

INSIGHT BRIEF

Aligning with 1.5 degrees: Managing the risks and opportunities for shipping and the companies in its value chain

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Shipping's value chain can expect continued pressure on targets and commitments until it clearly aligns with an IPCC-derived definition of the steps needed to avoid temperatures rising above 1.5C. This pressure will come both from the policy process at the IMO and from the landscape of voluntary initiatives and commitments that intensify scrutiny and expectations of transparency. At a sector level, 1.5-alignment means taking even greater steps than many had already factored in as sufficient – much of shipping's transition away from fossil fuel use will need to have been achieved by the end of the 2030's. Managing the risks and opportunities that this creates starts with understanding where pressure on targets comes from and what is driving these latest developments in their specification.

A lot has been asked of the shipping sector. As recently as 2015, the IMO made clear there would never be a cap on GHG emissions from ships. By 2018, that certainty had been shredded by the adoption of the GHG reduction targets in the IMO's Initial Strategy. To shipping's credit, many stakeholders across the sector's value chain did not start lobbying against this new objective, but reacted with enthusiasm and interest in how this could be achieved. Multiple studies have identified the need for a fundamental shift in the fuel mix and energy supply chains. Characteristic pragmatism has been applied and a mix of positions from early adopter to fast follower have been considered and in some cases adopted.

Since then, private sector initiatives and broader government agendas have increasingly aligned around 'deep' decarbonisation. Ahead of COP 26 in 2021, the predominant language used by businesses and many governments to describe this was 'Net Zero by 2050.'

However, the language of decarbonisation has been changing, and increasingly emphasises the need to act to avoid temperatures rising more than '1.5 [degrees]' (above pre-industrial temperatures), the temperature goal included in the Paris Agreement.

Are these the same things? What does avoiding temperatures rising more than '1.5' really mean? And what tools can be used to manage this situation?



Why does the target keep moving?

Setting aside the relationship between 'Net Zero' and '1.5', emphasis on the latter is relatively new in many industries, including shipping. There are two explanations for how the temperature target shifted, first from 2 degrees (pre-2015) to "well below 2, pursuing efforts for 1.5" (Paris Agreement, 2015) and now, increasingly, to "1.5."

- Politicians move as fast as electorates allow. They have found it easier to start with a more distant transition, and as evidence supporting the viability of decarbonisation increases, along with evidence showing the tragic impacts of climate change, they have increased ambition
- Evidence of impacts on the most vulnerable have increased, and their voices are increasingly being heard. Much international political leadership on climate, including at Paris, has come from the most vulnerable to climate change. The 50+ club of countries at the lowest income levels and highest susceptibility to climate impacts were an effective force behind the Paris Agreement, and have continued to build profile ever since. For these countries 1.5 is a guardrail against an existential threat. Unlike in many developed economies where climate change is perceived as a cost or even an opportunity.

Where is the IMO? Where might it go?

In the run up to the 2018 adoption of IMO's initial strategy, governments and non-government organisations made various pitches for what was necessary and what was feasible. These played out in the classical spirit of compromise so that the numbers agreed (at least 40% carbon intensity reduction by 2030, at least 50% GHG reduction by 2050) were not derived from the climate science but from what was politically feasible at the time.

The IMO's concessions to those member states existentially threatened by global temperatures exceeding 1.5 were small:

- The carbon intensity and GHG reductions were expressed as "at least" implying that they should set the floor rather than the ceiling of what should be achieved
- The level of ambition included a verbal nod to the cumulative emissions objective: "whilst pursuing efforts towards phasing [GHG] out ... as a point on a pathway of CO2 emissions reduction consistent with the Paris Agreement temperature goals"

The release of the IMO Initial Strategy (April 2018) was on the cusp of the organization receiving the IPCC's special report "Global warming of 1.5 Degrees Celsius," and as such many countries deemed it inadmissible as evidence during IMO negotiations. In 2023, the IMO will no longer be able to ignore the IPCC's special report, nor the more recent IPCC AR6 - detailing in much greater specificity the impacts of temperature rises, as well as the mitigation response needed to avoid temperatures exceeding 1.5. The interim period has seen a large number of governments increase their ambition (as expressed in nationally determined contributions - NDCs), and leaders express the



need to align shipping to a 1.5 pathway and reach zero GHG emissions no later than 2050¹:

So far, IMO discussion on what numbers to use in the revision of its GHG strategy have -unsurprisingly - not been conclusive. This debate will likely continue until the MEPC 80 meeting in July 2023. It is impossible to see where compromise and consensus will land until that debate; notably the warm-up discussions saw majorities (of member states) supporting a significant strengthening of the ambition as currently expressed.

- At MEPC 77, in 2021, led by Kiribati, Marshall Islands and Solomon Islands, 14 countries including US and UK supported a resolution that committed IMO to revise its ambition from 50% reduction to achieve zero GHG emissions from international shipping no later than 2050
- The majority of countries speaking on the matter supported the objective of reaching zero or net zero GHG emissions no later than 2050 (many countries thought that this was a decision that should be finalised in 2023 and so could not support the resolution)²

This political landscape of consensus-building and ratcheting-up (raising over time) of ambition is fundamentally unhelpful for a sector with long-life assets which need to be designed and built for decades of operation. The challenge for the sector is therefore not to get seduced into thinking any IMO agreed ambition is permanent or definitive, but to plan for it to increase ambition over time. As long as there is compromise or misalignment with IPCC advice to policymakers, there will be a ratchet. Taking guidance from the 'floor' of the debate (e.g. current IMO targets) is a gamble, as long as the 'ceiling' of the debate is set by IPCC.

Net Zero 2050 and 1.5 alignment

There are two reasons that a potential target of net zero by 2050 should not be seen as equivalent with a 1.5 degree-aligned target.

- Net zero by 2050 expresses nothing of the pathway between now and 2050. It implies significant reductions between now and then, but the 'shape' of the CO₂ pathway is not defined. Temperature rise is proportional to the cumulative emissions e.g. the sum of anthropogenic emissions occurring between pre-industrial ages and the points at which they reach net zero. The IPCC investigates myriad pathways and models on behalf of UNFCCC, and from these the expression for 1.5-alignment used in its advice to policymakers estimated pathways of

¹ *The UN secretary general and US President Biden have both been explicit about shipping needing to decarbonise in line with the 1.5 temperature goal. The G7 has also expressed in their communique in 2022, the importance of shipping reaching zero GHG emissions no later than 2050.*

² **Shaw A. Smith T.W.P. and Rojon I. (2021) Outcomes and implications of MEPC 77, expanded analysis**



CO₂ reduction³ that became more commonly referred to as “approximately halving of GHG emissions by 2030, net zero by 2050”. Only pathways that achieve that – or an equivalent amount of cumulative emissions between now and 2050 – are 1.5-aligned in the eyes of UNFCCC/IPCC.

- Net zero, in international climate policy, is an application of the concept under which any country can reduce emissions both by reducing emissions from things that put GHG in the atmosphere (sources) and by increasing deployment of things that ‘suck’ GHG out of the atmosphere (sinks). Generating power from biomass and burying captured CO₂ underground is a sink; planting more trees (afforestation) is a sink. These are options that make sense for countries and the companies they regulate, who can access land on which they can grow biomass and under which they can store CO₂. Shipping as a sector does not have sinks, only sources. Thus it is not clear how the ‘net’ in ‘net zero’ can be applied to international shipping. At a sectoral level it must imply the option to offset – to purchase credits of negative emissions from countries to counter ongoing positive emissions from ships.

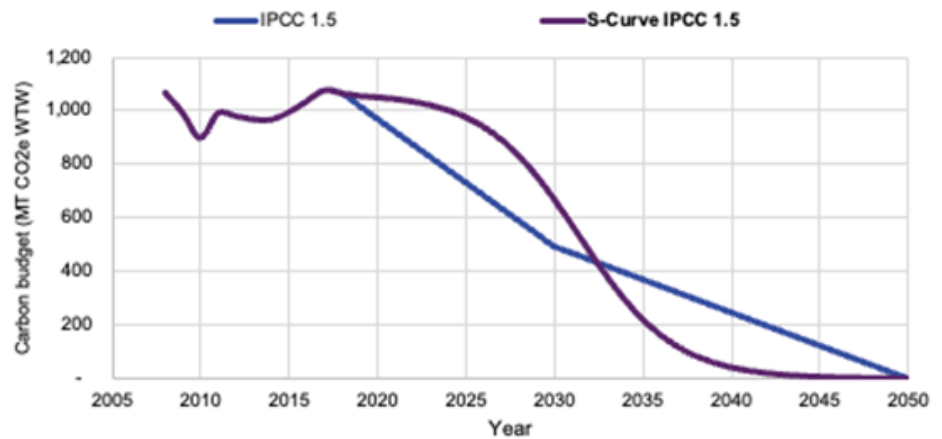
What this means is that in practice, the year emissions go to zero is not necessarily the critical year. There may well be a long tail of emissions that take a while to reach zero on a well-to-wake basis. A more important point on the GHG reduction curve is the point by which a large majority of the GHG reductions will need to have taken place if cumulative emissions are to be 1.5-aligned.

The specifics vary depending on how early the reductions start in practice, but with time advancing and carbon budget diminishing, the only option lefts is a very steep reduction in the 2030-40 period – 80% GHG reduction by 2040 (if substantial reductions are achieved by 2030) or 90%+ GHG reduction by 2040.

If this logic, as is likely, plays out through the political process of ratcheting ambition, and if richer economies are to take more of the burden and spare some budget for those in lower income countries, the implications for shipping companies can roughly be derived: companies operating on trade routes servicing developed economies may be expected to reach zero on a well-to-wake basis by 2040. The pathways of GHG reduction required for 1.5-alignment across all sectors and all of global shipping would not be far behind.

3 IPCC AR6 “Climate Change 2022: Mitigation of Climate Change”, para C.1.2: “...In pathways that limit warming to 1.5C (>50%) with no or limited overshoot global net CO₂ emissions are reduced compared to modelled 2019 emissions by 48% [36-69%] in 2030 and 80% [61-109%] in 2040...”

Figure 1. Maritime sector Well-to-Wake (WTW) emission pathways IPCC 1.5DS, IPCC 1.5DS Logistic.



What about biofuels and CCS? Does 1.5 rule out certain 'net zero' decarbonisation solutions?

Several options for decarbonising shipping have 'negative' upstream emissions that cancel out at least some of the GHG emissions that occur at the point of combustion. Growing biomass absorbs CO₂ from the atmosphere, which is released when it is used as a fuel. Several words are often used to express this - carbon neutral etc. Carbon capture and storage, whether on land or on a ship, follows a similar logic, though its 'neutrality' relies on verification and crediting of the subsequent sequestration of the captured GHG emissions.

The performance of all of these options can be more precisely expressed as "zero/low GHG on a well-to-wake basis" than net zero, because this also defines the system boundary of the accountancy - everything from the point of extraction/production, through transport, distribution, storage and onboard use. This definition clearly excludes the use of offsets. It also recognises that there are many options that whilst not zero, can enable material reductions. In practice, most biofuels produced at this point in time are not zero on a well-to-wake basis because of losses and energy used in their supply chains. However, they can be fairly credited for the reduction they achieve by applying well-to-wake accountancy/guidelines.

The development of LCA guidelines is an ongoing task of the IMO's MEPC - the LCA guidelines that will help clarify how different feedstocks, fuels and machinery options (including CCS used on land and onboard) will be evaluated for their GHG reductions (and some default values) are due for publication at MEPC 80 in July 2023.

Shipping is 'hard to abate' and crucial to world trade, shouldn't it get a larger share of the pie?

Much resistance to limiting shipping's emissions ahead of the IMO's Initial GHG Strategy was derived from statements about how crucial shipping is to world trade. It also pointed to the absence of solutions.

On a technical basis, the latter objection has all but been removed - the primary technology questions are how to minimise the cost of eliminating GHG emissions, and how to maximise safety during the transition.

Whilst the criticality of shipping to economic development and modern day standards of living is not disputed, this logic is not easily applied to every segment of IMO-regulated shipping (is cruise shipping, or even container shipping of high value goods to high-income economies, crucial in the same way as grain shipments?).

On the other hand, avoiding dangerous climate change is a zero-sum game – if shipping has a bigger share of the pie (the remaining GHG emissions before we exceed 1.5), then other sectors or countries need to take a smaller share of the pie. A sectoral beauty contest to determine which sectors provide most ‘benefit to society’ is difficult to constructively resolve. How does shipping rate in comparison to heating and cooling? Chemicals? Concrete and glass? Agriculture?

In such a debate shipping also faces a political disadvantage: Could politicians realistically be expected to come to the defence of an international sector that pays negligible rates of tax, and ask more of their domestic (tax-paying) emitters? At least in the UK, as shown in Figure 2, shipping is not considered a hard to abate sector but a sector expected to do a proportionate share of the total reduction, to achieve the whole economy net zero objective.

Figure 5 Sectoral emissions under the Balanced Net Zero Pathway

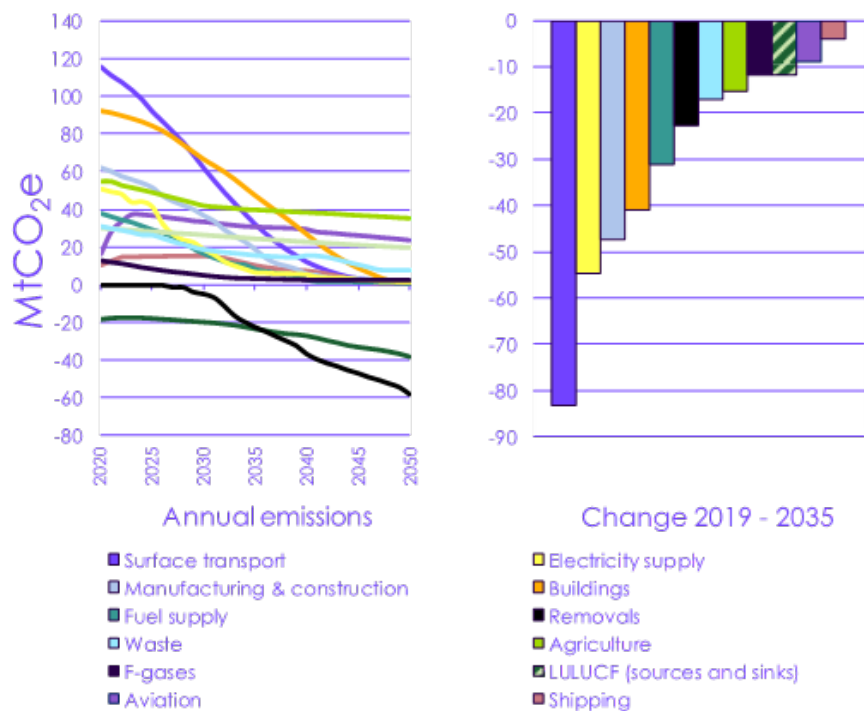


Figure 2. Emission reductions across sectors as assessed for the UK in its Sixth Carbon Budget.⁴ Shipping (including domestic and international shipping) is expected to reach zero by 2050

Source: CCC analysis.
Notes: LULUCF = Land use, land-use change and forestry

The IPCC’s simple answer, when using at multi-sector modelling to achieve 1.5 degrees, is that all sectors need to move urgently with deep reductions now. Given that essentially all sectors are behind in their reductions, it is hard to argue there will be future ‘spare’ budget

for offsetting, or allowing any sector with potential to reach zero emissions a delay or a larger than proportionate share of the pie.

Considering risks in the industry's response

A natural response to an evolving political expectations and requirements from the IMO is to shelter in ambiguity – to adopt language and commitments that convey high levels of ambition but leave room to manoeuvre in practice.

There are downsides that can arise from such a strategy:

- This will prolong and possibly widen the gap between the IMO 'floor' and the IPCC 'ceiling.' Political positions, especially in the IMO, are influenced by language and commitment in industry. If leading industry stakeholders are ambiguous about their support for the IPCC ceiling, there is less pressure on political negotiations, and less evidence of support that progressive countries can leverage.
- Ambiguity in commitments – even when well-intentioned – can create a slippery slope towards accusations of greenwashing, leaving companies in the worst of both worlds (bad publicity and constraints on operation).
- Allegations of double standards, where companies are seen to be profiting from the upside of the transition while also hindering it through other activities, can be even more damaging. Very tangible risks such as action from activist shareholders and/or climate litigation have already become a part of the risk landscape and may become more common as scrutiny increases.

"Realism," "viability," and self-fulfilling prophecies

Achieving a 1.5-aligned transition in shipping is certainly challenging. The implied rate of change demands that early adopters have some confidence that the wider transition will materialise at a speed that does not leave them exposed. It requires risk management for investment decisions taken in good faith, but whilst technology pathways are still clarifying.

Beyond what it asks of individual organisations, the sector as a whole will need to rapidly reskill its workforce. Beyond shipping, other sectors will need to do their part to meet demand for new energy sources in shipping.

These are changes with long lead times, that require starting now, in the early 2020's, if the adoption of solutions can happen in time. As an example, shipping's transition implies a rate of growth in fuel production based on clean hydrogen of 9% per year, starting from 2022. However a rate of growth of almost twice that (17%) if starting from 2030. A rapid deployment of new vessels, an intense programme of retrofitting, and even some early retirements and scrapping of vessels are likely to be part of the journey.

These challenges invite the counterargument that a 1.5-aligned transition is not ‘realistic,’ and that regulatory certainty on costs and specific timelines is a pre-requisite for action. Such an argument may prove to be a self-fulfilling prophecy: as the timelines for technology deployment slips, the window for 1.5-degree alignment via technology transition closes. The result may drive a wedge between shipping and its stakeholders – financiers and customers can pivot comparatively quickly if required, and policymakers (including national governments) may take more disruptive approaches to reducing shipping’s emissions.

Rigorous foresight of what is and is not realistic in a transition is hard to obtain. The nature of transition is that it is a process involving diffusion of new ideas and rapid innovation. At this point, we can have an idea of what it could look like, but innovation regularly creates breakthroughs in technology, operations, business models and policy design that mean estimated rates of change happen faster than expected. The classical illustration of this phenomenon is the consistent underestimation of renewable energy such as solar and wind and batteries, both in terms of cost reduction and scale/performance increase. Organisations such as IEA, throughout the early 2000’s, consistently expected lower per annum growth rates than real capacity revealed when examined in retrospect.⁵

A new era of scrutiny around 1.5, regardless of what happens next at the IMO

The tools to manage these risks have been in existence for some time. Clearly aligning corporate strategy to the science of IPCC and using the wealth of data and analysis in widely available IPCC reports is an obvious first step. These reports have retained a consistent message, albeit with increasing attention to the risks present above 1.5 degrees of warming as these have become more stark. They are written in scientific detail, but all come with “advice to policymaker” executive summaries that are more accessible.

Some organisations have asked civil society to help them with assurance that a guide or strategy is 1.5-aligned. Examples of this include the Climate Bond Initiative, which has been an early adopter of requiring 1.5-alignment as a minimum threshold to achieve accreditation, whilst many other similar initiatives continued to legitimise less ambitious thresholds.

However, the wide circulation of corporate commitments that did not evidence their alignment to the Paris Agreement’s temperature goals, especially since COP 26, has attracted attention at the highest levels of the UN. This led to the commissioning of a high-level expert group brought together to review current commitments by businesses, financial institutions, cities and regions, and produce guidance for how they could be more standardised and more specific. The report

5 **Figure 1: Growth in PV capacity and scenario projections. The underestimated potential of solar energy to mitigate climate change, Nature Energy**



out⁶ to COP 27 from this expert group contains specific and explicit requirements that are a minimum for any pledge/commitment avoiding being labelled as greenwashing including:

- Public disclosure of a pledge/target generated using a robust methodology consistent with limiting warming to 1.5C, verified by a third party (recommending SBTi, PCAF, PACTA, TPI, ISO as third parties)
- Include a sequence of 5-yearly targets (net zero 2050 is not good enough)
- Include all GHG emissions, include separate targets for material non-CO2 GHG (e.g. methane)
- Include full value chain and activities (inc. scope 1/2/3)

This outcome provides direct justification for demands from analysts for clarification and transparency on any company's progress in GHG emission reductions. Importantly, the inclusion of all scopes (e.g. not just the direct emissions of a company, but those from its supply chains), mean that customers of shipping will be under even more pressure to find reductions from the sector that can ensure their overall ability to authoritatively claim alignment with the Paris Agreement.

Of the third parties explicitly endorsed by the UN's High Level Expert Group, one of the better known is the Science Based Target Initiative (SBTi), which publishes sector-specific guidance. Its recently published method and tools for "Science Based Target Setting for the Maritime Transport Sector"⁷ presents approaches that both operators and customers of shipping can use to ensure alignment with 1.5.

6 Integrity Matters: Net Zero Commitments by Businesses, Financial Institutions, Cities and Regions, UN; Science Based Target Setting for the Maritime Transport Sector, Science Based Targets

7 Science Based Target Setting for the Maritime Transport Sector, Science Based Targets