POSEIDON PRINCIPLES

A global framework for responsible ship finance

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Poseidon Principles
Amaliegade 33 B, 3rd floor
1256 Copenhagen K
Denmark

www.poseidonprinciples.org
info@poseidonprinciples.org

Poseidon Principles

We are proud to continue our commitment to improving the role of maritime finance in addressing global environmental issues. The Poseidon Principles are a framework for assessing and disclosing the climate alignment of ship finance portfolios. They create a global baseline to support and work towards the greater goals for our society and the goal to align our portfolios to be environmentally responsible.

We know these steps are important for us to lead industry-wide change. As such, the Principles were developed in recognition of our role as financial institutions in promoting responsible environmental stewardship throughout the maritime value chain.

The Principles are consistent with the policies and ambitions of the International Maritime Organization ("IMO"), including its ambition for greenhouse gas ("GHG") emissions to peak as soon as possible and to reduce shipping's total annual GHG emissions to net zero by or around 2050 compared to 2008. In September 2023, signatories unanimously decided to align methodology with this ambitious outcome during MEPC 80. It is with pride that we take note of our own role, as the Poseidon Principles called for concrete leadership from the IMO in June 2023 to clarify ambitions for a 1.5°C future to enable cross sector engagement.

The Poseidon Principles are applicable to lenders, relevant lessors, and financial guarantors including export credit agencies. They apply globally, to all credit products secured by vessel mortgages, finance leases secured by title over vessel, or unmortgaged ECA loans tied to a vessel and where a vessel or vessels fall under the purview of the IMO.

Currently, climate alignment is the only factor considered by the Poseidon Principles. However, we recognise that they are intended to evolve over time and agree to contribute to a review process to ensure that the Poseidon Principles are practical and effective, and that further adverse impacts are identified for inclusion in due course. While the Poseidon Principles establish a global baseline, we recognise that some signatories may wish to go beyond this individually, and nothing in the Poseidon Principles prevents that.

The Poseidon Principles are ground-breaking in both the spheres of shipping and sustainable finance. They will not only serve our institutions to improve decision-making at a strategic level but will also shape a better future for the shipping industry and our society.

As signatories, we commit to implementing the Poseidon Principles in our internal policies, procedures, and standards, and to work in partnership with our clients and partners on an ongoing basis to implement the Poseidon Principles.

What began with 11 signatories in 2019 is now over 30 strong with increased membership anticipated, a testament to the growing impact of our collective commitment and the importance of transparency in propelling the maritime industry towards decarbonisation. We invite you to join us.

February 2024

Michael Parker
Chair, Poseidon Principles
Chairman, Global Shipping, Logistics and Offshore, Citi

Paul Taylor
Vice Chair, Poseidon Principles
Global Head of Maritime Industries, Société Générale

Preamble

The maritime sector has provided efficient economic services that have played a key role in enabling the growth of global trade and global economic development. However, this has not been without some adverse consequences unique to the maritime sector. The continued success of the maritime sector is intrinsically linked to the well-being and prosperity of the society we serve. Therefore, all industry participants must play a role in addressing adverse impacts.

As financial institutions, we recognise that our role in the industry affords us opportunities to promote responsible environmental stewardship throughout the maritime value chain. Thus, we have established the Poseidon Principles, which serve as a framework for creating common, global baselines that are consistent with and supportive of climate goals. This will enable us to better align our portfolios with responsible environmental impacts.

The Poseidon Principles are consistent with the policies and ambitions of the IMO, including its 2023 Revised Strategy on Reduction of GHG Emissions from Ships (2023 IMO GHG Strategy), which calls for the emissions from international shipping to drop to net-zero around 2050 compared to 2008 levels with interim targets in 2030 and 2040 on a well-to-wake basis. They are also intended to support other initiatives, such as the Principles for Responsible Banking, Carbon Disclosure Project ("CDP"), Energy Transitions Commission, Task Force on Climate-Related Financial Disclosures ("TCFD") and the many others that are developing to address adverse factors.

As signatories, we commit to implementing the Poseidon Principles in our internal policies, procedures, and standards. We will work in partnership with our clients and partners on an ongoing basis to implement the Poseidon Principles. We welcome the establishment of global baselines through the Poseidon Principles and acknowledge that some signatories may choose to go beyond them. This offers significant benefits to us as signatories, to the global maritime industry, and to society as a whole.

We understand that the Poseidon Principles are intended to evolve over time and agree to contribute to a review process when we as signatories decide to undertake it. This process will ensure that the Poseidon Principles are practical and effective and are linked to and support the development IMO's measures for GHG reduction.

Scope

The Poseidon Principles are applicable to relevant lenders, lessors, and financial guarantors, including export credit agencies (ECA). Signatories must apply the Poseidon Principles to all business activities:

1. that are credit products (including bilateral loans, syndicated loans, club deals, and guarantees) secured by vessel mortgages or finance leases secured by title over vessel or unmortgaged ECA loans tied to a vessel; and
2. where a vessel or vessels fall under the purview of the International Maritime Organization (IMO) (e.g. vessels 5,000 gross tonnage and above which have an established Poseidon Principles trajectory whereby the emissions intensity can be measured with IMO Data Collection System (DCS) data).

The scope of financial products will be reviewed and may be expanded by signatories on a timeline that is at their discretion.

Climate alignment is currently the only environmental factor considered by the Poseidon Principles. This scope will be reviewed and may be expanded by signatories on a timeline that is at their discretion.

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Principle 1

Assessment

We will annually assess climate alignment in line with the Technical Guidance for all business activities.

Our commitment:

Signatories will measure the emissions intensity of their shipping portfolios on an annual basis and assess their climate alignment relative to established decarbonisation trajectories. This assessment is based on a robust industry-appropriate methodology outlined in the Technical Guidance. The requirement to assess climate alignment takes effect the calendar year after a financial institution becomes a signatory.

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Principle 2

Accountability

> We recognise the important role that classification societies and other IMO Recognized Organizations ("RO")[1] play in providing unbiased information to the industry and the mandatory regulation established by the IMO for the data collection and reporting of fuel consumption from ships, (the IMO Data Collection System - "IMO DCS"). We will rely on such entities and mandatory regulations as explicitly identified in the Technical Guidance for the provision of information used to assess and report on climate alignment.

Our commitment:

For each step in the assessment of climate alignment, signatories will rely exclusively on the data types, data sources, and service providers identified in the Technical Guidance.

1 A RO is an authorised organisation that performs statutory requirements on behalf of the flag state of a vessel. While normally a Classification Society, in case of the IMO DCS, independent verifiers have been authorised by some flag states.

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Principle 3

Enforcement

> We will require that ongoing compliance with the Poseidon Principles is made contractual in our new business activities using standardised covenant clauses. We will contribute to the update and addition of standardised clauses through the annual review process.

Our commitment:

Signatories will agree to work with clients and partners to gather the necessary information to calculate emissions intensity and assess climate alignment.

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Principle 4

Transparency

> We will publicly acknowledge that we are a signatory of the Poseidon Principles and we will publish the results of the portfolio climate alignment score of our business activities on an annual basis in line with the Technical Guidance.

Our commitment:

1. Upon becoming a signatory, the financial institution will publicly acknowledge that it is a signatory of the Poseidon Principles.
2. On an annual basis, each signatory will report the overall climate alignment of its shipping portfolio and supporting information, as per the Accountability requirements, to the Secretariat no later than 15 November. This requirement takes effect for each signatory in the calendar year after the calendar year in which it became a signatory.
3. On an annual basis, each signatory will publish the overall climate alignment of its shipping portfolio in relevant institutional reports on a timeline that is appropriate for that signatory. This requirement takes effect for each signatory in the calendar year after the calendar year in which it became a signatory.

Technical guidance

1

Introduction

The purpose of the Technical Guidance is to clearly state the requirements and expectations for each Principle: Assessment, Accountability, Enforcement, and Transparency.

The Poseidon Principles are a framework for assessing the climate alignment of ship finance portfolios. They are supported by a robust and industry-appropriate climate alignment methodology and carefully-considered accountability and enforcement requirements that support practical and robust data collection and analysis practices. The Poseidon Principles also establish transparency requirements for signatories.

These requirements are stated in the boxes at the top of each section of the guidance to follow, followed by a more detailed overview of what these requirements entail. A general timeline of the requirements for signatories is in Figure 1.

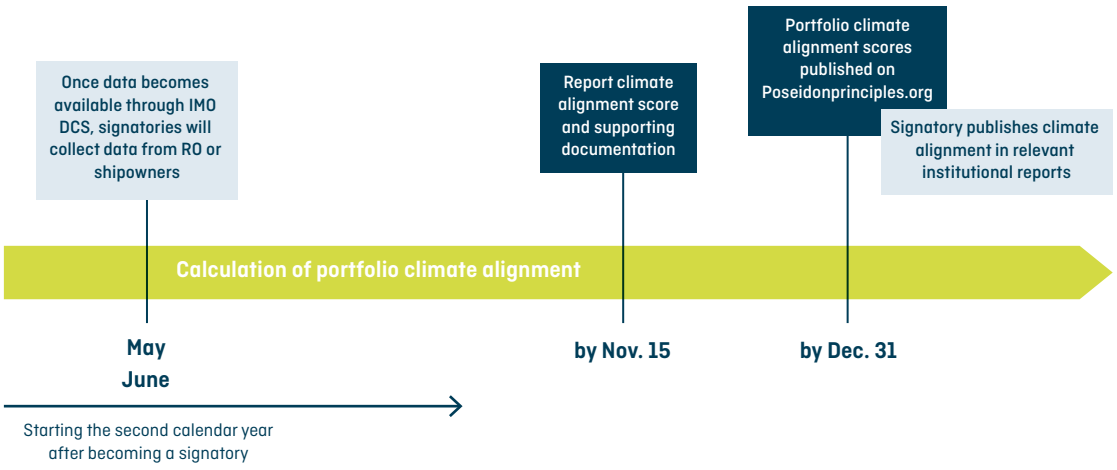


Figure 1.
Timeline for signatories of the Poseidon Principles

The Poseidon Principles are consistent with the policies and ambitions of the IMO, including its Strategy on Reduction of GHG Emissions from Ships (2023 IMO GHG Strategy), which calls for emissions from international shipping to drop to net-zero around 2050 compared to 2008 levels with interim targets in 2030 and 2040 on a well-to-wake basis[2]. Furthermore, the emissions boundary now includes the impact of non-CO_2 GHG species namely methane (CH_4) and nitrous oxide (N_2O).[3]

It is recognised that some signatories may choose to both fulfill their obligations under the Poseidon Principles as well as go beyond those obligations. Some signatories may choose to do this is through assessing their portfolios relative to the Paris Agreement's well-below 2°C objectives, which require a steeper decarbonisation trajectory.

It is recommended that, where possible, these additional efforts rely on the assessment, accountability, enforcement, and transparency practices established by the Poseidon Principles to ensure that these further efforts are robust in their demonstration of industry leadership.

2 Well-to-wake emissions are a combination of tank-to-wake and well-to-tank emissions. This accounts for both the emissions from upstream activities and operation of a vessel, or the "full lifecycle".

3 IMO MEPC. (2023). 2023 Strategy on reduction of GHG emissions from ships MEPC.377(80).

2

Assessment

PRINCIPLE

> We will annually assess climate alignment in line with the Technical Guidance for all business activities.

REQUIREMENTS

Signatories will measure the emissions intensity of their shipping portfolios on an annual basis and assess their climate alignment relative to established decarbonisation trajectories. This assessment is based on a robust industry-appropriate methodology outlined in the Technical Guidance. The requirement to assess climate alignment takes effect the calendar year after a financial institution becomes a signatory.

This section provides step-by-step guidance for measuring the climate alignment of financial institutions' shipping portfolios. The guidance is framed in the context of the existing IMO environmental regulations and climate agreements. It is informed by recommendations made by the CDP and the TCFD.

Shipping's governing body, the IMO, approved a revised GHG Strategy (the 2023 IMO GHG Strategy) in July 2023 to reduce GHG emissions generated by international shipping activity to net-zero by or around 2050, which represents a significant shift in climate ambition for a sector that currently accounts for 2%–3%[4] of global GHG emissions. This strategy sets out the following absolute reduction levels of ambition:

1. to reduce the total annual GHG emissions from international shipping by at least 20%, striving for 30%, by 2030, compared to 2008
2. to reduce the total annual GHG emissions from international shipping by at least 70%, striving for 80%, by 2040, compared to 2008.
3. GHG emissions from international shipping to peak as soon as possible and to reach net-zero GHG emissions by or around, i.e. close to 2050
4. carbon intensity of international shipping to decline to reduce CO_2 emissions per transport work, as an average across international shipping, by at least 40% by 2030, compared to 2008

Additionally, the 2023 IMO GHG Strategy specifies that any activity related to emission reduction and climate alignment in shipping will need to consider well-to-wake emissions as well as all the relevant GHG species as specified by the IMO:

"The levels of ambition and indicative checkpoints should take into account the well-to-wake GHG emissions of marine fuels as addressed in the Guidelines on lifecycle emissions intensity of marine fuels (LCA guidelines)[5] developed by the Organization with the overall objective of reducing GHG emissions within the boundaries of the energy system of international shipping and preventing a shift of emissions to other sectors."

4 Faber, J., Hanayama, S., Zhang, S., Pereda, P., Comer, B., Hauerhof, E., Schim van der Loeff, W., Smith, T., Zhang, Y., Kosaka, H., Adachi, M., Bonello, J. M., Galbraith, C., Gong, Z., Hirata, K., Hummels, D., Kleijn, A., Lee, D. S., Liu, Y., ... Xing, H. (2020). Fourth Greenhouse Gas Study 2020. International Maritime Organization.

5 The Committee adopted Resolution MEPC.376(80) containing the Marine Fuel life Cycle GHG Guidelines (LCA Guidelines) and agreed on a work program for further enhancement of the guidelines on specific areas via the existing correspondence group. Report submission planned for MEPC 81 (Spring 2024).

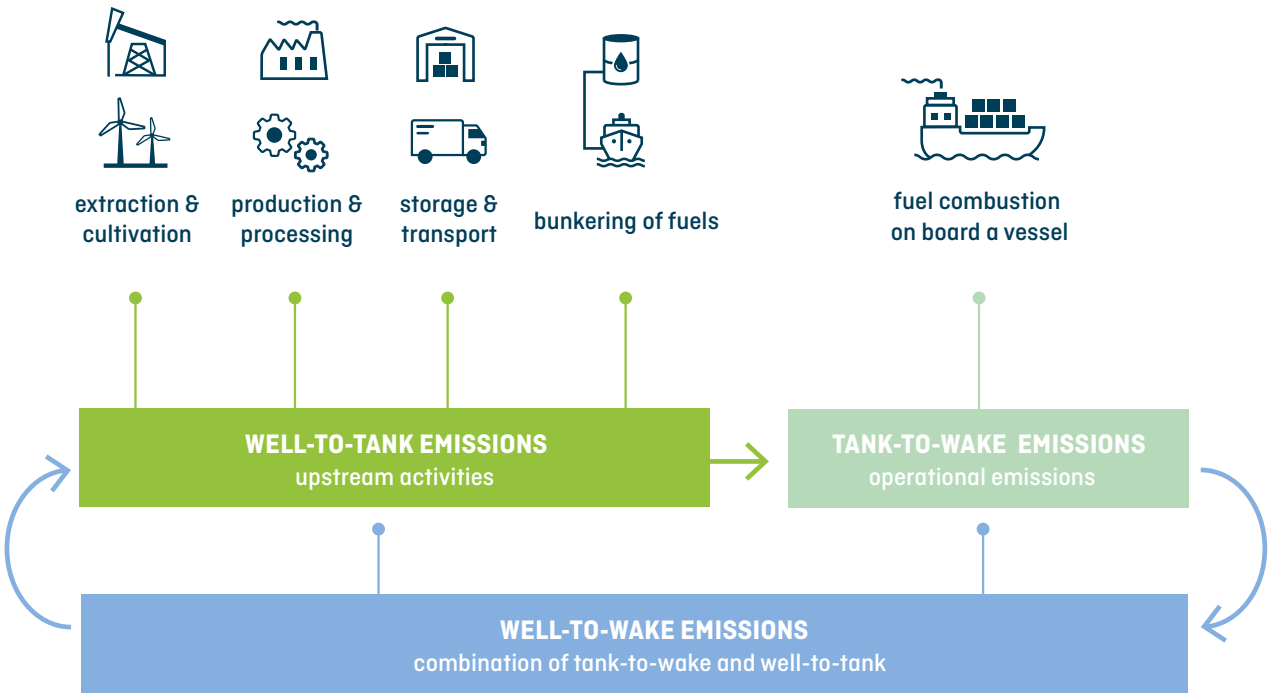


Figure 2.
Visual representation of the differences between tank-to-wake, well-to-tank, and well-to-wake emissions

Tank-to-wake, well-to-tank, and well-to-wake emissions: What is the difference?

Tank-to-wake emissions: from fuel combustion on board a vessel, or "operational emissions".

Well-to-tank emissions: from upstream activities including extraction, cultivation, production, processing, storage, transport, bunkering of fuels.

Well-to-wake emissions: a combination of tank-to-wake and well-to-tank. This accounts for both the emissions from upstream activities and operation of a vessel, or the "full lifecycle".

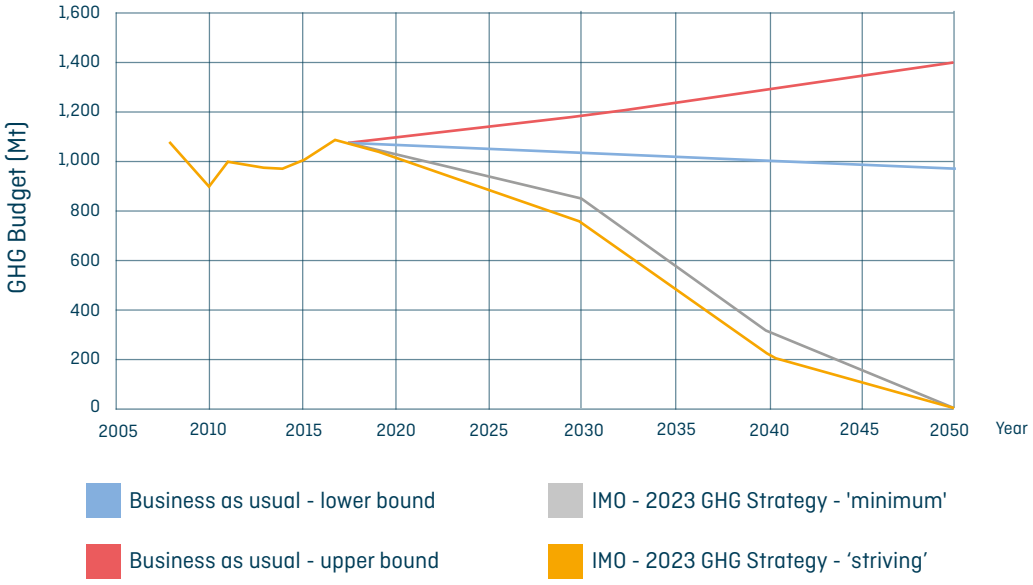


Figure 3.
Global fleet's CO_2e targets and trajectories defined by the 2023 IMO GHG Strategy (million tonnes of well-to-wake CO_2e)

The IMO absolute targets can be converted into an emission intensity target. Figure 4 shows intensity trajectories consistent with the 2023 IMO GHG Strategy compared to the pathway drawn using the IMO legacy intensity target.

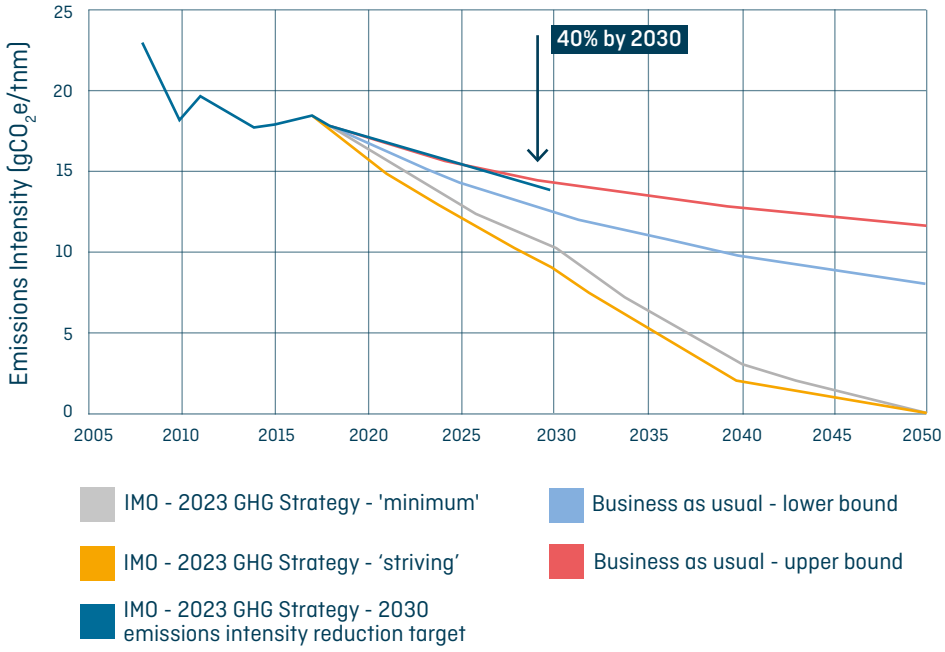


Figure 4.
Global fleet's emission intensity targets and trajectories defined by the 2023 IMO GHG Strategy (grams of well-to-wake CO_2e per tonne-nautical mile [gCO_2e/tnm])

The IMO intensity target is misaligned with the absolute reduction targets being significantly less ambitious as it was not updated to match the absolute target and the wording of the 2023 IMO GHG Strategy does not state that meeting the intensity target ensures compliance with the IMO absolute target. For these reasons, the Poseidon Principles will be linked to the IMO absolute target.

The Poseidon Principles fully supports the increased level of ambition set up by the new IMO GHG Strategy and therefore includes global decarbonisation trajectories that are aligned with the outcome of the 80th Marine Environment Protection Committee (MEPC 80). In order to take into account for this change, the Poseidon Principles will comprise of two trajectories for reporting:

- **2023 IMO GHG Strategy - 'minimum'**: defined by the 'minimum' requirement of the revised strategy with a 20% reduction in 2030, a 70% reduction in 2040 (compared to 2008 emissions) leading to net-zero by 2050.
- **IMO Revised Strategy - 'striving'**: defined by the higher level of ambition set in the revised strategy with a 30% reduction in 2030, a 80% reduction in 2040 (compared to 2008 emissions) leading to net-zero by 2050.

2.1 Selecting the right metric for measuring climate alignment

Both absolute and intensity-level measurements of GHG emissions are useful for meeting the IMO levels of ambition, and both measurements are recommended by other initiatives like the CDP (Carbon Disclosure Project) and the Science Based Targets Initiative. Absolute emissions are important as they represent the total emissions figure that will ultimately need to be reduced to mitigate climate change. However, an absolute emissions measure is not well-suited to the management or comparison of emissions/decarbonisation at the level of individual vessels or a group of vessels because vessels have different production units and need to be compared on a like-for-like basis. For this reason, a relative intensity-level metric is used in the Poseidon Principles.

Due to the changes in the 2023 IMO GHG Strategy, emissions intensity now has to represent the total GHG emissions (well-to-wake) to satisfy a supply of transport work (grams of well-to-wake CO_2e per tonne-nautical mile [gCO_2e/tnm]), meaning considering a full lifecycle approach. Emissions intensity is typically quantified for multiple voyages over a period of time (e.g., a year). To provide the most accurate representation of a vessel's climate impact, the emissions intensity of a vessel should be measured from its performance in real operating conditions instead of using a design specification metric (e.g., the Energy Efficiency Design Index).

The selection of this single metric is guided by an ambition that the Poseidon Principles use an emissions intensity metric which produces the closest measure of the vessel's true emissions intensity, while ensuring consistency with the policies and regulations of the as IMO as well as of the IMO DCS regulation and associated guidelines.

Currently, the IMO DCS defines the data that the IMO has mandated for shipowners to collect and report per calendar year. The IMO DCS is an amendment to MARPOL Annex VI which entered into force in March 2018. The IMO DCS specifies the data to be collected and reported for each calendar year for vessels 5,000 GT and above, not solely engaged in voyages within waters subject to the sovereignty or jurisdiction of the State the flag of which the ship is entitled to fly[6], which includes the:

1. amount of fuel consumption for each type of fuel in metric tonnes
2. distance travelled
3. hours underway
4. technical characteristics of the ship including DWT at maximum summer draught

Figure 5 shows the implementation schedule for the IMO DCS. The first data collection period was for the calendar year 1. Prior to reporting to the IMO, the data must be checked to be in accordance with the regulation by the relevant flag state or any organisation duly recognized by it (an RO). A Statement of Compliance ("SoC") will be issued by the relevant flag state or RO no later than 5 months from the beginning of the following calendar year (e.g., for the calendar year 2023, it would be issued by the end of May 2024) provided the data is in accordance with the regulation.

The reported data is transferred to the IMO Ship Fuel Oil Database no later than one month after issuing the relevant SoC. As of March 2021, a Verification Letter issued by a RO may be accepted in lieu of a SoC, where such a Verification Letter expressly states the vessel's identification, reporting period relating to the IMO DCS, and is duly signed. The data reported to the IMO is anonymised and confidential, and therefore it cannot

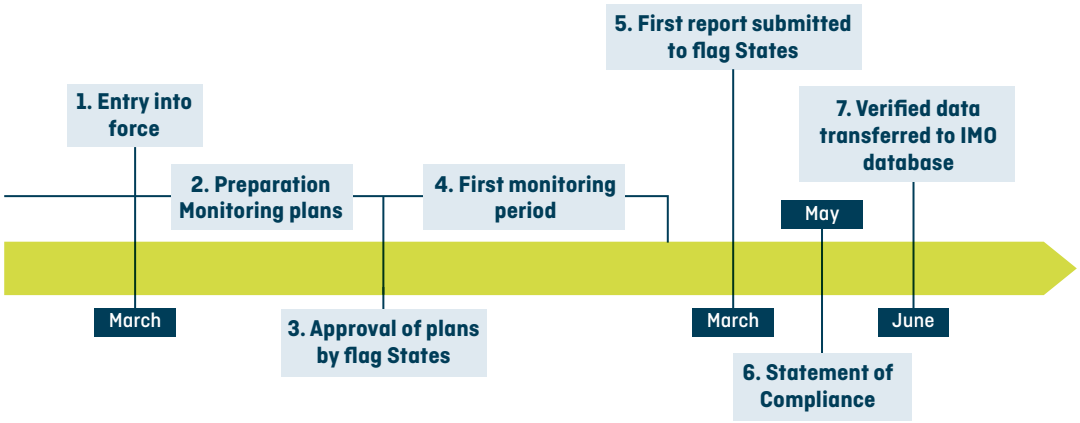


Figure 5.
The IMO DCS implementation schedule

be accessed from the IMO by signatories. However, because the regulation requires that all shipowners annually collect and report parameters relevant to the calculation of carbon intensity, the administrative burden placed on shipowners is minimized and simplifies the application of the Poseidon Principles.

6 IMO MEPC RESOLUTION MEPC.278(70).

The IMO DCS enables the calculation of a carbon intensity metric known as the Annual Efficiency Ratio ("AER")[7], using the parameters of fuel consumption, distance travelled, and deadweight at maximum summer draught ("DWT"). AER is reported in unit grams of CO_2 per tonne-mile (gCO_2/dwt-nm):

$$AER = \frac{\sum_i C_i}{\sum_i dwtD_i}$$

Equation 1

where C_i is the carbon emissions for voyage i computed using the fuel consumption and carbon factor of each type of fuel, ***dwt*** is the deadweight at maximum summer draught of the vessel, and D_i is the distance travelled on voyage ***i***. The AER is computed for all voyages performed over a calendar year.

This metric is calculated using the total possible annual transport work performed by a ship, obtained from its total distance travelled and DWT (in tonne units).
It is recognised that AER is less accurate at estimating a vessel's carbon intensity than some other metrics (e.g., Energy Efficiency Operational Indicator ["EEOI"]) because the actual cargo carried by a ship is often less than its maximum capacity and many ships (e.g., tankers and bulkers) operate with ballast voyages where for several voyages a year they have no cargo.

Currently, data collection on the mass of cargo carried on individual voyages is not globally collected through the IMO DCS or available globally from publicly accessible data sources to enable the calculation of EEOI. Should the IMO amend the DCS regulation to include data on mass of cargo carried, or this data becomes available elsewhere at appropriate coverage and accuracy, the metric used to calculate climate alignment under the Poseidon Principles may be adapted to reflect this.

2.2 Calculating vessel emissions intensity

Following the adoption of the 2023 IMO GHG Strategy, the emissions boundary for reporting against the IMO's level of ambition has changed from a tank-to-wake CO_2 to a well-to-wake CO_2e perspective. It is expected that the IMO DCS regulation will be updated to align with the 2023 IMO GHG Strategy in due course to reflect this change in data collection required.

In September 2023, the Poseidon Principles decided to pro-actively change its reporting methodology to include well-to-wake CO_2e emissions by providing a set of emission factors that can be applied to the existing IMO DCS data and AER calculation:

$$AER = \frac{\sum_i Ce_i}{\sum_i dwtD_i}$$

Equation 2

7 IMO MEPC RESOLUTION MEPC.352(78) recommended the use of cgDIST as a metric for cruise, ferry ro-pax, ferry pax-only and vehicle carriers which is the same formula as AER, except gross tonnage is used in place of deadweight in the denominator of Equation 1

In Equation 2, well-to-wake emission factors replace the carbon factors used to calculate C_i in Equation 1. Ce_i is the carbon equivalent emissions for voyage i, meaning the units of measurement are gCO_2e/DWTnm and gCO_2e/GTnm respectively.

References to AER/cgDIST in the Poseidon Principles refer to a well-to-wake emissions intensity metric rather than a tank-to-wake carbon intensity metric as defined by existing regulation. Complete details can be found in Appendix 3.

Vessel emissions intensity can be calculated using data provided by the shipowner as collected in the IMO DCS. This data has already been independently checked to ensure compliance in accordance with the IMO DCS but requires the shipowner to provide consent for the data as submitted to the relevant flag state to be shared with the signatory. The Poseidon Principles require that all signatories use this method for calculating emissions intensity.

There may be circumstances where it is not possible to gain access to the data as reported under the IMO DCS from shipowners. Section 3.3.4 outlines how this should be addressed.

2.3 Assessing climate alignment

For the purposes of the Poseidon Principles, climate alignment is defined as the degree to which a vessel, product, or portfolio's emissions intensity is in line with a decarbonisation trajectory that meets the 2023 IMO GHG Strategy ambition of reducing total annual well-to-wake GHG emissions to net-zero by 2050 on 2008 levels including interim indicative checkpoints in 2030 and 2040.

A decarbonisation trajectory is a representation of how many grams of CO_2e a single ship can emit to move one tonne of goods one nautical mile on a well-to-wake basis (gCO_2e/tnm) over a time horizon (as shown in Figure 3 and Figure 4). The decarbonisation trajectory relies on two assumptions:

- projections of transport demand for different shipping sectors out to 2050, including those available in the Fourth IMO GHG Study;
- the total CO_2e shipping emissions permitted to be in-line with the 2023 IMO GHG Strategy

While the trajectory is drawn and updated with the latest available research and will be aligned to or equal to the IMO's projections, there are uncertainties within them because of the two assumptions noted above.

To assess climate alignment of a single vessel, the vessel's annual emissions intensity is compared with the decarbonisation trajectory for its respective ship type and size category. To assess climate alignment at the product and portfolio level, the vessel emissions intensities in each product and the portfolio are aggregated. Section 2.5 discusses the method that is used.

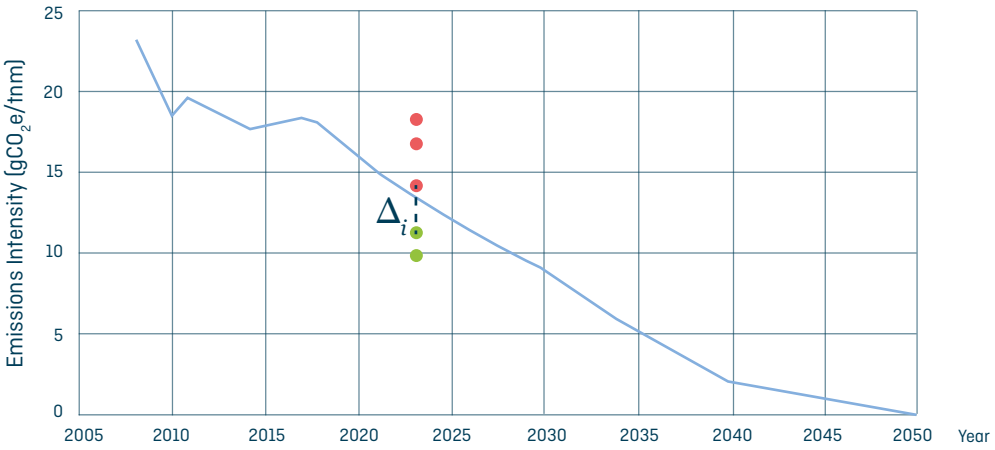


Figure 6.
Assessing alignment at the vessel level

In Figure 6, each dot represents the annual emissions intensity of a vessel. The blue curve represents the decarbonisation trajectory. The green dots are aligned, and the red dots are misaligned.

Climate alignment at the vessel level is the percentage difference between a vessel's emissions intensity and the decarbonisation trajectory at the same point in time. It is expressed as a (+/-) %. In mathematical terms, alignment at time ***t*** is:

$$\Delta_i = \left(\frac{x_i - r_s}{r_s} \right) 100$$

Equation 3

where x_i is the emissions intensity of vessel ***i*** and r_s is the required emissions intensity for the ship type and size class for time period ***t*** multiplied by 100 to convert into percentage terms. A positive alignment score means a vessel is misaligned (above the decarbonisation trajectory), whereas a negative or zero score means a vessel is aligned (on or below the decarbonisation trajectory).

2.4 Decarbonisation trajectory

A global decarbonisation trajectory is produced by the Secretariat of the Poseidon Principles based on agreed and clearly-stated assumptions. These will be produced for each ship type and size class and in a format that allows for simple weighting aggregation. This is to ensure that once the emissions intensity of vessels is understood, it is simple and practical to understand climate alignment. This also ensures that numbers are comparable between signatories.

Appendix 3 describes the method used for establishing the target emissions intensity for a given ship type and size class in a given year. This is carried out by calculating a decarbonisation-consistent emissions intensity trajectory up to 2050. The method is derived from IMO Secretariat commissioned data sources, mainly the Fourth IMO GHG Study. Assumptions for formulating the trajectory are also taken from the 2023 IMO GHG Strategy, including the use of interim targets and a 2008 baseline.

2.5 Aggregating alignment for product and portfolios

In order to calculate portfolio climate alignment, one must first calculate the climate alignment of each vessel within the portfolio. Then, the climate alignment of the portfolio can be calculated.

Steps for calculating climate alignment of the portfolio:

1. For each vessel in a relevant financial product, compare the annual emissions intensity of that vessel with the required decarbonisation value[8]. The alignment delta at time ***t*** is given by Equation 3.
2. Compute the weighted average of the vessel alignment deltas using the debt outstanding[9] of each vessel in the portfolio. Equation 4 below is the computation for the portfolio alignment delta, Δ_p:

$$\Delta_p = \sum_{i=1} w_i \Delta_i$$

Equation 4

where w_i is the vessel's debt outstanding as a share of the total debt outstanding and Δ_i is the vessel alignment, from Equation 3.

8 The required decarbonisation value is the maximum emissions intensity that a vessel can achieve and still be aligned with the decarbonisation trajectory. It is taken from the decarbonisation trajectory that corresponds to the specific vessel's type and size

9 See specific guidance for calculations below, which gives a thorough explanation of this term.

Specific guidance for calculations:

- When lenders are aggregating alignment scores to the portfolio level, the weighted average should be computed using the outstanding loan amount on 31 December of the year for which climate alignment is measured.
- The AER calculation for a vessel shall be based on a full calendar year as provided in IMO MEPC RESOLUTION MEPC.278(70) (i.e., 01 January until 31 December). However, where a shipowner was the owner of (or responsible for) a vessel for only part of a calendar year, and where IMO DCS data is therefore not furnished for the full year, the AER calculation may be based on a period shorter than a calendar year. However, the requirement for provision of a SoC and/or a Verification Letter for an applicable reporting period (including a period shortened as above) shall remain unaffected.
- When lessors are aggregating alignment scores to the portfolio level, the weighted average should be computed using outstanding capital payments under the lease on 31 December of the year for which climate alignment is measured.
- When guarantors are aggregating alignment scores to the portfolio level, the weighted average should be computed using amount outstanding under guarantee on 31 December of the year for which climate alignment is measured.
- When calculating the climate alignment of products with guarantees, the Poseidon Principles do not attempt to avoid double counting. For example, if an ECA guarantees a loan, it should base climate alignment calculations on the portion of that loan that it covers. The lender should disregard the guarantee and base climate alignment calculations on the outstanding loan amount on 31 December of the year. In their disclosures of their portfolio climate alignment, signatories are welcome to recognise that there may be some double counting in the case of guarantees.
- Where there may be multiple lenders involved in one transaction, suchas in a syndicated loan, an individual signatory should base climate alignment calculations on only its portion of that loan.
- When calculating the climate alignment of unsecured ECA products, the loan is always established to finance a specific commercial contract, and in the case of shipping, the loan agreement is linked to an identified ship. The signatory should therefore include these vessels within the scope of the Poseidon Principles, and use this information to calculate product climate alignment.
- In the case of a bilateral facility which has been structured to include a loan amount notionally allocated to a particular vessel, that vessel's outstanding debt, for the purposes of a signatory applying the AER calculation from Equation 4, can be the loan amount allocated that is consistent with the commercial intent in the original loan agreement.

Example:
Calculating alignment at the vessel and portfolio level

In this example, a signatory starts measuring its climate alignment in 2023. Table 1 illustrates a simple example of a portfolio with two products and shows the alignment deltas for each vessel within each product in the portfolio. The portfolio alignment delta shown in Table 2 is calculated using a weighted average according to Equation 4. Weighting is applied according to the debt outstanding designated to each vessel. The portfolio is not climate aligned because it is on average 14% above the emissions intensity required for decarbonisation.

Financial Product	Year	IMO	Actual value- Emissions Intensity (gCO_2e/tnm)	2023 IMO GHG Strategy - 'minimum'		2023 IMO GHG Strategy - 'striving'		Debt Outstanding (million $)	Debt Outstanding (Share of Portfolio)
				Required emissions intensity (gCO_2e/tnm)	Alignment Delta	Required emissions intensity (gCO_2e/tnm)	Alignment delta		
1	2023	######	6.72	4.30	56.28%	4.10	63.90%	150	19%
1	2023	######	29.06	38.60	-24.72%	37.20	-21.88%	150	19%
2	2023	######	6.04	4.70	28.51%	4.60	31.30%	100	13%
2	2023	######	10.04	8.50	18.12%	8.20	22.44%	400	50%

Table 1.
Vessel alignment

Financial Product	Capital Exposure (million $)	2023 IMO GHG Strategy - 'minimum' - climate alignment delta	2023 IMO GHG Strategy - 'striving - climate alignment delta
Portfolio	800	18%	22%

Table 2.
Portfolio alignment

3

Accountability and enforcement

This section provides the requirements and technical guidance for both the accountability and enforcement principles for the sake of clarity and simplicity. In implementation, both principles are closely related.

The accountability and enforcement principles are intended to ensure that the assessment and disclosure of portfolio climate alignment under the Poseidon Principles is practical, fair, and accurate. The intent of this approach is to ensure the development of trust in the Poseidon Principles and amongst signatories.

The Poseidon Principles use emissions intensity as the metric to measure climate alignment. The Poseidon Principles use the same information provided to the IMO DCS, which is mandatory for all ships of 5,000 gross tonnage and above engaged on international trade. Because of this, the Poseidon Principles rely specifically on AER as the emissions intensity metric[10].

The Technical Guidance for the accountability and enforcement principles lays out the four steps in the Poseidon Principles' information flow process. At each step, the assessment and enforcement requirements are clearly identified.

10 The rationale for this decision is fully discussed in Section 2.1

3.1 Accountability

PRINCIPLE

> We recognise the important role that classification societies and other IMO Recognized Organizations ("RO") play in providing unbiased information to the industry and the mandatory regulation established by the IMO for the data collection and reporting of fuel consumption from ships, (the IMO Data Collection System - "IMO DCS"). We will rely on such entities and mandatory regulations as explicitly identified in the Technical Guidance for the provision of information used to assess and report on climate alignment.

REQUIREMENTS

For each step in the assessment of climate alignment, signatories will rely exclusively on the data types, data sources, and service providers identified in the Technical Guidance.

3.2 Enforcement

PRINCIPLE

> We will require that ongoing compliance with the Poseidon Principles is made contractual in our new business activities using standardised covenant clauses. We will contribute to the update and addition of standardised clauses through the annual review process.

REQUIREMENTS

Signatories will agree to work with clients and partners to gather the necessary information to calculate emissions intensity and assess climate alignment.

3.3 Requirements at each information flow step

This section is broken into four information flow steps. The intent of this section is to give appropriate background and clearly demonstrate how information flows between parties. Specific accountability requirements regarding data types, data sources, and service providers are stated at each step. The enforcement requirement of using a standardised covenant clause is referenced, but the clause itself is available from the Secretariat. The Poseidon Principles' information flow process relies on data that shipowners are required to report to be in compliance with the IMO DCS and accordingly be granted an SoC or Verification Letter by the RO as discussed in Section 2.1. The IMO DCS requirements are separate to, and pre-date, the Poseidon Principles.

Figure 7 provides an overview of the potential information flow pathways. The pathways are divided into "preferred pathways" and "allowed pathways" tracks. Preferred pathways are those that rely on IMO-ROs to maintain data veracity and confidentiality.

For sake of clarity, once a signatory has chosen either the preferred or allowed pathways track, it may choose any option available for that step. For example, if a signatory chooses the allowed pathways track, it may choose to use any of the three available options for steps 2 and 3.

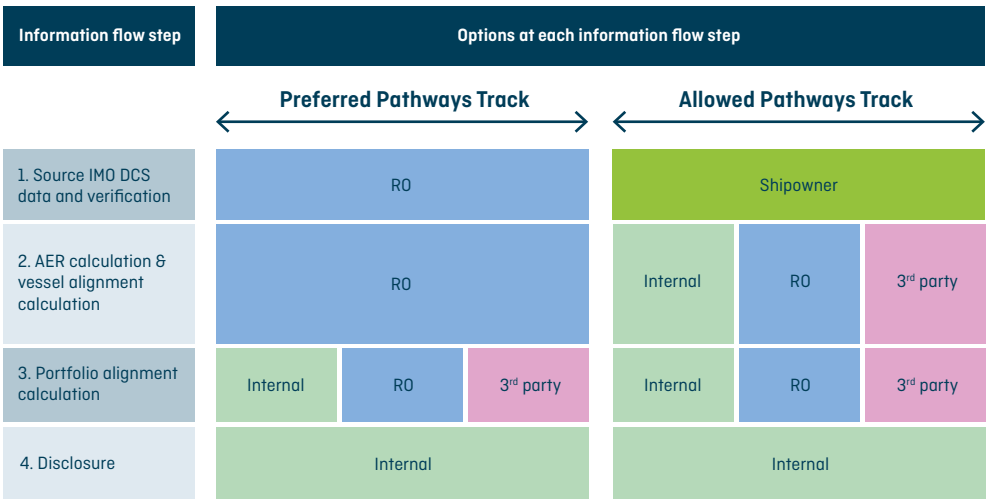


Figure 7.
Information flow pathway tracks

Step 1 Sourcing vessel IMO DCS data

Step 2 Calculating vessel emissions intensity and climate alignment

Step 3 Calculating climate alignment of portfolio

Step 4 Disclosure

3.3.1 Step 1: Sourcing vessel IMO DCS data

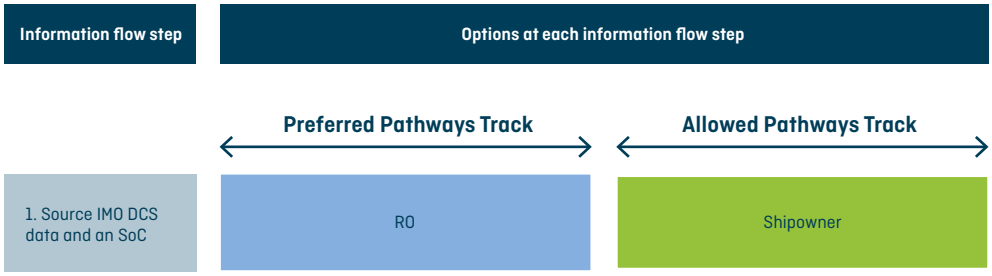


Figure 8.
Data sourcing

Step 1 requires the sourcing of IMO DCS data and SoC or a Verification Letter for the calculation of AER. It is permissible to source data from the RO upon the consent of the shipowner or directly from the shipowner. As Figure 8 indicates, sourcing data from an RO is preferable while sourcing data from the shipowner is allowed.

Figure 9 demonstrates how the Poseidon Principles interact with pre-existing IMO DCS requirements. Under IMO DCS requirements, the shipowner provides the specified data to the RO. The RO checks and verifies the data is in accordance with IMO regulation, issues an SoC or a Verification Letter to the shipowner and then submits the data to the IMO Ship Fuel Oil Consumption Database.

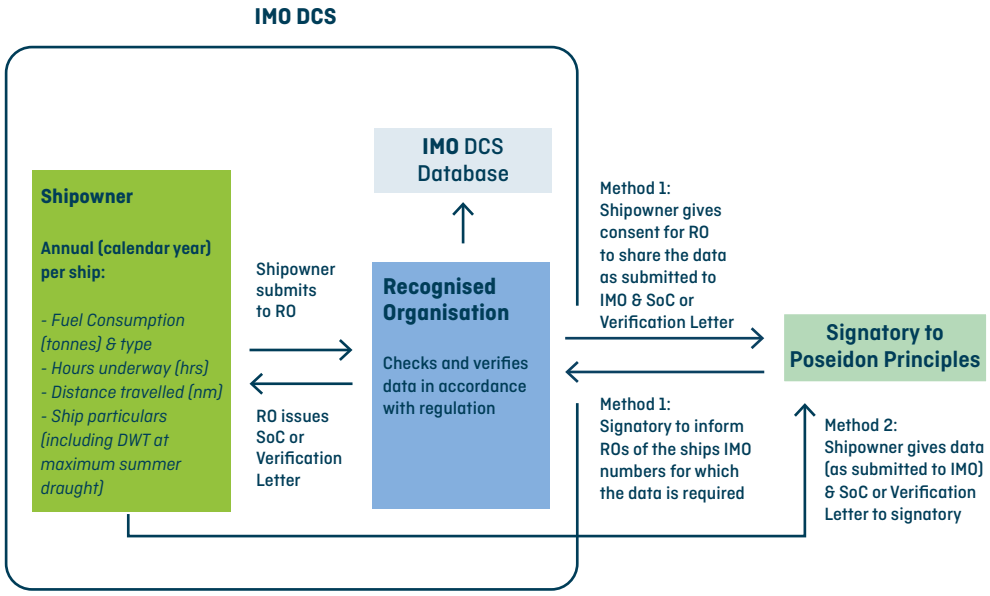


Figure 9.
Methods for sourcing vessel IMO DCS data

Permissible information flow methods:

Method 1 (Preferred Pathways Track): RO(s) provide data and a SoC or a Verification Letter to signatory. Note that consent for the RO to share IMO DCS data with the signatory can be given through the standard covenant clause.

Method 2 (Allowed Pathways Track): Shipowner(s) provide data and a SoC or a Verification Letter to signatory. The signatory requests the shipowner provide the data as submitted to the IMO DCS and the SoC or Verification Letter. Signatories are advised to ask shipowners for data "as it was submitted to the IMO" to reduce risk of error.

Special guidance for transactions with multiple lenders:
Where there may be multiple lenders involved in one transaction, such as in a syndicated loan, it remains the responsibility of the signatory to collect the appropriate information from an RO or the shipowner. However, it is both allowed and encouraged that signatories should work to reduce administrative burden by collaborating where possible. For example, if multiple signatories are sourcing data from a shipowner and or RO, it is in their interest and the interest of the shipowner or RO to coordinate their data requests.

How to meet the requirements:

1. IMO DCS data must be sourced from a RO or from the shipowner.
2. IMO DCS data may only be used if it is accompanied by a SoC or a Verification Letter provided by a RO.

3.3.2 Step 2: Calculating vessel emissions intensity and climate alignment

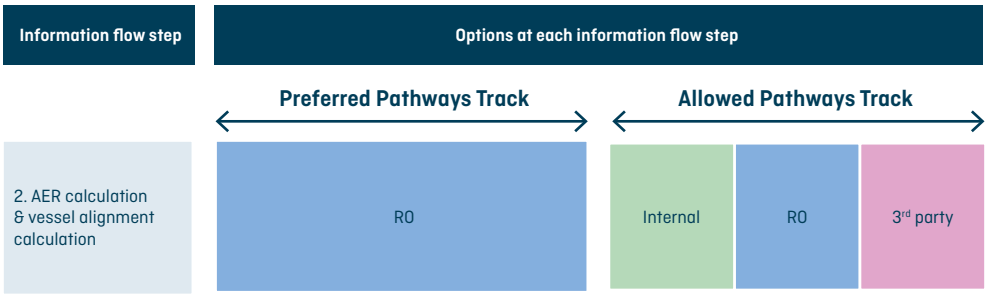


Figure 10.
Vessel alignment calculation

Step 2 requires the calculation of vessels emissions intensity using the IMO DCS data and the calculation of vessels' alignment with decarbonisation trajectories. There are three methods for undertaking these calculations, shown in Figure 11 below. Method 1 is relevant only to the preferred pathways track, while Method 2 and 3 are relevant to the allowed pathways track.

AER is used as the emissions intensity metric and is detailed in Section 2.1. The IMO DCS data used for calculating AER is also detailed in Section 2.1. Standard decarbonisation trajectories for each ship type and size class are produced specifically for the purposes of the Poseidon Principles so that all calculations are made in the same way.[11] These are available through the Poseidon Principles Secretariat. Figure 11 demonstrates the necessary information, where to source it, and who can perform calculations.

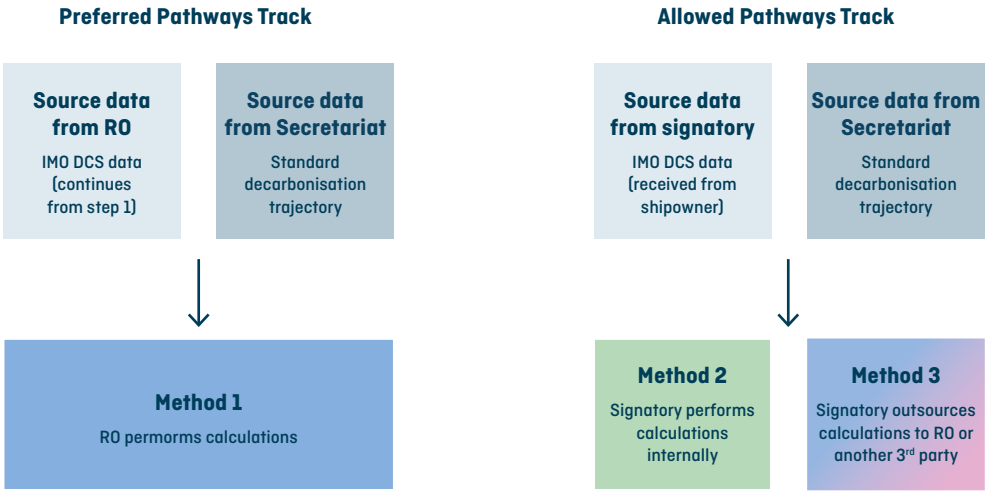


Figure 11.
Methods for calculating emission intensity and vessel climate alignment

11 See guidance in Section 2.4 and Appendix 3 for further clarification on the provision of trajectories.

Permissible methods for calculation

Method 1 (Preferred Pathways Track): RO calculates vessel emissions intensity and climate alignment on behalf of the signatory.

1. The RO will source the standard decarbonisation trajectories from the Secretariat.
2. The RO calculates vessel emissions intensity and climate alignment on behalf of the signatory using the verified data from the IMO DCS.
3. The RO provides the signatory with the emissions intensity (AER/cgDIST) of the vessel(s) and the decarbonisation delta for the vessel(s), the IMO DCS data, and the SoC or Verification Letter.

Method 2 (Allowed Pathways Track): Signatory uses data provided by shipowner(s) to make vessel emissions intensity and climate alignment calculations internally.

1. Using the verified IMO DCS data as submitted to the flag state provided by the shipowner and the standard decarbonisation trajectory, the signatory calculates emissions intensity and climate alignment of the vessel(s).

Method 3 (Allowed Pathways Track): After receiving data from shipowners, signatory outsources emissions intensity and climate alignment calculations to an RO or another third party.[12]

1. After selecting a RO or another third party in accordance with accountability requirements below, the signatory should send the verified IMO DCS data, an SoC or a Verification Letter, and the standard decarbonisation trajectories to that party.
2. The RO or other third party calculates vessel emissions intensity and climate alignment on behalf of the signatory using the verified data from the IMO DCS.
3. The RO or other third party provides the signatory with the emissions intensity (AER/cgDIST) of the vessel(s) and the decarbonisation delta for the vessel(s).

How to meet the requirements

- Vessel emissions intensity and climate alignment calculations must rely solely on verified IMO DCS data (i.e., data for which a SoC or a Verification Letter has been issued) and standard decarbonisation trajectories provided by the Poseidon Principles Secretariat.
- Vessel emissions intensity and climate alignment calculations can be performed by signatories, ROs, or other independent third parties (i.e., those that are not ROs).

12 If a third party other than an RO is used, that third party must be regarded as independent and have no shipbroking or commercial vessel interests.

3.3.3 Step 3: Calculating climate alignment of portfolio

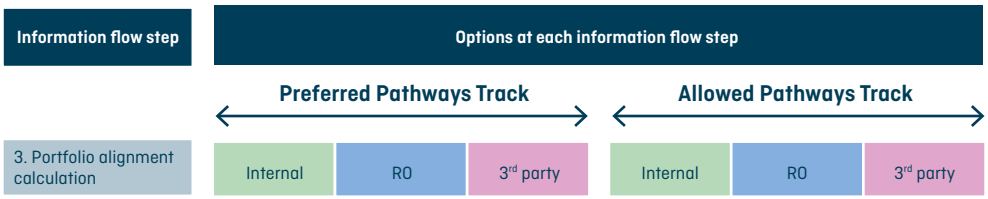


Figure 12.
Portfolio alignment calculation

Step 3 requires the calculation of portfolio climate alignment using the vessel climate alignment data from step 2 and signatories' loan book data (i.e., debt outstanding). There are two methods for undertaking this calculation. Method 1 and 2 are applicable in both the preferred pathways and allowed pathways tracks. This is due to the sensitivity of loan book data.[13]

Figure 13 demonstrates which data is necessary and who can perform the calculations.

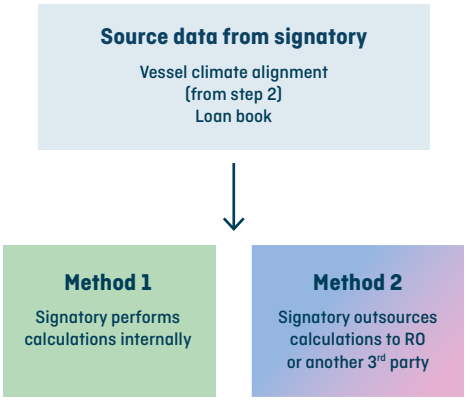


Figure 13.
Methods for calculating portfolio climate alignment

13 For a full calculation methodology, see Section 2.5 of the Technical Guidance.

Permissible calculation methods

Method 1 (Preferred and Allowed Pathways Track): Signatory performs portfolio climate alignment calculations internally.

1. Using vessel climate alignment data from step 2, signatory undertakes climate alignment calculations internally.

Method 2 (Preferred and Allowed Pathways Track): Signatory outsources portfolio climate alignment calculations to an RO or another independent third party.

1. After selecting a RO or another independent third party in accordance with accountability requirements below, the signatory should send climate alignment and loan book data for all vessels within the scope of the Poseidon Principles to that party.
2. The RO or other independent third party calculates the signatory's portfolio climate alignment using climate alignment and loan book data for all vessels within the scope of the Poseidon Principles.
3. The RO or other independent third party provides the signatory with its portfolio climate alignment score.

How to meet the requirements

1. Vessel emissions intensity and climate alignment calculations must rely solely on verified IMO DCS data (i.e., data for which a SoC or a Verification Letter has been issued) and standard decarbonisation trajectory provided by the Poseidon Principles Secretariat.
2. Portfolio climate alignment calculation can be performed by signatories, ROs, or other independent third parties (i.e., those that are not ROs).
3. The signatory should provide the following information to the Secretariat in line with the requirements identified in Section 4: Transparency.

Note: The AER calculation for a vessel shall be based on a full calendar year as provided in IMO MEPC RESOLUTION MEPC.278(70) (i.e., 01 January until 31 December). However, where a shipowner was the owner of (or responsible for) a vessel for only part of a calendar year, and where IMO DCS data is therefore not furnished for the full year, the AER calculation may be based on a period shorter than a calendar year.

However, the requirement for provision of a SoC and/or a Verification Letter for an applicable Reporting Period (including a period shortened as above) shall remain unaffected.

3.3.4 Step 4: Disclosure

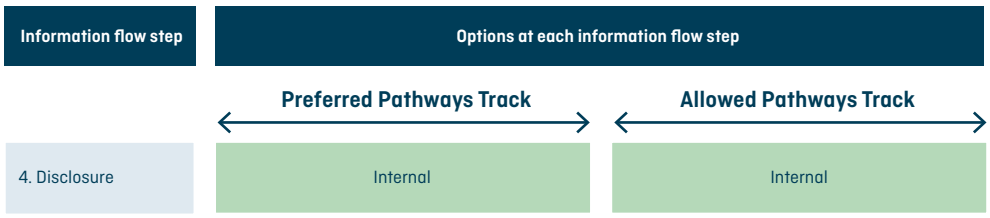


Figure 14.
Disclosure

Step 4 establishes disclosure requirements that will serve as a quality control mechanism. The information outlined below will be submitted to the Secretariat and made available only to signatories with the intent of informing the actions of the Steering Committee. Information submitted under these requirements will not be made public. This is intended to establish a quality control mechanism for signatories while also ensuring that information that may be regarded as sensitive by some signatories is not publicly disclosed. There is one method, which is applicable to both the preferred and allowed pathway tracks.

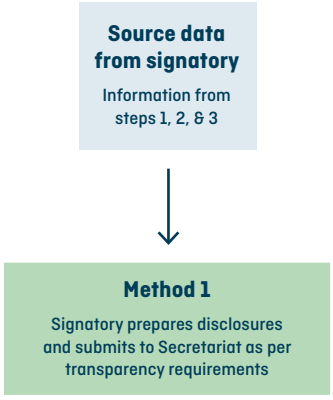


Figure 15.
Method for disclosure

Method (Preferred and Allowed Pathways Track): signatory prepares disclosures and submits to Secretariat.

1. If the signatory is unable to collect data for some portion of its portfolio, they should calculate the percentage of its eligible shipping portfolio for which it cannot report. This percentage is calculated against the percentage of the signatory's debt in portfolio, relying on the methodology outlined in Section 2.5.
2. The signatory should calculate the percentages of its portfolio for which it used the Preferred and Allowed Pathway Tracks. When calculating these percentages, the signatory should rely on the methodology outlined in Section 2.5. The signatory should also list the names of providers (i.e., RO or third party) it used, if any, to complete steps 1, 2, and 3 (i.e., those steps identified in Sections 3.3. –3.3.3).
3. The specific information required for reporting is evaluated by signatories each year. For the 2023 Annual Disclosure Report, for example, each signatory should provide the following information to the Secretariat:

- total climate alignment score against the 2018 IMO GHG Strategy and either 2023 IMO GHG Strategy 'minimum' or 'striving'
- separate climate alignment scores for passenger and cargo vessels (optional)
- percentage of eligible shipping portfolio reporting
- percentages of portfolio for which Preferred and Allowed Pathway Tracks were used
- the names of the service providers used, if any, to complete steps 1, 2, and 3

How to meet the requirements

The signatory should provide the information listed above to the Secretariat in line with transparency requirements identified in Section 4.

Example: Meeting disclosure requirements

In this example, a signatory successfully completes the assessment of its portfolio climate alignment. In addition to reporting its portfolio climate alignment score to the Secretariat, it also reports the following information shown in Table 3 below: the percentage of eligible shipping portfolio reported and not reported (L1 and L2), the percentage of eligible shipping portfolio for which the preferred and allowed pathway tracks were used (L3 and L4), and a list the names of providers it used, if any, to complete steps 1, 2, and 3. Answers to additional questions are also provided depending on the context of the year, which can either be public or only shared between signatories and the Secretariat. (i.e. use of emission factors, giving indication if shuttle tankers are in the portfolio, etc.).

CLIMATE ALIGNMENT SCORE	2023 IMO GHG Strategy - 'minimum'	2023 IMO GHG Strategy - 'striving'
Total climate alignment score	49.9%	55.2%
Climate alignment score for all cargo vessels (OPTIONAL)	8.1%	11.2%
Climate alignment score for all passenger vessels (OPTIONAL)	73.2%	82.4%

	Reporting vs. non-reporting		Validation
(L1)	Proportion of activities **reported**, against % of eligible shipping portfolio	95.2%	L1 + L2 = 100%
(L2)	Proportion of activities **not reported**, against % of eligible shipping portfolio	4.8%	

The following information is disclosed only internally and not made public:

	Preferred vs. allowed		Validation
(L3)	% of eligible shipping portfolio for which **Preferred Pathway Track** was used	75%	L3 + L4 = 100%
(L4)	% of eligible shipping portfolio for which **Allowed Pathway Track** was used	25%	
	Providers used	Company XY	

Note: The proportion of activities not reported refers to the % debt in a portfolio that is not reported, rather than the % of ships not reported

Table 3.
Example of disclosure requirement submission

3.4 Standard covenant clause

Key to supporting the accurate assessment of climate alignment and to creating an equal burden on all signatories is an enforcement mechanism that ensures that the appropriate data and information are provided by shipowners to signatories, the appropriate consents are given for the sharing of data, the data is shared, and appropriate privacy protections are established. This may include the sharing of data via a shared data platform or the data being provided by shipowners' commercial manager, depending on what is agreed between the shipowners and the signatories.

To assist in the collection and sharing of data for the Poseidon Principles, there is a standard covenant clause. There is also a form of letter to be sent by signatories to shipowners to request the data. The proforma clause and supporting definitions together with the form of letter are available from the Secretariat.

How to meet the requirements

In all new business activities that are finalised after a financial institution becomes a signatory to the Poseidon Principles, the signatory will use its best efforts to include definitions and covenant wording set out in the covenant clause in relevant documentation, amended where necessary, to reflect the signatory's proposed method of data collection.

4

Transparency

This section states the requirements for the transparency principle and provides the expectations and intent of each requirement. It also provides an outline of the timeline for the participation in and compliance with the Poseidon Principles.

PRINCIPLE

> We will publicly acknowledge that we are a signatory of the Poseidon Principles and we will publish the results of the portfolio climate alignment score of our business activities on an annual basis in line with the Technical Guidance.

REQUIREMENTS

1. Upon becoming a signatory, the financial institution will publicly acknowledge that it is a signatory of the Poseidon Principles.
2. On an annual basis, each signatory will report the overall climate alignment of its shipping portfolio and supporting information, as per the Accountability requirements, to the Secretariat no later than 15 November. This requirement takes effect for each signatory in the calendar year after the calendar year in which it became a signatory.
3. On an annual basis, each signatory will publish the overall climate alignment of its shipping portfolio in relevant institutional reports on a timeline that is appropriate for that signatory. This requirement takes effect for each signatory in the calendar year after the calendar year in which it became a signatory.

4.1 Information flow

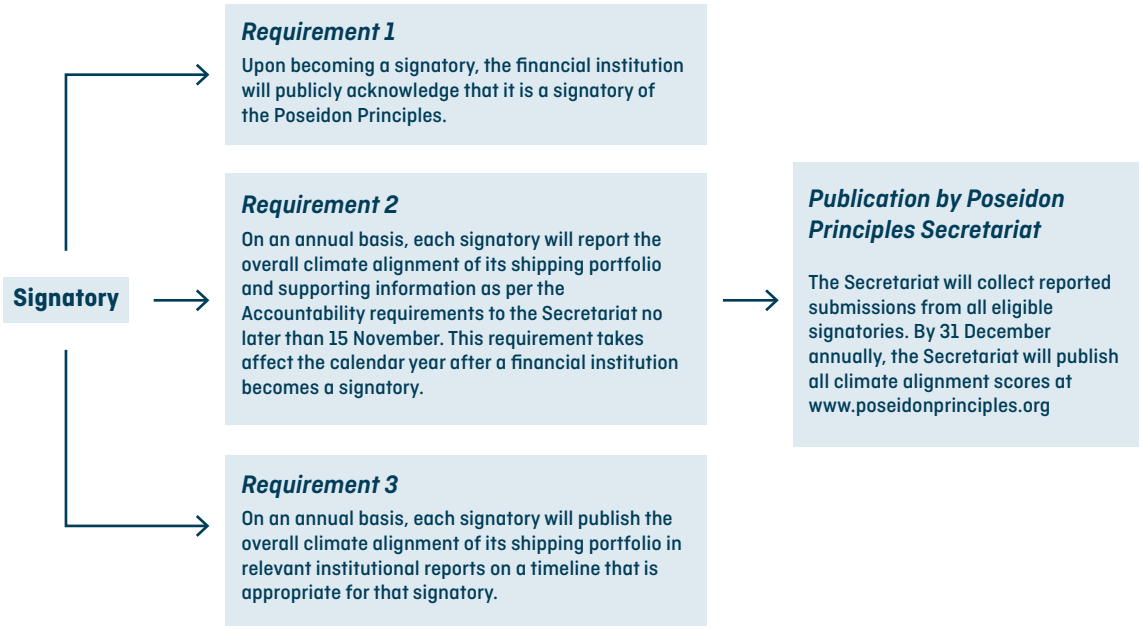


Figure 16.
Information flow for transparency requirements

Figure 16 demonstrates the information flow for each transparency requirement. Below, expectations and intent of each transparency requirement are further clarified.

How to meet the requirements

1. The expectations of transparency requirement 1 are that a signatory should make it publicly known that it is a signatory to the Poseidon Principles in a manner that is suitable for its organisation. The intent of this requirement is to increase awareness of the Poseidon Principles and to ensure it is clear which organisations are signatories without creating any significant burden to them.
2. The expectations of transparency requirement 2 are that a signatory should report all required information to the Poseidon Principles Secretariat (climate alignment of portfolio and supporting information as per accountability requirements) in a timely manner in accordance with the assessment, accountability and enforcement, and transparency principles. The intent of this requirement is to ensure that accurate information can be published by the Poseidon Principles Secretariat in a timely manner. The required reporting timeline is intended to create as little burden as possible to signatories.
3. The expectations of transparency requirement 3 are that a signatory should identify relevant institutional reports and ensure that the climate alignment of its shipping portfolio is included in them. Due to different institutional timelines, no specific expectations have been set for when reports including portfolio climate alignment scores should be published. The intent of this requirement is not to specify precisely where this information should be published, but instead to ensure awareness of the Poseidon Principles .

Example: Transparency

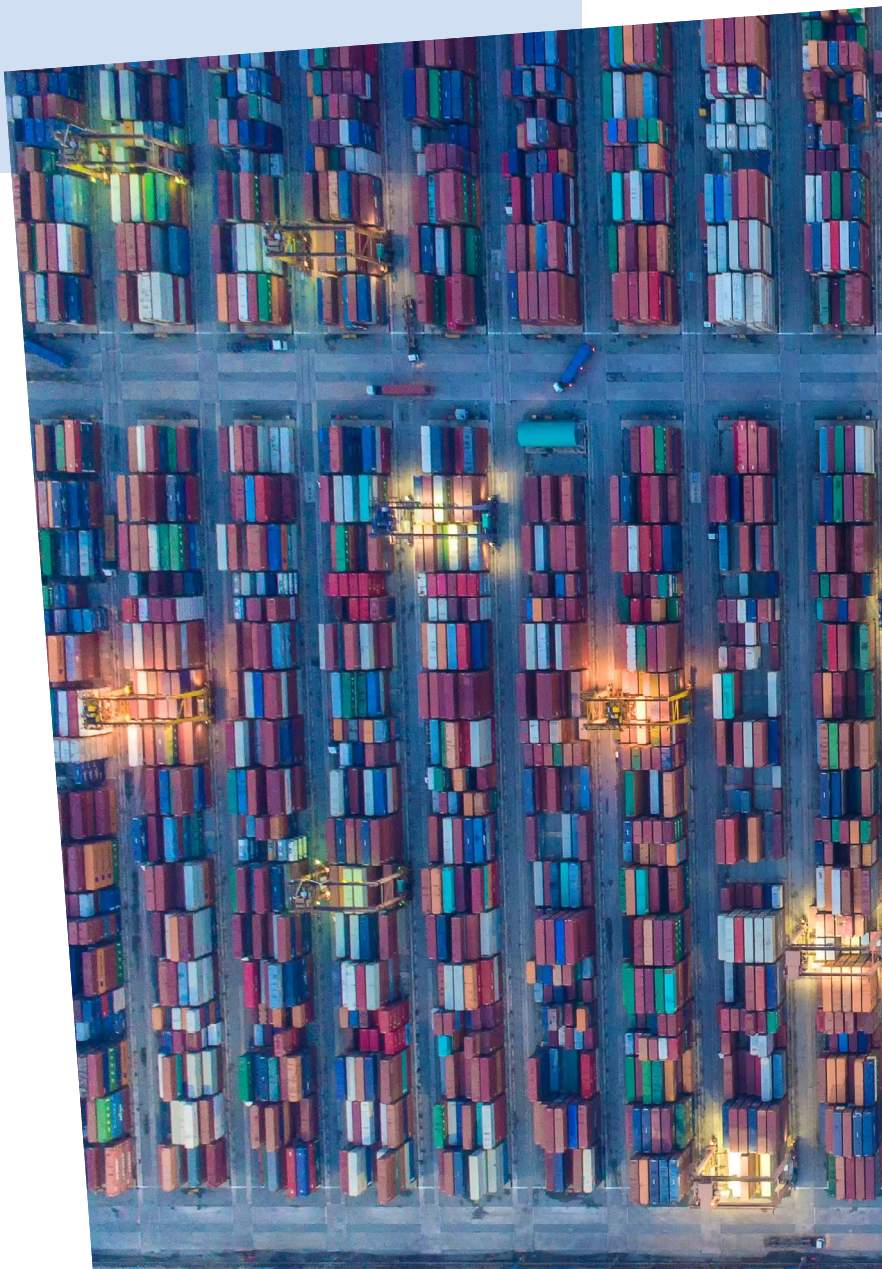
In this example, a lender becomes a signatory of the Poseidon Principles in November 2023.

Requirement 1: Lender issues a press release announcing that it is a Poseidon Principles signatory in November 2023.

Requirement 2: Prior to 15 November 2024, the signatory submits its portfolio climate alignment scores (for 2023) and supporting information as per the accountability requirements. The signatory has a score of +4% indicating that it is +4% above the decarbonisation trajectory.

Requirement 3: The signatory includes its portfolio climate alignment scores in its annual sustainability report in line with their internal timeline.

Publication by the Poseidon Principles Secretariat: All eligible signatories' 2023 climate alignment scores will be published online prior to 31 December 2024.

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5

How to become a signatory

The following outlines the process for financial institutions to become signatories and highlights the necessary documents.

This document is intended to be a how-to guide for the administrative aspects of implementing the Principles by prospective signatories.

Institutions wishing to become a signatory of the Poseidon Principles must adhere to the following process:

1. Using the Standard Declaration and signatory Application provided by the Secretariat, a financial institution wishing to become a signatory must complete and send both documents to the Secretariat.
2. The financial institution must complete and submit the Poseidon Principles Self-Assessment to the Secretariat within five months of becoming a signatory.

All onboarding documents are available from the Secretariat.

Step 1

Submit Standard Declaration, Signatory Application, and Membership Agreement

Step 2

Prepare and submit the Poseidon Principles Self-Assessment within five months of becoming a signatory

5.1 Standard Declaration

The Standard Declaration is the formal commitment required of financial institutions to become a signatory. Step one of the process, the Declaration, announces the intent of the financial institution to follow all binding requirements of the Principles. This means that the institution is prepared to take the necessary steps to comply with all four Poseidon Principles, and have this commitment and will make this commitment and related reporting public.

5.2 Signatory Application

Along with the Standard Declaration, the financial institution wishing to become a signatory must also complete the Signatory Application document. This document outlines who is responsible for contact, reporting, invoicing, and other necessary functions to implement and maintain the Poseidon Principles within the financial institution.

5.3 Self-Assessment

Each new signatory has five months to complete the Self-Assessment and return it to the Poseidon Principles Secretariat after joining. The purpose of this is to ensure that each signatory has made appropriate arrangements to fulfill its obligations under the Poseidon Principles and identified any challenges to doing so. The Self-Assessment is as brief as possible to reduce the administrative burden, while still addressing the core responsibilities of signatories to the Poseidon Principles.

The questions focus on ensuring that signatories are aware of timelines and obligations under the Poseidon Principles, have engaged internal stakeholders, have engaged clients, and have a plan for engaging the necessary service providers to complete their climate alignment assessment.

5.4 Timeline

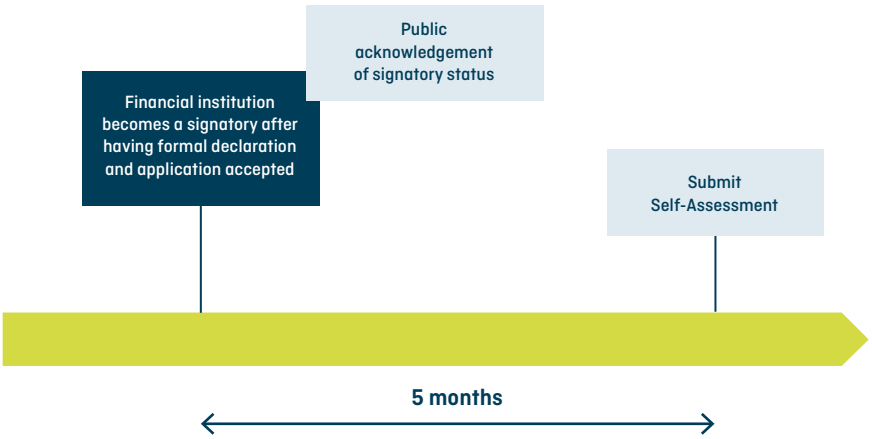

Figure 17.
Timeline for signatories of the Poseidon Principles

The Poseidon Principles aim to be easily implementable and achievable for each signatory. To these ends, the timeline for implementation in Figure 17 assists the Self-Assessment so that signatories know when there are important deadlines for alignment and reporting to comply with the Principles.

5.5 Governance

Information regarding the creation of the Poseidon Principles Association, the selection of the Steering Committee, and the role of the Secretariat can be found in the Governance Rules of the Association. These are available at https://www.poseidonprinciples.org/finance/about/governance/.

Appendices

Appendix 1

Definitions and abbreviations

AER means the Annual Efficiency Ratio, an emission intensity metric calculated in accordance with Equation 2 as set out in Section 2.1.

Business activity is defined as any credit product—including bilateral loans, syndicated loans, club deals, and guarantees—that is secured by vessel mortgage(s) or finance lease secured by title over vessel(s) and where that vessel, or unmortgaged ECA loans tied to a vessel, which have an established Poseidon Principles trajectory whereby the emissions intensity can be measured with IMO DCS data[14]. This scope may be amended or expanded by signatories in the future as per the annual review process.

CDP is the Carbon Disclosure Project, a not-for-profit charity that runs a global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.

Climate alignment is the degree to which a vessel, product, or portfolio's emission intensity is in line with a decarbonisation trajectory that meets the 2023 IMO GHG Strategy ambition of reducing total annual well-to-wake GHG emissions to net-zero around 2050. This should also take into account the interim checkpoints in 2030 (20% reduction, striving for 30% on 2008 levels) and 2040 (70% reduction, striving for 80% on 2008 levels).

Decarbonisation trajectory is produced by the Secretariat based on agreed and clearly-stated assumptions. The current decarbonisation trajectory used by the Poseidon Principles defines the rate of reduction of emissions intensity required to be aligned with the 2023 IMO GHG Strategy absolute emission reduction ambition. The method used for establishing the decarbonization trajectory up to 2050 is derived from emission and transport work data from the Fourth IMO GHG Study.

DWT is at maximum summer draught, a measure of how much weight a ship is designed to carry.

ECA is an Export Credit Agency.

EEOI is the Energy Efficiency Operational Indicator, developed by the IMO in order to allow shipowners to measure the fuel efficiency of a ship in operation.

Emissions intensity is the representation of the total well-to-wake emissions generated to satisfy a supply of transport work (grams of CO_2e per tonne-nautical mile [gCO_2e / tnm]). The Poseidon Principles use the AER metric for this calculation adapted to include upstream emissions as well as the impact of methane (CH_4) and nitrous oxide (N_2O).

GHG means Greenhouse Gas.

IMO is the International Maritime Organization, a specialised agency of the United Nations, and the global standard-setting authority for the safety, security and environmental performance of international shipping.

IMO DCS is the IMO's MARPOL Annex VI Data Collection System for Fuel Consumption.

LCA stands for IMO's Lifecycle Assessment model. This method refers to the assessment of GHG emissions

14 where a vessel or vessels fall under the purview of the IMO and is required to submit data to the IMO DCS, i.e., vessels 5000 GT and above, not solely engaged in voyages within waters subject to the sovereignty or jurisdiction of the State the flag of which the ship is entitled to fly (MARPOL Annex VI, Chapter 4, Reg. 19). Signatories are to use the ship type classification as submitted to the IMO DCS.
For clarification of classification of ship types or individual ships, please refer to:
(1) StatCode5 Ship Type Coding System document, and
(2) IMO GISIS
(3) If still in doubt, please contact the Secretariat

from the fuel production to the end-use by a ship (well-to-wake); it results from the combination of a well-to-tank part (from primary production to carriage of the fuel in a ship's tank, also known as upstream emissions) and a tank-to-wake (or tank-to propeller) part (from the ship's fuel tank to the exhaust, also known as downstream emissions).

MARPOL (The International Convention for the Prevention of Pollution from Ships) is the main international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. The MARPOL Convention was adopted on 2 November 1973 at IMO.

MEPC stands for IMO's Marine Environment Protection Committee.

RO (Recognized Organization) is an authorised organisation that performs statutory requirements on behalf of a vessel's flag state. While normally a Classification Society, in the case of the IMO DCS, independent verifiers have been authorised by some flag states.

Signatory is a financial institution or ECA that has sent a formal declaration to the Poseidon Principles Secretariat, has had that declaration accepted, and has had that declaration announced.

SoC is a Statement of Compliance issued by a flag state or an RO to the owner of a relevant vessel confirming its compliance with the IMO DCS.

Tank-to-wake emissions are from fuel combustion on board a vessel, or "operational emissions".

TCFD is the Task Force on Climate-related Financial Disclosure, a task force set up to develop recommendations for voluntary climate-related financial disclosures that provide useful information to lenders, insurers, and investors.

TEU means Twenty-foot Equivalent Unit, a unit of cargo capacity often used to describe the capacity of container ships.

TNM refers to tonne-nautical mile

Voyage includes the time spent in port for vessels sailing in international waters, as outlined by the IMO DCS requirements.

Verification Letter issued by a Recognized Organization may be accepted in lieu of an SoC, where such a Verification Letter expressly states the vessel's identification, reporting period relating to the IMO DCS, and is duly signed.

Well-to-wake emissions are a combination of tank-to-wake and well-to-tank emissions. This accounts for both the emissions from upstream activities and operation of a vessel, or the "full lifecycle".

Well-to-tank emissions are from upstream activities including extraction, cultivation, production, processing, storage, transport, bunkering of fuels.

A note on the versions of the Poseidon Principles

The "2023 Poseidon Principles" or "Version 5.0" refers to the version which uses the IMO 4th GHG Study trajectories and 2023 IMO GHG Strategy adopted during MEPC80.

Appendix 2

Selecting a carbon intensity metric

There are a number of different carbon intensity metrics that have been proposed both in IMO discussions and in the private sector, but no single metric on operational carbon intensity has been mandated by the IMO or used to define the carbon intensity goal in IMO strategies. There are only suggestions made in the guidelines.

Carbon intensity measures considered for the Poseidon Principles are the Energy Efficiency Operational Indicator (EEOI) and the Annual Efficiency Ratio (AER) which are two measures developed by, or being proposed to, the IMO. The following provides a summary of their differences:

1. **The Energy Efficiency Operational Indicator (EEOI)**
   - **a.** This requires information including the CO_2 emissions, the distances sailed whilst doing transport work, and the amount of cargo (or passengers or gross tonnage) carried.
   - **b.** The EEOI produces the closest measure of the vessel's true carbon intensity.
2. **Annual Efficiency Ratio (AER)**
   - **a.** AER is similar in form to EEOI but uses an approximation of cargo carried by utilizing the vessel's designed deadweight (or Twenty-foot Equivalent Unit (TEU) or passenger or gross tonnage) capacity in place of actual cargo carried and assumes the vessel is continuously carrying cargo.
   - **b.** Because ships are not always fully utilised in terms of capacity and many ships (e.g., tankers and bulkers) operate with ballast voyages where for several voyages a year they have no cargo, this method typically underestimates carbon intensity.

Different metrics place different requirements on the data that is needed in their calculation. To ensure consistency in application of the Principles and ensure an apples-to-apples comparison between the calculations can be made by signatories, it is important that all signatories apply the same single metric.

Measure	Pros	Cons
EEOI	• True measure of transport work included	• Requires additional data to be collected (cargo) that is not collected through the IMO DCS
AER	• Only fuel consumption and distance sailed need to be measured • Aligned with IMO	• Not a true measure of transport work. Assumes all vessels are sailing continuously loaded on all voyages

Table 4.
Comparison of EEOI vs. AER

Both the EEOI and AER have not been updated yet to be aligned with the 2023 IMO GHG Strategy since they are still based on operational CO_2 emissions only. It is expected that the MEPC will update the regulations concerning these metrics accordingly. Similarly, at MEPC 81, member states and organisations have been invited to submit proposals for amendments to the DCS regulation which may include the reporting of cargo transported and distance sailed laden which would allow for annual EEOI to be compiled using DCS data. The advisory will be assessing the developments at the IMO and considering the implications on the Poseidon Principles.

Appendix 3

Definition of the decarbonisation trajectory and vessel continuous baselines

Estimating the emissions intensity improvement required across all ship types

The overall (all ship type and size categories included as international shipping) improvement required in emissions intensity is calculated from:

1. a projection of the foreseeable growth in transport work across all ship types between baseline (2018) and the target year (2050);
2. the target CO_2e emissions defined by the 2023 IMO GHG Strategy absolute emission reduction ambition.

The projection of foreseeable growth is taken from the Fourth IMO GHG Study scenario RCP 2.6 SSP2. This scenario is selected because it is most aligned with decarbonisation in the wider economy, and most closely represents the rate of GDP and trade growth that has been observed in recent years. For each scenario, the Fourth IMO GHG Study employed two models for projecting transport work for non-energy products[15]. A logistics model which analyses the relationship between global transport work and its drivers using historical data to project transport work; and a gravity model, which presumes that transport work is a function of per capita GDP and population of the trading countries and uses econometric techniques to estimate the elasticity of transport work with respect to its drivers.

The results show that for most scenarios, including RCP 2.6 SSP2, the logistics model approach results in higher transport work projections than the gravity model approach. The logistics model approach was chosen as it represents an upper bound on the transport work projection and therefore is more conservative, allowing international shipping to meet its decarbonisation targets if transport work is higher than forecasted under the gravity model but within the upper bound set by the transport work assumed in the logistics model. This is consistent with the current Poseidon Principles methodology as well as the Poseidon Principles for Marine Insurance, Sea Cargo Charter and Science Based Targets Initiative.

The target CO_2e emissions is defined by the 2023 IMO GHG Strategy which has a net-zero target around 2050. Additionally, indicative check points for at least 20% striving for 30% reductions in 2030 on 2008 levels as well as at least 70% reduction striving for 80% reduction in 2040 on 2008 levels.

The Revised Strategy is anchored to the same 2008 global emissions inventory that was estimated in the Third IMO GHG Study. This value of 921 Mt of operational tank-to-wake CO_2 is translated to a lifecycle CO_2e value by using:

- A weighted average well-to-wake emission factor based on the fuel mix in 2008 from Lloyd's Register and UMAS.[16]

15 For a description of the full methodology employed to project transport work including energy products, see page 218 of the Fourth IMO GHG Study.

16 Lloyd's Register, & UMAS. (2019). Fuel production cost estimates and assumptions. The weighted average tank-to-wake CO_2 to well-to-wake CO_2e emission factor used is 1.157.

- 100-year global warming potential values aligned to IPCC Assessment Report 5 as used in the Fourth IMO GHG Study[17].

Table 5 presents the emissions budget translation from the Third IMO GHG Study to the 2023 IMO GHG Strategy minimum and striving numbers. These can then be used to build a global emissions budget by using historic data from the Third and Fourth IMO GHG Studies (2008 – 2018) and then linking the subsequent checkpoints linearly.

	2008	2018	2030	2040	2050
Total transport demand (billion tonne nautical miles)	46,003	59,230	81,804	100,616	119,429
Total CO_2e emissions (million tonnes) - 2023 IMO GHG Strategy - 'minimum'	1,066	1,062	852	320	0
Total CO_2e emissions (million tonnes) - 2023 IMO GHG Strategy - 'striving'	1,066	1,062	746	213	0
Estimated aggregate emissions intensity (gCO_2e/tnm) - 2023 IMO GHG Strategy - 'minimum'	23.2	17.9	10.4	3.2	0
Estimated aggregate carbon intensity (gCO_2e/tnm) - 2023 IMO GHG Strategy - 'striving'	23.2	17.9	9.1	2.1	0

Table 5.
Transport demand, CO_2e emissions and emissions intensity for international shipping

Figure 18 plots the intensity values in Table 5 and a linear trend line connecting them. There are many different assumptions that could be applied to specify the shape of the curve that defines the rate of emissions intensity reduction between 2018 and 2050. The chosen trajectory represents a gradual and consistent rate of improvement on average across the fleet; the assumption applied here is for a constant improvement year-on-year, which is described by a straight line between 2018 and 2030, 2030 and 2040, and down to 2050.

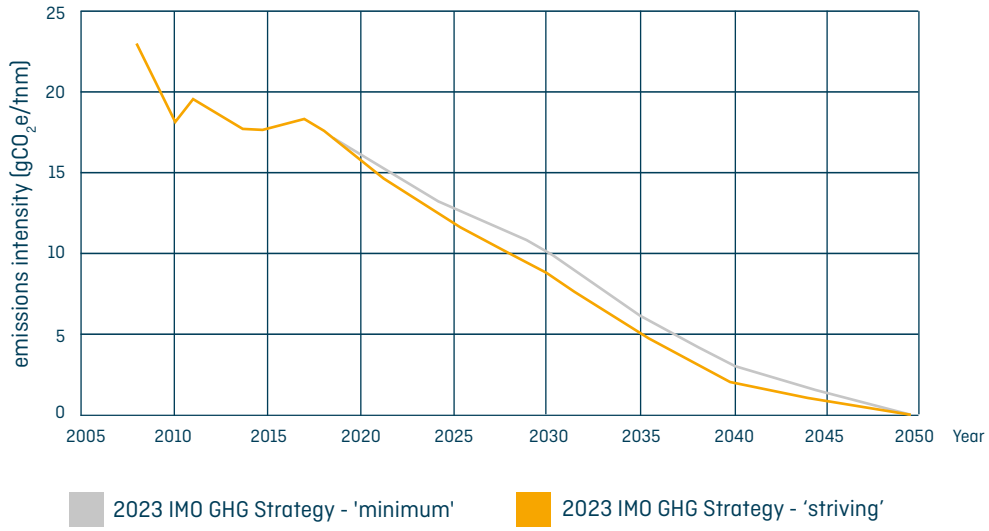

Figure 18.
Global fleet's emission intensity targets and trajectories defined by the 2023 IMO GHG Strategy (grams of well-to-wake CO_2e per tonne-nautical mile [gCO_2e/tnm]

17 100 year global warming potential values used are 28 for methane (CH_4) and 265 for nitrous oxide (N_2O).

As it stands, the trajectories do not account for projected efficiency or alternative fuel technology uptake by the industry and are not designed to forecast any changes in operating profile. The linear nature of the trajectories provides a method to overcome uncertainty introduced by projections relating to technology uptake or operational variation.

Calculating the target emissions intensity, corrected to AER, in a given year as a function of the ship type and size class

The rate of reduction required per year is relative to the last historical data point (2018). The trajectory is shown relative to 2018 global cargo emissions intensity (indexed to 2018 carbon intensity) in Figure 18.

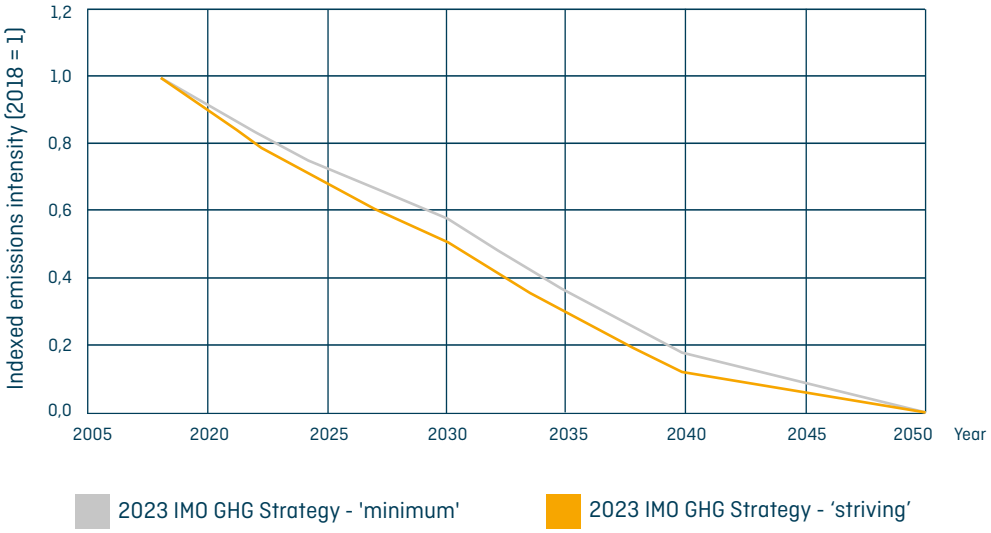

Figure 19.
Global fleet's emission intensity targets and trajectories defined by the 2023 IMO Strategy indexed to 2018 (grams of well-to-wake CO_2e per tonne-nautical mile [gCO_2e/tnm])

While the trajectory is presented for the time period 2018 to 2050, it is consistent with the 2008 baseline year as specified in the 2023 IMO GHG Strategy objectives as the end point is determined by a net-zero target in 2050 relative to the baseline.

The index currently chosen for the Poseidon Principles is AER for cargo-carrying ships which use deadweight to measure their capacity and cgDIST[18] for ships measured in gross tonnage. The latter category includes Cruise, Ferry Ro-Pax, Ferry-pax only and Vehicle carriers.

18 cgDIST is CO_2/GT*nm, the same formula as AER, except gross tonnage is used in place of deadweight in the denominator of Equation 1.

Estimating vessel specific required emissions intensity

As of September 2023, the Poseidon Principles introduced continuous baselines to define the required emissions intensity for vessels. This approach mitigates the impact of discrete size categorisation alignment especially for vessels at the edges of existing vessel categories. Continuous baselines are widely used for maritime benchmarking such as by the IMO MEPC Energy Efficiency Design Index (EEDI) and the more recent Carbon Intensity Index (CII) regulation. A continuous baseline is provided for the required emission intensity values for each ship type covered in the Poseidon Principles. To obtain a continuous baseline, a curve is fitted through a plot of the median emissions intensity of each vessel size bin vs. the median vessel size in that bin. This is based on data published in the Fourth IMO GHG Study. The result is a power law fit with a high coefficient of determination (R^2). Figure 20 shows the required emissions intensity values for bulk carrier in 2022. This exercise is repeated for each year up to 2050 following the global emissions intensity.

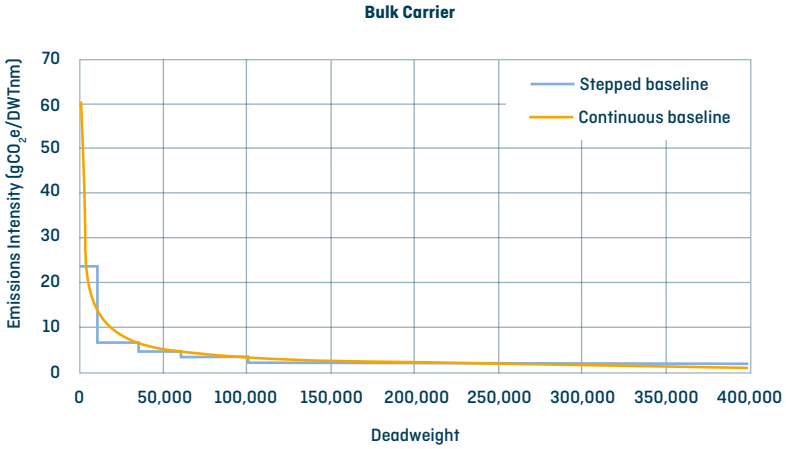

Figure 20.
Existing and proposed required emissions intensity baseline for bulk carriers for 2023 IMO GHG Strategy - 'minimum'

The required emissions intensity can be expressed by the following expression:

$$r_s = (a.Year^3 + b.Year^2 + c.Year + d).Size^e$$

Where r_s is the required emissions intensity, *Year* is the year for which the emissions intensity is required and ***Size*** is the size of the vessel in question in deadweight tonnage (DWT), gross tonnage (GT), twenty-foot equivalent unit (TEU) or gas capacity (CBM). The coefficients ***a, b, c, d*** and ***e*** arising from the fitted curves can be found in Tables 6 and 7 for the 2023 IMO GHG Strategy 'minimum' and 'striving' trajectories respectively.

Vessel Type	a	b	c	d	e
Bulk Carrier	0.19759542325	-1204.32747178827	2446554.0444015	-1656558770.18489	-0.621795966623
Chemical Tanker	0.719693754608	-4386.47285293474	8910984.05574822	-6033616474.6929	-0.708011940066
Liquefied Gas Tanker	0.037285112425	-227.249621692543	461650.584300832	-312583049.589491	-0.377221064754
Oil Tanker	0.801096445082	-4882.61539917067	9918882.30728505	-6716063155.91706	-0.704671437386
Container	0.016054286568	-97.849525238254	198778.286904762	-134592536.489406	-0.428275282772
General Cargo	0.037085016081	-226.030051324493	459173.064783691	-310905524.135346	-0.434668687862
Cruise	-0.202904040238	1318.73879151652	-2848777.32409091	2046038007.54034	-0.771393853454
Ferry-RoPax	-0.053419386606	331.293281605464	-684827.454172648	471850979.565415	-0.531478393368
Vehicle	0.840805915709	-5080.731653758560	10230590.8082445000	-6864583672.0680000	-0.848176548716
Ro-Ro	1.565977660197	-9544.50202016562	19389360.9223752	-13128512716.7907	-0.736571176805
Ferry-pax Only	0.096478498263	-586.550601635995	1188508.49447846	-802637774.998631	-0.532356707078
Refrigerated Bulk	0.997370849218	-6078.8913706611	12349079.9776283	-8361547045.10489	-0.689615587971
Other Liquids Tankers	40306988.5075979	-245667702047.081	499066345409893	-337917215965332000	-3.193817789625

Table 6.

Coefficients for determination of required emissions intensity for vessel types under the 2023 IMO GHG Strategy - 'minimum' trajectory

Vessel Type	a	b	c	d	e
Bulk Carrier	0.171970561295	-1046.38418984716	2122087.93600504	-1434398489.01475	-0.621795966623
Chemical Tanker	0.626361364577	-3811.20247609171	7729194.37684557	-5224451139.53197	-0.708011940066
Liquefied Gas Tanker	0.032449849324	-197.446638774031	400425.708083681	-270662690.689048	-0.377221064754
Oil Tanker	0.747182157837	-4546.35718466663	9220102.73851721	-6232211781.75456	-0.710709096846
Container	0.013972310831	-85.016906607075	172415.976481538	-116542397.678723	-0.428275282772
General Cargo	0.032275702171	-196.387010739776	398276.761367967	-269210137.34774	-0.434668687862
Cruise	-0.74991250408	4670.78533951923	-9695587.68050387	6707569905.95612	-0.771393853454
Ferry-RoPax	-0.084885637616	524.04805868704	-1078403.32448471	739715247.156488	-0.531478393368
Vehicle	0.398958348086	-2370.573392662960	4689747.0998958100	-3088722099.0801300	-0.848176548716
Ro-Ro	1.362896228927	-8292.77438887599	16817911.2962475	-11367854339.3143	-0.736571176805
Ferry-pax Only	0.071821812239	-435.117508255875	878509.748872544	-591117484.248128	-0.532356707078
Refrigerated Bulk	0.868028327473	-5281.66630012434	10711324.2404163	-7240184087.15166	-0.689615587971
Other Liquids Tankers	35079838.0032448	-213449253130.828	432879328083481	-292599304483860000	-3.193817789625

Table 7.

Coefficients for determination of required emissions intensity for vessel types under the 2023 IMO GHG Strategy - 'striving' trajectory

Example: Calculating emissions intensity

Considering a typical 80,000 DWT Panamax bulk carrier, the required emissions intensity in 2023 can be compiled as follows:

For 2023 IMO GHG Strategy - 'minimum' trajectory

a: 0.197595423250	Year: 2023
b: -1,204.327471788270	Size: 80,000
c: 2,446,554.0444015000	
d: -1,656,558,770.1848900	
e: -0.621795966623	

$$r_s = ((0.197595423250 * 2023^3) + (-1{,}204.327471788270 * 2023^2) + (2{,}446{,}554.0444015000 * 2023) - 1{,}656{,}558{,}770.1848900) * (80{,}000^{-0.621795966623}) = 3.80\ gCO_2e/tnm$$

For 2023 IMO GHG Strategy - 'striving' trajectory

a: 0.171970561295	Year = 2023
b: -1,046.384189847160	Size = 80,000
c: 2,122,087.9360050400	
d: -1,434,398,489.0147500	
e: -0.621795966623	

$$r_s = ((0.171970561295 * 2023^3) + (-1{,}046.384189847160 * 2023^2) + (2{,}122{,}087.9360050400 * 2023) - 1{,}434{,}398{,}489.0147500) * (80{,}000^{-0.621795966623}) = 3.63\ gCO_2e/tnm$$

Emission factors for well-to-wake CO_2e reporting based on IMO DCS data

The departure from the current tank-to-wake methodology requires the use of emission factors that cover the impact of the whole lifecycle of the fuel as well as the relevant GHG species (CO_2, CH_4, N_2O). The discussion around fuel lifecycle analysis is a rapidly shifting landscape with several developments impacting any decision-making upcoming from various different entities.

The most pertinent for the purposes of the maritime industry is the lifecycle assessment guidance (MEPC 80/7/4) that is due to be finalised and published at MEPC81 (scheduled for Q2 2024). This document will provide a widely accepted framework for defining emission factors which will become the standard for the industry.

However, the timing of this publication implies that it will not be available for the reporting period 2023 on 2022 data. A final draft of this document was adopted at MEPC 80 which only has a partial set of emission factors for the most common fossil fuels. Once this is published, it may still not be a definitive answer to emission factor definition as further changes will need to be undertaken to existing MEPC resolutions including changes in DCS. The intention of the advisory and Technical Committee is to evaluate the IMO LCA guidance when published and assess the applicability to the Poseidon Principles methodology with the understanding that this is likely to become the most widely used framework in the marine industry.

Following extensive advice from the Smart Freight Centre (SFC)[19], the Poseidon Principles Technical Committee has evaluated several options for establishing a set of default values for reporting that captured the latest available science, provided transparency, captured upstream emissions and the impact of onboard technologies. Several national and supranational entities have published emission factors to cater for their internal regulatory framework and emissions accounting all of which have advantages and disadvantages with no clear gold standard. The main sources consulted were the provisional IMO LCA Guidelines, material from the European Commission outlining reporting under Fit for 55 regulation, ecoinvent database, as well as the GREET framework used in the USA.

With this information at hand and keeping the logic that transparency will be key to ensure legitimacy and credibility for any pragmatic way forward, the Poseidon Principles Technical Committee agreed on the following cascading order of emission factor priority when coming up with a default set of values:

1. Emission factors for conventional liquid fuels available in MEPC 80/7/4 should be used;
2. All other emission factors should be taken from the Fuel EU/ecoinvent;
3. Any other emission factors should be taken from the GREET database.

The following sections will present the emission factors to be used under one of two scenarios. In the case that signatories only have basic DCS data, they are to use the default values presented below. If signatories have more granular data about fuels used and machinery on board (specifically for LNG vessels), more specific emission factors presented in subsequently should be used.

As this is an evolving topic, the Poseidon Principles will keep evaluating the changing landscape of fuel lifecycle assessment and update the Technical Guidance accordingly.

19 The Smart Freight Centre are a leading authority involved actively across supply chain and logistics emissions accountancy including the Global Logistics Emission Council Framework (GLEC), ISO 14083 and offer advisory to the Sea Cargo Charter.

Default emission factors for IMO DCS based data:

The DCS resolution does not specify the granularity to which fuels should be described in reporting and relies on MEPC.308(73) for tank-to-wake emission factors which are limited to eight generic maritime fossil fuels. This implies that signatories may not have access to the required information about fuel consumed and machinery on board to be able to report the most accurate emissions related to their activity. To this end, the following emission factors are presented for reporting on a well-to-wake basis in Table 8.

Fuel type	Notes	Emission factor (WtW $gCO_2e/gfuel$)	Source
Diesel/Gas oil (MDO/MGO)	ISO 8217 Grades DMX through DMB	4.01	MEPC 80/7/4
Light fuel oil (LFO)	ISO 8217 Grades RMA through RMD	4.06	ecoinvent 3.9.1 cut-off
Heavy fuel oil (HFO)	ISO 8217 Grades RME through RMK	3.84	MEPC 80/7/4
Liquefied petroleum gas (LPG)	Propane	4.02	ecoinvent 3.9.1, FuelEU Maritime
Liquefied petroleum gas (LPG)	Butane	4.05	ecoinvent 3.9.1, FuelEU Maritime
Liquefied natural gas (LNG)		4.47	FuelEU Maritime, MEPC 80/7/4
Methanol	Natural gas feedstock	1.50	GREET
Ethanol	1st Generation biogenic	1.29	Ifeu et al., amended

Note: These values were used in the 2023 Annual Disclosure Report and work on this topic is ongoing.

Table 8.
Default well-to-wake emission factors

Emission factors for granular fuel and machinery data

For the best possible representation of signatories' portfolio performance, the Technical Committee worked to provide a comprehensive set of default emission factors for those that are able to obtain more granular information about fuels consumed and propulsion systems on LNG assets. Table 9 provides a more granular set of emission factors based on input from the Smart Freight Centre which can be used by signatories.

Fuel type	Notes	Emission factor (well-to-wake $gCO_2e/gfuel$)	Source
Conventional fossil fuels			
HFO	ISO 8217 Grades RME through RMK, >0.5% S	3.76	MEPC 80/7/4
HFO (VLSFO)	ISO 8217 Grades RME through RMK, >0.1% < S < 0.5%	3.84	MEPC 80/7/4
LFO (ULSFO)	ISO 8217 Grades RMA through RMD	4.06	ecoinvent 3.9.1 cut-off
Diesel/Gas oil (MDO/MGO)	ISO 8217 Grades DMX through DMB	4.01	MEPC 80/7/4
LNG	Otto (dual fuel medium speed)	4.43	FuelEU Maritime amended
LNG	Otto (dual fuel slow speed)	4.05	FuelEU Maritime amended
Methanol	Natural gas feedstock	1.50	GREET
LNG	Diesel (dual fuel slow speed)	3.65	FuelEU Maritime amended
LNG	Lean burn spark ignited*	4.47	FuelEU Maritime amended, MEPC 80/7/4
LNG	Steam turbine and boilers*	3.70	FuelEU Maritime amended, MEPC 80/7/4
LPG	Propane	4.02	ecoinvent 3.9.1, FuelEU Maritime
LPG	Butane	4.05	ecoinvent 3.9.1, FuelEU Maritime
Methanol	Natural gas feedstock	1.5	GREET
Biofuels			
Ethanol E100	1st Generation biogenic	1.29	Ifeu et al., amended
Bio-diesel (FAME)	Waste feedstock mix	1.27	Ifeu et al., amended
HVO	Waste feedstock mix	1.26	Ifeu et al., amended
Bio Methanol	Waste wood	0.21	GREET
Bio Methanol	Black liquor	0.62	GREET
Bio-LNG	Otto (dual fuel medium speed)	2.39	Ifeu et al. amended, FuelEU Maritime amended
Bio-LNG	Otto (dual fuel slow speed)	1.98	Ifeu et al. amended, FuelEU Maritime amended
Bio-LNG	Diesel (dual fuel slow speed)	1.53	Ifeu et al. amended, FuelEU Maritime amended
Bio-LNG	Lean burn spark ignited*	2.24	Ifeu et al. amended, FuelEU Maritime amended, MEPC 80/7/4
Bio-LNG	Steam turbine and boilers*	1.47	Ifeu et al. amended, FuelEU Maritime amended, MEPC 80/7/4
Synthetic fuels			
e-methanol	with H2 recycling	0.06	GREET

Note: These values were used in the 2023 Annual Disclosure Report and work on this topic is ongoing.

Table 9.
Granular well-to-wake emission factors

Considerations for reporting using granular data

Fuel characteristics

As the 2023 reporting cycle (on 2022 data) is a transitionary reporting year for the Poseidon Principles with a substantial methodological change, the Technical Committee has decided not to provide guidance on certification verification for fuel characteristics in order to use the granular emission factors. The Technical Committee trusts that signatories will be reporting to their best possible knowledge.

Machinery information

Given the issues around fugitive methane emissions from vessels, the distinction between different propulsion plants is important to be factored in given the high global warming potential of methane. Not all signatories may have ready access to the specifications of the vessels in their portfolio therefore the Technical Committee recommends the following sources for the identification of LNG propulsion type:

1. Documentation held by financing institutions that is related to classification including shipbuilding contracts, classification documents or the International Air Pollution Prevention Certificate (IAPP)
2. RO's acting as service providers who may have access to a vessel specification database
3. Authoritative industry vessel databases (may require verification due to inconsistency between databases).

If the above information is not enough to determine the engine type, Table 10 may be used to indicate the appropriate emission factor in Table 9 (the one with granular factors) to be used in reporting for those signatories that cannot identify the vessel engine type. Table 9 is only an illustrative example and not an exhaustive list. Once again, signatories are expected to use the best of their knowledge to report in the correct way. If there is any doubt about the engine type, the default emission factor should be used.

Classification for emission factor selection	Industry reference	Alternative reference (examples from vessel databases)	Engine Type	Typical Makers / Models
LNG Otto (Dual Fuel -Medium Speed)	Dual Fuel Diesel Electric (DFDE)		4-stroke , Low pressure	CAT , Yanmar, Rolls Royce, MAN Diesel, Wartsila
LNG Otto (Dual Fuel - Slow Speed)	Low pressure Dual Fuel (LPDF)	2-Stroke Dual Fuel (Low Pressure)	2-stroke, Low pressure	MAN Diesel – ME-GA
LNG Diesel (Dual Fuel Slow Speed)	High Pressure Dual Fuel (HPDF)	2-Stroke Dual Fuel (High Pressure)	2-Stroke, High Pressure	MAN Diesel - ME-GI
LBSI	Low Burn Spark Ignited		4-stroke, Low Pressure	Rolls Royce, Bergen, Wartsila
Gas Turbine	Steam propulsion	Steam Turbine	NA	NA

Table 10.
Indicative LNG propulsion types for emission factor choice

This Appendix is only kept for reference. In the 2023 Annual Disclosure Report (on 2022 data), signatories reported against the 2018 IMO GHG Strategy for consistency with previous reportings. From 2024 on, Annual Disclosure Reports will be only against the 2023 IMO GHG Strategy.

Appendix 4

Definition of previous decarbonisation trajectory (for reference)

Calculation of decarbonisation trajectories per ship type and size class

The following describes the method applied for establishing the target carbon intensity for a given ship type and size category in a given year. This is carried out by calculating a decarbonisation-consistent carbon intensity trajectory from 2012 to 2050. The method is derived from IMO Secretariat-commissioned data sources - the Fourth IMO GHG Study. Assumptions for formulating the trajectory are also taken from the 2018 IMO GHG Strategy.

Ship type and size definitions

Carbon intensities vary as a function of ship type and size, as well as a ship's technical and operational specification. To enable the carbon intensity of ships to be compared to a peer group of ships of a similar type and size, a classification system is applied. The classification system is taken from the Fourth IMO GHG Study[20], to enable consistency with the IMO's process. Full details of the definitions can be found in that document. See the section on Revisions to the Poseidon Principles Trajectories for more information about the revisions to the classification system.

Estimating the ship type and size specific carbon intensity

The baseline year for the trajectories is 2012, consistent with the Poseidon Principles methodology used to calculate signatories' climate alignment for 2019.

Estimating the carbon intensity improvement required across all ship types

The overall (all ship type and size categories included as international shipping) improvement required in carbon intensity is calculated from:

1. a projection of the foreseeable growth in transport work across all ship types between baseline (2012) and the target year (2050);
2. the target CO_2 emissions in 2050 defined by the 2018 IMO GHG Strategy absolute emission reduction ambition.

20 Jasper Faber, Shinichi Hanayama, Shuang Zhang, Paula Pereda, Bryan Comer, Elena Hauerhof, Wendela Schim van der Loeff , Tristan Smith, Yan Zhang, Hiroyuko Kosaka, Masaki Adachi, Jean-Marc Bonello, Connor Galbraith, Ziheng Gong, Koichi Hirata, David Hummels, Anne Kleijn, David S. Lee, Yiming Liu, Andrea Lucchesi, Xiaoli Mao, Eiichi Muraoka, Liudmila Osipova, Haoqi Qian, Dan Rutherford, Santiago Suárez de la Fuente, Haichao Yuan, Camilo Velandia Perico, Libo Wu, Deping Sun, Dong-Hoon Yoo and Hui Xing. 2020, Fourth IMO Greenhouse Gas Study. International Maritime Organization, London, UK.

The projection of foreseeable growth is taken from the Fourth IMO GHG Study scenario RCP 2.6 SSP2. This scenario is selected because it is most aligned with decarbonisation in the wider economy, and most closely represents the rate of GDP and trade growth that has been observed in recent years (between 2012 and 2018). For each scenario, the Fourth IMO GHG Study employed two models for projecting transport work for non-energy products[21]: a logistics model which analyses the relationship between global transport work and its drivers using historical data to project transport work; and a gravity model, which presumes that transport work is a function of per capita GDP and population of the trading countries and uses econometric techniques to estimate the elasticity of transport work with respect to its drivers. The results show that for most scenarios, including RCP 2.6 SSP2, the logistics model approach results in higher transport work projections than the gravity model approach. The logistics model approach was chosen as it represents an upper bound on the transport work projection and therefore is more conservative, allowing international shipping to meet its decarbonisation targets if transport work is higher than forecasted under the gravity model but within the upper bound set by the transport work assumed in the logistics model.

The estimate of the target CO_2 emissions in 2050 is taken by applying the 2018 IMO GHG Strategy Objective 3 minimum target (at least a 50% reduction), to the IMO Initial Strategy's baseline year (2008) total CO_2 emissions (921 Mt), taken from the Third IMO GHG Study. It should be noted that as indicated by the "at least", this currently represents the minimum level of ambition and therefore the maximum absolute emissions and least ambitious aggregate carbon intensity. The estimate of 2012 emissions is taken from the Fourth IMO GHG Study16[22]. Rounded values for the total transport demand, total CO_2 emissions, and aggregate carbon intensity in 2008, 2012 and 2050 are given in Table 11.

	2008	2012	2050
Total transport demand (billion tonne nautical miles)	46,003	54,077	119,429
Total CO_2 emissions (million tonnes)	921	848	461
Estimated aggregate carbon intensity (gCO_2/tnm)	20.0	15.7	3.9

Table 11.
Transport demand, emissions and carbon intensity for international shipping.

Figure 21 plots the intensity values in Table 11 and a linear trend line connecting them. There are many different assumptions that could be applied to specify the shape of the curve that defines the rate of carbon intensity reduction between 2012 and 2050. The chosen trajectory represents a gradual and consistent rate of improvement on average across the fleet; the assumption applied here is for a constant improvement year-on-year, which is described by a straight line between 2012 and 2050.

21 For a description of the full methodology employed to project transport work including energy products, see page 259 of the Fourth IMO GHG Study.

22 The CO_2 emissions shown in Table 9 are for total international shipping emissions, and as such, include sectors which are measured in gross tonnage units (e.g.,Cruise, Vehicle and some Ferry-RoPax and Ferry-pax only). These sectors are included in order to maintain consistency with the method employed in the 2019 Poseidon Principles technical guidance, which is also consistent with how the 2008 CO_2 emissions has been derived for international shipping. International carbon emissions were 7% higher in 2012 in the Fourth IMO GHG Study than the Third IMO GHG Study.

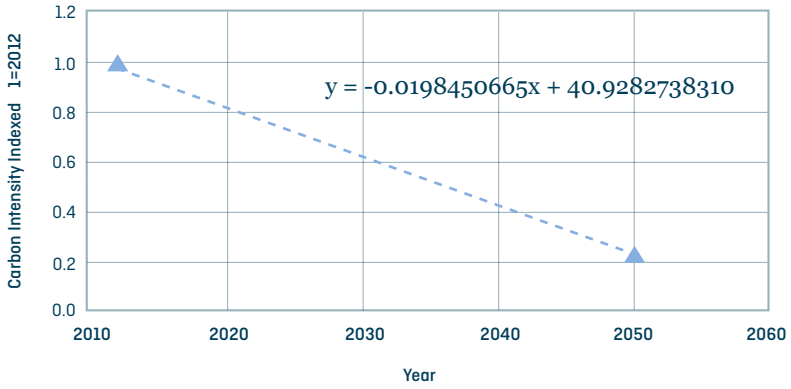

Figure 21.

Transport demand, emissions and carbon intensity for international shipping.

The Poseidon Principles trajectory is more ambitious than the 2018 IMO GHG Strategy Objective 2 intensity reduction values of 40% (2030) and 70% (2050), because it is derived to ensure achieving the 2018 IMO GHG Strategy Objective 3 (the absolute emissions objective). Meeting Objective 3 ensures that all IMO Initial Strategy Objectives are achieved. As it stands, the trajectories do not account for projected efficiency or alternative fuel technology uptake by the industry and are not designed to forecast any changes in operating profile. The linear nature of the trajectories provides a method to overcome uncertainty introduced by projections relating to technology uptake or operational variation.

Calculating the target carbon intensity, corrected to AER, in a given year as a function of the ship type and size class

The rate of reduction required per year is relative to the last historical data point (2012). The trajectory is shown relative to 2012 global cargo carbon intensity (indexed to 2012 carbon intensity) in Figure 22.

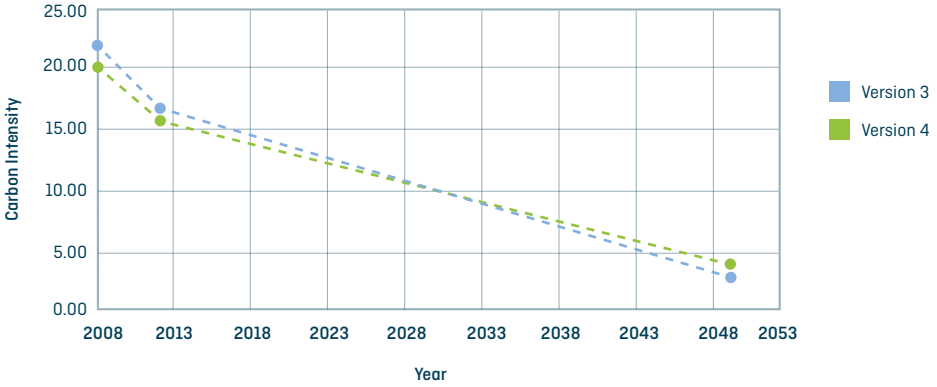

Figure 22.

Transport demand, emissions and carbon intensity for international shipping.

While the trajectory is presented for the time period 2012 to 2050, it is consistent with the 2008 baseline year as specified in the 2018 IMO GHG Strategy objectives as the end point is determined by a 50% reduction relative to the baseline. The formula for the trajectory is given in Figure 22, and allows the index value to be calculated for a given year[23].The index value represents the required carbon intensity value relative to the carbon intensity in 2012.

The index currently chosen for the Poseidon Principles is AER for cargo-carrying ships which use deadweight to measure their capacity and cgDIST[24] for ships measured in gross tonnage. The latter category includes Cruise, Ferry Ro-Pax, Ferry-pax only and Vehicle carriers. Each of these ship types has its own decarbonisation trajectory used to determine the trajectory values in Table 12.

The trajectory value for a given year is calculated in the following manner:

1. Calculate carbon intensity index for the given year
2. Multiply the carbon intensity index by the median 2012 AER value per ship type and size

The fleet type and size category median values in 2012 are included in Table 12. The AER and cgDIST trajectory values have been calculated for the years 2020-2023 and included in Table 12. Note that for the smallest bin size, there are ships of gross tonnage less than 5,000 GT which would be excluded from IMO DCS. Therefore a filter of 5,000 GT and above was applied on a case-by-case basis based on the trade-off between sample size and the difference in AER between the sample with all gross tonnage (including ships less than 5,000 GT) and the filtered sample. The filter was applied to Liquified Gas Tankers (0-49999 cbm) and Ro-Ro (0-4999 dwt).

23 The slope and intercept are rounded to the nearest four decimal places, calculated using the index values for 2012 and 2050.

24 cgDIST is CO_2/GT*nm, the same formula as AER, except gross tonnage is used in place of deadweight in the denominator of Equation 1.

			2012	2020	2021	2022	2023
Vessel Type	**Size**	**Size units**	**Median AER/ cgDIST**	**Trajectory value**	**Trajectory value**	**Trajectory value**	**Trajectory value**
Bulk carrier	0-9999	dwt	25,8	21,7	21,2	20,7	20,2
Bulk carrier	10000-34999	dwt	8,0	6,8	6,6	6,4	6,3
Bulk carrier	35000-59999	dwt	5,7	4,8	4,7	4,6	4,5
Bulk carrier	60000-99999	dwt	4,4	3,7	3,6	3,5	3,4
Bulk carrier	100000-199999	dwt	3,0	2,5	2,5	2,4	2,4
Bulk carrier	200000-+	dwt	2,6	2,2	2,1	2,1	2,0
Chemical tanker	0-4999	dwt	54,1	45,5	44,5	43,4	42,3
Chemical tanker	5000-9999	dwt	28,2	23,7	23,2	22,6	22,1
Chemical tanker	10000-19999	dwt	18,1	15,2	14,9	14,5	14,1
Chemical tanker	20000-39999	dwt	11,6	9,8	9,5	9,3	9,1
Chemical tanker	40000-+	dwt	8,4	7,1	6,9	6,7	6,6
Container	0-999	teu	24,4	20,5	20,0	19,5	19,0
Container	1000-1999	teu	17,9	15,1	14,7	14,4	14,0
Container	2000-2999	teu	12,1	10,2	10,0	9,7	9,5
Container	3000-4999	teu	11,4	9,6	9,4	9,1	8,9
Container	5000-7999	teu	10,4	8,7	8,5	8,3	8,1
Container	8000-11999	teu	8,5	7,2	7,0	6,8	6,7
Container	12000-14499	teu	6,7	5,6	5,5	5,4	5,2
Container	14500-19999	teu	4,4	3,7	3,6	3,5	3,5
Container	20000-+	teu	4,4	3,7	3,6	3,5	3,5
Cruise	2000-9999	gt	39,0	32,4	31,6	30,8	30,0
Cruise	10000-59999	gt	17,1	14,3	13,9	13,5	13,2
Cruise	60000-99999	gt	15,4	12,8	12,5	12,1	11,8
Cruise	100000-149999	gt	11,9	9,9	9,7	9,4	9,2
Cruise	150000-+	gt	9,0	7,5	7,3	7,1	6,9
Ferry-RoPax	5000-9999	gt	49,4	41,1	40,1	39,1	38,0
Ferry-RoPax	10000-19999	gt	32,1	26,8	26,1	25,4	24,7
Ferry-RoPax	20000-+	gt	22,3	18,6	18,1	17,7	17,2
Ferry-pax only	2000-+	gt	26,9	23,0	22,5	22,0	21,5
General cargo	0-4999	dwt	24,6	20,7	20,2	19,7	19,2
General cargo	5000-9999	dwt	19,4	16,3	15,9	15,5	15,1
General cargo	10000-19999	dwt	17,0	14,3	14,0	13,6	13,3
General cargo	20000-+	dwt	9,5	8,0	7,8	7,6	7,4
Liquefied gas tanker	0-49999	cbm	22,3	18,8	18,3	17,9	17,4
Liquefied gas tanker	50000-99999	cbm	9,9	8,3	8,1	7,9	7,7
Liquefied gas tanker	100000-199999	cbm	11,7	9,9	9,6	9,4	9,2
Liquefied gas tanker	200000-+	cbm	10,9	9,1	8,9	8,7	8,5
Oil tanker	0-4999	dwt	69,1	58,1	56,7	55,4	54,0
Oil tanker	5000-9999	dwt	33,8	28,5	27,8	27,1	26,5
Oil tanker	10000-19999	dwt	25,3	21,2	20,7	20,2	19,7
Oil tanker	20000-59999	dwt	10,4	8,8	8,5	8,3	8,1
Oil tanker	60000-79999	dwt	7,0	5,9	5,8	5,6	5,5
Oil tanker	80000-119999	dwt	5,1	4,3	4,2	4,1	4,0
Oil tanker	120000-199999	dwt	4,2	3,5	3,4	3,3	3,2
Oil tanker	200000-+	dwt	2,7	2,3	2,3	2,2	2,1
Other liquids tankers	1000-+	dwt	60,1	50,6	49,4	48,2	47,0
Refrigerated bulk	2000-5999	dwt	70,2	59,0	57,6	56,2	54,8
Refrigerated bulk	6000-9999	dwt	45,0	37,8	36,9	36,0	35,2
Refrigerated bulk	10000-+	dwt	36,8	31,0	30,2	29,5	28,8
Ro-Ro	0-4999	dwt	62,6	52,6	51,4	50,1	48,9
Ro-Ro	5000-9999	dwt	48,7	40,9	40,0	39,0	38,0
Ro-Ro	10000-14999	dwt	38,5	32,4	31,6	30,9	30,1
Ro-Ro	15000-+	dwt	21,8	18,3	17,9	17,5	17,1
Vehicle	0-29999	gt	20,2	17,1	16,7	16,3	15,9
Vehicle	30000-49999	gt	6,9	5,8	5,7	5,6	5,4
Vehicle	50000-+	gt	5,9	5,0	4,8	4,7	4,6

Note: AER for each ship type and size category is intended to compare ships in the same peer group, rather than across all ships.

Table 12.

The trajectory values for 2020-2023. For Cruise, Ferry-RoPax, Ferry-pax only and Vehicle, the denominator of carbon intensity is GT*nm where GT is gross tonnage instead of DWT*nm.

Appendix 5

Revisions to the Poseidon Principles trajectories

Future potential revisions to the Poseidon Principles

Over the timescale that the decarbonisation trajectory is estimated, a number of the parameters that are used in their calculation may change.

These include:

- Subsequent IMO GHG studies (released about every five years) and subsequent studies may update or modify the estimates of the historical emissions intensity and trends (e.g., if historical estimates are revised upwards, the emissions intensity objective will steepen).
- With the publication of the IMO lifecycle assessment guidelines (expected at MEPC 81 in Q2 2024), the Poseidon Principles will review its approach to determining fuel lifecycle GHG emissions with the intention to align with the IMO as much as possible. This a very dynamic landscape which will be consistently reviewed by the advisory team to ensure the most robust method for representing emissions is selected including fuel certification and emission factor verification
- It is expected that the IMO DCS regulation will be updated in order to align with the 2023 GHG Strategy which will be considered when designing the future of the Poseidon Principles data collection regime. This is expected to include more data collection around fuel types used and machinery on board.
- Transport demand growth may develop differently to the estimate used here to calculate the emissions intensity trend consistent with a 2050 absolute objective (e.g., if demand growth exceeds the trend used in these calculations, the emissions intensity objective will steepen).
- Demand growth may develop differentially between ship types and increase the demand for ships with different emissions intensity than the 2018 fleet (e.g., if demand modifies the fleet composition to increase the share of emissions by ships which have higher emissions intensity, the emissions intensity objective will steepen)..
- The IMO may develop exemptions or correction factors in the short-term measure to take into account the special nature of certain ship types' operations (e.g., ice-classed ships).
- The next scheduled IMO discussion around GHG emission reduction is scheduled for 2028.

While the decarbonisation trajectory and the ship type specific trajectory values have been calculated using the best available data, there are a number of foreseeable reasons why these values may need to change in the future. For this reason, it is proposed that decarbonisation trajectory is reviewed at a minimum every five years, approximately consistent with the periodic release of new analysis (the IMO GHG Studies). Any update to the decarbonisation trajectory should be applied for future climate alignment, not re-analysis of historical climate alignment.

Note: the Poseidon Principles will fine tune trajectories in 2024, reflecting on one reporting cycle and post MEPC 81.

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Current project team

Global Maritime Forum

Morgane Graffion, ESG Lead
Rita Hjelm, Project Coordinator

University College London/UMAS

Jean-Marc Bonello, Principal Consultant, UMAS
Akash Kapur, Consultant, UMAS
Haydn Francis, Consultant, UMAS

Rocky Mountain Institute

James Mitchell, Manager, Head of Impact

Founding project team

Global Maritime Forum

Johannah Christensen, Managing Director, Head of Projects & Programmes
Louise Dobler, Project Manager
Elyse Lawson, Project Assistant

Rocky Mountain Institute

James Mitchell, Manager, Head of Impact
Patrick Molloy, Associate

University College London/UMAS

Tristan Smith, Reader in Energy and Shipping, University College London
Sophie Parker, Principal Consultant, UMAS

Drafting group

Michael Parker, Global Industry Head, Shipping & Logistics, Citi (Chair)
Paul Taylor, Global Head of Shipping & Offshore, Société Générale Corporate & Investment Banking (Vice Chair)
Kristin Holth, Executive Vice President, Global Head of Ocean Industries, DNB John
Kornerup Bang, Head, Sustainability Strategy and Chief Advisor, Climate Change, A.P. Møller-Mærsk
George Wells, Global Head of Assets and Structuring, Ocean Transportation, Cargill
Hugo De Stoop, Chief Executive Officer, Euronav
Georg Whist, Chief Executive Officer, Gram Car Carriers

Additional support

Katharine Palmer, Global Sustainability Manager, Marine & Offshore, Lloyd's
Register Chris Craddock, Manager, Technical Advisory & Ship Performance, Lloyd's
Register Eliza Eubank, Director and Global Head of Environmental and Social Risk Management, Citi
Hui Wen Chan, Vice President, Corporate Sustainability, Citi
Knut Ola Skotvedt, Senior Vice President, Large Corporates, Ocean Industries, DNB
Holger Apel, Managing Director, Global Head Maritime Industries, KfW IPEX-Bank
Roland-Torsten Land, Director, KfW IPEX-Bank
Sebastian Fenk, Director Maritime Industries, KfW IPEX-Bank
Sabine Lehmann, Vice President, Strategy / Sustainability Management, KfW IPEX-Bank
Vishnu Prakash, Principal Data Scientist, Stena Bulk
Nigel Thomas, Chairman & Partner, Watson Farley and Williams
Lindsey Keeble, Partner, Watson Farley and Williams
Christina Howard, Partner, Watson Farley and Williams
Elaine Ashplant, Professional Support Lawyer, Watson Farley and Williams
Sabrina Chong, Trainee Solicitor, Watson Farley and Williams
Peter Appel, Chairman, Gorrissen Federspiel
Morten Berggreen, Attorney, Gorrissen Federspiel
Laura Düring Krabbe, Assistant Attorney, Gorrissen Federspiel
Michael Søsted, Managing Director, Head of Operations, Global Maritime Forum
Ingrid Sidenvall Jegou, Project Director, Decarbonisation, Global Maritime Forum

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Register


MAERSK


WATSON FARLEY
&
WILLIAMS


GLOBAL
MARITIME
FORUM


UMAS


RMI

Poseidon Principles
Amaliegade 33 B, 3rd floor
1256 Copenhagen K
Denmark

www.poseidonprinciples.org
info@poseidonprinciples.org