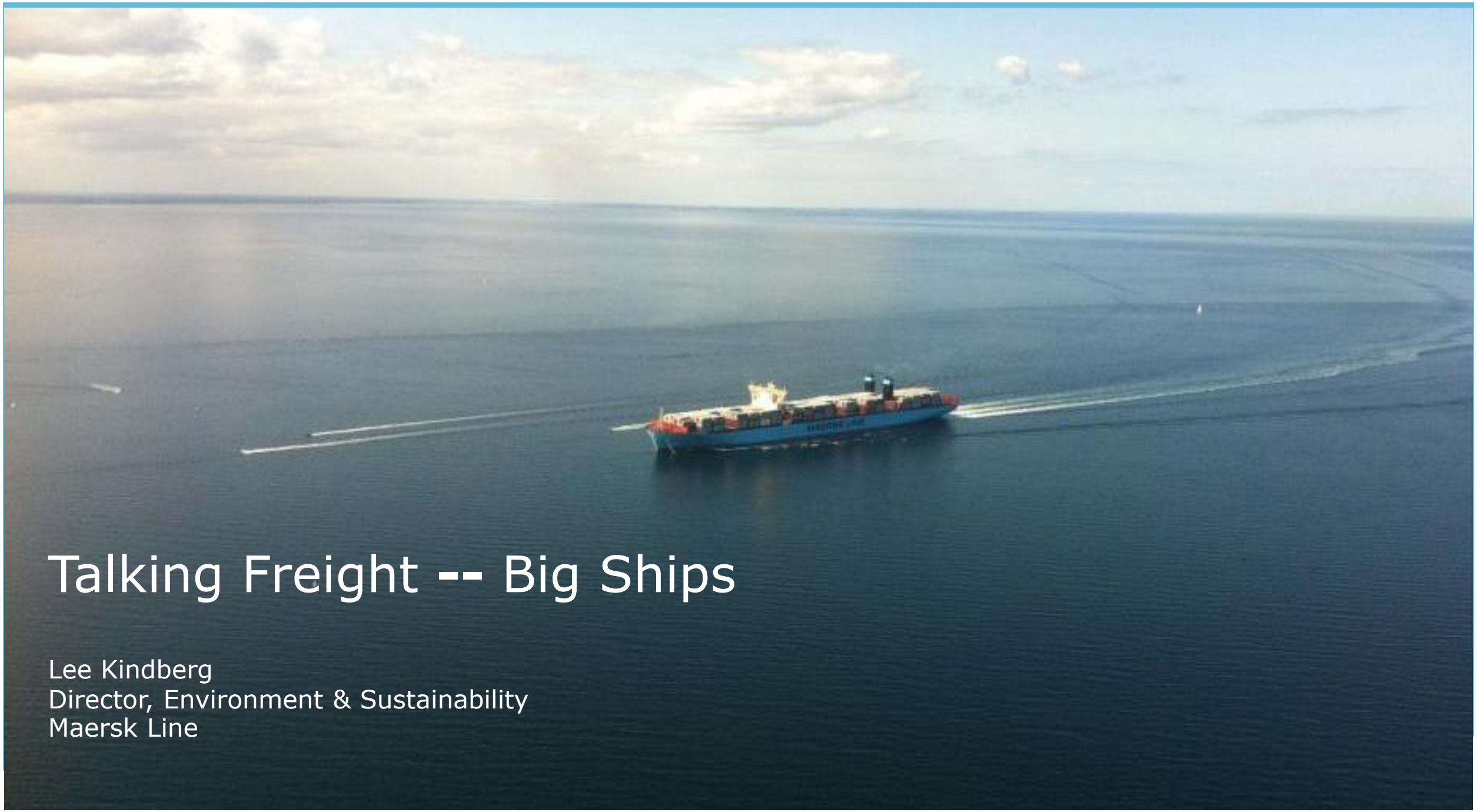
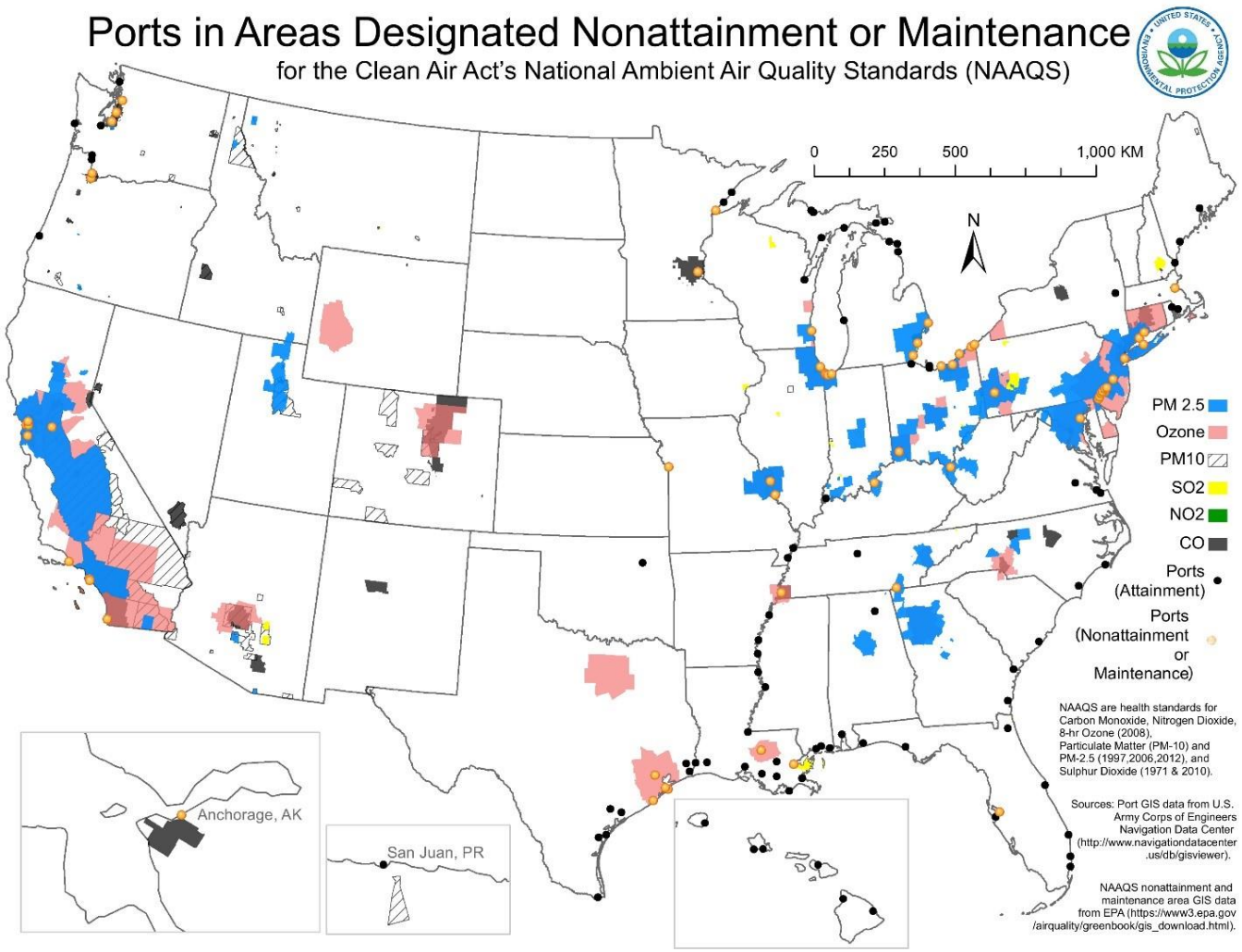


Talking Freight -- Big Ships

Lee Kindberg
Director, Environment & Sustainability
Maersk Line



Port-related operations are significant sources of air emissions and greenhouse gases.

Big ships have higher efficiencies and provide enormous economies of scale – and lower emissions per unit.

Largest variable costs are personnel and fuel.

- Vessels carry 18 to 20 personnel.
- New vessels have additional technologies for energy efficiency
- Some existing vessels were “Eco-retrofit”
  - Bridge elevation increases capacity with minimal additional energy use.

18,000+ TEU vessels set new standards for energy efficiency and environmental performance.

✓ *Energy efficiency*

✓ *Economy of scale*

✓ *Environmentally improved*

35% **LESS CO_2**

Engine

Hull Design

Capacity

Waste Heat Recovery System

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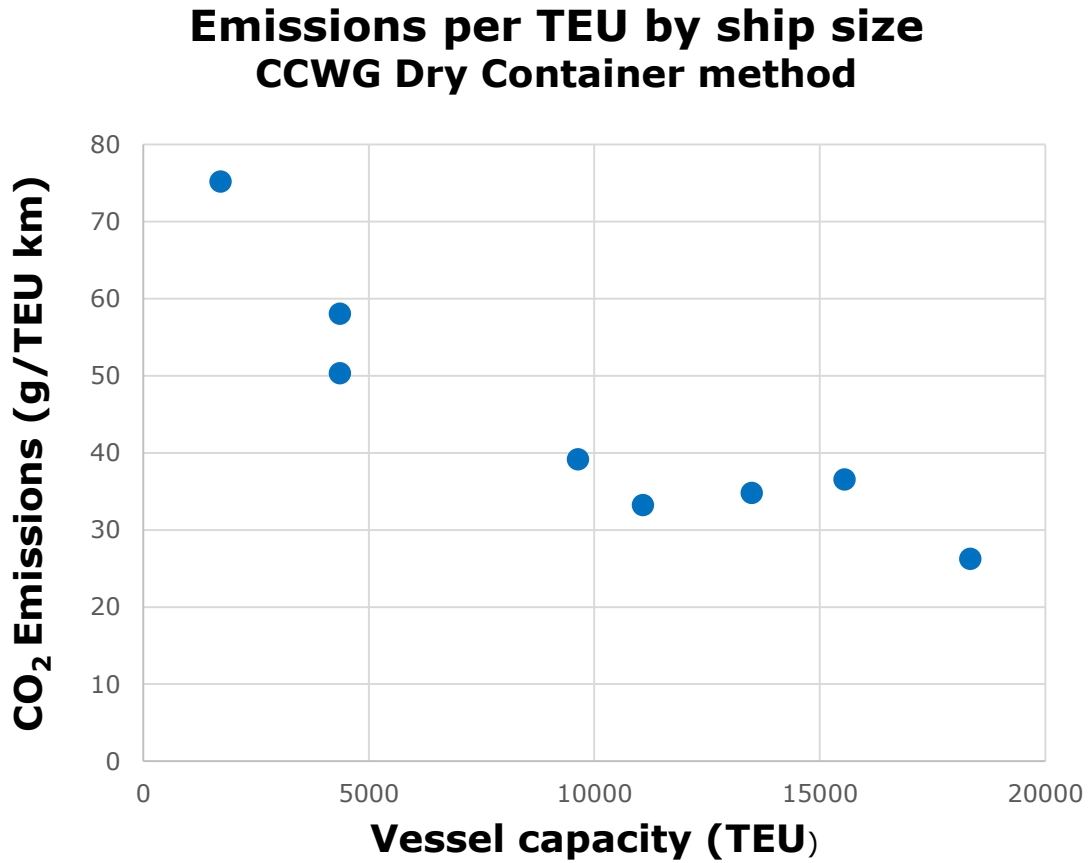
Vessel size, age and speed are the major determinants of fuel consumption and emissions.

Vessel	TEU	CO2 Dry g/TEU km	CO2 Reefer g/TEU km	Year built
Maersk Wolfsburg	1,713	75	118	2010
SL Racer	4,360	58	95	1995
SL Champion	4,360	50	88	1994
Susan Maersk	9,640	39	70	1997
Georg Maersk	11,078	33	69	2004
Maersk Edmonton	13,492	35	80	2011
Emma Maersk	15,550	37	66	2006
Majestic Maersk	18,340	26	54	2013



Methodology: Clean Cargo Working Group https://www.bsr.org/en/collaboration/groups/clean-cargo-working-group
Maersk Line data is verified by Lloyd's Register

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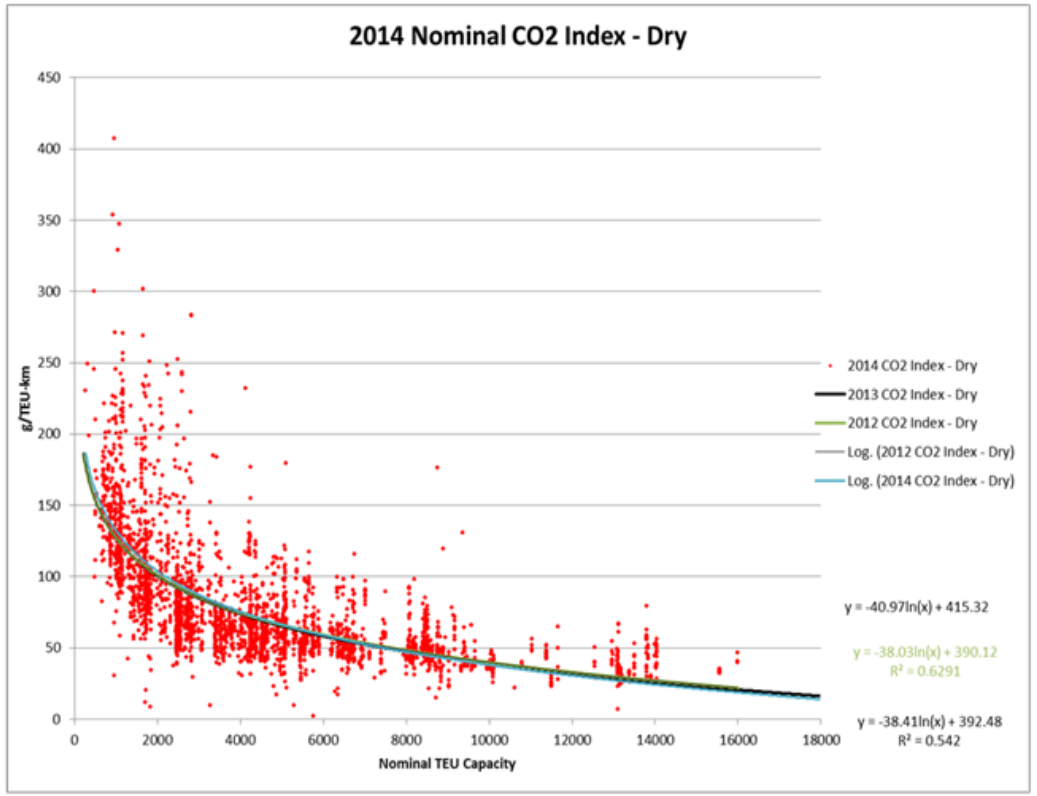
Clean Cargo Working Group annual benchmarking study

Emissions

High



Nominal Capacity

Emissions

Low

Other air emissions are proportional to fuel use and CO_2.

Source: BSR Clean Cargo Working Group, 2014 Environmental Performance study of ~2900 vessels.

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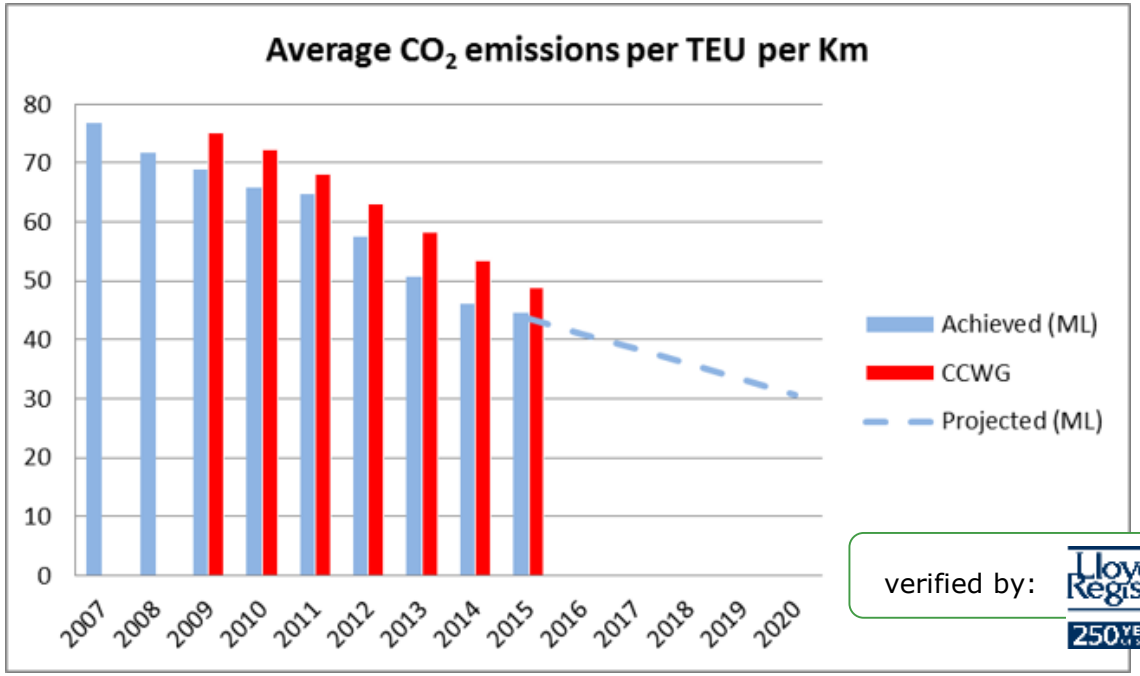
Vessels are increasingly fuel efficient.

This reduces fuel use, CO_2 and other air emissions in our customers' supply chains.



- New vessels
- Eco-Retrofitting vessels
- Network design
- "Smart steaming"
- Big data

2016 results:
Maersk Line -42%

less CO_2 per container per km vs. 2007

CCWG –34% vs. 2009

2020 Maersk Line goal: Reduce CO_2 by 60% vs. 2007

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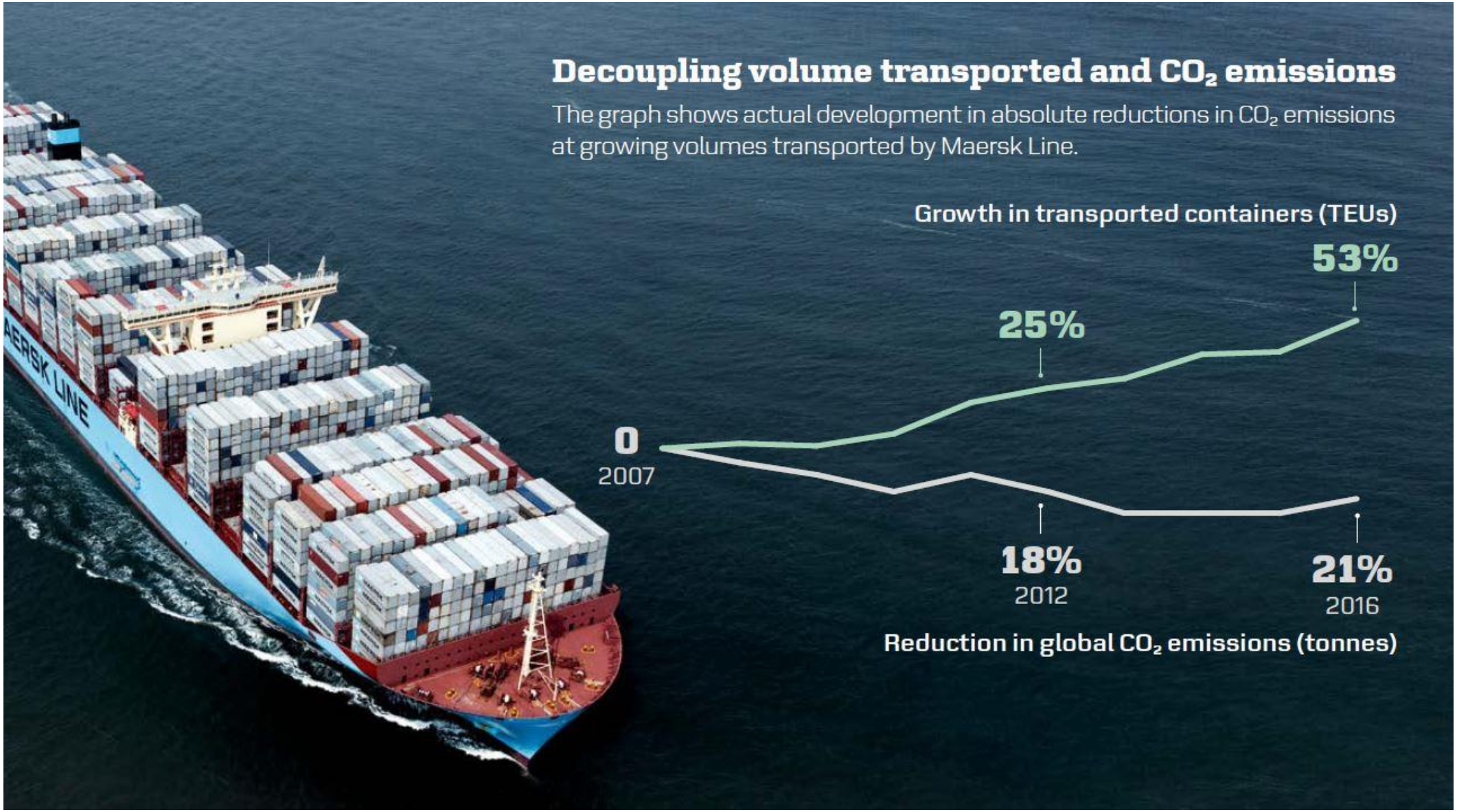
Decoupling volume transported and CO_2 emissions
The graph shows actual development in absolute reductions in CO_2 emissions at growing volumes transported by Maersk Line.
Growth in transported containers (TEUs)
53%
25%
0
2007
18%
2012
21%
2016
Reduction in global CO_2 emissions (tonnes)
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How big is big?

- Draft depends on loading & trim
- Air draft = Height - actual draft

Example:

- Edinburgh class (13,000 TEU)
- Height from keel to mast: 66m
- Typical draft: 12.1m to 13.7m
- Air draft:
  - 66m – 12.1 m = 53.9 m
  - 66m – 13.7 m = 52.3 m

Vessel	TEU	LOA (meters)	Beam (meters)	Keel to top of mast (m)	Max Summer Draft (m)	Air draft @ Summer draft (m)
MAERSK WOLFSBURG	1,713	175	28	45.3	9.5	35.8
SL CHAMPION	4,360	292	32	55.2	13	42.2
SUSAN MAERSK	9,640	347	43	63.4	15	48.4
GEORG MAERSK	11,078	367	43	68	15.9	52.1
MAERSK EDMONTON	13,492	367	48	66	16	50
EMMA MAERSK	15,550	399	56	73	16	57
MAJESTIC MAERSK	18,340	399	59	73	16	57

Challenges

- Will they fit?
  - Air draft
  - Turning basin and berth length
  - Crane height
  - Shore power connection locations
- Network planning and vessel deployment
- Capacity utilization
- Stowage planning

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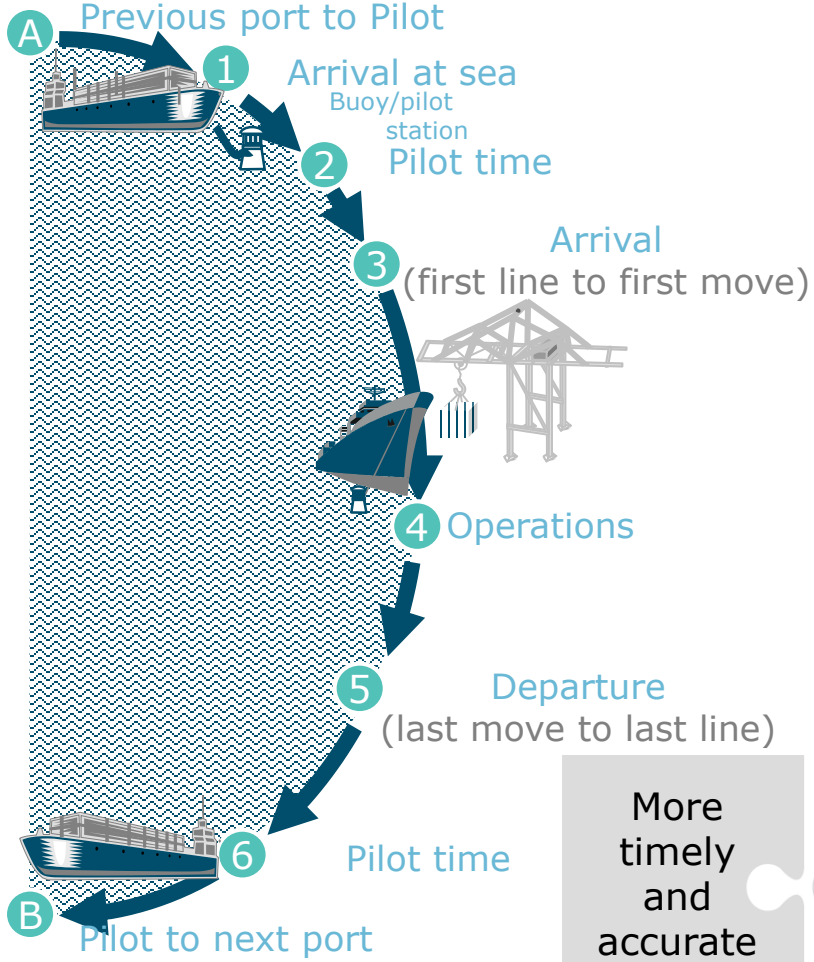
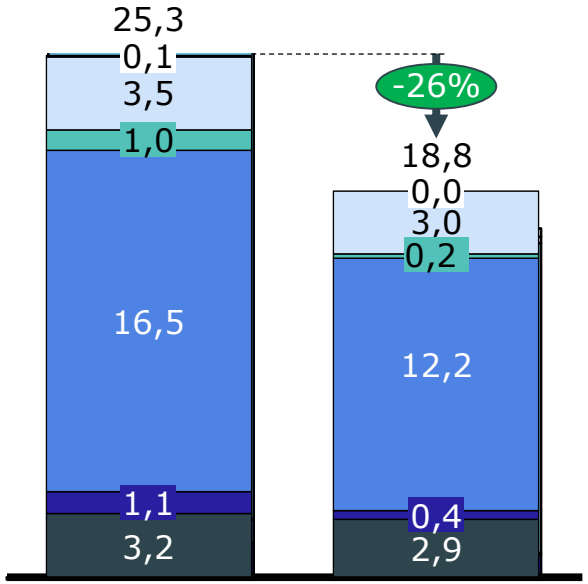
Opportunities in terminal efficiency

Working with terminals to reduce port stays through process improvements



Example: performance (hours)



More timely and accurate planning → Vessels on time → Optimized port stay and reduced emissions

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