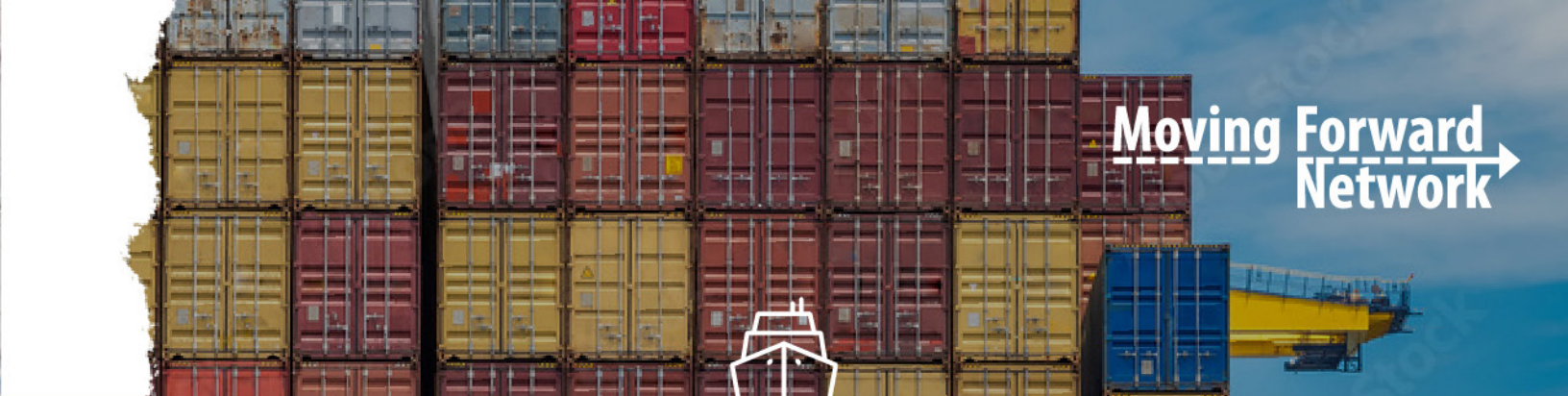




**Moving Forward
Network** →



MOVING FORWARD NETWORK
AND
**INTERNATIONAL
SHIPPING**



PRODUCED IN ASSOCIATION WITH

 **Opportunity
Green**



Moving Forward Network

The **Moving Forward Network** is a national network of over 50 member organizations that centers grassroots, frontline-community knowledge, expertise and engagement from communities across the US that bear the negative impacts of the global freight transportation system. MFN builds partnerships between these community leaders, academia, labor, big green organizations and others to protect communities from the impacts of freight. Its diverse membership facilitates an integrated and geographically dispersed advocacy strategy that incorporates organizing, communications, research, legal and technical assistance, leadership development and movement building. This strategy respects multiple forms of expertise and builds collective power. For further information, visit movingforwardnetwork.com



NOTE ABOUT THE LANGUAGE USED:

We acknowledge that the usage of language changes from community to community across the globe. There are a variety of ways to define and identify communities who live at the frontline and/or fenceline and suffer from disinvestment, are climate vulnerable, bear a legacy of systemic racism, have been disenfranchised from decision-making, and/or are subject to a variety of disproportionate environmental burdens.¹

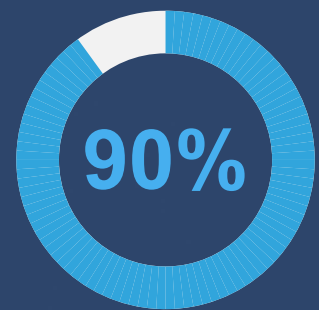
The use of the term 'environmental justice community' or 'overburdened community' suggests that the socio-demographic characteristics of that community represent mostly Black, Brown, Of Color, Indigenous and/or low wealth that bear the disproportionate impacts of climate change and public health impacts couples with ineffective governmental policy leading to the degradation of marginalized neighborhoods and communities.

WHY IS INTERNATIONAL SHIPPING RELEVANT TO THE WORK OF THE MOVING FORWARD NETWORK?

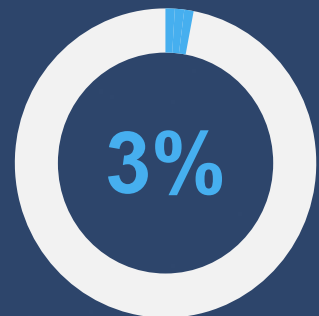
Around 90% of goods are transported by sea, making international shipping the backbone of the global freight transportation system.² However, international shipping is also a highly polluting sector, which can seriously impact human health and the marine environment. Certain communities, for example port and coastal communities, are disproportionately impacted.

INTERNATIONAL SHIPPING IS A POLLUTING SECTOR

Emissions from shipping include black carbon (BC), particulate matter or particles (PM), and greenhouse gasses (GHGs), which have negative implications for both human health and our climate. GHGs are the atmospheric gasses responsible for causing global warming and climate change. Maritime shipping is responsible for about 3% of all GHG emissions worldwide every year.³ The main GHGs emissions from shipping are CO₂, methane, nitrogen oxide (NO_x), sulfur oxide (SO_x), methane (CH₄).⁴ In addition, the sector contributes significantly to ocean noise pollution, and pollution discharges at sea and in delicate marine ecosystems, all of which have serious impacts on the marine environment.



AROUND 90%
OF GOODS ARE
TRANSPORTED BY SEA



APPROXIMATELY 3% OF
WORLDWIDE GREENHOUSE
GAS EMISSIONS ARE DUE
TO MARITIME SHIPPING



The quantity of emissions and their impacts vary according to the status of the vessel, including vessel type, size and mode of operation (i.e., transiting, maneuvering, at berth or at anchorage). Ocean-Going Vessels (OGVs) use their main engines for propulsion, with the majority of activity from these engines occurring in transit between ports and marine terminals. Main engines are responsible for the majority of OGVs' total emissions. OGVs also use auxiliary engines to provide power, and auxiliary boilers to heat fuel and water and maintain other necessary functions.⁵ These latter systems (auxiliary engines and boilers) usually run throughout a vessel's stay at port, and are responsible for essentially all emissions at berth. Emissions from auxiliary engine use at berth have substantial implications for portside communities.⁶

The average time spent at berth during a port visit varies by port, vessel type and vessel size.⁷ However, recent years have seen increased congestion at ports globally,⁸ with an abnormally high number of container vessels at anchor. The resulting increase in emissions from auxiliary engine usage at berth has negatively impacted air quality in ports and for the surrounding communities, for example in California's port communities.⁹





Many ports are located in urban areas and are often close to low-income, environmental justice neighborhoods. Research also shows clear racial disparities in the health effects of air pollution in port areas in the U.S.

OVERBURDENED POPULATION GROUPS ARE MOST SERIOUSLY IMPACTED

The impacts of emissions' pollution from international shipping are often unevenly distributed amongst population groups. Coastal communities and, in particular, port communities, are the front-line communities usually most impacted by the sector's emissions. Decades of racist zoning policies have practically ensured that polluting facilities are located in low-income communities and communities of color, creating an environmental justice disaster. Not only this, but it is commonplace for multiple polluting facilities to be concentrated in these communities. If there is a nearby port, there is more likely to be a nearby railyard, freeways, warehouses, or refineries—or all of the above. In 2007, ICF International conducted a study for EPA looking at the demographic composition of those living near U.S. ports and rail yards.¹⁰ The study found that of households and populations living near U.S. ports and rail yards in 2000, a greater proportion of people earned lower incomes (less than \$10,000 and \$10,000-\$29,999) and a larger proportion were people of color as compared to the nation as a whole.

People who bear the brunt of the negative effects of one polluting facility are much more likely to suffer the consequences of multiple cumulative impacts. In particular, low-income households and people of color living or working in or near port areas are significantly impacted. For example, in the U.S., many ports are located in urban areas and are often close to low-income, environmental justice neighborhoods.¹¹ Research also shows clear racial disparities in the health effects of air pollution in port areas in the U.S..¹² Addressing these cumulative impacts is key to intersectional and inclusive environmental justice.



EMISSIONS FROM INTERNATIONAL SHIPPING NEGATIVELY IMPACT HUMAN HEALTH

Maritime freight sector emissions have a devastating public health impact. There is a substantial amount of evidence on the wide range of human health impacts of air pollution, which include respiratory, cardiovascular, and metabolic diseases, stroke, lung cancer, impaired fertility outcomes, preterm birth, reduced birth weight and premature mortality.¹³ Particulate Matter, more specifically, is linked to heart attacks, strokes, and asthma, causes cancer, exacerbates obesity and diabetes, and contributes to cognitive challenges, including Alzheimer's, dementia, and mental health disorders.¹⁴ One study suggested that, based on data from 43 ports and 2000 Census figures, over 4 million people in the U.S. are exposed to port-related diesel PM concentrations that exceed a 100-per-million carcinogenic health risk if the exposure concentration was maintained for 70 years.¹⁵





In the U.S., the health of low-income, environmental justice communities who live in close proximity to many of the largest ports (e.g. Los Angeles and New York) is disproportionately impacted by the emissions associated with shipping, with clear racialized disparities. For Black residents within 25 miles of a major port facility, a 2021 study found that one additional average-tonnage vessel in a port over a year results in an additional 2,400 respiratory hospital visits, 510 heart-related visits, and 130 psychiatric visits (per million residents in a year in California). For white residents, the additional vessel in port results in 520 respiratory hospital visits, 280 heart-related visits, and 230 psychiatric visits (per million residents in a year). While negative health impacts are clear in both cases, these figures indicate that Black residents experience around three times the additional hospital visits.¹⁶

Globally, 'shipping-sourced emissions' were projected to account for around 265,000 premature deaths in 2020 (accounting for ~0.5% of global mortality).¹⁷ Similarly to the U.S. context, global populations closest to ports and high traffic shipping routes are burdened with the highest air pollution concentrations and, thus, the most significant health burdens. However, as most research on the health impacts of global shipping is concentrated in the European geographic region and on European populations,¹⁸ the majority of the world's population are inadequately represented in the current analysis.



WHAT IS THE INTERNATIONAL MARITIME ORGANIZATION AND WHY DOES IT MATTER TO THE WORK OF MFN?

Because international shipping is global by nature, it is regulated on the international level. The International Maritime Organization (IMO) is the United Nations specialized agency responsible for the safety and security of shipping and the prevention of marine and atmospheric pollution by ships.²¹ The IMO sets global standards for international shipping by creating universally applicable laws, regulations, and policy programs.



WHO MAKES THE DECISIONS AT THE IMO?

Representatives from member countries come together in various committees, subcommittees and working groups in order to make decisions at the IMO.¹⁹ There are currently 176 countries that are members of the IMO.²⁰ This makes the IMO a key forum through which countries can ensure that the shipping industry takes meaningful action on air pollution and other matters that have serious consequences for environmental justice communities worldwide.

IMO CURRENTLY HAS

176

MEMBER STATES

66

INTERGOVERNMENTAL
ORGANIZATIONS

85

INTERNATIONAL
NON-GOVERNMENTAL
ORGANIZATIONS

In addition to member countries, certain intergovernmental and non-governmental international organizations can actively contribute to the work of IMO, for example, by submitting documents in advance of meetings of the IMO body, attending meetings as ‘observers’, or by providing expert advice to countries. It is important to note that observers do not have voting rights at meetings of the IMO organs but may, on the invitation of the Chair and with the approval of the body concerned, speak on any item of the agenda of special interest to the non-governmental international organization.²² Therefore, the IMO can be a useful tool for civil society groups to engage with international decision-makers, although interested organizations must first be able to fulfill the eligibility requirements for consultative status.²³

WHAT HAS THE IMO DONE TO TACKLE THE CLIMATE IMPACTS OF INTERNATIONAL SHIPPING?



The IMO has already adopted a wide range of measures to prevent and control pollution caused by ships and to mitigate the effects of any damage that may occur as a result of shipping activities. Of particular importance in this area is the Marine Environment Protection Committee (MEPC), the IMO's senior technical body on marine pollution related matters. Its work has led to the adoption of measures addressing, inter alia, pollution from chemicals, garbage, sewage and air pollution, and GHG emissions from ships.²⁴

In July 2023, the MEPC adopted a revised strategy on the reduction of GHG emissions from international shipping, setting a net-zero GHG emissions reduction target for “close to 2050”; as well as indicative GHG emissions reduction checkpoints for 2030 (at least 20%, striving for 30%), and 2040 (at least 70%, striving for

80%).²⁵ Although setting a more ambitious emissions reductions pathway than ever before, the revised strategy has received criticism for its failure to align with the Paris Agreement goal to limit global warming to 1.5°C by the end of this century.²⁶

Going forward, the member countries of the IMO still need to assess, select and formally adopt the particular measures, including economic and technical measures, that will help the international shipping sector to achieve its emissions reductions goals.²⁷ All potential measures, and in particular their impacts on countries around the world, are currently being assessed by the United Nations Conference on Trade and Development (UNCTAD). This research will provide the basis for the finalization of measures by the MEPC in March 2024.

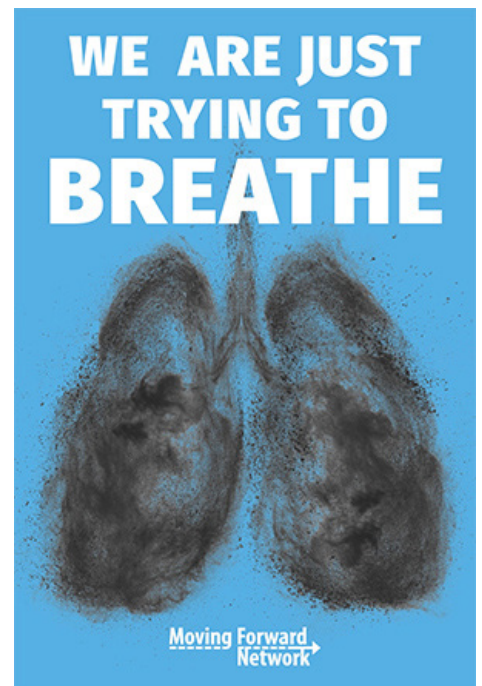




WHAT ARE MFN'S PRIORITIES IN SHIPPING?

ENSURING A ZERO-EMISSIONS FUTURE THAT PRIORITIZES FREIGHT IMPACTED COMMUNITIES

MFN launched a Zero Emission in Freight Campaign in 2021.²⁸ This campaign was the next phase in a decade's worth of organizing and advocacy confronting the public health and environmental impacts caused by the freight transportation system. As part of this campaign, MFN created a list of initial freight sector-specific demands, including marine vessels. On the international level, more ambitious regulations and advanced technological solutions that center around environmental justice are possible. These measures can help to ensure a healthy, sustainable, equitable, and just future for those most impacted by maritime freight emissions around the world.



PRIORITIZING ENVIRONMENTAL JUSTICE AND MARITIME FREIGHT IMPACTED COMMUNITIES IN GLOBAL DECISION-MAKING

While calling for a zero emissions freight future, MFN advocates for inclusive and effective rulemaking on global and local levels by facilitating information sharing; sharing advocacy tools; leading research; and convening movement building activities.²⁹ It is key that any decision-making process engages grassroots, frontline-community knowledge and expertise, prioritizing representativeness, and centering around the communities that disproportionately bear the negative impacts of the current global freight regime.

SUPPORT FOR CALIFORNIA'S AT BERTH REGULATION

California's original 'Ocean-Going Vessels At Berth Regulation' was adopted in December 2007, with compliance required from 2014. The U.S. EPA approved CARB's request for an updated (2020) At-Berth Regulation on October 20, 2023,³⁰ followed by a notification of enforcement from CARB on October 24, 2023.³¹ Beginning November 20, 2023, all regulated entities must comply with the requirements set forth in the 2020 At Berth Regulation. Since California can now enforce the regulation, states outside of California are able to advocate to pass the At Berth Rule for Ocean-Going Vessels. The goal of the Ocean-Going Vessels At Berth Regulation is to reduce diesel particulate matter (PM) and nitrogen oxides (NOx) from ocean-going vessels auxiliary engines while they are docked at California ports. The Rule requires ships to plug into shore power or otherwise reduce emissions while docked at port. The 2020 At-Berth Regulation fixed many critical flaws with the previous 2007 At-Berth regulation. Specifically, the 2020 At-Berth Rule applies to additional categories of ships – ro-ro vessels and tanker vessels – and establishes a 20-visit threshold for terminals, rather than a fleet-based threshold. As a result of these changes, the 2020 At-Berth Rule is projected to reduce NOx emissions by 6.9 tons per day and fine particulate matter, or PM2.5, emissions by 0.25 tons per day, respectively by 2025.³² It is estimated that the revised measures will avoid adverse health outcomes valued at \$2.32 billion, including reduced mortality, hospitalizations, and emergency room visits.³³



REGULATORY SLOW STEAMING

This is the reduction in the speed of the vessel. Slow steaming reduces all shipping air emissions.³⁴ The seminal study on slow steaming found that reducing ship speed by 10% would lead to a 13% reduction in ship emissions, even when accounting for the additional ships required to carry the same amount of goods under slow steaming scenarios.³⁵ Regulated slow steaming could be introduced at various levels, including global, regional or local with emissions reductions levels varying in accordance. In addition to the reduction in emissions, slow steaming also reduces whale strikes and ocean noise, which causes stress to marine life. There are a number of ‘Vessel Slow Down’ programs worldwide, including along North America’s western and eastern seaboard, in the Gulf of Panama and in Spain. However, participation in these programs is voluntary for the shipping companies involved, and the impact is unclear.

SUPPORTING AVAILABLE AND EMERGING AIR POLLUTION CONTROL TECHNOLOGIES AND ALTERNATIVE FUELS

There are a variety of established and emerging technologies that can immediately reduce air pollution from shipping. MFN will continue to monitor the effectiveness but, more importantly, the impacts of these technologies to address pollution from marine vessels.



Switching to low-sulfur fuel oil, using scrubbers (after-treatment devices which remove sulfur from the emissions of ships, but often create water pollution which is later dumped), and selective catalytic reduction technologies can reduce NOx emissions by up to 75%.



Increased shore power accessibility, allowing vessels to plug in while at dock and use the local electricity grid instead of their auxiliary engines.



Wind energy can be used in a number of ways on modern ships: soft sails, fixed wings, rotors, kites and conventional wind turbines. Estimates vary, however, a 2019 study showed reductions in emissions of almost 50% with the addition of wind technology to a ship.³⁶



Ship electrification, which is especially appropriate for smaller vessels operating locally, would also result in immediate emissions reductions. Although the bulk of emissions come from ocean-going vessels, direct electrification may be particularly useful for routes that are close to shore and often close to communities.

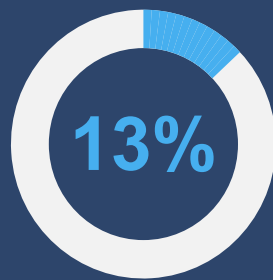
INTERNATIONAL SHIPPING IN THE U.S. CONTEXT

In the U.S., shipping, both domestic and international, generates a significant amount of localized pollution in environmental justice communities and for frontline workers while exacerbating the climate crisis across the country.³⁷ To achieve a just and equitable, zero emission future, serious changes are necessary at both global and domestic levels. As a key player on the international stage, the U.S. has a significant opportunity to lead on progressive and inclusive policies for a zero-emissions future in maritime freight.

WHY IS INTERNATIONAL SHIPPING IMPORTANT IN THE U.S. CONTEXT?

According to the U.S. Bureau of Transportation Statistics, maritime vessels accounted for 40% of U.S. international trade value, with trade of goods accounting for 18% of 2020 GDP.³⁸ This means that international shipping is a particularly important part of the U.S. economy.

However, based on international trade by mass, U.S. international shipping emissions of CO₂, methane and nitrogen oxide in 2018 totaled 143 million tons of carbon dioxide equivalent (MtCO₂ eq), or 13% of all global shipping emissions.³⁹ As noted above, international shipping emissions have serious domestic and global implications in the context of climate change, as well as impacts on human health and the marine environment.



U.S. INTERNATIONAL SHIPPING EMISSIONS TOOK 13% OF ALL GLOBAL SHIPPING EMISSIONS IN 2018.



WHAT ROLE DOES THE U.S. HAVE IN GLOBAL DECISION-MAKING?

The U.S. joined the IMO in 1950. It is highly active in discussions at the IMO and is consistently represented across the various IMO organs. The U.S. is regularly represented or otherwise involved in meetings and activities related to the environmental impacts of shipping at the IMO,⁴⁰ including:



**NAVIGATING
THE FUTURE:
SAFETY FIRST!**

- ➡ **The IMO Council:** The Council is the executive body of IMO and is responsible, under the Assembly, for supervising the work of the Organization. The U.S. was elected to the Council for the 2022-2023 Biennium as one of the 10 countries with the largest interest in providing international shipping services.⁴¹ The U.S. has submitted its candidature for re-election for 2024-2025.
- ➡ **Meetings of the Maritime Safety Committee (MSC).** The MSC deals with all matters of maritime safety and maritime security, for example the safety of lives at sea, transportation of dangerous goods, piracy or the training and certification of seafarers.⁴²
- ➡ **Meetings of the Marine Environment Protection Committee (MEPC)** and its intersessional Working Group on the reduction of GHG emissions in shipping (ISWG-GHG). The MEPC covers all topics related to the environmental impact of shipping. For example, the control and prevention of pollution from shipping, including oil, chemicals carried in bulk, sewage, garbage, air pollutants and greenhouse gas emissions.⁴³ The Committee and its sub-groups are also responsible for discussions and decisions related to ballast water management, anti-fouling systems, ship recycling, pollution preparedness and response, and identification of special areas and particularly sensitive sea areas.⁴⁴

EXAMPLES OF GLOBAL LEADERSHIP IN ZERO-EMISSIONS MARITIME FREIGHT

As a key player on the international stage, the U.S. has the opportunity to lead on environmentally progressive and inclusive maritime freight policies. Other members of the international community have taken ambitious steps towards a zero-emissions future in maritime freight. These technological and structural advances are pushing boundaries in ocean-going emissions reductions and efficiency, providing key examples for potential action by the U.S.

The Pacific Blue Shipping Partnership: Shipping plays a critical role in the Pacific Island countries, which are heavily dependent on shipping as a means to transport persons and goods. In 2019, the Governments of Fiji and the Marshall Islands, gaining support from the Solomon Islands, Tuvalu and Vanuatu launched a partnership to advance the just and equitable transition of the shipping sector in the Pacific Ocean.⁴⁵ The Pacific Blue Shipping Partnership (PBSP) intends to drive an ambitious, sustainable sectoral change in the region using country-led collective action and innovative financing. The PBSP is committed to full decarbonisation of the maritime transport sector by 2050, including a 40% reduction of greenhouse gas (GHG) emissions from shipping by 2030.⁴⁶ It has also sought to mobilize a blended finance package exceeding US\$500 million to complete its initial work programme (2020–2030).⁴⁷ According to the University of New South Wales (UNSW), a partner providing technical support to the project, the work plan prioritizes:

-  Large-scale infrastructure transformation including ferry upgrades and increased port/jetty access for underserved populations
-  Small-to-medium scale enterprise development, ensuring the private sector is well equipped to meet maritime transport needs
-  Capacity building, analysis, and Research & Development.⁴⁸

Norway leads the way with electric ferries: Norway has led the way on electric ferries since launching the world's first electric-powered passenger and car ferry, christened 'Ampere', in Sognefjord in 2015.⁴⁹ The electric ferry generates minimum sound and has a variety of energy efficiency prioritizing features onboard. Its hulls were constructed out of aluminum rather than steel to make the vessel lighter, it uses electric water heaters onboard, LED lighting, solar panels and a heating, ventilation and air conditioning (HVAC) system with a waste heat recovery system for low-energy consumption. When launched, it was estimated that Ampere would reduce diesel use by one million liters on an annual basis when compared to a fossil-fuel powered ferry on the same route, offsetting 570t CO₂ and 15t nitrogen oxide emissions.⁵⁰ By mid-2021, 60 of Norway's ferries (out of a total of around 200) were reported to be either electric or hybrid electric;⁵¹ and progress continues, with the world's largest electric ferry launching in Norway in 2023.⁵² While the electrification of ferries is only one small example, it makes a clear case that, under the right circumstances, energy transitions can however be politically accelerated.



Italy bans large vessels from Venice's city center: Large vessels, in particular cruise ships, have long contributed to air pollution and the physical deterioration of the historic city of Venice. In 2021, following UNESCO's threat to place the city on its endangered list,⁵³ the Italian government announced a 25,000 tonne limit on all vessels entering Venice's city center via the Giudecca canal, effectively banning all cruise ships and large freight vessels.⁵⁴ The ban entered into effect on 1 August 2021, helping Venice to lose its status as Europe's most cruise ship-polluted city in 2019, and drop to 41st place in environment NGO, Transport & Environment's 2023 ranking.⁵⁵

While the ban has resulted in a reduced concentration of vessels in the city center, a lack of appropriate infrastructure outside of the Venice Lagoon is problematic. Currently, the only appropriate port for large vessels to dock in the Venice region is in the industrial zone of Marghera. Although vessels by-pass the city center to reach Marghera, the port still sits within the Venice Lagoon, meaning large vessels still negatively impact Venice's delicate ecosystem. Additionally, Marghera is not suitable for use as a permanent passenger terminal for affected passenger vessels. While it was proposed as a temporary solution in 2021, authorities are yet to build a suitable docking terminal elsewhere.

The EU mandates on-shore power supply usage at ports: In July 2023, the European Council adopted the FuelEU maritime initiative as a key part of the EU's Fit for 55 package.⁵⁶ Its aim is to increase the demand for and consistent use of alternative fuels and reduce maritime GHG emissions. The legislation comprises several elements, including an obligation for passenger ships and container ships to use on-shore power supply for their electricity needs when docked in major EU ports, with a specific view to mitigating air pollution in ports, which are often close to densely populated areas. The obligation will come into effect as of 2030. However, even prior to its adoption, early response from industry and port authorities show that the legislation has renewed impetus in the drive towards installing shore power capabilities on ships and infrastructure at ports.⁵⁷

ENDNOTES

- 1 https://static1.squarespace.com/static/5d14dab43967cc000179f3d2/t/6492fff8f3f9ed1c7997e02d/1687355384264/Defining+Environmental+Justice+Communities+for+EJ+Policies_Final_June2021.pdf
- 2 IMO, 'Marine Environment'. Available at [Marine Environment \(imo.org\)](https://www.imo.org)
- 3 Fabel, J. et al. (2020) 'Fourth IMO Greenhouse Gas Study', International Maritime Organization.
- 4 U.S. Environmental Protection Agency (2011) Fact Sheet: 'Black Carbon Research and Future Strategies: Reducing emissions, improving human health and taking action on climate change'. Available at [Black Carbon Research and Future Strategies: Reducing emissions, improving human health, and taking action on climate change \(epa.gov\)](https://www.epa.gov/black-carbon-research-and-future-strategies-reducing-emissions-improving-human-health-and-taking-action-on-climate-change) last accessed 07 December 2023.
- 5 Engine illustration and emissions explanation available at: California Air Resources Board (2019) 'Update to Inventory for Ocean-Going Vessels At Berth: Appendix H 2019 Update to Inventory for Ocean-Going Vessels At Berth: Methodology and Results'. Available at [2019 Update to Inventory for Ocean-Going Vessels At Berth: Methodology and Results \(ca.gov\)](https://www.ca.gov) last accessed 07 December 2023.
- 6 California Air Resources Board (2021) 'Emission & Health Impacts from Vessels at Anchor: Quantifying emissions and health impacts of recent changes in container vessels at anchor near Ports of Los Angeles and Long Beach (SPBP) and the Port of Oakland (POAK)'. Available at: [Emissions Impact of Recent Congestion at California Ports June 23, 2021](https://www.ca.gov) last accessed 07 December 2023.
- 7 An overview of time spent at berth for OGVs attending Californian ports is available at: California Air Resources Board (2019) 'Update to Inventory for Ocean-Going Vessels At Berth: Appendix H 2019 Update to Inventory for Ocean-Going Vessels At Berth: Methodology and Results'. Available at [2019 Update to Inventory for Ocean-Going Vessels At Berth: Methodology and Results \(ca.gov\)](https://www.ca.gov)
- 8 Lerh, J. (2022) 'Global port congestion, high shipping rates to last into 2023 - execs'. (Reuters) Available at [Global port congestion, high shipping rates to last into 2023 - execs | Reuters](https://www.reuters.com) last accessed 07 December 2023.
- 9 For the case of San Pedro Bays Ports, information on port congestion impacts is available at: California Air Resources Board 'MSEI - Documentation - Port Congestion Impacts'. Available at [MSEI - Documentation - Port Congestion Impacts | California Air Resources Board](https://www.ca.gov) last accessed 07 December 2023.
- 10 As cited in: Moving Forward Network (2021). 'Making the Case for Zero-Emission Solutions in Freight: Community Voices for Equity and Environmental Justice'. (Moving Forward Network). Available at: [MFN_Making-the-Case_Report_May2021.pdf \(movingforwardnetwork.com\)](https://www.movingforwardnetwork.com) last accessed 07 December 2023.
- 11 Gillingham, K. and Huang, P. (Written July 2021, last revised July 2023). Racial Disparities in the Health Effects from Air Pollution: Evidence from Ports. [online] NBER Working Paper No. w29108. Available at: <https://ssrn.com/abstract=3897544> last accessed 07 December 2023.
- 12 Gillingham, K. and Huang, P. (Written July 2021, last revised July 2023). Racial Disparities in the Health Effects from Air Pollution: Evidence from Ports. [online] NBER Working Paper No. w29108. Available at: <https://ssrn.com/abstract=3897544> last accessed 07 December 2023.
- 13 Mueller, N. et al. (2022) 'Health impact assessments of shipping and port-sourced air pollution on a global scale: A scoping literature review', *Environmental Research*, 216(1), pp 1 - 24. doi: 10.1016/j.envres.2022.114460.
- 14 Moving Forward Network (2021) Making the Case for Zero-Emission Solutions in Freight: Community Voices for Equity and Environmental Justice. Available at: [MFN_Making-the-Case_Report_May2021.pdf \(movingforwardnetwork.com\)](https://www.movingforwardnetwork.com) last accessed 07 December 2023.
- 15 Rosenbaum, A. et al. 'Analysis of Diesel Particulate Matter Health Risk Disparities in Selected US Harbor Areas.' *American Journal of Public Health* 101, no. S1 (December 1, 2011): S217-23. <https://doi.org/10.2105/AJPH.2011.300190>.
- 16 All figures taken from: Gillingham, K. and Huang, P. (Written July 2021, last revised July 2023). Racial Disparities in the Health Effects from Air Pollution: Evidence from Ports. [online] NBER Working Paper No. w29108. Available at: <https://ssrn.com/abstract=3897544>
- 17 Mueller, N. et al. (2022) 'Health impact assessments of shipping and port-sourced air pollution on a global scale: A scoping literature review', *Environmental Research*, 216(1), pp 1 - 24. doi: 10.1016/j.envres.2022.114460.
- 18 Also noted in Mueller, N. et al. (2022) 'Health impact assessments of shipping and port-sourced air pollution on a global scale: A scoping literature review', *Environmental Research*, 216(1), pp 1 - 24. doi: 10.1016/j.envres.2022.114460.
- 19 Overview of the structure of the IMO available at: IMO, 'Structure of the IMO'. Available at [Structure of IMO](https://www.imo.org)
- 20 Full list available at: IMO, 'Member States'. Available at [Member States \(imo.org\)](https://www.imo.org) last accessed 07 December 2023.
- 21 For more information on the IMO, please visit: International Maritime Organization ([imo.org](https://www.imo.org)) last accessed 07 December 2023.
- 22 For further information, please refer to: IMO External Relations Office Legal Affairs and External Relations Division (2019) 'Rules and guidelines for consultative status of non-governmental international organizations with the International Maritime Organization'. Available at [NGOs RULES AND GUIDELINES \(post A 31\) \(imo.org\)](https://www.imo.org) last accessed 07 December 2023.
- 23 For a summary of the process, please visit: IMO, 'Relations with observer Organizations'. Available at [Relations with Observer Organizations \(imo.org\)](https://www.imo.org) last accessed 07 December 2023.
- 24 For more information on the MEPC's work, please visit: Marine Environment ([imo.org](https://www.imo.org)) last accessed 07 December 2023.
- 25 MEPC 'IMO RESOLUTION MEPC.377(80): 2023 IMO Strategy on Reduction of GHG Emissions from Ships'. Available at [MEPC 80-17-Add.1 - Report Of The Marine Environment Protection Committee On Its Eightieth Session \(Secretariat\) \(imo.org\)](https://www.imo.org) last accessed 07 December 2023.
- 26 See, for example: Comer, B. and Carvalho, F. (2023) 'IMO's Newly Revised GHG Strategy: What it means for shipping and the Paris Agreement'. Available at [IMO's newly revised GHG strategy: What it means for shipping and the Paris Agreement - International Council on Clean Transportation \(theicct.org\)](https://www.imo.org) last accessed 07 December 2023.
- 27 Accurate at time of writing, November 2023.
- 28 The Moving Forward Network (MFN) (2021). 'MFN Resource Library: Zero Emission in Freight Letter Submitted by MFN to EPA on October 26, 2021'. Available at: [Zero Emission In Freight Letter Submitted By MFN To EPA On October 26, 2021 | Moving Forward Network](https://www.movingforwardnetwork.com) last accessed 07 December 2023.
- 29 For more information on MFN's work, please visit: [About Us | Moving Forward Network](https://www.movingforwardnetwork.com) last accessed 07 December 2023.

- 30 Environmental Protection Agency, 'California State Nonroad Engine Pollution Control Standards; Ocean-Going Vessels At-Berth; Notice of Decision' (Federal Register, 20 October 2023). Available at: Federal Register :: California State Nonroad Engine Pollution Control Standards; Ocean-Going Vessels At-Berth; Notice of Decision last accessed 07 December 2023.
- 31 California Air Resources Board (CARB), 'Ocean-Going Vessel (OGV) At Berth Regulation ENFORCEMENT NOTICE' (CARB, October 24 2023). Available at: Ocean-Going Vessel (OGV) At Berth Regulation ENFORCEMENT NOTICE October 24th, 2023 (ca.gov) last accessed 07 December 2023.
- 32 For more information, visit: California Air Resources Board 'Ocean-Going Vessels at Berth Regulation'. Available at https://ww2.arb.ca.gov/our-work/programs/ocean-going-vessels-berth-regulation?utm_medium=email&utm_source=govdelivery last accessed 07 December 2023.
- 33 California Air Resources Board (CARB), 'Control Measure for Ocean Going Vessels at Berth (Second 15 day changes)' (CARB August 26 2020). Available at Control Measure for ocean-going vessels at berth (ca.gov) last accessed 07 December 2023.
- 34 Faber, J. et al. (2012). 'Regulated Slow Steaming in Maritime Transport: An Assessment of Options, Costs and Benefits' (CE Delft 2012). Available at: Vessel Speed Limits (ce.nl) last accessed 07 December 2023.
- 35 Faber, J. et al. (2012). 'Regulated Slow Steaming in Maritime Transport: An Assessment of Options, Costs and Benefits' (CE Delft 2012). Available at: Vessel Speed Limits (ce.nl) last accessed 07 December 2023.
- 36 Bryan, C., et al. (2019). 'Rotors and Bubbles: Route-Based Assessment of Innovative 28 Technologies To Reduce Ship Fuel Consumption And Emissions.' (ICCT International Council on Clean Transportation). As referenced in: O'Leary, A. (2022). Maritime Freight: Local and Global Impacts, Technologies and Considerations. Available at MFN_Maritime-Freight-Report.pdf (movingforwardnetwork.com) last accessed 07 December 2023.
- 37 For further information, please see: O'Leary, A. (2022). Maritime Freight: Local and Global Impacts, Technologies and Considerations. Available at MFN_Maritime-Freight-Report.pdf (movingforwardnetwork.com) last accessed 07 December 2023.
- 38 U.S. Bureau of Transportation Statistics (2021) 'On National Maritime Day and Every Day, U.S. Economy Relies on Waterborne Shipping'. Available at On National Maritime Day and Every Day, U.S. Economy Relies on Waterborne Shipping | Bureau of Transportation Statistics (bts.gov) last accessed 07 December 2023.
- 39 O'Leary, A. (2022). Maritime Freight: Local and Global Impacts, Technologies and Considerations. Available at MFN_Maritime-Freight-Report.pdf (movingforwardnetwork.com) last accessed 07 December 2023.
- 40 This is not an exhaustive list. The author has focused on U.S. participation in meetings and activities most relevant to the work areas of MFN and associated groups.
- 41 IMO 'Council Members'. Available at Council Members (imo.org) last accessed 07 December 2023.
- 42 For more information, please visit: Maritime Safety Committee (MSC) (imo.org) last accessed 07 December 2023.
- 43 The International Convention for the Prevention of Pollution from Ships (MARPOL) is the main international convention covering prevention of pollution of the marine environment by ships.
- 44 For more information, please visit: Marine Environment Protection Committee (MEPC) (imo.org) last accessed 07 December 2023.
- 45 See, Micronesia Centre for Sustainable Transport (MCST) 'Current Projects: Pacific Blue Shipping Partnership' (MCST webpage, nd) Available at: Micronesia Center for Sustainable Transport - PBSP Updates (mcst-rmiusp.org) last accessed 07 December 2023.; and Peter Nuttall, 'Decarbonising our domestic shipping fleet: The Pacific Blue Shipping Partnership' (MCST Blog, February 10 2023) (mcst-rmiusp.blogspot.com) last accessed 07 December 2023.
- 46 Institute for Global Development - University of New South Wales (UNSW), 'Pacific Blue Shipping Partnership' (UNSW website, nd). Available at: Pacific Blue Shipping Partnership | Institute for Global Development - UNSW Sydney last accessed 07 December 2023.
- 47 See John Paul, 'PACIFIC ISLANDS SEEK \$500M TO MAKE OCEAN'S SHIPPING ZERO CARBON' (Ocean Action Hub, last updated September 22, 2023). Available at: PACIFIC ISLANDS SEEK \$500M TO MAKE OCEAN'S SHIPPING ZERO CARBON - Ocean Action Hub last accessed 07 December 2023; and Andrew Irvin, 'How the Pacific is starting the voyage towards decarbonisation' (Global Maritime Forum, nd). Available at: How the Pacific is starting the voyage towards decarbonisation (globalmaritimeforum.org) last accessed 07 December 2023.
- 48 Institute for Global Development - University of New South Wales (UNSW), 'Pacific Blue Shipping Partnership' (UNSW website, nd). Available at: Pacific Blue Shipping Partnership | Institute for Global Development - UNSW Sydney last accessed 07 December 2023.
- 49 Ship Technology (2015) 'Ampere Electric Powered Ferry' (Ship Technology). Available at: Ampere Electric-Powered Ferry - Ship Technology (ship-technology.com) last accessed 07 December 2023.
- 50 Ship Technology (2015) 'Ampere Electric Powered Ferry' (Ship Technology). Available at: Ampere Electric-Powered Ferry - Ship Technology (ship-technology.com) last accessed 07 December 2023.
- 51 Rostad Saether, S. and Moe, E. (2021) 'A green maritime shift: Lessons from the electrification of ferries in Norway' Energy, Research and Social Science, 81, <https://doi.org/10.1016/j.jerss.2021.102282>.
- 52 Randall, C. (2023), 'World's largest electric ferry launches in Norway' (Electrify.com). Available at: World's largest electric ferry launches in Norway - electrify.com last accessed 07 December 2023.
- 53 Tondo, L. (2021), 'Venice may be put on endangered list if cruise ships not banned, says Unesco' (The Guardian). Available at: Venice may be put on endangered list if cruise ships not banned, says Unesco | Italy | The Guardian last accessed 07 December 2023.
- 54 Information available at: Giuffrida, A. (2021), 'Italy bans cruise ships from Venice lagoon after Unesco threat' (The Guardian). Available at Italy bans cruise ships from Venice lagoon after Unesco threat | Italy | The Guardian last accessed 07 December 2023.
- 55 Dijkstra, C. et al. (2023). 'The return of the cruise: how luxury cruises are polluting Europe's cities' (Transport and Environment). Available at: The-return-of-the-cruise-June-2023.pdf (transportenvironment.org) last accessed 07 December 2023.
- 56 For further information, visit: European Council, 'FuelEU maritime initiative: Council adopts new law to decarbonise the maritime sector' (European Council, 25 July 2023). Available at: FuelEU maritime initiative: Council adopts new law to decarbonise the maritime sector - Consilium (europa.eu) last accessed 07 December 2023.
- 57 See, for example, discussion in: The Maritime Executive, 'Renewed Interest in Shore Power due to EU and Environmental Regulation' (The Maritime Executive, February 11 2021). Available at: Renewed Interest in Shore Power due to EU and Environmental Regulation (maritime-executive.com) last accessed 07 December 2023.