeding facilities claim to operate with high standards of bio-security, quality control and quality assurance. The location of StofnFiskur (Iceland) is said to be one of the best places for disease-free production. However, we note that Benchmark cannot fully mitigate the risk, as safety problems arising from competitors may affect the market as a whole (e.g. Chilean example)	<b>Medium to high:</b> The recent closure of the Chilean border in H1 2016 to imports of all aquatic biological products from Iceland (including salmon eggs from StofnFiskur), followed by an outbreak of an algal bloom (which made seafood toxic and caused dozens of human food poisoning cases) led B&G sales to plunge by -40% YOY and the trading EBITDA to fall by -42% YOY in H1.	<b>Medium to low:</b> The lack of underlying health and security data makes risk mitigation claims difficult to assess. Norwegian-based facility Salmobreed does not provide any official documentation to certify that eggs have not been genetically modified, and overall information is not available in English (Norwegian only) – unlike StofnFiskur, which has a Veterinary Certificate on the non-use of GMO in its live salmon egg exports	Benchmark is not exempt from corrective measures related to disease outbreaks at other companies (negative impact on financials, but not on intangibles). Yet, such an occurrence could bolster demand for vaccines and health products, positively impacting the Animal Health division. Similarly, it could also increase farmers' appetite for more nutritional products (Advanced Animal Nutrition). The implications of such regulatory risks can be offset by continuous egg specie diversification (e.g. tilapia through the recent AFGC and Spring Genetics acquisitions as well as shrimp and other marine species), but we would appreciate the disclosure of each companies' contribution to divisional revenues to fine-tune our assessment.

Source: Kepler Cheuvreux

## Valuation

Benchmark (Buy, TP 110.00p): Attractively positioned in the value chain

**Investment view of Patrick Roquas on Benchmark (proquas@keplercheuvreux.com)**

Benchmark's portfolio is geared towards the start of the fish lifecycle, which is essential for farmers in terms of profitability. With aquaculture scaling up and increasing levels of professionalism, we believe its markets will outpace overall sector growth.

Improved genetic and breeding techniques as well as sophisticated feeding programmes are drivers of productivity gains, which we highlight with two examples: 1) currently, cow breeding is over ten times more productive than in the past; and 2) the FAO estimates that 40% of tropical shrimp production is lost annually due to diseases, equating to a value of USD3bn, which can be reduced through better genetics, breeding, feed and farming techniques. The majority of Benchmark's activities relate to these areas, which are drivers of efficiency, disease management and sustainability.

[Link to our ESG Profile on Benchmark.](#)

**Marine Harvest (Buy; TP NOK185.00): Tight markets ahead**

**Investment view of Fredrik Ivarsson on Marine Harvest (fivarsson@keplercheuvreux.com)**

Our positive view on Marine Harvest is based on a strong belief in continuously increasing salmon prices in the coming years, as markets are starting to look very tight. As the biological situation remains challenging in Norway and the UK, while the replaced volumes from the algae bloom in Chile will be visible in H2 2017 and H1 2018, global salmon markets will remain tight in the coming years. While the cost inflation in MH Norway remains a key concern, we argue that tight markets and increasing contract prices pave the way for strong underlying EPS growth of 30% and 9% in 2017E and 2018E, respectively.

**Investment view of  
Patrick Roquas on  
Benchmark (proquas  
@keplercheuvreux.com)**

**Attractive non-  
farming play on Aqua**

**Investment view of  
Fredrik Ivarsson on  
Marine Harvest  
(fivarsson@keplercheuvr  
eux.com)**

## Transport: not on track

Although shipping is a relatively efficient mode of transport, its global CO2 emissions are projected to soar (50-250% growth in 2050E compared to 2012 levels) on the back of strong structural expansion in seaborne transport (2-3% CAGR over 2027). High air pollutant levels, particularly NOX, SOX (main emissions from a diesel engine alongside PM) and SO2, equally raise legitimate concerns.

Clearly lacking ambition, the feeble and constantly postponed industry carbon ambition fuels uncertainties around potential risks of stranded assets. This contrasts with the encouraging tightening of marine pollution-related environment legislation, as new standards for sulphur content (scrubbers), alongside ballast water treatment, are both set to gather pace in the next few years (>USD12bn market). However, the latter looks more certain to take off than the former, due to the existence of attractive alternatives to scrubbers (using diesel or low-sulphur heavy fuel oil), especially in a low oil price and cash constrained environment. Wärtsilä is the more obvious beneficiary, in our view.

Against a backdrop of consolidation, Maersk's attempt to lead the way on CO2 in the ocean carrier segment is hampered by its average fleet age and lacklustre industry record, although weak disclosure on the whole and from most peers hinders a thorough comparison. In shipping, we also underscore concerns linked to using Indian facilities (Alang ship yards on a beach) amid continuously high levels of vessel scrapping in the industry.

### Investment opportunities

*This section draws on inputs from Johan Eliason (Maersk, Cargotec, Konecranes; [jeliason@keplercheuvreux.com](mailto:jeliason@keplercheuvreux.com)).*

The Transport Cluster offers the widest range of investable opportunities spanning across a myriad of sectors across the value chain:

- Container shipping (e.g. Maersk, Hapag-Lloyd).
- Ship equipment (e.g. Alfa Laval, ABB, Wärtsilä).
- Ship building (e.g. Fincantieri).
- Port equipment (e.g. Cargotec, Konecranes).
- Port operators (e.g. HHLA).
- Freight/Logistics (e.g. Kuehne + Nagel, DSV).
- Testing, Inspection & Certification (TIC) (e.g. Bureau Veritas, Intertek).

In our view, the most likely to benefit from the shift in the sector towards a more sustainable trajectory, notably from a climate change and marine pollution perspective, are ship equipment makers and TIC, as they help line transports comply and adapt to environmental economic and policy trends.

**We focus on ocean carriers and capital goods as more directly impacted by environmental trends**

## Macro trends

We identify five main short to mid-term trends shaping the landscape for shipping and port companies, whose impact overall carries ESG reverberations, in particular for CO2 and air pollution (trade growth) and ship waste (overcapacities).

**Table 32: Key seaborne transport trends**

Theme	Outline
Lower world trade growth	After growing 2.5x faster than GDP over the last 50 years, global trade as a percentage of world GDP seems to have peaked following the Great Financial Crisis, and trade growth is unlikely to recover significantly from here (see Head of Thematic Research Rui Mota Guedes's report: <a href="mailto:rmeta@keplercheuvreux.com">The global trade slowdown; rmeta@keplercheuvreux.com</a> ).
Ocean carrier consolidation	The difficult situation in the container shipping industry has accelerated the consolidation of the market into three major alliances, 2M (with Maersk), OCEAN, and THE Alliance, the last of which was announced on 13 May 2016. A series of mergers have taken place or are ongoing between ocean carriers e.g. Hapag-Lloyd and Dubai-based UASC (as of 31 March 2017); Maersk and Hamburg-Sud (until year-end); and CMA CGM and APL.
Mode shift	The ongoing shift from high-margin air freight to cheaper ocean. Continued market share gains from air (including high tech) are mainly based on transportation costs. This offers CO2 and cost-savings upside for companies with global supply chains. Companies like Electrolux and Borouge have made public announcements about the importance of environmental performance in their commercial relationship with Maersk, for example. Ocean freight has however slowed rapidly compared to overland transportation and contract logistics solutions, which are benefitting from both near-shoring and e-commerce growth.
Overcapacities	Partly caused by larger fleets (particularly container ships and bulkers) pressuring ocean freight rates. Oversupply accounted for about a quarter of the world's shipping capacity in 2015. Capacity expansion is, however, slowing (vessel deliveries down 41% in 2016).

Source: OECD, Hapag-Lloyd, Maersk, Kepler Cheuvreux

## Seaborne transport the cornerstone of international trade

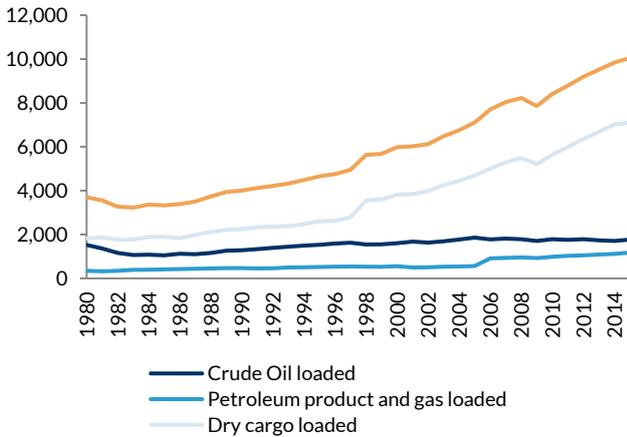
As a general rule, about one-third of the value of international merchandise exports is handled by road, one-third by air and one-third by sea, with obviously much bigger volumes handled by the lower-cost transportation modes and much lower volumes of higher value goods handled by air. Seaborne transport specifically is the backbone of international trade, as over 80% of world cargo volumes are transported this way. Total seaborne trade (in tonnes loaded) has also significantly outgrown world GDP by a factor of 1.4x, reaching a CAGR of 3.8% over the last 25 years. In 2015, world seaborne trade in fact reached an all-time high level, exceeding 10bn tonnes among the different subsegments (UNCTAD). Container trade, measured in millions of tonnes, has significantly outpaced any other type of seaborne trade.

**Five main short- to mid-term trends**

**Ocean transport offers CO2 and cost-savings upside for companies with global supply chains**

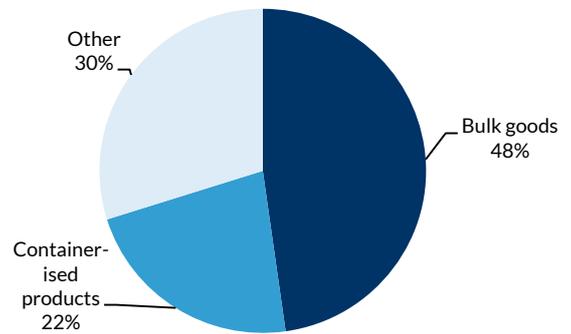
**Seaborne transport is the backbone of international trade**

Chart 31: World seaborne trade (mt)



Source: UNCTAD, Kepler Cheuvreux

Chart 32: International seaborne trade breakdown



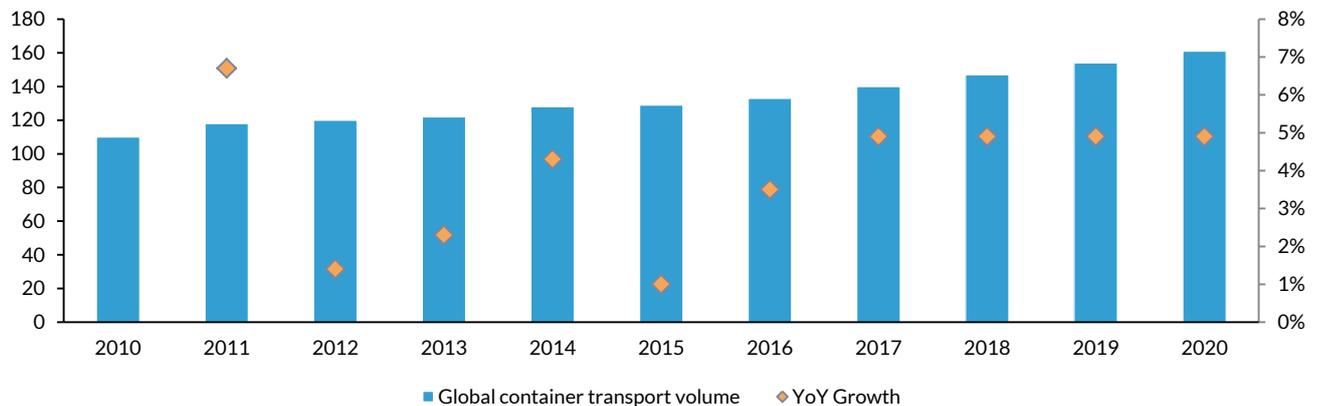
Source: IEA, Kepler Cheuvreux

### Container volumes expected to see near-term rebound

Despite the current sluggish global trade environment, we believe global container volumes are likely to improve in the short term, driven mainly by improving base effects on the back of more stable growth in China and the oil-exporting countries, and also the sluggish recovery seen in the West. However, the container liner industry will still need further consolidation on the back of the lower-than-historical growth rates, and we see the market leader Maersk as a winner in this scenario.

**The container liner industry will still need further consolidation on the back of the lower than historical growth rates**

Chart 33: Global container transport volumes (m TEU)



Source: IHS Global Insight (February 2016), Kepler Cheuvreux

We expect overall container volumes to rebound, from c. 2.5% in 2016 to 3% 2017E, and 3-4% thereafter. Maersk Line sees global market growth of 2-4% for 2017E, after 2-3% in 2016, and the industry consultancy Drewry estimates port throughput growth returning to +2.1% in 2016E and +2.9% in 2017E. In H1 2016, Maersk estimated market growth at +1-2% YOY, and since then we have seen comments indicating improving growth rates on several trade routes from April to July, which seems to corroborate our view that growth rates are increasing.

**Container growth to recover**

## Attractive long-term growth

In the longer run, we expect world seaborne trade to keep expanding at a 2-3% CAGR over 2027 (Alfa Laval, Clarkson), but there are more bullish estimates. OECD ITF expects global seaborne trade volumes to show continued growth of around +4% a year in the coming decade, with containers continuing to show the highest growth rate. This seems broadly aligned with the IEA reference scenario, in which international freight shipping is predicted to increase by 3.6% each year, in line with GDP (IEA WEO), which corresponds to a 1.9% rise per year for fuel consumption. In absolute terms, those estimates suggest a quadruple of seaborne trade by 2050 compared to 2005 levels.

**Table 33: Slowing global trade**

	2000-08	2010-15	2016E	KECH 2015-20E
Overland/Contract logistics			3-5%	3-5%
Ocean	8.50%	3.30%	2%	2-3%
Air	3.50%	-0.5%	0-1%	1-2%
Global GDP	4.30%	3.50%	3%	3%

Source: Kepler Cheuvreux

## Key ESG issues

Against this backdrop, we highlight three main ESG issues that are all growing in importance as a result of the ongoing sector expansion:

1. Carbon and energy.
2. Marine pollution.
3. Ship recycling.

### 1) Carbon and energy

#### Efficient mode but gloomy outlook

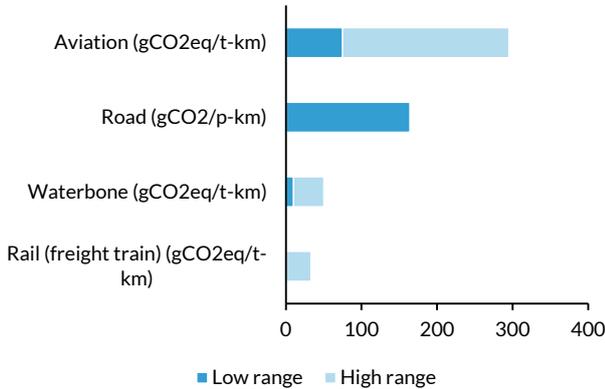
While the energy efficiency and CO<sub>2</sub> and GHG emissions of various forms of transport may differ greatly, depending on region, for instance, there is evidence that shipping is generally the most efficient of the international forms of transport, while aviation is typically the most intensive (per tonne-kilometre). However, overall, rail could be less CO<sub>2</sub>-intensive than shipping on some calculations, for example when using a life cycle perspective (wheel-to-wheel)<sup>7</sup>.

<sup>7</sup> Using IEA ETP definition: "GHG emissions that take place during the production of transport fuels can be separated into: 1) those occurring between extraction of primary feedstocks and delivery to the final site of distribution to the end user (well-to-tank), and 2) those occurring during the combustion of the fuels in the powertrain of vehicles (tank-to-wheel). Together, these make up total WTW GHG emissions".

**OECD ITF expects global seaborne trade volumes to show continued growth of around +4% per year in the coming decade**

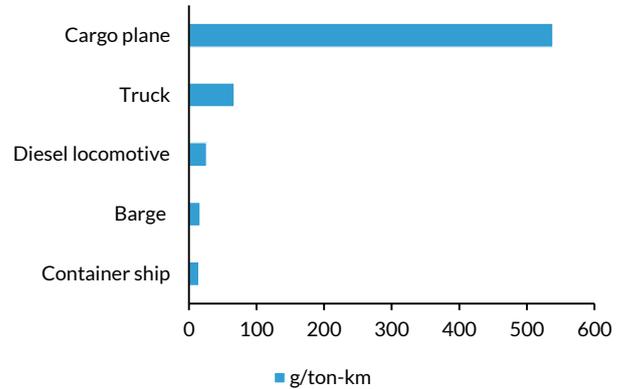
**Shipping clearly an efficient transport mode...**

Chart 34: Transport mode emission intensity



Source: IPCC (industry average; grams of CO2 equivalent per passenger kilometre)

Chart 35: Freight transport mode CO2 intensity (g/tonne-km)



Source: The network for Transport and the Environment

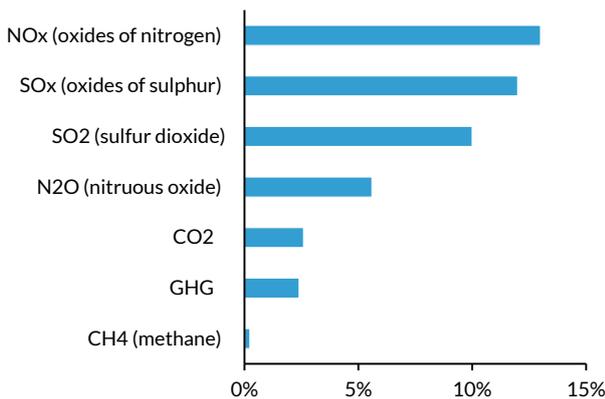
### Soaring carbon emissions ahead and significant air pollution concerns

Nonetheless, the sector still accounts for a sizeable share of global oil demand (5%) and transport-related liquid fossil fuel demand (e.g. 12% in the EU). Additionally, when also including air pollution, it carries a large negative environmental footprint and high levels of global emissions, particularly NOx and SOx (the main emissions from diesel engines, alongside PM) and SO.

More worryingly, global international shipping's CO2 emissions are projected to rocket in the business-as-usual scenarios (50-250% growth in 2050E compared to 2012 levels), propelled by the explosion in international freight transport volumes.

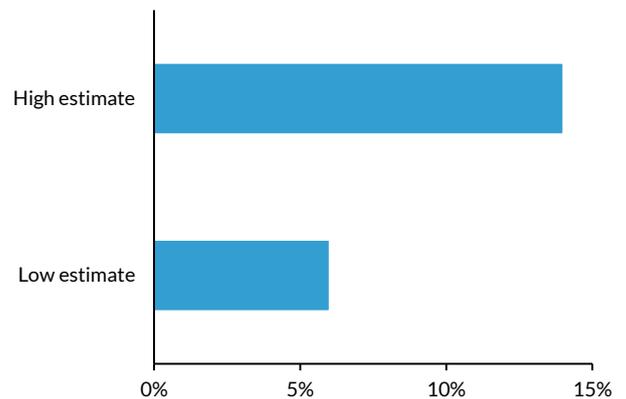
**...yet global CO2 emissions are projected to rocket and air pollutant levels raise legitimate concerns**

Chart 36: Shipping share of global emissions



Source: IEA, IPCC, Kepler Cheuvreux

Chart 37: Forecast shipping share of global emissions (2050E)



Source: IMA (BAU scenarios), Kepler Cheuvreux

### Gloomy energy efficiency outlook

Shipping fuel demand is expected to grow at a 2% CAGR over 2015-40E, about half of shipping activity growth. In terms of energy efficiency performance, the IEA foresees average energy efficiency per ship-km of the international shipping fleet improving by only 15% in 2015-30 because of the length of the average lifetime of

**CO2 emissions predicted to soar**

ships (25-40 years - IEA WEO). Overall forecasts indicate that energy efficiency improvements will not be enough to put us on a downward CO2 trajectory (IMO). Moreover, alternative scenarios created by the UCL Energy Institute and Carbon War Room show that the sector is currently wholly unprepared for the different possible decarbonisation pathways consistent with the global carbon budget assuming the 2°C temperature rise objective agreed by world leaders in the Paris COP21 Conference.

**Strong carbon mitigation potential untapped**

Strong carbon mitigation potential remains untapped despite the availability of a whole range of technological options to lower energy use and emissions by up to 75%, according to the IMO. Key CO2 and air pollution abatement measures, in decreasing order of magnitude (IPCC, IEA), can be grouped into three broad categories: 1) improvements in ships’ energy efficiency; 2) the rise in average ship size; and 3) a more diverse fuel mix.

Besides technological progress, ships have recently seen operational drivers, especially slow steaming, as reducing speed has proven successful in cutting fuel use and, in turn, costs.

*Efficiency is enabled by improvements in ships’ energy efficiency, the rise in average ship size, and a more diverse fuel mix*

**Table 34: Key abatement solutions (equipment and energy)**

		Comments on trends/Examples
1. Larger ships		The benefits of ever larger vessels are declining
2. High efficiency	New ships	Improvements in the efficiency of engines via waste heat recovery or hybridisation
	Retrofits	Engine derating to match operational speed and engine size, wind assistance and improved maintenance)
3. Fuel diversification	Switching to biofuel	Hampered by meaningful technological and political barriers (e.g. need for a global fuel supply). IEA forecasts 1% of the biofuel market to be shipping linked.
	Switching to LNG	Significant potential. Driven by air pollution concerns. IEA forecasts 1% of global natural gas demand in 2040 to stem from bunkers

Source: IEA, Kepler Cheuvreux

**Lacklustre carbon and energy performance due to lack of ambition**

In January 2013, the IMO rolled out a globally binding energy efficiency standard to tap into this potential, the so-called Energy Efficiency Design Index (EEDI), which sets a 10% improvement in the energy efficiency per tonne-km of new ship designs from 2015, 20% from 2020 and 30% from 2025. However, we argue that evidence of the effectiveness of this innovative mandatory industry-defined energy efficiency regulation is scarce.

Conversely, some studies have raised concerns about the actual trajectory observed for the energy efficiency of container ships, by underlining that new ships built in 2013 had on average 10% poorer fuel efficiency than those built in 1990 (Seas At Risk and Transport & Environment; 2015). The industry carbon ambition is set to be reviewed, as it was deemed lacking, but we believe little will change in the short run: the ambition level is set to be reviewed in 2018, and the final strategy including targets in 2023.

*Poor track record and limited ambitions in industry energy efficiency*

**Table 35: CO2 and energy industry regulation**

Level	Starting date		Description	Our view on effectiveness
International	2011 and 2013	Energy intensity (ship energy efficiency guidelines)	The regulations make the Energy Efficiency Design Index (EEDI) mandatory for new ships, to be phased-in between 2013 and 2025, while the voluntary Ship Energy Efficiency Management Plan (SEEMP) - which sets minimum energy efficiency levels for various ship sizes and types - has become a requirement for all ships. Both were projected to cut CO2 emissions from shipping by 13% by 2020 and 23% by 2023 compared to BaU. Different classes of ships will have to meet different standards: 1) an overall 10% improvement target in vessels' energy efficiency applies to new ships built between 2015 and 2019; 2) Ships built between 2020 and 2024 will have to improve their energy efficiency by 15 to 20%, depending on the ship type; 3) ships delivered after 2024 will have to be 30% more efficient.	According to a study from 13 April 2015 ( <a href="#">CE Delft</a> ), new ships are 10% less fuel efficient than those built in 1990. Subsequent analyses suggested the study was ineffective, with many new ships already on the waters exceeding 2020 and even 2025 targets by a wide margin
International	24-28 Oct. 2016	Data collection system	Ships of 5,000 gross tonnage and above required to collect consumption data for all types of fuel oil used, as well as other, additional, specified data including proxies for transport work	No concrete measure to cut CO2 from ships
EU	2014	Regulation on Monitoring, reporting and verification (MRV)	Ship operators are required to publicly report three metrics to measure the environmental performance of ships: 1) the theoretical energy performance of the ship known as the Energy Efficiency Design Index (EEDI); 2) its real-world fuel consumption; and 3) its energy efficiency	No concrete measure to cut CO2 from ships

Source: IMO, Transport & Environment, Kepler Cheuvreux

### EU talks to include shipping in carbon markets in deadlock

In the meantime, EU member states are reportedly blocking the attempted inclusion of shipping in the future carbon market overhaul for the period post-2023 as part of the EU 2030 climate and energy targets. This move is of particular interest as it puts pressure on the IMO to introduce concrete measures to tackle climate change by 2021. The EU has said it will not include shipping in its regulation if the shipping sector voluntarily regulates itself.

In conclusion, we expect this increasing strain on the sector to lead to some policy improvements, yet the lingering uncertainties regarding the timing and level of commitments raise questions around the financial risks for the sector, such as the potential obsolescence of current fleets if deemed inadequate by future policies.

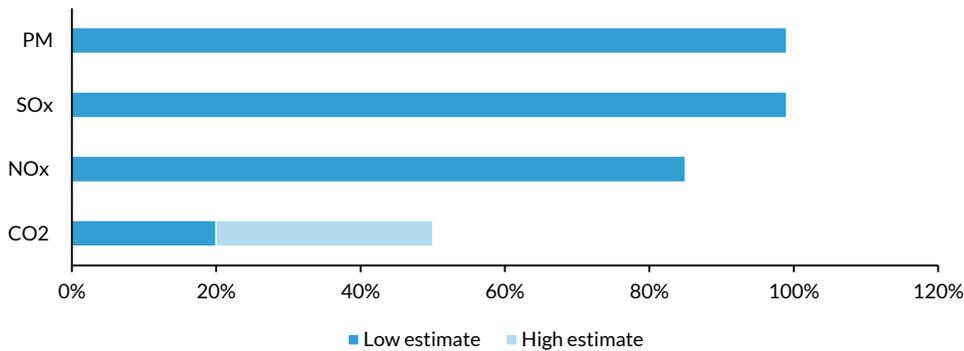
### Liquefied natural gas gathering pace from a low level

Among CO2 abatement options, LNG is gaining traction as a marine fuel, partly supported by the fact that it helps to comply with new rules concerning sulphur. In fact, sulphur emissions will be almost entirely removed if gas usage becomes the norm. While still in its infancy, there are signs of a growing appetite for the use of LNG among ocean carriers. CMA CGM, for instance, unveiled a new research agreement in October 2016 with Engie to explore LNG potential, while Maersk agreed to work with Qatar Liquefied Gas at the start of 2016, to test LNG. This momentum is benefitting Wärtsilä's dual-fuel technology but also Alfa Laval's various applications, e.g. boilers, although the impact is still low.

**We expect this increasing strain on the sector to lead to some policy improvements**

**LNG momentum benefiting dual fuel technology**

**Chart 38: LNG emission reductions compared to heavy fuel oil currently bunkered (gas only)**



Source: IMO

### Significant stumbling blocks

Besides challenges from a business and technological perspective (such as the need for adequate fuelling facilities for containers), LNG also raises concerns linked to its key externalities, carbon content and potential for fugitive methane emissions leakage through incomplete combustion of the gas in ship engines (WEO). The growing importance of LNG is, indeed, set to drive methane emissions up quickly (IMO GHG emissions study), meaning that when taking into account upstream fugitive emissions and methane slip, there could be little or no carbon benefit to LNG.

At the moment, there are only a few ships using LNG as a bunker fuel (in April 2016, DNV estimated that there were 65 globally, and another 76 under construction, including several cruise ships). So far, LNG infrastructure has not been developed in many ports, with bunkering operations being conducted by barges in most cases. DNV is particularly active on that front.

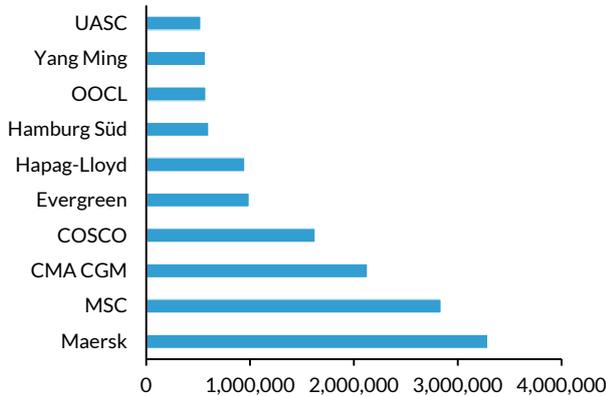
### Ocean carriers' climate performance: peer comparison

This section draws upon the input from Climate Change & Natural Capital Risks analyst Julie Raynaud ([jraynaud@keplercheuvreux.com](mailto:jraynaud@keplercheuvreux.com)) as well as James Mitchel from Carbon War Room and Dr Tristan Smith from UCL Energy Institute.

We focus on the top ten container shipping companies in terms of capacity in TEU (Twenty-Foot Equivalent Unit, which can be used to measure a ship's cargo-carrying capacity).

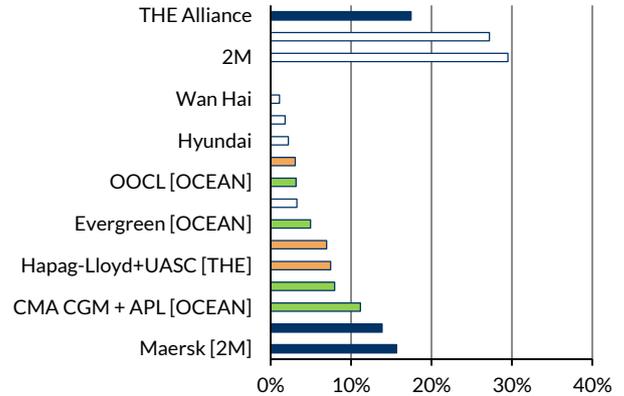
**LNG ramp-up raises concerns linked to carbon content and potential for fugitive methane emissions leakage**

Chart 39: Ocean carriers (Transport capacity in TEU)



Source: Kepler Cheuvreux

Chart 40: Market share



Source: Kepler Cheuvreux

Our peer comparison of the ocean carriers' ESG disclosure (overall poor) enables us to split them into three broad groups based on our view on their quality and quantity:

1. No substantiated reporting: MSC, COSCO, Evergreen, OOCL, UASC.
2. Lack of substantiated reporting: CMA CGM, OOCL, Yang Ming, Hapag-Lloyd and Hamburg Süd (which is somewhat better than the rest of this group).
3. Substantiated reporting: Maersk, which we thus naturally focus on in our peer review below.

Maersk's use of a relative target, however, makes it difficult to assess its alignment with a 2°C scenario trajectory. Maersk has a relative target of a 60% reduction in 2020 compared to 2007, and it has already achieved a 42% reduction.

Maersk efforts are clustered around three pillars: 1) network efficiency (leveraging data benefits and the use of sensors, e.g. based on weather conditions); 2) upgrade programme (e.g. more energy efficiency propellers, new bows); and 3) new vessels (e.g. downgraded engines, waste heat recovery system). The rotor sail installed on a 240m Maersk tanker epitomises innovative solutions for fuel savings.

The company plans to invest USD3bn a year in new ships, containers and retrofits until end-2017 (it owns 274 vessels and charters 336 vessels) and has already achieved significant efficiency improvements.

One of Maersk's key competitive edges is, indeed, that it started ordering very large ships with key benefits early on, highlighting their low consumption (it had already ordered the first triple E in 2011). Maersk is more profitable than the rest of the industry, and efficiency plays a big role in this (as bunker oil is a big chunk of total costs, with energy costs amounting to 10-15% of total opex). However, its average fleet age is relatively high versus peers, which raises questions about their actual CO2 intensity levels (poor disclosure from peers prevents such an assessment).

**We focus on Maersk, whose reporting is more detailed**

**One of Maersk's key competitive edges is that it was ordering very large ships with key benefits early on**

**Table 36: CO2 intensity peer comparison (CO2g/TEU/KM)**

Company	Level Reduction	Baseline	Horizon	Status	Scope (% of emissions)	CO2 intensity target (TEU.km)		
						No. of 'triple-e' vessels (low consumption/ container)	Energy costs as % of opex	
Maersk	n.a.	60%	2007	2020	42%	84% (Maersk Liner Business)	20	10-15%
CMA CGM	60	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Hamburg Süd	65.1	45%	2009	2020	35%	n.a.	n.a.	n.a.
OOCL	<60	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Yang Ming	64.8	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Source: Kepler Cheuvreux

Moreover, Maersk’s reporting has been somewhat inconsistent. In 2015, it disclosed its emissions per unit of production (46.7g CO2/TEU/KM for Maersk line), while we could not find any trace of such data in 2016 (CDP and CSR report).

**Can fleet age and vessel size be used as a proxy for CO2 efficiency?**

CMA CGM, Hapag-Lloyd (combined with UASC) and Hamburg Süd can boast the youngest fleet, and CMA CGM and Maersk the smaller average vessel size. Maersk indicates that there is a correlation between age and CO2 efficiency as well as between the vessel size and CO2 efficiency per container.

However, a comparison is overall made more difficult by notable exceptions, such as younger vessels, which are less CO2-efficient (e.g. the NeoPanamax vessels), and the fact that there are many other factors to consider, such as vessel employment, operation speed, vessel value, vessel life span and charter rates.

**Table 37: Fleet ownership and average ship age and size**

Company	Fleet ownership	Average ship age	Average vessel size (TEU)
Maersk	53%	8.4	5083
MSC	36%	8.8	6044
CMA CGM	44%	7.2	4862
COSCO	63%	7.4	5656
Hapag-Lloyd (combined with UASC)	57% (66%)	7.9 (6.3)	5800 (6857)
Hamburg Süd	41%	5	n.a.

Source: Companies, Kepler Cheuvreux

**Third-party insight into energy efficiency variability**

The study Existing Shipping Fleet’s CO2 Efficiency (UCL Energy Institute) provides valuable insight which helps to put messages emerging from companies’ reporting into perspective. The overall takeaway is that there is a large degree of variability between fleets, vessel size, markets, and actual CO2 intensity of the fleet:

- Within each container ship size range (or indeed any ship type), some ships are significantly more energy efficient (in operation) than others. This normally has to do with the service speed, but design and technical differences between ships also contribute a little.
- The concept that bigger ships are more energy efficient is a fallacy. The industry has done a very good job of pretending this is the case, because if you “assume” that bigger ships have similar utilisation, their economies of scale mean less fuel per TEU. However, in practice, bigger ships are less utilised (as a percentage, fewer TEUs per total TEU capacity). So on a per-

**Debunking myths suggested in companies reporting**

**The concept that bigger ships are more energy efficient is a fallacy**

TEU-carried or per-tonne-carried basis, the bigger ships are not more or less “flat lining”.

These considerations contrast with the “official” and rather scant data that is being published by companies. These often rely on nominal capacity utilisation (e.g. ship is 100% utilised) and therefore present very misleading and optimistic data to the market.

Finally, we note that the 2<sup>o</sup> Investing Initiative-led and EU-backed Sustainable Energy Investing (SEI) metrics research consortium ([link](#)) is currently looking into shipping companies alignment with the 2<sup>o</sup> target, based on the Existing Vessel Design Index (EVDI), a ship’s CO2 emissions measurement. Tentative findings suggest some correlation between design efficiency (gCO2/tonne-nm i.e. nautical mile) and age and that Maersk's fleet could compare well on design efficiency to peers other than Hamburg Süd overall.

### **Financial materiality: how clear is the business case?**

The Carbon War Room and UCL Energy Institute findings ([link](#)) tend to reinforce our assumption that the business case is far from clear and that, in short, there is no evidence of a price signal, measured in charter rates for instance, for CO2 performance.

The marginal excess returns to ship owners found in their reviewed Panamax dry bulk (historical contract data from the time charter market) sector for vessels with good GHG Ratings do not do much to justify the investment case for a more efficient newbuild or retrofit efforts, but investment costs need to be established to assess this conclusively. Nevertheless, they do show opportunity, particularly if operating ships with a good GHG Rating (owned or time-chartered in) on the spot market, for which any fuel savings should accrue to the owner or operator.

### **Conclusion: possible solutions to overcome ship CO2 conundrum**

In the light of these data and transparency challenges, we recommend two specific engagement pathways to overcome the shortcomings of companies’ reporting and tentatively pick those at the vanguard of the sector’s credible decarbonisation inflection: 1) a science-based approach; and 2) long-term strategic planning for vessel design and capital availability.

1. Maersk (most likely the biggest CO2 emitter with 33km tonnes of CO2e compared to 7m tonnes for Hamburg Sud) is the only company with a clear carbon emission reduction roadmap, although it is not science based, which we believe is a key criterion to demonstrate its credibility. Interestingly, K-Line recently announced the adoption of a science-based target, while among freight forwarders Panalpina had its target approved by the science-based target initiative, and we expect more examples like this in the future.
2. Engagement questions should focus on companies’ long-term plans to keep vessels competitive through vessel design (ensuring that vessels are being designed for ease of retrofit modifications) and capital availability (i.e. ensuring that capital is available to make these vessel modifications). These considerations will have to be made while ensuring compliance with upcoming ballast water management convention and the global sulphur cap.

***Carbon War Room findings tend to reinforce our assumption that the business case is far from clear***

***Two specific engagement pathways: 1) science based; and 2) long-term strategic planning for vessel design efficiency and capital availability***

## 2) Marine pollution-related environment legislation

The second big theme is marine pollution reduction. We distinguish two main business opportunities fuelled by stricter marine pollution regulation and standards:

1. New standards for sulphur content, expected to lower sulphurous oxide levels.
2. Ballast water treatment.

### a) Sulphur fuels create demand for scrubbers

Shipping accounted for 10% of total energy-related SO<sub>2</sub> (sulphur dioxide) emissions worldwide in 2015, with notable adverse health effects for citizens located close to ports or shipping lanes (IEA). The marine industry issued self-governed standards for sulphur content in Q4 2016.

These can be mainly achieved by:

- Installing a scrubber to remove the acid gases generated during the combustion of high-sulphur fuels, whose benefits include the use of low-cost bunkers and clean emissions on the vessel.
- Using diesel or low-sulphur heavy fuel oil (0.5% sulphur fuels), which is considered the easiest option.
- Converting to gas use or biofuels. In the longer run, gas engines are likely to solve the issue, but as gas distribution is still far in the future, it cannot be considered an immediate solution.

The first option creates opportunities for companies offering solutions like scrubbers, i.e. Wärtsilä, which generates 35% of its revenues from its Marine solutions business, or Alfa Laval (also 35%). Alfa Laval refers to EUR5bn of revenues over 2017-25, with the bulk materialising in 2018-23, which, conversely, creates sizeable costs for the container shipping industry: USD5-30bn according to the OECD due to a 20-85% cost increase on average, depending on speed, energy prices and vessel size. We forecast potentially EUR1-2bn for Maersk and EUR800m for Hapag Lloyd.

### Limited visibility: the low-sulphur ship fuel question

However, the huge cost for carriers is more ascribable to the use of low sulphur fuel than scrubbers, as refineries could actually be a competitive alternative supply source favoured by ocean carriers, especially in low oil-price environments, and as transporter lines are under fierce financial pressure. Maersk has already indicated that it is not installing scrubbers on a large scale and will favour sulphur, which could have material effects on its bunker fuel prices. Although marine diesel commands significant premiums (c. 80-90% on average according to our estimates), these could decrease going forward if meaningful investments flow into this option.

The focus on scrubbers follows a decade of policy tightening on marine air pollutants (also targeting NO<sub>x</sub>; see following table), with jurisdictions (Emissions Control Areas<sup>8</sup>) advancing at different paces and various standards and steps for ships to

<sup>8</sup> When the revised MARPOL (International Convention for the Prevention of Pollution from Ships) Annex VI entered into force in July 2010, it included a change of the name and definition of an emission control area from SECA to ECA – an area where special mandatory measures are required to control NO<sub>x</sub>, or SO<sub>x</sub> and

**Scrubbers help clean the exhaust gas from ship engines from sulphur**

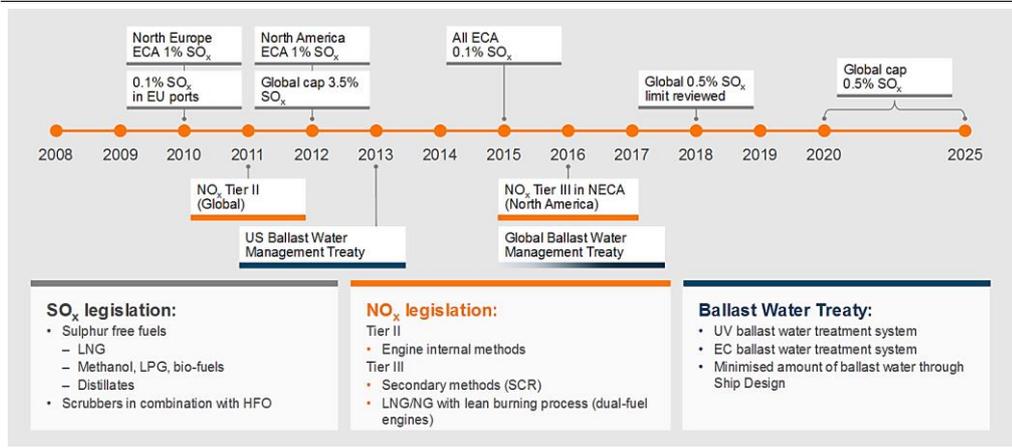
**Scrubbers: potential high revenues and costs**

**Low-sulphur ship fuel could hamper scrubbers' growth**

**NO<sub>x</sub> reduction also targeted**

boost an incremental improvement. All ECA (Emission Control Areas), including the US, Canada, Europe (the North Sea, Baltic Sea and English Channel) are already (since 2015) required to set a 0.1% limit on the sulphur content of fuel.

Chart 41: Marine environmental legislation timeline



Source: Wärtsilä

Table 38: Annex VI mandatory limits for NOx emissions of newbuild engines

Tier	Entry into effect	New diesel engines installed on ships	NOx limit in g/kWh	Relative reduction compared with Tier I
Tier I	2005	From 1 January 2000 to 31 December 2010	9.8-17.0	n.a.
Tier II	1 Jan 2011	After 1 January 2011	7.7-14.4	15-25%
Tier III	1 Jan 2016	Ship constructed on or after 1 January 2016 and operating in ECAs designated for NOx emission control	2.0-3.4	80%

Source: IMO

**b) First USCG approval of ballast water –market set to take off**

Invasive aquatic species present another major threat to marine ecosystems, and shipping has been identified as a major pathway for introducing species to new environments. The problem has increased as trade and traffic volumes have expanded in recent decades, particularly with the introduction of steel hulls, allowing vessels to use water instead of solid materials as ballast. The effects of the introduction of new species have been devastating in many areas of the world. Quantitative data show the rate of bio-invasions is continuing to increase at an alarming rate. As volumes of seaborne trade continue to increase, the problem may not yet have peaked, according to the International Maritime Organization (IMO).

Under the international Convention<sup>9</sup> that (finally) comes into effect on 8 September 2017, all ships in international traffic are required to manage their ballast water and sediments according to a certain standard that follows a ship-specific ballast water management plan. All ships will also have to carry a ballast water record book and an

**Ballast market, a solution to tackle invasive species, offers greater visibility**

**Ballast water treatment system about to take off**

particulate matter (PM) (source: Parker Kittiwake). These are regions where local ecological, oceanographic or vessel traffic patterns justify a higher level of protection from pollution. Currently, there are four MAR POL Annex VI designated ECAs worldwide: the Baltic Sea Area, the North Sea Area and the North American ECA, US Caribbean Sea Emission Control Area (IMO).

<sup>9</sup> International Convention for the Control and Management of Ships' Ballast Water and Sediments, adopted in 2004

international ballast water management certificate. The ballast water management standards will be phased in over a period of time. As an intermediate solution, ships will have to change ballast water mid-ocean. However, eventually most ships will need to install an on-board ballast water treatment system that kills or removes any aquatic species in the released water through chemicals or UV light or any other technology.

The US Coast Guard has now approved the first ballast water system, which means the market will finally take off when the global regulation comes into effect on 8 September 2017. This opens a market worth some EUR7bn for newbuilds (so far) as well as retrofits, with the bulk of opportunities lying ahead (2017-25; with most materialising in 2018-2021) and large costs for ocean carriers, e.g. USD300m estimated by Maersk.

We expect both Alfa Laval's and Wärtsilä's systems to be approved soon and see them as the main contenders in this market, which should principally stem from retrofits (as new builds are at lower levels). If we assume a EUR1bn market a year by 2018 and Wärtsilä takes a 20% share, this would add 3-4% to earnings – nice but not massive.

### **Upshot: Wärtsilä the clearest winner**

In aggregate, these new rules yield market opportunities worth more than EUR12bn until 2025E, which is not negligible in a market characterised by an unfavourable backdrop for capital goods exposed to Marine, as we expect a 10.2% reduction in marine 2015-18E capex.

Wärtsilä and Alfa Laval will both be major beneficiaries, and we expect Wärtsilä to benefit the most:

- **Scrubber:** Alfa Laval initially had a company-specific challenge. Its products, according to market participants, are very large and add weight that could otherwise be used to carry more cargo or for other commercial purposes. This compares with Wärtsilä's solution, which does not take up additional space on the ship but simply replaces the existing exhaust system. We assume this weakens Alfa Laval's position in the retrofit market but the difference might have evened out roughly four years after the initial product launches.
- **Ballast water treatment:** Wärtsilä is a late entrant, but as long as its technologies are as good as competitors', we believe its strong position in the marine industry, with an unmatched service network, will enable it to capture decent market share. Profitability-wise, we have no reason to believe these products have below-average margins. Despite increasing competition, we believe Alfa Laval has a good gross margin for this product group. However, we estimate the bottom line amount would be lower for Alfa Laval (also well placed), as it only owns half of this technology through a JV, meaning it would only obtain half of the profit from the technology.

**Potential 3-4% of earnings by 2018E for Wärtsilä**

**In our view, in the longer term we believe Alfa Laval will lose out to Wärtsilä in the scrubber market**

**Table 39: Wärtsilä and Alfa Laval exposure levels to self-governed global industry standards**

Theme	Market	Timeline	Relevant products	Exposure level	
				Wärtsilä	Alfa Laval
New standards for sulphur content	USD5-30bn	2017-25	Scrubbers	Strong	Medium
New standards for the management and control of ships' ballast water and sediments	EUR7bn	September 2017-25	Dual fuels engines Ballast water	Strong	No Strong

Source: Alfa Laval, Kepler Cheuvreux

Overall, the main environmental-related drivers for Alfa Laval are in fact in non-marine related business: energy efficiency, process efficiency/increased yield, reduced waste and improved water efficiency, and water cleaning. During 2015, heat exchangers covered a 44% share of the group order intake, and the key driver to buy them is increased energy efficiency (the main use is not in ships).

From an ESG standpoint, we have unanswered questions at this stage regarding the level of enforcement and monitoring of these legislations to prevent a scandal similar to the Volkswagen scandal.

**Concerns about the enforcement mechanisms of the global regulation**

**Table 40: Marine "Green" products overview**

Company	Marine business share of sales	"Green" Marine sales exposure and outlook	Products
Wärtsilä	35%	0-10%	Engine efficiency improvement Gas and multifuel engines Modernisations and conversion services Environmentally advanced vessel solutions Design solutions for flare gas utilisation Ballast water treatment Scrubbers New 31 engine (most efficient four-stroke diesel engine) Dual-fuel (DF) engine, including LNG and liquid bio-fuels Conversion of oil-fuelled engines for gas or bio-fuel use Powering LNG-fuelled passenger vessel
Alfa Laval	35%	0-10%	Ballast water treatment PureSOx LNG PureBallast SOx scrubber platform High-pressure fuel gas supply systems

Source: Kepler Cheuvreux

**Ship ports: are they affected?**

The same regulatory trends hold true for port operators, with a particular emphasis on health-related issues (air pollution), which is relevant for HHLA for instance. Port operators can use a range of operational efficiency measures that support these environmental gains, such as automated mooring systems, optimisation of terminals and ports to reduce at-berth time, electric shore side pumps for bulk liquids, off-terminal transloading (IMO).

In parallel with the main legislation (e.g. IMO, EU and California Air Resources Board (CAR B) regulations related to ports), a flurry of voluntary schemes have emerged targeting air pollution improvements, including:

1. The Environmental Ship Index (ESI), which assesses ships' environmental performance, with a view to guiding port rewards (ship owners can be granted bonuses from ports based on their score), mainly in the EU and the US (5% of ships currently enrolled globally), is the main incentive scheme.

**Port-based incentives**

- The Norwegian NOx tax and associated business fund, applied to domestic shipping.

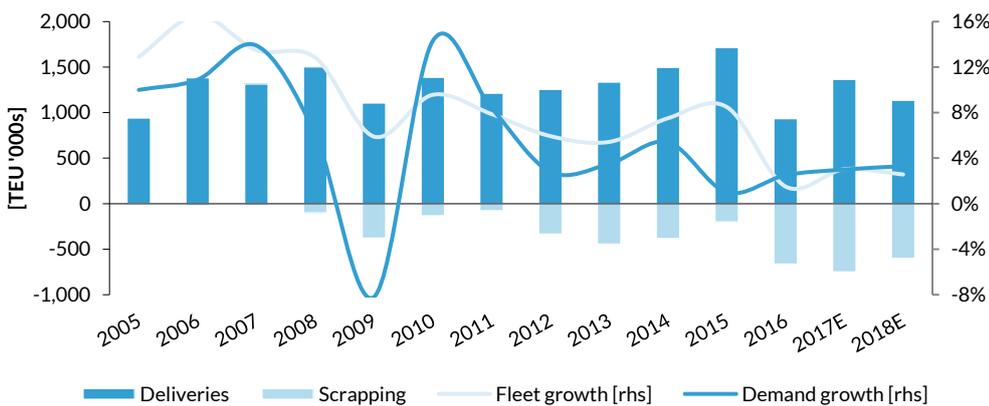
All in all, we understand that the operational and financial impacts have been very limited for now. Reporting is, however, scarce. In contrast, we see promising pockets of growth for port equipment companies, opened up by automation and new technologies. For example, more port terminals seem to be shifting from diesel-driven RTGs (rubber-tired gantry (RTG) cranes) towards hybrids or electric solutions, which benefits Cargotec’s rapidly growing RTG electrification service for instance (Kalmar).

## Ship waste

### Navigating high levels of scrapping

We expect scrapping levels to remain high in 2017 and 2018, driven by plans to reduce overcapacity and adapt to the new context (e.g. Panama Canal widening). Alphaliner expects 750,000 TEU to be scrapped in 2017 and 500,000 TEU to be scrapped in 2018. Moreover, scrap metal prices are currently on the rise.

Chart 42: Global container demand and supply balance



Source: Kepler Cheuvreux

Practices in ship recycling have received significant stakeholder attention given the widespread use of tidal beaches (87% of the total tonnage processed in 2016 worldwide according to the NGO Shipbreaking Platform), making it a reputational risk. According to Maersk, “responsible” dismantling is possible in a limited number of years (in China and Turkey) and costs an extra 1-2m per vessel, leading to an estimated extra cost of USD150m in the next five years as a large number of assets reach the end of their life.

Maersk claims a preference for the engagement route in order to encourage Indian facilities to upgrade their processes to meet its code of conduct and regulations (the EU Ship Recycling regulation, bringing into force the requirements of the 2009 Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships, came into force in December 2013).

**Port terminals seem to be shifting from diesel-driven RTGs (rubber-tired gantry (RTG) cranes) towards hybrids or electric solutions (positive for Cargotec)**

Recently, concerns have been raised about the fact that Maersk is using Indian facilities (Alang ship yards on a beach) – which are not covered by the EU regulation – leading to potential reputational concerns (only ships with the EU flag have to comply with the regulation, which means around 50% of Maersk’s fleet; the remainder are mostly registered under Singapore and Hong Kong flags).

Subsequently, Maersk disclosed more details on its approach to upgrading local practices, including: 1) a strict interpretation of yard compliance according to the Hong Kong Convention, audited by the ship classification society ClassNK, which issues a so-called “statement of compliance”; 2) a gradual improvement of local standards to cover other issues not included in the Convention, such as safety; 3) regular independent audits undertaken by Lloyd's; and 4) research into the Alang environmental impact of recycling.

In our view, although these commitments may point in the right direction, pending the publication of these findings and more thorough disclosure, it is too early to say whether ship dismantling on the beach can be done according to state-of-the-art standards and somewhat comparable to the EU regulation on ship recycling.

We also welcomed Maersk announcement of a new requirement in relation to the sale of vessels to remove financial incentives to recycle irresponsibly.

The cost of the new requirement in Maersk contracts is that they will take responsibility for scrapping the vessels in accordance with the A.P. Moller - Maersk “Responsible Ship Recycling Standard” for all vessels where the residual value is less than 25% above the highest recycling price. According to the company, also there are costs related to ensuring that the new owner of vessels where the residual value is 25-40% above the highest recycling price, they will scrap the vessels in accordance to Maersk standards if scrapped within two years.

Maersk has indicated that it will scrap 20 vessels in Maersk Supply Service (it has scrapped the first nine and will scrap the next 11 over the coming 15 months) and eight vessels in Maersk Line in Q1. Overall we assume that we will be scrapping more vessels in the coming years than in the past years, and hence we can expect the cash flow related to this to increase. Conversely, no scrapping is planned in 2017 and 2018 for Hapag-Lloyd. According to the NGO Shipbreaking platform, it is of particular note that Hapag-Lloyd has committed to not using the beaching method and to only use EU listed facilities.

## Valuation

### **Wärtsilä (Reduce, TP EUR40.00): Unattractive risk-reward profile**

*Investment view of Johan Eliason ([jeliason@keplercheuvreux.com](mailto:jeliason@keplercheuvreux.com))*

Despite the reduction in FY 2016 expectations in Q4 2016, the shares performed well up to year-end, buoyed by hopes of a recovery in the Marine sector and stability in the Energy-linked business. However, we believe weakness in the Marine division will persist in 2017, and the outlook will become less certain as management drops specific guidance.

We remain concerned about the margin development for the equipment divisions after our meeting with the CFO in early January 2017. He saw a good pipeline for Energy and Services orders and hoped that Marine had seen the trough in 2016. He gave no outlook for the margin development but said the group's goal is for an improvement. We are now 5% below consensus EPS for 2017E and see a risk for downgrades in H1. This, coupled with a valuation now at a premium to the sector, yields an unattractive risk-reward profile, and we reiterate our Reduce rating.

## Offshore energy: transition in the making

The sizeable growth opportunities for offshore wind contrast with the challenging market conditions for offshore oil & gas exploration & production, which have experienced a scaleback. Pioneering offshore wind developers (DONG Energy, E.ON and Innogy), wind turbine makers (Vestas, and the soon-to-be Gamesa-Siemens Wind Power) and offshore foundations (Sif) are well placed to seize the benefits from double-digit offshore growth spurred by continuously falling costs and innovation.

Oil & Gas majors' exposure to offshore wind remains small and projects nascent (e.g. Statoil, Repsol). Conversely, the foreseen deep offshore pick is likely to put a spotlight on downside from environmental and safety risks, while ocean-related spills and conservation-related KPIs are not reported. We also underline a buoyant decommissioning market, which will raise multiple environmental challenges, on which reporting is equally sparse.

### Investment opportunities: green and brown

*This section draws on input from Douglas Lindahl (DONG Energy, Gamesa, Vestas) and our Oil & Gas sector research team: Bertrand Hodee (Head of Oil & Gas Sector Research), Tristan De Jerphanion, and Kevin Roger.*

We tackle the diametrically opposed trajectories of offshore wind energy's ramp-up and offshore oil & gas extraction & production's slowdown separately.

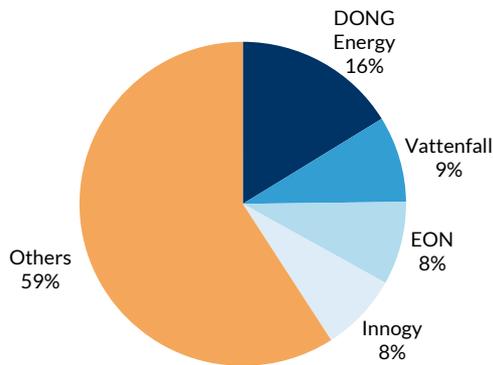
#### 1. Offshore wind

Our universe offers exposure to the following world-class offshore wind players across the value chain:

- Leading global offshore wind developer DONG Energy (c. 2GW of installed capacity) and to a lesser extent E.ON and Innogy (c. 1GW each). The rest of the market is clearly fragmented.
- Foundation manufacturer leader: Sif (22% of foundations installed in Europe).
- Two leading offshore wind turbine makers, Vestas (JV with Mitsubishi Heavy Industries) and the soon-to-be Siemens Wind Power-Gamesa. Siemens and Gamesa, which acquired Areva's stake in their JV last year, are expected to close the merger early in April, creating the global leading offshore wind turbine maker (with close to 40% of EBIT and 45% of revenues exposed). Siemens will fully consolidate the merged entity in its financial statements, and the merged entity will remain listed on the Spanish stock exchange.
- Wind cable manufacturers such as Nexans and Prysmian.

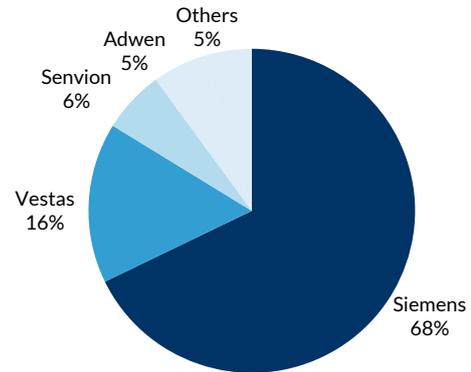
**Siemens Wind Power-Gamesa to become the global leading offshore wind turbine maker**

Chart 43: Offshore wind owners capacity (Europe)



Source: WindEurope

Chart 44: Wind turbine makers offshore market share (Eur.)



Source: WindEurope

### Oil services: Subsea7 ramping up capacity

We have not seen a major step-up among integrated oil & gas in the offshore wind space, although several players have modestly increased their presence e.g. Shell (Borssele III and IV awarded in December 2016) and Statoil (offshore wind a key target for its new energy solutions, with total projects being developed exceeding 1.1GW). In contrast, Repsol divested its UK offshore wind business last year for EUR238m (although it maintains other offshore wind commitments such as the 25% stake in foundation company PPI).

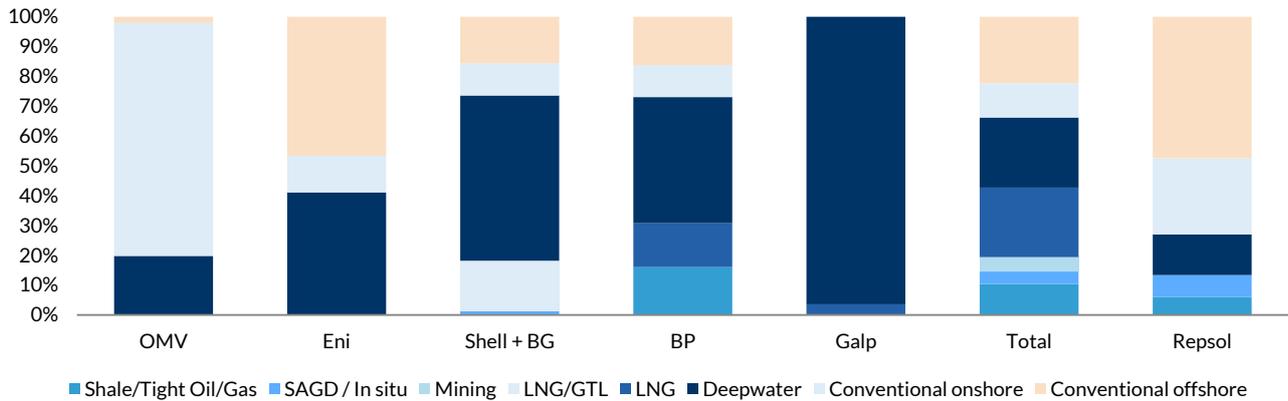
This contrasts with oil services' growing appetite for renewables and willingness to leverage their expertise in offshore oil projects as part of the energy transition, as illustrated by Subsea7's full acquisition earlier this year of Seaway Heavy Lifting, a specialist in offshore contracting (EPCI or Engineering Procurement Construction and Installation) with a USD284m order backlog, excluding USD1.1bn relating to the UK-based Beatrice offshore wind farm project (588MW planned). Additionally, Saipem has expressed interest in EPCI projects, which further demonstrates the appeal of the sector for oil services.

### 2. Offshore oil & gas

We see unconventional deep-water wells as the riskiest type of operation from both a financial (higher cash production costs, especially in a low oil prices environment) and environmental impact standpoint (more GHG intensive and higher probability of accidents or spills). The most exposed companies in our universe are Galp, Shell+BG, ENI and BP.

**Oil services shows growing appetite for renewables, epitomised by Subsea7**

Chart 45: Incremental production by upstream segment (2017-21E)



Source: Kepler Cheuvreux Oil & Gas team, The small contribution SAGD/ In situ for Shell comes from Tempa Rossa in Italy (heavy oil).

## Macro outlook

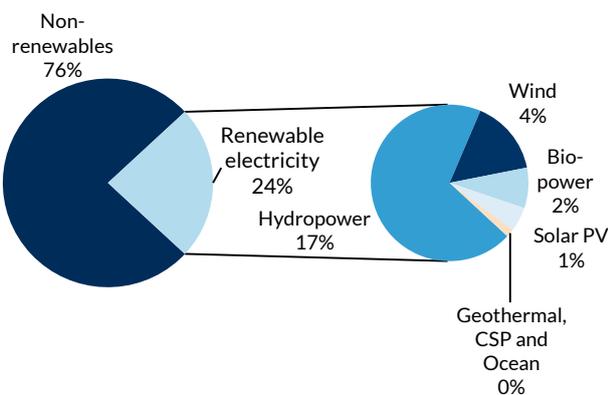
### 1. Offshore Wind

#### A structurally soaring industry

While renewables production is soaring, and renewables are set to represent the bulk of global installed capacity additions in the next few decades, wind, solar thermal, PV, and geothermal together still represent scarcely more than 1% of total energy production (c. 14% including hydro, biofuels and waste), but 24% of total electricity production worldwide (28% in 2021E). In particular, technologies such as offshore wind, marine energy (wave & tidal) or concentrated solar power still face competitive challenges. However, we argue that the energy landscape is evolving fast, with offshore wind particularly buoyant.

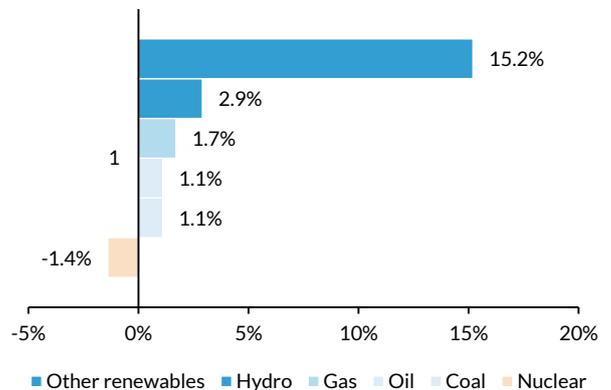
**Renewables' share of global electricity generation to climb from 24% to 28% in 2021**

Chart 46: RNW share of world's electricity production (2015)



Source: REN21

Chart 47: Energy consumption CAGR 2010-15



Source: Global Carbon Project

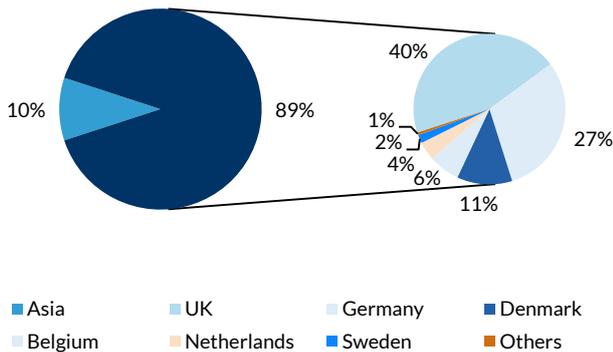
#### Offshore wind: double-digit growth expected to continue

So far, the market has mainly been concentrated in Europe, with the region accounting for over 90% of global installed capacity (source: MAKE Consulting),

**Europe (>90% of capacity) offshore wind to post an 18% CAGR in 2016-20E**

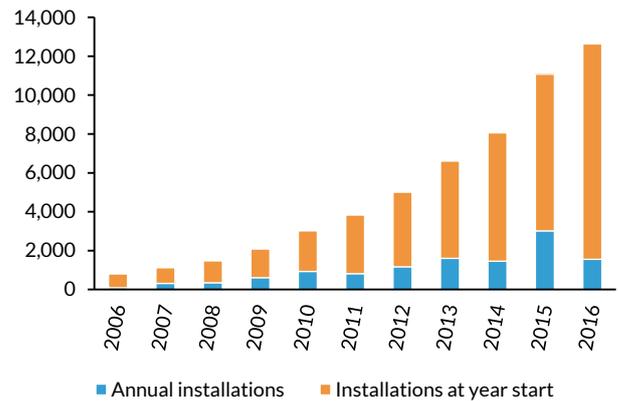
followed by Asia, principally China. According to Wind Europe (the European wind energy association), the total installed base of offshore wind in Europe amounted to 12.6GW of capacity at end-2016 and is set to rise to 24.6GW in 2020 (an 18% CAGR).

**Chart 48: Offshore wind capacity (GW, as of end-2015)**



Source: Wind Europe, IRENA

**Chart 49: Europe offshore wind installations growth**



Source: WindEurope

### Strong track record underscores potential

The offshore wind business is still in its infancy, with the first wind turbines in operation since 2000. Offshore costs were very high, giving the onshore wind business a clear head start. However, with the onshore market filling up and the sharp reduction in prices for offshore wind farms, the latter market segment has shown strong growth, and has started to really take off since 2004-05.

For the next 15 years, growth is seen developing at a CAGR of 10-12% (source: MAKE Consulting, BNEF). The OECD expects offshore wind to be the fastest-growing renewable technology (though growing from a low base) with a 2014-20E CAGR of 25%, which can be compared to more mature technologies such as Solar PV at 14%, onshore wind at 7% and hydro power at 0%. We believe there is strong growth potential for offshore wind but highlight that volumes will still be low compared to other energy sources (offshore wind only accounts for c. 5% of annual global wind installations, with onshore wind making up the remaining 95%).

### Back to cost basics

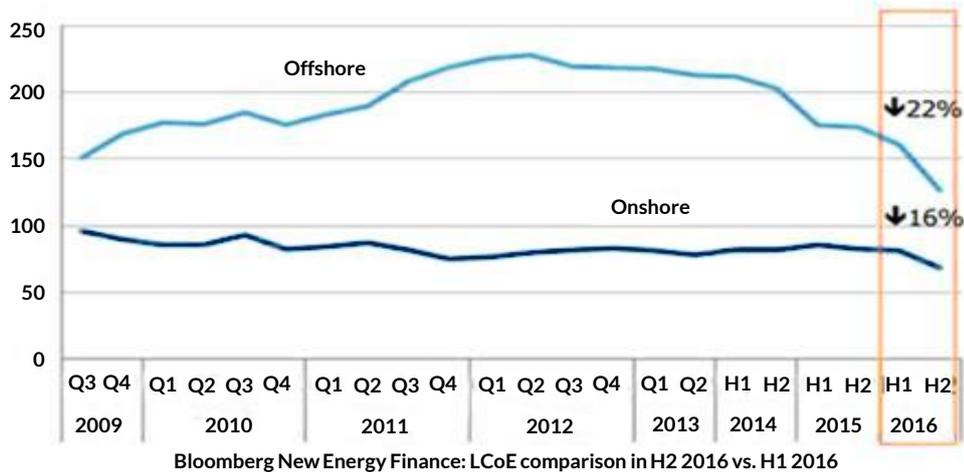
Offshore wind costs remain largely dependent on specific locations. However, overall, interestingly, the cost evolution diametrically differs from offshore to onshore wind: two-thirds of the costs for offshore stems from installations (including grid connection), the other third from turbines, while it is the opposite for onshore. The trend has been characterised by the shift to deeper waters (water depths up to 40m and up to 80km from shore vs. 203m and 30km respectively in 2007) and recently innovations around offshore-specific turbine designs (with bigger turbines being the main driver e.g. larger 7MW and 8MW machines installed by Siemens and Vestas, respectively), bespoke offshore wind installation vessels and advanced offshore electrical interconnection equipment.

**The small but fastest-growing renewable technology**

### Further declining LCOE ahead

On average, offshore wind is about twice as expensive as traditional energy sources like gas and coal, but that is also true for renewables like onshore wind and hydro (USD126/MWh in H2 2016, down 22% YOY, vs. c. USD68/MWh according to the latest BNEF data).

Chart 50: Offshore/Onshore LCOE comparison



Source: BNEF

Recent auctions (e.g. Borssele/Dong, Vattenfall/DNS) also show that the subsidy gap is narrowing fast, giving offshore wind more of a structural footing while it heads towards reaching a critical industrial size.

Dong already announced (during summer 2016) that it has already reached its 2020 goal, which was set four years ago, to cut costs and reach EUR100/MWh over the lifetime of a wind farm (the levelised cost of energy or LCOE<sup>10</sup>), which bodes well for additional improvements in offshore wind (although there are broad ranges for each technology and other significant variables are worth considering, e.g. daily peak pricing and the system value of wind and solar). It recently unveiled a deal whereby Dong will get paid EUR72.7/MWh (during a 15-year period; Borssele 1&2 auction).

As a result, the industry appears to be on its way to further reducing costs by over 40% by 2030, according to FLOW. Half should come solely from scale effects, with turbine sizes increasing strongly (from 0.5MW to 10MW) and wind farms getting larger (from just a few wind turbines to over 1,000 based on current plans).

According to the IEA, 40-50% additional cost reductions for new offshore wind plants could be achieved by 2021 (vs. 15% on average by 2021E for onshore wind). The main drivers include a mix of technological innovations, such as floating foundations, and other factors such as site locations or financing mechanisms. In Europe, EUR80/MWh is possible as of 2025.

<sup>10</sup> The levelised cost of energy (LCOE) is the total cost of building and operating a power generating asset per kilowatt-hour of electricity generated by that system over its projected life.

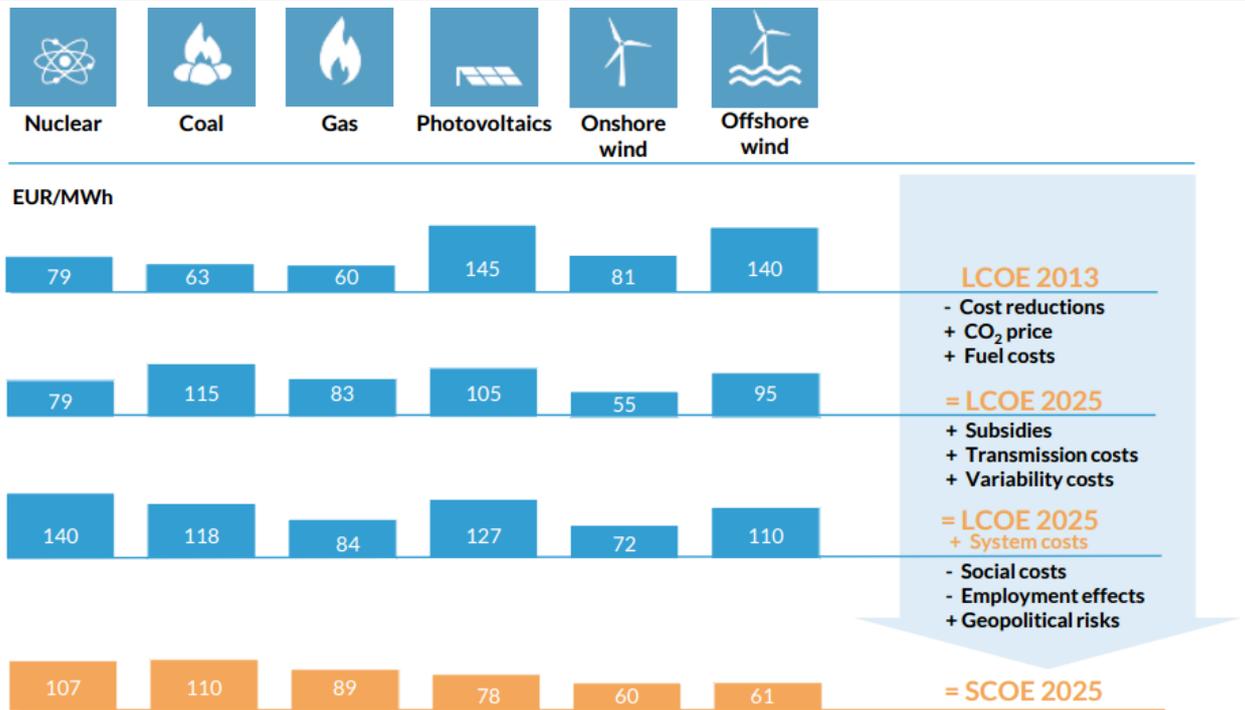
**Recent auctions (Borssele/Dong, Vattenfall/DNS) also show that the subsidy gap is narrowing fast**

**Recent auctions show that the subsidy gap is narrowing fast**

**According to the IEA, 40-50% additional cost reductions for new offshore wind plants could be achieved by 2021**

All this should result in double-digit growth over the next two decades, while factoring in the full footprint of wind strengthens the case (see chart below). Siemens has actually set new targets (announced in June 2016) of EUR80/MWh for 2025 and EUR100/MWh for 2020.

Chart 51: LCOE (and SCOE, which includes society's cost of electricity) for different energy sources over 2013-25



Source: Siemens; "What is the real cost of offshore wind? Note: Siemens targets have been updated since then

### Offshore wind challenges

To boost its development, offshore wind, however, still requires stable policy support in the short to medium term. While subsidies clearly helped in the early stages, with increasing scale and learning curve effects, fewer of these are required now, propelling the development of the offshore wind industry. Now it is based more on fundamentals, and it is increasing competitiveness.

Moreover, there are several factors that could limit growth. Brexit could be one, as the UK is a very large market. Another could be a potential shortage in production-related components (turbines, foundations) or external items such as offshore installation vessels. If these issues are not tackled, they could curtail growth.

With the farms becoming much larger, their arrival, and thus order intake, will be lumpier. There will be very busy years, but also more quiet ones, resulting in a more volatile market. Moreover, we note that profitability remains a challenge for wind turbine makers. Vestas is, for instance, still not generating money from its JV on a consolidated basis, which is set to change in 2019. There could also be technological challenges going forward.

**To boost its development, offshore wind still requires stable policy support in the short to medium term**

### **Dong Energy focus: cost overruns or project delays**

Cost overruns or project delays would naturally distort our estimates on DONG Energy, for instance, meaning that there is a certain amount of execution risk/sensitivity to our (and the markets') estimates. The monetary effects of these issues are difficult to calculate given the specific nature of such a delay and/or cost overrun, but we stress the importance of this risk factor.

Our 6.5% WACC is higher than the WACC we use for utility companies with renewable exposure such as ERG (6% WACC) and EDP Renovaveis (6% WACC), as we see the project execution risk (potential of cost overruns and or project delays) within offshore wind as much higher than within more conventional (mature) renewable energy sources (such as onshore wind), resulting in an elevated risk premium”.

### **Does Marine (tidal and wave) matter too?**

Ocean energy is set to remain tiny and at the bottom of the energy mix, even in the most optimistic scenarios (2030 renewables doubled share of global energy consumption): 7GW installed vs. 1GW currently and 2GW in 2030E based on existing policies.

## **2. Offshore oil & gas**

### **Long-term trends**

The portion of crude oil production derived from offshore projects is set to rise modestly from 32 % to 34% in 2025 (IEA). Indeed, the OECD forecasts a mere 1.2% 2010-30 CAGR for offshore oil & gas gross value added, with East Africa as the new hot spot (e.g. new developments in Mozambique and Tanzania). However, this potential could be higher depending on numerous factors, including new discoveries (currently c. 37% of proven oil reserves are estimated to be offshore, of which a third stems from deep water, according to the IEA).

### **Deep offshore pick-up**

Low oil prices have recently prompted Oil & Gas Majors to scale back expensive projects, including some of the most potentially disastrous for the ocean health i.e. offshore & Arctic. In December 2016, BP sanctioned its long-awaited flagship greenfield project, Mad Dog phase II, in the US deepwater Gulf of Mexico (GoM). The project is a good reflection of the industry's ability to reset its development costs to USD10- 15/bbl (-40/-50% from the 2013 peak of USD25-30/bbl).

Greenfield awards are set to pick up as of 2017E. 2015 saw an almost complete drought of new greenfield project awards in the deep offshore space with just two awards: Appomattox (GOM, Shell operator) and West Nile Delta (Egypt, BP operator). In 2016, there was some improvement in greenfield FIDs, with Zohr (Egypt, Eni operator), Atoll phase I (Egypt, BP operator), Mad-Dog Phase II (GoM, BP operator, contracts not yet awarded) and Coral-FLNG (Mozambique, Eni operator, contracts not yet awarded). We expect a notable improvement in 2017-18E, with at least six this year. As an illustration, we include below some of the key greenfield FID candidates.

***Ocean energy is set to remain tiny and at the bottom of the energy mix***

***The deep offshore market is picking up...***

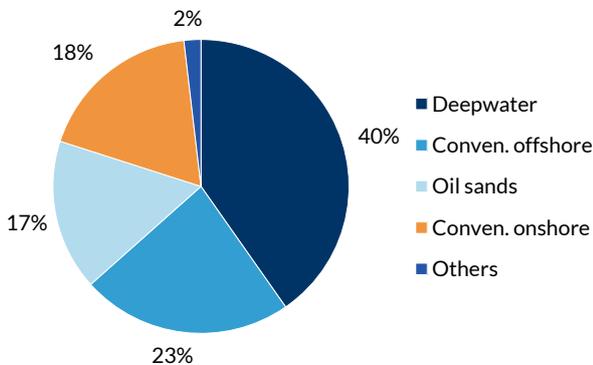
**Table 41: Greenfield FID (Final Investment Decision) candidates**

Field/project	Country	Client	Status	FID date	Probability of FID in line with expected timing	Total cost of the project (USDbn)	Additional comments
Ca Rong Do	Vietnam	Repsol	FEED (Front End Engineering Design)	2017E	>75%	1.1bn	Repsol has selected contractors for the production facilities
Coral FLNG	Mozambique	ENI	Agreement of all parties	Q1 2017E	>75%	8bn	Technip likely to secure
Johan Castberg	Barents sea, Norway	Statoil	FEED	H2 2017E	>75%	5.9-7bn	Aker solutions has completed the pre FEED.
KG-DWN-98/2	India	ONGC	Appraisal	2017E	>50%	4.5bn	Subsea 7 on the SURF
Libra FPSO 1	Brazil	Petrobras	Appraisal	H1 2017E	>75%	Multibillion	All SURF-SPS consortium have bid on the project
Liza	Guyana	Exxon Mobil	FEED	H2 2017E	>75%	8-10bn	SBM Offshore secured the FEED. Open competition on the SURF
Mad Dog Phase II	Gulf of Mexico	BP	FID	Q4 2016	100%	9bn	Subsea 7/One Subsea in Pole position

Source: Kepler Cheuvreux

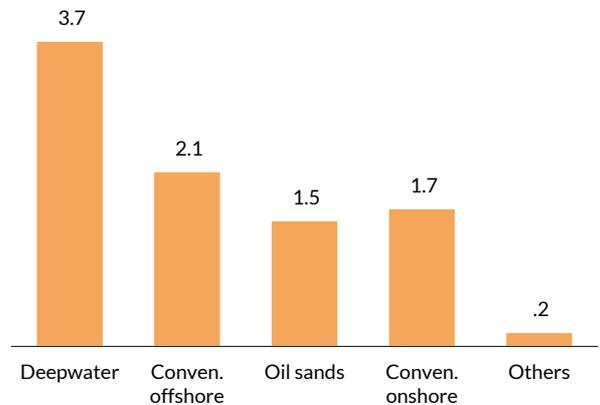
While deep-offshore costs have shrunk structurally, we expect offshore to grab the lion's share of incremental oil production growth and deepwater to be the lead contributor by far.

**Chart 52: Global incremental supply 2017-21E\* (mboe/d)**



Source: IEA, Company data, Kepler Cheuvreux (\* Excluding Russia, Middle-East OPEC countries, OPEC NGL, US shale and NGL and Biofuels)

**Chart 53: Global incremental supply 2017-21E\* (mboe/d)**



Source: IEA, Company data, Kepler Cheuvreux (\* Excluding Russia, Middle-East OPEC countries, OPEC NGL, US shale and NGL and Biofuels)

**Buoyant decommissioning market**

The decommissioning market is expected to grow strongly in the next decade along with the decline in production of existing fields. In the North Sea (UK), for example, almost all the 470 platforms, 10,000 km of pipelines and 5,000 wells will be decommissioned over the next 30 years, with companies expected to spend GBP40bn by 2040. Royal Dutch Sell (RDS) started this new wave of activity; the company set out ambitious plans to decommission the North Sea's Brent oilfield (a multibillion-dollar project over the next ten years). All regional markets are likely to see a boom in this activity as well, since fairly strict legal national, regional and

**...while the decommissioning market is expected to grow strongly**

international frameworks govern how offshore facilities are decommissioned in order to prevent environmental damage.

### Shipping regulation affects refineries

In addition, oil refiners are also exposed to regulations affecting their clients, such as biofuel standards and sulphur emissions in the marine industry, potentially leading to higher capex and expenses. While it is very difficult to establish a link between refinery margins and the price of finished products, it is possible to identify which companies are more exposed to diesel and might suffer from decreased demand versus others more exposed to heavy fuel oil that might need to invest more in refineries to help container shipping companies comply with sulphur standards in marine transport.

**Table 42: Refining product split**

Refining product split	BP	Eni	Galp	OMV	Repsol	Shell (2016)	Total
Total refining capacity (kb/d)	1,957	694	330	355	998	3,086	2,187
o/w gasoline	34%	26%	22%	14%	18%	35%	19%
o/w jet fuels / kerosene	13%	6%	8%	10%	5%	11%	9%
o/w diesel / heating oil	34%	43%	39%	55%	48%	32%	44%
o/w fuel oil / heavy fuel	4%	10%	17%	4%	8%	9%	7%
o/w others	15%	15%	14%	16%	21%	13%	21%

Source: Kepler Cheuvreux Oil & Gas team; NB: all are figures based on 2015 except Shell (2016)

### Renewables: offshore investments still at an early stage

While several strategies are available to mitigate these risks, diversification towards other activities and renewables, including offshore wind, is one potential way to respond and adapt to the energy transition. Repsol and Statoil are among the active players on that front.

**Repsol and Statoil particularly active in offshore wind**

**Table 43: Renewable energy exposure**

Shell	Has spent USD1.1bn on low-carbon R&D over the past six years. Plans to increase investments to USD1bn a year by 2020 (annual spending USD25bn). Set up a "New Energies" division. Net capacity of 500MW of wind in US and Europe. CCS Quest project. No major M&A deal in the renewable space since 2003.
Eni	Plans to spend EUR1bn over next three years on alternative energy. 150MW by end-2016 in Egypt, Algeria and Italy; 160MW by 2018 and 220MW in Italy by 2022 (mostly solar). Ultimately, one-third of own energy use (3GW) could come from renewables. Signed a deal with GE in November to "jointly identify and develop larger-scale power generation projects from renewable energy sources" - targeting wind, solar, hybrid gas-renewable and waste-to-energy projects. No M&A in the alternative energy space.
Total	Ambition of "20% low-carbon assets in 20 years". Sunpower acquisition in 2011, Saft in 2016. Plans to invest US500m per year on low-carbon energies between 2015 and 2019. 10% of R&D on CCS, 25% on cleantech and environmental issues. First reporting on division "gas, renewables and power" in Q1 2017.
BP	Onshore wind in US (capacity 1556MW) - largest wind business of all majors. USD8bn investments between 2005 and 2013. No commitments to future low-carbon spend. May update its US wind turbines with newer, high-capacity equipment (decision mid-year: 400MW capacity extra). Invested in Boone Pickens' bio-methane assets.
Galp	Has a 50% stake in Ventinveste, with a wind portfolio of 12MW in production and 50% stake in Ancora Wind project, started producing electricity in 2016 (360GW/year).
OMV	Wind2Hydrogen project: to transform wind-generated electricity to produce hydrogen and establish a hydrogen-refuelling network for fuel-powered electric vehicles in Germany.
Repsol	Has a 19.4% participation in the 25MW and EUR0.5m investment WindFloat Atlantic (WFA) project (Portugal) due to start in 2019. It has a 24.79% stake through Repsol Energy Ventures in Principle Power Inc. (PPI), the first company that has been able to design, install and operate a floating semi-submersible structure for offshore wind generation. The prototype has produced around 17,000MWh since it was commissioned at the end of 2011 in Portuguese waters. Repsol's total investment in this project to date is EUR7.4m. Repsol announced the sale of its offshore wind power business in the UK for EUR238m on 25 February 2016.
Statoil	Offshore wind projects currently in development surpassing 1.1GW including pioneering floating wind park offshore Scotland. The company is in the early phase of the projects (reported under 'Other' in accounts), with e.g. Dudgeon coming on stream late-2017 with all turbines. Load-out of the first four turbine sets from Siemens' new site in Hull (UK) started as planned in early-January 2017. The first turbine was successfully installed on 7 January with production start of power generation at end-January 2017. The company will then get stable cashflow from the project from end-2017.

Source: Kepler Cheuvreux, based on company reporting and press article

### Arctic drilling

Over the past few years, many expensive Arctic drilling projects have been abandoned or put on hold, including Shell's. The maximum thickness of Arctic sea ice as measured in March was the smallest in the past 38 years, based on NSIDC data. Correspondingly, concerns remain fierce about potential future developments as the impact of climate change continues to materialise.

**Table 44: Arctic exposure and decommissioning costs**

Company	Location	Details	Decommissioning costs (2015)	Provisions for decommissioning (At 31 December 2015)	Details on environmental considerations
BP	US-Alaska; Kara Sea; Barents Sea (Rosneft)	Operate nine onshore fields in Alaska; Exploration stage only for offshore; 19.75% shareholding in Rosneft (with Russia; major resource base in the continental shelf of the Arctic sea but states that it does not have offshore/partner on offshore Arctic exploration with them).	n.a.	USD18.9bn (+1% YoY)	Remediation work to enable redevelopment of former Paulsboro terminal in the US as a commercial port
ENI	Barents Sea, Norway	Johan Castberg, and Goliat fields. Offshore production activity limited to year-round ice-free conditions	n.a.	n.a.	n.a.
OMV	Barents Sea, Norway	Discovery in the Barents sea in November 2016 (Norwegian ice-free Arctic). Output could begin in 2024 or 2025.	EUR1.2bn (-21% YoY)	EUR3.4bn (+7% YOY)	n.a.
Repsol	North Slope, Beaufort Sea, US- Alaska; Barents Sea, Norway; North Seas	Norway/Barents Sea: Not qualified as arctic operations; North-sea-type operations; Alaska North Slope : onshore activity (including recent large discovery (Nanushuk play)); Russia: onshore activity; Alaska Beaufort Sea: no operations in the medium term	n.a.	EUR2.2bn (+391%)	OSPAR (North-East Atlantic international cooperation mechanism) and local regulation governs disused offshore installations
Shell + BG	Chukchi Sea, US-Alaska; Russia	Out of the Arctic after USD7bn unsuccessful exploration. Says it will not conduct further exploration offshore Alaska for the foreseeable future.	EUR4bn (+2% YOY)	EUR26bn (+9% YOY)	Brent field (UK) decommissioning ongoing including stakeholder engagement
Total	n.a.	No oil exploration or production operations in the Arctic ice pack	n.a.	n.a.	n.a.

Source: Companies

ESG Analyst Julie Raynaud’s *Climate change analysis: first aid kit* report tackles broader climate-related risks relevant to the sector, such as stranded assets, refineries’ carbon pricing, and methane ([link](#)).

## Key ESG issues

### 1. Offshore wind innovation: heavy investments in R&D

Innovation levers to prop up the LCoE range from smart turbine controller (to enhance the energy output of the turbines by cutting downtime), improved rotorblades (e.g. smarter blades to better handle extreme loads or blade protective coating lower maintenance requirements), optimised power electronics to reduce the probability of breakdown and lower repair times (source: Windtrust). Generally, the connection with the grid is a key area of focus.

#### Innovation: Reducing LCoE through smarter service setups

For instance, through increased data integration and monitoring of the wind turbines in operation, service and maintenance shutdowns can now be scheduled during periods of low wind speed to minimise the lost energy output. This development within the service business of wind suppliers has also helped reduce the LCoE for wind power: first, because efficient planning helps minimise lost output; and second, because proper servicing significantly boosts turbine lifespan. Vestas is by far largest R&D spender (c. 1.9% of sales) out of Gamesa, Nordex and Vestas.

**Turbine monitoring and smart service planning can reduce LCoE significantly**

**Table 45: Wind pure plays Innovation Focus**

Company	Sector	Green investments and innovation
EDP Renovaveis	Utilities	Offshore wind: "WindFloat2 (development of a floating foundation). "DEMOGRAVI3" (innovative gravity-based foundation for offshore wind turbines)
Falck Renewables	Utilities	Service in Rende (CS), the first renewable hybrid plant that combines two energy sources and two very different thermodynamic solar and biomass renewable technologies
Gamesa	Capital goods	New 3.3-MW platform and adaptation of the 2.5 MW platform for the Indian and Brazilian markets; offshore wind e.g. "Innwind" (design of lightweight rotors and of electromechanical conversion systems for a 10-MW to 20-MW turbine); prototype powertrain and generator based on superconductor technology
Nordex	Capital goods	Innovative rotor blade; Generation Delta (wind power platform for all wind classes featuring an optimised rotor output ratio, a low specific head mass and an optimised sound power curve
Vestas	Capital goods	Bigger turbines e.g. V136- 3.45MW. Multi- rotor concept demonstration turbine; service solutions ranging from pay as-you-go to full-scope energy-based availability guarantees

Source: Kepler Cheuvreux

## 2. Oil & gas: biodiversity and environment damages, safety

These include habitat loss and alteration through land use for exploration, production, disposing of drilling and associated wastes, and decommissioning of onshore and offshore wells.

Disclosure on these issues remains scarce across Oil & Gas majors besides anecdotal evidence. After reviewing companies' reports, we were unable to find data based on SASB metrics relevant to the ocean theme:

- Number and aggregate volume of hydrocarbon spills, volume in Arctic, volume near shorelines with ESI rankings 8-10, and volume recovered.
- Proven and (2) probable reserves in or near sites with protected conservation status or endangered species habitat.

Moreover, the rise in decommissioning raises multiple environmental concerns scarcely reported in detail currently and likely to vary project by project, such as in relation to hazardous waste generated during production, or the usage of production chemicals.

In terms of safety for offshore projects, the Macondo oil spill led to tightening safety regulations, but there is still no legally binding global set of standard for oil & gas operations besides transport. Reiterated attempts to establish an international liability convention to include damage to the ocean from offshore oil and gas installations have not succeeded so far.

## Valuation

### Dong Energy (Hold, TP DKK283.00)

Investment view of Douglas Lindahl ([dlindahl@keplercheuvreux.com](mailto:dlindahl@keplercheuvreux.com))

Along with stable regulated activity, we like the visibility and prospects that the announced capex pipeline up until 2020 offers (and also beyond 2020), which will add to the already large offshore wind power exposure (62% current and c. 80% of 2018E EBITDA) and improve Dong's green footprint. As Dong intends to divest its Oil & Gas business, the most likely scenario is Maersk Oil and Dong E&P merging and the resulting entity subsequently being IPOed. However, we see the earnings volatility and dependency on subsidies as adding to the risk premium and given our limited upside to our target price, we have a Hold rating.

**Reiterated attempts to establish an international liability convention to include damage to the ocean from offshore oil and gas installations haven't succeeded so far**

**Sif (Reduce, TP EUR22.00)**

Investment view of Andre Mulder ([amulder@keplercheuvreux.com](mailto:amulder@keplercheuvreux.com))

As demand increases for larger foundations on the back of increasing turbine sizes, the market should also evolve from standard monopiles to XL units that are taller (125 metres vs. 75 metres), wider (diameter of 11metres vs. seven metres), and heavier (1,500tonnes vs. 1,000 tonnes). These can accommodate bigger turbines. As Sif is singularly doubling production capacity in XLs to 150kt (65% of offshore wind, 50% of total capacity), we expect Sif's volumes to grow faster than the market's 10-12%, with the top line increasing even a bit faster than that, as XL units are more expensive. We downgraded our rating from Buy to Reduce on 21 March following a massive stock underperformance.

## Ocean investment universe

The following table lists companies covered as well as those reviewed in the context of this report for peer comparison purposes. However, there are plenty more fish in the sea, as many other companies exposed to the theme, particularly outside Europe, are not included in this mapping. For instance, we have not included certain specific activities that are outside the scope of this report:

- Sources and solutions to land-based pollution (e.g. toxic waste from industry, agriculture, chemicals and environmental utilities, such as asbestos, phosphates, petrochemicals, nitrates, mercury, oils and lead).
- Ship financing (there is a benchmarking tool to evaluate the environmental performance of ships and carriers: Clean shipping index).
- Fish & seafood processing.
- Satellite technology for marine surveillance.
- Telecoms cables.
- Desalination.

***There are plenty more  
fish in the sea***

**Table 46: Kepler Cheuvreux Ocean Investment universe (including non-listed companies) - Fish & Seafood**

Company	Public/ Private	Analyst	Sector	Country	Market cap blg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Aquaculture</b>									
<b>Aquaculture farming</b>									
Marine Harvest	Public	Fredrik Ivarsson	Food	Norway	6,515	Fish farming - salmon. Marine Harvest is one of the largest seafood companies in the world and by far the largest producer of Atlantic salmon with a 21% market share. The company controls its entire value chain and has production sites in the six largest salmon producing countries in the world.	100% of sales	3	Core
Austevoll Seafood	Public	Not covered	Food	Norway	1,432	Pelagic fishery and seafood specialist. Investments in Lerøy Seafood Group ASA, Austral Group S.A.A, Foodcorp Chile S.A, and Br Birkeland AS Pelagia Holding AS	100% of sales		
Bakkafrost P/F	Public	Not covered	Food	Faroe Islands	1,534	Producer of salmon from the Faroe Islands. Bakkafrost controls the value chain from the sourcing of raw material for fishmeal and oil to finished value -added salmon products	100% of sales		
SalMar	Public	Not covered	Food	Norway	2,415	Producers of farmed salmon, including offshore	100% of sales		
Lerøy	Public	Not covered	Food	Norway	2,551	Seafood (including salmon, fjord trout) production and distribution company. World's second largest producer of Atlantic Salmon	100% of sales		
Grieg Seafood	Public	Not covered	Food	Norway	853	Fish farming company, specialising in Atlantic salmon	100% of sales		
Norway Royal Salmon	Public	Not covered	Food	Norway	709	Fish farming company (Atlantic Salmon, Brown trout)	100% of sales		
Scottish Salmon Comp.	Public	Not covered	Food	United Kingdom		Independent producer of superior Scottish salmon	100% of sales		
Pesquera Los Fiordos	Private	Not covered	Food	Chile		Salmond producer	100% of sales		
Aquachile	Public	Not covered	Food	Chile	618	Salmon, Sea Trout and Tilapia producer	100% of sales		
<b>Aquaculture breeding &amp; genetics</b>									
Benchmark	Public	Patrick Roquas	Food	United Kingdom	535	Benchmark operates at the cross roads of food supply and sustainability. It supplies genetics, breeding, advanced feed, healthcare products and services to the Aquaculture and Animal Health industry	90% of sales	4	Core
Anpario	Public	Not covered	Food	United Kingdom	82	Producer and distributor of natural feed additives for animal health, hygiene and nutrition e.g. made from fish oil	0-10% of sales		
Aquagen	Private	Not covered	Food	Norway		Breeding company which develops, produces and delivers genetic material to the sea farming industry (genetic material from Atlantic salmon and rainbow trout)	50-100% of sales		
Cargill Aqua Nutrition (part of Cargill)	Public	Not covered	Food	Norway (parent company: US)		Aquafeed and nutrition for farmed fish, including salmon (mainly, in the form of extruded pellets), shrimps, tilapia (EWOS) - Functional feeds (22.5% of sales)	n.a. (0-10% of sales)		
Nutreco (owner of Skretting, part of SHV Holdings)	Private	Not covered	Food	Netherlands		Nutreco Aquafeed (Skretting is the leading global salmon feed producer)	n.a.		

Source: Kepler Cheuvreux

**Table 47: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/ Private	Analyst	Sector	Country	Market cap blng (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Wild catch fisheries</b>									
<b>Wild catch fishing</b>									
Maruha Nichiro Corporation	Public	Not covered	Food	Japan	1,527	Marine products (60% of 2013 sales): procurement of marine resources directly, mainly through longline tuna fishing, offshore and overseas purse seining, aquafarming for fishes with high added value such as bluefin tuna and greater amberjack (fisheries and aquaculture unit represents 4% of total sales); and overseas joint ventures such as shrimp trawl fishing, food processing, chemical foods, overseas joint ventures, fish breeding, livestock feedstuffs, other areas	50-100% of sales		
Thai Union Group	Public	Not covered (CIMB)	Food	Thailand	2,695	Ambient seafood (57%): Tuna, Sardine & Mackerel, Salmon, Others; Frozen & Chilled Seafood & Related Product (Shrimp, Lobster, Salmon, Others); Pet Care & Value Added (Pet Care, Value Added, Ready to Eat, Marine, Ingredient, Others)	50-100% of sales		
Dongwon Industries	Public	Not covered	Food	South Korea	945	Fishing (salmon, owner of StarKist Tuna)	50-100% of sales		
Nippon Suisan Kaisha	Public	Not covered	Food	Japan	1,481	1) Marine Products (42% of sales): fishery (5% of divisional sales), aquaculture (including tuna, yellowtail buri, salmon and trout: 11% of sales), processing/trade (47%); 2) Food products (48% of sales) e.g. frozen prepared foods for households and food service, fish sausage, shelf-stable foods; 3) Fine chemicals (4% of sales) e.g. high purity Eicosapentaenoic acid or EPA as a pharma ingredients; an unsaturated fatty acid contained in fish oil; 4) Others, including marine-related e.g. marine survival training facility	50-100% of sales		
Nissui	Public	Not covered	Food	Japan	281	1) Marine Products (42% of sales): fishery (5% of divisional sales), aquaculture (including tuna, yellowtail buri, salmon and trout: 11% of sales), processing/trade (47%); 2) Food products (48% of sales) e.g. frozen prepared foods for households and food service, fish sausage, shelf-stable foods; 3) Fine chemicals (4% of sales) e.g. high purity Eicosapentaenoic acid or EPA as a pharma ingredients; an unsaturated fatty acid contained in fish oil; 4) Others, including marine-related e.g. marine survival training facility	50-100% of sales		
<b>Catering</b>									
Compass	Public	André Juillard	Support services	United Kingdom	28,594	Seafood sourcing	0-5% of sales	2	Broad
Sodexo	Public	André Juillard	Support services	France	16,404	Seafood sourcing	0-5% of sales	3	Core
Elior	Public	André Juillard	Support services	France	3,602	Seafood sourcing	0-5% of sales	2	Broad
Autogrill	Public	Marco Baccaglio	Travel & leisure	Italy	2,338	Seafood sourcing	0-5% of sales	2	Broad
<b>Retail food</b>									
Ahold Delhaize	Public	Fabienne Caron	Food retail	Netherlands	25,134	Seafood sourcing	0-5% of sales	3	Broad
Axfood	Public	Fredrik Ivarsson	Food retail	Sweden	2,931	Seafood sourcing	0-5% of sales	3	Broad
Carrefour	Public	Fabienne Caron	Food retail	France	16,316	Seafood sourcing	0-5% of sales	3	Broad
Jeronimo Martins	Public	Inigo Egusquiza	Food retail	Portugal	9,943	Seafood sourcing	0-5% of sales	3	Broad
Tesco	Public	Fabienne Caron	Food retail	United Kingdom	17,870	Seafood sourcing	0-5% of sales	3	Broad

Source: Kepler Cheuvreux

**Table 48: Kepler Cheuvreux Ocean Investment universe (including non-listed companies) - Shipping lanes**

Company	Public/ Private	Analyst	Sector	Country	Market cap bllg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Shipping &amp; Port</b>									
<b>Container shipping</b>									
Maersk	Public	Johan Eliason	Transport	Denmark	31,165	Maersk (A.P. Møller-Maersk A/S) is reorganizing into Transport&Logistics: Maersk Line (global number one in container shipping), APM Terminals (top-five global container terminal operator), Damco (freight forwarding), Svitzer (towage operations) and MCI (container manufacturing). To be separated before 2019 Energy including: Maersk Oil (midsized upstream oil & gas), Maersk Drilling (offshore oil services), Maersk Tankers (crude&product tankers) and Maersk Supply Services (offshore services).	100% of sales	2	Core
MSC	Private	Not covered	Transport	Switzerland		The company offers trade services; dry cargo services that include hazardous, food-grade, and rare and precious cargo; reefer cargo; and oversized, out-of-gauge, and breakbulk cargo services. It also provides intermodal transportation services through containers (standard and specialist), trailers, chassis, and barges; warehousing and storage solutions; cross trading services, such as competitive pricing, securing bookings, documentation handling, tracking facilities, and pre/on carriage arrangements; customs clearance services; and cargo trailers.	100% of sales		
CMA CGM	Private	Not covered	Transport	France		The company provides dry containers, including general-use, pallet wide, and specialized containers; refrigerated containers for the containerization of tropical fruits; and XXL cargos for the transport of oversized cargo, such as luxury yachts, helicopters, large machinery, railroad cars, oversized turbines, and generators, as well as other cargos with non-standard dimensions and weights. It also owns and operates vessels.	100% of sales		
COSCO SHIPPING	Public	Not covered	Transport	China	7,062	Ocean shipping services of grains, ores and sands, coals, fertilizers, steels, timbers, agricultural products, and cements for customers. It also provides ship-booking and other services related to international trade for cargo owners.	100% of sales		
Evergreen	Public	Not covered	Transport	Taiwan	1,488	The company operates container ships to move freight throughout the world. Evergreen Marine has interests in terminals, airline operations and motor freight transportation, as well as container manufacturing.	100% of sales		
Hapag-Lloyd	Public	Johan Eliason	Transport	Germany	3,273	Hapag-Lloyd is a pure play container liner covering the entire transport chain, but focusing particularly on the ocean leg.	100% of sales	2	Core
Hamburg Süd	Private	Not covered	Transport	Germany		The Company focuses on line shipping, tramp shipping, logistics services, ship management, and owned containers and vessels	100% of sales		
OOCL	Private	Not covered	Transport	China		The company provides integrated international container transportation, logistics, and terminal services. It offers liner, container transport and logistics, supply chain management, import/export, intermodal transport, dangerous goods transportation, domestic logistics, and cargo and yacht shipping services.	100% of sales		
Yang Ming	Private	Not covered	Transport	Taiwan		Shipping; repair and chartering services in Taiwan and internationally. It also purchases and sells ships, containers, and chassis. In addition, the company acts as shipping, forwarding, and inland forwarding agent; and shipping manager. Further, it is involved in the warehouse and terminal operations; and container transportation, stevedoring, and logistics services. The company operates a fleet of 101 vessels.	100% of sales		
UASC	Private	Not covered	Transport			Containerised cargo transportation services to customers in the Middle East and internationally. It offers temperature controlled (reefer), dry cargo, and special cargo (break bulk and out-of-gauge cargo) transportation services. The company also provides shipping agency, freight forwarding, warehousing, trucking, logistics, customs brokerage, land transportation, sea/air cargo, petrochemical transportation, chartering, container maintenance and repair, ship repair, and storage services through its subsidiaries.	100% of sales		

Source: Kepler Cheuvreux

**Table 49: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/ Private	Analyst	Sector	Country	Market cap bllg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Ship equipment</b>									
Alfa Laval	Public	Not covered	Capital goods	Sweden	7,153	Ballast water treatment solutions, emission control e.g. PureSOx removes sulphur oxides from the ship's exhaust gas by scrubbing it with sea water or fresh water, heating and cooling, steam and heat generation, waste heat recovery.	35% of sales	3	Core
ABB	Public	William Mackie	Capital goods	Switzerland	47,408	Integrated marine systems e.g. generators, power transformers, drives for marine applications, low and high voltage marine motors, turbochargers, electric propulsion system	5% of sales	2	Broad
Burckhardt Compression	Public	H-J. Heimbuerger	Capital goods	Switzerland	889	Marine compressor applications solutions (e.g. for LNG Carrier Fuel Gas Supply, Merchant Shipping LNG Propulsion BOG-Handling)	20% of sales	2	Broad
Siemens	Public	William Mackie	Capital goods	Germany	104,338	Propulsion equipment, control equipment, port power suppliers, automation and monitoring software	5% of sales	3	Core
Norma Group SE	Public	H-J. Heimbuerger	Capital goods	Germany	1,357	High-quality stainless materials	0-10% of sales	2	Broad
Rolls Royce Holdings	Public	Christophe Menard	Aerospace & defence	United Kingdom	15,817	From vessel design and systems integration to the supply and support of power and propulsion equipment	0-10% of sales	1	Broad
Wärtsilä	Public	Johan Eliason	Capital goods	Finland	9,588	Medium-speed diesel and dual-fuel engines, Propulsion systems and gears, Seals and bearings, Navigation and automation systems, Entertainment systems, Communication and control systems, Power distribution and management systems, Electrical design for complex vessels, Energy management system and hybrid solutions, Environmental solutions, including e.g. exhaust gas cleaning and ballast water management systems, Pumps and valves, Gas systems, including LNG and LPG handling, inert gas systems, compressors, liquefaction, regasification, and equipment for small-to-medium scale onshore gas installations, Ship design	35% of sales	3	Core
<b>Ship building</b>									
Fincantieri	Public	Matteo Bonizzoni	Capital goods	Italy	1,118	With revenues of EUR4.2bn (2015), Fincantieri is the largest western shipbuilder by turnover and the fourth largest worldwide by backlog. The group has a broad coverage of the high value-added segment, with world leadership in Cruise Ships (39% of 2015 revenues) and established positions in Naval (25% of 2015 revenues), particularly in the captive Italian and US markets. The group also has a positioning in Offshore (29% of 2015 revenues), built up through the acquisition of a 55.6% stake in Vard (headquartered in Norway and listed in Singapore) in 2013	100% of sales	2	

Source: Kepler Cheuvreux

**Table 50: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/ Private	Analyst	Sector	Country	Market cap bllg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Port equipment</b>									
ABB	Public	William Mackie	Capital goods	Switzerland	47,408	Integrated marine systems e.g. generators, power transformers, drives for marine applications, low and high voltage marine motors, turbochargers, electric propulsion system	5% of sales	2	Broad
Cargotec	Public	Johan Eliason	Capital goods	Finland	2,988	Engineering solutions and services for handling marine cargoes and offshore loads (Macgregor)	71% of sales	2	Broad
Konecranes	Public	Johan Eliason	Capital goods	Finland	2,645	Shipyard Cranes: block handling cranes, floating dock cranes, goliath gantry cranes, plate handling cranes, single boom shipyard cranes, double boom shipyard cranes	16% of sales	2	Broad
Kuenz	Private	Not covered	Capital goods	United States	Port equipment	n.a.			
Liebherr	Private	Not covered	Capital goods	Switzerland		Shipyard Cranes	n.a.		
Palfinger	Public	Thomas Neuhold	Capital goods	Austria	1,312	Shipyard Cranes	8% of sales	2	Broad
TTS Marine AB	Private	Not covered	Capital goods	Sweden		The portfolio encompasses the design and manufacture of high capacity ramps for stern, side, bow and internal access, as well as ramp covers, movable car decks, internal and external doors and cargo lifts	n.a.		
Shanghai Zhenhua Heavy Ind-B	Public	Not covered	Capital goods	China	2,880	Shipyard Cranes	n.a.		
<b>Port operators</b>									
HHLA	Public	Nikolas Mauder	Transport	Germany	1,419	In the listed Port Logistics segment, HHLA divides its activities into three business divisions: 1) Container which operates three of the four container terminals at the Port of Hamburg and a container terminal in Odessa (Ukraine), 2) Intermodal which offers transport for containers, and 3) Logistics which provides handling and storage services. The company also has an un-listed real estate business. Our estimates refer only to the Port Logistics segment	100% of sales	2	Broad
DP World	Public	Not covered	Transport	United Arab Emirates	16,577	An operator of container terminals around the world, based in Dubai.	100% of sales		
Eurokai	Public	Not covered	Transport	Germany		An operator of container terminals around the world with a focus on Europe. Eurogate, a subsidiary of Eurokai, is HHLA's main and only competitor in the port of Hamburg. We exclude it from the applicable average as they share is highly illiquid	100%		
Hutchinson Shanghai	Private	Not covered	Transport	France			n.a.		
International Port Group	Public	Not covered	Transport	Singapore		The operator of the world's busiest port	100%		
Maritime and Port Authority of Singapore	Private	Not covered	Transport	Singapore		Maritime and Port Authority of Singapore operates as a maritime agency that focuses on the development of Singapore's port and maritime centre.	100%		

Source: Kepler Cheuvreux

**Table 51: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/Private	Analyst	Sector	Country	Market cap blng (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Freight/Logistics</b>									
Kuehne + Nagel	Public	Aymeric Poulain	Transport	Switzerland	15,601	K+N is the leading global freight forwarder in the highly fragmented sea freight container market. The group claims a 2.5% global market share of global sea trade, but on our estimates its share of the freight forwarding ocean market TEU is closer to 10%. Ocean freight accounts for 40% of turnover and we estimate 13% is derived from associated contract logistics	53% of sales	2	Broad
Deutsche Post	Public	Andre Mulder	Transport	Germany	38,630	Deutsche Post is active in mail, express and logistics on a global scale. The company aims to be a one-stop provider, offering the full range of logistics services. In mail it is the largest company in Europe. In express it is leading in Europe and AsiaPacific. In logistics it is largest in forwarding as well as in contract logistics, whereas in European road/rail logistics it is ranked second behind Deutsche Bahn.	0-50% of sales	2	Broad
Panalpina	Public	Aymeric Poulain	Transport	Switzerland	2,675	Panalpina is a global freight forwarder, with strong position in air and ocean freight and a top 20 player in supply chain management solutions. World's fifth-largest ocean freight forwarder by volume, according to Armstrong & Associates, and the fourth-largest in terms of value. Late comer to ocean freight, as its organisation is still evolving from a pure port-to-port service to a more complex end-to-end solution provider.	42% of sales	2	Broad
DSV	Public	Aymeric Poulain	Support services	Denmark	9,132	Sea freight (number 6). The group offers traditional cargo-booking services, and helps its SME customers to obtain the best deals by aggregating small shipments into one shipment, facilitating customs clearance, handling special cargos (including those requiring specific handling, health and safety or security protocols or cool temperature storage) and offering courier services	50% of sales	2	Broad
Testing, Inspection & Certification (TIC) Bureau Veritas	Public	Aymeric Poulain	Support services	France	8,177	Bunkers (commodities) and container ships (Marine & Offshore) inspections: as a classification society, Bureau Veritas assesses ships and offshore facilities for conformity with standards that mainly concern structural soundness and the reliability of machinery clients on-board. Bureau Veritas also provides ship certification on behalf of flag administrations. Governments & Public Organisations includes e.g. Pre-shipment inspection.	<27% of sales	3	Core
Intertek	Public	Aymeric Poulain	Support services	UK	7,327	Container ships business. Intertek ShipCare services help protect ship owners and operators from equipment failure, downtime, and repairs, and other risks	23% of sales	3	Core
SGS	Public	Aymeric Poulain	Support services	Switzerland	15,368	Bunker survey, expediting services, on hire and off shire services, sulge survey	<27% of sales	3	Core

Source: Kepler Cheuvreux

**Table 52: Kepler Cheuvreux Ocean Investment universe (including non-listed companies) - Energy & Resources**

Company	Public/Private	Analyst	Sector	Country	Market cap bllg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Offshore wind developers</b>									
Alstom	Public	William Mackie	Capital goods	France	5,891	Offshore a small part of the Renewable JV (EUR196m in 2016E) with GE	0-10% of sales	2	Broad
EDP Renovaveis	Public	Jose Porta	Utilities	Portugal	5,438	Offshore wind farms in the UK, France	c. 10% of capex to offshore wind projects	3	Core
E.ON	Public	Ingo Becker	Utilities	Germany	15,837	Offshore wind energy generation (1.1GW) in the UK	0-10% of EBITDA	2	Broad
DONG Energy	Public	Douglas Lindahl	Utilities	Denmark	14,724	Dong Energy is the world's largest offshore wind farm operator with c. 2GW of net installed offshore wind capacity, representing c. 26% of the global total.	62% current and c.80% of 2018E EBITDA	5	Broad
Iberdrola	Public	Jose Porta	Utilities	Spain	41,996	ScottishPower Renewables (UK); project in Germany (194MW in Europe)	0-10% of EBITDA	3	Core
Innogy	Public	Ingo Becker	Utilities	Germany	19,528	Around 31% of the renewables capacity is offshore wind (c.1GW)	0-10% EBITDA	3	Core
Statoil	Public	Not covered	Oil & gas	Norway	50,789	Investments in offshore wind projects in the UK (small)	0-10% of sales	2	Broad
<b>Offshore wind equipment manufacturers</b>									
ABB	Public	William Mackie	Capital goods	Switzerland	47,408	Offshore grid connections and platforms, cables (17% market share in Europe) and various transmission and distribution equipment.	0-10% of sales	2	Broad
Acciona	Public	Jose Porta	Utilities	Spain	4,209	Offshore wind turbine	0-10% of sales	3	Core
Boskalis	Public	Andre Mulder	Construction & materials	Netherlands	4,195	Development, construction, maintenance and decommissioning of pipelines and cables and offshore wind farms. As Boskalis took over the remaining 50% in some offshore wind activities it held in a JV with Volker, this part is now showing up in full as a result of full consolidation	0-10% of sales	3	Core
Fugro	Public	Andre Mulder	Oil services	Netherlands	1,216	Offshore wind services (e.g. site characterisation/seabed investigation)	6% of sales	1	Broad
Gamesa	Public	Douglas Lindahl	Capital goods	Spain	6,126	Adwen (offshore wind turbines)	0-10% of sales	5	Core
Prysmian	Public	Matteo Bonizzoni	Capital goods	Italy	5,245	Offshore wind cables	>20% of EBITDA	3	Core
Nexans	Public	Geoffroy de Mendez	Capital goods	France	2,036	Offshore wind cables	12% of sales	3	Core
SBM Offshore	Public	Andre Mulder	Oil services	Netherlands	3,108	Two projects in renewable energy, floating offshore wind farm and the energy wave converter	Immaterial	12	Broad
Siemens	Public	William Mackie	Capital goods	Germany	104,338	Global leading wind park developer with exposure across the value chain. Turbines now placed into Gamesa. All transmission and distribution equipment remains with the corporate.	0-10% of sales	3	Core
Sif	Public	Andre Mulder	Oil services	Netherlands	580	Sif is a leading manufacturer of large steel tubulars (monopiles, transition pieces) which are used as foundation components for the offshore wind and oil & gas industries. The group's products are predominantly installed in the greater North Sea region. Based on the number of monopiles it served about one-third of the European offshore wind market and about half of the oil & gas market. Offshore wind brought 88% of 2015 sales and 84% of gross profits.	92% of sales	4	Core
Subsea 7	Public	Kevin Roger	Oil services	Norway	4,667	Installations of EPCI jacket foundations and array cables, transportation and installation of the offshore transmission modules. Backlog: EUR4.5bn. Fully owned subsidiary: Seaway Heavy Lifting	0-10% of sales	1	Broad
Vestas Wind Systems	Public	Douglas Lindahl	Capital goods	Denmark	16,377	Second offshore wind turbine maker	100% of sales	5	Core

NC = Not covered; Source: Kepler Cheuvreux

**Table 53: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/ Private	Analyst	Sector	Country	Market cap blng (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Offshore oil exploration and production</b>									
BP	Public	Bertrand Hodée	Oil & gas	United Kingdom	101,538	Offshore hydrocarbon production	73% of 2017-21E incremental production	1	Broad
ENI	Public	Bertrand Hodée	Oil & gas	Italy	54,331	Offshore hydrocarbon production	87% of 2017-21E incremental production	1	Broad
Galp	Public	Tristan de Jerphanion	Oil & gas	Portugal	11,108	Offshore hydrocarbon production	100% of 2017-21E incremental production	1	Broad
OMV	Public	Tristan de Jerphanion	Oil & gas	Austria	11,656	Offshore hydrocarbon production	22% of 2017-21E incremental production	1	Broad
Repsol	Public	Tristan de Jerphanion	Oil & gas	Spain	21,391	Offshore hydrocarbon production	57% of 2017-21E incremental production	1	Broad
Royal Dutch Shell	Public	Bertrand Hodée	Oil & gas	Netherlands	201,210	Offshore hydrocarbon production	88% of 2017-21E incremental production	1	Broad
Total	Public	Bertrand Hodée	Oil & gas	France	113,197	Offshore hydrocarbon production	57.5% of 2017-21E incremental production	1	Broad

NC = Not covered; Source: Kepler Cheuvreux

Table 54: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)

Company	Public/ Private	Analyst	Sector	Country	Market cap bllg (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Offshore oil services</b>									
Fugro	Public	Andre Mulder	Oil services	Netherlands	1,216	Offshore oil services	90% of activities (all offshore)	1	Broad
Saipem	Public	Kevin Roger	Oil services	Italy	4,053	Saipem is one of the global leaders in the Engineering & Construction and Drilling businesses, with a strong bias towards oil & gas-related activities in remote areas and deep-water. The group operates in 62 countries, employs 50,000 employees, and realised EUR12.9bn of revenues in 2014. ENI owns 43% of the company	95% of sales	1	Broad
SBM Offshore	Public	Andre Mulder	Oil services	Netherlands	3,108	SBM Offshore is a multinational group of companies selling systems and services to the oil & gas industry. Activities include the engineering, supply and offshore installation of floating facilities for the production, storage and export of crude oil and gas, offering both lease and sale. SBM has the largest lease floater fleet, consisting of 17 units (one is idle).	100% of sales	1	Broad
Schoeller-Bleckmann	Public	Stephan Trubrich	Oil services	Austria	980	All offshore drilling as it requires directional drilling, in which SBO has a leading market share in key directional drilling equipment	n.a	1	Broad
Sif	Public	Andre Mulder	Oil services	Netherlands	580	Sif is a leading manufacturer of large steel tubulars (monopiles, transition pieces) which are used as foundation components for the offshore wind and oil & gas industries. The group's products are predominantly installed in the greater North Sea region. Based on the number of monopiles it served about 1/3rd of the European offshore wind market and about half of the oil & gas market. Offshore wind brought 88% of 2015 sales and 84% of gross profits.	92% of sales	4	Broad
Subsea 7	Public	Kevin Roger	Oil services	Norway	4,667	Cable, foundations, decommissioning	100% of sales	1	Broad
TechnipFMC	Public	Bertrand Hodée	Oil services	France	13,440	With a presence in 48 countries and 44,000 employees worldwide, TechnipFMC (born from the merger between Technip and FMC Technologies completed in January 2017) is a global leader in subsea, onshore/offshore, and surface projects. Most exposed to LNG	>50% of sales	1	Broad
Tenaris	Public	Kevin Roger	Oil services	Italy	17,318	Tenaris is a leading supplier of tubes and related services for the energy industry and certain other industrial applications. It principally engineers and designs casing, tubing line pipe and mechanical pipes. Tenaris employs more than 26,000 people, is present in all continents and its customers include world's leading oil and gas companies and engineering companies.	0-50% of sales	1	Broad
Vallourec	Public	Kevin Roger	Oil services	France	2,454	Tube system for anchoring offshore wind turbines	0-50% of sales	1	Broad
<b>Marine biotech</b>									
PharmaMar	Public	Not covered	Pharma	Spain	1,108	World leader in the development and commercialisation of anticancer drugs of marine origin	n.a.		
<b>Coastal livelihoods</b>									
<b>Tourism</b>									
Melia Hotels	Public	Inigo Egusquiza	Travel & leisure	Spain	2,892	Seafront resorts (Spain and Caribbean area)	74% of EBIT (resorts)	2	Broad
TUI	Public	Jürgen Kolb	Travel & leisure	Germany	7,585	TUI Group is the world's number one tourism business. The broad portfolio gathered under the Group umbrella consists of strong tour operators, 1,800 travel agencies and leading online portals, six airlines with more than 130 aircraft, over 300 hotels with 210,000 beds, thirteen cruise liners and countless incoming agencies in all major holiday destinations around the globe.	42% of EBITA (excl. Tour operator business)	2	Broad

Source: Kepler Cheuvreux

**Table 55: Kepler Cheuvreux Ocean Investment universe (including non-listed companies)**

Company	Public/ Private	Analyst	Sector	Country	Market cap blng (EURm)	Marine-related activities	Group Ocean business exposure (KECH est.)	KECHE Ocean Health Impact conviction score	KECHE Core/Broad Ocean universe
<b>Coastal protection</b>									
Boskalis	Public	Andre Mulder	Const. & materials	Netherlands	4,195	Land reclamation and coastal defence (climate adaptation theme);	10-15% of sales	3	Core
CFE	Public	Not covered	Capital goods	Belgium		Dredging	n.a.		
<b>Maritime surveillance</b>									
BAE Systems	Public	Christophe Menard	Aerospace & defence	United Kingdom	23,763	Naval ships and submarines	28% of sales	1	Broad
Dassault Aviation	Public	Christophe Menard	Aerospace & defence	France	9,405	Maritime surveillance (Surmar) aircrafts	0-10% of sales	1	Broad
Thales	Public	Christophe Menard	Aerospace & defence	France	18,834	Maritime surveillance systems (e.g. abnormal behaviour detection to support operators, Comprehensive Maritime Operational Picture based on networks of sensor sites and centres). DCNS (naval defence) manufactures ships, submarines and underwater weapons.	>10-15% of sales	1	Broad
Ultra Electronics	Public	Christophe Menard	Aerospace & defence	United Kingdom	1,724	Undersea Surveillance: towed sonar systems for ships and submarines; low cost, small form factor devices; submarine communications; Magneto Inductive (MI) communications and signalling for military, government and commercial applications.	25% of sales	1	Broad
<b>Pollution reduction</b>									
<b>Plastics</b>									
Corbion	Public	Not covered	Materials	Netherlands	1,621	Active in bioplastics and plan to make ingredients for biodegradable plastics. The company has a JV with Total (Total Corbion PLA) dedicated to Poly Lactic Acid (PLA), which is a biobased and biodegradable polymer. Total Corbion PLA, headquartered in the Netherlands, will start up a new production plant in Thailand in the second half of 2018.	0% of sales		Broad
Danone	Public	Jon Cox	Food	France	41,925	Relevant practices in terms of plastic waste reduction and	0% of sales	2	Broad

Source: Kepler Cheuvreux

## Glossary

**Blue economy:** Marine and coastal analogue to the Green Economy, the Blue Economy approach is based on a vision of “*improved wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities*” (UNEP 2013).

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

Other definitions exist, and the ambiguity has prompted calls for clarification (the WWF’s “Principles for a Sustainable Blue Economy): “*For some, blue economy means the use of the sea and its resources for sustainable economic development,*” the report reads. “*For others, it simply refers to any economic activity in the maritime sector, whether sustainable or not.*”

**Coastal tourism:** Coastal tourism covers beach-based recreation and tourism (e.g. swimming, surfing, sunbathing), and non-beach related land-based tourism in coastal areas (all other tourism and recreation activities that take place in coastal areas for which the proximity of the sea is a condition), as well as the supplies and manufacturing industries associated to these activities

**Ecosystem-based management.** This is an integrated approach to management that considers the entire ecosystem, including humans. The goal is to maintain an ecosystem in a healthy, productive and resilient condition so that it can provide the services humans want and need.

**Emission Control Areas (ECA):** When the revised MARPOL (International Convention for the Prevention of Pollution from Ships) Annex VI entered into force in July 2010, it included a change to the name and definition of an emission control area from SECA to ECA – an area where special mandatory measures are required to control NO<sub>x</sub>, or SO<sub>x</sub> and particulate matter (PM) (source: Parker Kittiwake). These are regions where local ecological, oceanographical or vessel traffic patterns justify a higher level of protection from pollution. Currently, there are four MAR POL Annex VI designated ECAs worldwide: the Baltic Sea Area, the North Sea Area and the North American ECA, US Caribbean Sea Emission Control Area (IMO).

**Exclusive economic zones:** The exclusive economic zone is an area beyond and adjacent to the territorial sea, subject to the specific legal regime established in this Part, under which the rights and jurisdiction of the coastal State and the rights and freedoms of other states are governed by the relevant provisions of this convention.

**Marine ecosystem:** Marine ecosystems encompass oceans, salt marshes and intertidal zones, estuaries and lagoons, mangroves and coral reefs, the water column including the deep sea, and the sea floor.

**Maritime tourism** covers tourism that is largely water-based rather than land-based (e.g. boating, yachting, cruising, nautical sports), but includes the operation of land-based facilities, manufacturing of equipment, and services necessary for this segment of tourism.

**Marine Spatial Planning (MSP)**, also known as Ocean Use Planning, is an approach that aims to allocate different human activities within specified marine areas in different scales and, by doing so, balancing ecological, economic, social and political interests and minimizing the conflict between different activities. MSP is an important instrument in managing entire marine areas within countries' exclusive economic zones (EEZs), at the borders between EEZs as well as offshore. Today, MSP is regulated under national law in a number of countries including China, Belgium, the UK, and the US.

**Maximum sustainable yield (MSY)** is the point where the harvest from the fishery is both as high as possible and can be sustained indefinitely with proper management.

**Maximum Economic Yield (MEY)** is the point where the greatest sustainable profits are achieved and usually results in slightly lower harvests and a larger number of fish in the water. The primary difference between MSY and MEY is MEY factors in the costs of fishing, whereas MSY does not.

**Rights-based fisheries management:** Rights-based management regimes are set up by allocating property rights or user rights to fishers in some fashion and because of the incentives implicit in these systems, the adoption of these management methods are more likely to lead to both economically and environmentally sustainable fisheries. There are various types of rights-based management (RBM) systems, including individual transferable quotas, community quotas, territorial user right fisheries (TURFs) and cooperatives. In most cases, rights-based management systems are not implemented in a fishery until after the fishing stock in question has been heavily overexploited.

**Ocean economy:** The ocean economy can be defined as the sum of the economic activities of ocean-based industries, and the assets, goods and services of marine ecosystems.

**Ocean renewable energy:** The production of ocean renewable energy, such as tidal energy, wave energy, osmotic energy and ocean thermal energy conservation (OTEC).

**Overfishing:** Stocks are considered to be biologically overfished when they are reduced to levels that prevent them from producing their maximum sustainable yield

**Tidal:** A tidal barrage is a dam-like structure used to capture energy from masses of water moving in and out of a bay or estuary.

Source: UN, EU, Ocean Health Index, EDF, OECD

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