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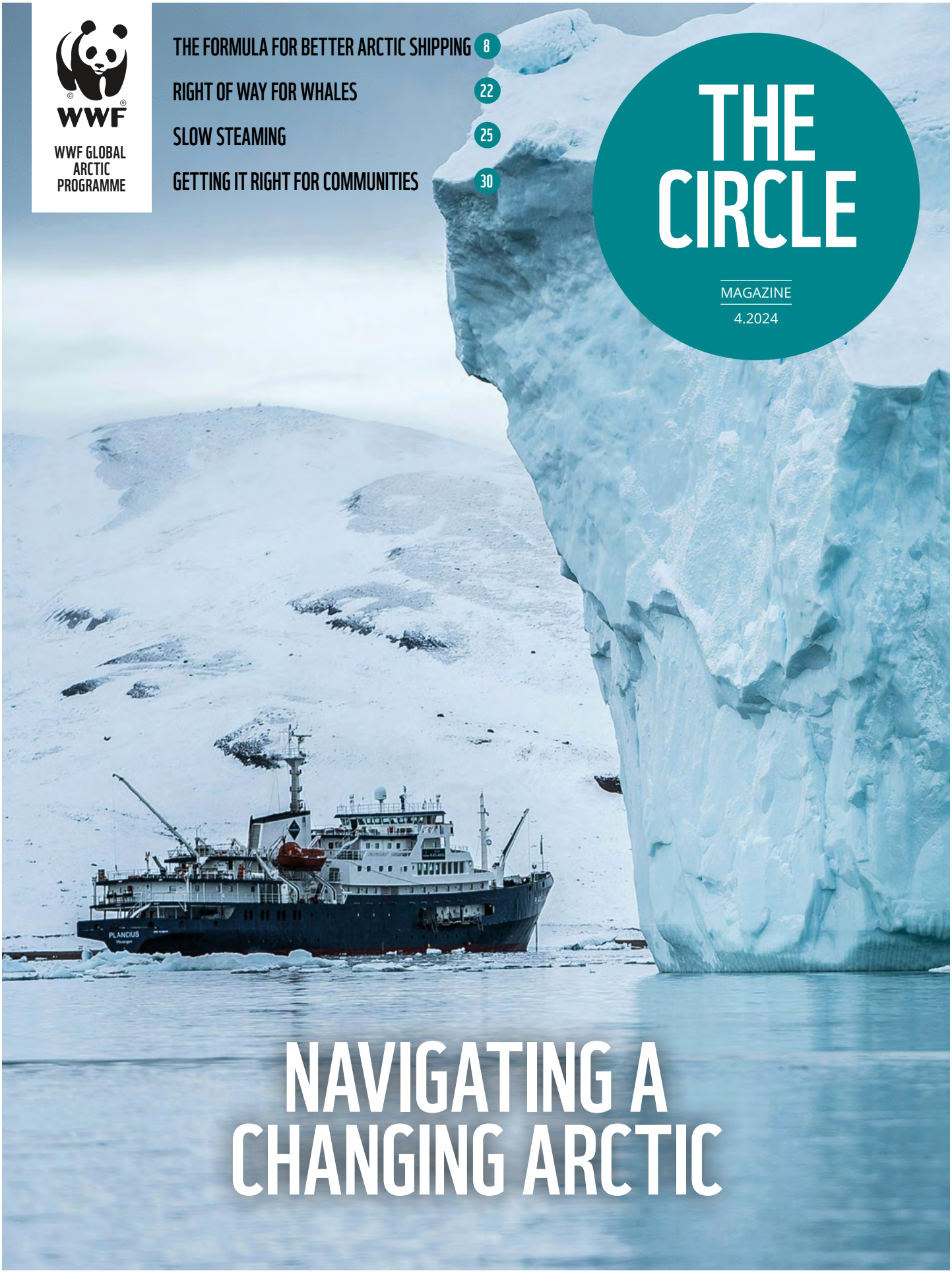

NAVIGATING A CHANGING ARCTIC

COVER: Polar cruise ship Plancius *navigates between icebergs along Greenland's coast.*
Photo credit: Hubert Neufeld on Unsplash

THIS PAGE: View from Hurtigruten's ship Fram *on its Northeast Greenland National Park expedition*
Photo credit: Serena Tang, CC BY-NC-ND 2.0 via Flicr.com

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The Circle 4.2024

NAVIGATING A CHANGING ARCTIC

EDITORIAL

Arctic shipping must change

Bulk carrier Selendang *aground on Unalaska Island near Alaska's Aleutian Islands in 2004. The ship spilled about 1.3 million litres of oil and diesel.*

The region's unique geography makes it more vulnerable to shipping-related impacts.

Foto credit: Collection of Doug Helton, NOAA/NOS/ORR. CC BY 2.0via Flickr.com

FOR HUNDREDS of years, shipping has connected people, places and goods. Today, it is the backbone of international trade and a lifeline for many remote coastal and Indigenous communities in the Arctic that depend on ships to deliver essential supplies.

But shipping in the Arctic is like nowhere else on Earth. Not only do harsh climatic conditions make for challenging navigation, but the region's unique geography makes it more vulnerable to shipping-related impacts.

Shipping is driving up greenhouse gas emissions, air and water pollution, and underwater noise. It is also causing fatal collisions with marine mammals and destroying ice habitats. As warming temperatures continue to cause Arctic sea ice to retreat, these negative impacts will worsen. Each year, more and more tankers and bulk carriers ply Arctic waters to deliver the oil, gas and metal ore produced there. More fishing vessels head deeper into the northern latitudes of the Arctic Ocean. More cruise ships take tourists to the far north.

More shipping routes—including two pan-Arctic routes—are expected to become more accessible for longer stretches of the navigation season, enabling commercial ships to venture into areas that were once impossible to traverse. According to the Arctic Councils' Shipping Traffic Database, the distances sailed by ships in the Arctic waters doubled between 2013 and 2023.

We must address these pressures without further delay, especially in areas where major improvements can be made quickly thanks to readily available technologies and operational measures. For example, the impact of black carbon emissions—a short-lived, potent climate pollutant that settles on ice and snow and amplifies melting—can be rapidly reduced by mandating vessels to switch from residual (heavier) fuels to cleaner (distillate) fuels.

Likewise, the negative impacts on marine mammals from underwater noise—whose levels have increased dramatically over the last decade, especially in marine mammals' migration corridors—can be reduced by rerouting vessels and enforcing slower speeds.

This issue of *The Circle* explores what sustainable shipping entails and how more companies can embrace higher environmental standards. For example, how does shipping interfere with the traditional fishing and hunting activities of coastal and Indigenous communities, and what can be done about it? How can cruise tourism in the Arctic be more sustainable? What are polar fuels, and how steeply might we cut emissions and reduce black carbon if ships began using them?

We also look at why exhaust gas cleaning systems (scrubbers), once seen as a useful way to reduce emissions from burning heavy fuel oil, should be banned to avoid a water pollution crisis, and how the International Maritime Organization's (IMO's) proposed measures to reduce the carbon intensity of vessels can benefit marine wildlife.

It is a pivotal time for the shipping sector. With the IMO's leadership and coordination, the industry has both the tools and the incentives it needs to embark on a transformative path to decarbonization, in line with the Paris Agreement, while also significantly reducing its impacts on marine biodiversity and coastal communities. The future of the Arctic's people, animals and ecosystems depend on it. ●

ELENA TRACY is a senior advisor on sustainable development with the WWF Global Arctic Programme.

THE NORTHWEST PASSAGE

Could melting sea ice pose obstacles for ships?

IT HAS LONG been believed that rapidly melting sea ice would create shorter routes through the Canadian Arctic, saving shipping operators money. But a new Canadian study suggests otherwise. The research shows that the rapid sea ice melt happening in the Arctic Ocean might actually be making some shipping routes less accessible.

The researchers analyzed changes to the lengths of shipping seasons along individual sections of the Northwest Passage from 2007 to 2021—some of the warmest years on record. Although the number of voyages in the Canadian Arctic has quadrupled since 1990—and certain areas are seeing longer shipping seasons—the study found that the number of weeks during which ships can safely travel through the entire Northwest Passage is decreasing.

The study found that although certain areas are increasingly ice-free, centuries-old, thick sea ice is being released and flowing south. This is creating choke points that are impassible for ships, making places like the Northwest Passage more hazardous and unpredictable.

A shortening of the shipping season could have serious ramifications for people in the Canadian Arctic who rely on shipping for supplies. Flying supplies in instead could dramatically increase the cost of food and other goods in many Arctic communities.

Female walrus and her pup sitting on an ice floe, Chukchi Sea.

Photo credit: Public domain, via Flickr.com

WEATHER ROUTING

Using AI to plan routes, save fuel and cut emissions

ACCORDING TO Riviera Maritime, a provider of information to the global maritime, offshore and energy industries, artificial intelligence (AI) and deep learning are revolutionizing weather routing for shipping. This could reduce fuel consumption by up to 17 per cent, depending on ship type and route conditions.

Weather routing—the practice of planning and optimizing a ship's route based on weather conditions—is particularly critical in the Arctic, where unpredictable storms and dynamic ice conditions present challenges. By recommending routes with favourable winds and currents, weather routing can help ships not only avoid danger, but reduce fuel consumption, leading to lower emissions and cost savings.

Traditionally, this technique has relied on satellite data, weather and ocean forecasts, and software to simulate route scenarios. AI-based systems enhance this process by analyzing vast datasets, including ship-specific information (like dimensions, reports and logs) and voyage data (like speed, trim, weather and location). The systems can predict a ship's response to conditions and model fuel consumption to identify the most efficient routes.

As a next step, integrating port authorities into the process could bring additional sustainability benefits. If vessel arrivals were better timed with port readiness, ships could spend less time at anchor, reducing fuel use and emissions.

CLOUD TROUBLE

Dust particles may be playing a role in Arctic warming

A STUDY PUBLISHED recently in the journal *npj Climate and Atmospheric Science* suggests that dust may play a more significant role in influencing Arctic warming than was previously thought. Researchers found that Arctic dust emissions, which have increased by 20 per cent over the past 40 years, influence the formation of clouds and their impact on the region's climate.

The findings highlight the complex role of dust in Arctic clouds. Dust particles serve as "seeds" for ice nucleation (ice formation in clouds), a process that affects clouds' ability to reflect sunlight and trap heat—key factors in regulating the Arctic's climate. But as Arctic warming exposes more ground, leading to more dust emissions, these particles are becoming less efficient at aiding ice formation. This counterbalancing feedback loop raises questions about whether current climate models accurately represent the role of Arctic dust.

The study shows that higher dust levels reduce clouds' ability to reflect sunlight, weakening the sensitivity of ice nucleation to warming by 40 per cent compared to scenarios that don't consider higher dust emissions.

The researchers emphasize the need for more investigation into how other particles, such as black carbon and organic emissions, interact with clouds in the Arctic. As warming continues, dust emissions and their impacts on ice nucleation are likely to increase, making the feedback loops more pronounced.

POWER BUNKERS

Providing "green" power to ships at port

A NEW European Union (EU) project aims to supply offshore electrical power to ships docked or moored at ports so they don't need to use their generators, which usually run on diesel. Launched in February 2024, the BlueBARGE project is developing an "energy barge" that can provide green energy to vessels and support the maritime industry's electrification and decarbonization.

The €11 million project is being led by a consortium of 14 companies and organizations from 10 European countries. The partners are working together to develop containerized green energy supply modules—or "power bunkers"—that are scalable, adaptable and flexible, with the aim of having them ready for commercialization by 2030.

The BlueBARGE project is exploring technical alternatives and configurations to address key challenges to providing clean offshore energy to ships in ports, including challenges related to power supply integration and connecting the energy barge to ships, ports and local power grids. The project is also looking at operational safety and regulatory compliance. The barge is slated to limit polluting emissions, with targets that align with the EU's and International Maritime Organization's goals to cut emissions from the shipping sector in half by 2050.

Ivory gull in flight, Bering Sea. The species is in fast decline.

Marine species populations have declined by 56 per cent in the past 50 years. This underscores the urgent need to improve the sustainability of shipping.

Photo credit: jomilo75, CC BY-NC-ND 2.0 via Flickr.com

The formula for better Arctic shipping

INTERNATIONAL GOVERNANCE, REGIONAL COLLABORATION—AND MORE AMBITION ALL ROUND

Climate-driven sea ice loss has been making the Arctic increasingly accessible and attractive to international shipping companies and cruise operators. But along with these economic opportunities come significant environmental, social and safety risks. **SAM DAVIN** explains why managing these risks will require International Maritime Organization (IMO) regulation bolstered by regional and national efforts.

EARLIER THIS YEAR, Protection of the Arctic Marine Environment (an Arctic Council working group) reported that from 2013 to 2023, the number of ships operating in the Arctic grew 37 per cent, while the total distance sailed increased by 111 per cent. This had the effect of doubling underwater noise pollution and nearly quadrupling greenhouse gas emissions. In the Canadian Arctic alone, polluting discharges from ships in marine protected areas increased by 33 per cent in just a three-year segment of that period (2019 to 2022).

This increase in Arctic shipping is arriving as the planet confronts dual climate and biodiversity crises. According to WWF's 2024 Living Planet Report, marine species populations have declined by 56 per cent in the past 50 years. This underscores the urgent need to improve the sustainability of shipping, especially in sensitive regions like the Arctic.

As the UN agency that regulates international shipping, the IMO's strength lies in bringing together diverse stakeholders—like Member States, intergovernmental organizations, and environmental and industry non-governmental organizations—to negotiate and adopt guidelines and international regulations. Through statutes like MARPOL (the International Convention for the Prevention of Pollution from Ships) and SOLAS (the International Convention for the Safety of Life at Sea,) the IMO sets minimum standards to manage environmental and safety risks.

THE IMO CAN DO BETTER

The agency also has the authority to designate regional protective measures where global standards fall short. This enables targeted ➤

Fishing vessels, Disko Island, Greenland.

IMO's decision-making processes often result in regulations that fall short of environmental best practices. Its consensus-driven structure can dilute ambitious proposals and delay crucial action.

Photo credit: Naja Bertolt Jensen on Unsplash

responses to specific challenges, such as Emission Control Areas in the Canadian Arctic and Norwegian Sea. In fact, the IMO adopted such measures earlier this year to reduce emissions of sulphur oxide, nitrogen oxide and particulate matter in these regions.

These measures follow the adoption of the Polar Code in 2017—which established mandatory safety and environmental standards tailored to polar waters, covering ship design, crew training and pollution prevention—and the Arctic heavy fuel oil (HFO) ban in 2021, which came into effect on July 1, 2024. Both were geared towards minimizing risks to the Arctic.

The IMO is now poised to play a key role in implementing the High Seas Treaty, also known as the UN Agreement on Marine Biodiversity in Areas Beyond National Jurisdiction. This could see the organization use its authority to create enforceable protections in the high seas by designating regions known as Particularly Sensitive Sea Areas, including in critical regions like the Central Arctic Ocean.

But the IMO's decision-making processes imperfectly balance environmental protections with economic considerations, often resulting in regulations that fall short of environmental best practices. Similarly, its consensus-driven structure can dilute ambitious proposals and delay crucial action.

Consider the HFO ban: it recognized the environmental risks, but deployed a phased approach that allows some ships to continue using HFO in the Arctic until as late as 2029. Similarly, measures to regulate underwater noise remain voluntary, despite the known harms caused to marine mammals. In addition, the IMO has yet to implement mandatory measures to control black carbon emissions, critical to preserving snow and sea ice habitat.

REGULATORY GAPS PERSIST

Further barriers to adequate protection exist because the IMO does not yet regulate certain harmful substances and technologies, like greywater and scrubbers. The absence of global regulations ➤

on issues like these prevents the Polar Code from offering enhanced protections tailored to the Arctic environment.

The same holds true for IMO-designated Particularly Sensitive Sea Areas and Special Areas. In addition, the Polar Code excludes significant parts of the Arctic, including waters under Nordic and Russian jurisdiction, and it does not apply to all ships. (It excludes all small vessels, although guidelines have been introduced for fishing vessels longer than 24 metres and private pleasure yachts. There are no requirements applied for cargo ships under 500 gross tonnes.)

The IMO will continue to play a central role in shaping the future of Arctic shipping, but it must address its regulatory gaps to safeguard the region's vulnerable ecosystems. In the meantime, Arctic states can use their jurisdictional authorities to introduce stronger local regulations. A good example is Canada's prohibition on *any* discharge of oil in its Arctic waters, exceeding the Polar Code's limit of five parts per million. States can also incorporate Indigenous knowledge, values and priorities to improve both national measures and international governance.

The Arctic Council—an intergovernmental forum that includes the eight Arctic states as well as Indigenous Peoples organizations, like the Inuit Circumpolar Council, Gwich'in Council International and Saami Council—can then complement national and IMO efforts. It can facilitate knowledge-sharing and dialogue between Arctic rights-holders and stakeholders, promote best practices and new research, and foster collaboration with the non-Arctic states whose vessels are increasingly present in Arctic waters. ●

SAM DAVIN is a senior specialist in marine conservation and shipping with WWF–Canada.

Regulating shipping

WILL THE IMO TIGHTEN THE RULES AROUND CARBON EMISSIONS?

Ships are responsible for a myriad of routine, yet damaging, operational practices—some legal, some not—that threaten ocean wildlife.

A tanker carrying liquid natural gas sits in Cook Inlet, Alaska.

Photo credit: Ground Truth Trekking, CC BY 3.0

International shipping makes an outsized and growing contribution to the climate crisis. Ships also regularly kill whales and generate underwater noise that compromises the ability of whales and other marine life to forage and reproduce. By going more slowly, ships could slash their climate emissions and reduce both underwater noise and the risk of whale strikes—but as **JOHN MAGGS** explains, this shift won't happen without ambitious regulation.

Fortunately, an opportunity exists right now for just that kind of action. The International Maritime Organization (IMO) is revising the rules around its Carbon Intensity Indicator, a metric for measuring and regulating ships' carbon emissions. Governments are consulting and reviewing evidence on barriers to efficiency and potential solutions. A decision on improving the indicator will be made in early 2025.

If designed properly, these new rules could address almost half of shipping's climate impacts and deliver massive ocean health co-benefits. But the outcome is far from certain.

THE SCOPE OF THE PROBLEM

Ninety percent of everything we send around the world travels by ship, and these ships burn a lot of fuel. They are massive, and the distances they travel are huge. As a result, the industry generates around three per cent of all climate emissions globally—a contribution equivalent to that of the whole economy of a country the size of Germany or Japan.

Ships are also undermining ocean health. We have all heard about the environmental devastation caused by oil spills when a tanker runs aground or collides with another ship. But ships are responsible for a myriad of other routine, yet damaging, operational practices—some legal, some not—that threaten ocean wildlife: oil and chemical discharges, toxic paint coatings, underwater noise pollution, sewage and greywater discharges, and the dumping of plastics, to name just a few.

Shipping also threatens human health. An estimated 250,000 deaths and millions of childhood asthma cases annually are caused by toxic air pollution from shipping.

The experimental ship Energy Observer *is the first vessel to be autonomous in energy thanks to a mix of solar energy, sail power, and renewable hydrogen produced onboard.*

Photo credit: Margaux P, CC BY-SA 4.0, via Wikimedia Commons

In all these areas, regulation has failed to keep up with the growth of the industry. Sporadic and weak measures mean the problem keeps getting worse.

TURNING THE PAGE?

But the IMO's coming revision of its Carbon Intensity Indicator is an important opportunity to address both the climate and ocean health impacts of global shipping and turn the tide on some of these problems.

By far the most effective way to reduce ship climate impacts is to slow ships down. A 10 per cent speed reduction can lower emissions by almost 30 per cent. In some cases, this will mean using additional ships. But even in these situations, there are still massive net emission reduction benefits. And slowing ships down can happen *immediately*—we don't need new technology just to take our foot off the gas pedal.

We can also look at wind power. In a case of "back to the future," new high-tech sails can dramatically reduce fuel burn (and thus emissions) on existing ships, and can go even further when ships are designed from scratch to use wind as their primary means of propulsion. No other transport mode can harness wind power directly in this way. This ability is shipping's climate crisis superpower.

Most underwater noise pollution is caused by ship propellers, so using sails and slowing ships down has a dramatic effect on noise levels. Slower ships are also less likely to strike and kill whales and other marine wildlife. And any action that reduces the amount of fuel burned doesn't only reduce climate emissions—it also cuts emissions of everything that is connected to burning fuel, including the particulates that are harmful to human health and the oily sludge that ship fuels generate, which are so often dumped illegally at sea.

Finally, reducing fuel burn also decreases the waste produced by the exhaust gas cleaning systems, or scrubbers, that ship owners have started installing to avoid using cleaner fuels. This shocking new waste stream is entirely unregulated and dwarfs other shipping pollution in terms of volume.

ANTICIPATING THE ARGUMENTS

Some of you may be asking yourselves: Surely ship owners are willing to take positive steps to reduce their climate impact by operating their vessels efficiently purely out of self-interest and a desire to minimize costs? Unfortunately, no. Often, there is a "split incentive," whereby the entity responsible for the technical efficiency of a ship and its equipment isn't the one paying for the fuel.

Inefficient ship operation is also often deliberately written into long-established conventions and contractual arrangements—the most famous one being the instruction in charter agreements to travel at "utmost dispatch" (quickly) and wait at destination if you get there too early. Slowing down and arriving on time would make more sense, but would also be a breach of the agreement.

Governments must close their ears to industry "special pleading" and agree to a set of transparent, ambitious and enforceable new requirements for the efficient operation of ships.

And in a booming market when few ships are without work, an individual owner acting from a business perspective might prefer to speed up and squeeze in an extra trip. Unfortunately, this is the worst approach from a climate, environment and ocean health point of view.

It's rare that a single measure or regulation holds the potential to have such wide-ranging positive impacts on the climate and environmental footprint of an industry. The revision of the IMO's Carbon Intensity Indicator truly holds the possibility to set the shipping industry on a much more sustainable path. But if we are to get there, governments must close their ears to industry "special pleading" and agree to a set of transparent, ambitious and enforceable new requirements for the efficient operation of ships. This is how we build a more ocean-friendly industry. ●

JOHN MAGGS is a board member of the Clean Shipping Coalition and is the coalition's accredited representative at the International Maritime Organization.

Industrial pollution

STEERING AWAY FROM SCRUBBERS

Scrubbers are exhaust gas cleaning systems that remove (or "scrub") harmful pollutants and particulate matter from exhaust emissions before they are released into the atmosphere. Used in various industries since the Victorian era, the systems became more common in shipping in the 2000s to help ships comply with international emissions regulations, such as the International Maritime Organization's 2020 sulphur cap. But as **EELCO LEEMANS** explains, we have better science now, and it's telling us that wastewater from scrubbers harms marine life—so it's time for a change.

"THE SOLUTION TO pollution is dilution": that saying was frequently heard half a century ago, but since then, scientific knowledge on toxicology has proven it false. Pollutants can persist in the environment and bioaccumulate in the food chain. As a consequence, environmental policies and regulations now steer away from the dilution approach to protect life on Earth.

But some sectors—such as the maritime industry—appear to be stuck in the old narrative. While the shipping sector is quick to claim that shipping is the least environmentally damaging mode of transportation, have you ever encountered another transport mode whose vehicles deliberately dump millions of tonnes of pollution overboard?

That is exactly what the global shipping fleet does, day in and day out, even in the Arctic Ocean. Discharges of sewage and wastewater from bathrooms and kitchens, toxins from paints, cargo residues, lubricating oil, and wastewater from scrubbers all end up in the ocean, with detrimental impacts on marine life and the millions of people who depend on the ocean for their livelihoods and well-being.

EELCO LEEMANS is a technical advisor to the Clean Arctic Alliance.

SENDING HEAVY METALS AND CARCINOGENS OVERBOARD

In 2009, the International Maritime Organization (IMO) decided to regulate ships' air emissions after calculating that pollution from shipping was contributing to more than 60,000 premature deaths each year. To reduce sulphur oxide (or SOx) emissions, ships can now choose from two options: they can reduce the sulphur content in the fuel they use, or they can install and use scrubbers.

Scrubbers remove SOx from exhaust by creating a mist of seawater in the ship's smokestack that binds to the SOx. The resulting seawater with sulphur content is then flushed overboard. The low pH of this mixture contributes to the acidification of the oceans, which are already under stress from excess carbon dioxide (or CO_2) uptake.

Compounding this problem, scrubbers pick up all kinds of other substances from the exhaust, including heavy metals, nitrites and nitrates, and polycyclic aromatic hydrocarbons, which are highly carcinogenic. A genuinely toxic cocktail is routinely dumped overboard through ships' discharge piping.

Scrubbers were deemed an acceptable solution by IMO members back in 2009. But 15 years later, a debate about this flawed approach is in full swing. Several recent studies have shown that scrubber wastewater cocktails have serious consequences for marine life. For example, even at a dilution of one part scrubber wastewater to one *million* parts clean seawater, an impact was seen on sea urchins, mussels and crustaceans, with lower fertilization rates and malformed larvae.

What this tells us is that the base of the marine food web is under threat.

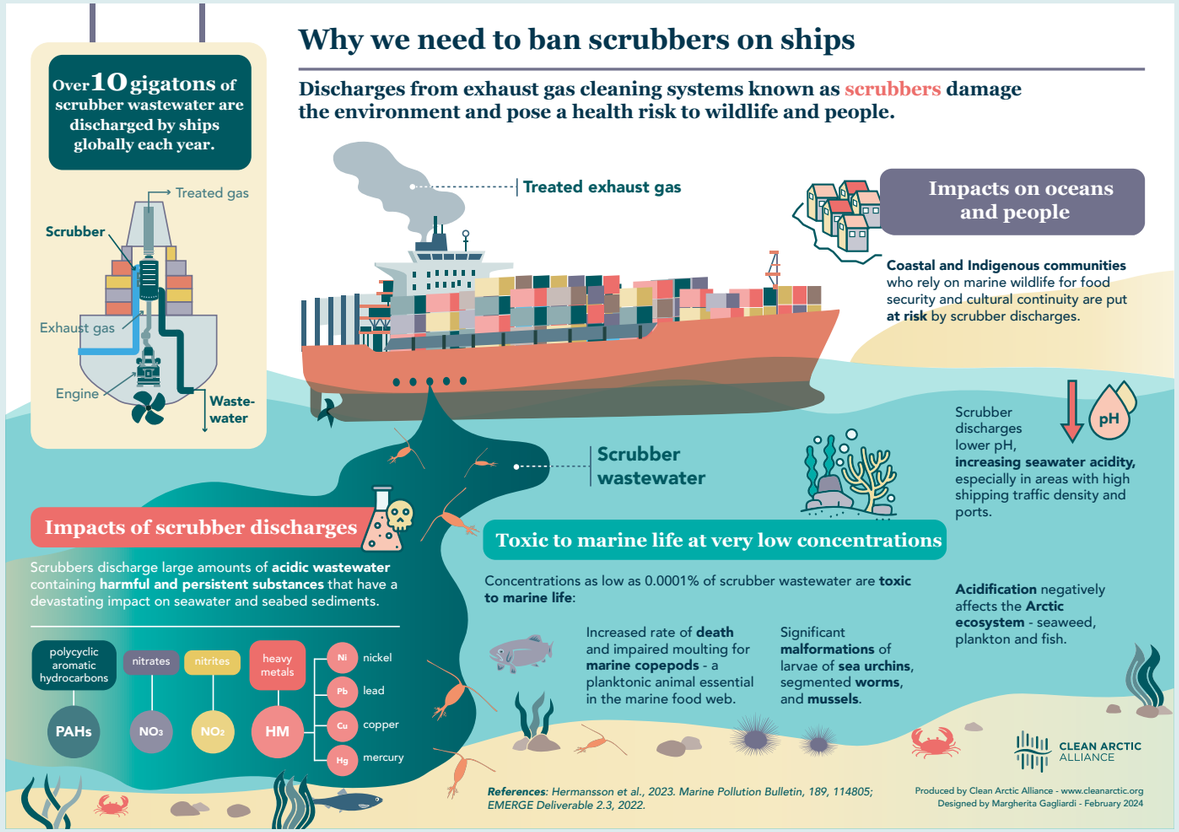
The International Council on Clean Transportation has estimated that more than 10 gigatonnes of scrubber wastewater are pumped overboard into the world's oceans every year. In response, more than 45 coastal and port states around the globe have raised concerns and started to regulate scrubber discharges in their coastal waters. The number of states on this list continues to grow: Denmark and Sweden plan to ban scrubber discharges in their territorial seas in 2025 because the Baltic ecosystem is suffering from multiple stressors.

WHO REALLY PICKS UP THE TAB?

Now, you might wonder what such decisions will mean for ship owners who have invested in scrubbers as an alternative to using cleaner fuel. It appears—again based on a scientific study published in *Nature Sustainability*—that more than 95 per cent of ships recoup the cost of the scrubbers they install within five years. This means the maritime industry will not suffer more than a minor loss if scrubbers are banned. Meanwhile, the marine ecotoxicity damage cost from scrubber water discharge in the Baltic Sea from 2014 to 2022 is estimated to be in excess of €680 million (USD$732 million).

It is time to say farewell to scrubbers, an outdated technology that is completely out of line with 21st century environmental standards for ocean protection. The best—ultimately, the only—solution is to ban scrubbers worldwide and require ships to switch to cleaner fuels as a step toward complete decarbonization.

In the meantime, scrubber wastewater restrictions should be rolled out as soon as possible, particularly in delicate ecosystems, such as Arctic waters. In January 2025, scrubbers will once again be on the IMO's agenda when its Pollution Prevention and Response subcommittee convenes. Several environmental organizations will be present to push for the immediate and long-term actions needed to end marine pollution from scrubbers. ●



A SHORT HISTORY OF SCRUBBERS

Although marine scrubbers only began to see widespread use by ships in the 2000s, the technology has been around since the 1850s, when the first basic scrubbers were introduced to remove pollutants from industrial exhaust, particularly in chemical plants.

Their use increased throughout the 20th century in industries like power generation, steel manufacturing and cement production as air quality regulations began to emerge, and became even more common in the 1970s in coal-fired power plants in response to concerns about acid rain.

The cleaner marine fuels available today contain much lower levels of sulphur than heavy fuel oil does, eliminating the need for scrubbers and their harmful side effects. It is time for the shipping industry to make the switch.

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Tourists on ship MV Fram *on Hurtigruten's Northeast Greenland National Park expedition.*

Photo credit: serena_tang, CC BY-NC-ND 2.0 via Flickr.com

Expedition cruise ships

ENSURING CRUISE TOURISM DOESN'T HURT THE ARCTIC

Loss of sea ice in the Arctic Ocean is giving ships access to regions of the Arctic that were previously difficult—if not impossible—to reach. In fact, from 2013 to 2023, the number of ships operating in the Arctic increased by 37 per cent. Although most are fishing vessels and cargo ships, there's also been a surge in Arctic cruise tourism in recent years. The Circle spoke to **MELISSA NACKE**, head of operations with the Association of Arctic Expedition Cruise Operators (AECO), about how her organization works with expedition cruise operators to protect the Arctic's natural environment and local communities—and ensure that tourism benefits the region rather than harming it.

The Rembrandt van Rijn *takes travellers from around the world on Arctic expeditions. About 50 metres in length, it accommodates 33 passengers.*

Photo credit: Mary Olga Lantce

Melissa Nacke

Photo credit: AECO

Why do you think there's a growing interest in travelling to the Arctic by ship?
I think there are different types of travellers. There's the traveller who wants to cross the Arctic off their bucket list. There's the traveller who's keen on history and wants to learn about the Franklin expedition, for example. And then there's the traveller who wants to know about wildlife and see a polar bear.

What steps do you take to ensure your members' operations don't negatively affect the Arctic environment and the people who live there?
In 2023, we had 51 vessels operating in the Arctic and a total of 427 trips. We're aware that we're contributing to warming and climate change, so we're working towards greenhouse gas emission reductions. We actually just launched a formal climate commitment to reducing greenhouse gases. The commitment contains a new requirement for all vessels to calculate their emissions—even very small vessels that are not legally required to do so right now.

But it's not black and white or easy. For example, some major elements are not in place, like access to biofuels and shore power so ships can actually connect onshore and not use their engines. These things are just not available in the Arctic. So, our climate commitment is about trying to find interim solutions.

Considering the power that you have, what steps can your members take to reduce their impacts on the Arctic environment and communities?
That is actually the backbone of our organization. Our mission is to reduce our footprint and be as sustainable as possible. We develop guidelines and standards that typically go beyond regulatory requirements. We have wildlife guidelines, biosecurity guidelines and cultural heritage guidelines. We also have community guidelines, and these are created by Arctic communities themselves. They come up with the "do's and don'ts," and we adopt those and make them mandatory for members. It can be very simple things, like not taking photos through people's windows, or not picking flowers or petting Arctic dogs when visiting communities.

How do you make sure that operators—and the tourists who take their cruises—follow these guidelines?
Every operator that wants to be a member—and every existing member, every five years—has to have an observer who goes on board and looks at how they've actually implemented the guidelines into their daily practices. For example, that includes things like making sure passengers are aware of community guidelines before going ashore. We also have an incident-reporting system and a compliance, dispute and resolution committee. If there's been a violation of a guideline, the committee evaluates the seriousness. This can lead to a member losing their good standing, or even in their removal from AECO, in very serious instances.

Have you seen that these guidelines are making a difference?
Definitely. We don't do comparative scientific studies, but for example, when it comes to community guidelines, we hear from community members who say, "I finally feel like I'm part of the process to decide on how tourism is going to happen in my community." That's really vital. That's what we want to see.

What are some of the other ways your members work to protect the Arctic environment?
We're involved in a lot of citizen science and research projects. Some of the newer cruise ships are almost like research vessels—with tourists on board. We're involved in a number of different projects to record marine mammal sightings, which helps assess populations. We're also involved in an underwater noise project in the Canadian Arctic that will help us develop mitigation measures. When our members go into the Arctic, they also pick up tons and tons of marine litter from the shorelines, typically from the fishing sector.

And AECO has been an early and huge supporter of the ban on heavy fuel oil. In fact, we implemented a self-imposed ban many years before the International Maritime Organization implemented the ban. We also ban drones, and we are really focused on not disturbing wildlife.

What do you see as the future for the industry? How can it balance people's desire to see this part of the world with the need to protect it?
There are some four million people living above the Arctic Circle—so I think the decisions on how to balance development and its impacts are for them to make. But for us, it's vital that tourism is benefitting the regions we visit. We are hiring local guides and connecting with local artists and service providers. What we really want is that when tourists go home after their visit, they have a deeper understanding of the Arctic—the environment, the wildlife and the people living there. So, the future is about working with local communities to have mutually beneficial tourism. That's the only way we can be sustainable in the Arctic. ●

We hear from community members who say, "I finally feel like I'm part of the process to decide on how tourism is going to happen in my community."

The shipping industry needs to move shipping routes away from blue corridors when whales are migrating.

Bowhead whales, Nunavut, Canada.

High-risk intersections

GIVING WHALES THE RIGHT OF WAY OVER SHIPS

In an earlier issue of *The Circle*, **MELANIE LANCASTER**, a senior species specialist with WWF's Global Arctic Programme, wrote about the marathon underwater migrations that whales make to, from and within the Arctic Ocean—and the need to recognize these corridors as lifelines and crucial connectors for marine life. Climate change continues to put pressure on Arctic whales in many ways. In this issue, she explains how growing ship traffic in the region is intensifying these pressures.

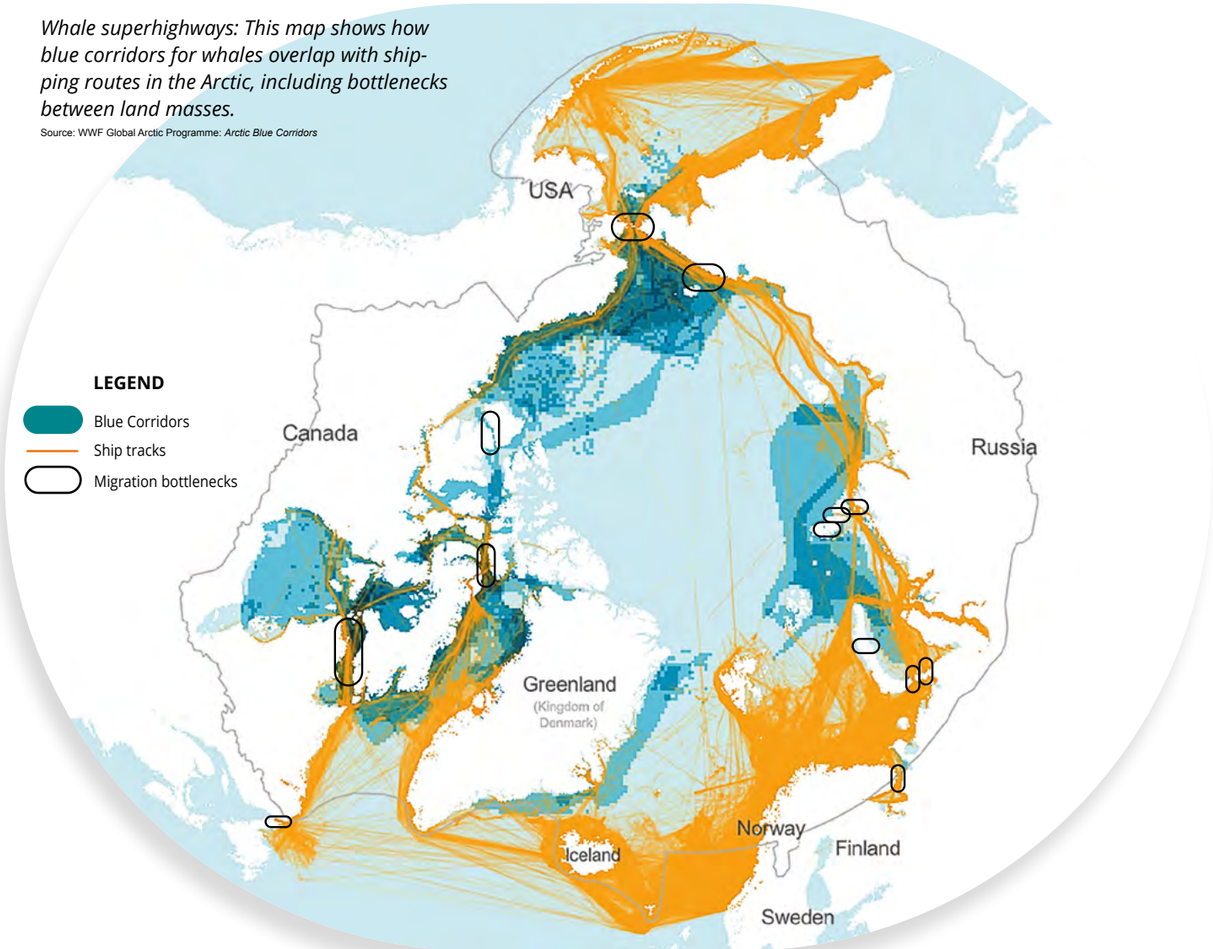
AS HUMAN-CAUSED CLIMATE change destroys our planet's cryosphere (its frozen place and elements), vessel traffic in the Arctic is growing. In the last 10 years, the number of ships entering Arctic waters has increased by 37 per cent, and the distance ships travel has doubled. Expansion has been across the board: more bulk carriers, gas tankers, fishing vessels and cargo ships frequent Arctic waters now, thanks to the ramping up of industrial sectors such as fisheries, oil and gas, and mining.

But whales and other kinds of marine life, having evolved for millions of years in the quiet, ice-covered Arctic Ocean, are ill-prepared for this onslaught. For whales, ships bring risks of fatal collisions along with exposure to underwater noise pollution that can hamper their ability to find food, avoid predators and navigate, among other things. We must get a better handle on the areas where ship traffic and important habitats for Arctic whales overlap so we know where measures are needed to safeguard them.

WHERE THE WHALES SWIM

The WWF Global Arctic Programme recently released an interactive report on Arctic blue corridors that does just that. With a focus on whale migratory routes, the report collates publicly available information for three whale species found only in the Arctic: narwhal, bowhead whales and beluga whales. Based on what we know, about 20 populations of these species swim between their summer and winter habitats, sometimes thousands of kilometres and across ➤

Photo credit: © VDOS Global / WWF-Canada



Whale superhighways: This map shows how blue corridors for whales overlap with shipping routes in the Arctic, including bottlenecks between land masses.

Source: WWF Global Arctic Programme: *Arctic Blue Corridors*

national borders, even into the high seas.

Putting this wealth of information—which included some 10,000 data points representing individual whale locations—onto maps was possible only because of decades of research by scientists around the Arctic who observed the whales from boats, planes and drones and fitted satellite transmitters to their backs to track their movements from space. The maps could be further enriched by Indigenous knowledge gathered by coastal communities that have been following the paths and timings of whale migrations for thousands of years. By mapping what was known, we also started to get a picture of what is not known about whale migrations. The Arctic is a vast region, and there are still many gaps in our knowledge.

MELANIE LANCASTER is a senior specialist, Arctic species with the WWF Global Arctic Programme. Together with WWF staff across the Arctic, she supports the conservation of Arctic species, including narwhals, beluga and bowhead whales.

WHERE THE SHIPS SAIL

By overlaying ship traffic, the report visualizes the intersection between ships and Arctic blue corridors.

The verdict? There is considerable overlap. It is probably unsurprising that whales and ships use many of the same corridors, especially as they move through bottlenecks between land masses, where there is typically only one route available. The overlap with ships is particularly high during the whales' autumn migrations, which follow the most ice-free month of September in the Arctic, when ship traffic is at its most dense.

SOLUTIONS FOR WHALE-SAFE SUPERHIGHWAYS

It turns out that there are many migration bottlenecks across the Arctic, making the battle for space between migrating whales and ships a pan-Arctic problem rather than an isolated issue. As Arctic countries commit to reaching global biodiversity conservation targets by 2030, they must incorporate Arctic blue corridors into their plans to protect 30 per cent of the oceans and sustainably manage the remaining 70 per cent. This needs to be done at the right scale for nature, which does not recognize political borders.

Meanwhile, the shipping industry needs to move shipping routes away from blue corridors when whales are migrating. Where this is not possible—as in migration bottlenecks—they must slow down to reduce underwater noise and the risk of fatal collisions with whales. With the industry under pressure to decarbonize, companies are looking for new, more fuel-efficient shipping routes through the world's oceans. They must consider important habitats for biodiversity in these exercises to avoid making the colossal mistake of moving more ships into the pathways of animals.

Such guidance to plan voyages accordingly is already available from the UN International Maritime Organization for ships operating in polar waters. Clearly, mandating it can be seen as regulatory low-hanging fruit. Further, investment by some of the world's largest shipping companies in quieting technology for ships would be an environmentally responsible use of some of the billions of dollars in profits they reported recently. (For example, in the first week of November, multiple news sources reported that French shipping and logistics company CMA CGM had a net profit of $2.73 billion for the third quarter of 2024.)

We have built our world in such a way that we are reliant on shipping. Even Arctic communities depend on shipping for the supply of essential goods. But we cannot forget that we are also reliant on nature to live, and our melting world should not be seen as an economic opportunity to exploit without consequence. ●

Slow steaming

DECREASING SPEED CUTS EMISSIONS, WILDLIFE COLLISIONS AND COSTS

Arctic shipping has already increased by 111 per cent over the past decade—and it is projected to continue accelerating as multi-year and summer sea ice diminishes due to climate change. **KRISTEN POWELL** explains how slow steaming can minimize harms to wildlife and the climate while cutting costs for operators.

ARCTIC SPECIES THAT were once largely buffered from the industrial activities affecting their southern counterparts are now threatened by the impacts of shipping—from underwater noise pollution to ship strikes and the effects of climate change from emissions. Could "slow steaming" be the obvious solution?

Slowing down is not a new idea. In other parts of the world, the shipping industry has relied on strategically reducing speeds to increase energy efficiency, curb fuel use and save costs for decades.

Ships frequently travel faster than their optimal fuel-efficient speed of 10 to 14 knots, depending on variables like vessel type, design and sea conditions. But the faster a ship goes, the more dramatically its fuel consumption rises. This means that even small reductions in vessel speed can lead to significant improvements in fuel efficiency. Decreasing a ship's speed by just 10 per cent can reduce its overall energy use by 20 to 30 per cent even though the voyage itself takes longer. These benefits can be even greater for certain ship classes and designs or vessels travelling longer routes.

ENVIRONMENTAL BENEFITS

The case for slow steaming becomes even more compelling when benefits to the environment are considered, such as:

- **Emissions reductions**. By reducing speed (and burning less fuel), ships can significantly lower their greenhouse gas emissions. Research shows that a 10 to 20 per cent reduction in speed will cut baseline carbon emissions by 13 to 24 per cent. Given shipping's outsized contribution to the climate crisis, speed reduction is a simple way to support climate goals, including those established by the International Maritime Organization, which has set a net-zero emissions target for international shipping by 2050.
- **Underwater noise**. Slower speeds substantially reduce underwater noise pollution, protecting Arctic marine mammals like belugas, narwhal and bowhead whales, which depend on sound to navigate, hunt and communicate. Research shows that a 10 per cent speed reduction can decrease noise pollution by 40 per cent, while a 20 per cent speed reduction can decrease noise pollution by 67 per cent.
- **Ship strikes**. Reducing ship speed significantly decreases the risk of fatal collisions with whales by giving both ➤

whales and ship operators more time to detect each other, react and avoid contact. The probability of death or serious injury to a whale in the event of a ship strike increases directly with speed: travelling at less than 11.8 knots cuts that chance by more than half, while speeds above 15 knots increase the risk exponentially toward 100 per cent.

■ **Vessel safety**. The Arctic Ocean's extreme weather, poor visibility, sea ice variability and poorly mapped seafloors pose significant navigational challenges. Operating at lower speeds improves reaction time, which can help ships avoid obstacles like ice floes and wildlife. It can also reduce the risk of accidents, such as groundings or collisions, which can lead to catastrophic fuel spills. Slower speeds even reduce mechanical wear and tear, supporting more reliable operations in a demanding environment.

CHALLENGES AND CONSIDERATIONS

Slow steaming is a globally recognized best practice, yet barriers to industry-wide implementation remain. Global market pressures are a major influence: profit margins can diminish the longer it takes to transport goods, and maximizing profits frequently takes precedence over the many benefits of slow steaming. Strict port-of-call schedules can also add to operational pressures to arrive on time, yet backlogged port traffic can mean that ships travelling at maximum speed may still end up anchored for days or weeks before being unloaded.

Another considerable challenge is the absence of global regulations requiring slow steaming. Without these, industry-wide adoption may never happen. Although some companies have adopted slow steaming on an as-needed or occasional basis, none have implemented fleet-wide policies.

Given that slowing down for even partial segments of a voyage can provide significant benefits for the Arctic, the practice could be mandated in priority conservation areas identified by Arctic and Indigenous communities, such as marine mammal migratory corridors. Industry could also incorporate slower speed criteria in Arctic "green" shipping corridors (routes aimed at promoting sustainable shipping practices), further prioritizing the long-term benefits of slow steaming.

Research shows that a 10 to 20 per cent reduction in speed will cut baseline carbon emissions by 13 to 24 per cent.

Ocean spray rises from the bow of a fast-moving bulk carrier.

Photo credit: Louis Vest, CC BY-NC 2.0via Flickr.com

Put simply, slow steaming can be a feasible, cost-effective and immediately impactful way to make shipping more sustainable. It offers a balanced approach that meets the needs of people and industry, with no investment costs, while minimizing impacts on the climate and wildlife.

As the shipping industry increasingly integrates environmental considerations into operations, the vast and varied benefits of slow steaming must become a top priority. The case for mandating slowdown zones is strong, but ship operators don't need to wait—when it comes to reducing speed in the Arctic, it's time to act fast. ●

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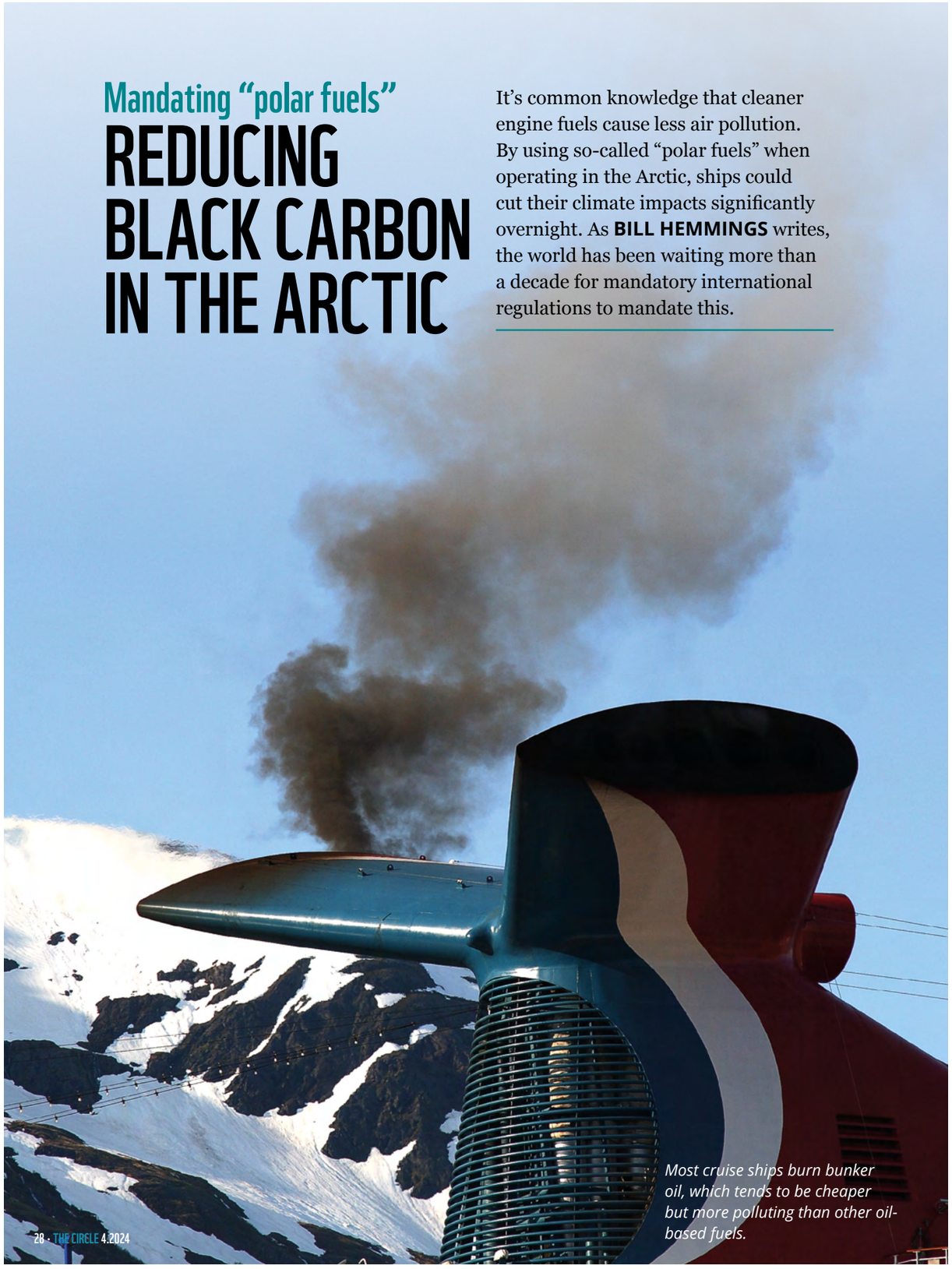
Mandating "polar fuels"

REDUCING BLACK CARBON IN THE ARCTIC

It's common knowledge that cleaner engine fuels cause less air pollution. By using so-called "polar fuels" when operating in the Arctic, ships could cut their climate impacts significantly overnight. As **BILL HEMMINGS** writes, the world has been waiting more than a decade for mandatory international regulations to mandate this.



Most cruise ships burn bunker oil, which tends to be cheaper but more polluting than other oil-based fuels.

Photo credit: Ground Truth Trekking, CC BY 3.0

TWO MAJOR POLLUTANTS present in crude oil—sulphur and aromatic compounds—have been heavily restricted for years in fuels used for road transportation, mobile machinery, rail locomotives and inland shipping. These measures have cut air pollution significantly. Yet the international shipping industry still operates mainly with cheap, dirty residual marine fuels. These fuels contain comparatively high levels of sulphur as well as aromatic compounds that generate black carbon (soot), causing ultra-fine particle pollution.

But there are ways to "clean up" these residual fuels. More intense refinery processes can reduce or remove pollutants to produce distillate fuels, which are cleaner-burning and already used in a variety of large marine vessels, including cargo ships, tankers and passenger ships operating in certain regulated areas, such as the Baltic and North seas.

The use of distillate fuels allows for the fitting of diesel particulate filters that further cut air pollution. These filters already dramatically reduce pollution from road vehicles, and they could do the same on ships—but they cannot be used with residual fuels because these would clog the filters immediately.

LITTLE PROGRESS SINCE 2011

In 2011, the International Maritime Organization (IMO)—the United Nations body responsible for ensuring that international shipping is safe and has minimal environmental impact—was tasked with limiting the impact of black carbon from ships on the Arctic. Black carbon had been recognized not only as a human health hazard, but a powerful, short-lived, climate-forcing pollutant whose impact is magnified when it is released in the Arctic, especially if it settles onto snow, ice and frozen seas.

Arctic ship traffic was already growing, and minimizing this source of black carbon was seen as urgent, given the evident signs of impending Arctic climate breakdown. Yet more than a decade later, sadly, little has been achieved.

More intense refinery processes can reduce or remove pollutants to produce distillate fuels, which are cleaner-burning and already used in a variety of large marine vessels.

In 2012, a study conducted for the IMO identified that switching from residual fuels to cleaner marine distillate fuels would be an effective, immediately feasible approach that would cut black carbon emissions from Arctic ships significantly. (The only downside is its 20+ per cent price premium versus residuals.) Civil society began pressing the IMO to mandate this fuel switch.

But under IMO rules, only Member States can initiate such regulatory action. So instead, working groups convened over successive years to develop a definition of black carbon that everyone could agree on. The groups also set out to identify ways to measure black carbon emissions from shipping, and drew up a long list of potential technical and engine abatement measures, recognizing that ship engine condition, type and load have major influences on emissions. But work to investigate and prioritize the most effective and feasible measures was not pursued.

POLAR FUELS AND LOOPHOLES

In 2021, an IMO resolution called for ships to voluntarily switch from residual fuels to distillate or other cleaner fuels in the Arctic. To reinforce the focus on engine-based solutions, voluntary guidelines for ships to measure and report their Arctic black carbon emissions and set reduction targets for black carbon were also developed and agreed upon by the IMO's Marine Environment Protection Committee in October 2024.

Pressure for the distillate switch was stepped up after the IMO agreed to a ban on the use and carriage of heavy fuel oil in the Arctic. The ban took effect in July, but it is full of loopholes and will not be fully effective until 2029. Moreover, it covers only IMO Arctic polar waters (those specified by the Polar Code), leaving out major areas of the Arctic north of the 60th parallel.

Distillate grade marine fuels were proposed as ideal polar fuels in February 2024 to replace residuals and significantly reduce ship black carbon emissions. The term "polar fuels" was first coined by IMO delegates from Norway and Iceland to disallow the use of high pour-point marine fuels in the Arctic. (High pour-point fuels need high water temperatures in order to remain fluid during an oil spill. In an Arctic oil spill, these fuels would congeal instead of dispersing, and would be virtually impossible to clean up.) Distillate grade marine fuels have low pour points. Last October, IMO delegates stressed that any definition of polar fuels should also include other clean fuels in use today as well as future low-carbon fuels.

Imposing an immediate and mandatory switch to distillate grade marine fuels or other cleaner fuels remains the quickest and most effective way for the IMO to finally act to reduce the impact of pollution from shipping in the Arctic. With the IMO meeting again in January 2025, one question looms: Surely it is worth saving the Arctic (along with the IMO's and international shipping's credibility) by implementing a switch to polar fuels now?

BILL HEMMINGS is a Brussels-based expert on environmental issues related to international shipping and aviation. He also an advisor to the Clean Arctic Alliance.

Photo credit: Northern Voices

Knowledge Keepers gather in Pond Inlet, Nunavut, for a mapping workshop that was part of the Arctic Corridors and Northern Voices project.

Community-based research

DIMINISHING THE IMPACTS OF SHIPPING TRAFFIC IN CANADA'S ARCTIC

Since 1990, shipping traffic in the Canadian Arctic has almost tripled. These ships don't just disrupt marine species—they affect the local Inuit communities that hunt them. The Arctic Corridors Research Project started in 2015 as a way to reduce the effects that increased shipping is having on traditional hunting and fishing activities in the region. During the project, which is ongoing, researchers collaborated with local residents across the north to identify significant marine areas in hopes of developing low-impact shipping corridors.

NATASHA SIMONEE is a resident of Pond Inlet, Nunavut and was one of the community researchers during the first stage of the project. *The Circle* spoke to her about why she got involved and the changes she hopes to see when it comes to shipping in the region.

How would you describe the Arctic Corridors Research Project?

The Arctic Corridors project started off as a few people getting together with ideas that coincided with each other. And then one thing led to another, and it became this really big, cool project. I feel that it was necessary, eye-opening and innovative. I also feel the team did a really good job making sure it spanned the north and including perspectives from different communities.

Why was a project like this needed?

In my community, we see a significant number of ships in a season—and the number is definitely increasing. But it wasn't always like this. To give you some context, as a kid, when a cruise ship came in, it was really exciting. Now, when we see a cruise ship, it's almost as if we sigh and say, "Another ship. I wonder how long they're here for this time?"

Photo credit: Natasha Bee

Natasha Bee with her family.

Not that we don't want them. And not that it isn't a good opportunity, economically. But we've gone from a handful of ships to approximately 30 ships each season, including cargo, cruise and private pleasure craft. And that doesn't include the more than 70 ships that carry iron ore. We have the mining company shipping iron ore through our waters during the entire open-water season. Then we have the tankers that come in with our fuel supply for the year.

How has this increased shipping affected your community?

From my perspective, it's stressful. There's a lot of interruption to our activities. Pond Inlet is an Inuit community that hunts for food. People here are travelling to their cabins and trying to continue their way of life while navigating and sharing the same waters as these really big ships. We have people driving 14- to 24-foot boats and they're having to navigate through the waves created by these ships—and avoid intersecting paths while hunting.

For animals, there are a lot of interruptions. As a matter of fact, this year has been an extreme low for narwhal sightings during the ice break-up and their migration. It's usually an exciting time in our community, with boats everywhere and everybody hunting and working together. But this year, we didn't get to share in that excitement because it was almost as if the narwhal didn't pass by our community, there were so few. But there's so much going on in the bigger picture that we can't pinpoint the cause.

People here are travelling to their cabins and trying to continue their way of life while navigating and sharing the same waters as these really big ships.

Arctic Corridors project lead Jackie Dawson (right) with Natasha Simonee (left) at Pond Inlet, Nunavut.

Photo credit: Jackie Dawson

How has this project helped to improve things?

A project like Arctic Corridors is needed to bring awareness to the daily realities of northern communities and also to the realities of increased shipping in the Arctic and how these two realities are struggling somewhat to coexist. There is no policing of ship traffic in the Arctic. Ships are trusted to follow suggested travel routes and recommendations. Along their paths are historic campsites, many of which are significant to communities and Inuit.

In one part of the project, we met with knowledge holders in the community, including Elders and hunters. And we talked about areas that are significant, such as campgrounds, historic sites or high-traffic areas. They got to highlight what they felt were significant areas, and based on that, they shared any recommendations, whether about ship travelling speeds, routes or "no go" zones. We compiled those recommendations with the hope that shipping companies would consider them. But we just have to hope that people travelling in Arctic waters will review the recommendations.

What would you like to see happen now?

I don't know. I've thought about it a lot. There are days when I think that in a perfect world, there would be no ships. But then no ships would mean I don't get my summer supply of goods and fuel, because that is also part of the shipping activity—we have to be careful that we're not eliminating necessary services. It's difficult, because we need to find the middle ground where we can have both shipping and our traditional way of life. Then there are days I think about how we can ensure that shipping activities and the Inuit way of life coexist without the negative impacts. So far, I don't think we have found a way to balance the two in our daily lives.

One thing we see is that the mining company, Baffinland, follows a very strict speed limit. But they're the only ones that are regulated. We can't really regulate everyone else. What I'm trying to say is that any shipping company that's going up north should consider the recommendations that were compiled through this project. If they did, we would have effective "no go" zones and speed limits in specific areas. But we can't make the law. ●

MAPPING OUT A MORE SUSTAINABLE FUTURE FOR SHIPPING

Shipping generates nearly three per cent of global CO_2 emissions. While there are some reasonably straightforward ways to cut these, the sector's interdependencies with other hard-to-abate industries, such as mining or steel production, complicate matters. As **RAM GANESH KAMATHAM** explains, addressing these issues requires a system-wide approach to sustainability.

At the Chittagong Ship Breaking Yard in Bangladesh, men scavenge barefoot in highly polluted water for scraps of scraps to feed their families.

Photo credit: Adam Cohn, CC BY-NC-ND 2.0 via Flickr.com

Less apparent are the sustainability aspects of building ships in the first place and scrapping them at the ends of their service lives.

THE MOST VISIBLE part of a ship's lifecycle is the time it spends on the water. The sustainability challenges of this phase are widely known: greenhouse gases and pollutants emitted during voyages, and accidents and ship strikes that can harm ecosystems and wildlife. Arctic-specific challenges, such as the risks associated with black carbon or whale strikes in blue corridors, are also clearly linked to shipping operations. Less apparent are the sustainability aspects of building ships in the first place and scrapping them at the ends of their service lives. Both of these phases involve embodied carbon, among other things (see box). The decisions that manufacturers make when building new ships—such as incorporating energy-efficiency technologies, ensuring compatibility with low-carbon fuels, and designing quieter propulsion—can play a significant role in the future of sustainable shipping. When ships are finally sent to scrapyards, different challenges arise, including the need to dispose of hazardous materials, prevent groundwater contamination, and ensure humane working conditions. (Modern ships have a lifespan of 25 to 30 years before corrosion, metal fatigue and a lack of parts render them uneconomical to operate.)

Given all these factors, a definition of "sustainable shipping" can seem elusive. However, leaving out pieces of the puzzle to simplify the definition risks painting an incomplete picture. For example, excluding the roles of ports or the banking and finance sector from the understanding of sustainability in shipping leads to a partial understanding of the problem. A broad and shared vision of what "good" looks like is a crucial step towards accelerating change across the sector.

■ Embodied carbon refers to the total greenhouse gas (GHG) emissions associated with producing, transporting, installing, maintaining and disposing of a material or product throughout its lifecycle, excluding its operational emissions.

In shipping, embodied carbon includes emissions from extracting raw materials (such as steel) for shipbuilding, manufacturing and assembling those components, transporting materials to shipyards, and eventually dismantling and recycling the ship at the end of its life.

Reducing embodied carbon in shipping can help lower the industry's overall environmental impact.

A ROADMAP FOR SUSTAINABILITY IN SHIPPING

In 2016, the Sustainable Shipping Initiative—a community that focuses on engaging with new and emerging sustainability challenges—developed a roadmap representing a holistic view of shipping sustainability. Members of the initiative span the maritime industry and include major shipping companies, banks, ship classification societies, charterers, maritime service providers, ship recycling yards and NGOs focused on shipping issues.

The roadmap depicts six interconnected areas for the industry and other interested parties to collaborate on: oceans, communities, people, transparency, finance and energy. In 2023, we launched a horizon-scanning programme to continuously update the roadmap with topics that could influence the sustainability landscape.

Our roadmap serves not only as a shared vision to inspire and influence the maritime industry, but also as a tool to measure its progress towards sustainability. In addition, efforts are underway to expand the milestones for each of the six areas by including topic-specific indicators to track their yearly progress. The roadmap also aligns with the United Nations Sustainable Development Goals and, increasingly, the recognized nine planetary boundaries within which humanity can continue to thrive for generations to come.

RESEARCH AND PRAGMATISM

The Sustainable Shipping Initiative takes a pragmatic approach to sustainability. This means motivated companies participate in working groups to tackle sustainability-related topics. For example, right now, we are researching how to make "green" steel (steel manufactured without the use of fossil fuels) more attractive to shipbuilders and ultimately reduce ships' lifecycle emissions. This includes making decisions that will affect the choice of steel for new builds, impacts during ship maintenance, and the flow of scrap steel in secondary markets to boost the material's overall circularity.

Companies that prioritize sustainability are drawn to the Sustainable Shipping Initiative because of the holistic approach to current and future challenges. Improving sustainability also requires a certain amount of willingness to engage with complexity and uncertainty. Cross-sectoral perspectives are also important because innovation and learning can be shared to accelerate change. The initiative, through its forums and roadmap, serves as a vital resource to support decision-making.

The shipping sector is making progress towards sustainability in key areas. Although much remains to be done, investing in sustainable solutions now will benefit the sector, society and the planet in the long term. ●

RAM GANESH KAMATHAM is a researcher and head of programmes at the Sustainable Shipping Initiative.

THE BACK PAGE

Photo credit: Public domain via National Library of Norway

Breakthrough in the Northwest Passage

In 1906, the *Gjøa* became the first vessel to successfully cross the entire Northwest Passage, from east to west, in one expedition. The passage is the sea corridor north of Canada's mainland that connects the northern Atlantic and northern Pacific oceans. Captained by Norwegian explorer Roald Amundsen, the journey took more than three years. Since then, some 430 complete maritime transits have been made of the passage.

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