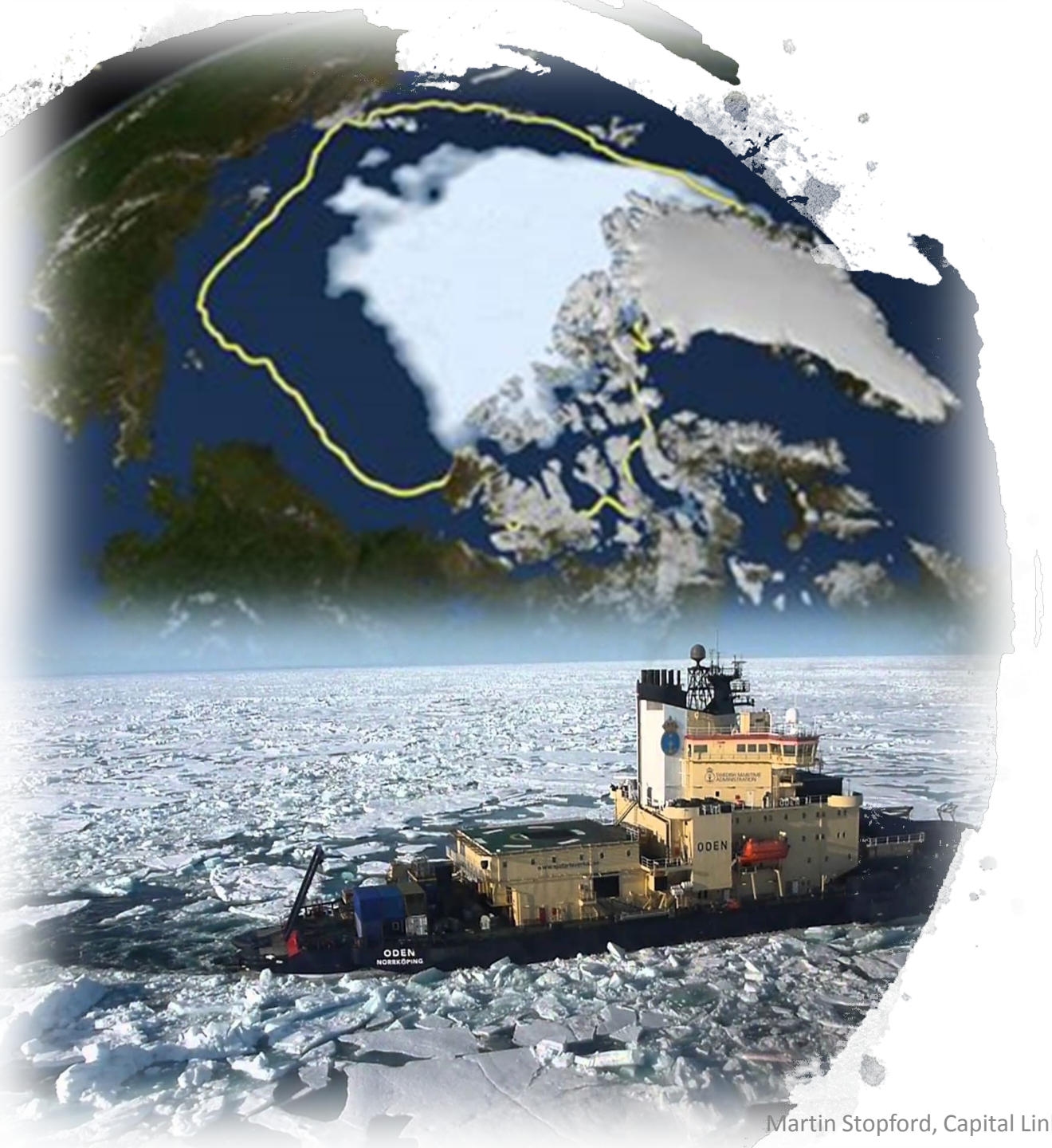
Dr Martin Stopford
Non- executive President, Clarkson Research



Dr Martin Stopford, President Clarkson Research

Coming to terms with the next era for shipping and shipbuilding

The next era for shipping and shipbuilding – Martin Stopford

SEVEN ISSUES TO COVER

ISSUE 1: The shipping market- still struggling
ISSUE 2: Market fundamentals - looking better
ISSUE 3: Strategies for reducing carbon emissions:-

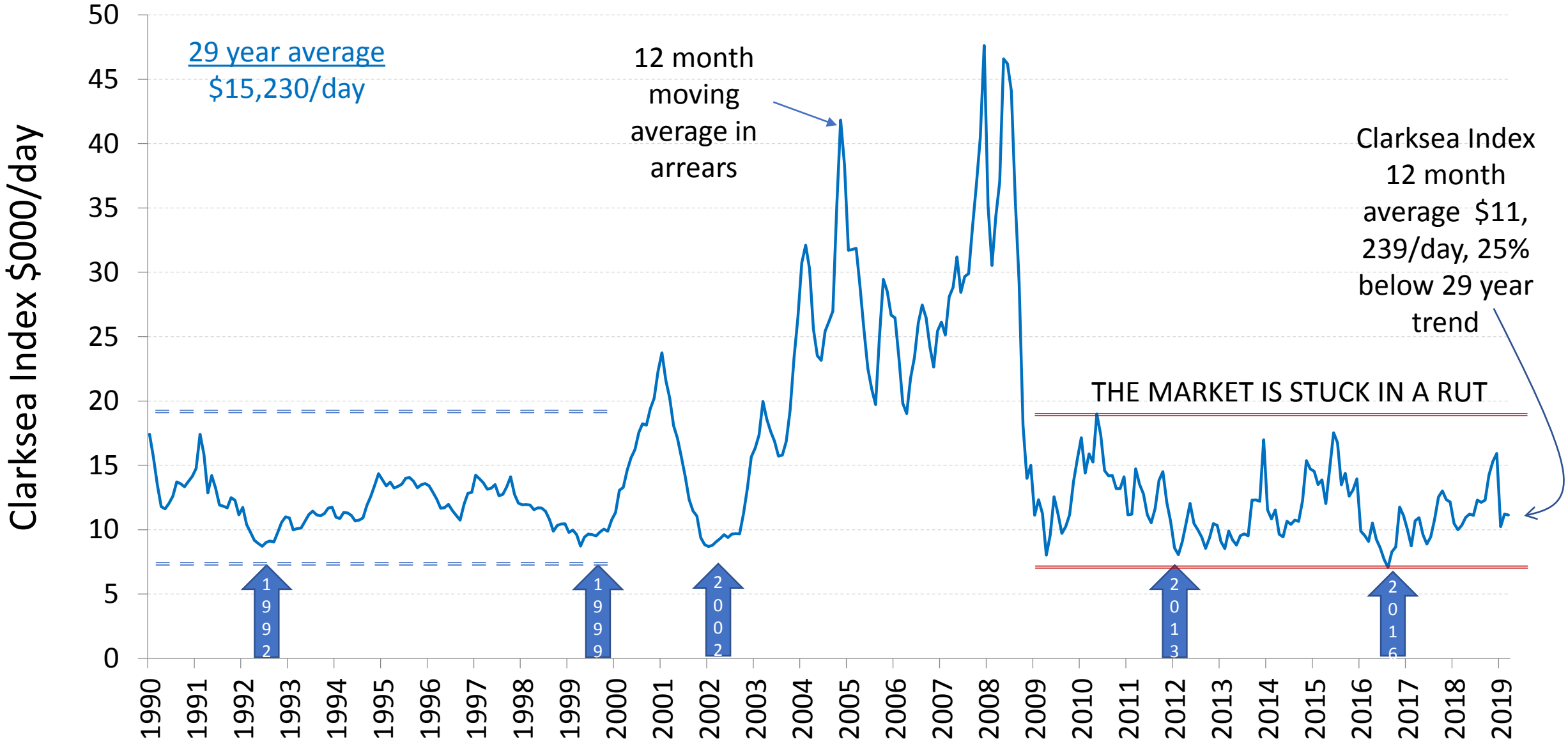
A. Cargo – lower growth
B. Ships - slower speed etc
C. Shipbuilding – lower carbon power & systems
D. Companies – future transport factories

THE ISSUES

Freight rates and prices remain “stuck in a rut”, and the market is still struggling

Part 1: The shipping market – still struggling

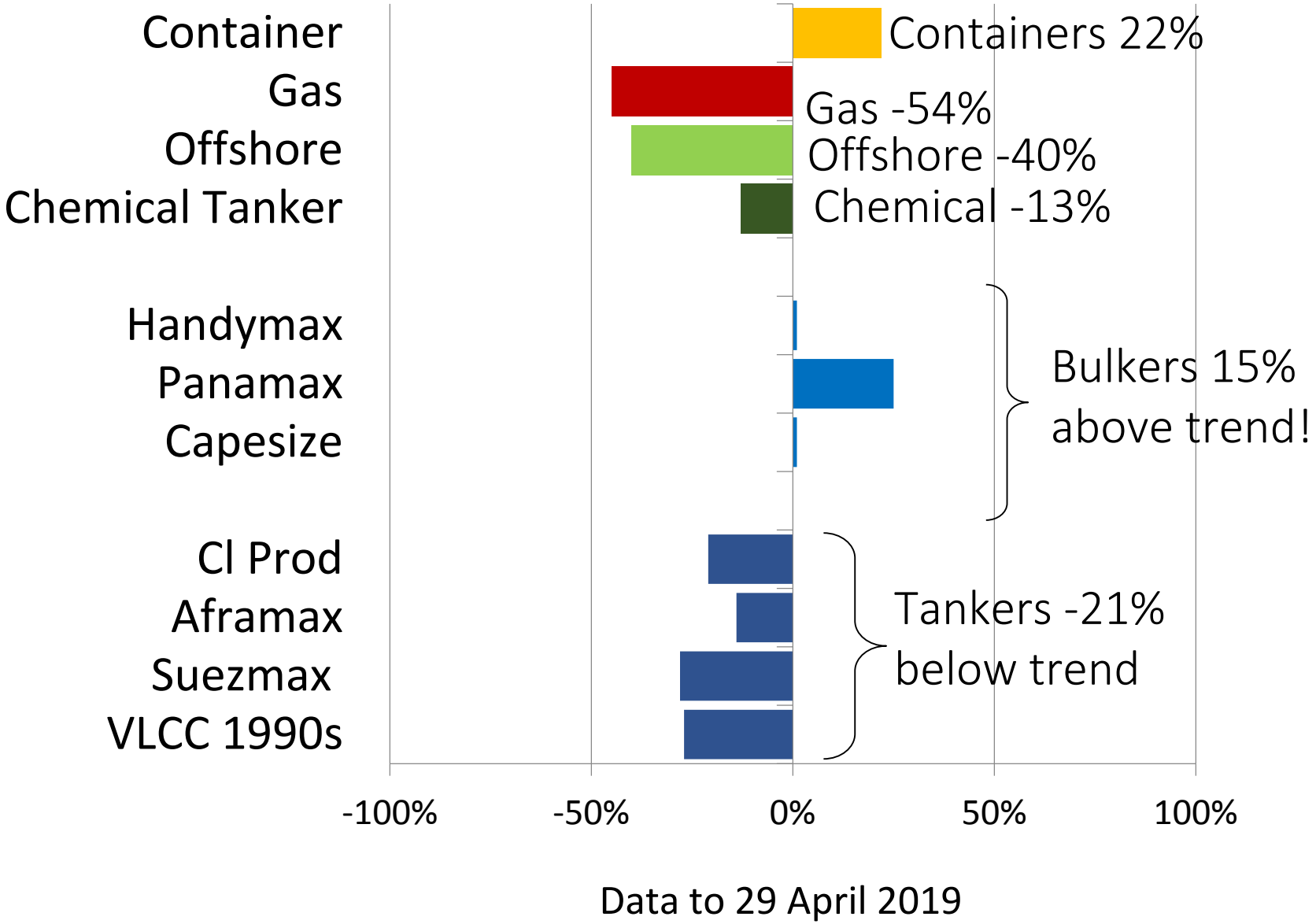
The Shipping Cycle – 12 month average to $11,239/day in April



The Clarksea index shows the average earnings of tankers, bulkers, containerships & gas

Cycle status in 12 markets: last 12 months as % seven year trend

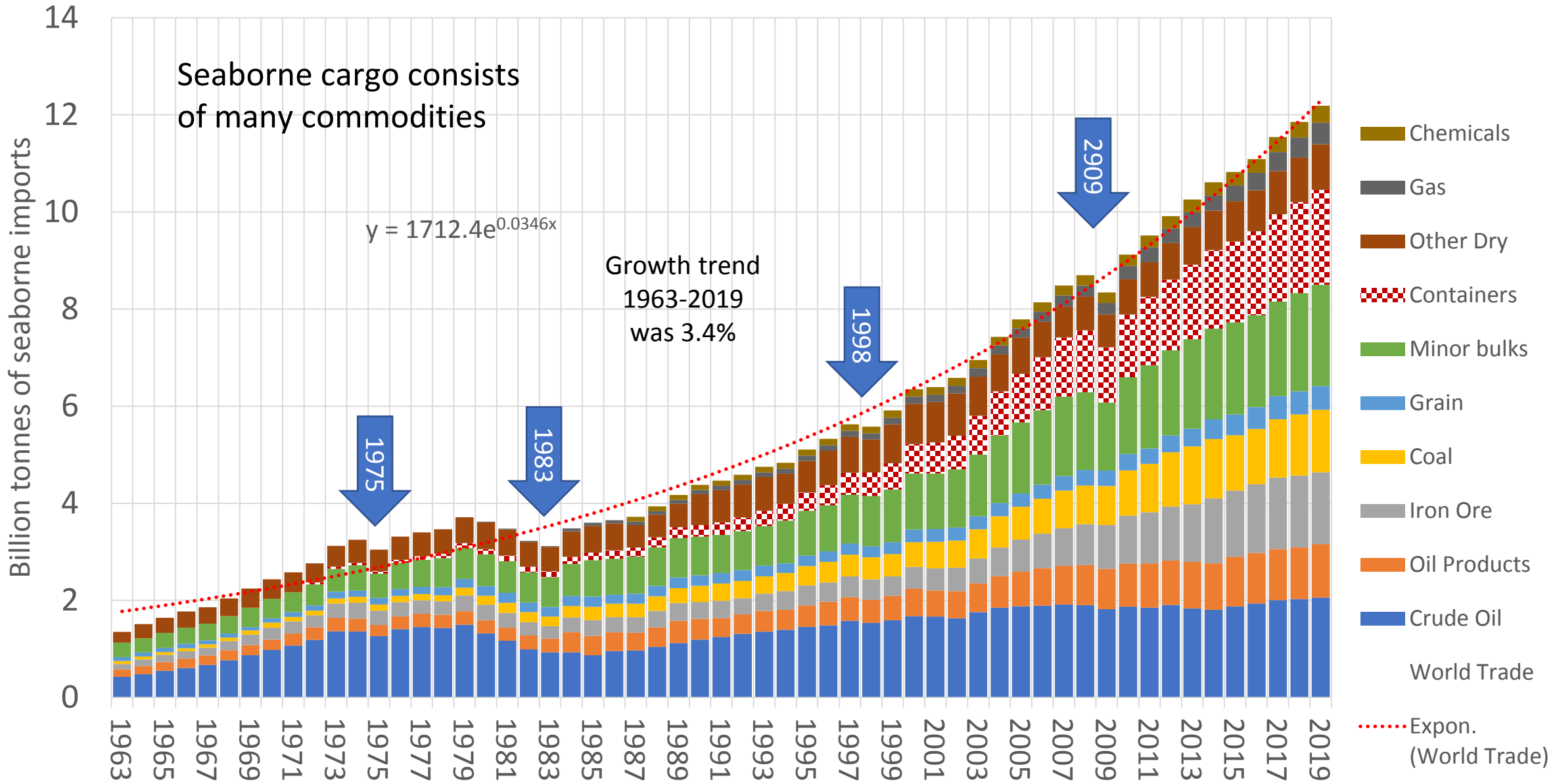
- Chart shows average earnings in last 12 months as a % of average earnings in last 7 years (April 2012 to April 2019)
- Bulk carriers are above the 7 year trend (but only just)
- Tankers below trend
- Gas market now well below trend



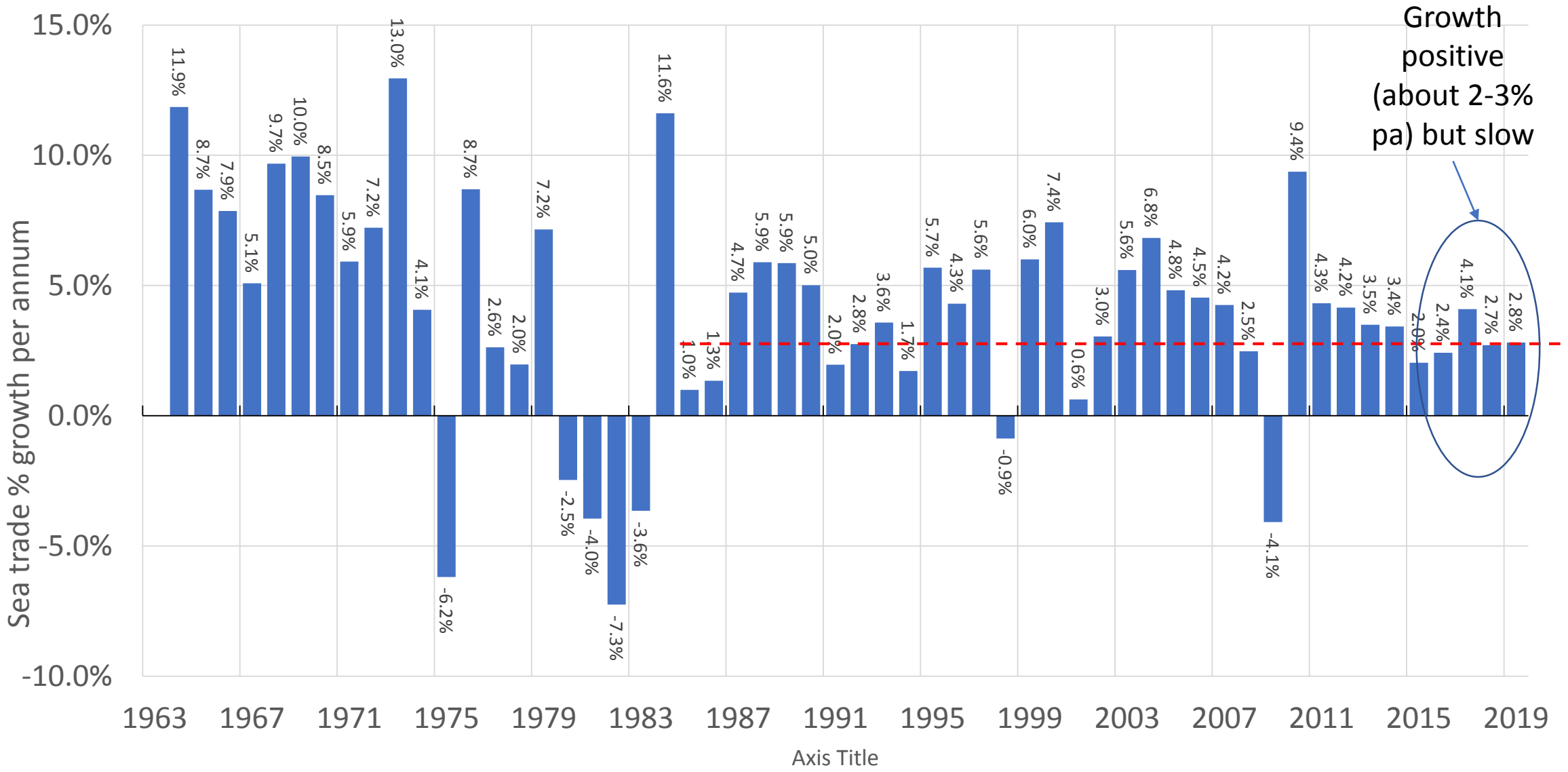
The world economy is caught up in long running developments in both supply and demand

Part 2: Market fundamentals looking better

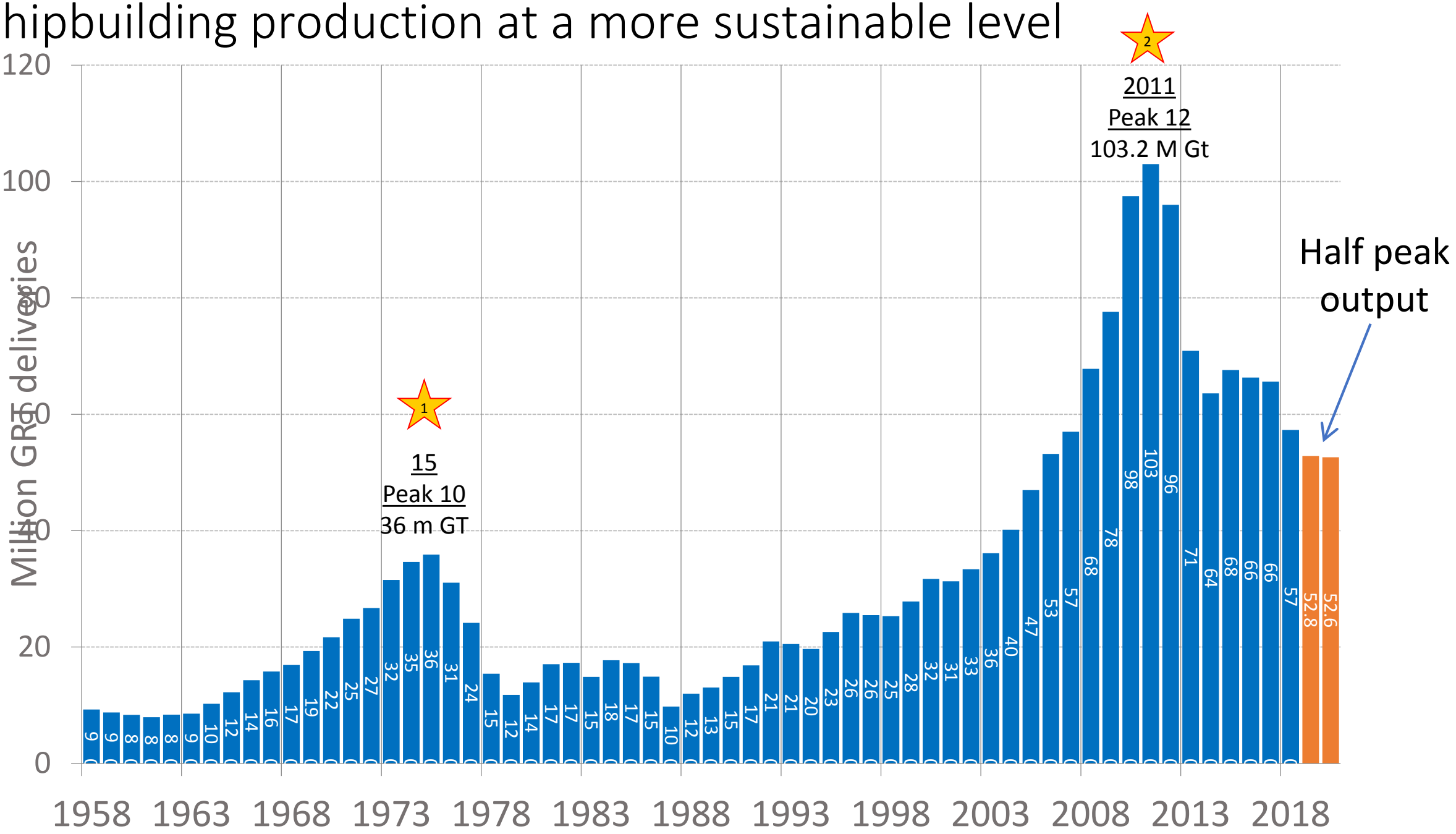
World seaborne trade 1963-2019 – recently slow but steady



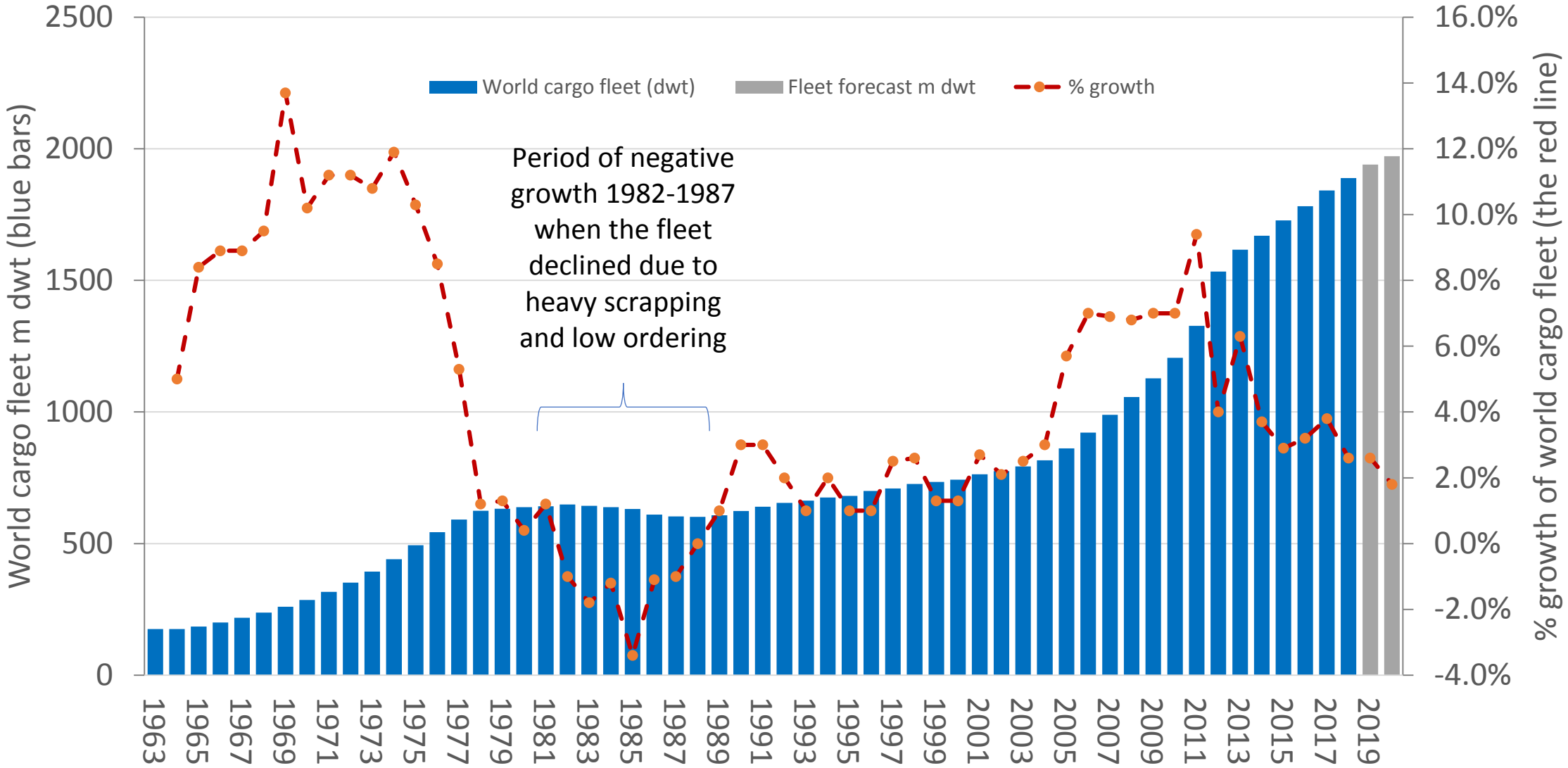
World sea trade 1963-2019 – about 2.8% in 2019



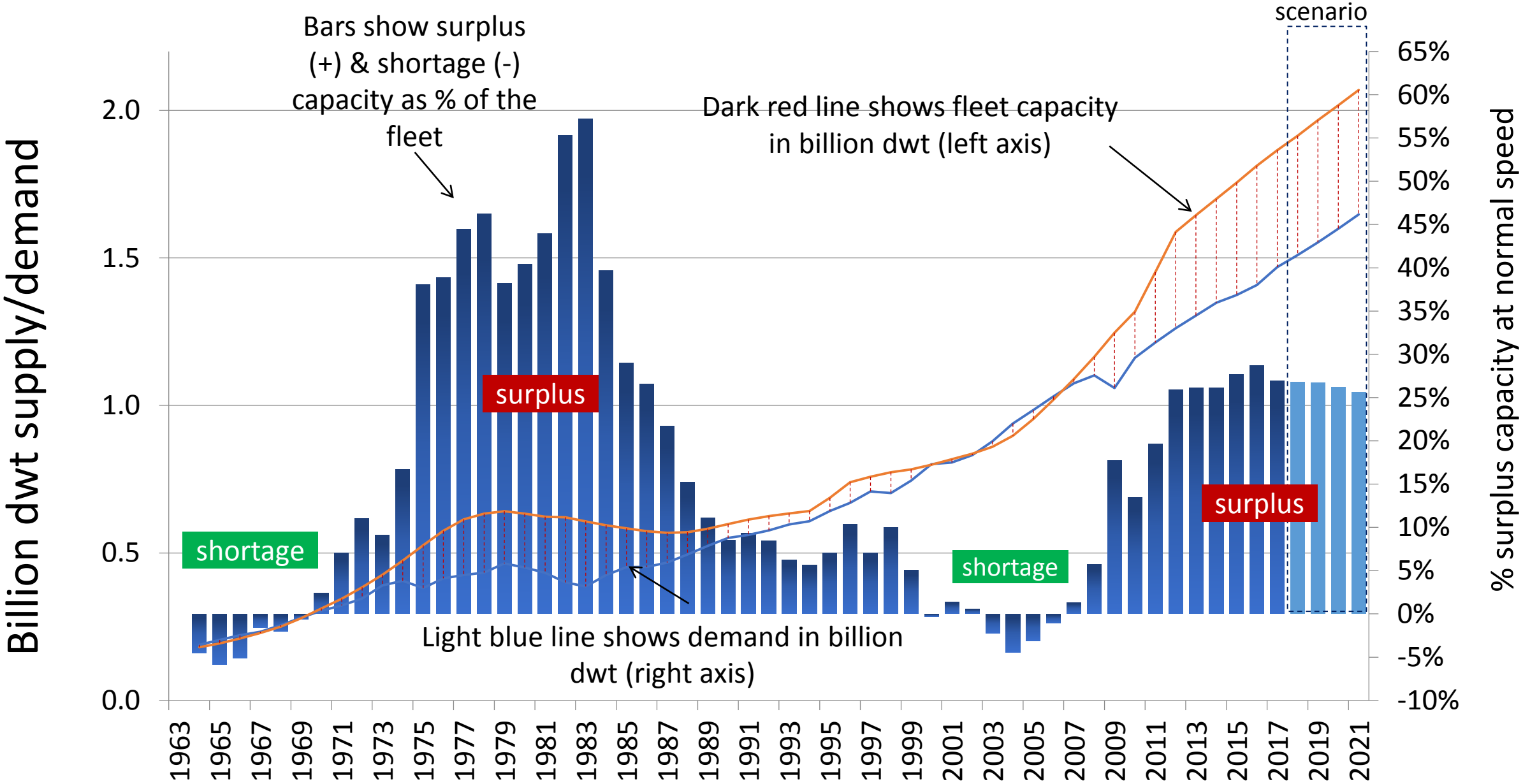
Shipbuilding production at a more sustainable level



World fleet growth - about 2.6% in 2019 & 1.8% in 2020



Shipping market balance – 25% surplus (but tied up slow steaming!)



The ship's emissions have become the industry's most pressing challenge

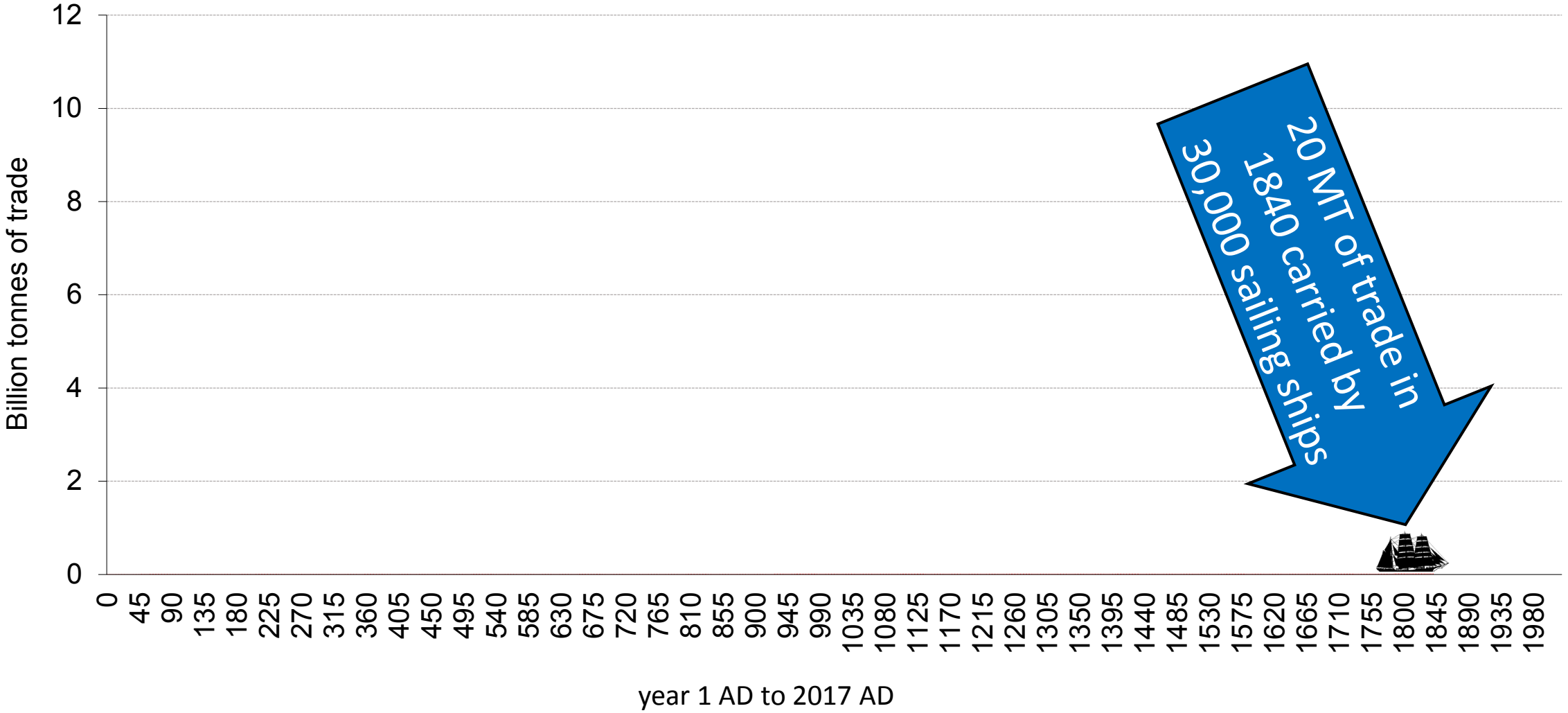
Part 3: Strategies for reducing carbon emissions

IMO’s Vision for elimination Greenhouse Gases (GHGs)– April 2018

“IMO’s vision is to reduce GHG emissions from international shipping. Emissions should peak as soon as possible and fall by at least 50% by 2050 compared to 2008. At the same time, the industry should pursue efforts towards phasing out GHG emissions entirely".

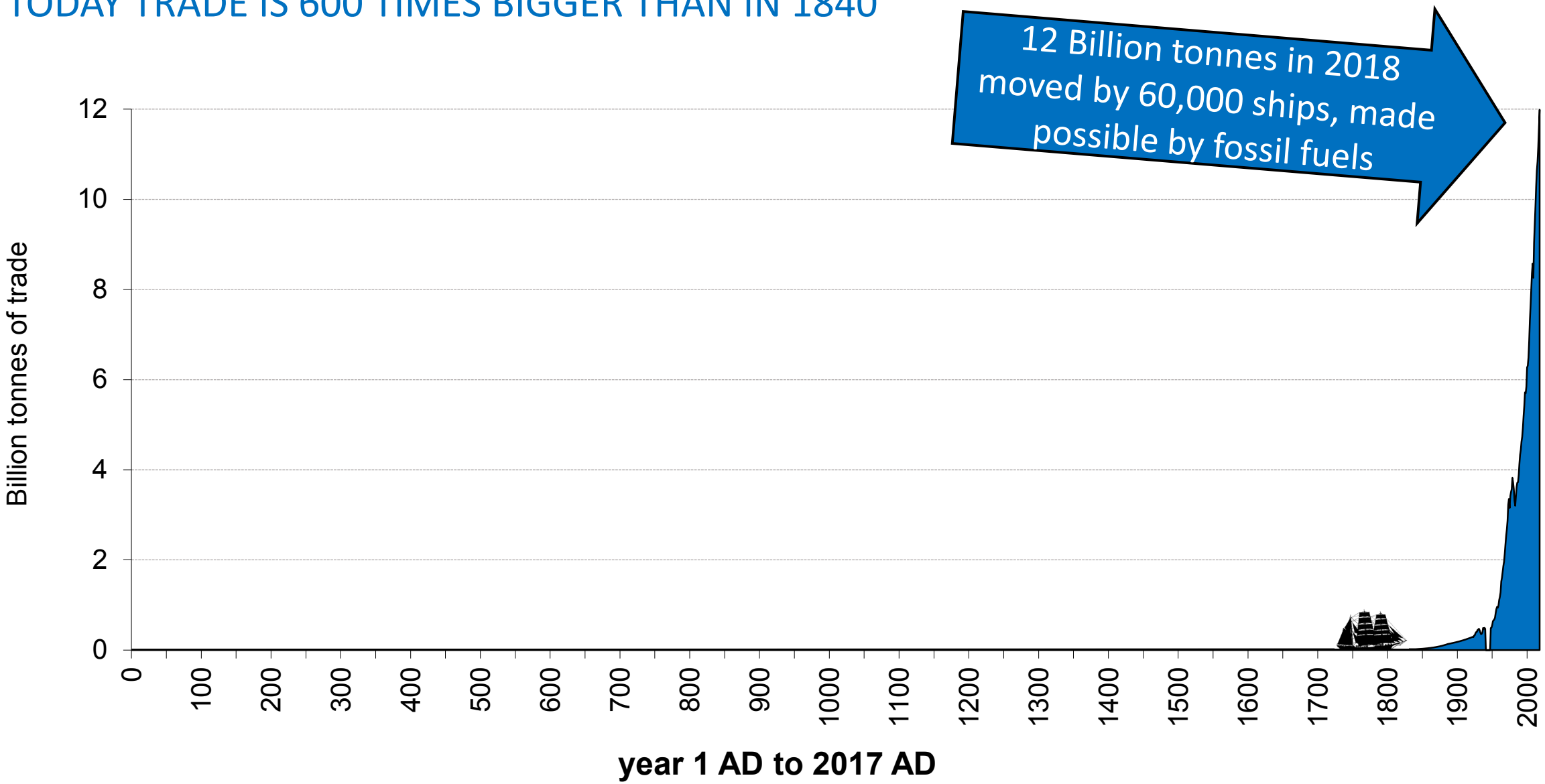
World Sea Trade in 1840 AD – before fossil fuels

In 1840, when shipping relied on the wind for power, Sea Trade was about 20 mill tonnes



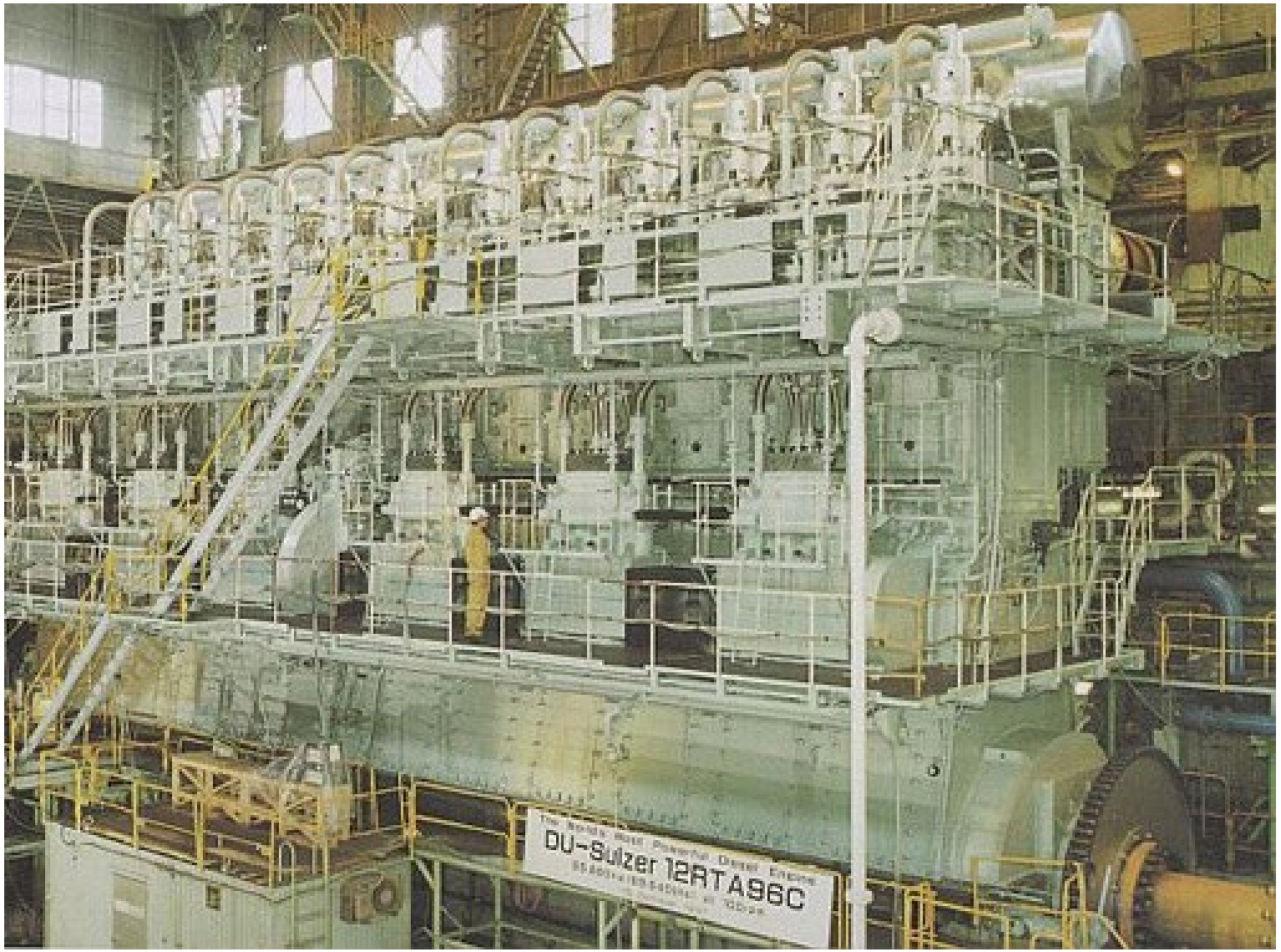
World Sea Trade 1 AD to 2017 AD

TODAY TRADE IS 600 TIMES BIGGER THAN IN 1840



Fossil fuel engines made this possible … this is the Emma Maersk's Engine

- Thanks to fossil fuel, this engine generates 109,000 HP (82 MW)
- It does the work of about 3 million people (working 8 hour shifts)
- If people powered the Emma Maersk they would need a town the size of Athens to live in
- They would eat about 9 billion calories a day (3,000 tonnes of grain)!
- Every tonne of bunkers produces 3.3 tonnes of carbon
- Where else can we get so much concentrated energy without the carbon?



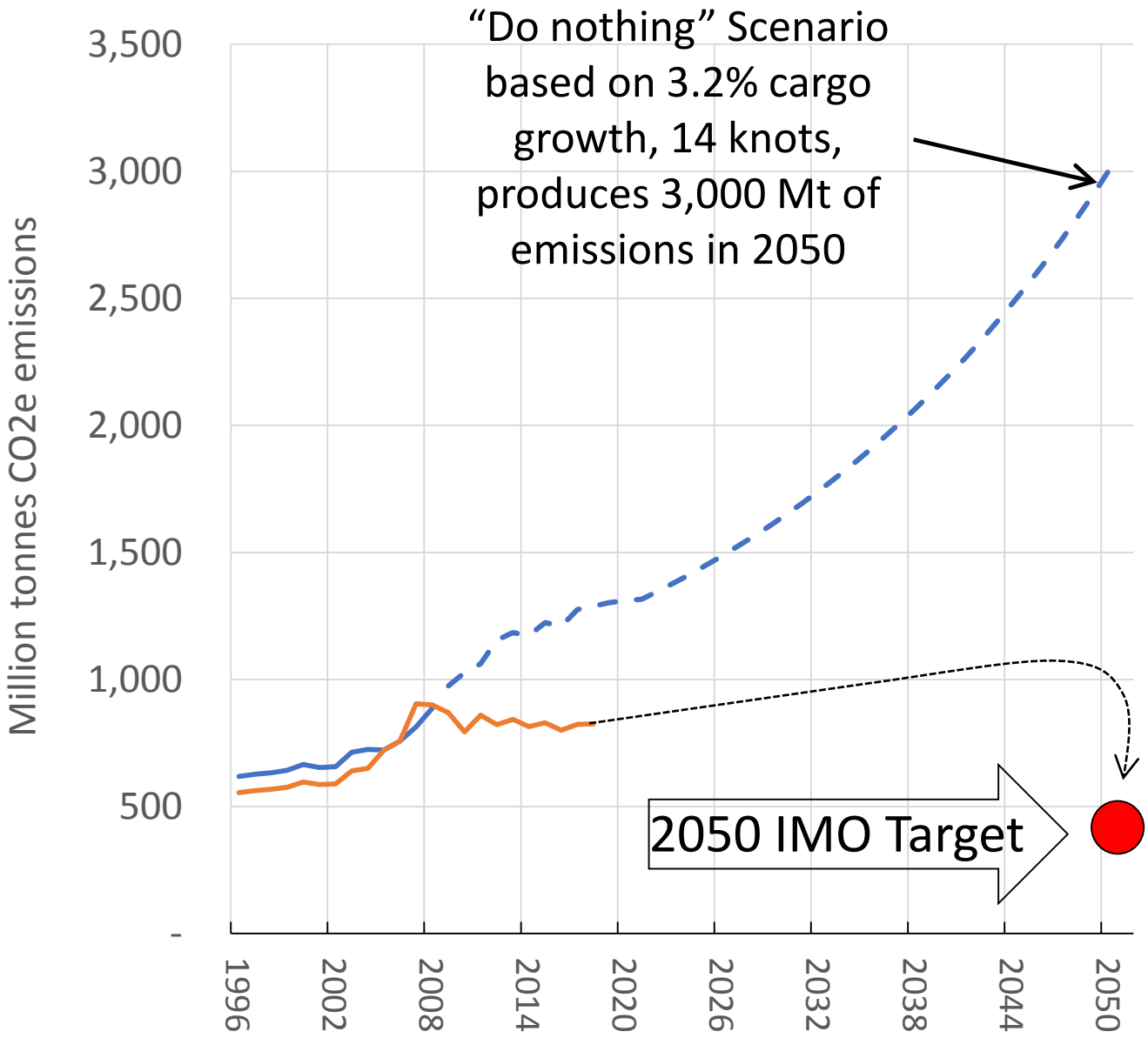
How could we realize the IMO's vision of a 50% cut by 2050?

Straetgy 1: Less cargo: Transport less cargo by changing trading patterns, transport policies, pricing and better information systems.

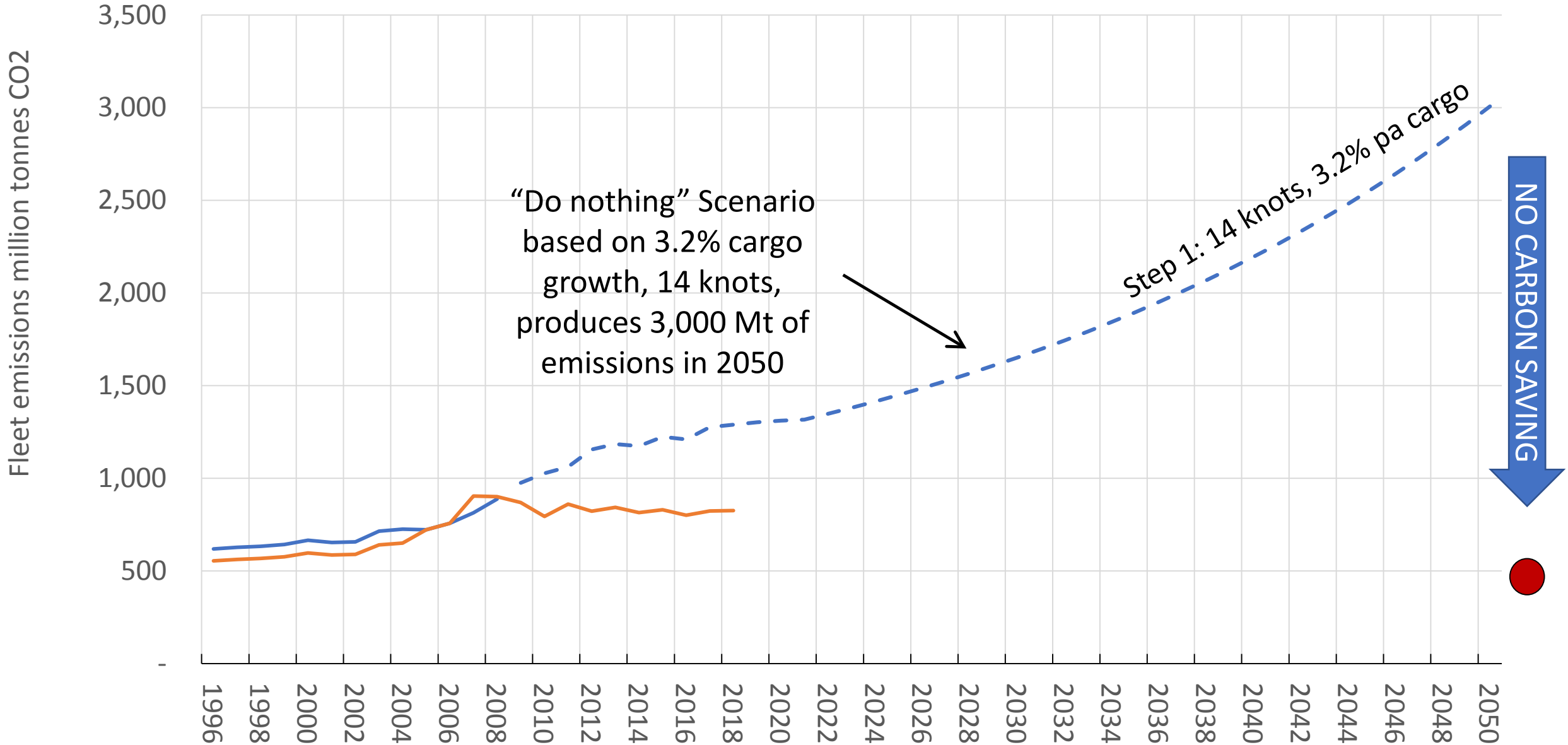
Strategy 2: Slow down: Cut carbon emissions/ship km by slowing down to 10 knots; using bigger ships; better designs; retrofitting for safe operation at slow speeds etc.

Strategy 3: Zerp carbon power: develop new propulsion systems. Electric fuel cells look the best bet for volume and performance

Strategy 4: Organization: Make sstrategies 1-3 possible by a complete re-think of the industry's organization and personnel.



World cargo fleet CO2 Emissions – 4 steps to a 50% reduction



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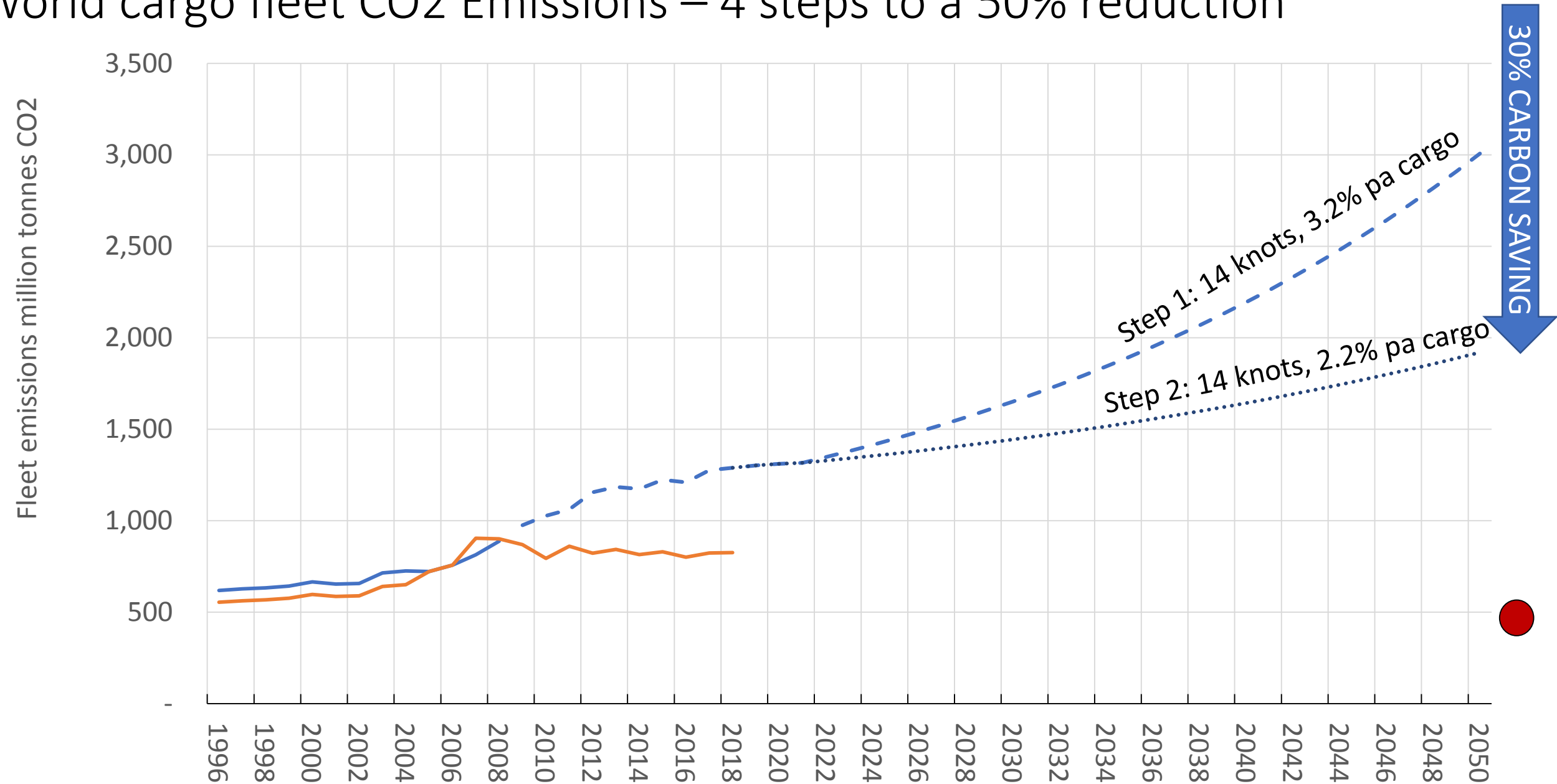

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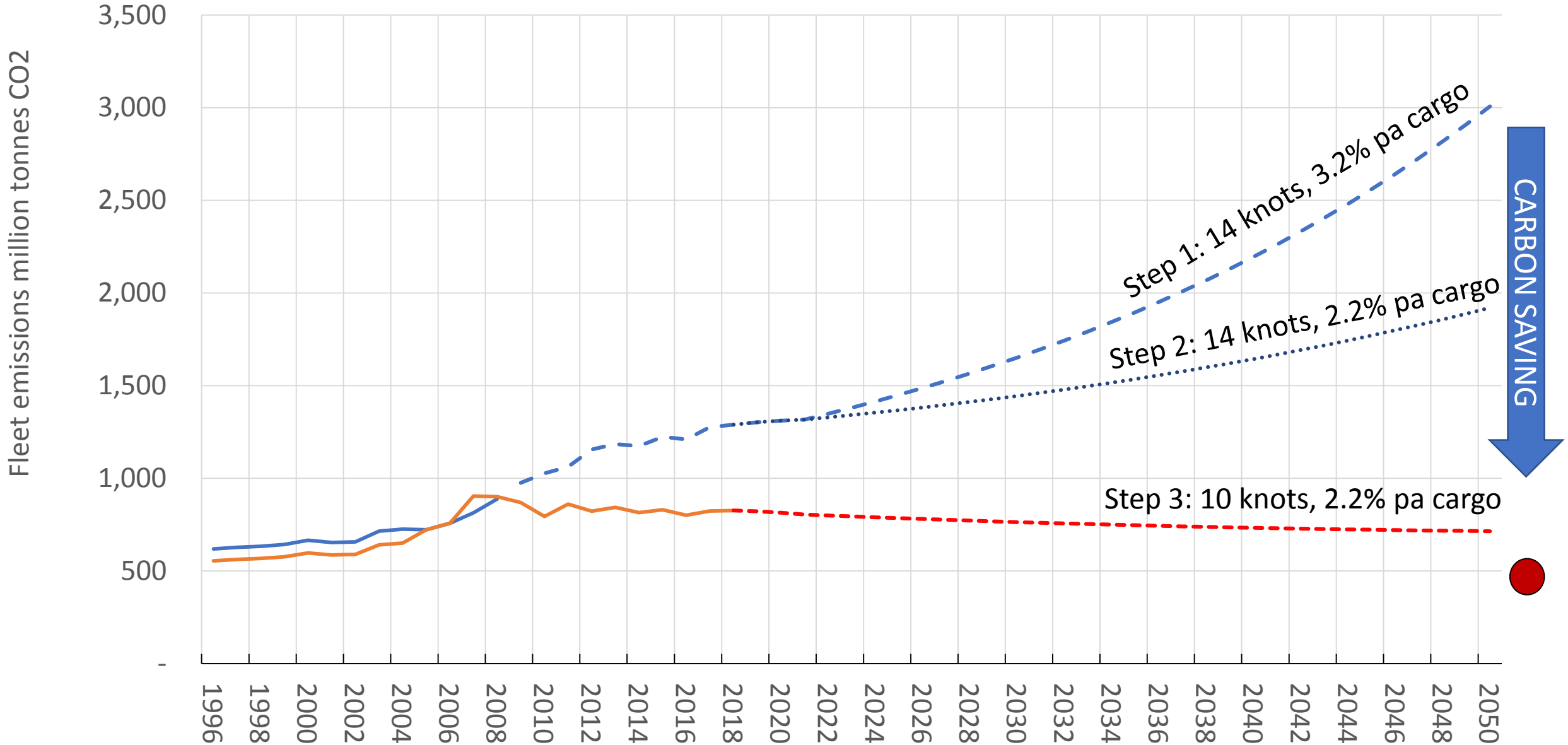

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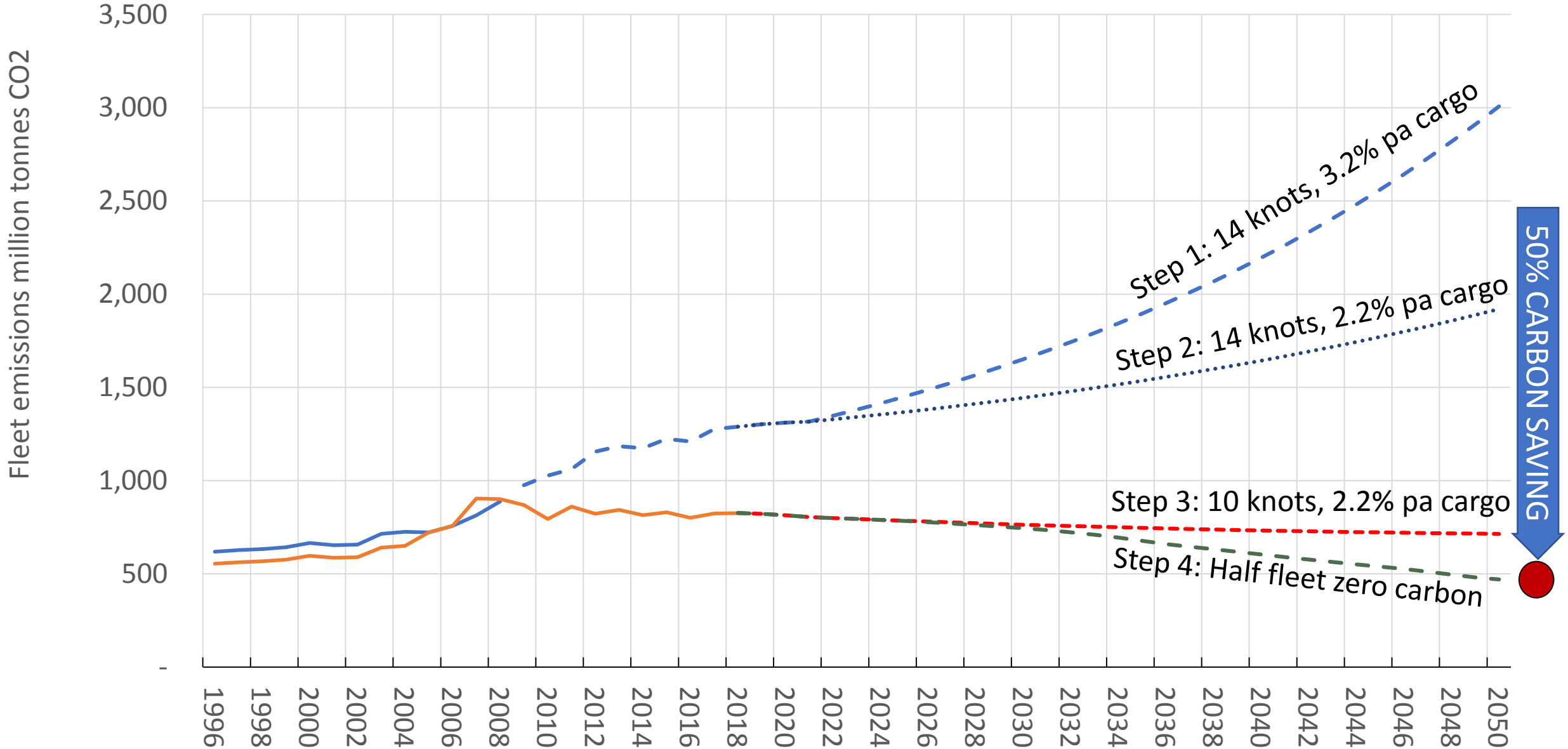
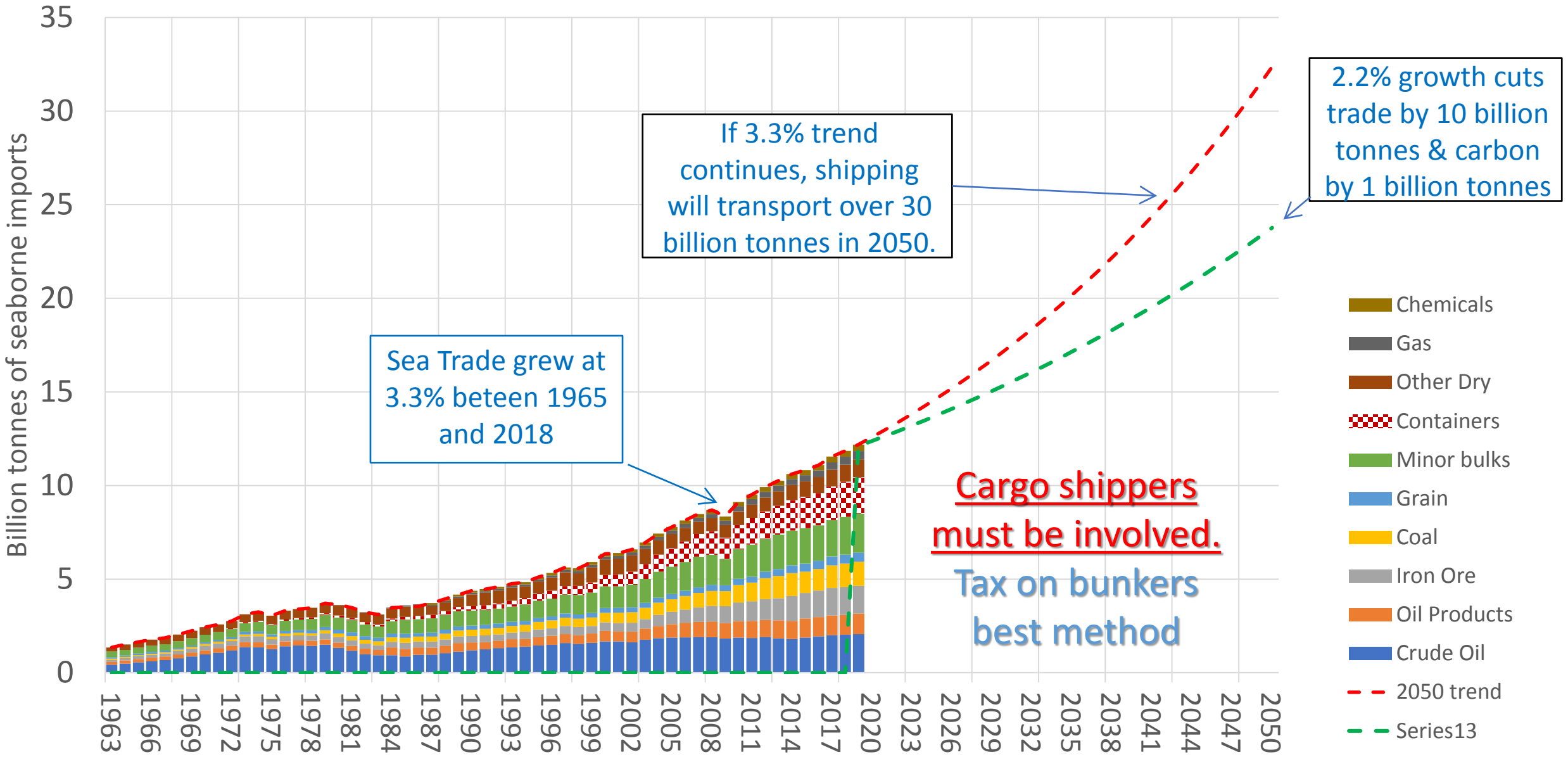


Develop better information about cargo "carbon footprint" and more develop B2B integrated through transport services

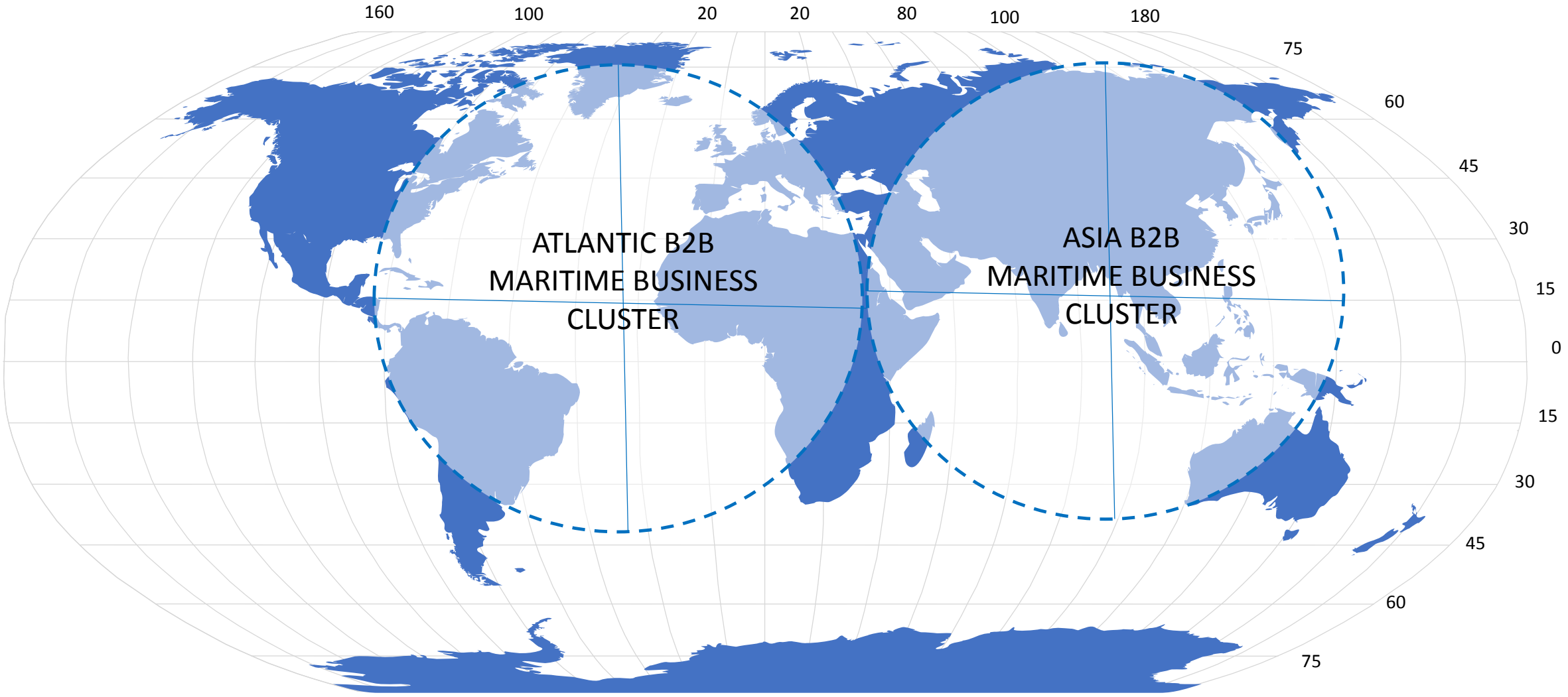
3A: CARGO strategy – reduce growth & improve logistics with better information

Cargo 1: Seaborne trade 3.4% growth trend – cut growth to 2%?



Develop regional short sea trade, supported by B2B commerce

Cargo companies should develop trading systems which are less reliant on long distance transport using the low carbon transport option (for example short sea shipping in preference to air, road or rail)

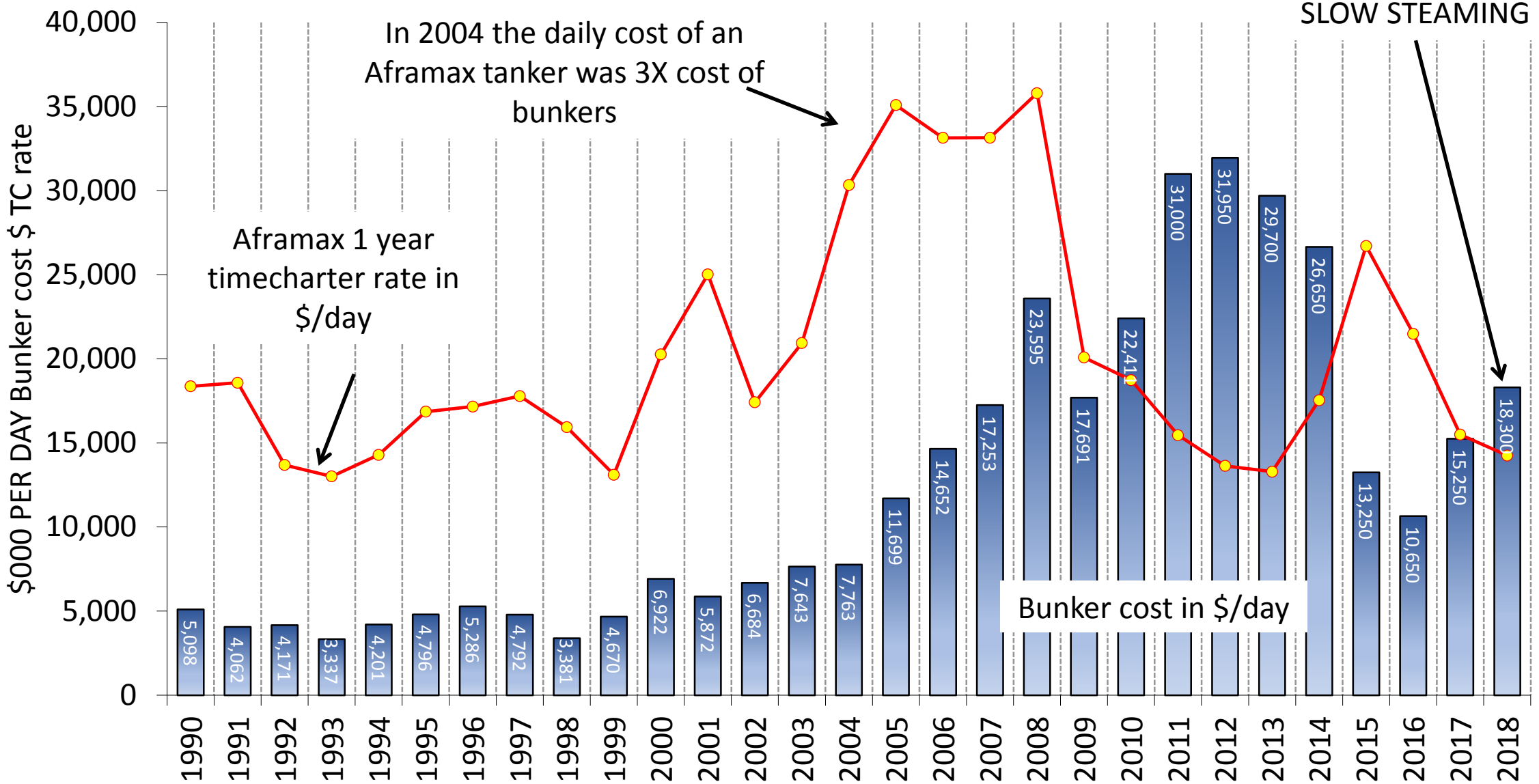


Information and monitoring are key (MRV)

3B: The SHIP – slow speed and fine tune and apply available technology

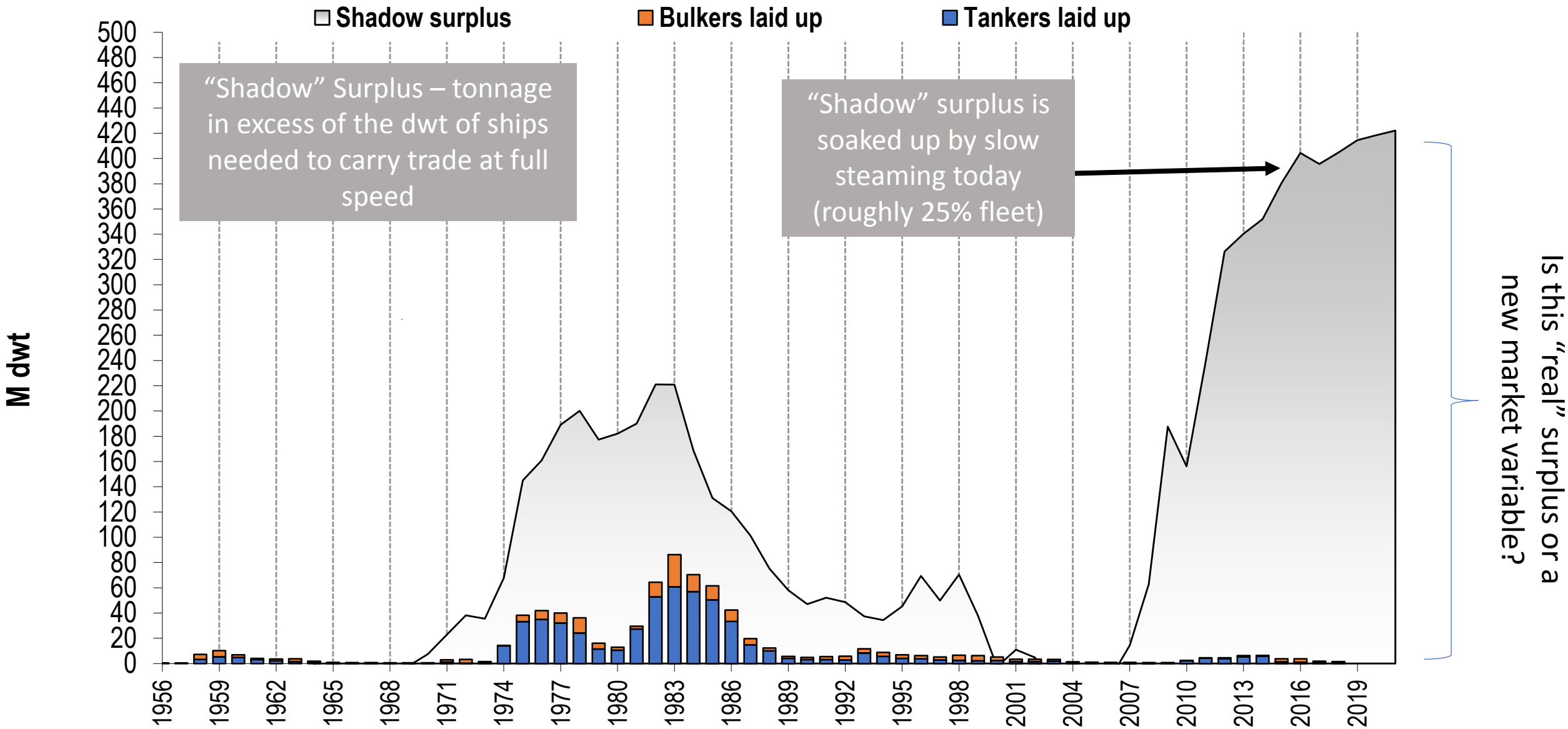
1: For the first time the fuel costs more than the ship

Based on Aframax tanker, 1 year TC rate and bunker cost at 50 TPD, 14.5 KTS, Rotterdam 380cst



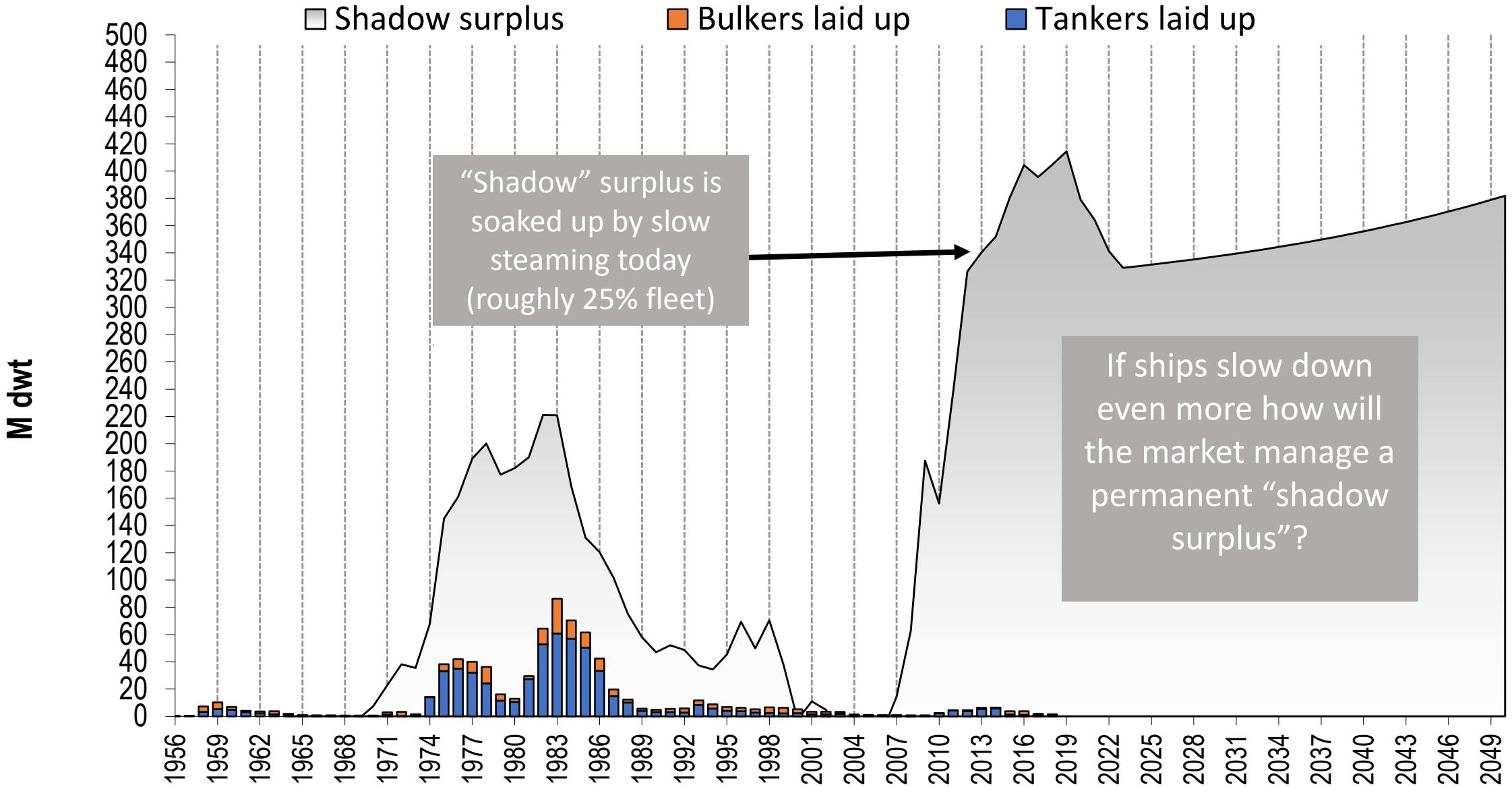
Ship 2: Surplus capacity and slow steaming raise “market-balance” issues

Shows “Shadow” surplus tonnage and the proportion laid up



Permanent ‘shadow surplus’?

Shows “Shadow” surplus tonnage and the proportion laid up



Is this “real” surplus or a new market variable?

A radical review in design methods is needed to integrate on board systems, achieving more efficient transport, lower emissions and greater safety

PART 3C: SHIPBUILDING zero carbon propulsion

How will ship design and construction develop in future?

50 Years change in car technology – "Modern BMW is a computer on wheels" (The Economist 17th Oct 2018)

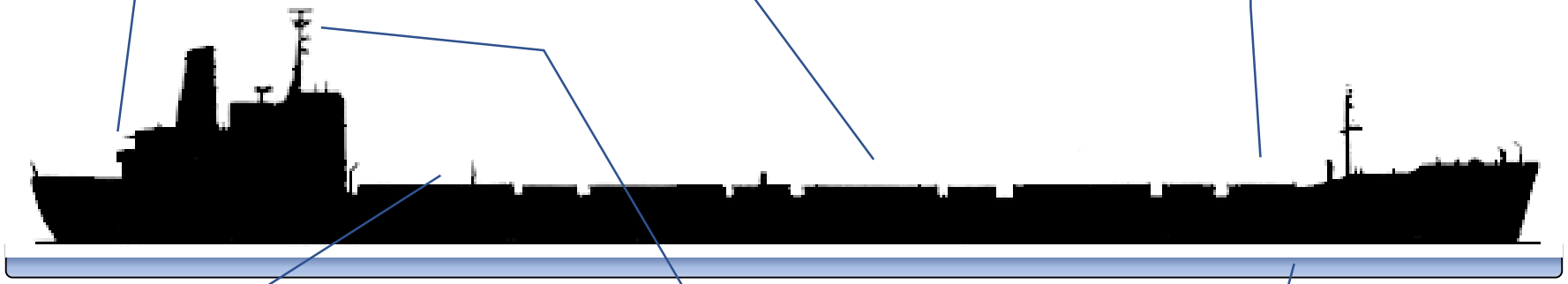
How might shipbuilders develop the next generation of ships?

Propulsion plant.
- Dual fuel diesel
- Diesel electric
- Battery & fuel cell
- Fusion??

Auxiliary power
- Common interfaces
- Power management systems

Auxiliary machinery
Digital protocols and direct systems support from suppliers in integrated system

Ballast & trim
Integrated digital management systems covering all operating components



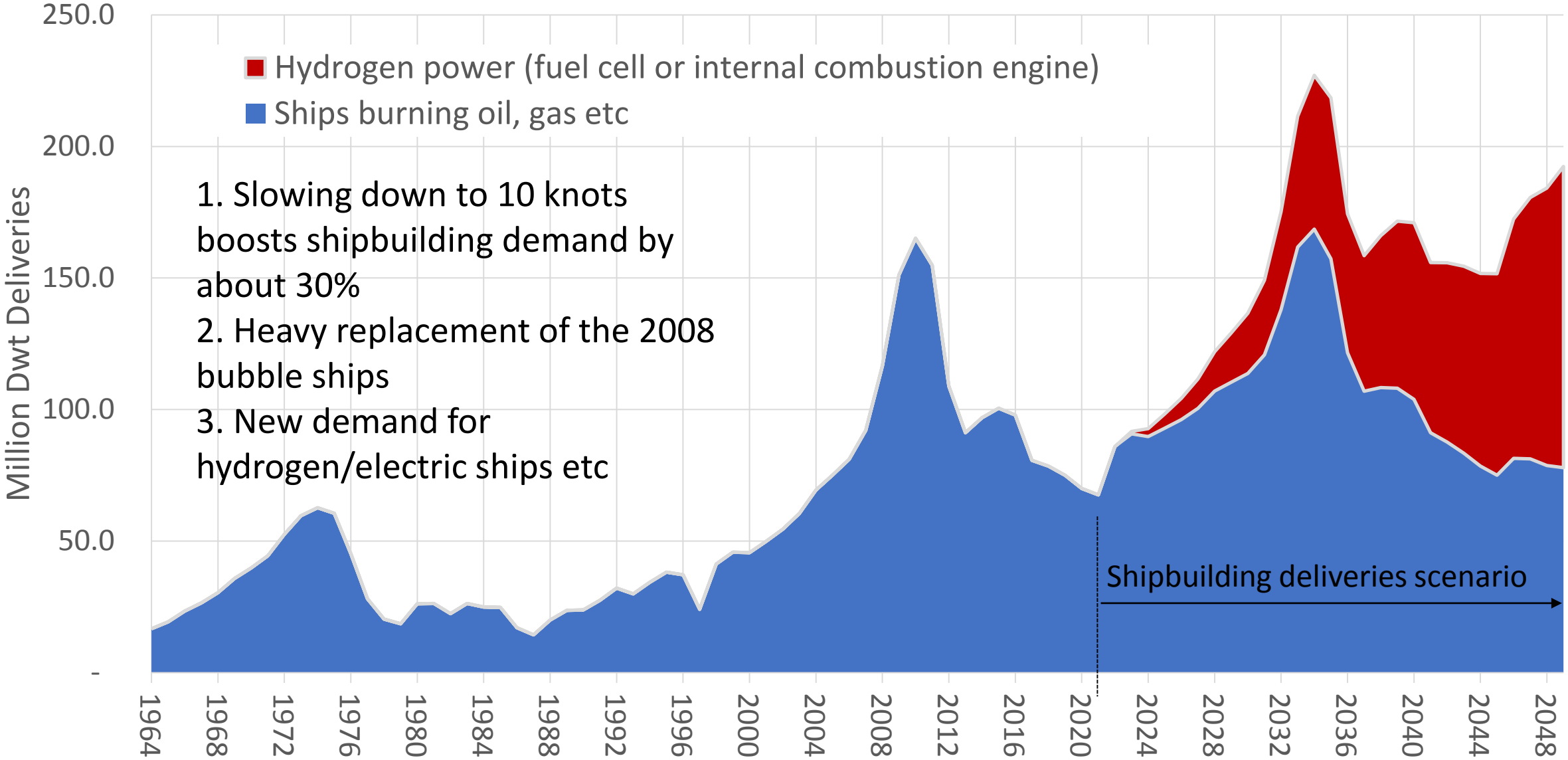
Navigation
Navigation on network with ability to view on shore as well as ship (e.g. Sperry system)

Cargo handling
Autonomous cargo handling systems driven by cargo management software sharing key data between ship & shore

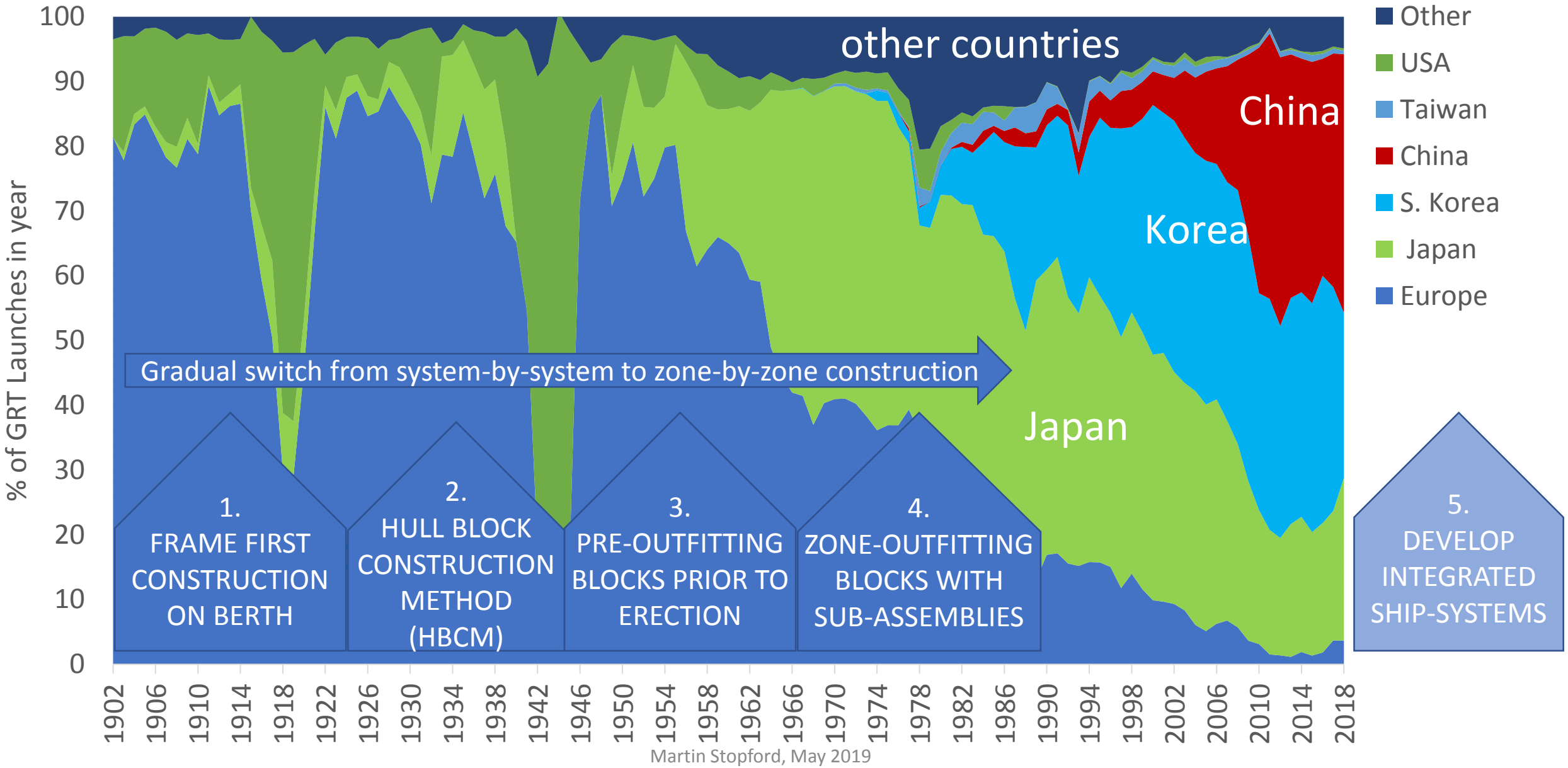
IT & comms
Ship systems managed across the fleet by company IT department rolling out upgrades & providing global support

Maintenance
Condition based systems managed across fleet, with telematics using standard protocols

The shipbuilding scenario 2018-2050 – mix of diesel & zero carbon ships



Shipbuilding competition – new construction methods will be crucial



Martin Stopford, May 2019

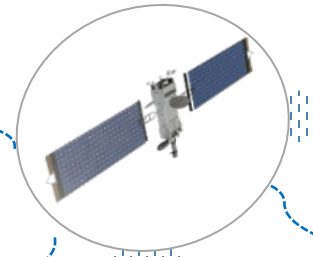
A radical review in design methods is needed to integrate on board systems, operating as transport factories

PART 3D: COMPANIES – new information based organizations

Change 2: Transport chain should be integrated using digital technology

7. PORTS & THROUGH TRANSPORT

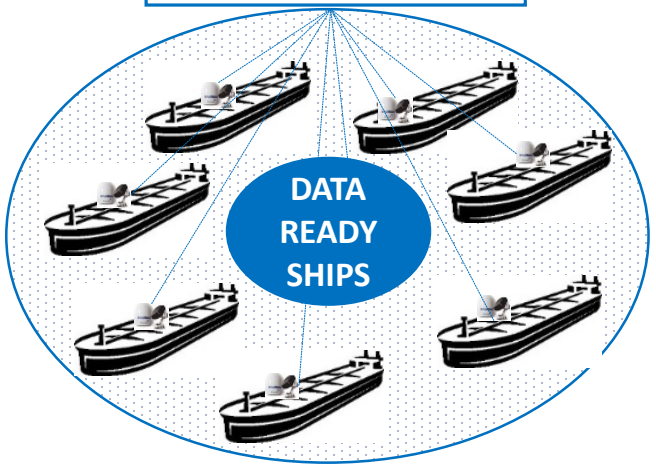
6. SHIPBUILDERS & EQUIPMENT SUPPLIERS



Warehouse (on cloud?)

5.CUSTOMERS WITH CARGO SYSTEMS

ship servers managing data, apps & comms



1. SHIP TEAMS

Core systems

1. Navigation
2. Operations
3. Comms.

Company Systems:-

1. Process management
2. STQ monitoring
3. Messaging system
4. Intranet & dashboards
5. Fleet maintenance
6. LPWAN & APIs

Fleet management

2. SHORE TEAMS

4. TECHNICAL TEAMS

1. Technical support
2. Maintenance systems
3. Regulatory reports
4. Fleet performance
5. Personnel management

3. SYSTEMS. TEAMS

1. Support systems
2. Process data
3. Automation
4. Build apps
5. Manage stats

Source: Martin Stopford 2019

Conclusions

1. We are facing unprecedented change in the maritime industry.
2. The goals are zero carbon shipping and developing the amazing logistics digital technology is already providing to businesses on land.
3. Cargo interests, shipowners and shipbuilders must all play a part.
4. Financiers will play a crucial part in enabling change.
5. Some of the architects of the next era in shipping are sitting here in this hall.
6. This is a once in a lifetime challenge – we must make it work.

Disclaimer

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