Decarbonizing maritime transport

- low GHG emission fuels
Every day, we help our customers move almost 20% of the world’s food, materials and goods - items we all depend on to live, work and thrive.
GLOBAL REACH

- 100,000+ Colleagues
- 300+ Offices
- 130+ Countries
- 700+ Vessels (calling 400+ Ports)
- 65+ Terminals
- 450+ Warehouses
- Fleet of Aircrafts

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Committed to accelerating
a green and equitable energy transition

“While we take a holistic approach to ESG, our greatest opportunity for change is within the environmental category.

In our global operations, we emit millions of tonnes of greenhouse gases every year. We recognise that we are part of the problem. We are, however, also part of the solution and uniquely placed to decarbonise the logistics industry by using our resources and technical expertise.

Our efforts must be matched at the industry level in order to successfully accelerate a green and equitable energy transition. Together with industry-leading customers and partners, we’re calling for ambitious policy and action to ensure this happens. And we are fully committed to doing our part to make this vision a reality.”

- Vincent Clerc, CEO A.P. Møller - Mærsk
Maersk targets net zero greenhouse gas emissions across our entire business operations by 2040

- **Ocean**: ~50% reduction* in emission intensity
- Min. 25% of Ocean cargo transported with green fuels
- **Air**: Min. 30% of cargo transported with Sustainable Aviation Fuels
- **Logistics facilities**: Min 90% green operations*
- **Landside**: Min 20% of moves of customer’s cargo on low/zero emissions technology
- **Terminals**: ~70% emissions reduction*
- **Landside**: Min 20% of moves of customer’s cargo on low/zero emissions technology
- **Terminals**: ~70% emissions reduction*

*from 2020 baseline

Net zero across our business and 100% green solutions to customers
Solving the scope 3 challenge with low GHG emission Ocean Freight

Manufacturing and Procurement of Goods are large causes of GHG emissions for any company.

Logistic emissions can contribute significantly to your company's overall GHG footprint.

Sea freight is the most energy efficient mode of transport, but the amount of ocean transport used means emissions add up.

Therefore, acting on ocean emissions is a quick and impactful strategy to reduce your scope 3 GHG emissions.

Source: International Maritime Organisation
Maersk definition of green and low emission fuels

- **Green** is defined as fuels that have low or very low GHG emissions over their life cycle compared to fossil fuels.
- ‘Low’ refers to fuels with 65-80% life cycle GHG reductions compared to fossil fuels.
- ‘Very low’ refers to fuels with 80-95% life cycle GHG reductions compared to fossil fuels.

Maersk evaluates all new fuels on a ‘well-to-wake’ life cycle basis

Well-to-Wheel/Wake (WtW)    Well-to-Tank (WtT)    Tank-to-Wheel/Wake (TTW)

Extraction   Transport   Refining   Transport   Distribution   Tank   Combustion
Land use   Cultivation   Collection of Waste feedstock   Transport   Processing   Transport   Distribution   Tank   Combustion

Lifecycle assessment (LCA) is the compilation and evaluation of the inputs, outputs, and the potential environmental impacts of a product or service throughout its lifecycle.
To help you reach your decarbonisation goals, we need to look at all levers – both green fuels and energy efficiency

<table>
<thead>
<tr>
<th>Key Lever</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green fuels*</td>
<td>• Maersk is currently sourcing biodiesel (from waste feedstocks), and green methanol (bio and e-methanol)</td>
</tr>
<tr>
<td></td>
<td>• We follow a sustainability policy with min. 65% savings</td>
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<tr>
<td></td>
<td>• We are evaluating the feasibility of using green ammonia and batteries</td>
</tr>
<tr>
<td></td>
<td>• *Maersk has elected not to procure alternative <em>fossil fuels, such as LNG to reach our targets</em></td>
</tr>
<tr>
<td>Efficient vessel design</td>
<td>• Optimising vessel design has the potential to increase the energy efficiency of vessels</td>
</tr>
<tr>
<td>Shore power</td>
<td>• Connecting to shore power in ports has the potential to reduce emissions and particle pollution</td>
</tr>
<tr>
<td>Efficiency retrofits</td>
<td>• Retrofitting existing vessels with energy efficient technical measures has the potential to save fuel and reduce emissions</td>
</tr>
<tr>
<td>Network and vessel</td>
<td>• Examples of such measures include new propellers, air lubrication systems and capacity extensions</td>
</tr>
<tr>
<td>performance</td>
<td>• We are also investigating innovative technologies such as fuel cell engines and wind-assisted propulsion</td>
</tr>
<tr>
<td>Offsetting (deselected)</td>
<td>• Real-time tracking and optimising of our vessel performance and network design, has the potential to reduce fuel needed for the same tasks – reducing emissions</td>
</tr>
<tr>
<td></td>
<td>• Some companies rely on offsetting to reach decarbonisation targets. We focus on reducing emissions</td>
</tr>
</tbody>
</table>

*Some companies rely on offsetting to reach decarbonisation targets. We focus on reducing emissions.*
Breaking the chicken-egg dilemma and leading the way in decarbonizing our industry

Who will build a ‘green’ ship if there is no green fuel, or fuel infrastructure?

Sourcing green methanol at scale
We are building a portfolio of partnerships with global suppliers and securing green methanol for our ships

The first ever green fuel powered vessel will sail in July 2023, and 24 large container ships able to sail on green methanol will enter the fleet starting in 2024

Who will produce green fuels if there are no customers for it?
## Priority fuels for decarbonising shipping

<table>
<thead>
<tr>
<th>Fuel</th>
<th>Key advantages</th>
<th>Key limitations/risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiesel (from waste feedstock)</td>
<td>• Biodiesel market already exists</td>
<td>• Limited availability of suitable biomass feedstock</td>
</tr>
<tr>
<td></td>
<td>• Can be used as drop-in fuel in existing vessels and engines</td>
<td>• Price pressure due to competing demand from road transport and aviation</td>
</tr>
<tr>
<td>Green methanol (bio-methanol and e-methanol)</td>
<td>• Can be produced from sustainable biomass and renewable electricity</td>
<td>• Bio-methanol: availability of suitable biomass feedstock</td>
</tr>
<tr>
<td></td>
<td>• Vessels running on methanol are already in operation today</td>
<td>• E-methanol: availability of biogenic CO(_2) source and renewable electricity</td>
</tr>
<tr>
<td></td>
<td>• Well-known handling</td>
<td></td>
</tr>
<tr>
<td>Green ammonia (e-ammonia)</td>
<td>• Can be produced at scale from renewable electricity</td>
<td>• Safety and toxicity challenges</td>
</tr>
<tr>
<td></td>
<td>• Contains no greenhouse gas</td>
<td>• Infrastructure challenges at ports</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Future costs depend on cost of renewable electricity and availability of engine</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(evaluation is still ongoing)</td>
</tr>
</tbody>
</table>

- Engine technology
- Toxicity
- Handling onboard

- Storage
- Energy density
- Production pathways

- Cost effectiveness
- Chemical simplicity
- Regulation
- Future-"proof"
Comparing toxicity of different future fuels

Figure 11. Lethal dose to 50 percent (LC50) of a fish population

- Ammonia 0.068 mg/l
  ECHA, European Chemical Agency, registration dossier Ammonia
- Gasoline 8.2 mg/l
  Petrobras/Statoil ASA, Safety Data Sheet, ECHA registration dossier Gasoline
- Methane 49.9 mg/l
  ECHA, European Chemical Agency, registration dossier Methane
- Diesel 65 mg/l
  ECHA, European Chemical Agency, registration dossier Diesel
- Heavy fuel oil 79 mg/l
  GKG/ A/S Dansk Shell, Safety Data Sheet
- Methanol 15,400 mg/l
  ECHA, European Chemical Agency, registration dossier Methanol

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Asia has enormous collections points of waste and residues feedstocks that are used for bio marine bunkers...

**Supply of Used Cooking Oils**

000 tons

**Top 10 Largest Consumers of Vegetable Oils**

000 tons

Source: Argus
Our decarbonisation roadmap
from renewables to Power-to-X

Direct electrification
Electric propulsion

Power-to-X

Transmission and charging infrastructure
Transmission
Electrolysis
Fuel cells electrical propulsion
Transmission
Electrolysis
Synthesis
Combustion

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Pathways to green methanol, the current green fuel choice for Maersk

<table>
<thead>
<tr>
<th>Source</th>
<th>Production</th>
<th>Fuel Type</th>
<th>Min. lifecycle Greenhouse Gas Reduction in REDII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste Biomass</td>
<td>Waste Biomass</td>
<td>Bio-methanol</td>
<td>≥65%</td>
</tr>
<tr>
<td></td>
<td>Biogas upgrade to bio-methane</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Bio-methane added into gas grid and physically connected to production facility</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Methanol plant produces green methanol from the grid on a mass-balance basis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Waste Biomass</td>
<td>Waste Biomass</td>
<td>Bio-methanol</td>
<td>≥65%</td>
</tr>
<tr>
<td></td>
<td>Gasification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Syngas</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Methanol synthesis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable Electricity</td>
<td>Renewable Electricity</td>
<td>Bio-methanol</td>
<td>≥70%</td>
</tr>
<tr>
<td></td>
<td>Electrolysis</td>
<td>E-methanol</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Green Hydrogen</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CO₂ Biogenic</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Methanol synthesis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Credibility is key – therefore we developed strict decarbonisation principles

Our decarbonisation guidelines are driven by ambitious targets with a real and significant environmental impact.

- All of our customer decarbonisation offerings allocate **GHG emissions reductions to your transportation**.
- **We don’t offer emissions offsetting*** outside of our own operational boundaries, as our focus is on decarbonising our own supply chain.
- Our GHG emission calculations are in accordance with the industry-leading **GLEC framework**** (aligned with ISO 14083 requirements).
- We consider **all GHG emissions listed in the** Intergovernmental Panel on Climate Change (**IPCC**) not just CO2 – that’s one of the reasons we don’t use LNG.
- We quantify GHG emissions on a **Well-to-wake/wheel (WTW)** basis, including upstream emissions of the fuels / energy used.
- For green fuels, we only use **2nd generation (waste and residues) fuels**.
- Fuels and energy used in operations (i.e. renewable electricity, biofuels, e-fuels) have to comply with our **Maersk sustainability policies**.
All the way to zero – Green Methanol Powered Vessels

How to benefit?

- In fall 2023, the first (of 25) green methanol-powered Maersk vessels will start its operations.
- All these vessels have dual-fuel capability.

Maersk’s investments into Methanol-enabled vessels

How can customers benefit?

- **Benefits from the GHG emission reductions** from green methanol-enabled vessels by purchasing Maersk ECO Delivery Ocean.
- Green methanol results in a **lifecycle GHG reduction of at least 65%** vs fossil fuels.
- **Two types of green methanol**: Bio-methanol (based on waste biomass) and e-methanol (produced from waste CO2 and renewable electricity)
- **ECO Delivery is fuel-agnostic**: Green methanol and biodiesel are used (mass-balance principle), and makes emission reductions available on all trades, globally.
In summary, the major changes you will see to your traditional fossil fuel contract with ECO 2.0 adoption:

$0 BAF+LSS
For every container shipped with Maersk ECO Delivery 2.0, you will only pay a green premium and any BAF or LSS charges will be $0. This is the first ocean product that fully moves away from the fluctuating BAF model.

$0 EU ETS
Every container shipped with ECO Delivery 2.0 will be exempt from the upcoming EU ETS surcharges beginning on January 1, 2024. More emissions surcharges are soon to follow. Instead of paying rent to continue to emit, invest in strategies to reduce your emissions to avoid these fees!

Price transparency and stability
The methodologies for pricing and emissions factors are based on actual data from our own vessels and fuel consumption. Maersk also has long term offtake agreements with green methanol suppliers, giving us greater visibility and transparency into long term pricing.
Maersk ECO Delivery Ocean:
Solves Scope 3 problem in an easy and credible way

The Ocean ECO Delivery product offers emissions reduced shipping based on biofuels enabling immediate and externally verified GHG savings for customers

How it works

- Certified biofuel procured and blended by Maersk
- Biofuel bunkered and documented on mass balance log
- Emission savings allocated to loaded ECO Delivery bookings
- Process and methodology are audited and third-party verified

Customer benefits

- Flexible & easy
- Low abatement cost (no BAF, LSS and EU ETS payment required)
- Credible
- De-linked from Fossil Fuels
- Improved emission methodology
- Up to 1 year fixed price
THANK YOU

ALL THE WAY TO ZERO