



# UNLOCKING U.S. LEADERSHIP TOWARD ZERO EMISSION SHIPPING

## WORKSHOP SUMMARY

Aspen Institute Shipping  
Decarbonization Initiative

NOVEMBER 3, 2022



# EXECUTIVE SUMMARY



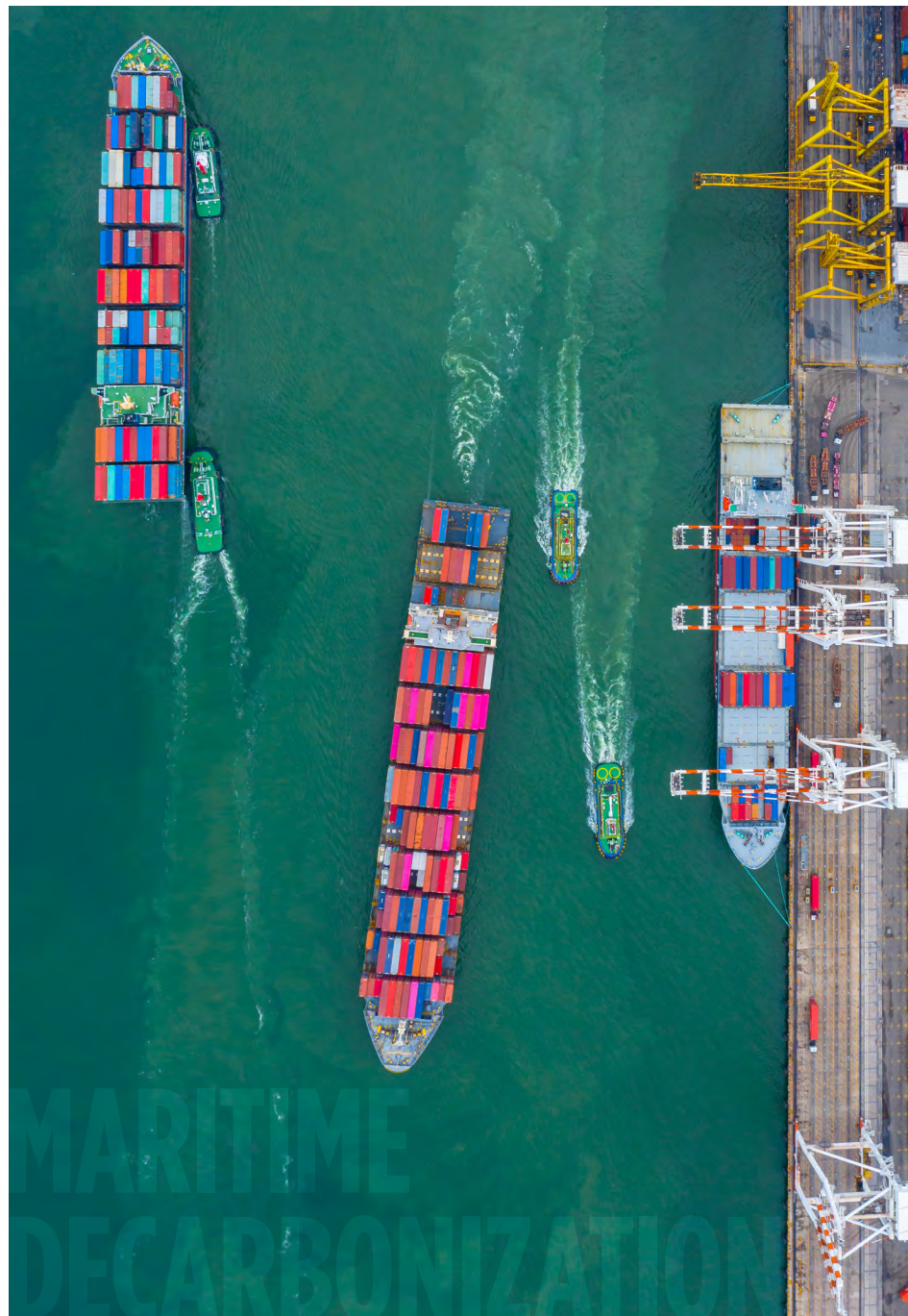
On November 3, 2022, the Aspen Institute’s Shipping Decarbonization Initiative (Aspen SDI) convened a workshop with 45+ U.S. maritime actors titled “Unlocking U.S. Leadership Toward Zero Emission Shipping—Opportunities, Challenges and Pathways Forward.” Participants engaged in a wide-ranging discussion guided

by an agenda which consisted of remarks from government leaders, discussion panels, and participant dialogue focused on challenges and opportunities for maritime decarbonization. The workshop was held under Chatham House rule by which participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed.<sup>1</sup>

Andrew Wishnia, Deputy Assistant Secretary for Climate Policy, Office of the Assistant Secretary for Transportation Policy at the U.S. Department of Transportation (DOT), and Maritime Administration (MARAD) Administrator Rear Admiral (Ret.) Ann Phillips provided keynote addresses. Key points included the Biden Administration’s whole-of-government approach to maritime decarbonization, leveraging recently passed legislation, ensuring an inclusive transition to zero emission shipping accounting for workers and communities, and the need for greater collaboration and partnerships between sectors.

The workshop explored the roles and perspectives of various federal agencies as well as U.S. efforts on the international stage, particularly at the International Maritime Organization (IMO).<sup>2</sup> Through panel and plenary discussion, participants explored the following issues and opportunities:<sup>3</sup>

- 1 An exception to the Chatham House rule was made for prepared remarks delivered by Administration officials, where speakers agreed to have prepared remarks summarized in this document.
- 2 The International Maritime Organization is a specialized agency of the United Nations responsible for setting global standards for the safety, security of international shipping and to prevent pollution from ships.
- 3 Note: these statements do not reflect consensus recommendations. For additional discussion insights, please see full text of the summary.



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**01** Participants expressed that the time is now for action to transition vessels to zero emission fuels to achieve maritime decarbonization goals. This transition may require the retirement or retrofitting of fossil fuel-powered vessels, building new dual-fuel vessels, and procurement of low- to zero emission fuels<sup>4</sup> (hereafter zero emission fuels) such as hydrogen, ammonia, methanol, and/or biofuel to power vessels.

**02** While important steps have been taken toward decarbonization in the U.S. (e.g., through the Bipartisan Infrastructure Law (BIL) and the Inflation Reduction Act (IRA)), there was a sense among participants that significant work remains to align the shipping industry with national and international climate mitigation goals. This includes enhanced funding for innovation and addressing disincentives that may exist in statutes and regulatory structures to enable fuel transitions. Participants underscored the need for the government to help de-risk the transition by providing regulatory certainty and incentives for the private sector. At the same time, agency representatives are looking for signals in the private sector for leadership on the transition.

**03** Participants were enthusiastic about the opportunity for enhanced collaboration and coordination across sectors and communities, including between the shipping industry and port authorities, workers, local communities, and the energy industry to ensure an inclusive and efficient maritime transition. In addition, convening these groups offers a powerful tool to foster connectivity and create new partnerships. Collaboration can also yield enhanced effectiveness when it comes to delivering unified messaging to Congress to educate about the importance of the maritime sector to our nation and encouraging government action in support of decarbonization.

**04** Some participants suggested that elevating the voices of port-adjacent communities is essential for ensuring just outcomes from transitions in the maritime economy. Ports can take action to reduce emissions and pollution while making a significant impact on the surrounding communities, which are frequently minority, underserved, and underrepresented.

**05** It was raised that timely action can yield significant co-benefits for noise reduction, wildlife conservation, and climate adaptation, strengthening the argument for creating timely change.

**06** The maritime sector's ability to decarbonize relies heavily on the energy sources that power the grid. Participants discussed the value of co-locating the build-out of offshore wind development, production facilities for zero emission fuels, and the ports that will utilize them, in order to create a more comprehensive approach to planning for maritime decarbonization.

**07** It was noted that green shipping corridors can serve as pilots and case studies for decarbonizing port infrastructure and vessels, and there are opportunities to expand green shipping corridors using U.S. ports as anchors.

Ultimately, participants concluded that partnerships within and between the private and public sectors, enhanced by civil society engagement and expertise, are critical to channel ambition into action. Building on the topics raised and the success of the workshop, the Aspen Institute plans to convene additional workshops around specific U.S. maritime decarbonization issues, including several topics identified as opportunities and challenges during this workshop.

<sup>4</sup> Zero emission for the purposes of this workshop was defined as "near-zero" for all greenhouse gas emissions on a lifecycle basis rather than net zero, which in some cases may suggest the use of out-of-sector offsets to achieve decarbonization goals.



# BACKGROUND



The Aspen Institute's Energy and Environment Program (EEP) has worked on complicated energy and environmental issues for more than 50 years. EEP's approach is grounded in the Aspen Institute's philosophy that humanity makes progress when thinkers and doers from different backgrounds and perspectives come together to solve critical problems. The program also embraces the power of convening individuals to illuminate new and innovative pathways forward.

In recent years, EEP is actively and purposefully engaging in climate change issues: mitigating the effects of climate change, adapting to the inevitable impacts of climate change, and helping build relationships for corporations needed to achieve these goals amongst people and nations. Toward this mission, Aspen SDI is partnering with leading organizations and companies from around the world, tapping into a vast network to drive the transition to zero emission maritime shipping and decarbonize one of the most important sectors of the global economy. Among its core activities, Aspen SDI is convening multinational cargo owners to accelerate shipping decarbonization, elevating the need for shipping decarbonization within the U.S. policy context, and advancing the establishment of zero emission transoceanic green shipping corridors.



**The time is ripe  
for U.S. leadership  
on maritime  
decarbonization.**

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To make progress on these goals, on November 3, 2022, the Aspen Institute’s SDI convened a workshop titled “Unlocking U.S. Leadership Toward Zero Emission Shipping – Opportunities, Challenges and Pathways Forward.” The workshop, which took place at the Reservoir Center for Water Solutions in Washington D.C., convened 45+ U.S. maritime actors, including U.S. government (USG) officials, policy makers, Jones Act fleet representatives, environmental justice advocates and environmental organizations, port representatives, industry groups, energy producers, and supply chain partners. Workshop objectives included:

## 01.

Build a shared understanding of current and planned activities by governmental and private sector actors that support maritime decarbonization;

## 02.

Identify unique opportunities and challenges for U.S. maritime decarbonization leadership and innovation, domestically and globally; and

## 03.

Explore the critical links between maritime decarbonization and other national priorities, including national security, other environmental obligations, economic development, environmental justice, and American jobs and competitiveness.

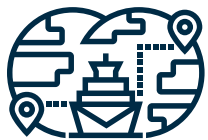
The meeting was designed to foster cross-sectoral dialogue among a representative group of leaders across the value chain in the U.S. maritime economy and several other relevant stakeholders. This was the first in a series of convenings, the outcomes of which will educate decision makers and stakeholders about pathways for U.S. leadership in maritime decarbonization. Participants engaged in wide-ranging discussion and the agenda consisted of remarks from government leaders, discussion panels, and participant dialogue focused on challenges and opportunities for maritime decarbonization. Highlights included:

- Fireside Chat with Andrew Wishnia, Deputy Assistant Secretary for Climate Policy, Office of the Assistant Secretary for Transportation Policy, U.S. Department of Transportation
- Leadership Remarks by Rear Admiral Ann Phillips, U.S. Navy (Ret.), Administrator, Maritime Administration (MARAD), U.S. Department of Transportation
- USG Panel Discussion: “Decoding the Role of the Federal Government in Fostering Maritime Decarbonization”
- Plenary Discussion: “Navigating the Intersection of Maritime Decarbonization and a Range of National Priorities”

The workshop was held under Chatham House rule by which participants are free to use the information received, but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed. The only exceptions were select government officials who agreed in advance to have their keynote remarks summarized on the record. The following sections summarize insights shared throughout the workshop by keynote speakers, panelists, and participants. Key concepts are bolded throughout. The workshop was facilitated by Ingrid Irigoyen, Director of Aspen SDI.



# U.S. GOVERNMENT LEADERSHIP



Recognizing the critical role that the U.S. government plays in setting standards, making key investments in infrastructure, and enabling the conditions that encourage investment in zero emission shipping fuels and technologies, the meeting featured keynote remarks by senior Administration officials and a panel discussion among key leaders at federal agencies that have a role to play in driving maritime decarbonization.

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## Fireside Chat with Andrew Wishnia, U.S. Department of Transportation

To open the meeting, Andrew Wishnia, Deputy Assistant Secretary for Climate Policy, Office of the Assistant Secretary for Transportation Policy at DOT, offered insights into U.S. leadership and innovation opportunities in the transition to zero emission shipping. The format for this discussion was a Fireside Chat with Greg Gershuny, Executive Director of EEP.

During their conversation, Mr. Wishnia conveyed that **the time is ripe for U.S. leadership on maritime decarbonization** by deploying a whole-of-government strategy with several new “tools in the toolkit” provided by the BIL and IRA. Although the shipping sector will be difficult to decarbonize, the funding streams provided through these policies can help the U.S. progress toward its stated economy-wide goals of 50 percent emission reduction by 2030 and net zero by 2050.

Current DOT programs highlighted by Mr. Wishnia as relevant to maritime decarbonization include the Marine Highway Program, the Port Infrastructure Development Program (PIDP), and the Low-No Ferry Program. Mr. Wishnia noted that these programs must align with the Biden Administration’s Justice40 initiative, which makes it a goal that 40 percent of the overall benefits of certain federal investments flow to disadvantaged communities that are marginalized, underserved, and overburdened by pollution, especially as those adjacent to ports tend to experience higher rates of asthma and cancer. In some cases, Mr. Wishnia noted that DOT is going above and beyond this threshold—the PIDP is providing 60 percent of benefits to disadvantaged communities. Mr. Wishnia also noted that it’s not just about resource transfer to these communities but also seeking benefits beyond funding; DOT is developing benefit metrics to ensure a holistic view of community interconnections with government programs.

Mr. Wishnia underscored that **partnerships between federal agencies, other countries, and the private sector will be critical to**

**bring these developments to scale.** To complement the regulatory and funding capabilities the DOT and other agencies possess, the power of convening should be utilized to advance these partnerships and build momentum for action. Mr. Wishnia concluded by underscoring how several cities and ports, both domestic and international, are leading the way and making meaningful contributions to global efforts to limit warming, such as through port electrification.

**The next two years will be critical for progressing toward full maritime decarbonization by 2050.**

## Leadership Remarks by Rear Admiral (Ret.) Ann Phillips, Maritime Administration

Maritime Administration (MARAD) Administrator Rear Admiral (Ret.) Ann Phillips highlighted growing recognition among the American people of the critical role the maritime sector plays in moving goods on which the economy depends. Administrator Phillips noted the Biden Administration’s focus on this issue through the February 2021 Executive Order on Supply Chains and creation of a Supply Chain Disruptions Task Force co-chaired by Transportation Secretary Buttigieg. The Administrator discussed recent funding announcements for the PIDP and highlighted projects under the Maritime Environmental and Technical Assistance (META) Program.

Administrator Phillips conveyed that **maritime decarbonization solutions need to cater to specific regions and vessels.** She emphasized the importance of MARAD projects supporting maritime workers and underrepresented communities. As much of the progress toward decarbonization will depend on upgrading fleets, it will be important to provide guidance on preferred fuels and technologies. As these fuels will need to be transported to ports and vessels, infrastructure development will be critical. To conclude, the Administrator underscored the opportunity for collaboration across agencies and stakeholders and emphasized that now is the time for action.



## KEY FEDERAL AGENCY ROLES AND PERSPECTIVES

In addition to the keynotes, agency representatives across the USG who have a role to play in driving maritime decarbonization shared key insights on their roles and perspectives on enabling zero emission shipping during a panel presentation. The panel was moderated by Kathryn Benz, Senior Policy Manager, Aspen SDI. Through their remarks and perspectives, it was clear that **collaboration and coordination across and within agencies is key to how the U.S. government is creating a pathway to maritime decarbonization**. Roles that each agency highlighted include the following:

**Agency representatives are looking for signals in the private sector for leadership on the transition, but industry representatives assert the need for the government to establish a clear regulatory framework due to the complexity of the transition and the need for global interoperability. Collaboration across private and public spaces can help break this cycle of waiting for others to act and identify a path forward.**

### Department of Energy (DOE)

The DOE is supporting the transition to net zero in the transportation sector through research, development, and large-scale demonstration (RD&D) of fuels and technologies. DOE noted that many of the zero emission shipping fuels already exist but are not yet produced at the scale needed to decarbonize the maritime sector. Therefore, DOE will largely focus on refining technical applications and supporting technology-to-market activities designed to accelerate the commercial viability and availability of these fuels and technologies. Current foci include investments in hydrogen, biofuels, electrification of powertrains, and infrastructure. On hydrogen for example, DOE is working to address storage needs by developing large scale hydrogen storage vessels in partnership with the National Aeronautics and Space Administration (NASA). The National Laboratories play a key role in the agency's research infrastructure. For example, DOE's Argonne National Lab is using modeling to examine lifecycle assessments for emissions to help identify pathways and implementation.

### Maritime Administration (MARAD)

MARAD's mission is to foster, promote and develop the U.S. maritime industry to meet the nation's economic and security needs. The DOT agency is responsible for the U.S. waterborne transportation system and its seamless integration with other segments of the transportation system, including maintaining the viability of the U.S. Merchant Marine. MARAD manages several programs that support the U.S. maritime industry, including the META program, PIDP and the Marine Highway Program. MARAD is partnering with DOE, the U.S. Environmental Protection Agency, National Oceanic and Atmospheric Administration (NOAA) and other agencies to address the various facets of maritime sector decarbonization. To meet near and long-term domestic and international decarbonization goals, MARAD noted that additional coordination and partnerships with industry stakeholders and non-governmental organizations will be essential to meet this challenge.



**Planning for port infrastructure upgrades to foster decarbonization is also an opportunity to plan for greater resilience to sea-level-rise and increasingly severe coastal storms.**

### U.S. Environmental Protection Agency (EPA)

The EPA regulates air pollution from port activities. EPA's Ports Initiative provides funding and technical resources to ports, fosters federal agency coordination, and enhances knowledge sharing. EPA is also working to ensure benefits to the people facing the greatest environmental and public health impacts from port infrastructure by promoting collaboration between ports and communities for effective planning, which requires local and community level partnerships.

### Department of State (DOS)

The DOS, Bureau of Oceans and International Environmental and Scientific Affairs, in partnership with the Office of the Special Presidential Envoy for Climate, has been leading U.S. climate efforts abroad. Overall, DOS is leveraging bilateral relations to increase ambition of other countries domestically and internationally on maritime decarbonization. At COP26, the U.S. announced support for zero emission shipping by 2050 and a declaration on green shipping corridors. Looking ahead to COP27, DOS noted that the U.S. is preparing to announce the Green Shipping Challenge with Norway and other partners meant to put the sector on a credible pathway this decade toward decarbonization by 2050.

### U.S. Coast Guard (USCG)

The USCG, Systems Engineering Division, is responsible for developing and promulgating national regulations and standards that govern the safe design and construction of marine engineering equipment, including mechanical, electrical, and navigation equipment. Overall, the USCG plays a key role in international maritime policy and serves as the U.S. Head of Delegation to the IMO.

**Collaboration and coordination across and within agencies is key to how the U.S. government is creating a pathway to maritime decarbonization.**

## **U.S. WHOLE OF GOVERNMENT APPROACH & INTERNATIONAL LEADERSHIP**

Each of the aforementioned agencies work in partnership on maritime decarbonization efforts. Participants noted that this is not an exhaustive list of agencies involved in maritime decarbonization; NASA, NOAA, other divisions of the DOT, and additional agencies are valuable partners. In discussion among panelists, agencies described how they are employing a whole-of-government approach to climate action, bolstering collaboration on zero emission shipping. The agencies see themselves as playing a key role in providing confidence in a decarbonized future and de-risking private sector investment. They also see collaboration with other sectors as key to realizing their missions—especially when it comes to identifying fuel sources and technologies of the future.

In addition to the domestic responsibilities outlined above and driving action at home to act as a global leader, there has also been significant action on the international stage. Several agencies are engaged at the IMO, which is in the process of revising its strategy for reducing greenhouse gas (GHG) emissions from international shipping. The U.S. has been an active participant in these international discussions and is collaborating with other countries to drive ambition and establish robust mid-term targets.

At COP26, the U.S. announced support for zero emission shipping by 2050 and a declaration on green shipping corridors with over 20 additional nations. At COP27, the U.S. and Norway are expected to launch the Green Shipping Challenge which will include major announcements from countries, ports, and companies on issues such as innovations for ships, expansion in low- or zero emission fuels, and policies to help promote the uptake of next-generation vessels.

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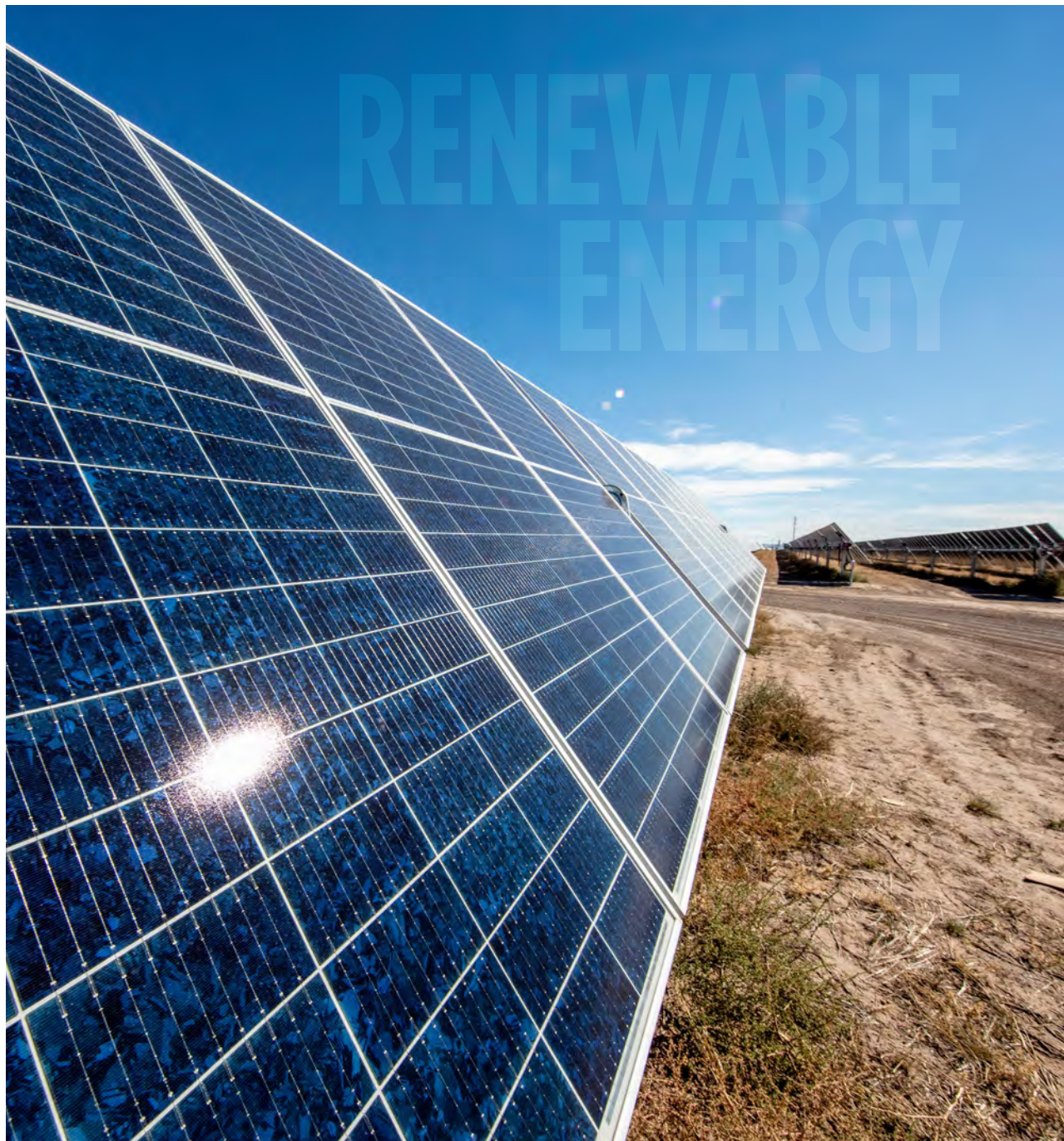
# KEY WORKSHOP THEMES

## Catalyzing an Inclusive Transition to Zero Emission Shipping



Through generative discussion and joint exploration, participants at the workshop identified a variety of opportunities and challenges in the movement toward maritime decarbonization and explored innovative policy options to help address challenges and promote opportunities. Among the topics discussed, several participants expressed the view that nearly all vessels will need to operate on zero emission fuels to decarbonize the sector by 2050. This may require the retirement or retrofitting of fossil-fuel powered vessels, building new dual-fuel vessels, and the procurement of zero emission fuels such as hydrogen, ammonia, methanol, and/or biofuel to power these vessels. Maritime workers will need to be familiar with these vessels and trained to operate them safely and efficiently. Meanwhile, participants expressed their views that ports will need to become almost entirely electrified in order to achieve decarbonization. For these transitions to support economy-wide decarbonization, the fuel production process and electricity powering ports as well as any electric vessels must be generated through renewable energy.

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## ➤ Reason for Optimism, Movement Towards Action

Participants spanning sectors and geographies agreed **the next two years will be critical for progressing toward full maritime decarbonization by 2050**. There was a sense that progress has been made in recent years, including the increasing number of private sector commitments from across the maritime value chain, some domestic policy action, and increased pressure on the IMO to raise decarbonization ambition globally. In addition, the American public has a greater sense of the importance of maritime commerce based on how supply chain disruptions impacted their lives during the COVID pandemic. Meanwhile, **participants underscored the need for raising ambition, transforming commitments into action, and answering core questions as soon as possible, recognizing that delays now will lead to higher future costs. Participants further recognized that in order to achieve 2050 decarbonization goals, innovation needs to be catalyzed this decade because of the long-term nature of investments in the maritime sector.**

Participants noted that the identification of and coalescing around zero emission fuels is essential to invest in the infrastructure necessary to realize their generation, delivery, and use in a sustainable, economical, and efficient manner. Participants differed on the roles that these fuels should play, and there is a need for coordinated discussion that considers multiple factors across sectors to identify a path forward. Once government and civil society align around standards and policies to support zero emission fuels (e.g., hydrogen, ammonia, methanol, and/or biofuel), first-mover risk will be reduced, facilitating adoption and infrastructure buildout. Fortunately, across the private and public sectors, innovation to meet these endpoints is expanding. The maritime industry is receiving greater resources and attention, having moved past the question of if there's a need to decarbonize and instead focusing on how to achieve this goal.

**Recent legislation passed in the U.S. is helping to create the market signals and enabling conditions necessary for decarbonization of this sector.** As referenced by the keynote speakers, the last two years saw the BIL and IRA signed into law, securing significant investments in port infrastructure, cleaner vessels and fuels, and grid electrification. These investments will bolster existing programs that reduce air pollution at ports, allow for installation of port electrification and hybrid/electric equipment, and offer incentives for ferry boats to decarbonize. One clear example of how these signals are driving change for decarbonization overall is how the IRA, and the hydrogen production tax credit in particular, have transformed the economics of hydrogen, moving “green hydrogen”—hydrogen generated by renewable energy—in the U.S. towards cost competitiveness and shifting the market from Europe to the U.S.

**Partnerships within and between the private and public sectors, enhanced by civil society engagement and expertise, enable greater understanding and effectiveness in tackling maritime decarbonization.**



## ➤ De-Risking to Enable Maritime Sector Leadership

Participants expressed that maritime decarbonization will depend on transformative action by actors across the value chain, as well as government and port entities. However, actors seeking to be leaders in the transition face significant uncertainty, and different sectors are looking to each other for leadership. **Agency representatives are looking for signals in the private sector for leadership on the transition, but industry representatives assert the need for the government to establish a clear regulatory framework due to the complexity of the transition and the need for global interoperability. Collaboration across private and public spaces can help break this cycle of waiting for others to act and identify a path forward.** While there is great interest in maritime decarbonization, and RD&D projects on zero emission fuels are underway, additional clarity on the fuels and technology pathway is needed. Without addressing this uncertainty, those seeking to drive innovation and adopt new technologies may encounter a competitive disadvantage by investing in less proven options or they may have to engage in costly retrofits later in time. Participants stressed the importance of government action to de-risk the transition and to ensure the cross-value chain coordination, collaboration and innovation needed to decarbonize the sector.

The creation of the Maritime Green Corridor in the Pacific Northwest across three cruise lines and seven ports was given as an example of innovation, collaboration, and leadership in action to create a new path forward. Participants suggested that green shipping corridors can serve as pilots and case studies for decarbonizing port infrastructure and vessels. Participants noted that the U.S.-Canada maritime border should be considered as a prime green corridor opportunity, as should Seattle to Alaska, the U.S. West Coast to Hawaii, the U.S. East Coast, the Great Lakes, and the Gulf of Mexico. Green shipping corridors can act as a likely first step towards larger-scale international interoperability; ports engaged in green shipping corridors can act as anchors for expansion.

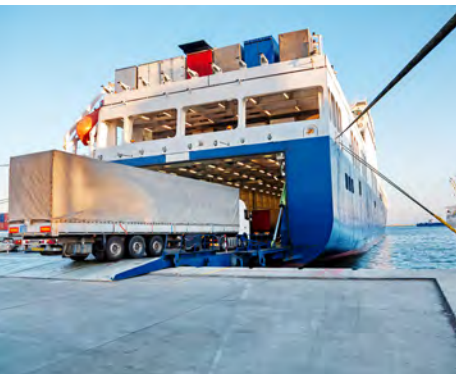
In addition to specific nodes of collaboration, more rapid and consistent change will require consistency and a stronger enabling environment. It was emphasized that the government can also take several steps to help build confidence to catalyze the necessary private sector investment and de-risk the transition. As there is uncertainty about the pathways for development of zero emission fuel(s) amongst the suite of options—hydrogen, ammonia, methanol, biofuels, etc.—clear guidance will be necessary. However, **identifying leading fuels and transitioning to shore power will require collaboration across the value chain and among government agencies as well as representation from other stakeholder communities.** Participants noted that once additional clarity is determined, the government can support the production, investment, and purchase of preferred fuels, vessels, and supporting infrastructure that can operate on them and provide the regulatory consistency needed for widespread adoption. These same opportunities for government support apply to port electrification. If this is done in a timely manner, it can support first movers in the short- and long-term during their leadership efforts in maritime decarbonization.



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## ➤ Addressing Worker and Community Needs

It was emphasized in discussion that maritime decarbonization will have broad ranging impacts for a variety of stakeholders. **New infrastructure, fuels, and vessels will require different operating procedures for maritime workers. These workers will need to be trained and supported during the transition to new technologies.** As the individuals who will be implementing many of the changes on ships and at ports, workers are key to ensuring efficient and effective adoption. Chief among the issues facing this community is ensuring worker safety on new or retrofitted ships and establishing protocols for safety at sea with new fuel sources. It was noted that the USCG is leading efforts to ensure a safe and sustainable environment for the maritime community amidst changing fuels through regulations and international collaboration. In addition, the workforce will need to be trained for new technologies—maritime academies need support to advance curricula, while engineering programs can offer new certifications to ensure consistency and excellence in the workforce. By prioritizing workers, the shift toward zero emission shipping can align environmental and labor interests, which as one participant noted, may help bridge historical disagreements. Attention should be given to helping the existing workforce transition their skill sets to ensure that concerns about automation or other economic impacts are mitigated. It was noted that it will be critical for worker voices to be represented across maritime policy and technology discussions.



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**Transitions in maritime spaces also need to consider and prioritize the needs of port-adjacent communities. It was noted that these communities, which often consist of disadvantaged and underserved populations, have faced some of the greatest impacts from emissions from the maritime sector.** Ports and vessels create significant amounts of air, water, and noise pollution, and it was noted that increased levels of pollutants have been linked to higher rates of asthma and cancer in these areas, undermining public health goals. As one participant exclaimed, “we can do better.” The discussion pointed to the power of individual ports to make meaningful change when it comes to emission and pollution reduction, in a way that makes a significant positive impact on surrounding communities while simultaneously working to achieve decarbonization goals and reducing the climate pollutants in these areas as well.

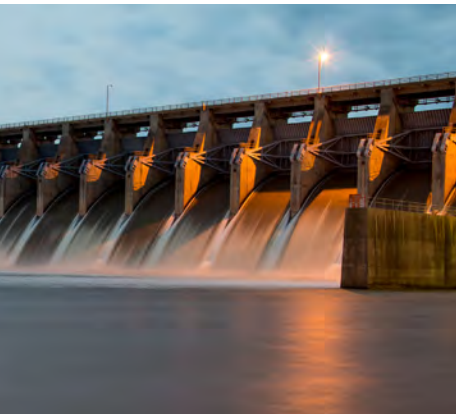
The Moving Forward Network was raised as an example of environmental justice groups coordinating on policy and advocacy, with a key focus on zero emission freight. This network has focused on the development of mandatory regulations to guarantee a path to zero emissions, ensuring zero emissions throughout a vessel’s lifetime, and preventing the expansion of ports to accommodate larger, more emission and pollution intensive, ships. One participant noted that port-adjacent communities are sometimes wary of transitioning to hydrogen fuels but could be more open to considering the full range of fuel options with increased engagement with maritime leaders. Overall, participants stressed that local communities and labor interests should be elevated in maritime decision-making so the sector can chart an equitable future during this transition.



## ➤ Partnering with the Energy Industry



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As several participants highlighted throughout the workshop, **the maritime sector's ability to decarbonize relies heavily on the energy sources that power the grid.** Ports are significant consumers of electricity, and thus their ability to decarbonize is contingent upon whether the electricity was generated by renewable or fossil fuel sources. Similarly, shoreside electric hookups for ships at berth and electric vessels will be operated by the same fuel sources that power the grid. Participants noted that production of zero emission fuels like ammonia or hydrogen is only considered “green” if the electricity is sourced from renewables. Zero emission fuels are fuels which have zero or near-zero GHG emissions (not only carbon dioxide emissions) on a lifecycle basis; the importance of the consideration of emissions from the production of these fuels was noted by participants in order to assess the complete climate impact of zero emission fuels. These factors contributed to a shared sense that **renewable energy production to power the creation of zero emission fuels needs to be considered in tandem with other maritime decarbonization efforts.** One specific suggestion is to seek out opportunities to enhance discussion and collaboration between the maritime and energy sectors, including utilities, as they do not traditionally engage with one another.

Synergies were also raised in particular with offshore wind development. **Co-location of the build out of offshore wind development, production facilities for zero emission fuels, and the ports that will utilize these fuels can offer a more comprehensive approach to planning for a low carbon future.** There was a sense by some participants that a renewable grid is within reach for much of the U.S., although others were less optimistic about the transition. In addition, Power-to-X initiatives by renewable energy companies can help to support the transition with focused attention on bringing renewable power where it needs to be to facilitate zero emission fuel production and infrastructure transitions overall. Such linkages would increase efficiency and resilience. Accordingly, participants expressed a desire to include representatives from the offshore wind industry and other renewable energy producers in future workshop discussions to promote alignment and discuss comprehensive approaches to planning as regions move towards renewable transitions and projects are developed.

## ➤ Recognizing Context to Facilitate Maritime Decarbonization

There was a strong sense among participants that **each vessel type, port, local community, electric grid, and market in the maritime sector has unique characteristics, which need to be accounted for when developing and implementing climate transition strategies.** For example, one participant noted that prevailing winds on the West Coast tend to move air pollutants onshore, generating an additional set of impacts on the local communities, whereas winds on the East Coast tend to move pollutants offshore. While zero emission mandates provide a “north star,” some participants felt that implementation roadmaps should be customized based on their contexts – including geography, vessel types, and routes.

Participants also noted that **decarbonizing the federal fleet is a specific untapped opportunity to drive shipping decarbonization domestically.** Participants acknowledged the challenge of influencing the U.S. Department of Defense’s policies on this issue related to decarbonizing military vessels, while nevertheless emphasizing the importance of doing so. However, even excluding military vessels, the federal government owns and operates a significant number of ships which present a prime decarbonization opportunity.

**The Jones Act Fleet, i.e., U.S. -owned, -built, -crewed, and -flagged vessels engaged in the domestic transport of cargo, represents a unique opportunity for decarbonization as well, especially the inland waterways fleet.** Key elements making the Jones Act Fleet optimal for a large impact on decarbonization include: much of the fleet is aging, it is widely distributed across the U.S., the large size and fuel demand nearly satisfies the scale required to make zero emission fuel sources profitable, and there is a great potential to support the existing workforce through these changes. The fleet is also already supported within a robust, bipartisan piece of legislation. However, the fleet needs regulatory certainty and government investments to facilitate changes, which can come not just through building new ships but also through retrofits. There was also a sense that domestic ports and vessels need to collaborate more frequently on jointly developing solutions; in some cases, one is waiting for the other to provide necessary direction, rather than working together on creating a path forward.



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## ➤ Other Policy Tools

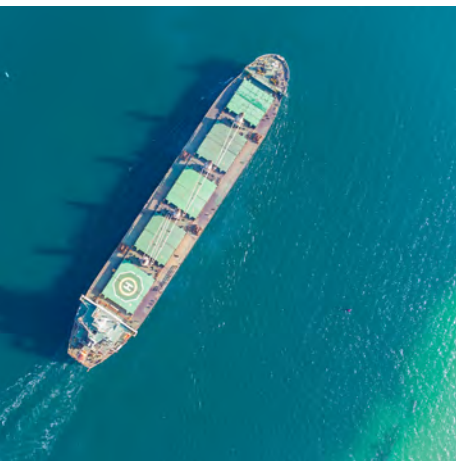
Fuel standards were another major discussion topic to create consistency and direction necessary to foster change. Some participants felt that fuel intensity standards, such as those proposed in the Clean Shipping Act of 2022, are a key enabler for vessel decarbonization by providing clarity and metrics. **Monitoring, reporting, and verification of emissions from ports and vessels was deemed important to create transparency and accountability and ensure climate benefits are achieved from technological changes.**

Participants also discussed the Clean Shipping Act's zero emission at berth standard, which was viewed by some participants as a "win-win" for environmental justice and decarbonization. However, in the absence of federal funding to support infrastructure upgrades required for achievement of such a standard, others considered it prohibitively expensive to reconstitute berths for shore power and logistically difficult due to infrastructure permitting timelines.

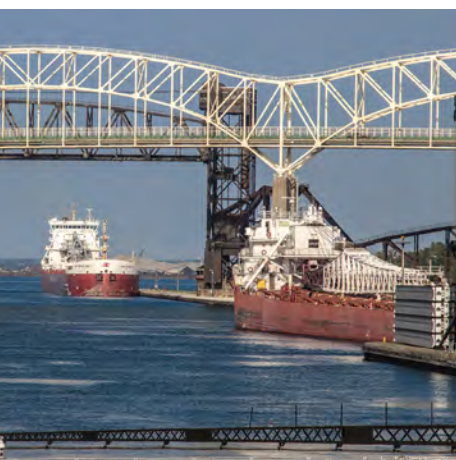
Participants referenced several other policies as critical enablers for decarbonization. Some participants noted that global carbon pricing can help put decarbonized fuels on a more level playing field with their fossil fuel competition. One participant explained that a global carbon price of \$250-\$500 per ton of carbon dioxide emissions may be necessary to close the cost gap, and that each year of delay may increase the cost of achieving decarbonization by 2050 by \$100 billion. However, some participants noted that there may be challenges to achieving this global policy goal given concerns about carbon pricing expressed by some delegations at the IMO.

One participant pointed out that the renewable fuel standard (RFS) program has Internal Revenue Service carve-outs around excise taxes that could disincentivize decarbonization. Another participant explained that this carveout is statutory, not regulatory, limiting the EPA's ability to address it beyond the agency's interpretation of the statute.

**Participants agreed on the need to take a bipartisan approach to maritime decarbonization.** For example, the Jones Act has bipartisan support, which can be built upon. Other ideas raised were replicating successful programs in other transport industries such as the "Cash for Clunkers" program for older, less fuel-efficient vehicles, and applying the concept to ships. There was also an optimistic sense that "we've been here before and can do it again" with fuel transitions (e.g., moving away from coal in the transportation sector) and with transitions in the maritime sector (e.g., how enactment of the Oil Pollution Act of 1990 resulted in phasing out single-hull tankers in U.S. waters). Participants noted that there is an opportunity to come together to develop a broader congressional education campaign and ensure it is reflective of the broad range of perspectives within the maritime community. In doing so, it was suggested that identifying commonalities can bring strength to collaboration and advocacy efforts.



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## ➤ Co-Benefits of Transitioning to Zero

As one participant put it, “zero solves lots of problems.” Participants pointed out that **reducing emissions not only helps with GHG reduction and associated climate benefits, but also with noise and other pollutants that cause environmental and human health impacts**. Some participants emphasized that noise is particularly important for the maritime community due to the prevalence of endangered and protected marine mammal species that are sensitive to noise. It was noted that reduction of ship noise in places like Puget Sound has been shown to have positive environmental co-benefits.

In addition, **planning for port infrastructure upgrades to foster decarbonization is also an opportunity to plan for greater resilience to sea-level-rise and increasingly severe coastal storms**. While not discussed in depth at the meeting, one participant noted the importance of this context for future conversations to ensure infrastructure investments not only advance decarbonization, but also do so in a way that is resilient to growing threats from climate change.



# PATH FORWARD



The workshop provided valuable insights on catalyzing an inclusive transition to zero emission shipping, planning for maritime decarbonization, federal leadership, and policy opportunities.

Across each of these topics, participants considered cooperation between a variety of public and private actors to be a critical enabler. **Partnerships within and between the private and public sectors, enhanced by civil society engagement and expertise, enable greater understanding and effectiveness in tackling maritime decarbonization.** There was also a sense that the broad community represented in the room holds a lot of potential for affecting change; opportunities to find common ground and advocate for creating a decarbonized maritime future in partnership with Congress can help advance shared interests.

Aspen SDI plans to convene additional workshops around specific U.S. maritime decarbonization areas. The aim of the workshop series is to foster greater collaboration within and between the public and private sectors. At the conclusion of the series, the Aspen Institute will issue recommendations for decarbonizing domestic U.S. shipping and enhancing U.S. leadership globally on this issue. The Aspen Institute welcomes suggestions on future agenda items and ways of broadening the discussion to ensure all relevant stakeholders are represented.

## Acknowledgments

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