

ASPEN INSTITUTE SHIPPING DECARBONIZATION INITIATIVE
WORKSHOP SERIES

Mapping Pathways to U.S. Maritime Decarbonization

WORKSHOP SUMMARY

MAY 10, 2023

Workshop Topics

Green Build:

Port Infrastructure Permitting
and Financing Opportunities and
Challenges

Charting a Course Toward

Decarbonization:

Establishing Domestic Maritime
Green Shipping Corridors

MAY 16, 2023

Workshop Topic

On the Horizon:

Building Zero-Emission Vessels
in the U.S.

EXECUTIVE SUMMARY



Shipping Decarbonization Initiative

◆ aspen institute

Decarbonizing the United States (U.S.) maritime sector on a 1.5°C Paris-aligned timeframe will require harnessing the existing momentum of first movers, building on recent federal investments in maritime decarbonization, and creating public-private partnerships to

tackle outstanding challenges in a coordinated fashion. Creative approaches to making zero-emission¹ technologies and fuels commercially viable, updating workforce training and safety protocols, streamlining regulatory processes, and considering the needs of port communities in decision-making will be essential components for success.

In late 2022, Aspen Institute's Shipping Decarbonization Initiative (Aspen SDI) commenced a workshop series to convene government, industry, and civil society organizations involved in U.S. maritime issues to: 1) build a shared understanding of current planned activities by government and private sector actors that support maritime decarbonization; 2) identify unique opportunities and challenges for U.S. maritime decarbonization leadership and innovation domestically and globally; and 3) determine policy actions, partnerships, and incentives that could further support decarbonization efforts in the U.S.²

¹ *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.

² Aspen SDI initiated the series by convening an in-person workshop on November 3, 2022, titled "Unlocking U.S. Leadership Toward Zero Emission Shipping – Opportunities, Challenges and Pathways Forward" (summary available upon request).



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The first in-person workshop broadly explored the roles and perspectives of various federal agencies on maritime decarbonization, as well as potential partnerships between private and public sectors in this area. The event convened over 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.

MAY WORKSHOPS

Based on input from the inaugural event, Aspen SDI convened two additional virtual workshops in May 2023 to focus more deeply on challenges and opportunities for decarbonizing port infrastructure, establishing domestic maritime green shipping corridors (maritime GSCs), and building zero-emission vessels in the U.S.³

The virtual meetings convened U.S. maritime actors, including USG officials, Jones Act fleet representatives, environmental justice advocates, environmental organizations, port representatives, shipyard representatives, industry groups, and members of the maritime supply chain. Through focused workshop-wide discussion and smaller breakout groups, participants sought to meet three primary objectives:

- 1** Explore viable technical, financial, and regulatory pathways toward a zero-emission U.S. maritime sector;
- 2** Create space for multi-stakeholder discussion, collective learning, and joint problem solving to address opportunities and challenges unique to decarbonization of the U.S. maritime sector; and
- 3** Identify short and long-term policy measures, partnerships, and incentives needed to accelerate decarbonization actions in the U.S.



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The workshop on May 10, 2023, included two sessions focused on: 1) permitting and financing of resilient port infrastructure and zero-emission port equipment and technology; and 2) identifying and advancing opportunities for establishing domestic maritime GSCs. The workshop on May 16, 2023, focused on designing, building, launching, and operating zero-emission vessels in the U.S., as well as workforce development in the U.S. shipbuilding sector.

These workshops were held under the 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 following sections summarize insights shared by participants throughout the workshops. Key insights are bolded throughout.⁴ The workshop on May 10 was facilitated by Ingrid Irigoyen, Director of Aspen SDI, and the workshop on May 16 was facilitated by Selena Elmer, Aspen SDI Senior Program Manager.

³ The May workshops acknowledged, but did not focus on, issues with the availability of zero-emission fuels, renewable energy supply, or the U.S. grid system. Rather, these issues will be addressed separately in a future, dedicated workshop.

⁴ Note: The following statements do not reflect consensus recommendations. For additional discussion insights, please see the full text of the summary.

KEY THEMES

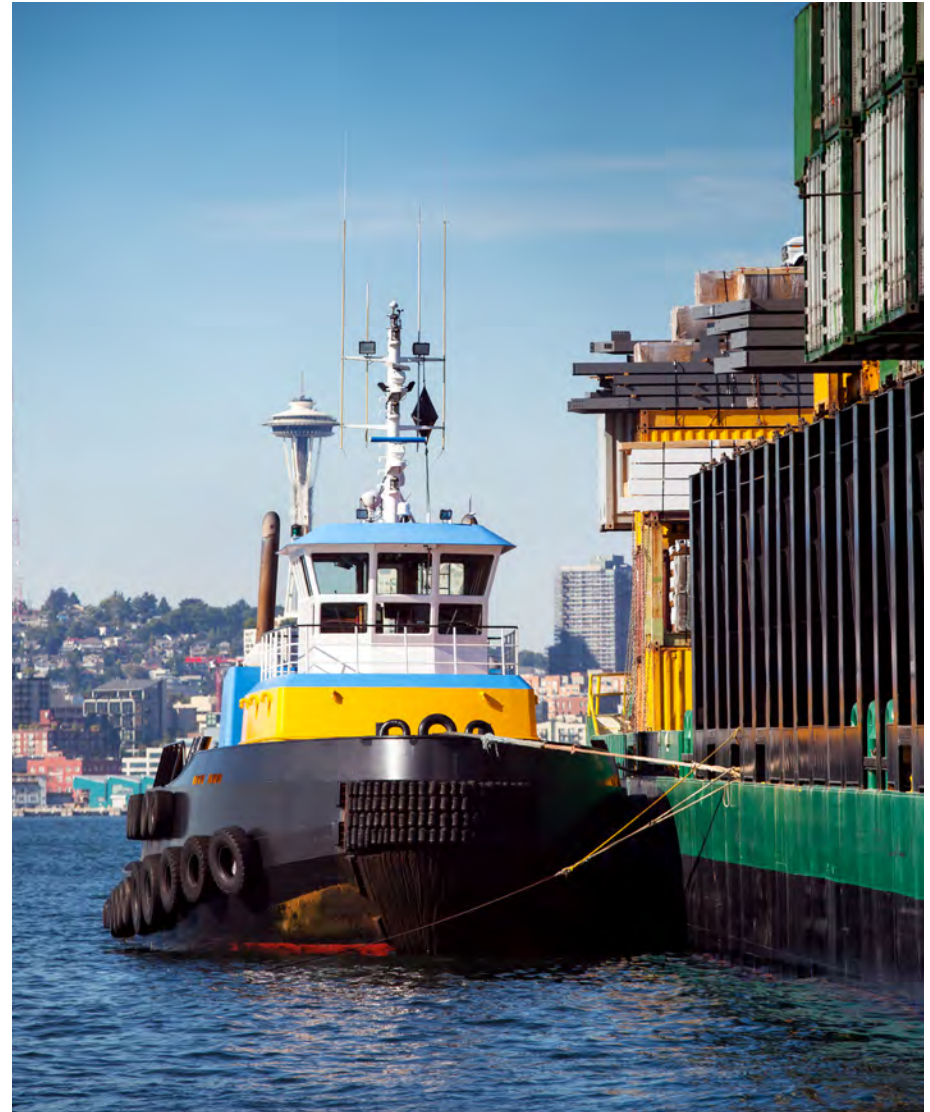
Five primary cross-cutting themes were raised throughout the workshop series:

1 TRANSPARENCY AND COLLABORATION

Establishing a shared understanding of definitions, sharing data, early engagement, and forming partnerships (public-private, private-private, and public-public) are critical to successful cross-sector collaboration. Participants flagged the need to address the core tension between data transparency and market competition in order to promote the decarbonization transition. Throughout all three sessions, participants frequently highlighted the need to collaborate and communicate more often and more effectively across the public and private sectors, and to establish spaces that allow for this collaboration. This need was also identified in the November workshop.

2 SCALE MATTERS

It is crucial to consider the different needs of, and resources available to, smaller and regional maritime players to facilitate an effective and inclusive transition that ensures no one is left behind. Participants noted that economies of scale are a challenge for smaller ports when purchasing new equipment, investing in infrastructure, applying for grants, and securing the environmental permitting required before receiving grant funding. Beyond size differences, multiple participants also noted U.S. ports vary widely in governance structure, ranging from public ownership to private operations to public-private partnerships. Participants generally agreed that current funding mechanisms do not take into account the diversity of the U.S. ports and vessel owners and operators and their unique needs and resource limitations.



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3 UNIQUE NATURE OF U.S. MARITIME INDUSTRY

The Jones Act ([46 U.S.C. § 50101](#)) plays a significant role in U.S. national security and competitiveness, and the domestic context requires tailored approaches. The importance of the Jones Act fleet was discussed throughout the workshops, and multiple participants noted that it makes financial sense to invest in rebuilding and refurbishing the Jones Act fleet, as those vessels have a longer service life than vessels built in Europe or elsewhere. Participants highlighted that the “Buy America” stipulations in recent infrastructure bills pose a challenge because much of the technology needed for maritime decarbonization is not currently manufactured in the U.S.



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4 CREATIVE PLANNING FOR THE FUTURE

Participants noted that rapidly evolving technologies and an aging workforce require rethinking what the maritime industry is and must become to effectively plan for decarbonization of the sector. Workforce development was discussed at length, particularly in relation to the U.S. mariner and shipbuilding workforce, and participants raised that market stability and predictability in the sector are a major challenge that must be addressed in order to build the blue economy of the future.

5 BALANCE POLICY WITH PROGRESS

Regulation, policy, and financial incentives can play a key role in stabilizing markets and fostering innovation in the maritime sector, but certain regulatory and grant processes used to upgrade port infrastructure or approve new zero-emission technologies can be time consuming and create implementation delays. Multiple participants observed that federal agencies are understaffed and need additional support to award port infrastructure grant funding and to review and approve new zero-emission ship designs in a timely manner. Workshop discussions focused on the need for increased clarity on the scope of existing federal and state regulations and grant programs, and the need for stable funding for incentive programs in order to create an even playing field in the marketplace. This added clarity would also benefit the development of maritime GSCs in the U.S. and provide further opportunity to pilot new decarbonization technologies. To address these issues, the need for a more cohesive U.S. national maritime strategy was raised on a number of occasions. A national maritime strategy could help identify maritime decarbonization needs and determine the best value for government investment in terms of emissions reductions.

OPPORTUNITIES



Throughout the two workshops, participants shared experiences and collaboratively identified solutions that could help to pave the way for a zero-emission U.S. maritime sector. These opportunities are identified below as potential paths forward for both the public and private sectors.

Note: *These opportunities were raised by individual participants throughout the workshops and do not reflect consensus recommendations.*

The U.S. needs a comprehensive national maritime strategy that identifies maritime decarbonization needs, coordinates federal programs and investments, and strives to determine the highest-impact federal investments to accelerate emissions reductions.



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EXECUTIVE BRANCH: Grants and Coordination

- Reduce barriers to partnership on grants by removing restrictions on the number of applications per port or how many times one organization can apply for a grant.
- Increase, and clarify the process for, engagement with industry before a new technology design is created and encourage concept review discussion early and often in order to facilitate faster approval of these designs.
- Enhance interagency collaboration to coordinate disparate maritime decarbonization programs for a more cohesive impact.
- Identify standard measurements for emission reduction to support consistent reporting and methodology across the maritime value chain.

PRIVATE SECTOR/CIVIL SOCIETY: Partnerships and Information Sharing

- Consider establishing a zero-emission technology and design information hub to share information and lessons learned among stakeholders. Allow the federal government to access the information to develop decarbonization programs more quickly.
- Collaborate with the U.S. Merchant Marine Academy in developing curricula based on new zero-emission technology, designs, and industry needs forecasting.
- Increase prioritization for recruiting and retaining a U.S. maritime workforce that can build zero-emission vessels.
- Create platforms or webinars for ports to share information and lessons learned about applying for grants and permits to modernize and decarbonize port infrastructure and operations.
- Co-create granting and permitting applications for port infrastructure upgrades with the surrounding community.
- Establish cross-industry partnerships to enable new opportunities, improve information sharing, and provide opportunities for equipment sharing. These partnerships could lead to economies of scale through bulk purchasing agreements for new technology, thereby allowing for increased capacity and resources along the maritime supply chain.

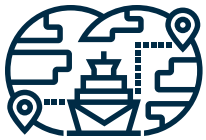
CONGRESS: New Policies and Clarity

- Establish emission reduction standards and decarbonization incentives for ports and vessels.
- Consider revisions to federal permitting requirements to allow streamlined environmental review for decarbonization efforts.
- Request the development of and fund a robust national maritime strategy that includes a focus on the domestic shipping industry, U.S. ship-building sector, national security, environmental justice, and American competitiveness.
- Provide financing support or incentives for domestic retrofitting or building of zero-emission vessels.
- Increase funding for the [Port Infrastructure Development Program \(PIDP\)](#) and [Maritime Environmental and Technical Assistance \(META\)](#) programs to assist ports with technology transition and help drive technology-related regulatory coordination with government agencies and private sector partners.
- Increase funding for the Centers of Excellence for Domestic Maritime Workforce Training and Education and the Small Shipyard Grant Program to ensure a strong American maritime workforce for the future.
- Provide funding for federal agencies that oversee regulation and grant management related to decarbonization of the U.S. shipping industry.
- Increase availability of waivers for “Buy America” provisions in recently passed funding laws when necessary technology is not manufactured in the U.S. and/or create incentives sufficiently strong enough to enable rapid domestic innovation and production of necessary maritime technologies.

MAY 10, 2023

TOPIC 1

GREEN BUILD: Port Infrastructure Permitting and Financing Opportunities and Challenges



Upgrading, modernizing, and electrifying port infrastructure and operations is key to decarbonizing shipping, addressing negative impacts to port communities, and creating a climate-resilient supply chain. Funding provided by the [PIDP](#), and more recently, the [Infrastructure Investment and Jobs Act \(IIJA\)](#) and [Inflation Reduction Act \(IRA\)](#), provide critical opportunities for these investments. However, time is of the essence to decarbonize on a 1.5°C Paris-aligned timeframe. To be successful, domestic ports of all sizes must secure the necessary permits and financing for infrastructure projects.

On May 10, 2023, 33 participants including officials from a number of federal agencies that have a role in driving maritime decarbonization, Jones Act fleet representatives, environmental justice advocates and environmental organizations, port representatives, industry groups, and actors across the supply chain convened virtually to discuss the opportunities and challenges ports face when securing financing or permitting for electrification of or upgrading infrastructure.

To kick off the conversation, discussants shared their experiences and highlighted successes and challenges when applying for and receiving grants and permits for port infrastructure projects, and highlighted policy actions and incentives that could further support decarbonization. Following the plenary conversation, participants engaged in small breakout sessions.

DISCUSSANT REMARKS

The first discussant described the challenges of upgrading port infrastructure, sharing that the lead-time for permitting, developing, and building infrastructure is significant, and port and bunkering infrastructure must be in place in order to avoid unnecessary costs and stranded assets. Each port is unique, and there is no one-size-fits-all approach, and uncertainty about fuels, technology, and what will work at different ports contributes to potential delays. They shared that **funding provided in programs like [PIDP](#) is key to proving viability of new technologies, but competition for grants can sometimes lead to zero-sum competition among ports, which in turn poses a barrier to industry-wide progress.** They recommended partnering with diverse industry groups to enable effective grant opportunities and share lessons, and even partner on purchasing and sharing equipment to provide increased certainty for all aspects of the equipment and infrastructure supply chain.

Additionally, the discussant recommended that grant applicants should engage in project planning and early timeline coordination in order to ensure coordination among stakeholders like utilities, permitting agencies, and manufacturers. Even if an application does not get funded, the discussant stressed that the process ultimately increases knowledge and ability to complete the transition to decarbonization. They also recommended writing workforce development into grant proposals to make proposals more competitive and ensure the future employees can safely operate new technology. Potential

policies they discussed included **establishing low carbon and renewable maritime fuel standards to create an even playing field, and incentivizing and/or allowing agencies to develop streamlined permitting processes for port electrification.**

Another discussant described their regional partnership with other ports and partners to create a hydrogen hub in their region to ensure a reliable energy source for all partners; they stressed the importance of securing reliable energy sources before investments are made in equipment and infrastructure. They noted that current grant programs may inadvertently disincentivize reduced carbon emissions. For example, they stated that the U.S. Environmental Protection Agency (EPA)'s [Diesel Emissions Reduction Act \(DERA\)](#) **is a good program for purchasing lower-emission equipment but requires a one-to-one swap, which may lead to diminished returns on investment in terms of greenhouse gas emission reduction.** This requirement can also be challenging for ports because much of the new, lower-emission technology is not yet proven in the marketplace and taking the risk to purchase such equipment may require ports to retire hybrid vehicles—which have low emissions to begin with—in order to purchase fully electric vehicles, potentially limiting the emissions abatement return on investment. **Workshop participants suggested grant programs should be more flexible and focus simultaneously on cost-effectiveness and the overall zero-emission goal.**

It was also noted that the “Buy America” stipulations on many of the grant opportunities provided through the IIJA ([P.L. 117-58](#)) and the IRA ([P.L. 117-169](#)) pose a challenge because the technology needed for port decarbonization is not currently manufactured in the U.S. Ports could leverage additional federal funds for decarbonization if waivers to these requirements were provided for maritime infrastructure. The discussant also noted the hardest and sometimes most expensive part of modernizing and electrifying port infrastructure involves challenges with permitting and completing the required environmental analyses in a timely manner. The discussant also

Co-creation of decarbonization projects with the surrounding community and a focus on environmental justice are critical to lasting success with port infrastructure upgrades.

noted that even when the port is willing to take on the risk to begin a project, they are not allowed to deploy funds ahead of government grant approvals. In order to reduce individual port risk, the discussant recommended developing a process that would allow for a multi-port grant package for the purchase of zero-emission port equipment.



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SUMMARY OF PLENARY AND BREAKOUT GROUP DISCUSSIONS

➤ TRANSPARENCY AND COLLABORATION. Participants agreed that additional transparency and collaboration are crucial for ports to decarbonize, particularly with so many different players and interests involved at each port. It was noted that implementing innovative port infrastructure improvements can be challenging because many ports host dozens of tenants operating with various needs.

It was shared that the EPA is working to design a new funding program for zero-emission technologies at ports and is seeking input from industry to inform that process. Throughout the discussion, it was suggested the **private sector or civil society should build an information hub where all stakeholders can learn from each other about decarbonizing port infrastructure, equipment, and technology.** One federal agency flagged that real-time information sharing would be especially helpful as agencies work to design new funding programs for zero-emission technology at ports. Other participants suggested that ports need to actively learn from each other's experiences when decarbonizing port infrastructure and flagged the need for solutions that allow for innovative information sharing while maintaining individual organizations' disclosure needs. Another participant referenced the Port of Los Angeles' [Ports' Technology Advancement Program](#) that provides funding, guidance, and staff support to test promising emission-reduction technologies in a real-world port environment and suggested this model could be used at other ports or perhaps be supported federally. **One strategy to facilitate information exchange was standing up and facilitating a multi-port working group to share lessons learned.**

In discussions around community engagement, participants noted the importance and challenge of balancing the need for rapid progress while meaningfully engaging near-port communities in

planning for projects to modernize and decarbonize port infrastructure. They stated that **co-creation of decarbonization projects with the surrounding community and a focus on environmental justice are critical to lasting success with port infrastructure upgrades** and to help avoid delays in the future. Another participant noted that a cohesive economic development strategy will also be needed to direct and deepen investments in each port community.

Economies of scale are a challenge for smaller ports to achieve when purchasing new equipment, investing in infrastructure, and even applying for grants.

➤ SCALE MATTERS. Workshop participants noted frequently that every port is different and solutions for decarbonization will require tailored approaches. Multiple participants also noted that U.S. ports vary widely in size and governance structure, ranging from public ownership to private operations to public-private partnerships. Further, size and scale impacts how much financial risk a port can bear and their access to resources. One participant suggested that **agencies should allow for regionally-specific port and vessel operator considerations in their grant requirements.** Others noted that economies of scale are a challenge for smaller ports to achieve when purchasing new equipment, investing in infrastructure, and even applying for grants. Another participant added that getting from award to agreement is the hardest part for grants, especially for smaller ports. Project partners are not allowed to start the project unless the agreement is in place, which requires often-lengthy federal permitting. They stated that starting the environmental impact review early is not feasible for smaller ports due to the up-front costs, although it was acknowledged that modifications to federal permitting laws would require congressional action.

Grid capacity was also identified as a challenge with port electrification. Several participants highlighted challenges with shore power, noting that many utilities in smaller communities do not have the electric grid capacity to provide shore power to ships. One participant noted shore electrification is challenging because a port typically needs to utilize 50 percent of the electricity demand within a few years and there is significant uncertainty around how many vessels will need shore power, how much, and on what timeline. Participants suggested that a future workshop could focus on challenges and solutions for shoreside power connections.

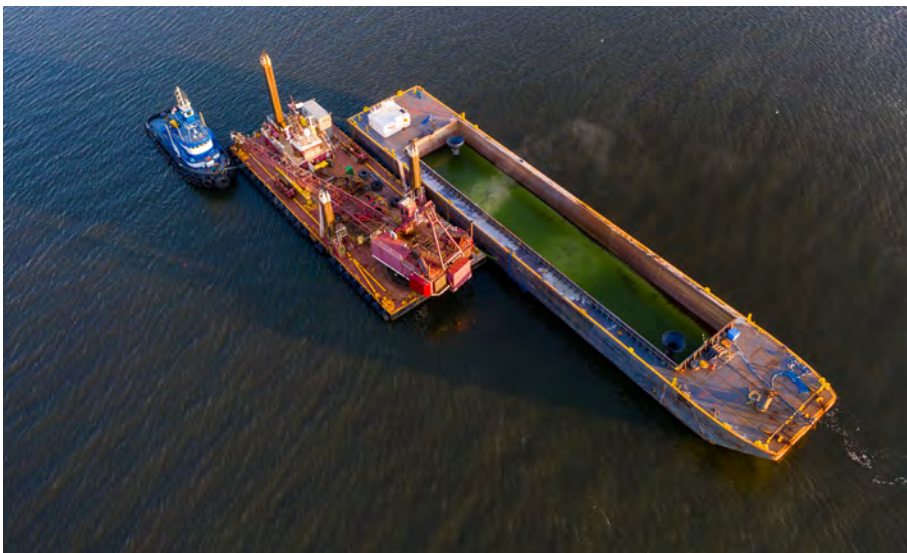
➤ CREATIVE PLANNING FOR THE FUTURE. In discussing the need to more actively and creatively plan for the transition to zero-emission shipping, it was suggested **the U.S. needs a comprehensive national maritime strategy.** This strategy should identify maritime decarbonization needs, coordinate federal programs and investments, and strive to determine the highest-impact federal investments to accelerate emissions reductions. For example, one participant recommended that federal grant programs and policies should consider cost-effectiveness of emission reductions to avoid

inadvertently incentivizing replacement of relatively low-emission technologies. **The need for enhanced strategic coordination was echoed throughout both workshops on multiple topics.**

➤ BALANCE POLICY WITH PROGRESS. Policy, grant, and regulatory needs were a major focus of the discussion. Many of the challenges raised related to permitting, policy clarity, and the effectiveness of existing programs. Multiple participants across both workshops noted that **federal agencies are understaffed and need additional support to award port infrastructure grant funding.**

Multiple participants noted that **greater clarity related to incentives, regulations, and grants from the government is needed to create an even playing field among prospective beneficiaries of these policies and programs.** One participant noted that increased clarity on the nature of and eligibility for federal and state tax credits related to decarbonization is essential to facilitate financing port infrastructure. Another suggestion was to clarify that ports can and should partner on grant proposals and may apply both as individual ports and in a partnership. At the state level, a participant noted that California agencies have developed streamlined permitting processes for electrifying port infrastructure, and these processes could be models for other state governments. Changes to federal permitting requirements would require congressional action.

Participants expressed a diversity of views on ports' best use of available grant funds. One participant offered that grants are most effectively used to fund projects that would not otherwise be funded by private capital, giving port operators experience with technology and allowing manufacturers to see their products used in the field. Another participant suggested that pilot programs are not a good use of grant funds because they are time consuming and do not replace carbon-intensive equipment, while a different participant indicated that pilots are important for providing feedback to manufacturers and could potentially be made even more effective through sharing equipment in regional partnerships.



MAY 10, 2023

TOPIC 2

CHARTING A COURSE TOWARD DECARBONIZATION: Establishing Domestic Maritime Green Shipping Corridors



The second topic discussed during the May 10 workshop focused on establishing domestic maritime GSCs⁵ in the U.S. Maritime GSCs have the potential to be platforms to test, demonstrate, and deploy zero-emission fuels and technologies at scale in the U.S.

Discussants provided an overview of their work on domestic maritime GSCs and shared perspectives on how these green corridors can provide opportunities to demonstrate the viability of maritime decarbonization in specific geographies. In a moderated discussion following discussant remarks, workshop participants focused on key enabling conditions required to accelerate corridor development in the U.S., and explored what role these corridors may play in driving decarbonization of the U.S. maritime sector.

DISCUSSANT REMARKS

Opening the session, a discussant stated an effective GSC in the U.S. context must be vision-led to align the value chain, then work backwards from there. They noted that some vessels in the U.S. have been in service since the Civil War and updating those domestic vessels will require significant investment. They recommended that systems efficiency should be prioritized before deployment of new technology and fuels, adding that addressing digital and operational

platforms that control maritime activity can make a big difference in greenhouse gas emissions as a “low hanging fruit” first step.

A second discussant noted that GSCs are important but are not a panacea and do not replace the need for strong global and domestic regulations to encourage the decarbonization of the maritime sector. It was suggested that while there is no current consensus on the definition of a maritime GSC, policy can establish clear regulatory frameworks to enable their use. The discussant emphasized that the **key element of maritime GSCs is strong partnerships, and that organizations must engage with and clearly define roles for surrounding port communities and labor representatives early in the process.** Given the relatively nascent nature of maritime GSCs, it was suggested that it is a good time to set up formal mechanisms for information sharing and learning, and the International Maritime Organization (IMO) could take on this role at the international level.

SUMMARY OF PLENARY DISCUSSION

➤ TRANSPARENCY AND COLLABORATION. The bulk of the discussion focused on the importance of transparency and collaboration for successful and effective maritime GSCs, although participants raised that **the core tension between data transparency and market competition will ultimately require a policy intervention**

⁵ Workshop discussions used the Global Maritime Forum definition of maritime green shipping corridors as “specific shipping routes where the technological, economic and regulatory feasibility of the operation of zero-emission ships is catalyzed by a combination of public and private actions.”

to resolve. It was noted that without a global consensus around the definition of GSCs and guidelines around emissions transparency, market competition may result in misleading information about the effectiveness of some maritime GSCs. Other participants agreed, adding that digitization and data transparency is an important way to share information, but it can be challenging due to market competition. Participants flagged that the International Association of Ports and Harbors ([IAPH](#)) will make emissions data available to members so ports can learn from each other about what works in this space.

When discussing data and innovation, **a participant shared that maritime GSCs will not all look the same in different geographic locations, which is why common measurements to determine progress and data transparency is critical.** They added that standardized measures of carbon intensity can provide level-setting required to build transparency, enable cargo owners to meet their decarbonization goals, and support investors seeking to allocate funding to the most cost-effective tactics. A federal agency representative suggested that data should drive decisions around placement of maritime GSCs, noting that consideration should be given to regional areas with bunkering and alternative fuel production capabilities. Another participant flagged that clearly defined roles for formal and informal partners is critical to GSC success.

➤ SCALE MATTERS. When discussing where and how maritime GSCs can work in the U.S., multiple participants agreed there are opportunities for smaller-scale maritime GSCs in the U.S., and it was noted that smaller ships operating on certain existing shipping routes are likely to be first movers due to scaling ability and availability of e-fuels in the short-term. This is a unique opportunity in the U.S., particularly on inland waterways.

➤ UNIQUE NATURE OF U.S. MARITIME INDUSTRY. Challenges and opportunities related to Jones Act ships in the context of domestic

The key element of maritime GSCs is strong partnerships...organizations must engage with and clearly define roles for surrounding port communities and labor representatives early in the process.

maritime GSCs were discussed. Participants noted domestic vessels are older and more expensive to retrofit and replace than ships built in other countries, and that the vessel owner assumes the majority of the risk in adopting new fuels given existing technical and financial barriers.

Multiple participants highlighted that **it makes financial sense to invest in rebuilding and refurbishing the Jones Act fleet as these vessels can have a longer service life than those built elsewhere,** but noted that the U.S. needs to incentivize Jones Act shipowners to adopt new technologies in order to facilitate the development of new maritime GSCs in the U.S. The conversation also explored opportunities for cargo owners to help de-risk the transition and help create domestic maritime GSCs in the U.S.

➤ CREATIVE PLANNING FOR THE FUTURE. When discussing opportunities for the future, a participant said maritime GSCs are critical laboratories and incubators of innovation where the sector can build experience and learn what works as the world navigates a major energy transition. These initiatives can provide opportunities to try out new technologies and demonstrate viability at a manageable scale.

➤ BALANCE POLICY WITH PROGRESS. Workshop participants discussed how U.S. policy could help support domestic maritime GSCs and focused on existing programs and collaboration with government agencies. Among the suggestions were a consistent,

unified definition of what constitutes a GSC, and having the federal government establish a clear regulatory framework to de-risk establishment of maritime GSCs, thereby creating an even playing field and opportunities for private-public partnerships.

An USG representative encouraged participants to tie their work into the [U.S. Marine Highway Program](#), and recommended stakeholders consider how current programs could be adapted before asking Congress to create new ones or make any changes. It was noted that the recently released [Ocean Climate Action Plan](#) encourages advancing opportunities for maritime GSCs along existing maritime trade routes, indicating potential momentum to leverage this program to further domestic maritime decarbonization. Another USG representative recommended those interested in GSCs also consider the new [EPA Clean Ports Program](#) funded through the IRA.

The group discussed opportunities to support domestic maritime GSCs, and a participant suggested that the U.S. Maritime Administration (MARAD), U.S. Department of Energy (DOE), and the EPA should coordinate on their funding opportunities and mechanisms for maritime decarbonization to ensure maximum effectiveness. Agency representatives noted they want to learn as much as they can about new technologies through maritime GSCs, and asked that the private sector share its lessons learned and best practices with federal partners.

Greater clarity related to incentives, regulations, and grants from the government is needed to create an even playing field among prospective beneficiaries of these policies and programs.



MAY 16, 2023

TOPIC

ON THE HORIZON: Building Zero-Emission Vessels in the United States



On May 16, 2023, the Aspen Institute hosted the third workshop virtually with 29 participants, including environmental organizations, industry groups, officials from USG agencies that have a role in driving maritime decarbonization, Jones Act ship owners, operators, and shipyard representatives. The session explored what it will take to design, build, and launch zero-emission vessels in the U.S. Remarks from discussants and workshop-wide moderated question-and-answer sessions were followed by small group breakout sessions in which participants further analyzed the challenges and opportunities of building and operating zero-emission vessels in the U.S.

DISCUSSANT REMARKS

INDUSTRY DISCUSSANTS. Industry discussants highlighted their role in developing some of the first zero-emission commercial vessels being built in the U.S., lessons learned from the experience, and the opportunities for and barriers to replicating this success.

The first discussant shared that alternative fuels are the most direct path to maritime decarbonization, but they cannot currently meet the same operational needs as incumbent fuels, and there is currently no regulatory structure for approving technologies that use these fuels in the U.S. Even using [IMO regulations](#) as a reference may not work because the U.S. maritime industry differs from the global industry and the IMO regulations do not translate to most of the

domestic fleet. They added that **technology is advancing faster overseas due to incentives provided by other governments to their own domestic shipbuilding industries, making Jones Act and “Buy America” compliant zero-emission shipbuilding more costly and difficult.**

They noted that **lack of regulations around zero-emission technology creates risk and can hamper the business case for innovation.** For example, the discussant stated that it is hard for businesses to justify investing in [Tier 4 engines](#) while the regulations still allow for use of [Tier 3 engines](#), and there is uncertainty about new technologies. They shared that the U.S. Coast Guard’s capacity will be further stretched with decarbonization. Without additional funding, the Coast Guard will likely lack the resources and capacity needed to certify and manage these new technologies.

The second industry discussant shared the challenges of being a first mover in the maritime sector, noting significant financial and time resources are required to develop and build a ship based on a new design. In order to be successful, a shared vision and frequent collaboration and communication with all involved is key, particularly sharing risk and responsibility with shipyards constructing these new vessels. They shared unexpected challenges with designing a zero-emission vessel, including making space for additional technology required and retraining mariners on how to navigate the vessel with the new propulsion system. They also shared that grants are currently

Lack of regulations around zero-emission technology creates risk and can hamper the business case for innovation.

the only way to achieve cost parity between zero-emission vessels and traditional vessels. They also noted that the significant length of the Coast Guard approval process necessitated requesting grant extensions. To make the process more sustainable, they **recommended policymakers create and sustain longer term incentives that support investment in the development and launch of zero-emission vessels and infrastructure.**

The third industry discussant said most U.S. shipyards are interested in building zero-emission ships for decarbonization, but it is difficult to grow for markets when demand is uncertain. To address this, they highlighted the need for collaboration, market stability and predictability, and funding for the next generation of maritime assets and workforce. In general, the participant shared that recruiting and retaining a qualified workforce is the number one challenge facing U.S. shipyards; with market stability and predictability, shipyards would be able to make additional investments in apprenticeship programs and youth education. They also noted that legislation like the Energizing American Shipbuilding Act (117th: [S.707](#) / [H.R.1819](#)) and the SHIPYARD Act (117th: [S.1441](#) / [H.R.2860](#)) would strengthen U.S. shipbuilding and national security if passed.

GOVERNMENT DISCUSSANTS. Federal agency discussants raised key opportunities and challenges in developing the approval process for zero-emission vessels and technologies. Discussants also described how their agencies deal with technological uncertainty in program design.

Discussants noted that **federal agencies need more information about what technology industry stakeholders are using so they can**

be as proactive as possible in supporting industry and the next generation of mariners. A USG discussant noted that workshops such as these are helpful in the collaboration and learning process, and that federal agencies want to focus on the domestic fleet as an opportunity to support U.S. innovation and send market signals for investment in zero-emission technologies.

USG representatives also stated the desire to develop standard design approaches based on first movers in the domestic fleet. It was noted that the U.S. Coast Guard recently released a [policy letter](#) to create more transparency and proactively address questions about design standard equivalency requests for vessels using new technologies. Acknowledging that the approval process is more time consuming than approving current designs, there are efforts to make this collaborative process more transparent and proactive. The discussant stressed that **early coordination, communication and flexibility between the USG and industry partners are key for a smooth process.**

The discussion also highlighted the importance of the [META](#) program, which funds coordination between and among federal agencies and outside partners on regulations and protocols for focused projects, and a discussant suggested this program offers a platform for federal agencies to coordinate maritime decarbonization efforts.



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SUMMARY OF PLENARY AND BREAKOUT GROUP DISCUSSIONS

➤ TRANSPARENCY AND COLLABORATION. Participants agreed transparency and collaboration are critical as all stakeholders work on new designs for zero-emission vessels. Participants noted the need for collaboration between ship owners, shipbuilders, and with the government on design approval. It was suggested that for additional efficiency, private sector partners should coordinate decarbonization efforts for multiple modes of transportation within a single region to have greater access to funding through grants. Most participants agreed additional collaboration between federal government agencies, the U.S. Merchant Marine Academy, maritime academies, and the U.S. shipping industry is needed to better understand the workforce needs of the future would be helpful.

While discussing the regulatory approval process, participants highlighted the difficulty in creating a comprehensive regulatory policy when technology is changing quickly. It was noted that approving zero-emission ship builds and retrofits is currently done on a case-by-case basis through the U.S. Coast Guard's Design Basis Agreements, which is time consuming. USG representatives **recommended industry stakeholders collaborate on standardized designs to help with speed and predictability of the technology approval process.** However, the discussion revealed that standardization might be challenging. One participant responded that the small boat space has been unable to align on standards to date. Another suggested an advisory committee to federal agencies to discuss issues related to specific technology in zero-emission ship building, and **participants agreed that establishing a better process for communicating to the USG on new ship technology is important.** USG representatives discussed the possibility of leveraging existing collaborations rather than setting up a new group or formal federal advisory committee, which would be time-consuming.

➤ SCALE MATTERS. Participants generally agreed that existing funding mechanisms do not currently take into account the diversity of the U.S. shipping industry needs and resources. One participant stated that it is difficult to access federal funding because the grant writing process is time consuming and expensive and can be too risky to take on for smaller operations. Another noted that there is federal funding for ports but not for ships to decarbonize, and even if there were federal funding available, grants typically require agreements with public entities, which doesn't generally work for ship building. A USG representative added that the recent federal funding has been specialized for ports and certain technologies, but there are no programs designed for tugs, tows, and other harbor vessels.

➤ UNIQUE NATURE OF U.S. MARITIME INDUSTRY. The group generally noted a lack of cohesion and vision needed to transition an industry as unique as the U.S. shipping sector. One participant



noted that the U.S. Department of Transportation is more focused on decarbonizing other transportation modes, including trucks, trains, and planes rather than on the maritime industry. This can slow the pace of maritime decarbonization and may leave the U.S. behind other countries. As with the May 10 workshop, participants suggested that **the U.S. needs a comprehensive national maritime strategy to ensure the maritime industry has a sufficient voice in decarbonization and is met with a whole of government approach.** It was noted that maritime decarbonization was included in the recently released [Ocean Climate Action Plan](#), which some participants found to be moving in the right direction. Some participants agreed that **regulations and emission standards for vessel building can drive innovation at the state and federal level.**



↗ CREATIVE PLANNING FOR THE FUTURE.

Workforce needs was a major topic of discussion.

Participants noted that **market stability and predictability for zero-emission vessels is needed to grow the next generation of shipyard workers and vessel operators in the U.S.**, particularly in light of existing labor shortages. USG representatives shared that despite legislative proposals around workforce training, maritime academies are challenged by uncertainty and inconsistency around the education needs and future job opportunities for cadets. One participant noted that maritime academies need the industry’s help in developing their curriculum. In the absence of this clarity from industry, USG representatives said graduates will have to rely on-the-job training and adjust as market needs change, meaning the best path to meet workforce training needs in the short term is to create market stability and demand for zero-emission vessels now.

A participant shared that the shipbuilding workforce is aging, and fewer younger workers are entering the field, highlighting the need to further develop the domestic workforce. Meanwhile, technology advancements are redefining historical shipbuilding roles and locations. It was suggested that industry and government agencies should focus on worker welfare and design recruitment and retention

Market stability and predictability for zero-emission vessels is needed to grow the next generation of shipyard workers and vessel operators in the U.S.



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efforts that include addressing housing needs, mariner comfort aboard vessels, essential workforce classification, providing childcare, improving working conditions, and educating children early about career options in the maritime industry and in Science, Technology, Engineering, and Math (STEM). One participant shared that they are working actively with the U.S. Coast Guard to make entry into the industry easier and could use more support to achieve that goal. Another recommended the industry should work to “demystify” what happens on and off ships through outreach and education.

The group identified that current federal funding mechanisms do not appropriately address the need for maritime workforce development, particularly in light of rapidly changing technologies. Two participants noted that other federal entities, like DOE, received funding for workforce development through the [IRA](#), but the funding was not focused on maritime decarbonization. The group discussed opportunities to help educate DOE on the needs of the maritime sector and encouraged the agency to look for opportunities to provide funding for the maritime workforce. It was noted that the [PIDP](#) program could include workforce development, which would allow the government to incentivize and help shipyards that do not have the capacity to recruit new employees. A USG representative responded that it would be difficult to add even more criteria to the [PIDP](#). Participants instead **recommended increased funding for [Centers of Excellence for Domestic Maritime Workforce Training and Education](#) and the [Small Shipyard Grant Program](#).**

↗ BALANCE POLICY WITH PROGRESS. Discussions on policy generally focused on underfunded regulatory agencies, the fact that recently passed legislation did not account for the challenges associated with implementing new technology, and the need for more policy clarity.

Most participants agreed **there is a need to balance sufficient regulatory flexibility to accommodate emerging zero-emission technologies with the time-and labor-intensiveness of customized approval processes.** USG representatives acknowledged the need for more flexibility, collaboration, and communication with industry and first movers to see if creating standard approaches to zero-emission designs is possible and encouraged additional concept review discussions at the outset of the process. Participants recognized there is a need for more agency capacity for an even more iterative process before a design is finalized and that there is a fine balance between regulatory certainty/standardization and allowing for innovation.

It was noted that other countries have incentives and funding to create market stability in their shipbuilding sector while the U.S. does not have this type of funding support. Participants suggested that the domestic shipping industry needs reliable and consistent financial incentives that encourage investment in zero-emissions technologies and vessels, such as a tax rebate for every percentage point in emissions reduction. One participant suggested incentives for industry to use zero-emission technology, and raised an example where ship owners who reduced their speed on approach to port received a rebate from the port in recognition of their green performance. Other examples included a vessel “cash for clunkers” program for older, less fuel-efficient vessels, decarbonization vessel construction subsidies, and financing support for building or retrofitting ships.

A few participants shared that technology-forcing emission reduction standards would create more clarity and certainty for the shipping industry and domestic market. One participant referenced the recently reintroduced Clean Shipping Act ([H.R.4024](#); [S.1917](#)) that would establish a fuel standard, and the International Maritime Pollution Accountability Act ([S.1920](#)), which would put a fee on shipping emissions from certain vessels. The participant noted that the revenues collated from these fees could help with decarbonization needs like modernizing the Jones Act fleet and funding programs for workforce development to ensure a just transition. In response, a participant added that when Congress sets laws and federal agencies implement them, it forces the industry’s hand and creates an even playing field.

Participants discussed opportunities for the federal government to better link maritime decarbonization investments across agencies to help de-risk the transition holistically, perhaps even training other agencies that are not as well-versed in the maritime space, such as DOE. Other solutions offered included redefining criteria for federal grants (either through regulations or legislation) so they are more accessible for vessel operators, and investing in zero-emission fuels and technology research and development.

CONCLUSION

The Aspen Institute will continue to convene stakeholders to further identify challenges and opportunities to decarbonize the U.S. shipping industry. This effort will focus on collaboration, viable technical and financial policy solutions, and incentive mechanisms needed to accelerate maritime decarbonization in the U.S.

Participants were eager for additional engagement opportunities and suggested future discussions focused on:

- Exploring private sector financing solutions for port and ship decarbonization with economic developers.
- Examining renewable energy, grid capacity, and shore power issues with utilities and others in the maritime value chain.
- Using data to drive locations of maritime GSCs.
- Exploring the role of federal agencies in supporting and establishing maritime GSCs.
- Evaluating further environmental justice and labor issues in port communities and working with local communities to advance decarbonization of U.S. ports.
- Considering additional workforce development issues with labor and maritime academy representatives.

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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.

EEP is now actively and purposefully engaging in climate change policy—mitigating the effects of climate change, adapting to the inevitable impacts of climate change, and helping to build relationships for cooperation needed to achieve these goals amongst people and nations.

To further this mission, the Aspen Institute's Shipping Decarbonization Initiative 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 to decarbonize one of the most important sectors of the global economy. The Aspen Institute's Shipping Decarbonization Initiative is convening multinational cargo owners to accelerate shipping decarbonization, elevate the need for shipping decarbonization within the U.S. policy context, and advance the establishment of zero-emission transoceanic GSCs.



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