POSEIDON PRINCIPLES

A global framework for responsible ship finance

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Poseidon Principles

As Signatories and members of the Poseidon Principles drafting group, we are proud to announce 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 by at least 50% by 2050 compared to 2008.

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 recognize 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 recognize 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.

We believe now is the time to take this initiative, and we invite you to join us.

June 2019

Michael Parker
Global Industry Head,
Shipping & Logistics, Citi

Paul Taylor
Global Head of Shipping & Offshore,
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Kristin Holth
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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 recognize 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 society's 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 ambition for GHG emissions to peak as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008. 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 recognize 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 recognize 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, are linked to and support the IMO's GHG measures developed through 2023, and that further adverse impacts are identified for inclusion.

Scope

The Poseidon Principles are applicable to lenders, relevant lessors, and financial guarantors including export credit agencies. The Poseidon Principles must be applied by Signatories in all Business Activities that are 1) credit products–including bilateral loans, syndicated loans, club deals, and guarantees–secured by vessel mortgages, 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 IMO (i.e., vessels 5,000 gross tonnage and above which have an established Poseidon Principles trajectory whereby the carbon intensity can be measured with IMO DCS data).[1] 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.

1 See Appendix 1

POSEIDON PRINCIPLES

Principle 1

Assessment of climate alignment

We will annually assess climate alignment in line with the Technical Guidance for all Business Activities.

Our commitment:

Signatories will, on an annual basis, measure the carbon intensity and assess climate alignment (carbon intensity relative to established decarbonisation trajectories) of their shipping portfolios. This requirement takes effect for each Signatory in the following calendar year after the calendar year in which it became a Signatory.

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Principle 2

Accountability

> We recognize the important role that classification societies and other IMO- Recognized Organizations ("RO")[2] play in providing unbiased information to the industry and the mandatory regulation established by the IMO for the data collection and reporting of fuel oil consumption from ships, (the "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.

2 An RO is an authorized organization 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 authorized 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 standardized covenant clauses. We will contribute to the update and addition of standardized clauses through the annual review process.

Our commitment:

Signatories will agree to work with clients and partners to covenant the provision of necessary information to calculate carbon intensity and 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 Signatory 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.

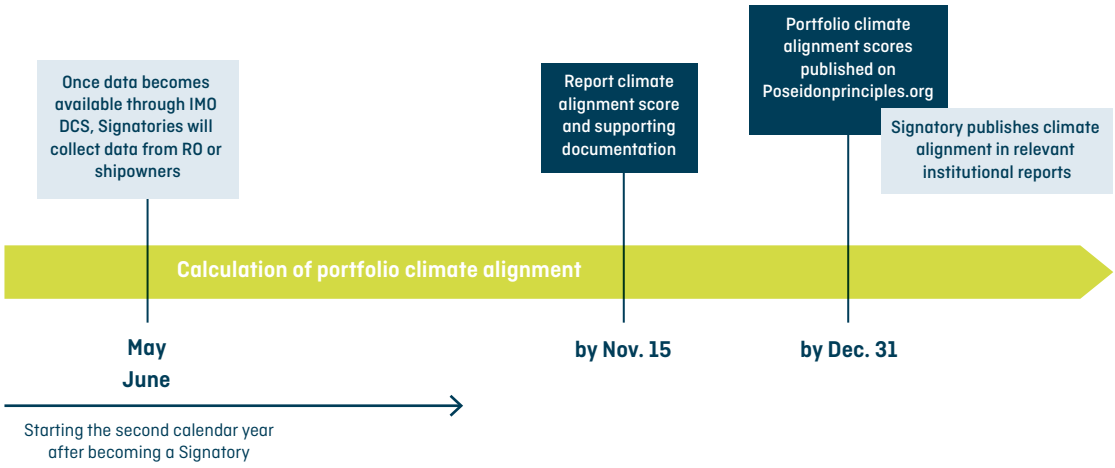


Figure 1.
Timeline for Signatories of the Poseidon Principles

The Poseidon Principles are consistent with the IMO's ambition for GHG emissions from international shipping to peak as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008.[3]

It is recognized that some Signatories may choose to both fulfil 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.

3 IMO. (2018). Resolution MEPC.304 (72) (adopted on 13 April 2018), Initial IMO strategy on reduction of GHG emissions from ships, IMO doc MEPC 72/17/Add. 1, Annex 11.

2

Assessment of climate alignment

PRINCIPLE

> We will annually assess climate alignment in line with the Technical Guidance for all Business Activities

REQUIREMENTS

Signatories will, on an annual basis, measure the carbon intensity and assess climate alignment of their shipping portfolios (carbon intensity relative to established decarbonisation trajectory). This requirement takes effect for each Signatory in the following calendar year after the calendar year in which it became 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, the TCFD, and the Science Based Targets Initiative.

Shipping's governing body, the IMO, approved an Initial GHG Strategy (**"the Initial Strategy"**) in April 2018 to reduce GHG emissions generated by shipping activity, which represents a significant shift in climate ambition for a sector that currently accounts for 2%–3% of global carbon dioxide emissions. This Initial Strategy sets out the following levels of ambition:

1. To reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008 (**"the IMO Absolute Target"**). See Figure 2.
2. To reduce CO_2 emissions per transport work by at least 40% by 2030, pursuing efforts towards 70% by 2050 compared to 2008 (**"the IMO Intensity Targets"**). See Figure 3.

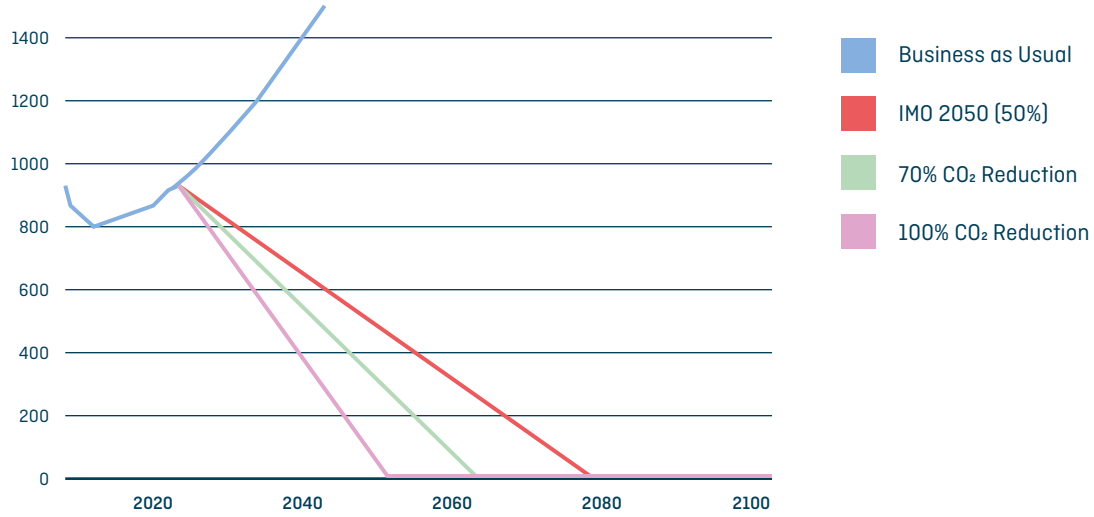


Figure 2.
Global fleet's CO_2 targets and trajectories under IMO targets (million tonnes of CO_2)

The IMO Absolute Target can be converted into a relative (carbon intensity) target. Figure 3 shows three possible intensity trajectories consistent with the Initial Strategy compared to the pathway drawn using the IMO Intensity Targets. The IMO Intensity Targets lie significantly above the other pathways consistent with the IMO Absolute Target.

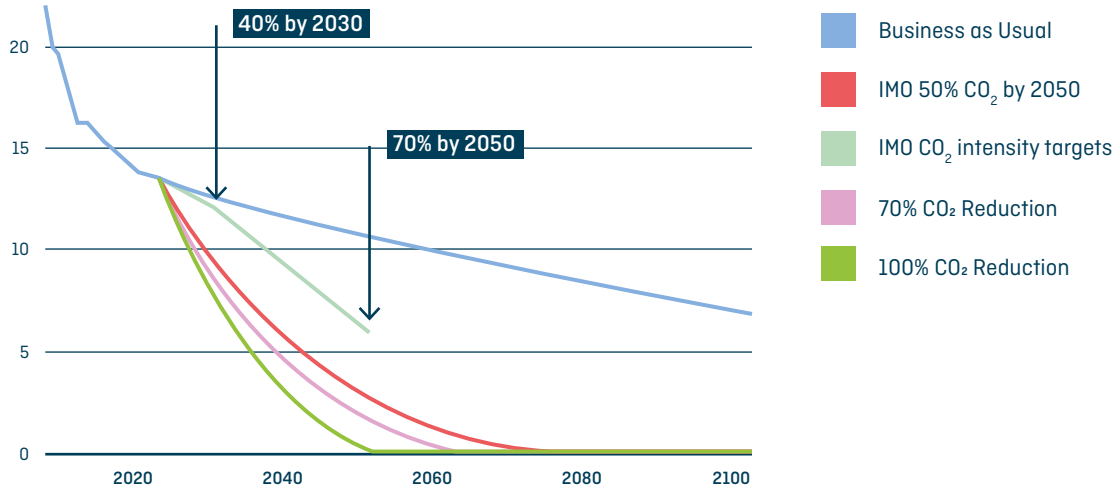


Figure 3.
Global fleet's carbon intensity targets and trajectories (grams of CO_2 per tonne-nautical mile [gCO_2/tnm])

There is some misalignment between the IMO Absolute Target and the IMO Intensity Targets:

1. The IMO Intensity Targets were set prior to the determination of the IMO Absolute Target. Depending on future demand for shipping services, the IMO Absolute Target and IMO Intensity Targets may or may not align. Alignment is unlikely, however.
2. The wording of the IMO Initial Strategy does not state that meeting the IMO Intensity Targets ensures compliance with the IMO Absolute Target.
3. It is expected that the IMO will update the IMO Intensity Targets to better align with the IMO Absolute Target at the forthcoming review process for the IMO's Initial GHG Strategy.

For these reasons, and to enable alignment with climate goals (both IMO and Paris Agreement) the Poseidon Principles will be linked to the IMO Absolute Target.

2.1 Selecting the right metric for measuring climate alignment

Both absolute and intensity-level measurements of CO_2 emissions are useful for meeting the IMO levels of ambition, and both measurements are recommended by other initiatives like the CDP. 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 will be used in the Poseidon Principles.

In shipping, carbon intensity represents the total operational emissions generated to satisfy a supply of transport work (grams of CO_2 per tonne-nautical mile [gCO_2/tnm]). Carbon 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 carbon 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 a carbon intensity metric which produces the closest measure of the vessel's true carbon intensity, while ensuring consistency with the policies and regulations of the IMO and the IMO DCS regulation and associated guidelines.

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 ships which are 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:[4]

1. the 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 4 shows the implementation schedule for the IMO DCS. The first data collection period was for the calendar year 2019. 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 organization 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 2019, it would be issued by the end of May 2020) 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 an RO 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.

4 (MARPOL Annex VI, Chapter 4, Reg. 19).

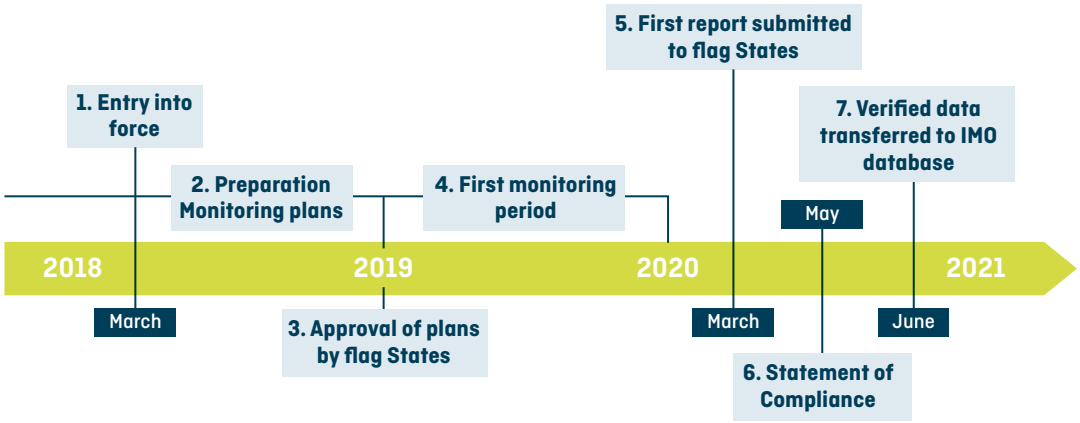


Figure 4.
The IMO DCS' implementation schedule

The data reported to the IMO is anonymized and confidential, and therefore it cannot be accessed from the IMO by the 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.

The IMO DCS enables the calculation of a carbon intensity metric known as the Annual Efficiency Ratio ("AER"), 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):

$$AER = \frac{\sum_i C_i}{\sum_i dwt D_i}$$

Equation 1

where *Ci* 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 *Di* is the distance travelled on voyage *i*.[5] The AER is computed for all voyages performed over a calendar year.

This metric is calculated using an approximation of the total annual transport work performed by a ship, obtained from its total distance travelled and DWT (in tonne units). It is recognized 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.

5 The emission factors can be found in resolution MEPC.308(73) on 2018 Guidelines on the method of calculation of the attained Energy Efficiency Design Index (EEDI) for new ships, which can be found in document MEPC 73/19/Add.1, Annex 5.
HFO: 3,114 t(CO_2)/t fuel
MDO/MGO: 3,206 t(CO_2)/t fuel
LNG: 2,750 t(CO_2)/t fuel
It should be noted that low sulphur fuels carry the same CO_2 emission factor.

2.2 Calculating vessel carbon intensity

Vessel carbon 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 carbon 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 carbon intensity is in line with a decarbonisation trajectory that meets the IMO ambition of reducing total annual GHG emissions by at least 50% by 2050 based on 2008 levels.

A decarbonisation trajectory is a representation of how many grams of CO_2 a single ship can emit to move one tonne of goods one nautical mile (gCO_2/tnm) over a time horizon (as shown in Figure 2 and Figure 3). 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_2 shipping emissions permitted to be in-line with the IMO's 2050 target.

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[6].

To assess climate alignment of a single vessel, the vessel's annual carbon 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 carbon intensities in each product and the portfolio are aggregated. Section 2.5 discusses the method that is used.

6 See Appendix 3

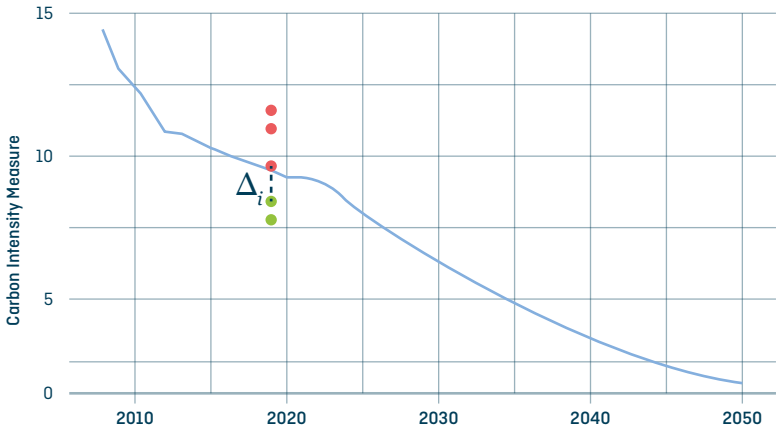


Figure 5.
Assessing alignment at the vessel level

In Figure 5, each dot represents the annual carbon 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 carbon 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 2

where x_i is the carbon intensity of vessel *i* and r_s is the required carbon 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

Standard 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 will be produced in a format that allows for simple weighting aggregation. This is to ensure that once the carbon 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 carbon intensity for a given ship type and size class in a given year. This is carried out by calculating a decarbonisation-consistent carbon intensity trajectory from 2012 out to 2050. The method is derived from IMO Secretariat commissioned data sources, both the Third IMO GHG Study and IMO MEPC 68 Inf. 24 publication. Assumptions for formulating the trajectory are also taken from the Initial Strategy, including the use of 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:

For each vessel in a relevant financial product, compare the annual carbon intensity of that vessel with the required decarbonisation value[7]. The alignment delta at time *t* is given by Equation 2.

Compute the weighted average of the vessel alignment deltas using the debt outstanding[8] of each vessel in the portfolio. Equation 3 below is the computation for the portfolio alignment delta, Δ_p:

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

Equation 3

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 2.

7 The required decarbonisation value is the maximum carbon intensity (gCO_2/tnm) 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/category category.

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

Specific guidance for calculations:

- In general, 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 MARPOL Annex VI, Regulation 27 (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 an SoC and/or a Verification Letter for an applicable reporting period (including a period shortened as above) shall remain unaffected.
- In general, 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.
- In general, 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 recognize that there may be some double counting in the case of guarantees.
- Where there may be multiple lenders involved in one transaction, such as 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 3, 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 2019. Table 1 illustrates a simple example of a portfolio with two products and shows the alignment deltas for each vessel in the products and portfolio. The portfolio alignment delta shown in Table 2 is calculated using a weighted average according to Equation 3. 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 carbon intensity required for decarbonisation.

Financial Product	Year	IMO	Actual Value (CO_2 Intensity)	Required Value (CO_2 Intensity)	Alignment Delta	Debt Outstanding (million $)	Debt Outstanding (Share of Portfolio)
1	2019	9511349	7	8.3	-16%	150	19%
1	2019	9340635	10.4	9.8	6%	150	19%
2	2019	9293739	10.1	8.3	21%	100	13%
2	2019	9331517	9.5	7.5	26%	400	50%

Table 1.
Vessel alignment

Financial Product	Capital Exposure (million $)	Aligment Delta
Portfolio	800	14%

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 carbon intensity as the metric to measure climate alignment. In order for the Poseidon Principles to align with the IMO DCS, which is mandatory for all ships 5,000 gross tonnage and above and engaged on international trade, the Poseidon Principles rely specifically on AER as the carbon intensity metric.[9]

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.

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

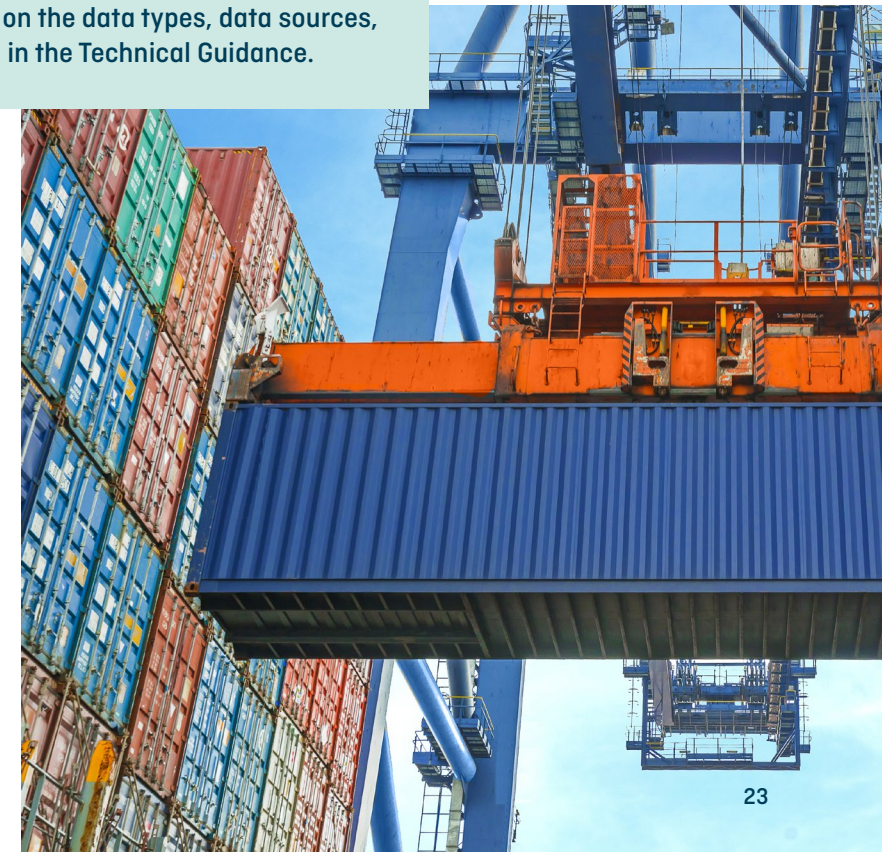
3.1 Accountability

PRINCIPLE

> **We recognize the important role that classification societies and other IMO-ROs play in providing unbiased information in the industry and the mandatory regulations established by the IMO for the data collection system for fuel oil consumption from ships. 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 standardized covenant clauses. We will contribute to the update and addition of standardized clauses through the annual review process.

REQUIREMENTS

Signatories will agree to work with clients and partners to covenant the provision of necessary information to calculate carbon intensity and 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 standardized 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 6 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.

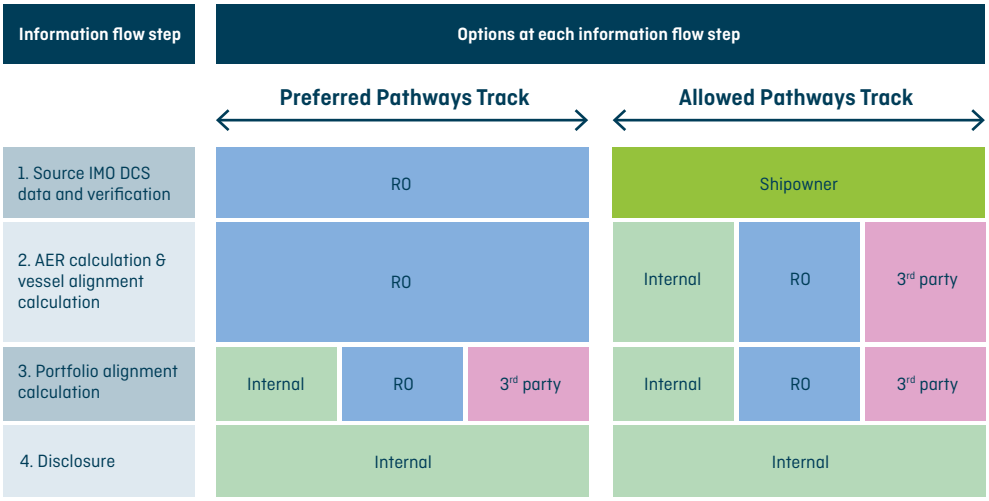


Figure 6.
Information flow pathway tracks

Step 1 Sourcing vessel IMO DCS data

Step 2 Calculating vessel carbon intensity and climate alignment

Step 3 Calculating climate alignment of portfolio

Step 4 Disclosure

3.3.1 Step 1: Sourcing vessel IMO DCS data

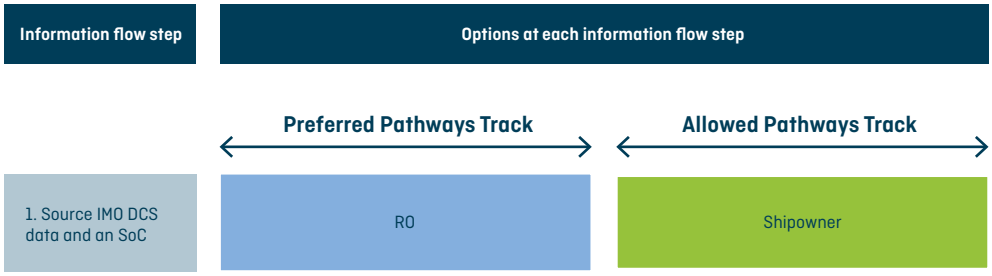


Figure 7.
Data sourcing

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 7 indicates, sourcing data from an RO is preferable while sourcing data from the shipowner is allowed.

Figure 8 demonstrates how the Poseidon Principles interact with pre-existing requirements under the IMO DCS. 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.

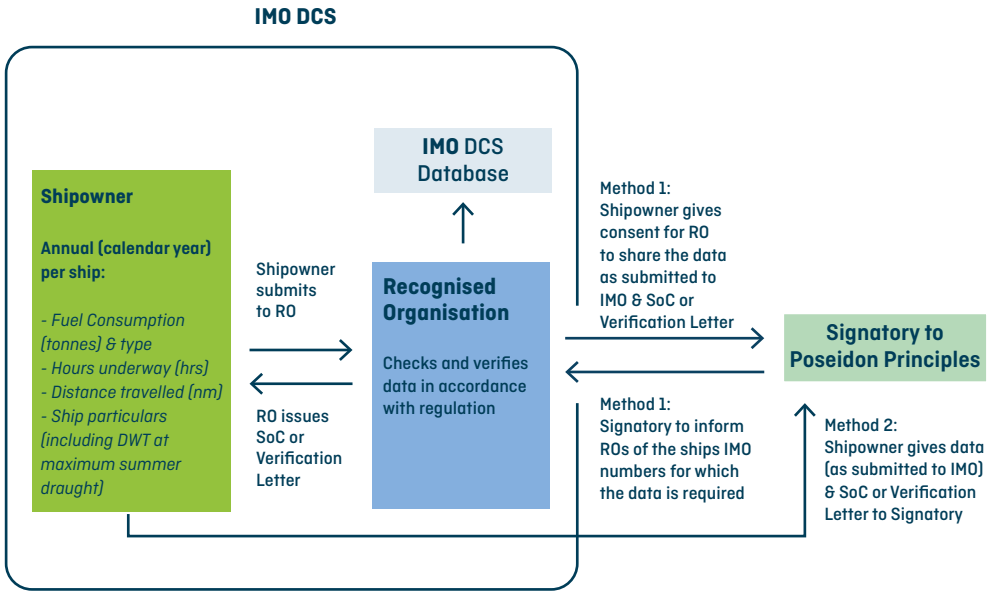


Figure 8.
Methods for sourcing vessel IMO DCS data

Permissible information flow methods:

Method 1 (Preferred Pathways Track): RO(s) provide data and an 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 an 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 an RO or from the shipowner.
2. IMO DCS data may only be used if it is accompanied by an SoC or a Verification Letter provided by an RO.

3.3.2 Step 2: Calculating vessel carbon intensity and climate alignment

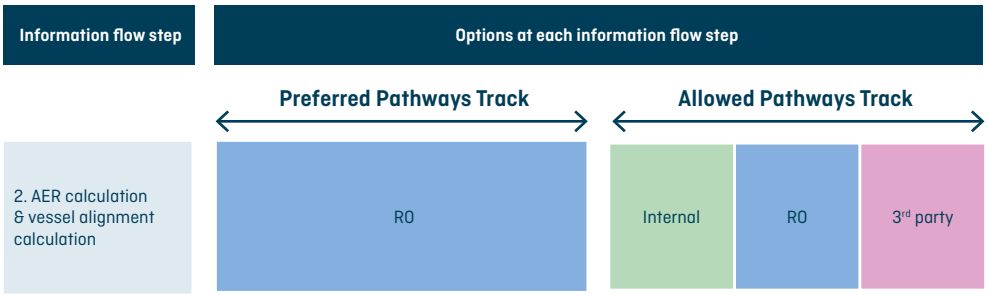


Figure 9.
Vessel alignment calculation

Step 2 requires the calculation of vessels' carbon intensity using the IMO DCS data and the calculation of vessels' alignment with decarbonisation trajectories. There are three methods for undertaking these calculations. The first method is relevant only to the preferred pathways track, while the latter two are relevant to the allowed pathways track.

AER is used as the carbon intensity metric and is detailed in Section 2.1, and 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.[10] These are available through the Poseidon Principles Secretariat. Figure 10 demonstrates the necessary information, where to source it, and who can perform calculations.

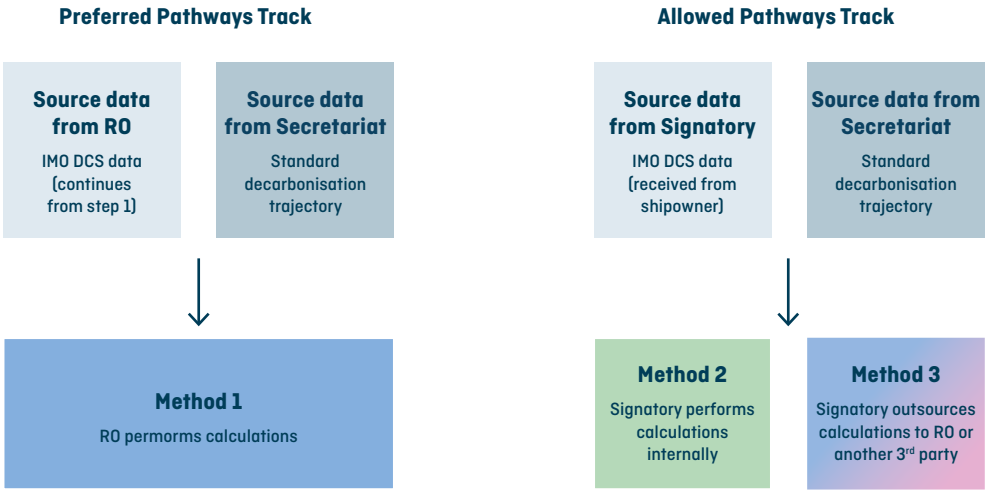


Figure 10.
Methods for calculating carbon intensity and vessel climate alignment

10 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 carbon 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 carbon 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 carbon intensity (AER) 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 carbon 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 carbon intensity and climate alignment of the vessel(s).

Method 3 (Allowed Pathways Track): After receiving data from shipowners, Signatory outsources carbon intensity and climate alignment calculations to an RO or another third party.[11]

1. After selecting an 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 carbon 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 carbon intensity (AER) of the vessel(s) and the decarbonisation delta for the vessel(s).

How to meet the requirements

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

11 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

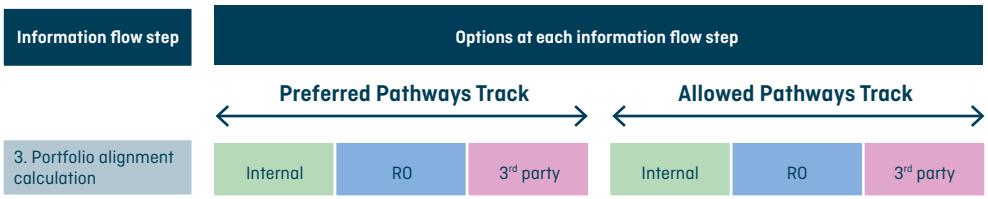


Figure 11.
Portfolio alignment calculation

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. Methods 1 and 2 are applicable in both the preferred pathways and allowed pathways tracks. This is due to the sensitivity of loan book data.[12]

Figure 12 demonstrates which data is necessary and who can perform the calculations.

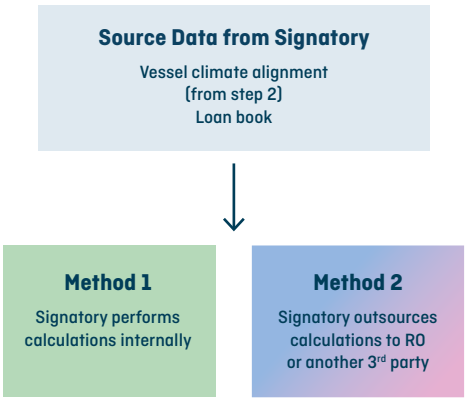


Figure 12.
Methods for calculating portfolio climate alignment

12 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 an 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 carbon intensity and climate alignment calculations must rely solely on verified IMO DCS data (i.e., data for which an 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 MARPOL Annex VI, Regulation 27 (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 an 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

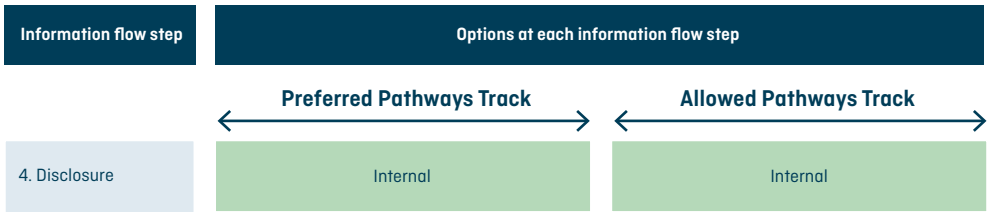


Figure 13.
Disclosure

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.

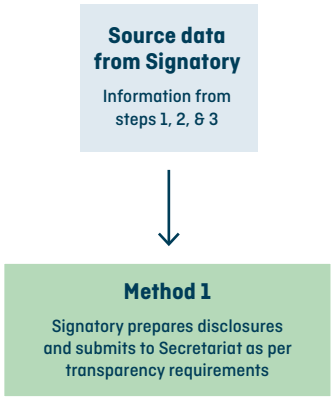


Figure 14.
Method for disclosure

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, the Signatory should calculate the percentage of its eligible shipping portfolio for which it cannot report. This percentage is calculated against % of 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 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 3.3.1–3.3.3).
3. The Signatory should provide the following information to the Secretariat:
   - total climate alignment score
   - separate climate alignment scores for passenger and cargo vessels *(OPTIONAL)*
   - percentage of eligible shipping portfolio non-reporting
   - percentages of portfolio for which Preferred and Allowed Pathway Tracks were used
   - names of providers used, if any, to complete steps 1, 2, and 3

How to meet the requirements

The Signatory should provide the information listed in the third bullet point 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, which is demonstrated in Table 3 below: percentage of eligible shipping portfolio non-reporting, percentage of portfolio for which preferred and allowed pathway tracks were used, and a list the names of providers it used, if any, to complete steps 1, 2, and 3.

The following information is made public:

CLIMATE ALIGNMENT SCORE			
Total climate alignment score		2.5%	
Climate alignment score for all cargo vessels (OPTIONAL)		-1.1%	
Climate alignment score for all passenger vessels (OPTIONAL)		3.8%	
Reporting vs. non-reporting			**Validation**
(L1)	Proportion of activities **reported**, against % of eligible shipping portfolio	90.0%	L1 + L2 = 100%
(L2)	Proportion of activities **not reported**, against % of eligible shipping portfolio	10.0%	

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	75.0%	L3 + L4 = 100%
(L4)	% of eligible shipping portfolio for which **Allowed Pathway Track** was used	25.0%	
	Providers used	Company XY	

Note: % non-reporting refers to the % debt in a portfolio that is non-reporting, rather than the % of ships non-reporting

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 finalized after a financial institution becomes a Signatory to the Poseidon Principles, the Signatory will use its best efforts to include the Definitions and Covenant wording set out in the covenant clause in the 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 our assessment of the climate alignment of our Business Activities at the portfolio level in line with the Technical Guidance on an annual basis.**

REQUIREMENTS

1. Upon becoming a Signatory, the Signatory 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 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

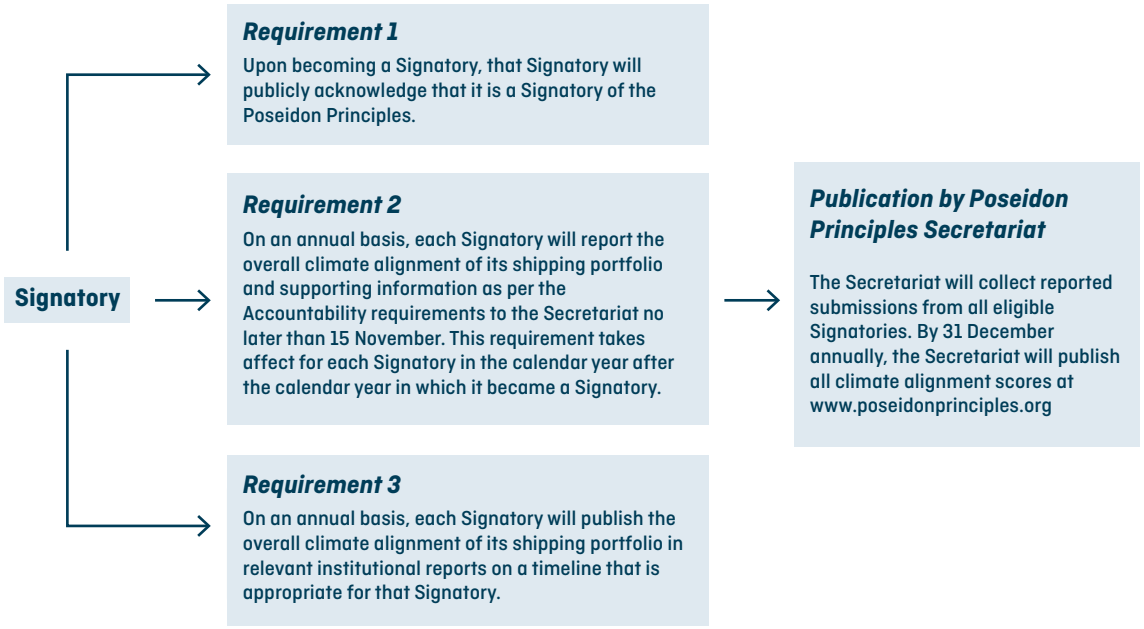


Figure 15.
Information flow for transparency requirements

Figure 15 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 publicly known that it is a Signatory to the Poseidon Principles in a manner that is suitable for its organization. The intent of this requirement is to simply ensure awareness of the Poseidon Principles and to ensure that it is clear which organizations 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 technical guidance. The intent of this requirement is to ensure that accurate information can be published by the Poseidon Principles Secretariat to www.poseidonprinciples.org 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 or create a significant burden for Signatories. Instead, it is intended to ensure awareness of the Poseidon Principles and their approach.

Example: Transparency

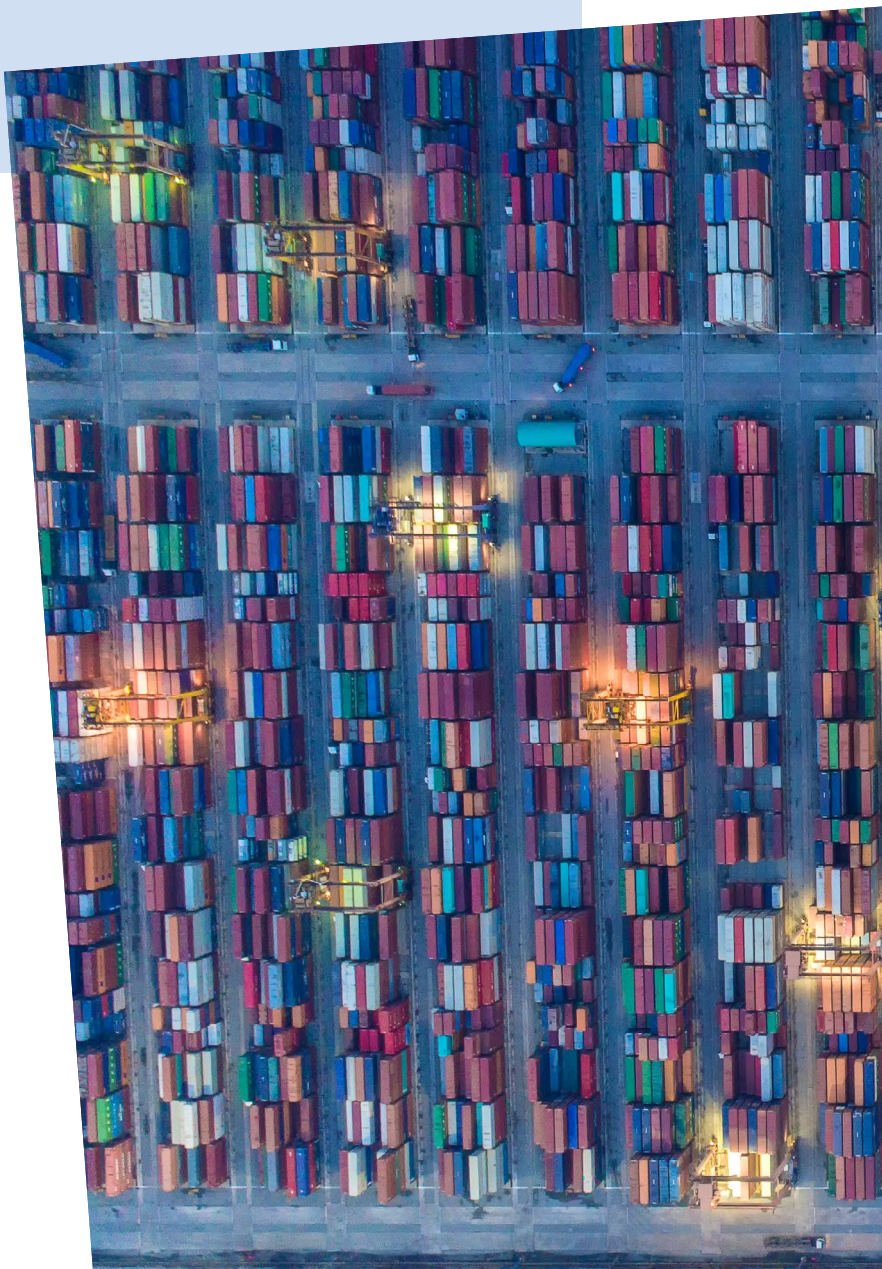
In this example, a lender becomes a Signatory of the Poseidon Principles in November 2022.

Requirement 1: Lender issues a press release announcing that it is a Poseidon Principles Signatory in November 2022.

Requirement 2: Prior to 15 November 2023, the Signatory submits its portfolio climate alignment score (for 2022) 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 score in its annual sustainability report in line with their internal timeline.

Publication by the Poseidon Principles Secretariat: All eligible Signatories' 2022 climate alignment scores will be published online prior to 31 December 2023.

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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 proposed 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 (5) 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 5 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 legally 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 related reporting made 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

Upon becoming a Signatory, each Signatory has five (5) months to complete this Self-Assessment and return it to the Poseidon Principles Secretariat. The purpose of this is to ensure that each Signatory has made appropriate arrangements to fulfil 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

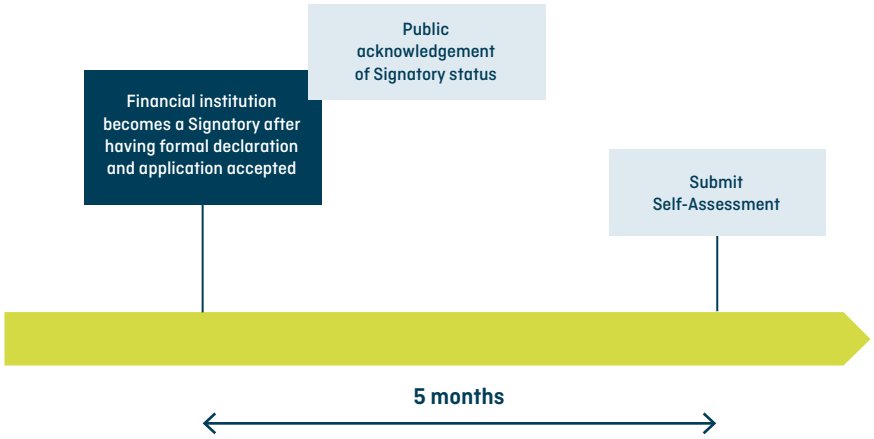

Figure 16.
Timeline for Signatories of the Poseidon Principles

The Poseidon Principles aim to be easily implementable and achievable for each Signatory. To these ends, the Timetable for Implementation in Figure 16 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 founding 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 (available on the website).

Appendices

Appendix 1

Definitions and abbreviations

AER means the Annual Efficiency Ratio, a carbon intensity metric calculated in accordance with Equation 1 as set out in Section 2.1 of the Technical Guidance.

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 carbon intensity can be measured with IMO DCS data[13]. 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.

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 carbon intensity required to be aligned with the IMO's Initial Strategy absolute emission reduction ambition of at least 50% by 2050 on 2008 levels.

The method used for establishing the decarbonisation trajectory up to 2050 is derived from emission and transport work data from the Fourth IMO GHG Study.

DWT is DWT 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.

GHG means Greenhouse Gas.

IMO is the International Maritime Organization, a specialized 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.

RO is an authorized organization 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 authorized 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.

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13 *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

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.

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 is including 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.

A note on the Versions of the Poseidon Principles

The "2019 Poseidon Principles" or "Version 3.0" refers to the version which uses the IMO 3rd GHG Study trajectories. This version was used for the first Annual Disclosure Report, which used 2019 emissions data. Versions 1.0 and 2.0 were earlier editions with the same trajectories, but corrected inconsistencies throughout the document following launch in June 2019.

The "2020 Poseidon Principles" or "Version 4.0" refers to the version which uses the IMO 4th GHG Study trajectories.

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 the IMO Initial Strategy. 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 utilized 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

Appendix 3

Definition of decarbonisation trajectory

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 Initial 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[14], 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 IMO Initial Strategy absolute emission reduction ambition.

14 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[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.

The estimate of the target CO_2 emissions in 2050 is taken by applying the IMO's Initial Strategy Objective 3 minimum target (at least a 50% reduction), to the IMO Initial Strategy's baseline year (2008) total CO_2 emissions (921Mt), 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 Study[16]. Rounded values for the total transport demand, total CO_2 emissions, and aggregate carbon intensity in 2008, 2012 and 2050 are given in Table 5.

	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 5.
Transport demand, emissions and carbon intensity for international shipping

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

16 The CO_2 emissions shown in Table 5 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 17 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 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.

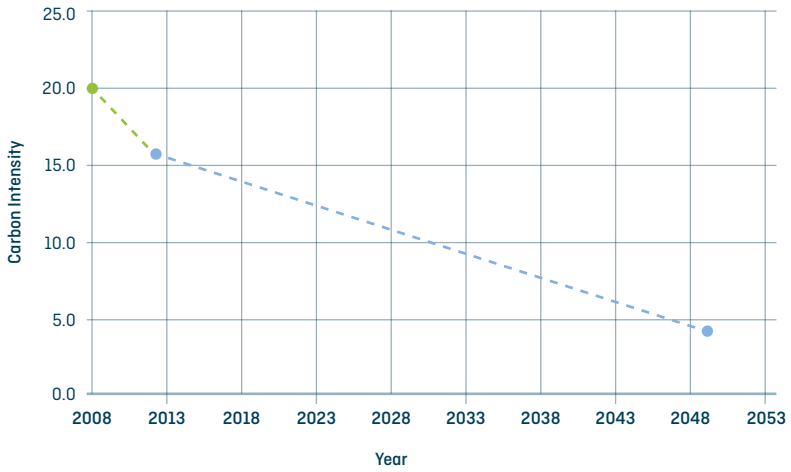

Figure 17.
Global carbon intensity trajectory

The Poseidon Principles trajectory is more ambitious than the IMO Initial Strategy Objective 2 intensity reduction values of 40% (2030) and 70% (2050), because it is derived to ensure achieving the IMO Initial 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 18.

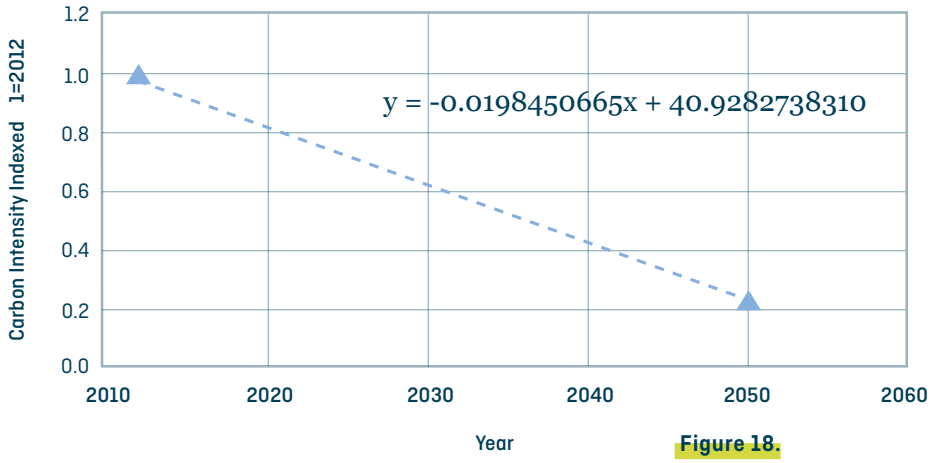

Figure 18.
Indexed decarbonisation trajectory, 2012-2050

While the trajectory is presented for the time period 2012 to 2050, it is consistent with the 2008 baseline year as specified in the IMO Initial 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 18, and allows the index value to be calculated for a given year.[17] 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[18] 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 6.

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 6. The AER and cgDIST trajectory values have been calculated for the years 2020-2023 and included in Table 6. 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).

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

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.

			2012	2020	2021	2022	2023
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 6:

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 4

Revisions to the Poseidon Principles Trajectory

Update from the Third to the Fourth IMO GHG Study

Previous revisions to this Technical Guidance took into account the following factors:

- The Fourth IMO GHG Study (published in 2020) updated the carbon intensity estimates for 2012, the size categories per ship type and size, and future projections of transport demand for 2050.
- The developments leading up to MEPC 76 in terms of the carbon intensity metrics chosen for ship types that use gross-tonnage (e.g., Cruise).

The Fourth IMO GHG Study improved its methodology for estimating carbon emissions, and estimated the carbon intensity of ships in the world fleet and per ship type and size category. Various carbon intensity metrics were estimated including EEOI, AER, and cgDIST for the period 2012-18. The Study also used a different methodology for projecting transport demand. Overall, the revisions made to carbon emissions were a result of an improved methodology[19], while transport demand projections took account of recent trends in the relationship between maritime trade and its drivers (e.g., macroeconomic indicators) and different models used.

This impacted the steepness of the global cargo decarbonisation trajectory, which can mostly be explained by a lower transport demand projection. Figure 19 shows a comparison of the Poseidon Principles global cargo decarbonisation trajectory following the Third IMO GHG Study (blue colour) and following the Fourth IMO GHG Study (green colour).

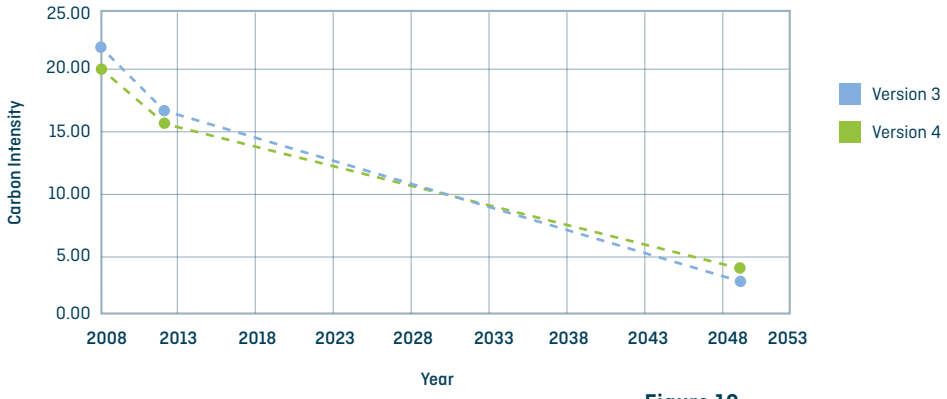

Figure 19.
A comparison of the global carbon intensity trajectory between the reflecting the update from the Third to the Fourth IMO GHG Study

The Fourth IMO GHG Study also updated the size bins per ship type to take into account the development of the fleet between 2012 and 2018 whilst also considering future fleet development. This had the effect of breaking out larger size ranges used in the Third IMO GHG Study into smaller size bins.[20]

19 See page 184 of the 4th IMO GHG Study for a comparison between the Third and Fourth GHG Studies.

20 See Table 8 in the 4th IMO GHG Study for a mapping of size bins from the 3rd IMO GHG Study to the 4th IMO GHG Study.

In the 2019 Poseidon Principles (Version 3.0), the carbon intensity of three ship types – Cruise, Ferry Ro-pax and Ferry Pax-only, were measured in CO_2/GT which are better measured using a volumetric proxy as they carry passengers. Various proposals submitted to the IMO in advance of the MEPC 76 meeting have recommended the use of cgDIST for these ship types, as well as Vehicle carriers which are also measured in GT units in the Fourth IMO GHG Study. The Poseidon Principles has adopted this metric as it controls not only for the different capacity units but also the distance travelled. Therefore, separate global decarbonisation trajectory is provided for these four ship types to determine the global index values.

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:

- The IMO may modify the levels of ambition of its initial GHG reduction strategy, including when the IMO revises its strategy (expected 2023) (e.g., if the objectives increase in ambition, the carbon intensity trajectory will steepen). Or the Poseidon Principles Association may decide to take a different interpretation of the IMO's strategy, or align to different levels of ambition to the IMO.
- Adopting a continuous curve approach to model the relationship between size and AER for each ship type, which would adjust the 2012 baseline (upwards or downwards) if the ship's size differs from the median ship per ship type (e.g., if the ship is larger than the median ship, the decarbonisation trajectory value would be more stringent).
- 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).
- Subsequent IMO GHG studies (released about every five years) and subsequent studies may update or modify the estimates of the historical carbon intensity and carbon intensity trends (e.g., if historical estimates are revised upwards, the carbon intensity objective will steepen).
- Transport demand growth may develop differently to the estimate used here to calculate the carbon intensity trend consistent with a 2050 absolute GHG objective (e.g., if demand growth exceeds the trend used in these calculations, the carbon intensity objective will steepen).
- Demand growth may develop differentially between ship types and increase the demand for ships with different carbon intensity than the 2012 fleet (e.g., if demand modifies the fleet composition to increase the share of emissions by ships which have higher carbon intensity, the carbon intensity objective will steepen).

While the decarbonisation trajectory and the ship type and size 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.

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