

Independent Technical Assessment Statement

1. Introduction

Hapag-Lloyd AG (Hapag-Lloyd) is a **container liner shipping company** operating more than 280 vessels with a combined capacity of more than 2.1 mn TEU. 2023 transport volume amounted to 11.9 mn TEU. Besides that, Hapag-Lloyd is growing its terminal & infrastructure business segment, which currently owns respectively co-owns 20 terminals globally.

As part of its Strategy 2030, Hapag-Lloyd aims at becoming a **sustainability driver** in the container shipping segment. Hapag-Lloyd has communicated the following **decarbonisation targets** related to scope 1 and scope 3 emissions of maritime operations of its liner shipping business segment:

- reducing **absolute emissions** of its total fleet by about **one third** to about 10.0mn t CO₂e well-to-wake (WtW) by 2030 vs. base year 2022,
- reducing **average emission intensity**, measured as Annual Efficiency Ratio (AER) of its total fleet by **about 53%** from 9.2 g CO₂e/dwt NM in 2022 to approximately 4.3 g CO₂e/dwt NM in 2030 in WtW perspective
- being **net zero in 2045**, and
- following an AER trajectory fully **aligned with a 1.5°C pathway**.

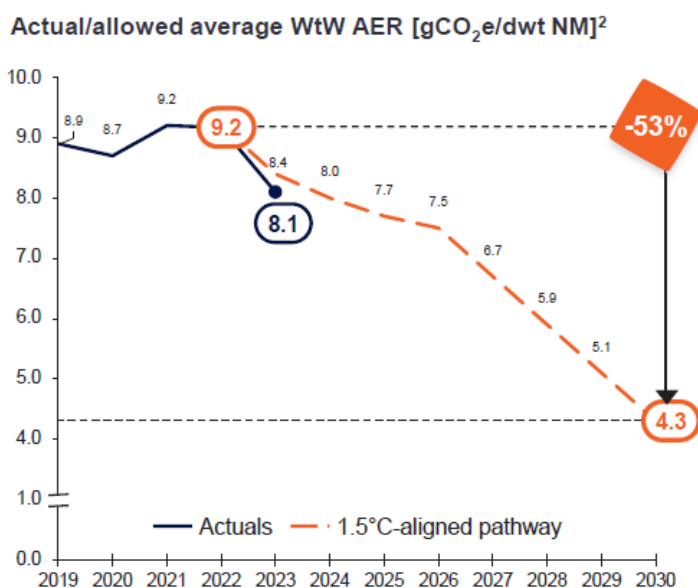


Figure 1: Hapag-Lloyd AER intensity target trajectory as of April 2024

The above statement on an absolute target refers to specific assumptions on future fleet development, while the relative AER trajectory is mainly driven by 1.5°C-aligned carbon reduction factors from the 1.5°C Initiative of 10 major ship financing banks. Hapag-Lloyd has substantiated these targets with a range of decarbonisation levers it identified and quantified.

2. Scope of assessment

DNV Business Assurance Services UK Limited (DNV) has been commissioned by the management of **Hapag-Lloyd AG (Hapag-Lloyd)** to carry out an independent technical **assessment of the alignment of its decarbonisation targets with a 1.5°C global warming pathway**. Furthermore, DNV has assessed if the decarbonisation levers identified and quantified by Hapag-Lloyd are suitable and sufficient to meet the targets set.

The technical assessment statement represents DNV's independent opinion and is intended to inform all stakeholders of Hapag-Lloyd.

3. Documents and data assessed

Hapag-Lloyd has provided the following documents and data to DNV:

- 2024-01-24_Strategy 2023_Workstream 3.5_Sustainability-Trajectories
- 2024-02-15_Information Memo on Hapag-Lloyd's Carbon Dioxide Emission Reduction Targets
- 2024-02-15_Assessment of Decarbonization Targets – Kick-off Meeting
- 2024-02-15_Emission Analysis 2023-to
- 2024-03-11_Fleet Transition Model v1.4
- 2024-03-11_Sustainability Workstream – Handover Deck
- Access to verified IMO DCS data of the owned fleet for 2022 and 2023

4. Assessment methodology

4.1 Step 1: Assessment of fleet and emissions baseline

DNV began the assessment by reviewing the **actual greenhouse gas (GHG) emissions of the fleets operated by Hapag-Lloyd in 2022 and 2023**. This comprised of both owned and chartered vessels. Whilst 2022 fuel consumptions have already been verified by recognised organisations in course of IMO DCS reporting, 2023 data was still under verification. As a result, 2022 data serve as verified baseline.

4.2 Step 2: Assessment of fleet development plans

Whilst the intensity targets are mainly driven by externally provided 1.5°C-aligned carbon reduction factors, the absolute emission target is notably dependent on the fleet size and respective transport work. As such, DNV reviewed Hapag-Lloyd's **assumptions on future fleet development** in detail. For all existing vessels as well as vessels on order, DNV reviewed the current age vs. assumed phase-out age, duration of charter contracts and probability of replacement by a vessel of the same size. Vessel additions, both to compensate for slow-steaming as well as to allow growth in transport work, have been considered. Assumptions had also been made regarding the sizes of these prospect vessels. **Different fleet development scenarios** have been considered in Hapag-Lloyd's model, ranging from "constant transport work", translating to a Compounded

Average Growth Rate (CAGR) of 0%, over “growth in line with market average”, meaning a CAGR of ca. 4%, to “growth beyond market average”, being a CAGR of ca. 6%.

4.3 Step 3: Assessment of targets

Hapag-Lloyd had primarily set an **absolute GHG emission target of 10.0mn t CO₂e well-to-wake for 2030**, which equals a reduction of nearly 36% compared to the 2022 baseline. In combination with its fleet development base case, this resulted in an AER trajectory towards 2030.

As third step of the assessment, DNV combined Hapag-Lloyd’s scenarios of **future fleet compositions** with the **1.5°C aligned trajectories** (defining allowed well-to-wake AER by vessel segment, size and year) developed for and applied by the **1.5°C Initiative** of 10 ship financing banks, jointly representing about 85bn USD in ship lending. These trajectories had been developed in response to methodological shortcomings of other target setting approaches, and were meanwhile used by a number of banks for setting of Net-Zero Banking Alliance (NZBA) aligned decarbonisation targets.

This combination was meant to triangulate, and respectively verify or falsify the 1.5°C alignment of the target(s) set by Hapag-Lloyd.

4.4 Step 4: Assessment of decarbonisation levers

Hapag-Lloyd had identified a number of **decarbonisation levers** to achieve the intended reduction of absolute emissions from 15.6 to 10.0 mn t CO₂e against the effect of a growing fleet.

- Lever 1: Fleet composition & renewal
- Lever 2: Slow steaming & network efficiency
- Lever 3: Fleet upgrade efficiency
- Lever 4: Alternative fuels

Each of the **levers were described and quantified** by Hapag-Lloyd. DNV’s assessment focused on the questions, if the levers are suitable to decarbonise the fleet and sufficient to meet the targets. Assumptions of applicability by vessel, degree of implementation (e.g. with regard to speed reduction), impact on emission intensity, absolute emissions and transport work have also been reviewed.

5. Technical Assessment Opinion

5.1 Step 1: Fleet and emissions baseline

The verification of the fleet and emission baseline has been completed based on the actual fleet composition of the year 2023. It included both owned and chartered vessels, and vessels which have been with Hapag-Lloyd for the entire year as well as vessels serving Hapag-Lloyd for only part of the year. Verified IMO DCS data were available for all vessels, and carbon factors applied were in line with the FuelEU Maritime regulation. In well-to-wake perspective, 2022 GHG emissions of the fleet operated by Hapag-Lloyd amounted to **15.6mn t CO₂e** at the given transport work. This is **in line with the baseline applied by Hapag-Lloyd in its Fleet Transition Model applied for the target setting**.

5.2 Step 2: Fleet development plans

The overall **fleet development** is driven by continued deployment respectively phase-out of **existing vessels** as well as **addition of new tonnage** (owned and chartered). The fleet required is determined by the intended future transport work (and services) as well as operational profiles. Slow steaming requires additional vessels at constant transport work.

Hapag-Lloyd considered different scenarios for the future development of **transport work** and thereby fleet employed for the time frames 2022-2030 and 2030 to 2050. Scenarios range from “constant transport work” over “growth in line with market average” to “growth beyond market average” with respective CAGRs defined in Section 4.2. Specific assumptions on the development of transport work have been documented. The main case “growth in line with market average” was found to be in line with the CAGR assumed in the Shared Socioeconomic Pathway 2 of IPCC for containerized cargo. For each **scenario, specific assumptions on future fleet composition** have been documented by Hapag-Lloyd.

All assumptions on future fleet composition at defined transport work scenarios and operational profiles **were plausible**. For future vessels additions (beyond vessels contracted or specifically planned today), suitable common standard assumptions on vessel capacity were made. This appears reasonable. Though, further differentiation on future vessel sizes by service might have increased the accuracy of the results.

5.3 Step 3: Targets

As outlined above, Hapag-Lloyd has set an **absolute emission target of 10.0mn t CO₂e by 2030** together with a reduction of its **average emission intensity**, measured as Annual Efficiency Ratio(AER), of its fleet by **about 53%** from 9.2 g CO₂e/dwt NM in 2022 to about 4.3 g CO₂e/dwt NM in 2030.

By use of the 1.5°C aligned trajectories developed for and applied by the 1.5°C Initiative of 10 ship financing banks, DNV found that **under the scenario “growth in line with market average” 10.0mn t CO₂e are in line with 1.5°C global warming impact** at (required) medium confidence. Under the scenario “constant transport work” 1.5°C would require lower emissions. Under the scenario “growth beyond market average”, in turn, a higher emission budget would be acceptable.

The **intensity target trajectory** (see Figure 1 above) **reflects the assumed future fleet mix for the scenario “growth in line with market average” and meeting the 1.5°C target**. Following the 1.5°C aligned trajectories developed for and applied by the 1.5°C Initiative, a higher average vessel size would allow Hapag-Lloyd a marginally lower average intensity expressed as average AER at the same transport work. Smaller average vessel size, in turn, would allow a marginally higher emission intensity, as again in terms of average AER.

5.4 Step 4: Decarbonisation levers

Hapag-Lloyd had identified a number of **decarbonisation levers** to achieve the intended reduction of absolute emissions against the effect of a growing fleet. Detailed assumptions have been documented and

provided for the assessment. Per lever and underlying measure, DNV has reviewed the overall suitability (i.e. technical and operational feasibility of the lever) on a vessel class basis. Some measures apply to basically all vessels, others only to selected vessels. **All measures identified by Hapag-Lloyd are suitable and can reasonably be applied as assumed.**

Thereafter, DNV has reviewed the **assumed impact per measure** including potential interactions or overlaps.

Lever 1: **Fleet composition & renewal:** All assumptions made on replacement of existing vessels against more efficient tonnage and growth with efficient vessels of defined sizes appear plausible. Size mix can have some impact.

Lever 2: **Slow steaming & network efficiency:** Assumed speed reduction for existing vessels and for newbuilds with respective impact vessel emission intensity appear realistic. We have not verified if/how additional tonnage requirements can be met (on charter respectively newbuild market).

Lever 3: **Fleet upgrade efficiency:** Assumed penetrations and emission reductions per technical energy saving measure appear overall realistic.

Lever 4: **Alternative fuels:** Assumed amounts of the defined alternative fuel types appear ambitious (given that the combined share of alternative fuels significantly exceeds the IMO target of 5-10% by 2030), yet possible for a company like Hapag-Lloyd if required and sourced in time.

6. Inherent limitations

The link between absolute emission targets and **allowed emission intensities lies in the development of the fleet and its transport work**, because the absolute allowed emissions are derived bottom-up from the allowed emission intensities. Analyses have shown that Hapag-Lloyd is allowed to emit 10.0mn t CO₂e in 2030 in line with 1.5°C global warming if its transport work grows in line with the market average. **If Hapag-Lloyd's transport work grew faster than the assumed market average** (i.e. gaining market share), **higher absolute emissions would be allowed while still being 1.5°C aligned**. This is independent from the question if growth took place organically or by acquisitions. – In turn, if Hapag-Lloyd grew below the market average, less than 10.0mn t CO₂e would be required to stay 1.5°C aligned.

In line with global carbon budgets, **1.5°C alignment is less a question of** absolute emissions or emission intensity in **a certain year** (2030) than a question of absolute emissions respectively emissions intensities over the **time period from 2020 to 2050**. Accordingly, the defined trajectory (average AER, considering certain fleet mix) needs to be met any time between 2024 and 2050. DNV recommend remaining stringent in consistently achieving targets year-on-year, as opposed to compensating underachievement in early years with overachievement in later years. This is because the timing of emissions plays a crucial role in the emission lifecycle and absorption capabilities of global ecosystems.

With regard to the decarbonisation levers identified and quantified by Hapag-Lloyd, DNV is confident that they are suitable and sufficient, noting that the **required amounts of alternative fuels might face supply constraints** and may result in high abatement costs. Therefore, DNV suggests utilizing the other levers to the highest reasonable degree before closing the gap to target through more alternative fuels.

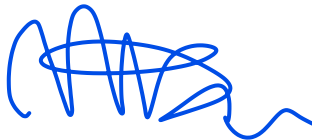
7. Conclusion

DNV Business Assurance Services UK Limited (DNV) has conducted an independent technical **assessment** if the **decarbonisation targets set by** Hapag-Lloyd AG related to well-to-wake scope 1 and 3 emissions of maritime operations of its liner shipping business segment **are aligned with 1.5°C global warming** and if the **decarbonisation levers** identified and quantified are suitable and sufficient to meet the targets set.

Based on a thorough assessment DNV concludes:

- **Baseline:** The 2022 GHG emissions of the fleet operated by Hapag-Lloyd AG, serving as baseline for target setting, amounted to 15.6 mn t CO₂e in WtW perspective at the given transport work.
- **Fleet development:** All assumptions on future fleet composition at defined transport work scenarios and operational profiles were plausible. The main case “growth in line with market average” was found to be in line with the CAGR assumed in the IPCC Shared Socioeconomic Pathway 2 for containerized cargo.
- **Targets:** The absolute emission target of 10.0 mn t CO₂e WtW by 2030 under the scenario “growth in line with market average” is in line with 1.5°C global warming impact at (required) medium confidence. The intensity target trajectory reflects the assumed future fleet mix for the scenario “growth in line with market average” and meets the 1.5°C target.
- **Levers:** The identified decarbonisation levers are suitable and sufficient, ambitious yet achievable, to meet the decarbonisation targets.

DNV Business Assurance Services UK Limited
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