

MARINE ENVIRONMENT PROTECTION
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REDUCTION OF GHG EMISSIONS FROM SHIPS

Climate science, cascading tipping points, the Initial IMO GHG Strategy, and urgent action on shipping to reduce climate risks

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SUMMARY

Executive summary: This document outlines recent scientific evidence on the risks of triggering cascading climate tipping points from climate heating and makes recommendations for urgent near-term actions that will contribute to limiting global heating to below 1.5°C to mitigate these risks.

Strategic direction, if applicable: 3

Output: 3.2

Action to be taken: Paragraph 18

Related documents: MEPC 75/7/15, MEPC 75/10/6, MEPC 78/7/18, MEPC 78/7/27,

Introduction

1 Our climate is changing. These changes are already affecting every inhabited region across the globe. The headline conclusions¹ from the first of three² Working Group reports contributing to the United Nations' Intergovernmental Panel on Climate Change's (IPCC) 6th Assessment Synthesis Report (due to be published in 2023) carry a clear message:

"Human-caused climate change is unequivocal, its size and rate is unprecedented, and It's already causing weather and climate extremes across every inhabited region."

2 The Physical Science Basis report, which pulls together the findings from more than 14,000 peer-reviewed studies, indicates that the Paris Agreement limits of 1.5°C and 2°C will be passed in the 2030s and 2050s if emissions don't immediately peak and rapidly decline over the next few decades. It warns that global heating exceeding 1.5°C could be reached in the early 2030s and multiple climate tipping points could be triggered by further warming.

¹ <https://www.ipcc.ch/report/ar6/wg1/resources/spm-headline-statements/>

² <https://www.ipcc.ch/report/ar6/wg1/>

3 The second of the 6th Assessment Working Group Reports³ addressing the climate change impact, adaptation and vulnerability (see document MEPC 78/7/18 (WWF et al.)), draws attention to a cascading web of local, regional and global impacts within and beyond polar regions. Rapid warming and extreme temperatures in the Arctic are leading to unprecedented seasonal ice loss, permafrost thaw and increasing ocean temperatures. There is high confidence that increased weather and climate extreme events are exposing Arctic communities to acute food insecurity and that the Arctic is a global hotspot of high human vulnerability. The events however also impact the rest of the world since the Arctic serves as a regulator of global climate and other ecological processes. There is high confidence that these processes are nearing points beyond which rapid and irreversible changes (on the scale of multiple human generations) are possible. The cascading changes likely over the next two centuries include regional warming and temperature extremes, permafrost thaw, and sea ice loss beyond that experienced in human existence.

4 There is very high confidence that under all climate and socio-economic scenarios low-lying cities and settlements, small islands, Arctic communities, remote Indigenous communities and deltaic communities will face severe disruption by 2100, and as early as 2050 in many cases. Indeed, a delegation who spoke during the opening of MEPC 76 (see MEPC 76 Audio, 10 June 2021 at 11.32.49), recently bore witness to the devastating impact of a storm which ravaged Bering Sea communities over several days and destroyed hundreds of family homes and camps in the Alaskan Arctic.

5 The third of the 6th Assessment Reports⁴ addressing the mitigation of climate change, was published in April this year (see MEPC 78/7/27), alongside words of warning from the UN Secretary-General Antonio Guterres⁵, which we repeat here:

"We are on a fast track to climate disaster. Major cities under water. Unprecedented heatwaves. Terrifying storms. Widespread water shortages. The extinction of a million species of plants and animals. This is not fiction or exaggeration. It is what science tells us will result from our current energy policies.

We are on a pathway to global warming of more than double the 1.5°C limit agreed in Paris. Some Government and business leaders are saying one thing, but doing another. Simply put, they are lying. And the results will be catastrophic. This is a climate emergency.

Climate scientists warn that we are already perilously close to tipping points that could lead to cascading and irreversible climate impacts. But, high-emitting Governments and corporations are not just turning a blind eye, they are adding fuel to the flames."

Tipping points

6 These IPCC reports and the UN Secretary-General refer to "tipping points". A tipping point refers to "a critical threshold at which a tiny perturbation can qualitatively alter the state or development of a system" whereby the system responds nonlinearly to a small change in forcing, significantly altering future states⁶.

3 www.ipcc.ch/report/sixth-assessment-report-working-group-ii

4 www.ipcc.ch/report/sixth-assessment-report-working-group-3/

5 <https://youtu.be/2E9LfkW27sg>

6 Lenton, T. M. et al. *Tipping elements in the Earth's climate system*. Proc. Natl Acad. Sci. USA 105, 1786–1793 (2008)

7 Climate tipping points are a source of growing scientific, policy, and public concern. Significant, policy-relevant impacts from triggered tipping points include substantial sea level rise from collapsing ice sheets, dieback of biodiversity rich biomes such as the Amazon rainforest or tropical corals, and carbon release from thawing permafrost. A recent UN report *United in Science*⁷ found that the world is heading into an 'uncharted territory of destruction' and there is a "significant likelihood" of "multiple tipping points being crossed if global heating crosses the 1.5°C threshold."⁸

8 The past seven years were the hottest on record⁹. The United Nations Environment Programme (UNEP), the Intergovernmental Panel on Climate Change (IPCC), the World Meteorological Organization (WMO), the United Nations Office for Disaster Risk Reduction (UNDRR), and the Global Carbon Project (GCP) predict that "there is a 48% chance that, "during at least one year in the next five years, annual mean temperatures will temporarily be 1.5°C higher than in 1850 -1990."

9 Potential early warning signals of the Greenland ice sheet, Atlantic Meridional Overturning Circulation, and Amazon rainforest destabilization have been detected. Recent work has suggested that up to 15 tipping elements are already active¹⁰.

Risks of triggering cascading tipping points

10 Current global warming of ~1.2°C above pre-industrial temperatures already lies within the lower end of some tipping point uncertainty ranges. Preliminary data for 2022¹¹ shows that global CO₂ emissions (January to May) are 1.2% above the levels recorded during the same period in 2019 (prior to the pandemic). The UNEP Emissions Gap Report (2020)¹² indicates that the world is still heading for a temperature rise in excess of 3°C this century – far beyond the Paris Agreement goals of limiting global warming to well below 2°C and pursuing a limit of 1.5°C.

11 There is strong scientific evidence of the need for urgent action to mitigate climate change. Even the Paris Agreement goal of limiting warming to well below 2°C and preferably 1.5°C is not safe, as 1.5°C and above risks crossing multiple tipping points, one of the most imminent being the collapse of the Greenland ice sheet. Ice loss from the Greenland ice sheet is currently one of the largest sources of sea-level rise (SLR). Recent estimates show SLR rise of ~27 cm with up to 78 cm if the heat of 2012 was permanently applied out of a total ~700 cm¹³ Crossing these tipping points can generate cascading feedback that increases the likelihood of crossing other tipping points¹⁴. Several tipping point elements and related feedbacks are proximal to the Arctic.

⁷ World Meteorological Organization (WMO), *United in Science 2022: A Multi-Organization High-Level Compilation of the Most Recent Science Related to Climate Change, Impacts and Responses (2022)*

https://public.wmo.int/en/resources/united_in_science

⁸ Armstrong McKay et. al., Exceeding 1.5°C Global Warming Could Trigger Multiple Climate Tipping Points, 377 *Science* 6611 (2022). <https://doi.org/10.1126/science.abn7950>

⁹ World Meteorological Organization (WMO), *United in Science 2022*

https://public.wmo.int/en/resources/united_in_science

¹⁰ <https://www.nature.com/articles/d41586-019-03595-0>

¹¹ World Meteorological Organization (WMO), *United in Science 2022*

https://public.wmo.int/en/resources/united_in_science

¹² <https://www.unep.org/emissions-gap-report-2020>

¹³ <https://www.nature.com/articles/s41558-022-01441-2>

¹⁴ <https://esd.copernicus.org/articles/12/601/2021/>

Vulnerability of maritime infrastructure, ports, coastal communities, and climate vulnerable countries

12 By 2050, over a billion people will be at risk of coast-specific climate hazards, along with USD7 to USD14 trillion of coastal infrastructure assets by 2100¹⁵.

13 The maritime industry is particularly vulnerable to the changes that would be triggered by the major tipping points identified. The IPCC Sixth Assessment Report found that the maritime industry, global supply chains, and the infrastructure upon which they depend are particularly vulnerable to climate shocks, extreme weather, sea level rise and environmental disruption brought on by climate heating.

14 For the poor and vulnerable nations around the globe climate catastrophe is already a permanent reality. The interaction of accelerating sea level rise and storms, combined with confining development and infrastructure, will place greater stresses on physical, ecological, and human systems along the ocean-land margin¹⁶. Economic losses are increasing as these effects of climate heating worsen, with climate vulnerable countries who are doing the least to cause the climate crisis, paying the highest price.

15 Small Island States, Least Developed Countries, and Indigenous communities such as those in the Arctic, are facing unprecedented challenges brought on by the climate emergency, which are not of their doing. The world's richest 10% are collectively responsible for 52% of global carbon emissions¹⁷. Mechanisms to implement the UN Declaration on the Rights of Indigenous People (UNDRIP), to account for devastating disproportionate climate impacts, and to support the economies of vulnerable communities must be agreed and implemented without delay, this is particularly true at the IMO. Existing inequalities remain unaddressed in the environmental regulation of the shipping industry, and these cannot persist in the race to lower emissions and implement zero carbon pathways¹⁸. With increasingly severe weather events, and scientific and indigenous knowledge pointing to catastrophic global climate tipping points, an equitable and just transition framework is imperative.

Cost of inaction

16 Deloitte research reveals inaction on climate change could cost the world's economy USD178 trillion by 2070¹⁹, while a report titled "The Costs of Climate Inaction for Ports and Shipping" finds that climate-related disasters could cost the shipping industry up to USD25bn every year by the end of the century²⁰. Document ISWG-GHG 6/2/1 (Denmark) notes that the costs of inaction outweigh the costs of climate action. The economic benefits of climate action are greater as concluded in *The Climate Economy Report (2018)*²¹ which states that "bold action could yield a direct economic gain of \$26 trillion through to 2030 compared with business-as-usual. And this is likely to be a conservative estimate."

15 www.ipcc.ch/report/sixth-assessment-report-working-group-ii

16 <https://www.nature.com/articles/s41598-021-94942-7>

17 <https://www.oxfam.org/en/research/confronting-carbon-inequality>

18 [https://www.google.com/url?q=https://unctad.org/news/why-should-we-talk-about-just-and-equitable-transition-](https://www.google.com/url?q=https://unctad.org/news/why-should-we-talk-about-just-and-equitable-transition-shipping&sa=D&source=docs&ust=1664881884018399&usq=AOvVaw0dzoMHQN3PIiLrOfCjFY7q)

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<https://www2.deloitte.com/global/turningpoint.html>

19 <https://www.edf.org/sites/default/files/press-releases/RTI->

20 [EDF%20Act%20Now%20or%20Pay%20Later%20Climate%20Impact%20Shipping.pdf](https://www.edf.org/sites/default/files/press-releases/RTI-EDF%20Act%20Now%20or%20Pay%20Later%20Climate%20Impact%20Shipping.pdf)

21 <https://newclimateeconomy.report/2018/executive-summary/>

Revision of the IMO GHG Strategy

17 The words of the UN Secretary-General's (paragraph 5) should underpin the need for IMO and all of its Member States to take decisive and transformative climate action. To this end, the co-sponsors urge the Organization and its Members to agree as a matter of urgency to:

- .1 bring the levels of ambition in the Initial GHG Strategy unambiguously into line with the Paris Agreement's goal of keeping warming below 1.5 degrees, including a target of halving ship climate impacts by 2030 and full decarbonization of shipping well before 2050;
- .2 make deep cuts to Black Carbon (BC) emissions from shipping in and near the Arctic, e.g., via an immediate mandatory switch to distillates, urgently develop mandatory targets and measures to reduce Black Carbon emissions from international shipping; and include BC in CO₂e metrics;
- .3 raise the level of ambition in the recently agreed Carbon Intensity Indicator (CII) to 6 to 7% annum to ensure a 1.5°C-compatible improvement in the carbon intensity of ships;
- .4 ensure that climate vulnerable nations and Indigenous communities are fully involved and enabled to participate in all aspects of the shipping industry's just and equitable green transition; and
- .5 enhance collaboration between UN agencies and between UN and other national and international agencies (polycentric governance²²) to speed up climate action and make it more effective.

Action requested of the Committee

18 The Committee is invited to note paragraphs 1 to 16, to support the actions laid in paragraph 17 to effectively and rapidly reduce climate impact from international shipping, and to take action as appropriate.

²² Polycentricity, a governance system in which multiple governing bodies interact to make and enforce rules within a specific policy arena or location, is considered to be one of the best ways to achieve collective action in the face of disturbance change. IPCC_AR6_WGIII (2022) highlights the need for multi-level and polycentric governance and the need to increase the range of societal actors that are engaged. https://www.ipcc.ch/report/ar6/wg3/downloads/report/IPCC_AR6_WGIII_Chapter_14.pdf