MAN Energy Solutions
Future in the making

資料37-3

Regulatory Developments

Marine, EU and IMO GHG and Air Emissions

Dorte Kubel
Tuesday, 7 November 2023

AGENDA

1 EU Status

2 IMO Status

1 EU Status

EU

Inclusion of shipping in the EU Emission Trading system (ETS)

Key elements of EU ETS:

- Cap on GHG emissions* to be reduced over time
- Trading with other sectors possible
- CO_2 price fluctuating*

Entry into force

- Ships will have to buy allowances for:
  - **In 2025**: 40 percent of their verified emissions in 2024.
  - **In 2026**: 70% of verified emissions in 2025.
  - **In 2027**: 100% of verified emissions in 2026.
- N_2O and CH_4:
  - To be reported to MRV from 2024, allowances to be surrendered by 2026.
  - Default and actual values follows FuelEU regulation

*) GHG: CO2, CH4 and N2O. TtW but biofuels and synthetic fuels will count as zero, provided EU criteria for GHG savings and sustainabilty are fulfilled.
'*) EU ETS per May 23 has a price of ≈90 EUR/tonne CO2

EU

FuelEU Maritime

Key elements

– Reduction of the GHG* intensity of the fuel used

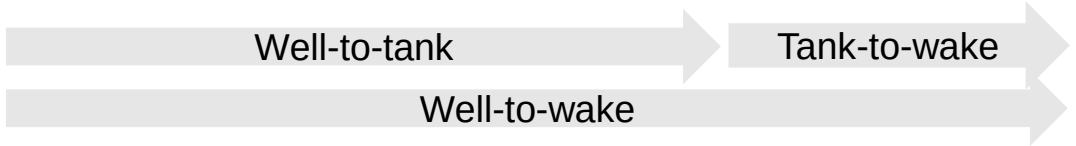
– Compliance:
  – Annual average
  – Ship or fleet basis (pooling mechanism)
  – Remedial penalties -> compliance

– Well-to-Wake basis
  – Calculation methodology and sustainability criteria defined
  – Default factors for WtT and TtW emissions defined
  – Use of actual values allowed, if certified (procedures under development)

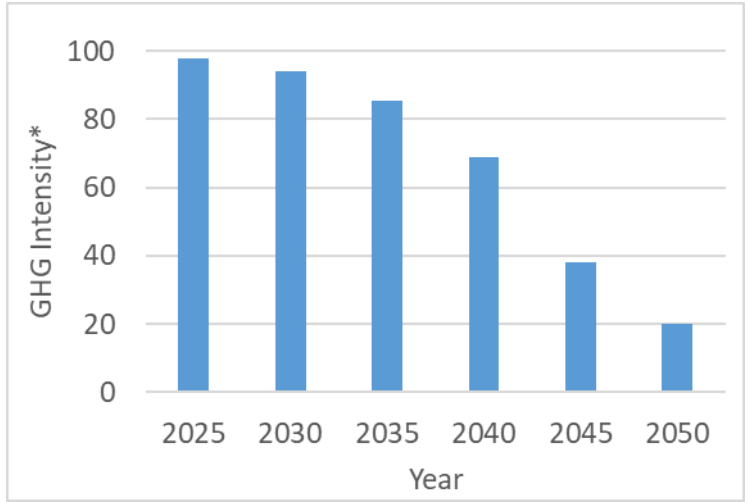
Entry into force

– 1 January 2025

*) GHG: CO_2, CH_4 and N_2O, 100 years GWP.



Reduction requirement (rel. to VLSFO)



GHG intensity* = Gram CO_2 equivalent per MJ

EU

Common elements of FuelEU Maritime and Shipping in EU ETS

Ships covered:

– Most ships above 5000 GT

Fuel/Energy covered:

– All energy used on internal EU voyages and port stays, and

– half of energy used on voyages departing from/arriving at EU-ports to/from non-EU ports

Implementation

– Several delegated and implementing acts provides details on reporting.

– Intention to align with MRV reporting to the extend possible

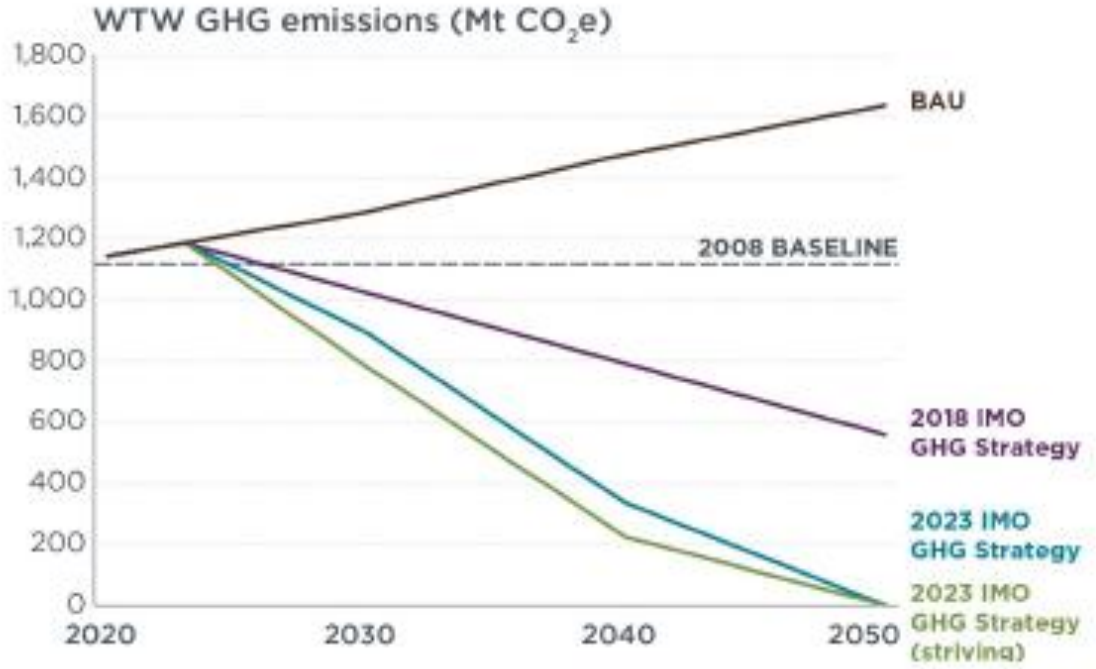
2 IMO Status

IMO 2023 GHG Strategy

Adopted 7 July 2023 with Support from all IMO Member States!

IMO 2023 GHG Strategy

Levels of Ambition and Indicative Checkpoints



GHG emissions to reach net-zero

– by or around, i.e. close to, 2050

Indicative Checkpoints

– Absolute reduction of the total annual GHG emissions*

2030: at least 20%, striving for 30%

2040: at least 70%, striving for 80%

CO_2 emissions per transport work to decline

– At least 40% by 2030*

Uptake of zero or near-zero GHG emission technologies, fuels and/or energy sources

– at least 5%, striving for 10%, of the energy by 2030

Well-to-Wake approach

– WtW GHG emissions of marine fuels should be taken into account, based on IMO LCA Guidelines

*) Compared to 2008

IMO 2023 GHG Strategy

Next steps

A basket of mid-term GHG reduction measures to be developed:

Elements (details to be defined)

- ❑Technical: A standard regulating GHG intensity of marine fuels and
- ❑Economic: Based on a GHG emissions pricing mechanism

Timeline

Summer 2023 – Spring 2024:
Development of measures

Autumn 2024:
Impact assessment (final report)

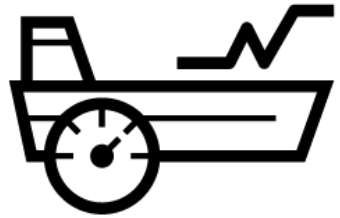
Spring 2025 – Autumn 2025:
Approval and adoption of measures

2026
Revise EEDI, EEXI, CII

Spring 2027:
Entry into force of measures

IMO 2023 GHG Strategy

Mid-term GHG Reduction Measures



Basket of candidate mid-term measures

– **Technical element**:
  – Goal-based low-GHG fuel standard (w. or w.o. flexibility element*)
– **Economic element, e.g**:
  – A GHG levy (e.g. USD 100/tonne CO2 eq, to be adjusted over time)
  – A “Fee-bate system” (Fee for fossil fuel, Rebate to low/zero carbon fuels)

General support in IMO for a combination of technical and economic elements **(basket of measures).**

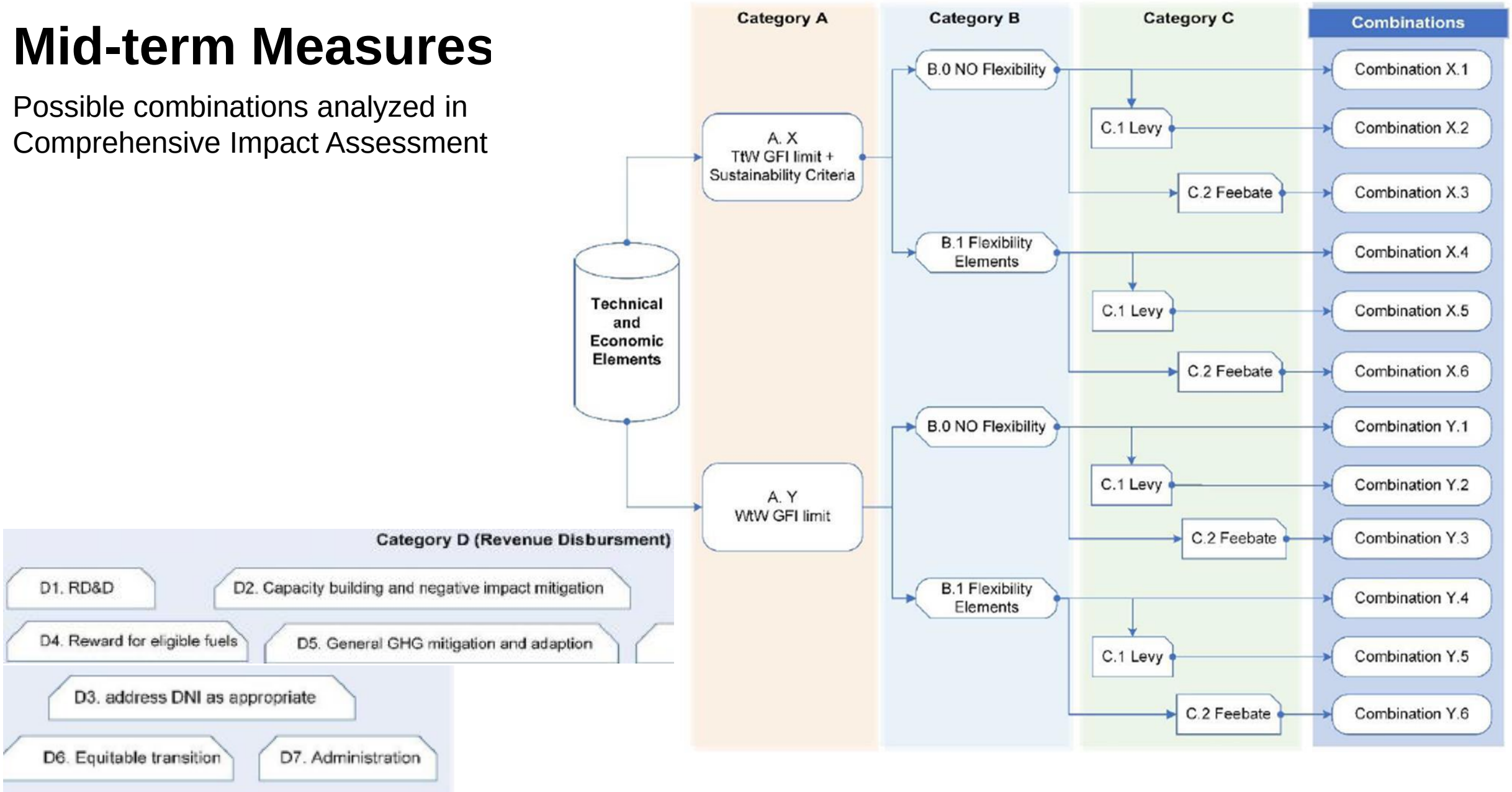
Impact Assessment

– Different combinations of measures to be analyzed
– Mitigation of negative impacts on states will be a key issue

*) Some consider the flexibility element of the goal-based fuel standard to be a part of the technical element, others consider it an economic element

Mid-term Measures

Possible combinations analyzed in Comprehensive Impact Assessment



IMO LCA Guidelines

Guidelines for Life Cycle Assessment (LCA) of GHG Intensity of Marine Fuels

Status

– IMO adopted first version LCA guidelines for marine fuels in July 2023

Main elements

– Calculation methodology GHG intensity (WtT, TtW and WtW)

– Sustainability aspects

– Default factors for WtT and TtW emission for main fuel pathways

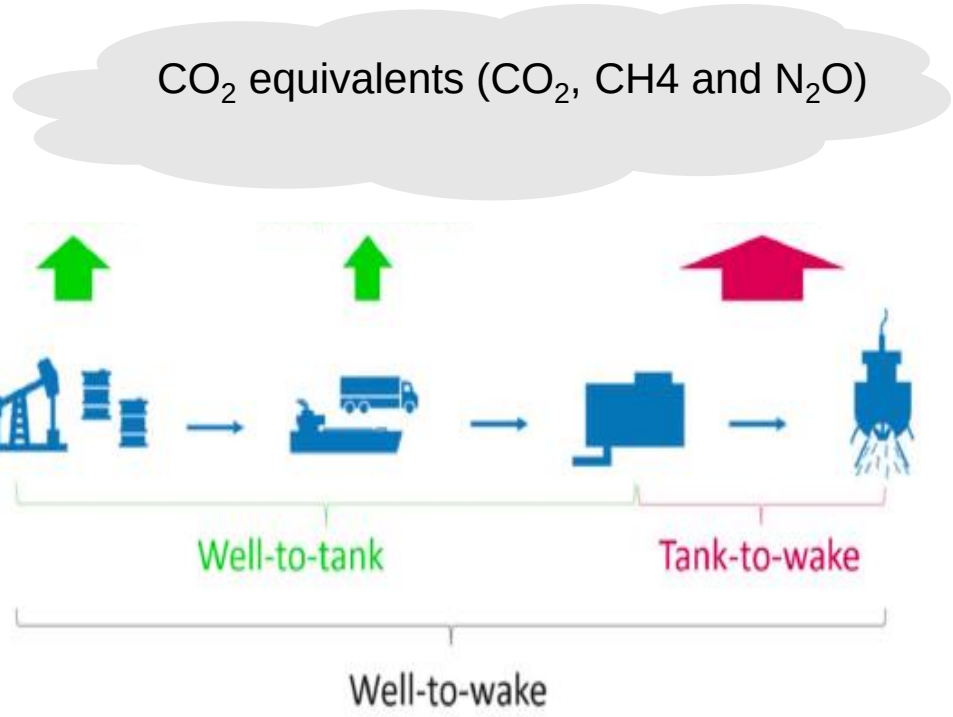
– Allows for use of actual values, if certified*

Next steps

– Correspondence group on further development of LCA framework

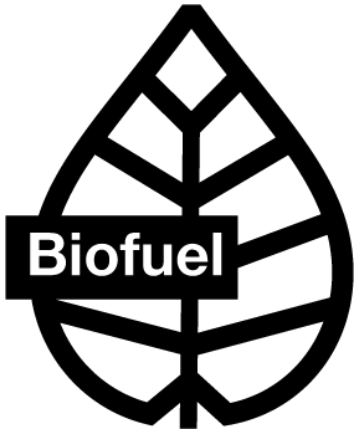
  – Methodological issues (e.g. on-board carbon capture)

  – WtT and TtW emissions: Default and actual values



*) Procedures to be developed

IMO – Other Issues



Accounting for biofuels in CII

– MEPC 80 adopted interim guidance on how to account for biofuels in the CII.

Black Carbon

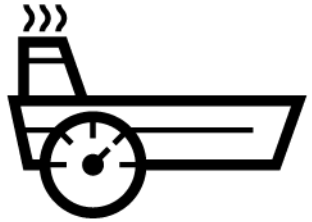
– Ban of HFO (use and carriage for use) in Arctic waters from 1 July 2024 (multiple exemptions until mid 2029)*.

– PPR 10 (April 2023) agreed to develop "*Guidelines on **recommendatory goal-based control measures** to reduce the impact on the Arctic of Black Carbon emissions from international shipping".*

– Correspondence group to report to PPR 11

*) Introduced to reduce the risk of oil spills.

IMO – Other Issues



Amendments to NOx Technical Code

– MEPC 80 agreed to develop "Amendments to the NOx Technical Code 2008 with regard to **re-certification procedures of existing marine diesel engines on board of ships**" (PPR 11)

– EUROMOT is working with US and IMarEST to submit proposed amendments to NOx Technical Code 2008 regarding **Multiple engine operational profiles and off-cycle NO_x emissions** (PPR 11)

Future revision of NOx requirements?

– Canada (MEPC 81/5/1), supported by some member States and NGO's:
  – Recent measurement campaigns in NO_x-ECAs indicate high NO_x emissions at low load
  – Current NO_x test cycles are not representative for operation (esp. in costal areas)
  – Low loads (< 25 %) are often observed in coastal areas

Certification of Actual TtW Emissions

Tank to Wake (TtW) Emissions of CH_4 and N_2O

Certification of actual TtW emission factors of CH_4 and N_2O

- EU and IMO allows for actual values to be used, if certified
- Procedures for certification to be developed
- **IMO**
  - General support to use NOx Technical Code as basis for certification
  - Procedures to be developed as part of LCA Guidelines (not started)
- **EU**
  - EUROMOT coordinating work in ESSF* on procedure for certification of actual TtW values
  - Described different options and their pros and cons
  - Next steps: Develop basis for EU Guideline for certification for use with MRV
  - ESSF work may inform EU submissions to IMO

*) European Sustainable Shipping Forum

Certification of Actual TtW Emissions

Possible options for certification of actual values for TtW CH_4 and N_2O

- **Test bed certification**
- **On-board certification**
  - Test cycle certification
  - Continuous monitoring
    - “Truly continuous” + reporting
    - Measurement over a given period
  - Estimation based on engine Load distribution

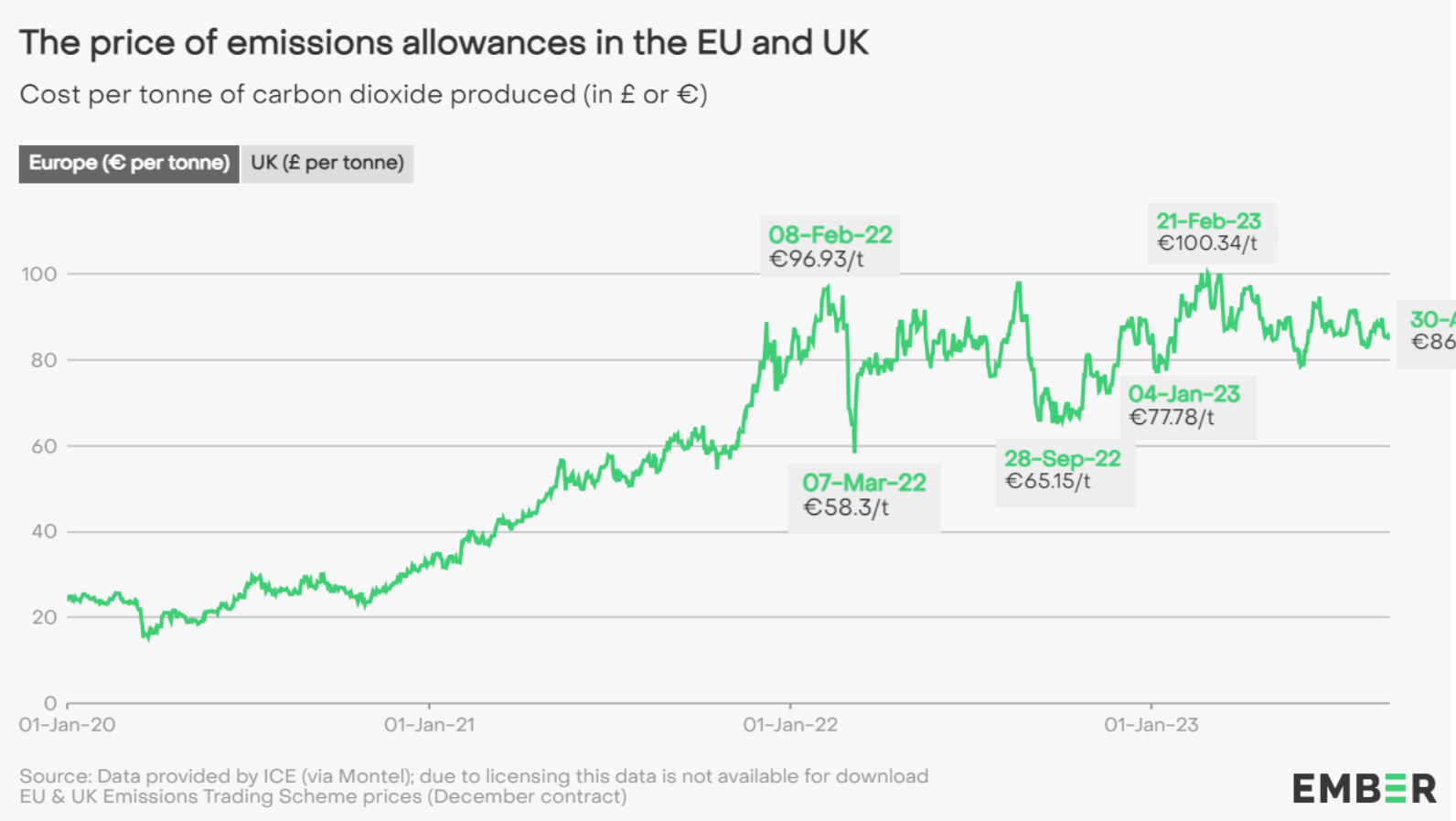
MAN Energy Solutions
Future in the making

Thank you very much!

Dorte Kubel (EED)
Tuesday, 7 November2023

Cost per tonne of CO_2 produced

in Euro



All data provided in this document is non-binding.
This data serves informational purposes only and is especially not guaranteed in any way.
Depending on the subsequent specific individual projects, the relevant data may be subject to changes and will be assessed and determined individually for each project. This will depend on the particular characteristics of each individual project, especially specific site and operational conditions.