Radical Improvements in Vessel Efficiency

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90% of internationally traded goods are transported by sea.
Vessels are significant sources of air emissions in ports. Improvements are clear, but the vessel share is growing as other modes have reduced emissions more quickly.
(source: Port of Los Angeles 2016 emissions inventory)
Ports impact adjacent communities – whether or not the region meet air quality standards.

https://www.epa.gov/caaac/final-ports-initiative-workgroup-report-recommendations-us-epa
It starts with Transparency

Container shipping is the most energy efficient means to move high volumes of goods across long distances.

However, in absolute terms, the environmental impacts of the industry are significant.

Maersk Line environmental impacts, 2017:

1. Fuel consumption: 10.2 million tonnes
   \[ \text{CO}_2 \] emissions: 32.8 million tonnes

2. SOx emissions: 530,000 tonnes
   NOx emissions: 811,000 tonnes

3. Waste: 172,000 tonnes
Standard methods are available to report the environmental impacts of ocean shipping. The best-accepted are from the Clean Cargo Working Group.

＞85% of the global container capacity in CCWG membership

- Annual data collection and benchmarking since 2005
- Standardized CO₂ industry methodologies
- Verification protocol.
- Enables customers to make informed decisions and integration of sustainability into the supplier selection process.
Vessels are increasingly fuel efficient. This reduces fuel use, CO₂ and other air emissions in our customers’ supply chains.

Maersk Line 2017 result:
-43% less CO₂ per container per km vs. 2007

CCWG 2016 result:
-36% vs. 2009

2020 Maersk Line goal: Reduce CO₂ by 60% vs. 2007
Fuel consumption is a function of vessel size, equipment and operations.

Source: Clean Cargo Working Group, 2017 Benchmark study of 2016 data.
We are decoupling growth in our business and our environmental impact. Progress toward our CO₂ reduction goal is good, but slowed in 2016 – 2017.

2016 Highlights:

**25%**
Relative CO₂ reduction for A.P. Moller-Maersk compared to 2010 baseline. 2020 target: 30%

**42%**
Relative CO₂ reduction for Maersk Line compared to 2007 baseline. 2020 target: 60%

Share of total CO₂ eq. emissions: 84% Maersk Line, 9% Maersk Oil, 4% Maersk Tankers, 3% Others

*Decoupling volume transported and CO₂ emissions*

The graph shows actual development in absolute reductions in CO₂ emissions at growing volumes transported by Maersk Line.

Growth in transported containers (TEUs)

Reduction in global CO₂ emissions (tonnes)
How will we achieve our 60% goal?

Through increased energy efficiency for low CO₂ shipping

- We are constantly optimizing network design and execution
- New vessels set new standards on energy efficiency
- Retrofit our existing fleet with new technologies
- The connected vessel strategy is already revealing new opportunities to optimize operations.
Energy efficiency makes good business

Since 2007, Maersk Line has reduced CO₂ by 43% per container.

On average, Maersk Line is currently 10% better than the industry.

We aspire to reach 60% CO₂ reduction per TEU before 2020 (2007 baseline).

Vessel Performance Centre saved >400,000 tonnes of fuel and >$400M in fuel cost since 2012.
EXTREME MAKEOVERS FOR OUR EXISTING FLEET

- 1 billion USD invested over five years
- Over 100 vessels to be upgraded
- More than 1 million tonnes of CO2 expected to be saved over the next five years
Radical Retrofit - example

“G” Class – 12 vessels

**Energy Efficiency & Environmental Technologies**
1. New Bulbous Bow
2. New Propeller
3. Propeller Boss Cap Fins
4. Engine de-rating
5. Fuel flow meters
6. Other technologies

**Capacity Boost**
1. Raise Wheelhouse
2. Upgrade Lashing Bridges
3. Upgrade hatch covers
4. Scantling draft evaluation
The Connected Vessel – preparing for tomorrow
Cost Leadership Must Win Battle

- UPGRADED VESSELS
  - New vessel IT platform
  - Maritime IT support center
    - Automated consumption flow meters

- UPGRADED DATA MANAGEMENT
  - Automated, real-time data collection
  - One standardized way of transmitting data between ship and shore
  - One data repository, integrated to other OPS systems

- UPGRADED PERFORMANCE MANAGEMENT
  - One standardized and flexible platform and operating system onboard and ashore to visualize opportunities and guide on action
Maersk G-Class
Radical Retrofit Timeline
Radical Retrofit Results

- **Successful reduction in fuel consumption and related emissions**

- **Technology Advancement Project (TAP) – Sponsored by Ports of Los Angeles and Long Beach**
  - Currently analyzing the efficiency improvement using Connected Vessel data

- **Unplanned benefit: reduction in underwater noise generation**
  - Scripps’s Institute has >10 years of sound data in the northbound lane of the Santa Barbara Channel
  - 5 Maersk vessels were evaluated before and after retro-fit
  - Source SPL when corrected for vessel speed and draft is
    - lower by 6 dB in 8-100 Hz band
    - lower by 8 dB in 100-1000 Hz band
  - “Reductions of ship source sound pressure level due to changes such as those employed by the radical retrofits may result in ocean-basin-wide noise reductions.”

Sustainability is the right thing to do and also makes good business sense.