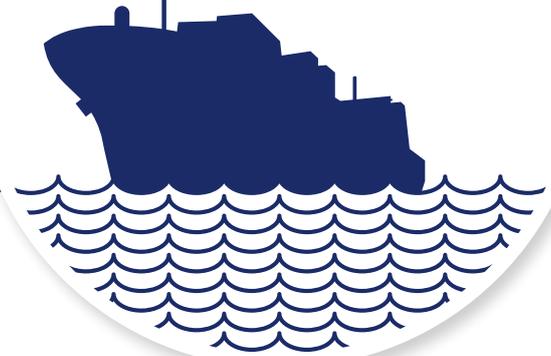




**sustainable  
shipping  
initiative**



# Changing Context - Global Trends

2012 to 2015: How global trends have progressed  
and moving towards our vision for shipping in 2040

– April 2015

Prepared by

 **forum for  
the future** | futures  
centre

# Executive Summary

*The Sustainable Shipping Initiative (SSI) brings together some of the biggest names in the maritime sector to plan how it can contribute to – and thrive in – a sustainable future.*

In 2011, the SSI made the [Case for Action](#), identifying seven global trends which represented the key sustainability challenges and opportunities facing the shipping industry. These trends highlighted the urgent need to reshape how shipping business was conducted, and set the stage for a series of practical, collaborative action plans launched in 2012. Three years on, it is timely to revisit these global trends to understand how far we have progressed towards our vision for shipping in 2040, where sustainability equals success. What has changed since 2012?

- Higher expectations and increased scrutiny, enabled by a highly networked, social media savvy world, have pushed investors, shipping customers and in turn, ports and charterers to push for transparency in ship performance. This has in part resulted in incentives for the adoption of energy efficient technology and stronger enforcement of sustainability standards and regulations.
- Investment in alternatives to oil for the shipping sector is growing alongside the mainstreaming of renewables in the global energy system. These developments coincide with the rising influence of emerging economies, which are leading the way on clean energy growth, fuelling both the supply and demand.
- The long-term fate of global ocean governance remains as uncertain as before, with a complex patchwork of local regulatory frameworks looking increasingly likely. However, a multipolar world could still lead to greater support for international frameworks as more evenly balanced powers recognise the benefits of cooperation.
- Climate change is accelerating faster than expected. The impact of climate change specific to the maritime sector requires industry-wide attention beyond climate mitigation efforts, currently focused on reducing carbon emissions. Until shipping companies are able to quantify the economic consequences and needs for change in safe ship designs and operations, this will remain an ill-defined threat to safety lurking on the horizon.

The value of trend monitoring lies in **identifying opportunities for action**. Areas of high potential indicate where a small amount of investment or effort might tip the scales, and areas of high risk indicate where urgent action is most needed. Trend monitoring also exposes potential blind spots - areas where change is happening quickly, which we may have missed or deprioritised previously. There is a need to delve deeper into specific sub-trends and indicators that can act as a proxy for understanding how far along the shipping sector is moving towards the desired 2040 outcome that SSI has set.

To do this, SSI is launching the [Future of Shipping](#) topic hub, in partnership with Forum for the Future. The online portal will enable the shipping industry to collectively monitor for signals of change with the ultimate aim to find opportunities for the SSI and the wider industry to accelerate progress towards the SSI Vision 2040.

We invite shipping professionals, practitioners, students and enthusiasts (such as the readers of this report) who are interested in the future of sustainable shipping, to engage with members of the SSI via the platform.

The Future of Shipping topic hub can be accessed at [www.thefuturescentre.org/topic-hubs/shipping](http://www.thefuturescentre.org/topic-hubs/shipping).

# Contents

<b>Executive Summary</b>	<b>2</b>
<b>A vision for shipping in 2040</b>	<b>4</b>
<b>Monitoring how change is happening to achieve Vision 2040</b>	<b>5</b>
<b>2012 to 2015: How has the future changed?</b>	<b>6</b>
1. The global economy: “Shift east” continues even as growth slows in emerging economies	9
2. Ocean governance: Governance struggles to keep up with new areas of concern	10
3. Demand for transparency: At sea no longer means unseen	11
4. The future of energy: Investments in alternatives to oil accelerate	12
5. Sustainability regulation: Shipping sector makes steady progress	13
6. Advancing technology: Growing number of incentives for early adopters	14
7. Adapting to climate change: More robust information needed in order to act	16
<b>Monitoring trends to identify opportunities for action</b>	<b>17</b>
Topic hubs on the Futures Centre	17
Monitoring areas of high potential	18
Monitoring areas of high risks	18
Discovering potential blind spots	19
<b>About the Sustainable Shipping Initiative</b>	<b>20</b>
<b>About Forum for the Future</b>	<b>20</b>

# A vision for shipping in 2040



Image credit: Ayanami No03

*The year is 2040.*

*A formal system of global ocean governance is in place, recognising the rights and responsibilities of key ocean users. Heavily used areas in the ocean are managed through a system of well-enforced Marine Spatial Plans.<sup>1</sup>*

*The shipping sector has diversified its energy sources and uses a range of biofuel, oil, wind, and hydrogen power. Global shipping fleet have achieved a 90% CO<sub>2</sub> reduction per ship as compared to 1990 levels. Large, super-efficient and fully integrated supply chains are operating throughout the industry, supported by widespread sharing of resources and information.*

*Port communities have clean and healthy environments, corruption has been eradicated and the shipping industry is seen as an enabler of trade and development. Shipping is a recognised career sector and features in international rankings of sought-after careers. Labour conditions are assessed on a level playing field across all segments of the industry (e.g. short sea, coastal and deep sea).*

*Ecosystem valuations now have a real impact on decisions affecting maritime regulation and ocean planning. Credible sustainability rating schemes are used regularly to inform shipping-related commercial decisions – only transparent and accountable companies have the 'licence to trade'.*

This is a plausible future that **member companies** of the **Sustainable Shipping Initiative (SSI)** have envisioned for the shipping industry. This is an industry that carries over 90% of world trade,<sup>2</sup> accounts for 2.2% of global greenhouse gas emissions,<sup>3</sup> and has the opportunity to play a vital role in the global shift to a genuinely

1 Marine spatial planning is a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. Characteristics of marine spatial planning include ecosystem-based, area-based, integrated, adaptive, strategic and participatory. (UNESCO, Intergovernmental Oceanographic Commission, Marine Spatial Planning).

2 United Nations <https://business.un.org/en/entities/13>

3 IMO (2014), Greenhouse Gas Emissions <http://www.imo.org/OurWork/Environment/PollutionPrevention/AirPollution/Pages/GHG-Emissions.aspx>

sustainable economy. As leaders in our industry, SSI members are imagining and showing the way towards a better future, and [taking action on several fronts to get there](#). (Click on links for latest information on the SSI, member companies and existing working groups.)

### Monitoring how change is happening to achieve Vision 2040

SSI has set out [Vision 2040](#) (see sidebar) for the shipping industry and developed a roadmap for the journey – a living document that identifies immediate and mid-term milestones for what needs to happen by the 2010s, 2020s and 2030s for Vision 2040 to become a reality.<sup>4</sup>

Keeping on track to such targets over a long period requires being up-to-date in a rapidly changing context. Which areas have gained traction faster than previously expected? Where has the industry not moved as quickly as we have needed it to? An understanding of these shifts is important to the SSI in **knowing where to act**: Where might a small amount of investment or effort tip the scales? Where are the gaps where action is most needed?

In making the [Case for Action](#), the SSI identified seven global trends based on research and interviews, which we consider to represent the key sustainability challenges and opportunities facing the shipping industry to 2040. With the SSI Vision 2040 and Roadmap in place and the member-driven working groups tackling specific change areas, it is timely to revisit these trends to understand how far the industry has or has not moved towards Vision 2040.

### SSI Vision 2040

- Changing to a diverse mix of energy sources, using resources more efficiently and responsibly, and dramatically reducing greenhouse gas intensity.
- Providing safe, healthy and secure work environments so that people want to work in shipping, where they can enjoy rewarding careers and achieve their full potential.
- Earning the reputation of being a trusted and responsible partner in the communities where we live, work and operate.
- Developing financial solutions that reward sustainable performance and enable large-scale uptake of innovation, technology, design and operational efficiencies.
- Transparency and accountability drive performance improvements and enable better, sustainable business decision-making.
- Proactively contributing to the responsible governance of the oceans.

## the changing context – global trends

3

Based on research and interviews, we have identified seven global trends that we consider to represent the key sustainability challenges and opportunities facing the shipping industry over the next 30 years.

We explore these trends in a global context. We then take a closer look at how they might affect the shipping industry. There is inevitably cross-over and interaction between trends and their impacts. In section 4 we investigate how these trends combine to present three key challenges to the industry.

- the global economy: emerging giants?**
- freedom vs level playing field: ocean governance**
- no secrets: demand for transparency**
- moving on from oil: the future of energy**
- demanding higher standards: sustainability regulation**
- advancing technology: making it pay**
- adapting to a changing climate**

Contents • 1. Executive Summary • 2. Introduction • 3. Global Trends • 4. Key Challenges • 5. Driving Change • 6. Conclusions
Page 17

Image credit: Case for Action

<sup>4</sup> SSI plans to release the roadmap to Vision 2040 in the fourth quarter of 2015



## An overview

Our view of the future is always influenced by current events. What has changed in the trends since 2012?

1. **The global economy:** Economic influence continues to “shift east”, with ‘South-South’ trade surpassing ‘North-South’ trade. There is a growing global rhetoric of a “slow growth era” as developed economies struggle to recover and the blistering growth rates in emerging economies start to drop.
2. **Ocean governance:** Despite efforts to share best practices at the local and regional level, global ocean governance struggles to keep up with new areas of concern such as territorial disputes and new uses of marine resources such as deep sea mining.
3. **Demand for transparency:** Shipping companies are grappling with growing demands for transparency from charterers, ports and the world of social media at large.
4. **The future of energy:** A combination of regulations on polluting emissions, the mainstreaming of renewable energy on land and looming emission reduction targets has seen a further push to invest in alternatives to bunker fuel, with LNG gaining the most traction as a near-term solution.
5. **Sustainability regulation:** Most regulations affirmed, amended or further developed since 2012 come as no surprise, but growing public awareness and demands have seen regulations and commitments enforced more strictly.
6. **Advancing technology:** With a growing number of incentives for early adopters, there is more certainty around the uptake of viable technologies with the potential to improve sustainability - most of which were already available in 2012.
7. **Adapting to a changing climate:** Current knowledge about the impact of climate change specific to the maritime sector remains insufficient for identifying specific needs for change.

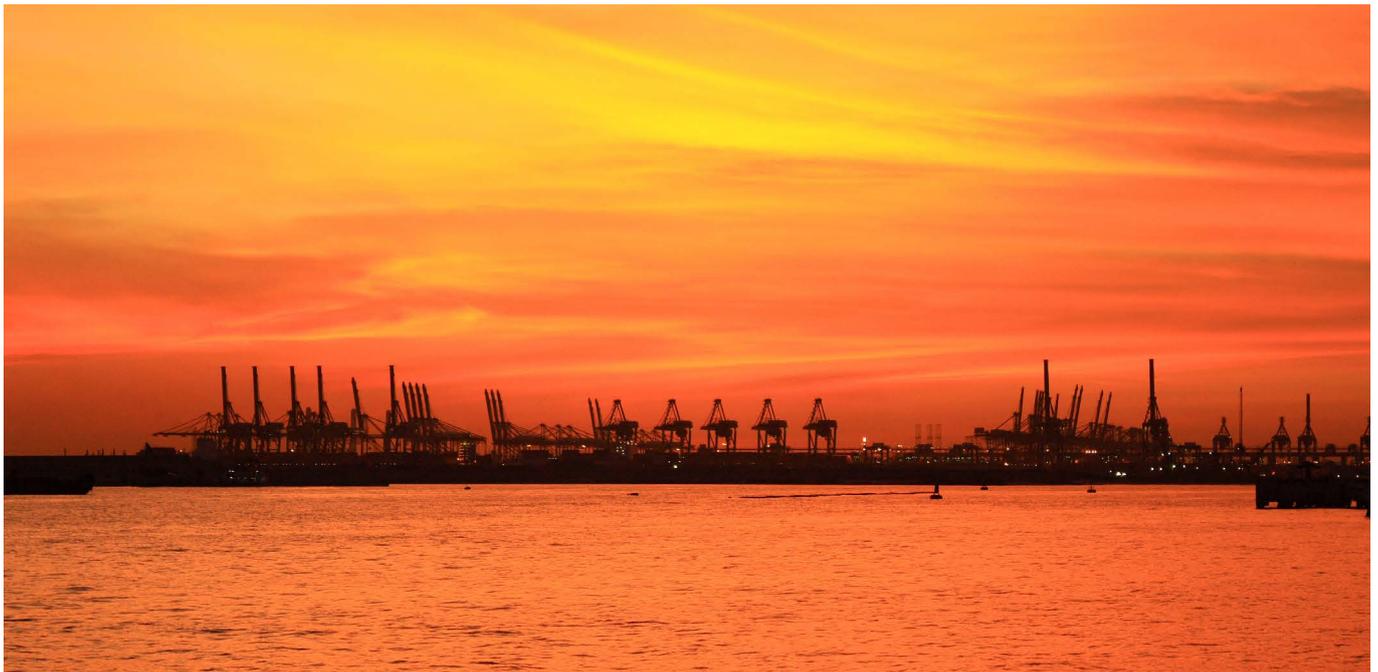


Image credit: Siva Davalan

While there have been no global shocks since 2012 that have reversed the trajectory of any particular trend, our 2015 perspective suggests that some global trends have moved quickly, while others remain uncertain or slow-moving.

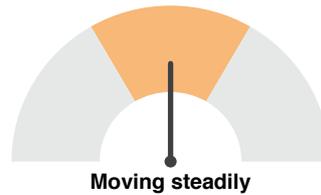
Global Trends	Rate of Change
<ul style="list-style-type: none"> <li>• Demand for transparency: At sea no longer means unseen</li> <li>• The future of energy: Investment in alternatives to oil accelerate</li> </ul>	<b>Moving quickly</b>
<ul style="list-style-type: none"> <li>• The global economy: “Shift east” continues even as growth slows in emerging economies</li> <li>• Sustainability regulation: Shipping sector makes steady progress</li> <li>• Advancing technology: Growing number of incentives for early adopters</li> </ul>	<b>Moving steadily</b>
<ul style="list-style-type: none"> <li>• Ocean governance: Governance struggles to keep up with new areas of concern</li> <li>• Adapting to climate change: More robust information needed in order to act</li> </ul>	<b>Moving slowly</b>

Some key observations:

- Higher expectations and increased scrutiny, enabled by a highly networked, social media savvy world, have pushed investors, shipping customers and in turn, ports and charterers to push for transparency in ship performance. This has in part resulted in incentives for the adoption of energy efficient technology and stronger enforcement of sustainability standards and regulations.
- Investment in alternatives to oil for the shipping sector is growing alongside the mainstreaming of renewables in the global energy system. These developments coincide with the rising influence of emerging economies, which are leading the way on clean energy growth, fuelling both the supply and demand.
- The long-term fate of global ocean governance remains as uncertain as before, with a complex patchwork of local regulatory frameworks looking increasingly likely. However, a multipolar world could still lead to greater support for international frameworks as more evenly balanced powers recognise the benefits of cooperation.
- Climate change is accelerating faster than expected. The impact of climate change specific to the maritime sector will require industry-wide attention beyond climate mitigation efforts, currently focused on reducing carbon emissions. Until shipping companies are able to quantify the economic consequences and needs for change in safe ship designs and operations, this remains an uncertain threat.

The following section explores developments in each trend and provides a quick assessment of the speed of change for each trend.

## 1. The global economy: “Shift east” continues even as growth slows in emerging economies



Even as economic growth in emerging markets has slowed,<sup>5</sup> the global balance of economic power continues to “Shift East”, most notably to the BRIC (Brazil, Russian, India and China) economies. ‘South-South’ trade surpassed ‘North-South’ trade in 2014,<sup>6</sup> as developed economies struggle with slow and uneven recoveries. China’s recent success in attracting traditional allies of the United States such as the United Kingdom, France and Germany to join its Asian Infrastructure Investment Bank (AIIB) – a proposed new institution viewed by some as a rival to the IMF, World Bank and ADB – has solidified its status as a rising global political and economic powerhouse.

### ***Dramatic change in conversation on oil***

In 2012, some commentators believed peak oil was around the corner, while others predicted a boom in oil production. The latter were proven right in late 2014, when global oil prices fell sharply due to a combination of weakened demand, a surge in oil production in the US, and OPEC countries choosing not to curb supply to maintain oil prices. This is having a ripple effect on different players in the shipping industry: liner companies will benefit initially from lower prices, but shipyards and specialist offshore equipment manufacturers for the oil and gas industry are vulnerable to reduced demand.

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**As of 2014 South-South trade exceeded North-South trade**  
*- World Economic Forum*

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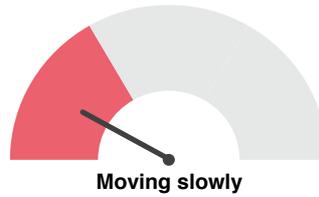
### ***Weakened demand from emerging economies***

The growth performance of emerging markets was less than expected in 2013 and 2014, which has negatively affected the shipping industry. Although this is not considered to be a long term trend, and further moderate growth is anticipated in 2015 and beyond, there is a risk that a slowdown in the growth of emerging economies could have a wider impact, including disrupting the financial recovery of Europe.

5 Financial Times (Oct 2014), “Emerging markets enter slow growth era”, <http://www.ft.com/cms/s/0/c64c6944-51f8-11e4-b55e-00144feab7de.html>

6 World Economic Forum (2014). The Global Enabling Trade Report. [http://www3.weforum.org/docs/WEF\\_GlobalEnablingTrade\\_Report\\_2014.pdf](http://www3.weforum.org/docs/WEF_GlobalEnablingTrade_Report_2014.pdf)

## 2. Ocean governance: Governance struggles to keep up with new areas of concern



In an increasingly globalised and interconnected world, how we manage shared spaces like the oceans is of paramount importance. In 2012, we observed a high level of uncertainty over the direction in which this will develop – can we expect a robust international regime, presenting a level playing field for all, or weak global governance and an increasingly complex tapestry of local regimes, industry codes of conduct and voluntary standards?

The past three years have not provided a clearer sense of direction than before, though a multipolar world seems increasingly likely (see trend 1). This has coincided with the rise in territorial disputes and claims, with the South China Sea and Arctic eyed by multiple states as political and economic levers. At the same time, the maritime sector is forging ahead on new frontiers such as seabed mining, autonomous vessels, and the charting of Arctic routes - all areas with a strong need for collaborative governance.

### ***Marine spatial planning receives increased attention***

Commendable efforts by the World Ocean Council in particular to publish, share and discuss case studies of best practices in Marine Spatial Planning (MSP) - a process which brings together multiple users of the ocean to make informed decisions about using marine resources - have led to a rise in awareness and the possibility to coordinate across local efforts at the regional level. The jury is still out whether such an approach can be pushed out internationally and enforced in equal measure across different regions.

### ***New frontiers require collaborative governance***

New areas of concern are rising up the agenda, and bringing the need for collaborative governance to the forefront – from seabed mining, to new navigation routes and to autonomous vessels roaming the ocean.

- In late 2014, IMO adopted the Polar Code, a set of mandatory safety and environmental protection regulations and non-mandatory provisions that covers all aspects of shipping in the Arctic and Antarctic areas. The Code is expected to be in force by January 2017.<sup>8</sup> The need for a strong polar code is perhaps highlighted by the recent decision by the US government to give Royal Dutch Shell the go-ahead to restart controversial oil exploration in the Alaskan Arctic.<sup>9</sup>
- Seabed mining, a closely watched, if relatively unexplored territory, is also set to emerge soon as a significant new use of the world's oceans. The International Seabed Authority (ISA) has granted 19 exploration licences, and the first commercial deep-sea mining project is expected to start operations within the next five years.<sup>10</sup>

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**Global institutions have insufficient resources to address catastrophic environmental and humanitarian issues, and no single institution can solve complex global problems. The onus to take action is shifting to businesses.<sup>7</sup>**

***- The Futures Centre***

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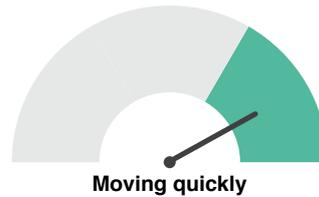
<sup>7</sup> The Futures Centre (2015), Global Governance, <http://thefuturescentre.org/trend-cards/155/global-governance>

<sup>8</sup> IMO (November 2014), IMO adopts mandatory Code for Ships Operating in Polar Waters, <http://www.imo.org/MediaCentre/PressBriefings/Pages/38-nmsc94polar.aspx>

<sup>9</sup> Reuters (April 2015), US re-approves oil exploration in Arctic as Shell prepares to resume drilling, <http://rt.com/usa/245749-shell-arctic-oil-exploration-reopened/>

<sup>10</sup> Futures Centre (March 2015), Seabed mining: 19 exploration licences and the first commercial project, <http://www.thefuturescentre.org/signals-of-change/3074/seabed-mining-19-exploration-licences-and-first-commercial-project>

### 3. Demand for transparency: At sea no longer means unseen



The maritime sector has arguably yet to feel the full impact of “ultra-transparency”. However, this is changing and will continue to change dramatically. With the rise of social media and data availability throughout the supply chain, shipping is ever more subject to scrutiny. The last few years have seen shipping companies needing to grapple with growing demands for transparency from charterers, ports and the world of social media at large. Down the road, ever-tougher questions will need to be answered as retailers move towards full supply chain transparency. Monitoring and tracking technology is already exposing data on the behaviour of fishing vessels. At sea no longer means unseen.

The 29 September 2014 collision of Hapag-Lloyd’s MV Colombo Express and MV Maersk Tanjong in the Suez Canal is a good example of the new power of social media. The collision was captured on video, apparently filmed from a third vessel, was then picked up by numerous online media sites and went viral, garnering millions of views overnight. Social media and mobile connectivity have developed rapidly since 2012, and show no signs of slowing down.

#### **Transparency increasingly part of licence to operate**

In our report [Driving Transformational Change through the Value Chain](#) released in 2014, the SSI highlighted how forward-looking companies such as AkzoNobel, Cargill, Wal-Mart, IKEA and Nike are applying beyond-compliance rating schemes including the Clean Shipping Index (CSI) and RightShip’s GHG Emissions Rating to their procurement processes.<sup>11</sup> Charterers are financing and pushing for the installation of ship performance monitoring technology, which equips them with a potential bargaining tool for more efficient ships, while helping to gather key information required for various reporting standards.<sup>12</sup>

#### **Early examples demonstrate marine “Internet of Things”**

Widespread deployment of cheap, connected sensors is also hinting towards a future marine Internet of Things. Early examples include the Whale Alert 2.0 app is already used to alert ship masters of protected zones, and allows the public to monitor and upload whale-sighting data, and Global Fishing Watch, a collaboration between Google, Oceana and SkyTruth, which shows where and when fishing is happening, allowing anyone to spot illegal activity.

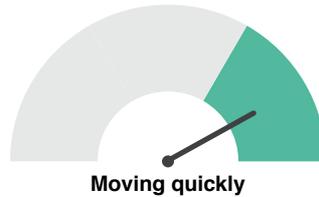


Image credit: Deepwater Horizon Response

11 Sustainable Shipping Initiative (November 2014), *Driving Transformational Change through the Value Chain: How customers are raising the bar for the entire shipping industry*, [http://ssi2040.org/wp-content/uploads/2014/11/SSI\\_SustainableShipper\\_final-041114.pdf](http://ssi2040.org/wp-content/uploads/2014/11/SSI_SustainableShipper_final-041114.pdf)

12 Fathom (September 2014) *Transparency in the Eyes of Charterers*, <http://shipandbunker.com/news/features/fathom-spotlight/837682-fathom-spotlight-transparency-in-the-eyes-of-charterers>

#### 4. The future of energy: Investments in alternatives to oil accelerate



On land, alternative fuels are maturing: overcoming early obstacles such as sustainable supply to demonstrate their mainstream potential. More countries are reaching grid parity for renewable energy sources – notably solar and wind. New applications of nanomaterials are spurring the next wave of innovation in energy efficiency across different industries. In the short run, low oil prices are reducing the financial incentive to switch away from fossil fuels, yet most business leaders agree that reducing carbon emissions will become mandatory sooner rather than later.

##### ***LNG becomes a real proposition***

Since 2012, there have been significant developments in liquefied natural gas (LNG), the “least bad” of fossil fuels. Ship builders are already preparing for fuel shifts, with an initial focus on LNG. In November 2014, the United Arab Shipping Company (UASC) announced the world’s first LNG-ready ultra large container vessel. As of 2014, there are already over 100 LNG vessels in operation globally, and DNV GL forecasts 1,000 on the seas by 2020.<sup>13</sup>

##### ***Investments in biofuel research on the rise***

A slew of biofuel partnerships and investments in the aviation industry in 2014 indicate biofuels may be ready to scale. This will place growing pressure on the shipping industry to do the same, or find alternative means to cut emissions. In the longer term, oil and gas companies are investing in next generation biofuels, which have a smaller environmental footprint than existing fuels. Biofuels from advanced feedstocks such as lignocellulosic crops and algae that could be blended with existing fuels to further reduce emissions are currently being researched.

##### ***COP21 and a renewable energy future***

In 2013, two significant carbon reduction regulations came into force: the Energy Efficiency Design Index (EEDI) made mandatory for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) made a requirement for all ships,<sup>14</sup> representing the first ever mandatory emissions-related regulations for the shipping industry.<sup>15</sup> While progress has been made in the absence of a binding and universal agreement on carbon emissions, this has often been pointed out as the elephant in the room when it comes to industry commitment to renewable energy investments. The somewhat unexpected US-China Joint Announcement on Climate Change and Clean Energy Cooperation,<sup>16</sup> made in November 2014, has sparked renewed confidence in the upcoming United Nations Climate Change Conference (COP21). In early 2015, the negotiating text for COP21 took an important step forward by including a call for further, absolute emission reduction target for international shipping.<sup>17</sup> For shipping, this could mean a boost for the proposal to introduce carbon levies or carbon trading.

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13 DNV GL, Blikom, Lars Peter, <http://blogs.dnvgl.com/lng/>

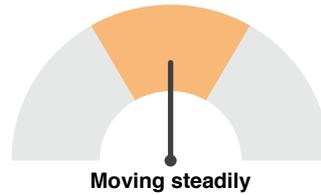
14 IMO, Energy efficiency and the the reduction of GHG emissions from ships, <http://www.imo.org/MediaCentre/HotTopics/GHG/Pages/default.aspx>, Accessed April 2015.

15 Sustainalytics (July 2013), Emission Reduction in the Shipping Industry: Regulations, Exposure and Solutions, [http://www.sustainalytics.com/sites/default/files/shippingemissions\\_july2013.pdf](http://www.sustainalytics.com/sites/default/files/shippingemissions_july2013.pdf)

16 The White House (November 2014) FACT SHEET: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation <https://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c>



## 6. Advancing technology: Growing number of incentives for early adopters



When SSI members started on their journey, there was already no shortage of viable technologies available for companies across the shipping value chain to reduce costs, improve efficiency and increase the flexibility of sector to meet future regulations.

### Wind-assisted propulsion inches forward

One innovation identified in our Case for Action report was SkySails, a propulsion system that uses a kite to harness wind energy, towing the vessel and so decreasing fuel consumption. Though SkySails has not had further successful trials since 2011,<sup>20</sup> it has drawn significant attention to the viability of wind propulsion technologies applied to commercial shipping. Earlier this year, Lloyd's Register released an independent report examining the four main types of wind-assisted propulsion technologies applicable to commercial shipping, and key barriers to overcome.<sup>21</sup> One such technology is modernised versions of the Flettner rotor, which uses wind-assisted cylindrical rotating masts to propel ships forward, reducing engine output by around 28%.<sup>22</sup> In late 2014, Finland's Bore Shipping started sea trials of a rotor sail auxiliary wind propulsion system developed by Norsepower.<sup>23</sup> 2014 also saw the formation of the International Windship Association to encourage, advise and advocate for the use of wind propulsion technologies in the shipping industry.<sup>24</sup>

### Incentivising efficiency-related technologies

The key uncertainty with new technologies will always be in their validation and uptake, rather than in their technical performance. What has changed since 2012 is the uptick in investors, customers, charterers, ports and local authorities who are incentivising energy efficiency, and reporting processes and schemes that allow for comparative assessment.

- Barbados Port announced in November 2014 that it is joining a growing community of worldwide ports that are utilising the RightShip and Carbon War Room's Greenhouse Gas Emissions Rating system to reward sustainable ships.<sup>25</sup> The Port of Rotterdam also announced in late 2014 that it has started to explore incentives for low-carbon vessels.
- In February 2015, the Liberian Registry, the world's second-largest flag state for ships, committed to offering tax discounts of up to 50% for vessels retrofitting energy efficiency technologies.<sup>26</sup>
- In 2013, Bunge, a global agribusiness company, shared that it has saved around 10,000 MT of fuel oil per annum by working with ship owners to run vessels more economically and where possible, upgrade vessels with retrofit technology ranging from high efficiency propeller systems, low friction paint, to engine upgrades.<sup>27</sup>

20 Chris Lo (December 2013), SkySails: bringing wind back to ship propulsion, <http://www.ship-technology.com/features/feature-skysails-bringing-wind-back-ship-propulsion/>

21 Lloyd's Register Marine (February 2015), Wind-powered shipping: A review of the commercial, regulatory and technical factors affecting uptake of wind-assisted propulsion, <http://www.lr.org/en/marine/technology-and-innovation/technology/windpoweredshipping.aspx>

22 Almeida, Rob (29 May 2014), For Sea Captains, Flettner Rotors May Make Their Job More Tactical in Nature, <http://gcaptain.com/tankers-outfitted-giant-spinning-cylinders-see-huge-efficiency-gains-sea/>

23 Norsepower (1 December 2014), Norsepower starts sea trials of an auxiliary wind propulsion system that maximizes cargo ship fuel efficiency, <http://www.norsepower.com/SiteAssets/news/Norsepower%20Press%20release%202014-12-01%20EN%20SE%20FI.pdf>

24 International Windship Association <http://wind-ship.org>

25 Carbon War Room (December 2014) <http://carbonwarroom.com>

26 Nichols, Will (6 March 2015), Liberia makes waves with greener shipping plan, <http://www.businessgreen.com/bg/feature/2398324/liberia-makes-waves-with-greener-shipping-plan>

27 Sustainable Shipping Initiative (November 2014), Driving Transformational Change through the Value Chain: How customers are raising the bar for the entire shipping industry, [http://ssi2040.org/wp-content/uploads/2014/11/SSI\\_SustainableShipper\\_final-041114.pdf](http://ssi2040.org/wp-content/uploads/2014/11/SSI_SustainableShipper_final-041114.pdf)

## Energy efficient technologies come to fruition

Air lubrication systems reduce the resistance between ship hulls and seawater using air bubbles, thereby cutting fuel consumption. This technology has been tested since the late 2000s, and is starting to gain traction. Mitsubishi Heavy Industries (MHI) is due to deliver three dry bulk carriers, which utilise a range of energy saving technologies, including its Mitsubishi Air Lubrication System, to reduce CO<sub>2</sub> emissions by up to 27%.<sup>28</sup> Silverstream Technologies, which has invested significantly in the research and development of the technology over a decade, successfully conducted sea trials of its Silverstream® System with Shell in February 2015. Lloyd's Register independently verified that the technology achieves 4.3% fuel savings with scope for further improvement.<sup>29</sup>

Telematics, which uses wireless devices to track real-time data on vehicle behaviour and performance, has transformed the transportation sector on land. Uptake in the shipping sector has been slower due to higher upfront expenses and the limited communication bandwidth on maritime satellite channels. Driven by a greater need for transparency and accountability (see trend 3), and improvements in satellite technology, "big data" in shipping is on track to grow exponentially. Maritime Reporter & Engineering News reported in late 2014 that "the last five years have seen a significant rise in new starts-ups entering the maritime space offering automated ship to shore solutions combined with sophisticated data analytics to improve ship performance levels."<sup>30</sup>

Further on the horizon are significant technological advancements beyond the maritime sector that may have an impact on shipping by altering its role within the global economy. Our Signals of Change report released in March 2015 identified self-adaptive materials and mainstream adoption of 3D printing as examples to watch.<sup>31</sup>

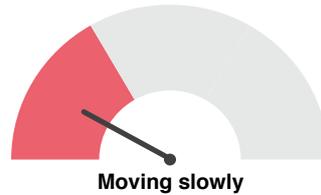
28 Maritime Information Centre (29 October 2014), MHI bulk carrier reduces CO<sub>2</sub> emissions by 27%, <http://www.micportal.com/2014/10/29/mhi-bulk-carrier-reduces-co2-emissions-27/>

29 Ship & Bunker (5 February 2015) Silverstream Air Lubrication System Shows 4.3% Bunker Savings, Gets LR Approval, <http://shipandbunker.com/news/world/893496-silverstream-air-lubrication-system-shows-43-bunker-savings-gets-lr-approval>

30 Rhodes, Jim and Soccoli, Frank (11 September 2014), Shippers Must Reduce Costs, Boost Efficiency, <http://www.marinelink.com/news/efficiency-shippers376978.aspx>

31 Sustainable Shipping Initiative (March 2015) Signals of Change – Looking at the potential impact of emerging signals of change on the future of sustainable shipping <http://ssi2040.org/wp-content/uploads/2014/10/SSI-Signals-of-Change-March-2015-Digital-Final.pdf>

## 7. Adapting to climate change: More robust information needed in order to act



We are currently on an emissions pathway consistent with the 'worst case' scenario from the Intergovernmental Panel on Climate Change, which forecasts a possible global average temperature rise of 1.5 degrees by 2040.<sup>32</sup>

The impact on the shipping industry is likely to be significant and widespread, including sea level rise, the opening of new shipping lanes due to melting ice caps, and changing global trade patterns. Current knowledge about climate change and hazards specific to the maritime sector remain insufficient for quantifying the economic consequences and specific needs for change in safe ship designs and operations.

### **Investigations into adaptation measures kick-off**

DNV GL identified a number of adaptation challenges and opportunities specific to the shipping industry. This includes extreme temperatures, sea level rise, storms, floods and wave heights, which will each affect yard operations, port operations and ship operations. Adaptation measures range from better forecasting of extreme events to improving the resilience of infrastructure; for instance, higher sea walls and new tanker designs are being explored to deal with increased wave heights.<sup>34</sup>

A recent DNV GL study quantified how an increase in the height of extreme waves will pose as a risk for existing tanker designs. Results show that when significant wave height goes up by 1 meter, reliability is maintained if the amount of steel in the deck is increased by about 5 to 7%.<sup>33</sup>



Image credit: Louis Vest

<sup>32</sup> IPCC (2014) Fifth Assessment Synthesis Report

<sup>33</sup> DNV GL (2014) Adaptation to climate change: Maritime Case Study, Tanker Design <https://www.dnvgl.com/technology-innovation/broader-view/adaptation-to-climate-change/cases/maritime.html>

<sup>34</sup> DNV GL (2014) A Broader View: Adaptation to a changing climate [http://issuu.com/dnvgl/docs/dnv\\_gl\\_-\\_adaptation\\_to\\_a\\_changing\\_c](http://issuu.com/dnvgl/docs/dnv_gl_-_adaptation_to_a_changing_c)

# Monitoring trends to identify opportunities for action

A refreshed perspective on the global trends identified in 2012 has revealed that while transparency and accountability have moved quickly and there is a real shift towards the uptake of alternatives to oil, the long-term fate of global ocean governance remains as uncertain as before. Climate change is accelerating faster than expected, and there is a need for the shipping sector to pay greater attention to what might be needed in terms of adapting ship designs and operations to ensure safety in the face of extreme weather patterns.

What opportunities do these insights present for the shipping sector in moving towards to a sustainable sector by 2040?

The value of trend monitoring lies in identifying opportunities for action. Areas of high potential indicate where a small amount of investment or effort might tip the scales, and areas of high risk indicate where urgent action is most needed. Trend monitoring also exposes potential blind spots - areas where change is happening quickly, which we may have missed or deprioritised previously.

There is a need to delve deeper into specific sub-trends and indicators that can act as a proxy to understand how far along the shipping sector is moving towards the desired 2040 outcome that SSI has set.

To do this, SSI is launching the Future of Shipping topic hub on the Futures Centre, in partnership with Forum for the Future. The online portal will enable the shipping industry to collectively monitor for signals of change with the ultimate aim of finding opportunities for the SSI and the wider industry to accelerate progress towards the SSI Vision 2040.

The digital platform will enhance horizon scanning and trend monitoring by gathering and sharing knowledge with individuals and networks interested in the future of sustainable shipping around the world.

## Topic hubs on the Futures Centre

Developed by Forum for the Future, the Futures Centre uses the collaborative potential of the digital world to help make the big shift to a sustainable future.

Topic hubs on the Futures Centre are areas where businesses, non-profit organisations, and individuals can collectively monitor the future of a specific area of interest. Participants can gain a better understanding of how change is happening and its future implications through discussion, horizon scanning and exploring the convergence of future trends.

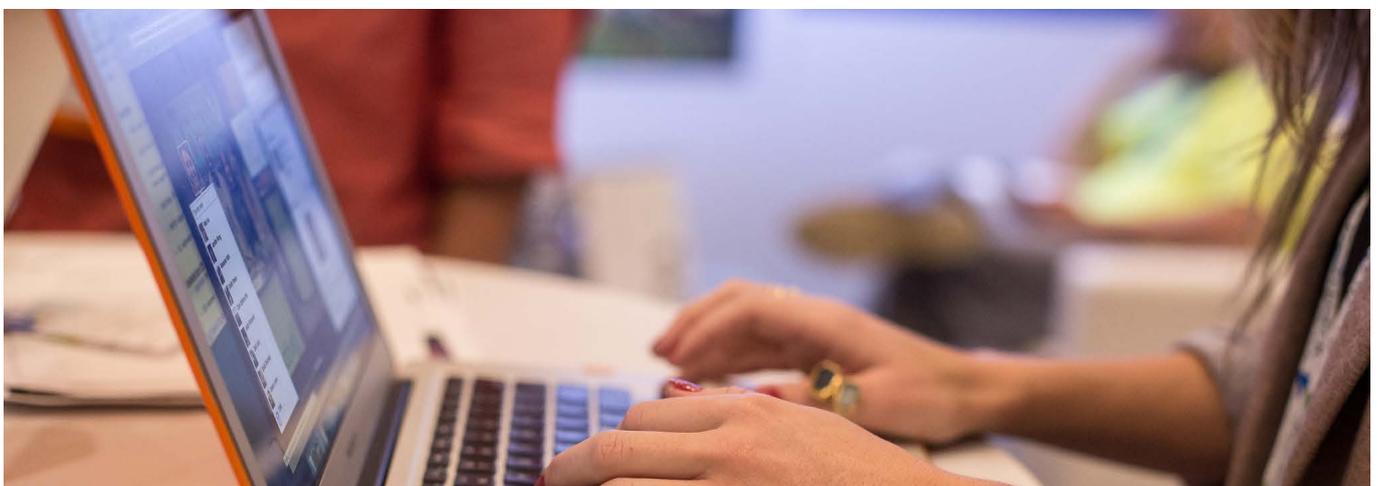


Image credit: Kris Krüg

## Monitoring areas of high potential

On the Future of Shipping topic hub, we will monitor more closely sub-trends within areas of high potential, with a view to acting to accelerate change towards Vision 2040 in areas that are already relatively dynamic. As an example:

SSI Vision Statement	Trends analysis	Sub-trends to consider
Transparency and accountability drive performance improvements and enable better, sustainable business decision-making	Higher expectations and increased scrutiny, enabled by a highly networked, social media savvy world, have pushed investors, shipping customers and in turn, ports and charterers to push for transparency in ship performance. This has in part resulted in incentives for the adoption of energy efficient technology and a stronger enforcement of sustainability standards and regulations.	<ul style="list-style-type: none"> <li>Shipping customers publicly factoring sustainability performance into commercial decisions</li> <li>Rating schemes moving from assessing ship design to ship operation</li> <li>Finance and insurance decisions considering performance on sustainability rating scheme</li> </ul>

## Monitoring areas of high risks

We will also monitor areas of high risk, where inaction or uncertainty might unravel efforts in other areas and constitute barriers to achieving Vision 2040. This would allow us to identify barriers to change and take a targeted course of action to tackle them. As an example:

SSI Vision Statement	Trends analysis	Sub-trends to consider
Proactively contributing to the responsible governance of the oceans.	The long-term fate of global ocean governance remains as uncertain as before, with a complex patchwork of local regulatory frameworks looking increasingly likely. However, a multipolar world could still lead to greater support for international frameworks as more evenly balanced powers recognise the benefits of cooperation.	<ul style="list-style-type: none"> <li>Progress on marine spatial planning and natural capital accounting</li> <li>Maritime industries (e.g. Oil &amp; Gas, Wind) being represented alongside shipping companies to enable participation in ocean governance processes</li> <li>Enforcement of existing and new sustainability regulations</li> <li>Pilot programmes to address piracy at source</li> </ul>

## Discovering potential blind spots

Revisiting the global trends has also highlighted a couple of potential blind spots, which will be taken forward in discussions where SSI decides on its areas of focus.

### ***Understanding changes in the global workforce***

Members of the shipping profession do not typically identify changes in the global workforce, the future of work, or the rise of “millennials” as trends that are highly material to the sustainability of the shipping sector. Yet the ability to attract good and competent talent is often held up as one of the key mid-term challenges for the sector. Our Vision 2040 statement includes “Providing safe, healthy and secure work environments so that people want to work in shipping, where they can enjoy rewarding careers and achieve their full potential.”

There is a need to better understand changing expectations of the global workforce and its impact on the shipping sector. It is also important to explore the drivers behind changing expectations, what strengths and weaknesses are currently associated with the shipping sector, and how this might evolve in the future. This ties in with a theme identified in the recent SSI [Signals of Change](#) report, where signals that indicate changing shareholder expectations and the rise of automation led us to question “Who will be future captains of the sea?”

### ***Climate adaptation – what needs to be done?***

Relative to the agriculture and infrastructure sectors, the shipping industry perceives itself as less vulnerable to the impact of climate change, with the possible exception of ports exposed to climate extremes. Yet until shipping companies are able to quantify the economic consequences and needs for change in safe ship designs and operations, climate change will remain an ill-defined threat to safety lurking on the horizon. The SSI and its member companies have the opportunity to take the lead in this area if it determines this to be crucial to a sustainable shipping sector in 2040.

These are the types of conversations we would explore on the Future of Shipping topic hub. We invite shipping professionals, practitioners, students and enthusiasts (such as the readers of this report) who are interested in the future of sustainable shipping, to engage with members of the SSI via the platform. The Future of Shipping topic hub can be accessed at [www.thefuturescentre.org/topic-hubs/shipping](http://www.thefuturescentre.org/topic-hubs/shipping).

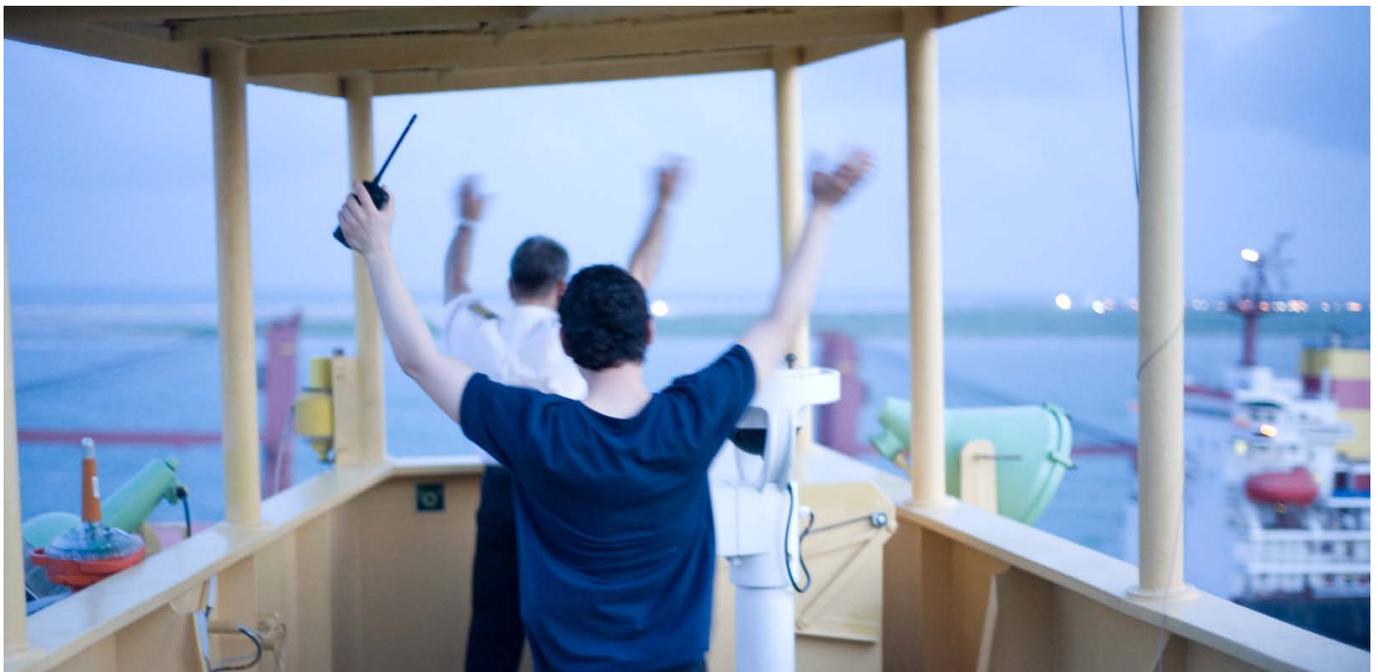


Image credit: Louis Vest

# About the Sustainable Shipping Initiative

The Sustainable Shipping Initiative (SSI) is an ambitious coalition of shipping leaders from around the world, which is taking practical steps to tackle some of the sector's greatest opportunities and challenges and achieve a vision of a shipping industry that is both profitable and sustainable by 2040.

SSI members are leading companies from around the world and NGOs Forum for the Future and WWF. The cross-industry group represents ship owners and charterers, shipbuilders, engineers and service providers, banking, insurance, and classification societies.

[www.ssi2040.org](http://www.ssi2040.org)

# About Forum for the Future

Forum for the Future is an independent non-profit working globally with business, government and other organisations to solve complex sustainability challenges. Our Futures Centre uses the collaborative potential of the digital world to help make the big shift to a sustainable future. By tracking trends, sharing resources, and stimulating dialogue, we can explore how change is unfolding and make considered choices about what we do today for better outcomes tomorrow.

The Futures Centre features topic hubs, areas where businesses, non-profit organisations, and individuals can collectively monitor the future of a specific area of interest. Participants can gain a better understand of how change is happening and its future implications through discussion, horizon scanning and exploring the convergence of future trends. Our first topic hub explores the future of shipping.

[www.forumforthefuture.org](http://www.forumforthefuture.org)  
[www.thefuturescentre.org](http://www.thefuturescentre.org)

If you want to get involved  
in the SSI, or want to find  
out more:

**W:** [www.ssi2040.org](http://www.ssi2040.org)

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