DNV·GL

# ENERGY TRANSITION OUTLOOK 2017

# Maritime Forecast to 2050

December 2017

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# Introduction

- In September, DNV GL issued the *Energy Transition Outlook* forecasting the world's energy future through to 2050
- Shipping is a vital part of the world's transport system, and the energy future holds significant impact for the future of shipping
- We use the independent DNV GL model of the energy future to give a forecast for maritime trade growth

# Key inputs

- **Economic growth**: Gross World Product (GWP) will grow 130% by 2050 (from 2015)
  By mid-century, even today's rapidly growing emerging economies will experience significantly slower growth as their economies de-industrialize and become more service orientated

- **Population**: projected global population in 2050 of 9.2 billion
  This is 6% lower than the latest (2017) UN median forecast, and reflects our view that rapid urbanization and rising education levels will lead to more sharply declining fertility levels

- **Learning Curves:** forecast average cost reduction per doubling of installed capacity - wind 16% solar PV 16%
  Non-renewable energy sources have shown impressive cost cuts in recent years, but installed capacity of such sources will not expand at the same rate as renewable sources; hence a lower cost-learning curve effect

- **Global energy intensity:** decline in units of energy required per units of GDP will improve from an historical average 1.4%/yr to 2.5%/yr
  This is linked to many technology and usage efficiency gains, but is mainly the result of the rapid electrification of the world's energy system, driven by efficient renewables

# Maritime ETO Key conclusions (1/2)

- The world energy system undergoes a major transition towards 2050 and will have significant implications for shipping
- Overall the demand for seaborne transport will increase by 60% by 2050 with the pace of growth being highest up to 2030

# Maritime ETO Key conclusions (2/2)

- Seaborne transport growth varies significantly between shipping segments:
  - Bulk transport will grow towards 2050, but with notable cargo differences
  - Oil transport will grow towards 2030, and thereafter decline towards mid century
  - Gas transport will grow throughout the forecast period and gas will be the single largest energy source from 2034 onwards
  - Container growth, closely linked to GDP growth, is solid during forecast period
- Seaborne transport growth will be strongest in the Asian and African regions

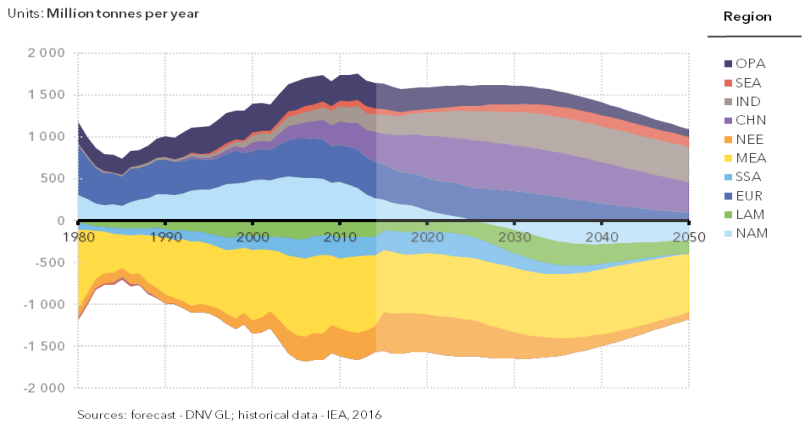
# The ETO study gives us an unique insight into…

- Trade in commodities between and within 10 regions towards 2050.

- We provide a long term outlook for:
  - Crude oil
  - Oil products
  - Gas
  - Bulk cargo
  - Containerized cargo
  - Offshore

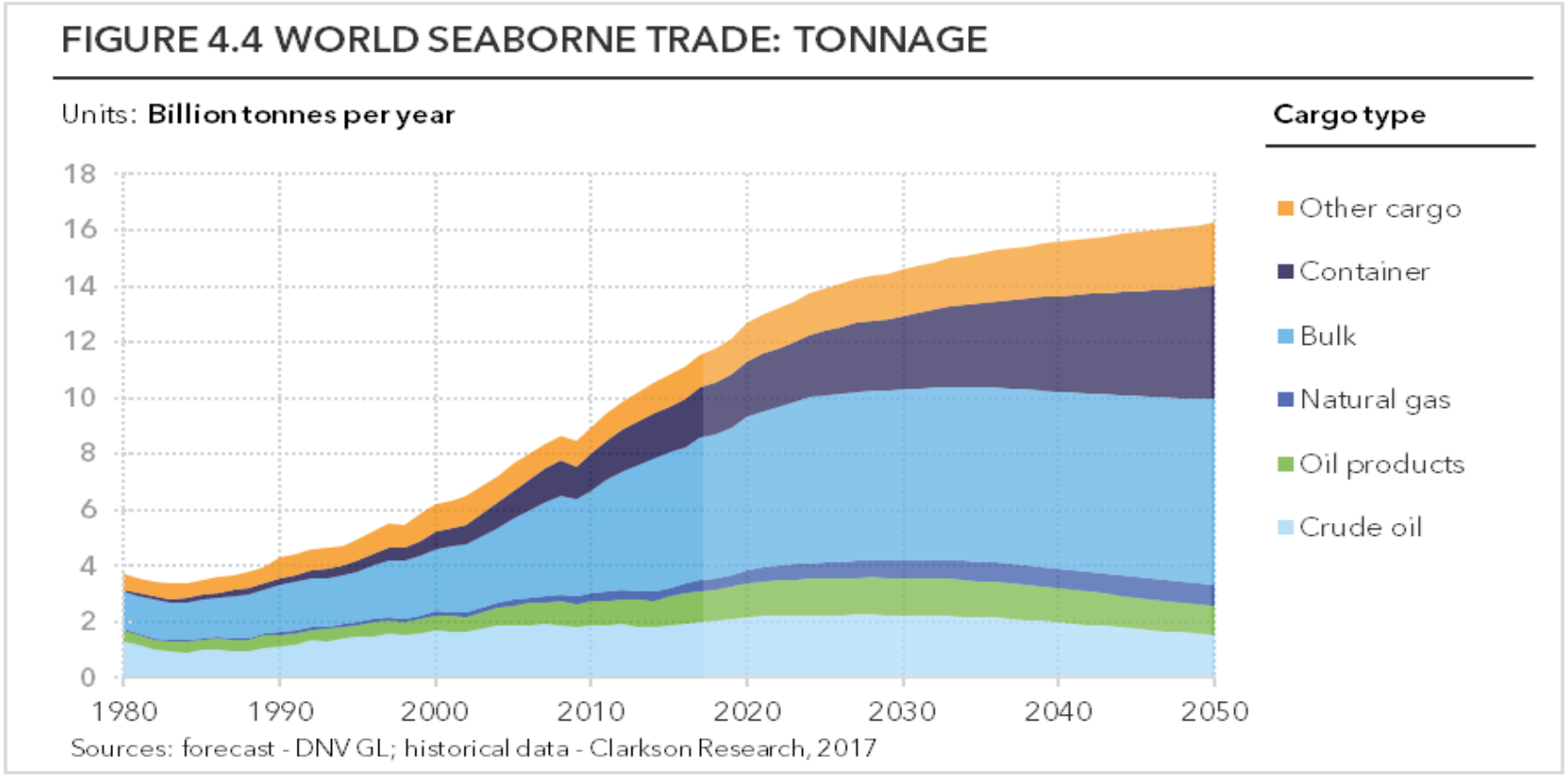
- The shipping impacts are derived from the DNV GL Energy Transition Outlook

FIGURE 4.7 REGIONAL NET CRUDE OIL IMPORTS




Sources: forecast - DNV GL; historical data - IEA, 2016

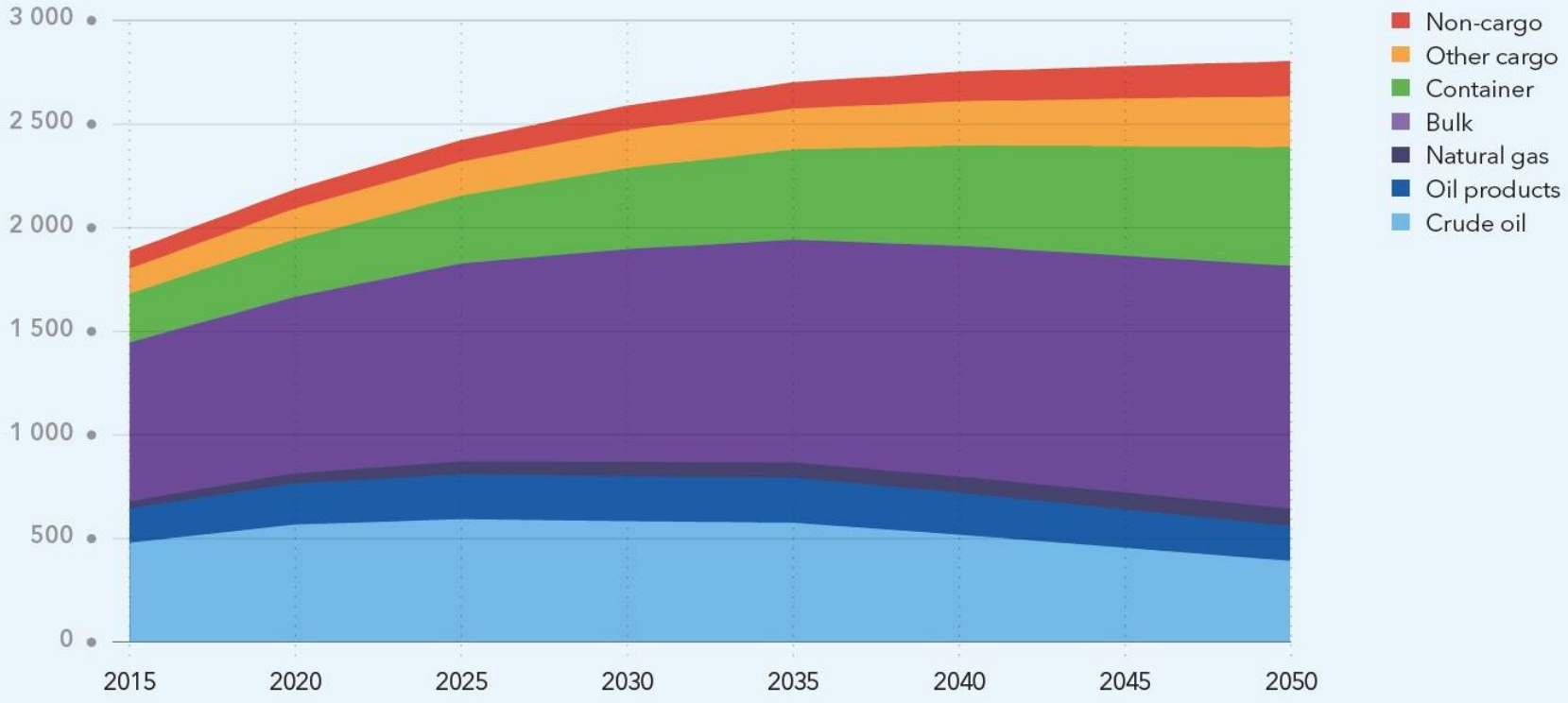
# Demand for seaborn transport will grow 60% 2050




Average growth of 2,2%/yr to 2030, then 0.6%/yr towards 2050

# Maritime fleet to grow, but slower than trade growth due to digitalization and assumed improved utilization

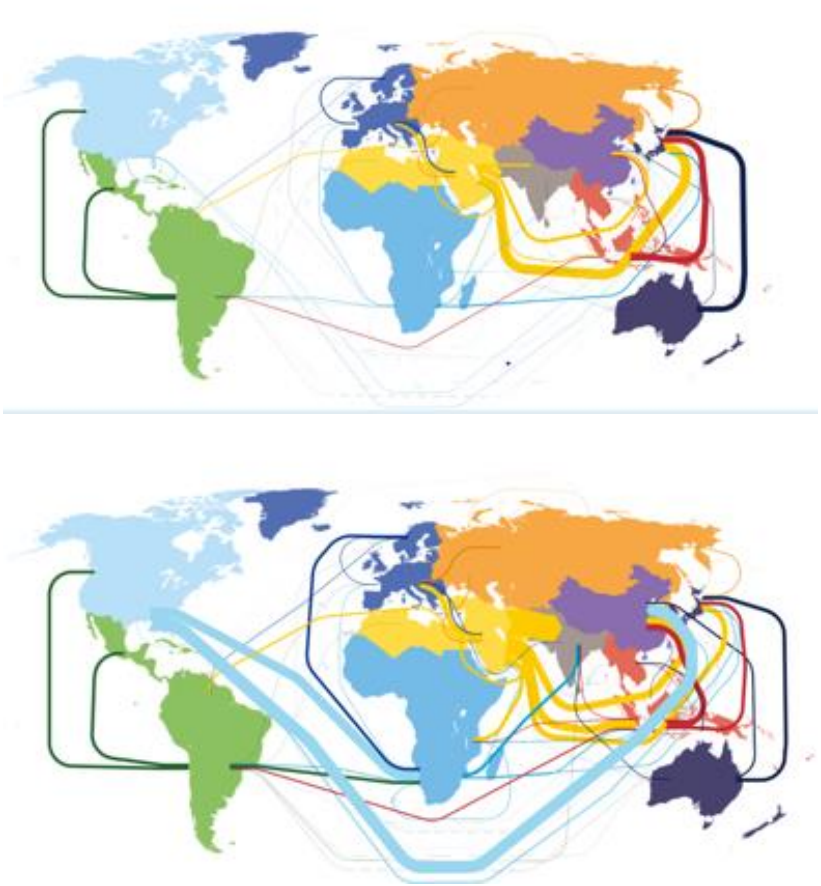
**FIGURE 1.3 FLEET DEVELOPMENT 2015-2050 BY SEGMENT**




Source: DNV GL

# Trade growth will be strongest in the Asian regions

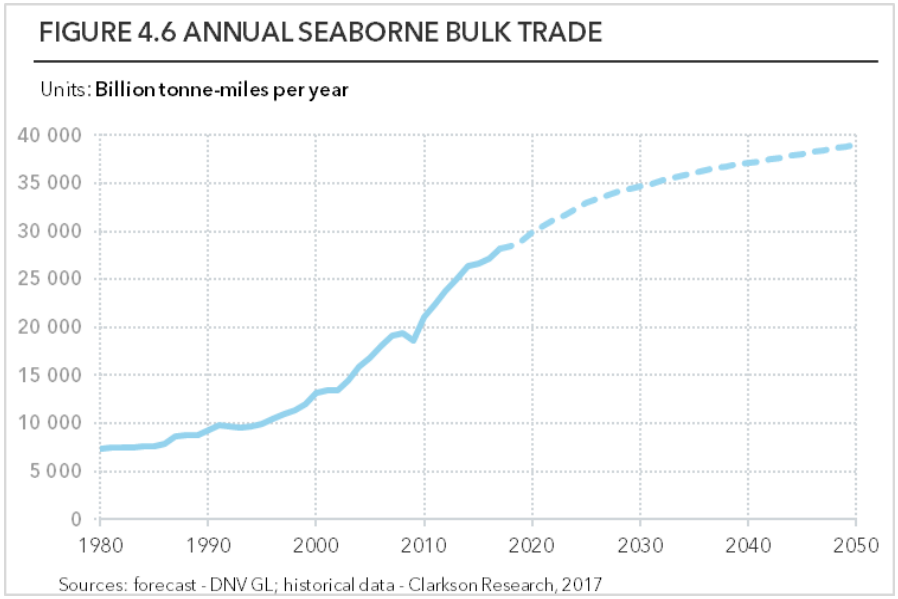
4.10 Inter- and intra-regional seaborne natural gas trade



- Trade growth is strongest in the Asian regions: China, India, South-East Asia, plus Africa
- New trade patters, such as oil and gas trade from the shale developments in North America will emerge

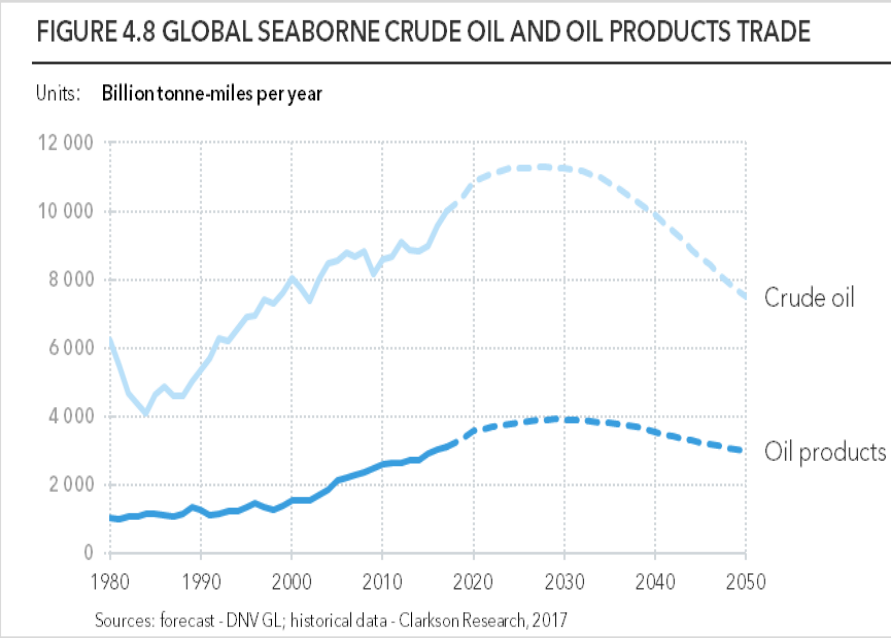
- Our Energy Transition model, with 10 regions, gives detailed regional analysis of supply and demand
- Trade patterns can be analyzed in detail, as shown here for gas

# Bulk transport continues to grow, but with notable cargo differences



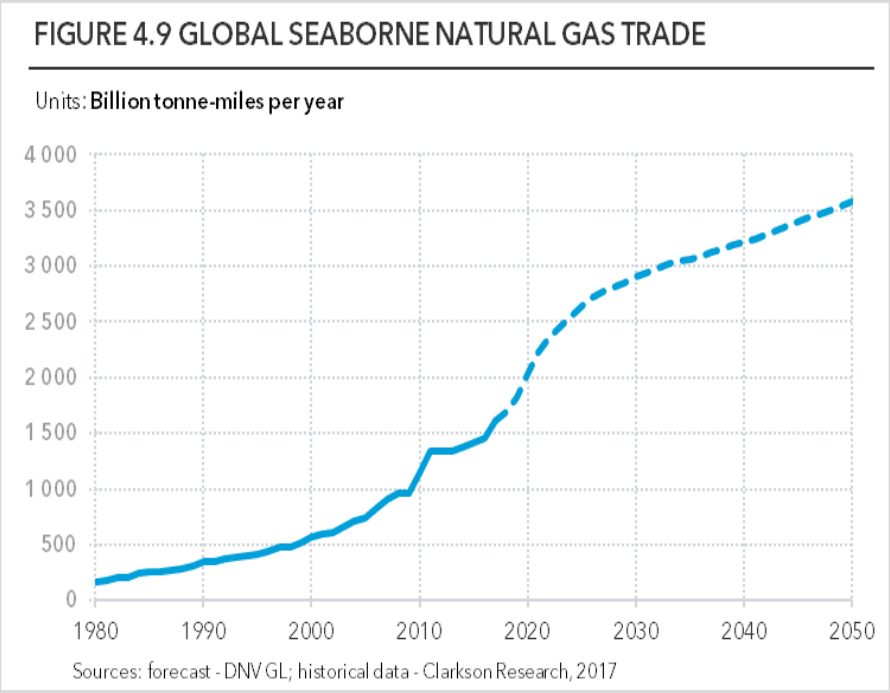

- World coal consumption to decrease, shipping will follow, but share of domestic production in India and China is crucial for shipping
- Iron ore and minor bulk growth slows after 2030, but electrification will give rise to increased transport of copper, lithium and other related materials
- Grain will grow significantly in the period

# Oil transport will grow towards 2030, and thereafter decline



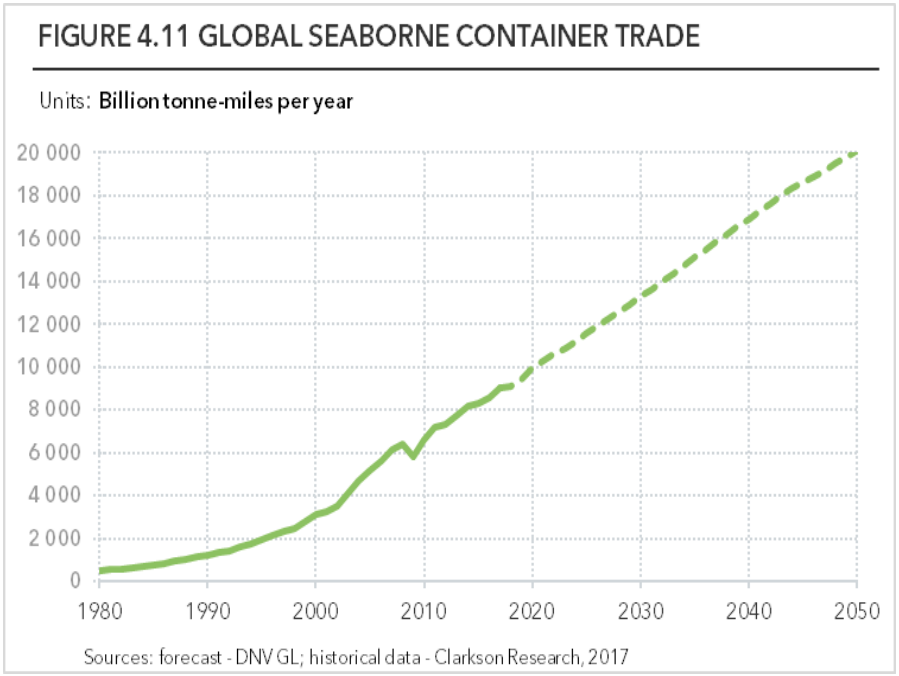

- World oil consumption to peak in 2020s, thereafter decline
- Majority of world oil is transported on keel
- Trade patterns will change, shale oil transport from Americas grows, Middle East remains a large exporter and Asian imports increase

# Gas transport will grow throughout the forecast period, as gas takes over as the largest energy source




- World gas demand to grow until 2035, and gas takes over as the largest energy source
- Share of gas that is transported on keel is constantly increasing, driven by changing geographical patterns and energy security considerations
- New patterns add to existing trade, US exports grow and imports into India and China increase

# Container growth is solid, closely following GDP growth



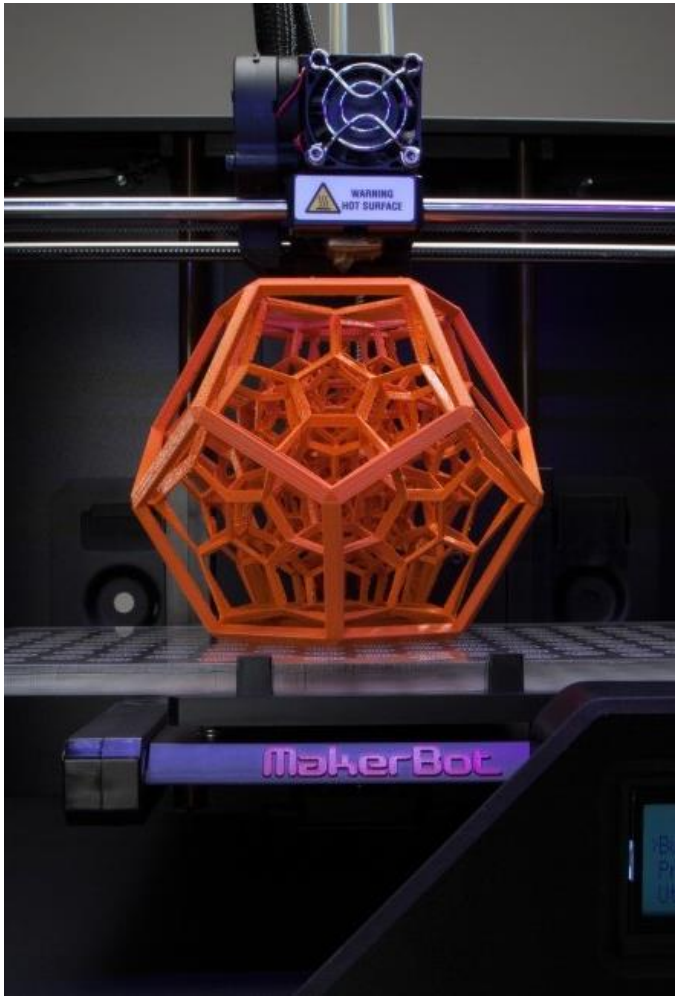

- Main driver is GDP growth with an average of 2.4% yearly growth
- Trade multiple of 1.1 times GDP expected, with increased containeri-sation, but over time also influenced by 3D Printing and automation
- Trade across all world regions is expected to increase. Strongest growth is inter-Asia trade, with India having the highest export growth

# Offshore shipping activity will reduce in the forecast period


- Offshore shipping activity related to new oil and gas field developments will likely more than halve
- Reduced activity for existing oil and gas fields is also expected
- Offshore wind will grow strongly and is an important new market
- Aquaculture, decommissioning and other emerging marine activities will stimulate new shipping activity

# These factors included in our forecast should be watched closely

- New commodity flows
  - Biofuel and new raw materials needed in the energy transition
- Environmental awareness and decarbonization
  - Policy, future $CO_2$ regime
- Digitalization
  - Additive manufacturing, automation
- Recycling
  - Circular economy
- Innovation
  - Innovative ship design, new operating models



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