



WASHINGTON
MARITIME
blue

Washington State's Strategy for the Blue Economy

Charting a Course to 2050

January 2019

Introduction



Today, Washington State's maritime sector has emerged as a model for environmental performance and best practices. If the goal is to inspire increased motivation for innovative design, clean technology, and 21st century workforce development, arguably few places in the world provide such an opportunity.

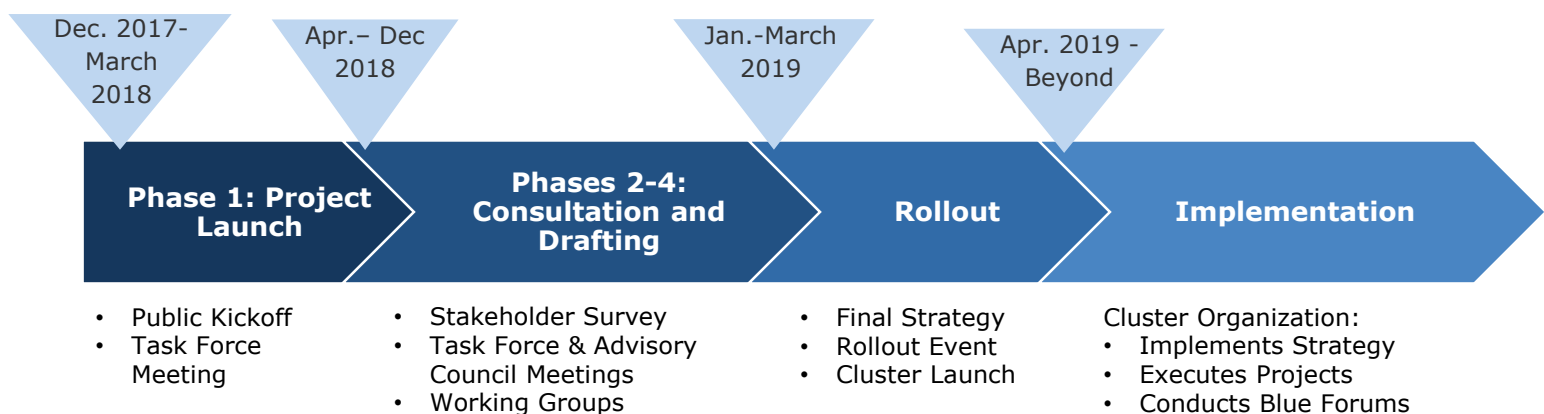
To build on the strengths and commitment of Washington's maritime sector, Governor Jay Inslee assembled his Maritime Innovation Advisory Council on December 12, 2017. He called upon the Council to develop a comprehensive plan for all stakeholders to accelerate and support technology innovation and best practices throughout the state's maritime industry. The Co-chairs and full Advisory Council have been responsible for stewarding the vision and setting the course for Washington State to become home to a world-class, thriving, and sustainable maritime industry by 2050.

The Washington Maritime Blue Strategy Initiative has been led by the Governor's Maritime Sector Lead in the Washington State Department of Commerce. Global maritime and energy experts at DNV GL facilitated the strategy development and stakeholder engagement process. Funding for the Washington Maritime Blue initiative was provided by the U.S. Department of Commerce Economic Development Administration, i6 Program.

The Blue Strategy has been developed through broad and inclusive stakeholder input from representatives of industry, workforce, research, academia, government, tribes, trade, labor, and environmental organizations and across maritime and related sectors such as clean tech, information and communication technology, aerospace, financial, and more. The Task Force, its Steering Committee, and the Pathway Workgroups have dedicated numerous hours in collaborative meetings and providing content review and shaping.

This report, as well as the strategic vision and framework for Washington Maritime Blue would not have been possible without the contributions of all stakeholders. The Strategy is a product of what participants brought to the table and a direct outcome of the collaborative nature of the discussions and innovative thinking that was brought to the process.

This report is for the public and has been written for non-technical readers as well as industry experts.



Governor's Maritime Innovation Advisory Council



"This Washington Maritime Blue: 2050 vision for accelerating innovation project will leverage the strong connections created through our Sector Lead Program to develop a diverse workforce, stronger businesses and new technology to meet the challenges ahead. Our goal is to build a green, efficient and sustainable maritime sector that will serve as a model for the rest of the country... I congratulate and thank everyone who has been part of the vision and commitment to implementing Washington Maritime Blue. I am proud that Washington is among those charting the course to ocean health and sustainable maritime practices. The transition is happening now in our state." **Washington State Governor Jay Inslee**

"The Maritime Blue initiative is the first of its kind in the United States to ensure that Washington's maritime and fishing economy thrives as population growth, climate change, and global competitive pressures call for innovative workers and clean technology solutions. Today, Washington's maritime industries are the backbone of the most trade-dependent economy in the country. Tens of thousands of family-wage jobs in the maritime trades have transformed communities throughout our region and state. Now, we must find paths to give future generations of Washingtonians access to these jobs and opportunities. By developing a new generation of an inclusive and diverse maritime workforce, our companies will lead the world in creating hundreds of thousands of jobs in a clean-trade maritime economy that works for all of us". **Representative Gael Tarleton, Washington State Legislature**

"I'm honored to have had the opportunity to co-chair Maritime Blue, which is aimed at a vision for Washington State to be home to a world-class, thriving, and sustainable maritime industry by 2050. To be successful, this strategy must be iterative, adapting as needed to achieve this vision as we proceed. At Vigor we believe tomorrow's economic opportunities involve sustainable solutions. Identifying courageous and committed long term investment will allow the maritime industry to lead in a way that honors our precious environment, accelerates innovation and creates great opportunities for skilled workers." **Frank Foti, Vigor**

"Creating a more efficient, more competitive, more collaborative and cleaner maritime industry will mean green jobs, better air quality in our communities and a healthier climate. Becoming a global center for innovation creates and preserves the family wage jobs that the maritime industry has long provided in Washington. Congratulations to Governor Inslee for having the foresight to establish this effort and to the participants on the Advisory Committee and Working Groups. Implementation of key elements of the strategy is already underway and I am excited to be part of this important effort," **Dennis McLerran, Cascadia Law Group**

Co-Chairs: Governor's Maritime Innovation Advisory Council

Rep. Gael Tarleton – WA State Legislature

Frank Foti – Vigor

Dennis McLerran – Cascadia Law Group

Staff

Joshua Berger – Governor's Maritime Sector Lead



Table of Contents



Executive Summary	5
Global Issues and Opportunities	19
Sustainable Blue Economy	
Global Trends	
Maritime Clusters	
Washington's Role in the Blue Economy	25
State Maritime Overview and Linkages	
Developments, Challenges, & Opportunities	32
State Maritime Subsector Analysis & Stakeholder Perspectives	
Washington Maritime Blue Strategy	51
Maritime Blue Strategy Framework	
Goals, Pathways & Initiatives	
Policy Recommendations	
Project Overview	69
Stakeholder Process	
Cluster Organization	
Conclusion	76
About the Team	
Appendix (available online)	
A. Maritime Blue Strategy Course Setting	
B. Cluster Organizations & Pathway Case Studies	
C. White Paper – Workforce Sustainability in the Washington Maritime Industry	
D. References and Additional Sources	

The report is divided into four sections that can be downloaded individually:

- Strategy Summary Brochure
- Executive Summary
- Main Report Body
- Appendices

The entire report with all sections can be read and downloaded at:

<https://www.commerce.wa.gov/growing-the-economy/key-sectors/maritime/>
<https://www.maritimeblue.org>



WASHINGTON
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EXECUTIVE SUMMARY

Washington State's Strategy for the Blue Economy

January 2019

WASHINGTON MARITIME BLUE: AN INTRODUCTION

From innovative ship design to clean technology, sustainable fishing practices to leading-edge workforce development, Washington State's maritime sector is a model for environmental performance and best practices.

Leveraging these strengths, the Maritime Innovation Advisory Council was formed by Gov. Jay Inslee in December 2017 to ensure Washington State will be home to a world-class, thriving and sustainable maritime industry through 2050 and beyond. The result is much more than just a list of recommendations to the Governor and State Legislature. The pathways and projects outlined in the following pages were developed by and for Washington's maritime stakeholders – industry, government, Tribes, research universities, and NGOs. These are strategies **by maritime, for maritime.**

None of these goals can be accomplished in a vacuum. That's why we have created Washington Maritime Blue – a cluster organization built on broad participation and strong new partnerships -- to transform these strategies from vision to reality.



“Washington State is a place where nature and humans are inextricably linked; a place where the lifecycle of salmon can indicate the health of an industry; a place where ingenuity is measured not only by its success, but also by its impact in a changing world.”

—Governor's Maritime Sector Lead

AN OCEAN OF OPPORTUNITIES

Economic growth and ocean health are not just compatible, they are mutually dependent for long-term sustainability. This "Blue Economy" is built on a three-legged platform: economic growth, healthy ecosystems and thriving communities, creating opportunities for all.

From small island nations to high-tech industrial countries, the world is embracing this approach:

- International maritime companies are shifting mission and focus – for example, changing from "propulsion company" to "energy and technology company."
- Industry is investing in technology for efficiency gains, lower operational costs, and to comply with and exceed new regulatory standards.
- Entrepreneurs are addressing global challenges like energy production, desalinization, data solutions, cybersecurity, sustainable aquaculture, and underwater noise.
- Private capital, impact investments, and public dollars are funding Blue Cluster organizations, which in turn inform best practices and investment principles.

“The Blue Economy is sustainable use of ocean resources for economic growth, improved livelihoods and jobs, and ocean ecosystem health.”

—World Bank

What is the Opportunity?



Ocean economy is expected to double by 2030 to \$3 trillion



97% of Earth's water is in the ocean



98% of habitable Earth is underwater



90% of the ocean is unexplored



Infinite clean tidal, wave, and wind energy



80% of people live near the shore



9 billion people will need protein in 2030



90% of goods are transported by ocean



WASHINGTON STATE'S BLUE ECONOMY

Washington's maritime economy boasts a culture of competitive advantage through innovation and sustainability.

Our Assets:

- A diverse and interdependent maritime industry with strong leadership in environmental best practices and technology investment.
- World-class research institutions and capabilities in ocean science and marine energy.
- One of the nation's strongest tech sectors.
- A fishing and seafood sector that manages the most productive and sustainable wild fishing grounds in the world.
- Cross-sector leadership and support for advanced manufacturing, including aerospace, military and defense, clean technology, and shipbuilding.
- World-class naval architects, marine engineers, and service providers.
- Ports, shipping and logistics sector that exceeds environmental impact goals.
- A vibrant recreational boating community connected to a strong maritime supply chain.
- A top-notch network of formal, informal, and youth education and training institutions.
- A strong environmental ethic, that when focused towards creative and pragmatic solutions, will support our state's growing blue investments and economy.

Our Sectors & Stakeholders:

Washington's Blue Economy is comprised of many interconnected sectors:

- Commercial Fishing and Seafood Products
- Maritime Logistics and Shipping
- Passenger Water Transportation
- Ship & Boat Building, Repair & Maintenance
- Maritime Support Services
- Ocean Science Technology

Underpinning each sector is a robust partnership of stakeholders, including maritime businesses, public agencies, research institutions, education and training organizations, finance and funders, and community and labor organizations.





BLUE VALUES: SUSTAINABILITY DEFINED

Washington Maritime Blue is committed to the development of maritime business, technology, and practices that promote a sustainable future, contributing to economic growth, ecological health, and thriving communities.

Sustainability means different things to different people. For Washington Maritime Blue, the definition is threefold: a growing economy, healthy ecosystems, and resilient communities. This trifecta is the foundation on which our strategy is built.

Growing Economy: We will build a strong business climate, attract talent and investment, and develop an efficient regulatory structure that supports innovation and infrastructure.

- We collaborate for growth to drive operational efficiency in our maritime companies.
- We use strategic partnerships to develop resources and infrastructure.
- We promote an efficient and goal-based approach to regulation.

Healthy Ecosystems: We are committed to restoring and sustaining the health of our coastal and marine ecosystems.

- We drive the adoption of best management practices or standards.
- We leverage the knowledge of our research institutions in renewable energy and ocean research.
- We apply an environmental ethic to development and seek to minimize impact.

Resilient Communities: We will apply a social justice lens to all our efforts, to ensure thriving and resilient communities across the maritime sector.

- We proactively engage with our stakeholders to gain trust and anticipate and address unintended consequences of development and sustainability initiatives.
- We reduce adverse impacts of economic development on vulnerable communities while supporting climate change and natural-disaster resiliency.
- We are committed to a diverse, inclusive, and representative maritime industry with abundant living-wage jobs.

BLUE VALUES: GROWTH, SUSTAINABILITY AND INCLUSION

During the strategy development process, two key issues quickly emerged: how to address bias in the maritime workplace and work toward inclusion, and how to support maritime companies so they can more easily adopt sustainable practices and technology.

Growth in a Sustainable Blue Economy

Around the world, the drive toward sustainability is rewriting the rules for all industries – Maritime is no exception. This new emphasis brings with it unwelcome disruptions, yes, AND new business opportunities. Both large multinationals in thriving commercial centers and small entrepreneurs in developing economies can attest that reducing and eliminating waste, providing meaningful work and wages, cooperating with competitors, aligning with community values, and investing in innovation can be very profitable.

It can be risky to be a trailblazer. It can require significant capital investment, and it can prove challenging to build trust with community stakeholders. This either becomes a cycle of doubt that slows the velocity of change, or – when collaboration, regulation and action are embraced – becomes the sustaining energy that accelerates a cycle of progress. It is a fact that when maritime companies are supported in their innovation-based business plan they can and will make investments geared toward community empowerment and sustainable returns. The Maritime Blue Strategy embraces this cycle to propel the industry and communities forward.

Including pathways, policy recommendations and demonstration projects, the Maritime Blue Strategy leverages the exceptionality of our ecosystem to achieve this vision. Just as important, it lays out a collaborative process to bring together businesses, public agencies, research, and training institutions to identify opportunities, direct funding and build social license and trust. The result will be a cycle of progress that attracts top talent, brings more investment, allows businesses to expand and creates jobs that are meaningful, place-based, and provide a high quality of life.



Addressing Bias, Working Toward Inclusion

Economic development strategies often don't address gender, racial, and socio-economic inequalities as a core objective and value. In contrast, Washington Maritime Blue seeks to accelerate a "Blue Economy for All" by providing support and developing programs that address bias in the maritime workplace and support workforce training opportunities for youth of color, low-income white youth, women, and girls.

Sustainability strategies will "provide equal opportunities for different demographic groups in Washington to build careers in the maritime sector. The creation and retention of a diverse workforce are critical to the sector's long-term sustainability. Research has demonstrated that diverse workforces are not only more profitable but are also more productive and satisfying places to work.

"However, attempts to make the workforce look more diverse without addressing the reasons it isn't will not be enough.

*Telling a maritime story that is recognizable and representative, removing barriers to entry, and increasing retention are parallel imperatives that will require dedicated leadership, funding, and the endorsement and commitment of Washington decision-makers. Furthermore, efforts to expand current initiatives or embark on new ones should include input from a wide range of perspectives, including women, people of color, tribal entities, managers, community members from throughout the state, and workers from various stages of maritime career trajectories."**

Addressing Bias and Working Toward Inclusion

“A maritime story and symbol that genuinely and respectfully acknowledge the history of tribal entities and contributions of women, people of color, and other groups may give more Washingtonians a sense of pride in the maritime sector.”

– Tressa Arbow

*University of Washington School of Marine and Environmental Affairs
Workforce Sustainability in the Washington Maritime Industry, 2018

WASHINGTON MARITIME BLUE STRATEGY: STRATEGIC FRAMEWORK

The framework for this strategy was built from the ground up, leveraging direct stakeholder input and stewardship from the Governor's Maritime Innovation Advisory Council.

Vision: Washington State will be home to a world-class, thriving, and sustainable maritime industry by 2050.

Mission: The Washington Maritime Blue Strategy will accelerate the Blue Economy as a leader in maritime clean tech innovation and best management practices that will support a growing maritime economy in all sectors with increasing living-wage jobs, a healthy environment, and resilient communities. This will be accomplished through a partnership with all stakeholders, including: public entities, maritime business, academic and research institutions, ports, labor groups, and community organizations.

Strategic Goals:

What success will look like

Development Pathways:

How we will achieve the goals

Initiatives:

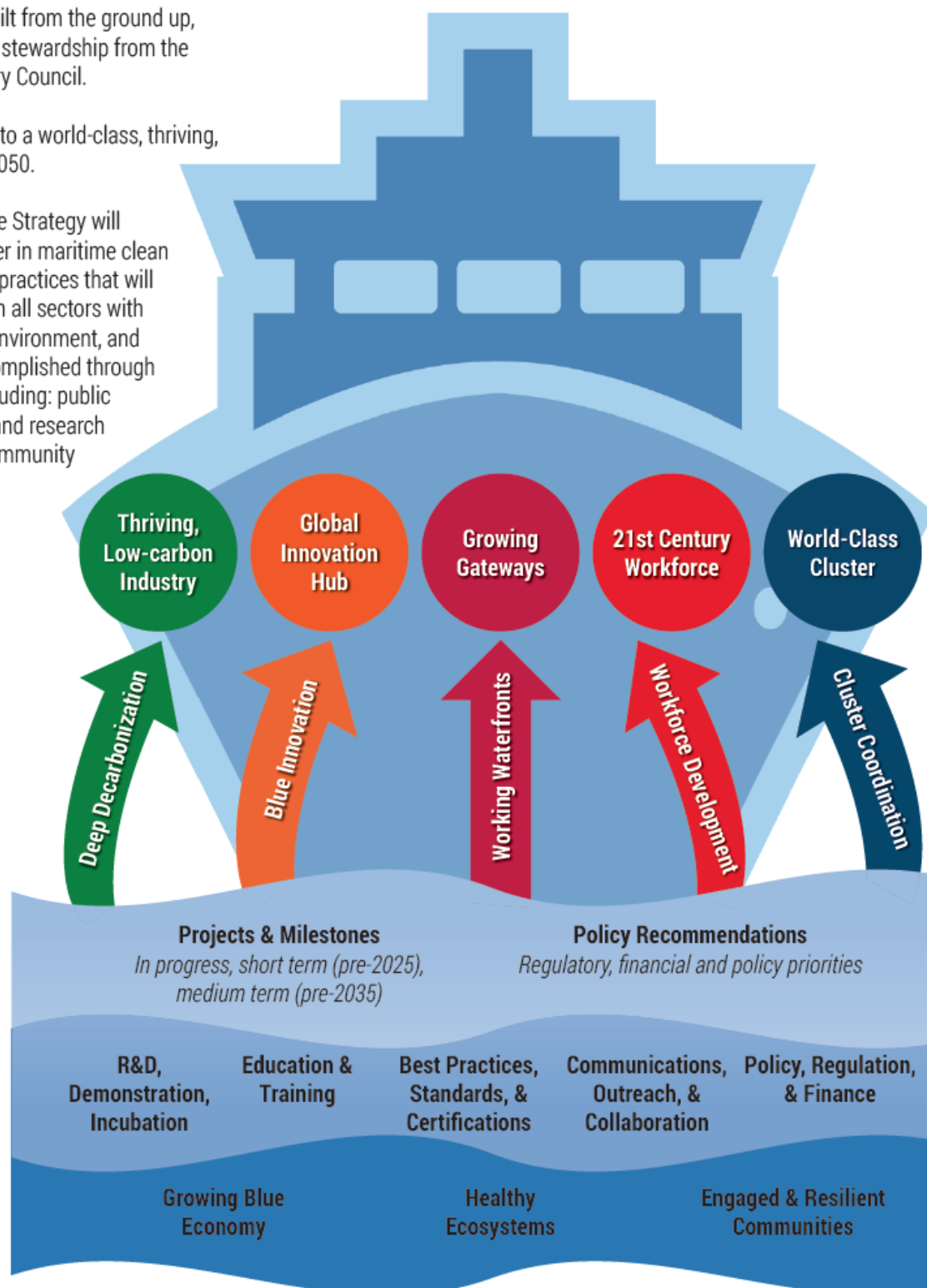
Course setting for implementation

Action Areas:

What tools we use

Values:

What guides our actions



WASHINGTON MARITIME BLUE STRATEGY: PATHWAYS & INITIATIVES

Thriving, Low-carbon Industry

Deep Decarbonization: Accelerate the transition of Washington's maritime industry to a low-carbon future.

Initiative 1:
Low-carbon maritime technologies
on board

Initiative 2:
Low-carbon shore side
infrastructure

Initiative 3:
Strategies for emissions
reductions

Global Innovation Hub

Blue Innovation: Drive the commercialization of emerging blue technologies.

Initiative 1:
Digital transformation

Initiative 2:
Modernization of
fishing and seafood
industries

Initiative 3:
Collaborative R&D

Initiative 4:
Maritime Innovation
Center

Growing Gateways

Working Waterfronts: Lead the nation in efficient, clean, and safe maritime practices across all sectors of the industry.

Initiative 1:
Smart Ports

Initiative 2:
Infrastructure & regulatory
strategy

Initiative 3:
Green Gateway

21st Century Workforce

Workforce Development: Next generation of an inclusive and diverse maritime workforce with technological expertise and access to clean, healthy, living wage jobs.

Initiative 1:
Career pipeline, pathways, & connections

Initiative 2:
Inclusivity, support, & outreach

World-Class Cluster

Cluster Coordination: A formal cluster organization will drive implementation of Washington Maritime Blue to ensure a strong maritime industry founded on competitive companies and an attractive business environment.

Blue Focus:
Communications &
Marketing

Blue Forum:
Knowledge Sharing

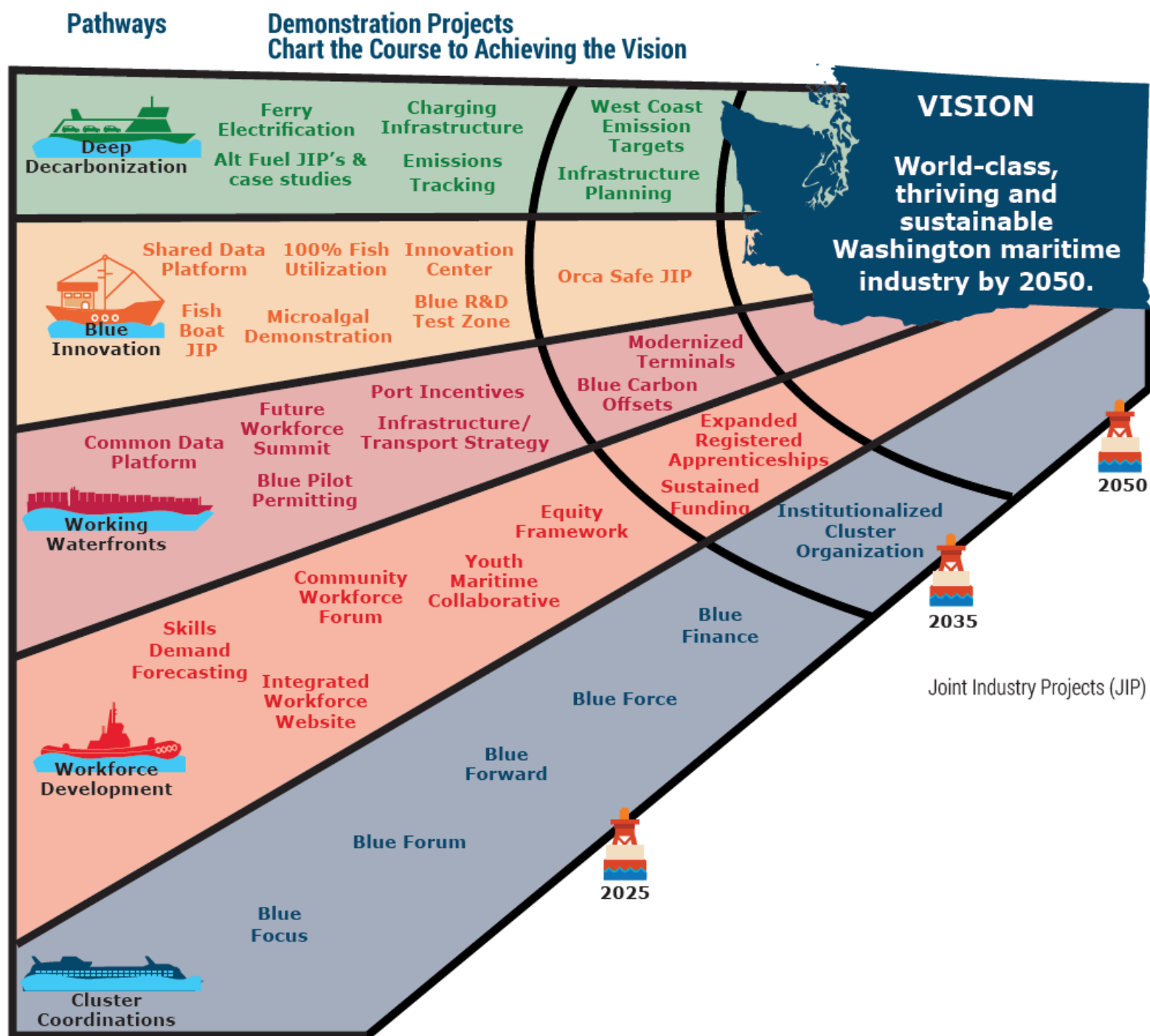
Blue Forward:
JIP* & Business
Services

Blue Force:
Training &
Education

Blue Finance:
Funding &
Investment

*Joint Industry Projects (JIP)

WASHINGTON MARITIME BLUE STRATEGY: CHARTING A COURSE FOR 2050



WASHINGTON MARITIME BLUE STRATEGY: KEY DEMONSTRATION PROJECTS

Maritime Blue is an action-oriented plan with demonstration projects and an organization charged with implementation. Key pilot projects include the following:

Thriving, Low-carbon Industry

Electrification of state and regional ferries to reduce air and noise emissions and establish a competitive edge in sustainable vessel design and manufacturing:

- Conversion of 2 existing state ferries
- WSF to construct two new electric ferries
- Planned Skagit County all-electric ferry
- High-speed passenger ferries across the region

Global Innovation Hub

Design and build a Maritime Innovation Center to house cluster programming, co-working space, incubation and support commercialization of technology. The center will serve as a focal point for the blue economy and support early-stage companies through hub-and-spoke model of collaboration across the entire maritime sector in the state.

Growing Gateways

Grow and Sustain the Youth Maritime Collaborative, guiding Washington youths toward maritime-related careers. With a focus on reaching underrepresented communities through experiential events and high school internships, the collaborative works to connect companies with the next generation of workers.

21st Century Workforce

Remove Barriers to Innovation by working with regulatory agencies to create an approval process for projects meeting sustainable economic development criteria. This body of work could include the establishment of a maritime innovation validation zone and a designated in-water location with streamlined permitting to allow for research, demonstration, testing, and evaluation of new technologies.

World-Class Cluster

Launch an independent Washington Maritime Blue Cluster organization to implement this strategy. This alliance is composed of maritime businesses, public entities, community organizations, research and training institutions that are ready to proactively accelerate innovation and growth.

WASHINGTON MARITIME BLUE STRATEGY: POLICY RECOMMENDATIONS

Support from local, state, and federal governments will be key to the success of the Maritime Blue strategy, particularly in their roles as stakeholder convener and as creators of policies and regulations. They can impact the rate at which industry can accelerate innovation and living-wage job creation.

These recommendations are intended to be complementary and aligned to parallel or connect policy initiatives when they support the Blue Strategy Goals. (While a particular policy or aspect of a recommendation may be highlighted in the Blue Strategy, it is not necessarily an endorsement of an entire initiative.)

Other initiatives that share at least some alignment include:

- Governor Inslee's Clean Energy Future for Washington State
- Washington Maritime Federation 2019 Legislative Priorities
- Washington State Ferries 2019 Long Range Plan
- Puget Sound Partnership Agenda
- Northwest Ports Clean Air Strategy
- Southern Resident Killer Whale Task Force Recommendations
- Career Connect Washington Policy Agenda
- Other State Agency policy and funding requests
- Local municipality and ports policy agendas

Combined Policy Recommendations for Blue Goals

Thriving, Low-carbon Industry

Secure funding to develop and support vessels and shore side infrastructure for electric operations and cleaner low-carbon fuels.

Adopt policies and incentives to create market conditions that reduce carbon (and other) emissions from maritime applications.

Ensure public funds for clean energy and carbon mitigation are directed towards maritime, clean technology applications.

Global Innovation Hub

Develop incentives and finance mechanisms for maritime innovation in shipbuilding and manufacturing, including vessel replacement for ferries, modernizing fishing fleet, noise reduction, and water quality.

Designate a maritime innovation validation zone to perform R&D, testing and evaluation of safety and operational performance for digitally assisted operations.

Fund and develop incubation, R&D and commercialization platforms for maritime innovation facilities and research centers.

Growing Gateways

Invest in critical port and maritime infrastructure to maintain and increase modernization and competitiveness.

Align and simplify the regulatory and permitting process to improve, speed, efficiency, and predictability in maritime infrastructure projects.

Develop regional collaborations and partnerships that promote competitiveness and reduce ecological impact.

21st Century Workforce

Dedicate funding for maritime specific training, education and workforce development, including expansion of registered apprenticeships and youth programs.

Support initiatives for statewide workforce development that encourage alignment and efficiency of programs according to community and industry sector-based priorities.

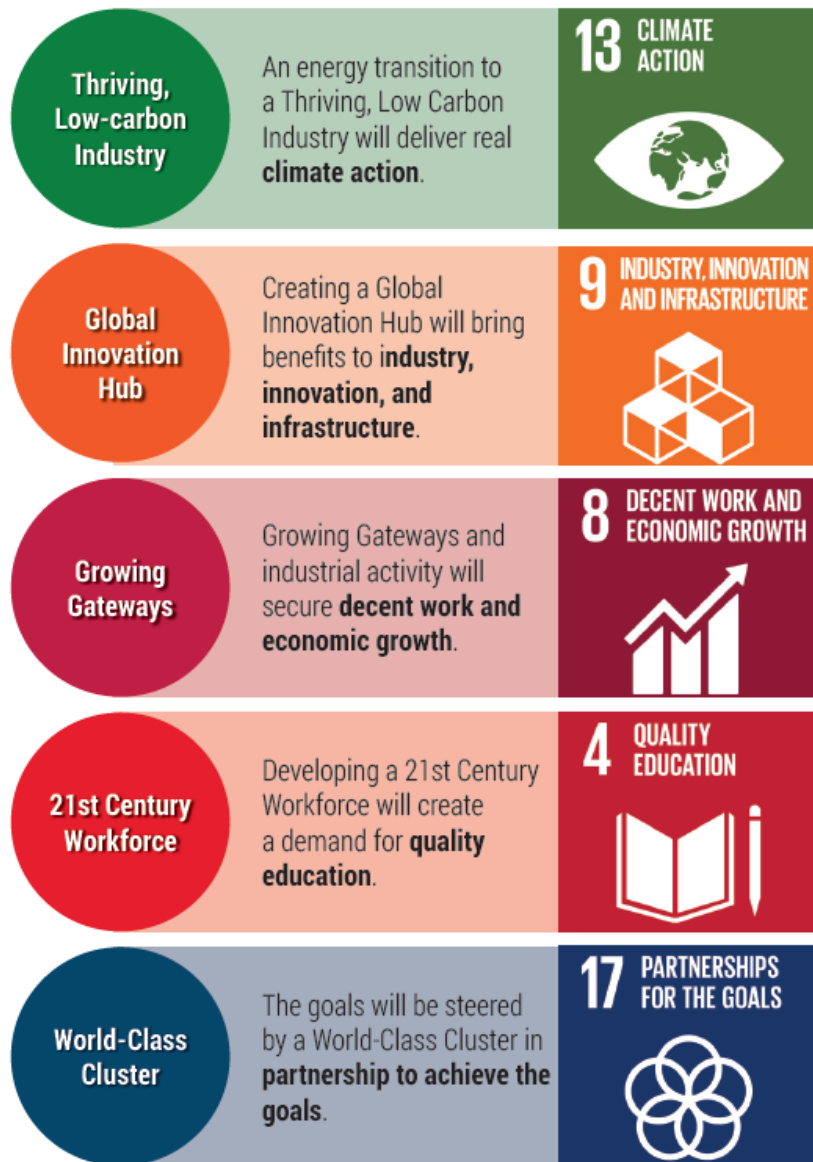
Adopt recommendations of Career Connect Washington and regional efforts to define and support maritime career pipeline development.

ACHIEVING BALANCE & ALIGNMENT

Avoiding Unintended Consequences: The policy statements and recommendations in this strategy are intended to enhance the three-legged framework of sustainability: economic growth, healthy ecosystems, and thriving communities. This means that policy, incentives, or regulatory regimes in this strategy should provide balanced impacts on the other legs of the framework, or address those intended or unintended consequences to create balance.

An example of the trilemma involved in balancing this three-legged framework may be found in the growth of innovation in digital processes and autonomous systems. While digitalized and automated processes can deliver benefits to efficiency and safety, their implementation may lead to overall adverse reductions in living-wage, trade-based jobs. Fair and just management of the social impact of innovation and transformation required by economic and environmental imperatives must be a test of any sustainable strategy. The key to successfully striking this balance is in open, honest dialogue between all parties to find creative and pragmatic solutions that can secure good jobs, economic growth, and environmental protection.

Aligning with Global Sustainable Development Goals: This strategy was designed to align with the United Nations' Sustainable Development Goals, which recognizes that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs that include education, health, social protection, and job opportunities, while tackling climate change and environmental



SUSTAINABLE DEVELOPMENT GOALS

IMPLEMENTING A LIVING STRATEGY:

A Living Document

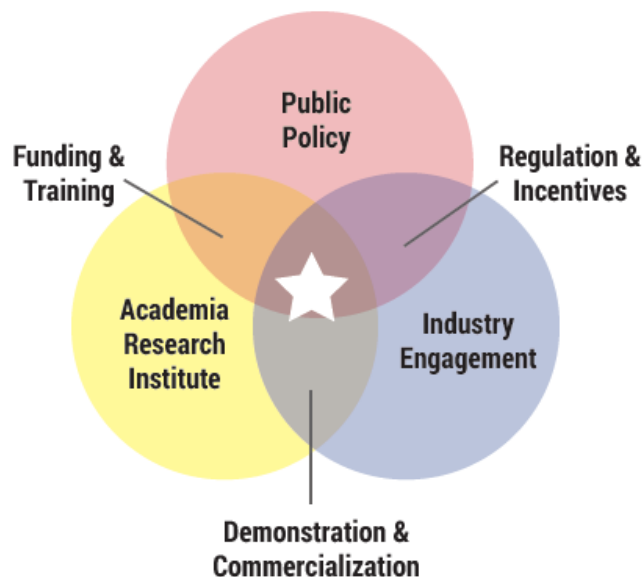
The Washington Maritime Blue Strategy is intended to be a living document with projects, initiatives, pathways, and even the goals themselves to be measurable over time with key milestones. As new projects, funding opportunities, or policy paths take shape, they can be incorporated and become additional "waypoints" along this plotted course. The real strength of this strategy is not the aspirational Goal Statements -- instead it's in the actionable projects themselves that define the Pathways towards the Goals and, ultimately, the Vision.

Implementation and Accountability

Our independent cluster organization -- Washington Maritime Blue -- has been created to implement the Blue Strategy through the strategic alliance of maritime businesses, public entities, community organizations, research, and training institutions ready to proactively accelerate innovation and growth.

Washington Maritime Blue will have global reach as part of a group of formal and organized Ocean/Maritime Clusters around the world that have been formed to enhance industry competitiveness in a transforming industry. As a focal point for business-to-business engagement, incubation, capital investment, and commercialization, Washington Maritime Blue will provide the platform to support the strategy's goals for growth and innovation, tech transfer and investment, skills development, and a diverse pipeline of workers.

The Components of a Cluster



The Role of a Cluster

- Communications & marketing
- Funding & investment
- Knowledge & innovation collaboration
- Incubation and commercialization
- Joint industry projects (JIP)
- Cross-cluster collaboration
- Strategy Review

The Washington Maritime Blue Strategy provides a robust and effective framework charting out the role of Washington State's Blue Economy in addressing global issues and securing sustainable development opportunities.

By an inclusive and iterative execution of this strategy, Washington Maritime Blue will be able to deliver the vision of a world-class, thriving, and sustainable maritime industry by 2050.

Global Issues and Opportunities



Ocean-Based Industries Offer New Opportunities



Established and emerging ocean based industries offer significant opportunities for growth.

Globally, public and private entities are increasingly turning to the ocean to explore the potential it offers. The ocean covers more than 70% of the earth's surface and holds about 97% of its water (NOAA 2018).

According to the Organization for Economic Co-operation and Development (OECD), by 2030 many ocean-based industries have the potential to outperform the growth of the global economy as a whole (2016). OECD's projections depict the significance of the global ocean economy by measuring its value added in terms of the ocean-based industries contribution to economic output and employment.

OECD estimates that in the business-as-usual scenario (BAU), industries are projected to double their contribution to global value, bringing in \$3 trillion in 2030 compared with \$1.5 trillion in 2010. The growth is in both established and emerging ocean based industries, particularly in marine aquaculture, offshore wind, fish processing, and shipbuilding and repair. The 2030 projections for industry employment growth are also significant with the addition of 40 million full-time equivalent jobs, particularly in offshore wind energy, marine aquaculture, fish processing, and port activities.

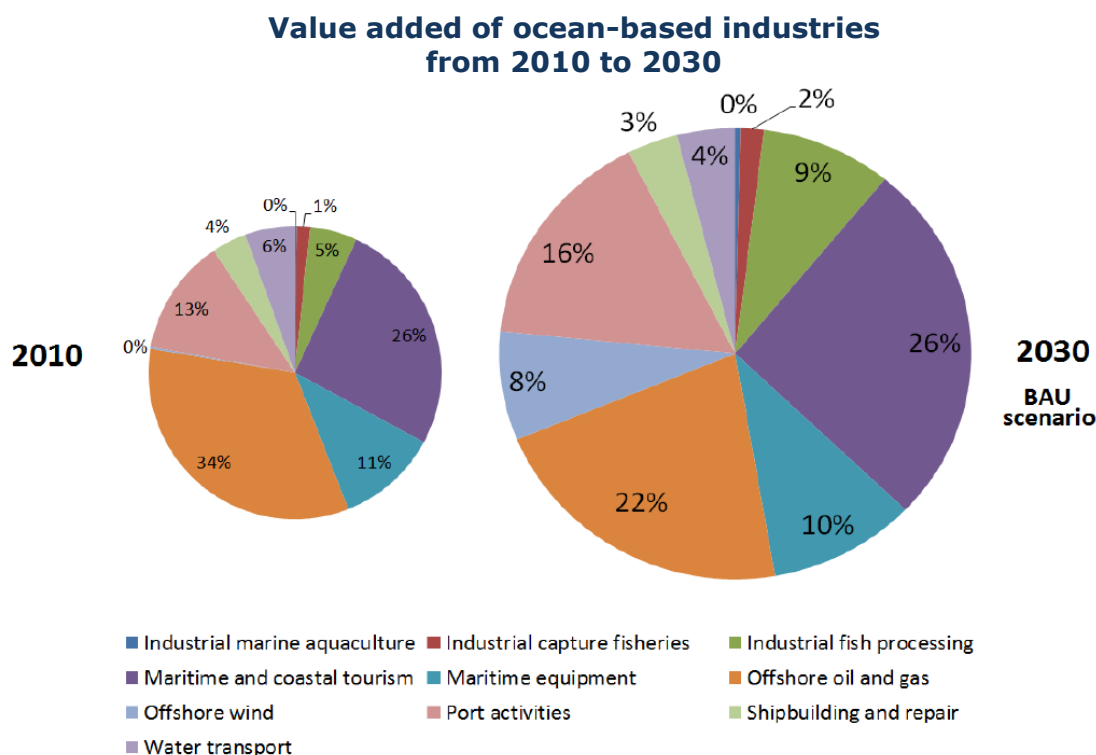


Image Source: OECD 2016

These increasing ocean-based activities also bring challenges, including growing pressure on an already stressed marine ecosystem. Threats to the environment include over-exploitation, pollution, declining biodiversity, and climate change. In order ensure sustainable ocean industries, opportunities need to be carefully managed so the Blue Economy lasts well into the future.

Sustainable Blue Economy

What is the Blue Economy?

With this growing trend in ocean-based activities impacting marine ecosystems, the term **Blue Economy** has seen a surge of interest all over the world.

An emerging concept with no universal definition yet, the Blue Economy is described by the World Bank (2017) as:

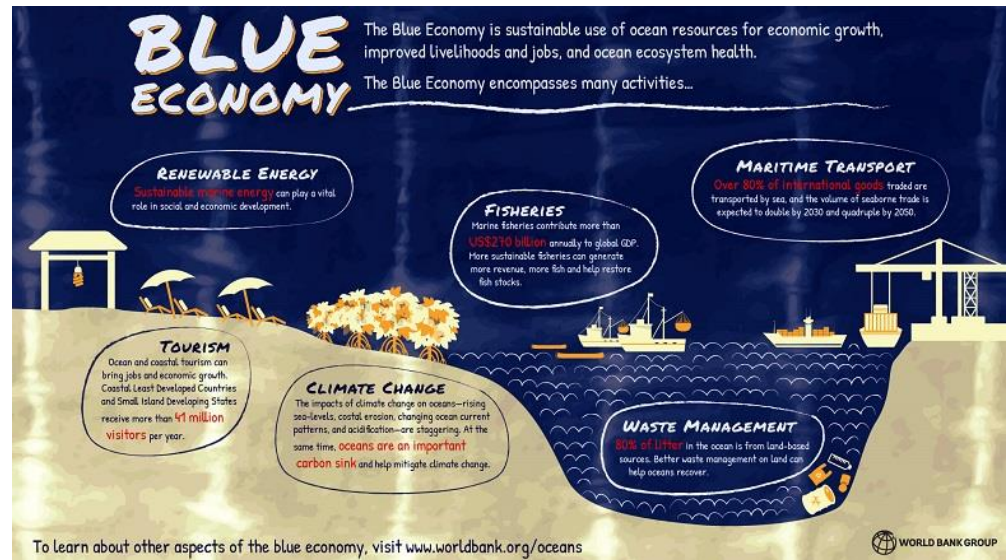


Image Source: World Bank 2017

"the sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem."

The Blue Economy has diverse components including established ocean-based industries such as fisheries, tourism, and maritime transport, but also emerging industries such as offshore renewable energy, aquaculture, seabed extractive activities, and marine biotechnology and bioprospecting.

The Blue Economy seeks to transition the maritime economy beyond "business as usual" and embrace the idea that economic growth and ocean health are entirely compatible, if not necessary, for long-term sustainability. Only by leveraging scientific and technological advances can the environmental challenges facing the oceans be adequately addressed. Innovations are expected in the areas of advanced materials, subsea engineering and technology, sensors and imaging, satellite technologies, computerization and big data analytics, autonomous systems, biotechnology, and nanotechnology.

The role of government is important to facilitate the development of science, innovation, and technology in the Blue Economy. The global nature of the challenges facing our oceans and of the maritime industry makes international collaboration and cooperation essential to ensure a sustainable Blue Economy. Sustainable development will not be secured by regional or local initiatives alone.

The Blue Economy is taking off around the world: Norway's ships are humming to electric engines. Ports are investing in the future for greater efficiencies, including the Port of Los Angeles/Long Beach constructing the world's first zero emission terminal. Marine renewable energy is growing to grid scale, and our ability to collect and analyze ocean data has increased dramatically.

The various trends in the sustainable development of the global maritime industry are categorized in nine areas, as illustrated on the next page.

Global Maritime Trends in Sustainable Development



Alternative Fuels

MEPC 72 GHG decision increases pressure for the low carbon transition



- Gas-fuelled fleet expands
- Biofuels, methanol, and hydrogen concepts develop further
- Fuel cell technologies mature
- Wind on the horizon?

Electrification

Falling costs & technical advances speed the uptake of battery & hybrid solutions



- Rapid expansion in shortsea and ferry applications
- Huge potential for hybrid applications
- Fully electric not viable for deep sea trade for foreseeable future

Policy & Incentives

Maritime nations are taking a more strategic approach to the industry



- 'Smarter' policy is driving & incentivizing development in key strategic areas
- Local emissions & environmental rules rewarding positive efforts

Digitalization

Data availability & transparency revolutionizes traditional business models



- The digital transformation provides opportunities to:
- Improve efficiency & accuracy
 - Add customer & stakeholder value.
 - Generate new businesses.

Environmental Capital

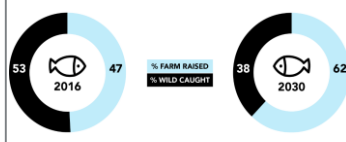
Growing awareness of and sensitivity to the health of marine ecosystems



- Public and supply chain stakeholder scrutiny and expectations are growing
- Industry taking a broader view of its environmental impact
- Local environmental requirements

Aquaculture

Aquaculture provides a growing share of the world's fish



- Significant growth forecast to meet global consumption demand
- Aquaculture pushing further offshore
- Rapid innovation in technology & practices

Partnerships

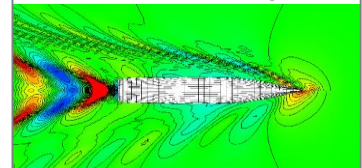
Leading maritime capitals invest in collaboration



- Government, Industry and Research partnerships
- Formal and dedicated cluster organizations are growing

Efficient Design

Advances in computing power & advanced materials drive efficient designs



- Advanced hydrodynamics simulation capabilities
- Modelling of complex cyberphysical systems
- Lightweight and next generation materials

Automation/Autonomy*

Cost pressures and manning shortages drive advances in automated and autonomous technologies



- The first fully autonomous ships
- Focus on safety and reliability benefits of autonomy
- A future skills strategy must be understood and addressed

Maritime Clusters: Enhance and Develop Maritime Sectors

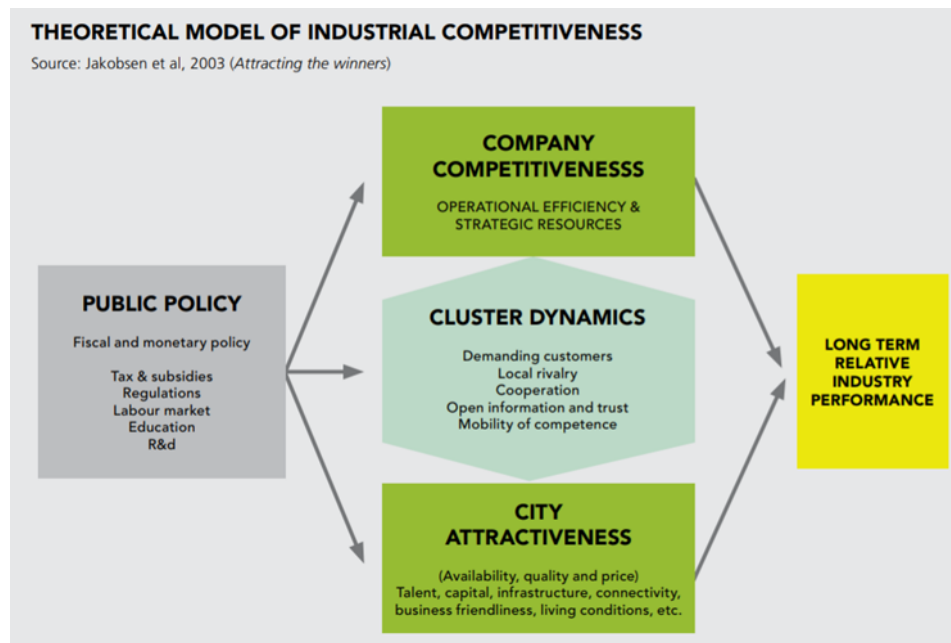


The maritime industry is a global business, characterized by many mobile companies.

Attracting these companies to a specific location involves tough competition amongst other candidate locations. Specialized knowledge-based services are the least mobile companies in the maritime industry as they are deeply embedded in the local community due to links to universities and reliance on specialized local competence. Because firms increasingly split up their value chains, cities compete to attract activities – not companies.

Location attractiveness of a city or country can be defined as a function of:

- Companies competitiveness present in the location
- City attractiveness to host those companies. This relates to the qualities of resources (people, competence, access to capital, infrastructure) available in the location and the price they have to pay these resources and how these resources are perceived by companies inside and outside of the location
- Cluster dynamics present in the location. Strong cluster dynamics encourage increased competitiveness for companies and the location, which further attracts companies to the location.



These three elements are directly influenced by public policies of the location that support value creation such as taxes, subsidies, R&D, education, and also indirectly by policies in other locations as the competition is global.

The winners in the future will be those cities that are able to attract:

- Science and higher education
- Owners and headquarters
- R&D – product and technology development
- Financial, legal and other sophisticated business services (Jakobsen et al. 2017)

Cluster Focus & Organizations Strengthen Maritime Industry



Countries and cities around the world compete to attract and retain global maritime companies operating in global markets. The race for attractiveness has never been as intense as it is today.

Several countries and cities have already recognized the tremendous success that comes from a cluster focus. Countries such as Norway, Singapore, and UK have already started initiatives aimed at helping maritime industries grow by giving them the support they need.

One common method of ensuring the cluster focus and dynamics run smoothly is setting up a cluster organization. European Union defines cluster organizations as “structures or organized groups of independent parties designed to stimulate innovative activity by promoting sharing of facilities and exchange of knowledge and expertise and by contributing effectively to knowledge transfer, networking, information dissemination and collaboration among the undertakings and other organizations in the cluster.”

An overview of mature maritime clusters in leading maritime locations:



Norway

- Norway is one of the few European countries with a complete maritime cluster including shipbuilding
- Norway has a government-induced cluster that aims to enhance value creation within innovation, internationalization as well as developing expertise
- Norway has 13 cluster organizations



Singapore

- Singapore has 3 cluster organizations working towards strengthening Singapore's position as an International Maritime Center: Maritime & Port Authority (MPA), Singapore Shipping Association (SSA), and Singapore Maritime Foundation (SMF).
- MPA acts as an industry regulator, SSA as a National trade association and SMF as an industry outreach and promotion organization.



United Kingdom

- UK benefits from a diverse, wide-ranging and competitive maritime sector with a number of important constituent parts.
- The UK maritime industry is represented by various industry associations and sector bodies that positively contribute to the overall cluster development, however each of them represent their own interests/priorities.

Success from this cluster focus has worked well for these countries and they now hold a strong position as leading maritime countries across the world. This trend is easily observed in a ranking published in **The Leading Maritime Capitals of the World** (Jakobsen et al. 2017) and **The Leading Maritime Nations of the World 2018** (Jakobsen et al. 2018) – a study that benchmarks the 30 leading maritime city regions/countries around the world in four sectors: shipping, finance and law, technology, ports and logistics, together with an overall assessment of the cities' attractiveness and competitiveness.

Norway ranks 4, UK ranks 8 and Singapore ranks 9. While the US holds a high rank of 2, Washington needs to work towards increasing the competitiveness of the state by developing strategies to attract highly productive and innovative companies and activities, along with talented individuals to make them more competitive.

Washington's Role in the Blue Economy



State Maritime Overview & Linkages

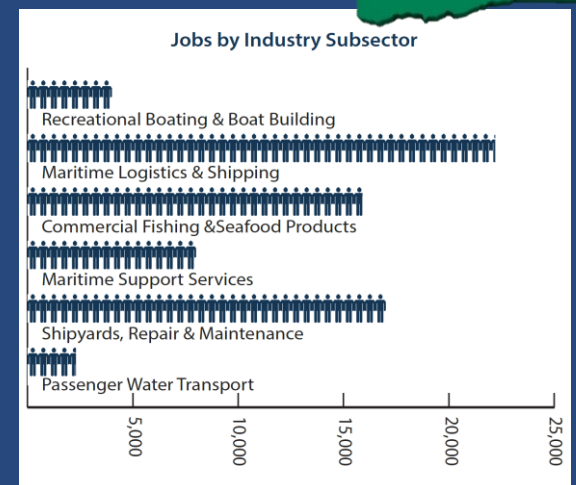
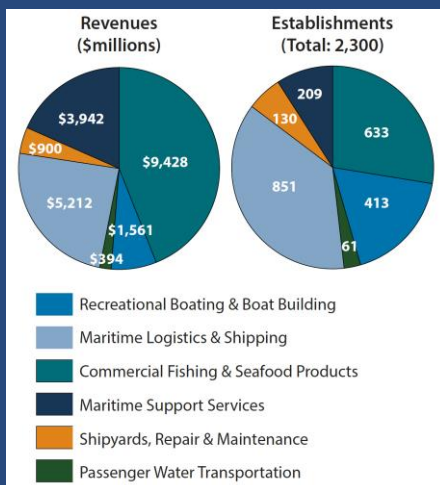
The Washington Maritime industry impacts the entire state of Washington. Not every county in Washington State has a port authority, but the maritime sector directly employs workers in every county. Washington State boasts one of the most interdependent and diverse maritime sectors in the country, and it is the most trade-dependent state in the US with 1 in 4 jobs tied to international trade.

Maritime activity has long been a pillar of Washington State's economy, with \$17.1 billion in gross business income and 69,500 good-paying jobs. Today's maritime jobs have salary ranges above that of other trade industries. The average pay for a job in Washington is \$56,900, while maritime workers are paid an average of \$67,000 — totaling over \$4.7 billion in wages in 2015. This sector continues to grow at an average of 6.4% a year and has the potential for a much greater impact on the state's economy (Community Attributes Inc. 2017).

Other key statistics include:

- Maritime industry worth more than \$37 billion to state economy.
- Washington's maritime sector includes 2,300 companies that employs almost 70,000 people. The industry responsible for more than \$17.1 billion in revenue and \$4.7 billion in wages annually. Historically, the annual growth rate has been between 3% to 6%.
- The cluster represents a deep network of activities that positively contributes to economic growth of the state. Statewide, for every direct job in Maritime, an additional 1.6 jobs were supported elsewhere in the state economy. Likewise, every million dollars of sales by Maritime firms supported almost 10 jobs throughout the state economy.

Washington's Maritime Economic Impact



The maritime industry paid nearly **\$4.5 billion** in wages in 2015 with average salaries of **\$65,300**. In comparison, the state's average wage in 2015 was **\$56,700** (does not include benefits).

Industry-wide, revenues have grown **2.4%** per year from 2012 to 2015, with the largest growth rate in Maritime Logistics & Shipping at **5.2%**.



WASHINGTON MARITIME FEDERATION
A Coordinated Voice for Maritime Progress

2016 Economic Impact Study, Community Attributes

Governor Inslee's Sector Lead Program

Mission:

To grow and **strengthen communities** by promoting a strong business climate in our state through targeted high demand industry sectors that focus on strategic economic development efforts.

In recognition of the maritime sector's role and its potential in the state's economy, Governor Jay Inslee established a Maritime Industry Sector Lead in 2013, housed within the Department of Commerce. The Sector Lead serves as liaison for the Governor with maritime industry interests, supports industry-wide coordination, creates a supportive business climate, sets strategic direction, and encourages the development of the 21st century workforce. The lead is also responsible for coordination with key trade associations and cluster organizations, such as the Washington Maritime Federation and the new Washington Maritime Blue Cluster organization, described below.



The Washington Maritime Federation (WMF) is a coordinated and unified voice of the diverse and interdependent subsectors of the maritime industry. WMF supports policy and investment priorities that support the vitality, growth and resilience of Washington's maritime industry. Regional, state, and federal priorities are based on a full consensus decision-making process by WMF members advised by associate members and a broad group of business, labor, and government stakeholders.

It has created a communication conduit to decision makers and for the various sub-sectors of the industry to engage with one another. There are now open channels to convene ports, labor organizations, the workforce system, university research centers, and other economic sectors.

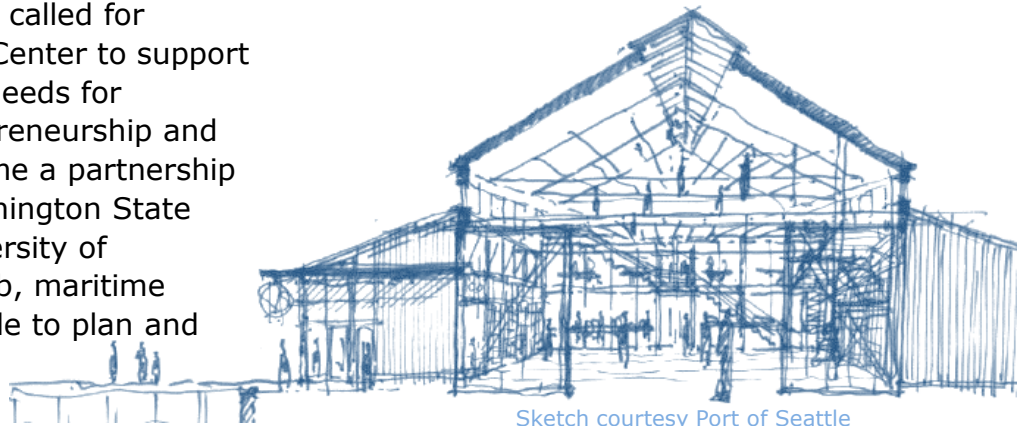


This is a strategic alliance to accelerate growth in maritime business, technology and practices that promote a sustainable future contributing to economic growth, ecological health, thriving communities – the Blue Economy.

The alliance will drive implementation of the Washington Maritime Blue Strategy and facilitate collaboration to ensure a strong maritime cluster focused on technology acceleration, entrepreneurship, business support services, and workforce development

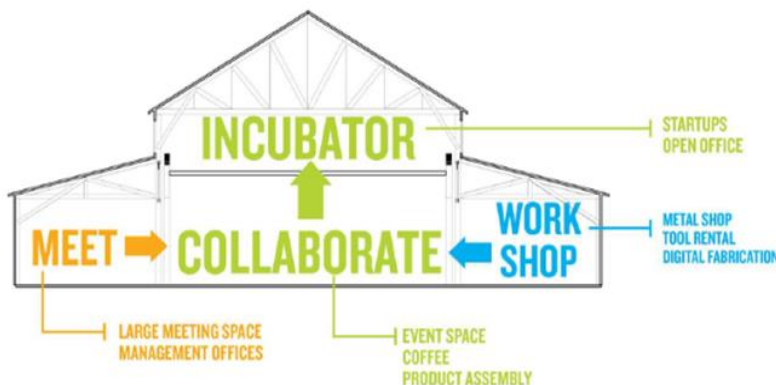
Working in concert, the two organizations can ensure that policies and incentives that support a thriving and sustainable maritime industry are prioritized by decision makers and regulators.

In 2013, Governor Jay Inslee called for planning a Maritime Innovation Center to support Washington's diverse maritime needs for technology development, entrepreneurship and business services. Since that time a partnership has been built between the Washington State Department of Commerce, University of Washington's Applied Physics Lab, maritime businesses and the Port of Seattle to plan and build a facility.



Sketch courtesy Port of Seattle

In 2018, the Port of Seattle engaged the Maritime Alliance to complete a planning and feasibility study to underpin the start-up and ongoing operations of the Maritime Innovation Center and has subsequently included the building's development in the Port's Capital Budget Plan. Governor Inslee has proposed funding in the 2019-2021 Biennial Capital Budget to support the effort.



Next Steps

The Washington Maritime Blue cluster organization will work in partnership with the Port to develop a business plan to begin offering services and manage the facility as a focal point for a "hub and spoke" model to support innovation across the State of Washington.

What is clear in our research of incubation programs is that co-location of like-minded businesses or startups with collaboration from academia, Industry, and policy-makers is critical to help facilitate the needed culture for innovation in maritime.



The Maritime Innovation Center will:

- 1. raise the profile of maritime industries in a crowded media space,*
- 2. leverage regional expertise in high-tech software and data companies to introduce disruptive technologies in the maritime field,*
- 3. introduce young people to exciting new careers, and*
- 4. support early stage maritime companies with a hub-and-spoke model of collaboration across the entire maritime sector in Washington State.*

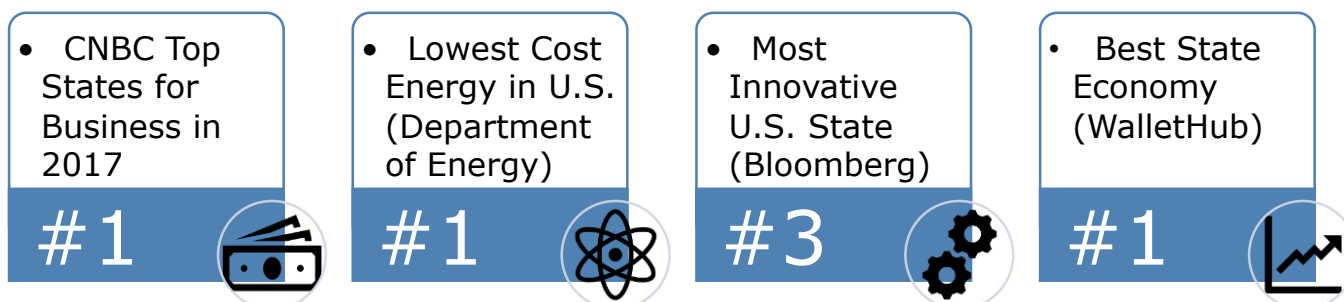
(Source: Maritime Alliance & ECONorthwest 2018)

Washington's Leadership, Need for Linkages



Washington State is recognized for its stewardship in sustainability. WA is part of a coalition of 15 states and territories that has committed to reaching the climate goals of the Paris agreement. Washington also shares the regional goals for reducing greenhouse gas emissions at least 80% by 2050 as part of the Pacific Coast Collaborative: "Through the Pacific Coast Collaborative, British Columbia, Washington, Oregon, California, and the cities of Vancouver, Seattle, Portland, San Francisco, Oakland, and Los Angeles are working together to build the low carbon economy of the future" (Pacific Coast Collaborative home page 2018).

Governor Inslee has also provided policy and strategic guidance through his Deep Decarbonization efforts and Clean Energy Future for Washington State (both available on Governor Inslee's government website), which the Maritime Blue strategy is aligned with.



Source: <http://choosewashingtonstate.com/>

Washington is also well known for being the birthplace for international companies and for being one of the best places in the US to start and to run a business. There is a culture of creativity and cooperation in this state that seems to be very beneficial for businesses. There are many reasons for this and the examples are many.

The maritime industry in Washington is less known to the general public, however equally impressive. Washington's maritime industry operates in one of the most stringent regulatory climates and often with public scrutiny on the impacts of the industry on the natural environment and disaffected communities. Yet, in comparison to other maritime clusters, Washington's maritime industry is a global leader in best practices, technology deployment and sustainable actions, from innovative port stormwater systems to the world's first hybrid tug boat. The industry is eager to collaborate, share and communicate more clearly its leadership and intention to continue towards sustainability – it's an integral part of the local ethic. Couple that drive with clear indications that the new ocean/maritime economy is set for extraordinary growth, and you have the perfect ingredients for a cluster organization's ability to facilitate the Blue Economy.

In this context, collaboration and coordination of industry activities become key, including the creation of linkages that extend beyond state borders to leverage regional, national and global activities that align with the sector's common objectives. These linkages will broaden the knowledge base for WA stakeholders by sharing best practices and collaborating in innovation areas to accelerate commercialization opportunities. To optimize the opportunities and support growth throughout the industry regardless of location or sub-cluster, it is necessary to organize and provide support through a "hub and spoke" model.

Building on Washington's Strengths Across Sectors



In any strategy work, it is important to identify key strengths to be able to build on those to reach new goals.

Washington has a long, proud history in the maritime industry. There is a reason why the Seattle baseball team is called the Mariners. As highlighted in the subsector analysis later in this report, state maritime industry has grown from a strong base of fishing fleets to encompassing the full range of support services, international and regional ports, yard services, and more.

Some of the most exciting opportunities for the maritime sector, however, arise from collaborations with subsectors and leveraging some of Washington's other strengths. The State of Washington is an international leader in information and communication technology (ICT) and ranks highly as an alternative to Silicon Valley. Being the home of Amazon and Microsoft, as well as hosting a thriving entrepreneurial ICT community, the state is well-established as an innovation leader.

For decades Washington has also been a leader in the aerospace industry, with material science, production engineering, and advanced manufacturing all standing out as strengths with potential applications in the maritime industry.

Washington also boasts significant activity in the clean technology sector. According to the state's Department of Commerce website, there are nearly 90,000 clean tech workers in the state backed by more than \$1 billion in venture capital. This sector has also been supported by innovation in academic and research institutions and state and federal funding.

The defense sector is Washington's second largest direct public employer, just after the state itself. Defense industries here comprise many sectors, which contributes to a strong economy. The diverse defense missions, military installations, pioneering companies, and military-friendly communities contribute enormous value now and possibility.

The economic contribution and historical legacy of the maritime industry in combination with the strengths of the industries described below are critical to developing and executing strategies to grow a Blue Economy.

WA Clean Tech Sector

100+ companies, possessing 195 patents serving more than 12 different industrial sectors. This sector is supported by world-class research institutions including the Pacific Northwest National Laboratory, the University of Washington and Washington State University.

WA Information & Communication Technology Sector

- ~200,000 jobs at 14,000 Firms
- Payroll- \$22 billion
- Median Wages - \$110,00-\$140,000

WA Aerospace Sector

- 136,100 jobs at 1,400 firms
- \$69.9 B in economic activity
- 59.8% of foreign exports
- Boeing 777X and its carbon-fiber wing are built here.
- Emergent sub-sectors: UAV/UAS, space exploration, MRO and aviation biofuel.

WA Military and Defense Sector

- Second largest public employer in WA state (>127,000 employees)
- Supports over \$13 billion dollars in annual procurement through ~2,000 businesses, representing almost 3% of the state's GDP.
- Focuses on strong military-civilian partnerships, enhancing innovation, providing for compatible use in local communities, and supporting the transition from service members to civilian life.

Funding Opportunities for Maritime Innovation



While Washington State does not have the same type of government financial support as seen in places such as Norway, Singapore, China and other countries ranked in the Leading Maritime Nations of the World report, the US was just named as number one in the category of Maritime Finance and Law. This was due to its bond markets, large number of listed companies, IPO's and private equity markets (Jakobsen 2018). A cluster organization can help companies with finding ways to tap into these resources. In addition, there are state and federal funding opportunities available for maritime innovation and growth. Some of those opportunities are described below.

Washington State Clean Energy Fund (CEF)

WA Commerce manages this bi-annual fund to support development, demonstration & deployment of clean energy technologies. For CEF Round 3, \$46 million was allocated as follows:

- Matching Program for Energy Research and Development (R&D) - \$8.6 million
- Grid Modernization Program - \$11 million
- Transportation Electrification - \$11 million
- Solar - \$4 million

The Transportation Electrification category specifically calls out maritime transportation. Grid Modernization and R&D could also be applied for maritime shore power and other maritime clean energy innovations. For details, please visit: <https://www.commerce.wa.gov/growing-the-economy/energy/clean-energy-fund/>

Opportunity Zones

The new federal Opportunity Zone program provides tax incentives for investing in certain low income census tracts. Washington State has 139 of these Opportunity Zones, and over 50 percent are located on the waterfront or in ports. For details, please visit:

<https://www.commerce.wa.gov/growing-the-economy/opportunity-zones/>

Volkswagen (VW) Settlement Fund

Washington State is eligible for \$112.7 million from the VW settlement for projects that reduce emissions. According to the State of Washington Beneficiary Volkswagen Settlement Plan (2017), funds will be prioritized based on where VW vehicles were, are or will be operated and have greatest potential to mitigate the total, lifetime excess NOX emissions. The key opportunities include Electric Ferries in the Puget Sound and Electric Charging Stations (including ports, non-road equipment, marine vessels and heavy-duty trucks). For details, please visit: <https://ecology.wa.gov/DOE/files/41/417a6510-a669-4a10-927d-4ebc02282f4a.pdf>

EPA Diesel Emission Reduction Program

In April of this year, EPA announced that they anticipate awarding approximately \$40 million nationwide in [Diesel Emission Reduction Program](https://www.epa.gov/newsreleases/epa-grants-available-reduce-emissions-diesel-engines-alaska-idaho-oregon-and-washington) (DERA) grant funding. This program includes commercial marine vessels. For details, please visit: <https://www.epa.gov/newsreleases/epa-grants-available-reduce-emissions-diesel-engines-alaska-idaho-oregon-and-washington>

US Department of Commerce, Economic Development Administration's (EDA) Public Works and Economic Adjustment Assistance (EAA) programs

EDA solicits applications from applicants in rural and urban areas to provide investments from \$100,000 to \$3 million that support construction, non-construction, technical assistance, and revolving loan fund projects. For details, please see: <https://www.grants.gov/web/grants/view-opportunity.html?oppId=306735>

Developments, Challenges, & Opportunities in WA's Blue Economy



State Maritime Subsector Analysis & Stakeholder Perspectives

Range of WA's Maritime Industry and Subsectors



Washington's maritime sector includes a diverse range of maritime subsectors and support services. In addition to thriving private enterprises, the maritime industry includes significant public sector elements such as military and federal activities through the U.S. Navy, U.S. Coast Guard, National Oceanic and Atmospheric Administration; university and research institutions; and numerous public support entities, including 75 port districts statewide.

Federal Presence in WA Maritime Sector

Naval Base Kitsap/Puget Sound Naval Shipyard	U.S. Coast Guard District 13	National Oceanic & Atmospheric Administration Western Regional Center	University of Washington (UW)
The Puget Sound Naval Shipyard is the Pacific Northwest's largest Naval shore facility and one of Washington State's largest industrial installations, employing nearly 13,400 workers in 2015.	Based in Seattle, performing maritime safety, security, law enforcement and environmental missions on the navigable waters of WA, OR, ID, MT and 460,00 square miles of the Pacific Ocean. Home to the U.S. icebreaker fleet.	Based in Seattle, houses the largest variety of NOAA programs at a single location in the nation, including the Pacific Marine Environmental Laboratory, Oceanography and Marine Services and elements of the National Marine Fisheries Service.	Based in Seattle, UW has substantial fisheries and ocean sciences teaching and research departments, which are strongly supported by federal research programs.

Most maritime activity is clustered around the Puget Sound, with important nodes across the state and along the Snake and Columbia rivers. Boat and ship building, repair and maintenance activities are centered in Kitsap, King, Pierce, Skagit, and Whatcom counties, with the largest number of workers are based at the Puget Sound Naval Shipyard in Bremerton. Recreational boat building and boating activities are centered in King County, which spread across the state's inland water resources including the Columbia River. Commercial fishing and seafood processing activities are clustered primarily in the Greater Seattle area, but smaller seafood processing and aquaculture activities can be found elsewhere in the state.

The maritime logistics and shipping subsector extends into Eastern Washington with employment in rail and trucking activities directly related to the maritime sector. Rail networks extend across the state, with major railyards in Seattle, Tacoma, Centralia, Pasco, and Spokane. Rail is an essential component of Maritime Logistics and Shipping, facilitating the movement of marine cargo to and from the state's seaport terminals.

The Northwest Seaport Alliance—representing Washington's two major containerized ports—manages the movement of discretionary cargo traffic, i.e., imported containers destined for locations in the Midwest and elsewhere. Handling of this cargo supports many jobs and businesses within Washington, including among terminal operators, rail yards, and freight logistics businesses.

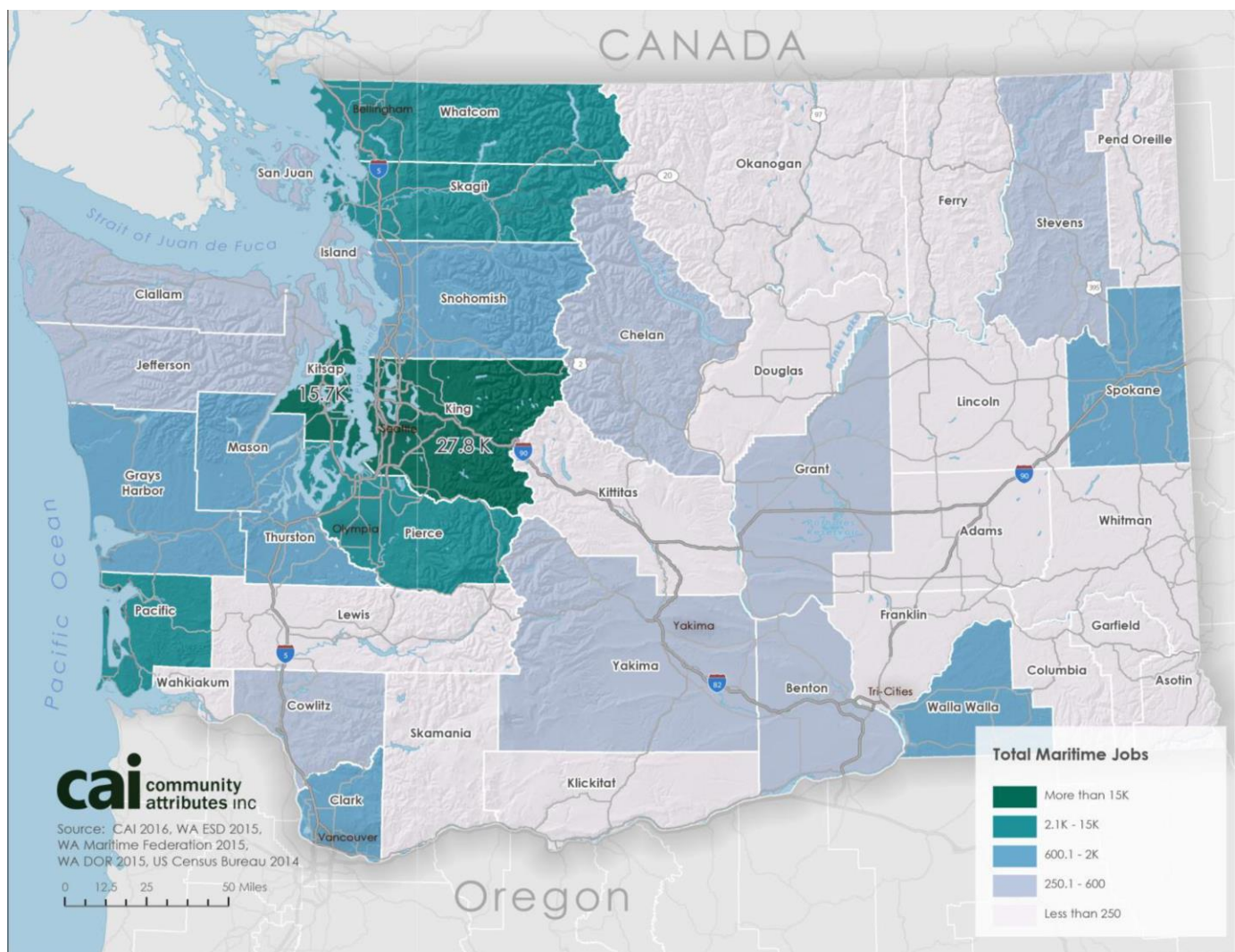
Range of WA's Maritime Industry and Subsectors



The Passenger Water Transportation subsector focuses on activities in King and Kitsap Counties, which include the daily movement of Seattle area commuters by ferry as well as cruise ships embarking from Seattle. Less visible but equally important to highlight are the dozen river boat manufacturers residing within Clarkston, a small town in eastern Washington that borders Idaho, and produces over \$70 million dollars in annual sales.

Maritime support services is a broad subsector that covers naval architecture, marine construction, geotechnical and environmental analysis, marine education, and associations. These businesses are spread across the state, though a large number are located in proximity to the maritime businesses they serve.

Maritime Sector Employment by County 2015

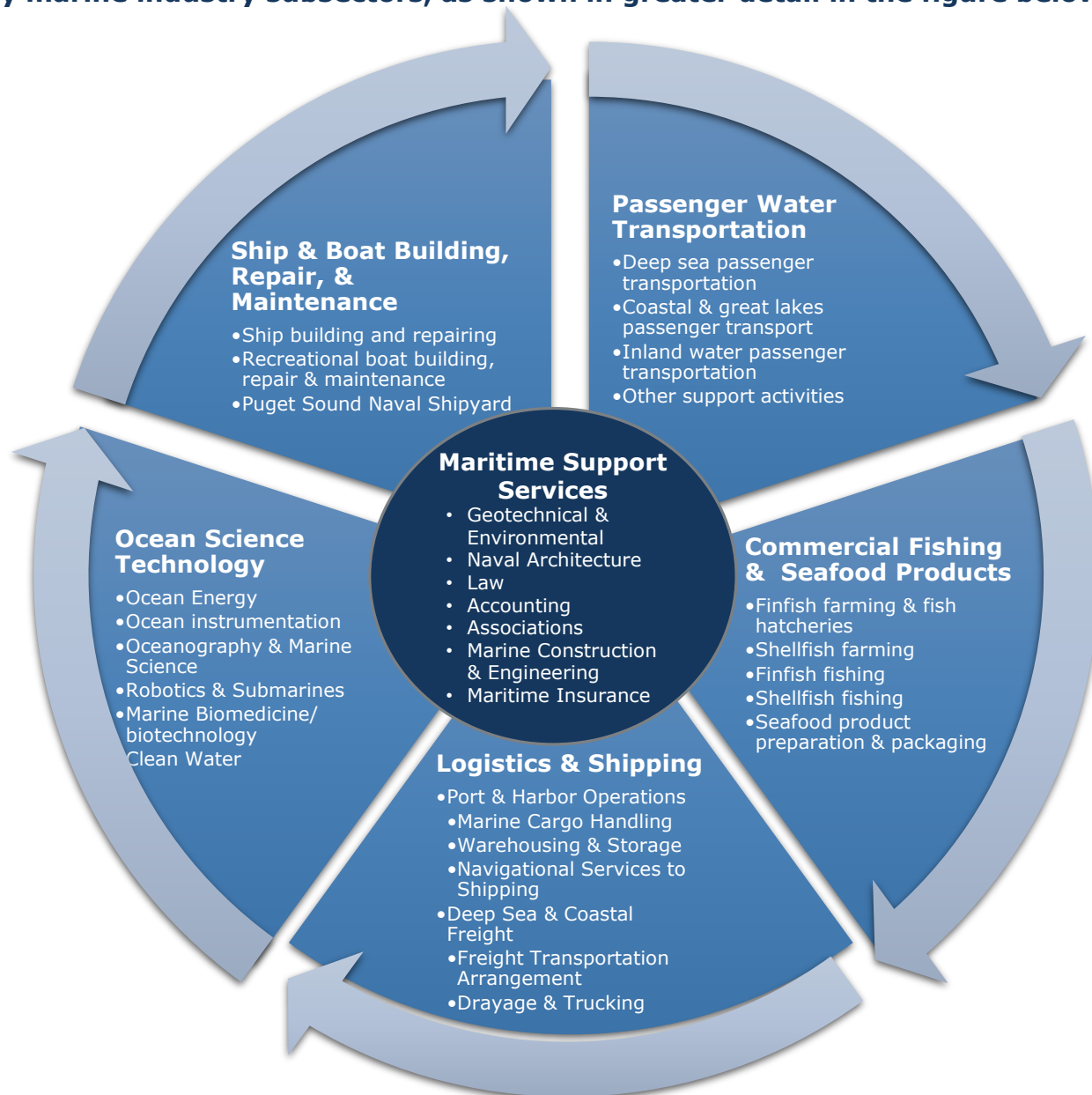


Sources: Washington State Department of Revenue 2015; Washington State Employment Security Department 2015; United States Census Bureau 2014; Washington Maritime Federation 2016; Community Attributes Inc. 2016

Washington's Maritime Subsector Analysis



As part of the Maritime Blue strategy initiative, an analysis was conducted for six key marine industry subsectors, as shown in greater detail in the figure below:



The subsector analysis on the following pages provides a snapshot of their economic contributions, current developments, and current challenges that impact Washington's Blue Economy. The six subsectors were defined, categorized, and grouped based on previous maritime-industry studies, such as those conducted by the Washington Maritime Federation. There are two differences in the grouping for this analysis: Ocean Science Technology was added as a single subsector, given current national and international developments in this area. The Recreational Boat Construction and Recreational Boating category was designated within the Ship and Boat Building subsector. This analysis drew on numerous sources, which are listed in Appendix D: Subsector Analysis Sources.

Commercial Fishing & Seafood Processing



This subsector includes 3 areas:

- *Wild Capture Fishing*: aquatic life is not controlled (includes finfish and shellfish fishing)
- *Aquaculture/Fish Farming*: Raising aquatic life for commercial use (includes finfish and shellfish farming)
- *Seafood Processing*: Establishments involved in processing, preparation and packaging of seafood.

DNV GL photo

In 2015, this Washington subsector:

Contributed **44%** of the total maritime industry revenue



Supported **23%** of total maritime jobs

Paid \$1,075 million in wages



Current Developments

- Precautionary, ecosystem-based federal fisheries management ensuring world-class sustainable fisheries.
- Increased investment (e.g., new vessels and value-added processing) in North Pacific and West Coast fisheries that account for more than 70% of all U.S. seafood landings.
- Improved technology and performance in groundfish fisheries promoting “clean” fishing, including decreased Chinook bycatch.
- Advances in marine science allowing for more accurate stock assessments and climate predictions.
- Puget Sound Partnership addressing water quality and habitat in Puget Sound.
- Shellfish aquaculture rapidly expanding.
- Non-native fish farms being phased out in Washington.
- Federal funding made available to assist with aquaculture pilot projects.

Current Challenges

- Changing climate conditions increasing uncertainty in fish stock forecasts and business planning.
- Trade-dependent WA State seafood industry challenged by uncertain trade agreements.
- Seafood industry markets impacted by agenda-driven, not science-driven non-governmental organizations.
- Decreased funding for stock surveys, critical research, and key federal agency personnel.
- Access to resources limited by allocation conflicts and extra jurisdictional regulatory bodies.
- High regulatory standards and compliance cost relative to other producing regions in global seafood markets.
- Puget Sound vital signs below 2020 targets.
- Interactions with marine mammal predators.
- Increasing costs and lack of maritime, industrial lands for working waterfronts.



This subsector includes 3 areas:

- *Transportation*: Establishments involved in water transportation of cargo.
- *Warehousing*: Establishments involved in providing refrigerated and general warehouse facilities.
- *Support Firms & Services*: Establishments that provide specialized logistics & shipping services such as operating ports and marine cargo handling.

DNV GL photo

In 2015, this Washington subsector:

Contributed **24%** of the total maritime industry revenue



Supported **32%** of total maritime jobs



Paid \$1,479 million in wages

Current Developments

Seaport Alliance's Strategic Business Plan:

- Optimized infrastructure investment to develop facilities for the future
- Deliver customer focused operational excellence

Successful policies from Ports of Vancouver and Savannah, GA:

- New investment models for financial sustainability and growth
- Improved siting and project delivery
- Enhancing port stakeholder coordination

Regional Green Initiatives:

- Northwest Ports Clean Air Strategy, participation in Green Marine, Cold Ironing (onshore power supply), FRATIS (freight advanced traveler information system), cargo handling equipment with fuel-efficiency plans.

Current Challenges

- Declining cargo market share due to:
 - Terminal productivity and rail competitiveness
 - Difficulties in securing the industrial lands for world class facilities
 - Shifting global trade patterns, alliance models and route diversification
- Fewer green-related incentives/rewards (e.g., discounted harbor dues) than neighboring and competing Port of Vancouver as well as leading ports in the world.

Passenger Water Transportation



This subsector includes 3 areas:

- *Deep Sea Water Transportation:* Transportation of passengers to and from foreign ports (cruise)
- *Coastal & Inland Water Transportation:* includes all water transportation of passengers in coastal and inland areas (ferries).
- *Support Activities:* establishments involved in providing services to water transportation.

DNV GL photo

In 2015, this Washington subsector:

Contributed **2%** of the total maritime industry revenue



Supported **3.3%** of total maritime jobs



Paid \$138 million in wages

Current Developments

- Reducing environmental impact of passenger water transportation: cleaner burning engines, low-emissions fuels, reduced risk of fuel spills, hull design to reduce wake, and quieter machinery.
- \$600,000 funding to Washington State Ferries (WSF), to explore conversion of three ferries (Jumbo Mark II Class) from diesel to hybrid electric.
- WSF Long Range Plan to build new hybrid/electric fleet and transition to a zero-carbon-emissions, including the accelerated adoption of both ferry electrification and operational improvements that will conserve energy, cut fuel use and reduce the cost of operating ferries.

Current Challenges

- International regulation and local factors driving a need to reduce the environmental impact of the growing deep sea water transportation market.
- WSF face growing demand and ridership while contending with:
 - Aging fleet: all but 13 vessels are over 30 years old
 - Lack of time for maintenance: Boats are in service 20+ hours a day
- One relief boat and limited drydock capacity:
 - Aging workforce and a need to focus on succession planning

Ship and Boat Building, Repair, & Maintenance



This subsector includes 3 areas:

- *Puget Sound Naval Shipyard*: repair and maintenance of military (U.S. Navy) vessels.
- *Boat & Ship Building*: new construction of commercial and recreational vessels.
- *Repair & Maintenance*: maintaining all existing commercial and recreational vessels.

DNV GL photo

In 2015, this Washington subsector:

Contributed **12%** of the total maritime industry revenue



Supported **30%** of total maritime jobs



Paid \$1,395 million in wages

Current Developments

- U.S. consumers want fish that have been sourced in an environmentally friendly manner – need for fisheries and fish farms to create a green image.
- Washington State Ferries shift to hybrid-electric propulsion systems opportunity to demonstrate leadership.
- Increasingly strict international, EPA and state environmental legislation increases the need to build and operate green vessels.
- Strong ties with Canada and Asian trade partners present opportunities for cooperation and export.
- Washington Clean Energy Funds available for maritime electrification to support renew or retrofit of fleet with clean technologies.

Current Challenges

- An ageing workforce and a growing skills gap as new methods and technologies emerge.
- Washington's annual average wages for technical shipbuilding professions is much higher than US average, making shipyards less competitive domestically.
- Norway and Denmark are strong competitors in building specialized tonnage with state-of-the-art technologies.
- Neighbouring Canada is growing into a strong international competitor in batteries and fuel cell technologies.



This subsector includes 3 areas:

- *Naval Architecture & Marine Engineering*: construction & architecture firms specializing in designing & building structures on or near water.
- *Geotechnical & Environmental*: firms engaged in providing environmental impact analysis, geotechnical analysis and engineering, & environmental remediation.
- *Other professional services*: ecosystem of legal, insurance, & accounting firms.

DNV GL photo

In 2015, this Washington subsector:

Contributed **19%** of the total maritime industry revenue



Supported **12%** of total jobs

Paid \$569 million in wages



Current Developments

- Rising demand for maritime engineering expertise driven by emerging technologies and legislative challenges.
- Increasing public and private focus on technology research and development to meet changing industry needs.
- Growing promotion and recognition of the value of green and sustainable practices and design.
- Societal and consumer expectations for increased transparency in business processes.

Current Challenges

- Gap between workforce demand and supply, particularly for skilled maritime disciplines and professional services.
- Limited business associations restrict collaboration within the sector.
- A lack of specialized maritime capital sources and financial service providers.
- Innovation restricted by a lack of knowledge transfer and limited mechanisms for incubation and acceleration.



This subsector includes 4 areas:

- *Ocean Technology*: includes ocean energy, ocean instrumentation, & oceanography.
- *Robotics & Submarines*: includes both manned and unmanned underwater vehicles.
- *Water Technology*: addressing water quality and desalinization.
- *Marine Biomedicine/Biotechnology*: products developed from marine animals and plants.

DNV GL photo

Washington is a leader in:

- ✓ Clean water science, ocean research, and data collection and processing
- ✓ Clean energy technologies research, development, and commercialization

More than \$300 million of annual federal funding to ocean research institutions in WA State, including: PNNL-MSL, UW-APL, NOAA, WWU-Shannon Pt. Marine Center

Current Developments

- Explosive growth in marine renewable energy (wave, tidal, offshore wind) and significant progress in cost reductions.
- Development in instruments for environmental monitoring and modelling for marine mammals, ocean acidification, condition monitoring and the changing arctic.
- Increase of unmanned/autonomous vehicles for measurements and data collection.
- Improvements in climate and ecosystem modelling capabilities.
- Potential growth in innovative products in marine biotechnology.
- Real-time environmental monitoring and coordination on ocean acidification, cabled seafloor infrastructure and arctic awareness
- Bioretention filtration techniques for storm water remediation.

Current Challenges

- Ocean Energy resources are located in challenging environments where conventional technologies are impractical.
- Critical shortage of offshore energy installation vessels in US shipyards to meet Jones Act requirements.
- Lack of a permitting process to encourage innovation and small-scale demonstration of new blue technologies.
- Storm water runoff leading to water pollution and causing floods. High cost for solutions.
- Lack of awareness of commercial opportunities and cross-over to maritime markets.
- Limited access and engagement from private capital investors.

As part of the development of the Strategy Framework, DNV GL and the Department of Commerce conducted a survey in April 2018 of maritime stakeholders. Referred to as the Cluster Survey in this report, the objective of the survey was to gather stakeholders' perspectives of Washington's relative strengths and weaknesses and possible growth opportunities.

The results of this survey were supplemented by another survey carried out in January 2018 to gauge interest in and preferences for a proposed Maritime Innovation Center. This earlier survey, referred to as the Maritime Innovation Center Survey, was designed by Port of Seattle, ECONorthwest, and The Maritime Alliance.

The results of the two surveys are complementary, indicating both perceived priorities for the effective growth of the cluster and, specifically, stakeholders' expectations for the future development of innovation in the cluster.

Cluster Survey

The online questionnaire was issued to more than **450** maritime stakeholders in Washington State. The survey had a response rate of approximately **21%**.

The stakeholders were divided into two main groups:

Maritime industry businesses
– **57% of the responses**

Trade associations, ports, labor organizations, Associate Development Organizations, research facilities etc.
– **43% of the responses**

Maritime Innovation Center Survey

The online survey was sent to over **400** stakeholders and **136** full responses were received.

40% of the respondents self-identified as affiliated with the **Maritime Business sector** with the second largest category being the **Government (17.7%)**. The survey also had representations from other stakeholders such as academia and investors.

The **Cluster Survey** questionnaire was based on one used by DNV GL and Menon Economics to evaluate the strengths and weaknesses of leading maritime clusters. Respondents were asked to:

- Rank the attractiveness of Washington as a place to do maritime business in a number of competitive dimensions.
- Say to what extent they felt statements associated with leading maritime clusters applied to Washington State.
- Express their interest in participating in a formal cluster organization

The **Maritime Innovation Center Survey** was conducted by ECONorthwest and designed to better understand the needs and views of targeted stakeholders such as startups and SMEs in the maritime and BlueTech sectors. The survey was sent to stakeholders with potential interest in a Center and they were asked to help identify:

- Innovation and growth barriers
- Trending technology that can transform the maritime business
- Preferred focus and services of the Center

Results from the Cluster Survey

The following factors were regarded as the **most attractive** aspects of doing business in Washington State:

- **Proximity to sophisticated customers**
- Availability of world-class competence
- Specialized/competitive supply chain

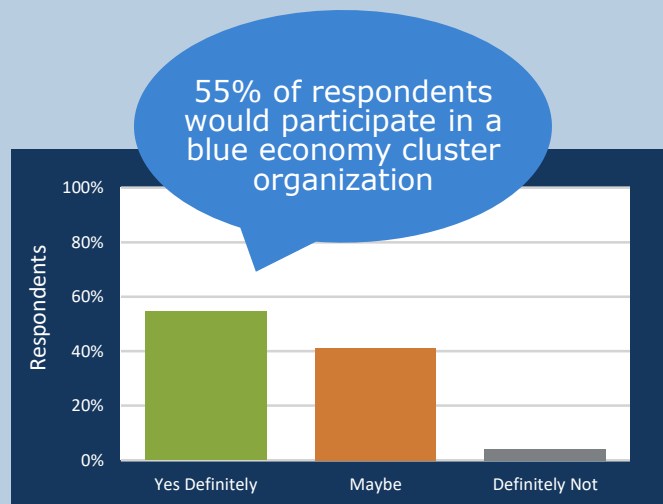
Maritime businesses cited widespread cooperation between the maritime companies in this region, and respondents also felt that the demands of local customers drove innovation and improvement of products and services.

The aspects of WA's maritime industry that participants ranked as most **unattractive** compared to other regions were:

- **Access to capital (investors, banks and brokers)**
- **Personnel costs**
- **Policy framework**

Statements which participants **disagreed** most strongly with were:

- Our **banks and financial service providers** have highly specialized maritime competence
- Our **maritime research institutions** are among the best in the world
- Our **maritime educational institutions** are among the best in the world
- The relationships among the companies in the maritime cluster are characterized by **openness and information sharing**
- Our government and governmental bodies are supportive of the maritime industry



Source: DNV GL in publication

Results from the Maritime Innovation Center Survey

All sectors surveyed indicated that the Center should focus on the following objectives (roughly equally):

- ✓ Promote knowledge transfer.
- ✓ Promote business incubation.
- ✓ Promote workforce development.

Be More Innovative!

2 out of 3 respondents felt the maritime sector in the state is lacking in terms of innovative performance when compared with other industries.



Maritime Innovation Center Survey Results



Takeaways from the Maritime Innovation Center survey

TOP FIVE INCUBATOR SERVICES

Survey respondents were asked to assess a large range of incubator services. The following are the top five challenges they identified in order of rating priority:

1. Shared resources with research centres, testing facilities, universities, and private companies
2. Guidance and mentorship from business leaders/investors
3. Business support service provider assistance (e.g., HR, legal, and marketing)
4. Access to general equipment for testing or fabrication of prototypes
5. Classes/trainings for workforce and skills development

TOP FIVE BARRIERS TO MARITIME GROWTH

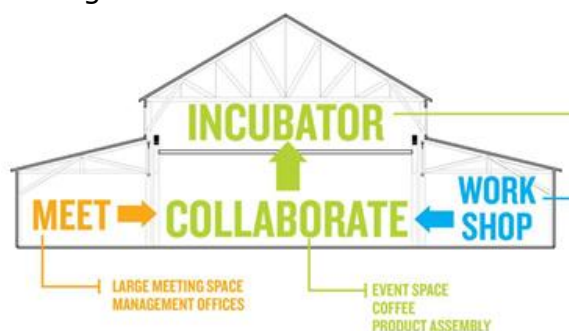
Approximately 400 stakeholders were asked to assess a large range of business and innovation challenges in the maritime sector.

The list shows the top five identified challenges:

1. Lack of public policy and incentives support
2. Workforce talent, skills, and development
3. Understanding business/opportunities within the maritime sector
4. Access to investors and funders
5. Lack of R&D resources

(Source: Maritime Alliance & ECONorthwest 2018)

The barriers to growth identified in the Maritime Innovation Center survey align well with the Maritime Blue stakeholder feedback identifying stakeholder engagement and awareness, lack of investment opportunities, regulations and standards, and workforce skill gaps as sector-wide challenges.



Growth in a Sustainable Blue Economy

The drive for sustainability is rewriting the rules for all industries – and maritime is no exception. The longevity and profitability of its operators depend on a proactive approach to sustainability. The nature of the industry is changing and there are many issues that could bring unwelcome disruption, but there could also be opportunities for those companies that are well prepared. This makes it all the more important to look at the market, regulatory and technological challenges, and opportunities of future scenarios for a growing and sustainable maritime future.

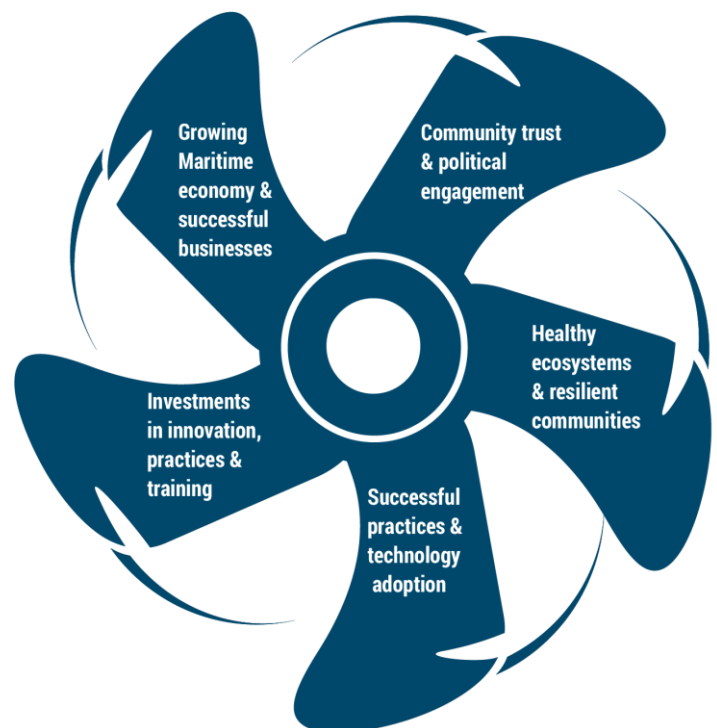
The notion that “going green is good for business” has been discussed, editorialized, and debated many times over. From large multinational corporations to small entrepreneurs in developing countries, most can attest that reducing/eliminating waste, providing meaningful work and wages, cooperating with competitors, aligning community values, and investing in innovation have proven can be very profitable. But it is risky to be a trailblazer, it often requires significant capital investment and it is challenging to gain trust from community stakeholders.

If maritime companies are supported to adopt a technology and innovation-based business plan and economic model, they can make investments and see their return on sustainability investments increase as technology innovation increases. This acceleration takes place faster and more effectively when it is in collaboration across the sector. When businesses, public agencies, and research and training institutions are working together, identifying opportunities, directing funding, and gaining social license and public trust, the benefits occur faster. When this ecosystem begins to grow, it attracts talent, recruits more investment, and businesses expand. This allows them to create

more jobs that are meaningful, place-based, and provide a high quality of life, which strengthens communities.

There are many examples demonstrating how companies can benefit from sustainable practices. However, the full potential of sustainable business models will only be realized through a broad industry collaboration involving all stakeholders in the entire value chain. Going it alone will only ever get the industry so far.

If we are to find answers to the challenges, we will only do so as part of a much broader dialogue that will have to take place between operators, regulators, and society at large. Together, we must meet the challenges and work in a collaborative, strategic manner to deliver transformative technology and solutions that will support a growing and sustainable industry.



The model above highlights how a growing maritime economy fosters a culture of innovation and sustainability. Each blade is needed to propel the industry forward.

Addressing Bias and Working Towards Inclusion

Addressing gender, racial and socio-economic inequalities as a core objective and value statement is often overlooked in economic development strategies. With a goal to accelerate the **Blue Economy For All**, this strategy seeks to provide support and program development that address bias in the maritime workplace and supports workforce training opportunities for youth of color, low-income white youth, women and girls. For details, please see Appendix C: Workforce Sustainability in the Washington Maritime Industry



Photo courtesy: Sound Experience

A maritime story and symbol that genuinely and respectfully acknowledge the history of tribal entities and contributions of women, people of color, and other groups may give more Washingtonians a sense of pride in the maritime sector.

—Tressa Arbow, University of Washington School of Marine and Environmental Affairs

"As the Washington maritime industry embarks on its strategic plan to become the most sustainable maritime industry in the US by 2050, it will be crucial that sustainability goals include providing equal opportunities for different demographic groups in Washington to build a career in the maritime sector. The creation and retention of a diverse workforce is critical to the sector's long-term sustainability. Research has demonstrated that diverse workforces are not only more profitable but are also more productive and satisfying places to work.

However, attempts to make the workforce look more diverse without addressing the reasons it isn't will not be enough. Telling a maritime story that is recognizable and representative, removing barriers to entry, and increasing retention are parallel imperatives that will require dedicated leadership, funding, and the endorsement and commitment of Washington decision-makers. Furthermore, efforts to expand current initiatives or embark on new ones should include input from a wide range of perspectives, including women, people of color, tribal entities, managers, community members from throughout the state, and workers from various stages of maritime career trajectories" (Arbow 2018).

Sector-Wide Challenges from Stakeholder Feedback



Washington State has a diverse range of maritime subsectors that have recently gone through numerous developments. There are challenges that need to be addressed that are specific to each subsector and some that are sector-wide.

To achieve the 2050 vision, it is critical to identify and overcome these universal barriers. The challenges were initially identified through the subsector analysis and further refined through workshops with the industry stakeholders. The workshops also helped identify development pathways that formed strategic directions for cluster development.

Addressing the following 10 sector-wide challenges will be critical to the success of the Maritime Blue strategy and each pathway to the 2050 vision:

1. Stakeholder expectations moving faster than industry

Public and consumer awareness of environmental and sustainability challenges is growing, whether from the state's Deep Decarbonization efforts, the continued decline in the Southern Resident Orca population or the growing pressure on marine ecosystems in general. This sets expectations which the sector struggles to meet in a fiercely competitive setting.



2. Aging fleets (fishing, ferries, coastal trade)

Much of Washington State's fleet across fishing, ferries and coastal trade consists of aging vessels. This presents both an operational and investment challenge and an opportunity for renewal.



3. Lack of investment and funding availability

All sub-sectors suffer from a lack of sustainable funding mechanisms to support the industry and limited access to sources of capital.



4. Local regulation and standards impacting competitiveness

Strict permitting processes and high environmental standards slow planning and development and lead to increased costs in development and operation, reducing Washington's competitiveness.



5. Competition for industrial lands and infrastructure

Waterfront land is highly prized for urban development, plays a critical role in the marine ecosystem and can have significant impact on local communities.



6. High cost of doing business

High labor costs and aging infrastructure combine to make Washington a less attractive place for doing business than other maritime regions.

7. An aging workforce is not being replaced

A proportion of the current workforce is approaching retirement while not enough youth are getting involved in the industry.

Sector-Wide Challenges from Stakeholder Feedback



8. Skill gap between current and future workforce needs

With the current workforce, employers are faced with a growing talent crisis that will have serious implications when the current workforce retires and as the nature of work evolves.



9. Low awareness and societal engagement in the maritime industry

An important factor contributing to the lack of participation from the broader community. The next generation has particularly low awareness.



10. Lack of collaboration and coordination across the industry

The various challenges facing the sector are too large for any one part of it or group to address alone.



By pursuing clearly defined initiatives, each Maritime Blue pathway presents an opportunity to address these structural challenges for the sector and secure a thriving, competitive and sustainable future for the industry.



Turning Challenges into Opportunities



Feedback from both stakeholder surveys and the pathway workshops all identify similar challenges and barriers for the growth of Washington maritime industry. **Meeting these challenges and overcoming these barriers will present the sector with valuable opportunities for sustainable development.** The Washington Maritime Blue Cluster will play an integral role in this development and will be essential in ensuring long term sustainable performance and competitiveness of Washington in the industry.

Aligning with stakeholder expectations

Through public outreach and engaging stakeholders in sector initiatives, the sector will be better able to understand, anticipate and meet public and consumer expectations for environmental and societal benefits from sustainable development.

Fleet modernization

Modernization of Washington's fleet with low carbon technologies and low impact vessel designs will help the sector to establish a competitive edge in sustainable vessel construction and develop an ecosystem for innovation.

Develop new sources of investment and funding

Strategic partnerships need to be established to drive the commercialization of emerging blue technologies. The industry will need access to financing for all stages, from early-stage start capital to financing newbuilds and large infrastructure investments.

Regulatory predictability

Establishing a predictable regulatory environment while maintaining environmental, safety, and social standards will improve competitiveness for the sector.

Securing industrial lands

A broad, strategic approach to infrastructure planning will secure sufficient land for the industry's needs while holistically managing environmental and societal impacts.

Turning Challenges into Opportunities



Moving from high cost to high value

Nurturing a high skilled, high value workforce and securing sustainable investment in infrastructure will present a compelling benefit case and enable the sector to capitalize on Washington's other advantages.

An inclusive and sustainable workforce pipeline

Working waterfronts and workforce development pathways will manage the future careers of maritime workforce.

A skills strategy to meet future workforce needs

A targeted skills strategy will ensure not only a sustainable supply of appropriate talent, but enable the industry to manage the transition to new operating models in a just and fair manner.

Raising awareness and building a societal stake

Community outreach and engagement in all areas of society will be critical to align the development of industry to the expectations and priorities of the public and ensure that all of Washington State has a stake in its future success.

Industry collaboration and coordination

A well-coordinated approach to policy-setting, the adoption of standards and development of funding mechanisms will ensure a level playing field for fair competition. Promoting collaboration on issues of common interest across government, industry and academia will leverage greater investment in innovation and accelerate technological development.

Washington Maritime Blue Strategy



Values to Ensure Success of Washington's Blue Economy



Washington Maritime Blue is committed to the development of maritime business, technology, and practices that promote a sustainable future contributing to economic growth, ecological health, and thriving communities.

BLUE VALUES

Growing Economy: We will build a strong business climate, attract talent and investment and develop an efficient regulatory structure that supports innovation and infrastructure.

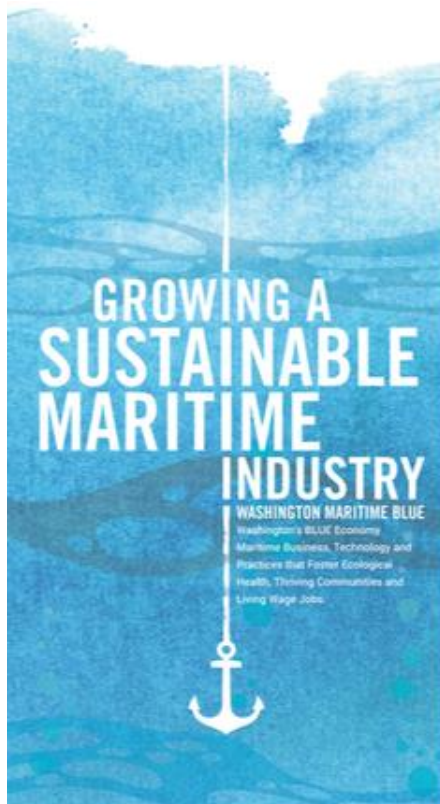
- We collaborate for growth to drive operational efficiency in our maritime companies.
- We use strategic partnerships to develop resources and infrastructure.
- We promote an efficient and goal-based approach to regulatory implementation.

Healthy Ecosystems: We are committed to restoring and sustaining the health of our coastal and marine ecosystems.

- We drive the adoption of best management practices or standards by addressing barriers to their adoption and implementing incentives.
- We leverage the knowledge of our research institutions in renewable energy and ocean research.
- We apply an environmental ethic to development and seek to minimize impact.

Resilient Communities: We will apply a social justice lens to all our efforts to ensure thriving and resilient communities will be engaged in the sustainable development of the maritime sector.

- We proactively engage with our stakeholders to achieve social license and anticipate and address unintended consequences of development and sustainability initiatives (supporting holistic decision making).
- We reduce adverse impacts of economic development on vulnerable communities, while supporting climate change and natural disaster resiliency.
- We are committed to a diverse, inclusive and representative maritime industry with increasing living-wage jobs.



Washington Maritime Blue Strategy Framework

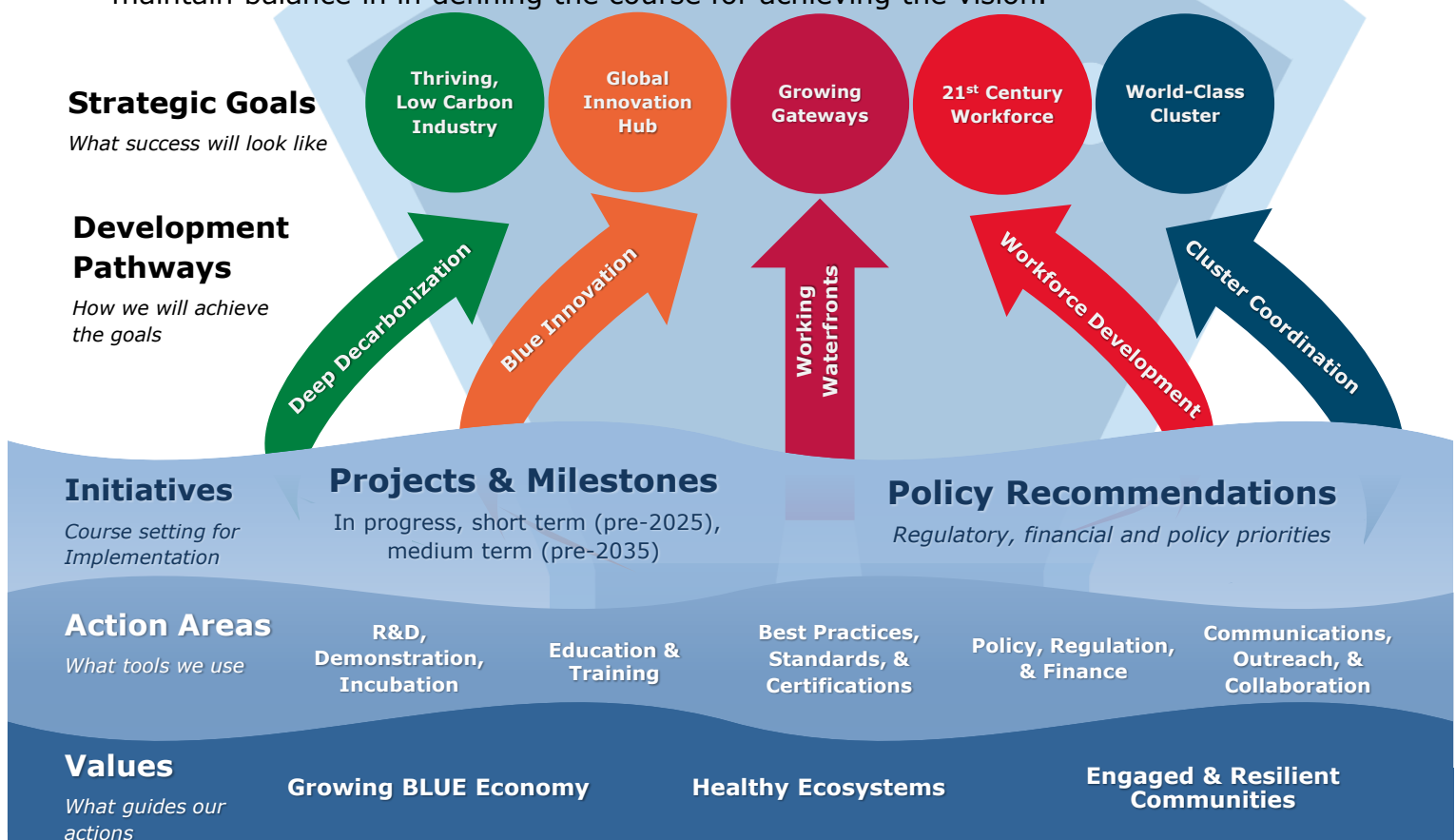


Vision: Washington State will be home to a world-class, thriving, and sustainable maritime industry by 2050.

Mission: The Washington Maritime Blue Strategy will accelerate the Blue Economy as a leader in maritime clean tech innovation and best management practices that will support a growing maritime economy in all sectors with increasing living-wage jobs, a healthy environment, and resilient communities. This will be accomplished through partnership with all stakeholders; including public entities, maritime business, academic and research institutions, ports, labor groups, and community organizations.

Strategy Framework: The strategy framework was built from the ground up leveraging direct stakeholder input and stewardship from the Advisory Council.

- **Strategic Goals** are the high level, aspirational goals established to achieve the Vision of the Plan
- **Development Pathways** are the strategic directions for cluster development. They are measurable efforts based on the region's expertise, needs and opportunities.
- **Initiatives** are specific recommendations for policies, projects and milestones that need to be implemented to reach the vision.
- **Action Areas** are the tools used to achieve the strategic plan.
- **Values:** Underlying all we do, the three values of the Blue Economy guide our process to maintain balance in in defining the course for achieving the vision.



Strategy is a Combination of Effort from All Stakeholders



The work that has been undertaken since the Governor launched the Maritime Blue initiative and selected the Maritime Advisory Council back in December 2017, has been a broad concerted effort engaging a number of maritime sub-sectors and communities.

Several workgroups, task force meetings and steering committee meetings have taken place, in addition to outreach via online surveys across the different communities, companies and organizations that are part of the industry. It has been important to ensure that the full breadth of the industry and the parties that are affected have been given the opportunity to take part in the development of the strategy framework, and that the findings are 'by and from' the stakeholders themselves.



Governor's Maritime Innovation Advisory Council & Launch Event
•December 12, 2017



Washington Maritime Blue Strategy Task Force
•January 20, 2018



Task Force & Advisory Council
•April 24 & 26, 2018



Pathway Workgroup Meetings
•June 22-28, July 18, 2018



Joint Session Co-Chairs & Steering Committee
•October 19, 2018

Pathways Addressing Sector-Wide Challenges



The Maritime Blue strategy will address each of the identified sector-wide challenges through the five Maritime Blue pathways as shown in the figure below.

The extent to which these challenges are managed or mitigated will be a key test of all initiatives and projects to meet the Maritime Blue goals and achieve the vision of a world-class, thriving, and sustainable maritime industry by 2050.

		PATHWAYS				
		Deep Decarbonization	Blue Innovation	Working Waterfronts	Workforce Development	Cluster Coordination
CHALLENGES	1. Stakeholder Engagement	✓	✓	✓		✓
	2. Aging Fleet	✓	✓			
	3. Lack of Investment		✓			✓
	4. Regulations & Standards			✓		✓
	5. Land & Infrastructure			✓		✓
	6. Cost of doing business			✓	✓	✓
	7. Aging Workforce			✓	✓	
	8. Skill Gap				✓	
	9. Low awareness				✓	✓
	10. Lack of collaboration					✓

Challenge Addressed

Strategic Direction: Thriving, Low-Carbon Industry

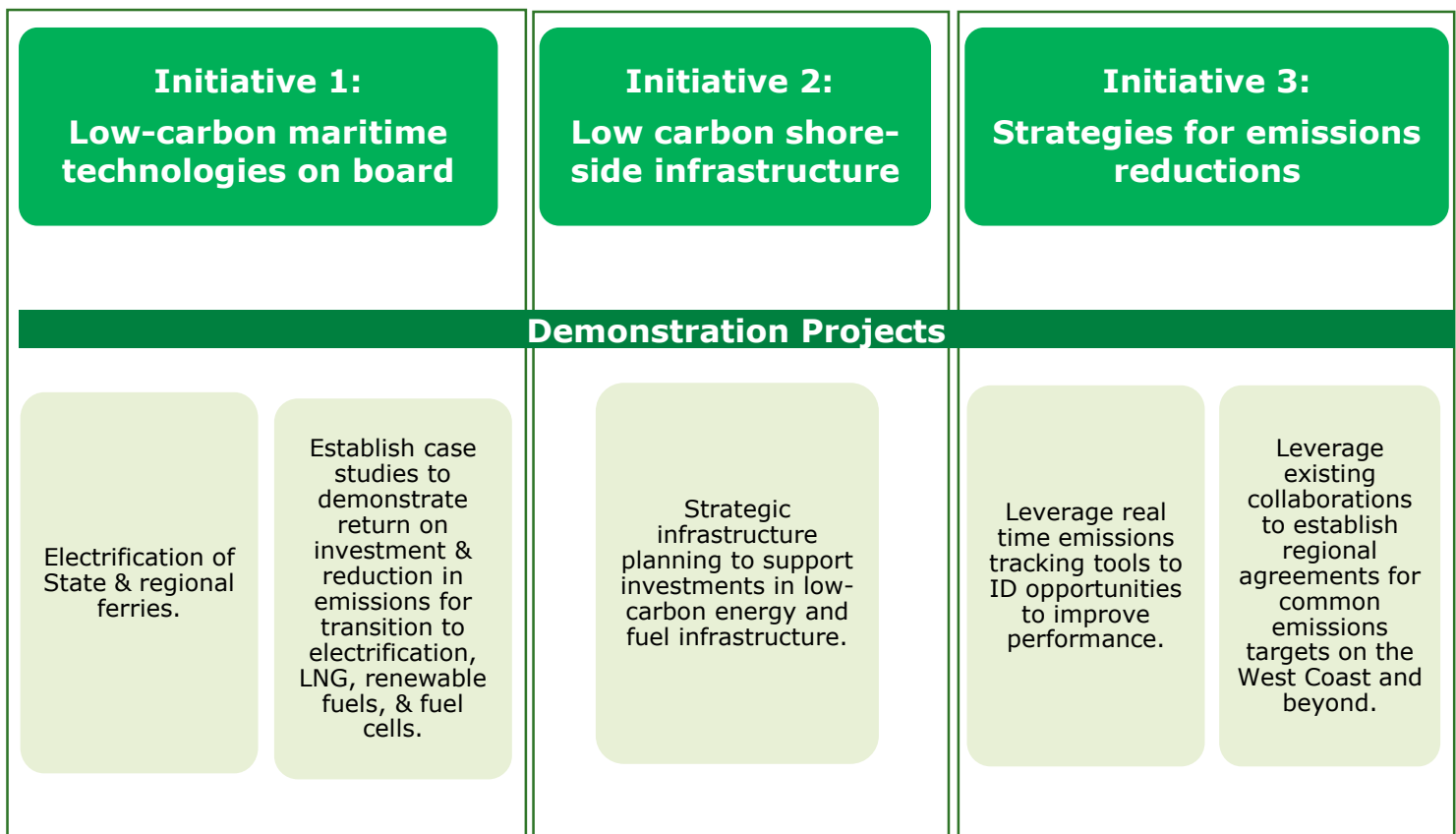


Strategic Goal: A Thriving, Low-Carbon Industry

Establish a decarbonized maritime industry that continues to grow and maintain resiliency by taking advantage of an ecosystem of innovations for cleaner air and efficient, cost-saving operations.

Pathway: Deep Decarbonization

Accelerate the transition of Washington's maritime industry to a low-carbon future pursuing technological innovations, infrastructure, and incentives to enable the transition of local, coastal, and international maritime activity.



Thriving,
Low Carbon
Industry

Deep Decarbonization

WA State Policy Recommendations

Secure funding to support vessels & shore side infrastructure for electric operations and low-carbon fuels.

Adopt policies and incentives to create market conditions that reduce carbon (and other) emissions from maritime applications.

Ensure public funds directed towards clean energy and carbon mitigation are available for maritime, clean technology applications.

Detailed Policy Statements

Secure funding for electrification of state/county/regional/private ferries and passenger services.

Adopt a clean fuel standard (and credit program) to incentivize the development and usage of alternative fuels.

Secure continued and increased funding for the WA Clean Energy Fund and ensure inclusion of maritime innovation.

Secure an array of incentives and funding mechanisms to drive early-stage innovative clean fuel and electrification projects for ports.

- Bond funding, cap and trade revenues, grants, loans, and other financing mechanism for capital investments.

Strategic Direction: Global Innovation Hub



Strategic Goal: Global Innovation Hub

Establish Washington State as a global maritime technology innovation hub

Pathway: Blue Innovation

Drive the commercialization of emerging blue technologies in Washington State by through strategic partnerships.

Initiative 1: Digital Transformation

1.1 Digitally assisted operations

1.2 Maritime data science

Initiative 2: Low-Impact Vessel Design & Advanced Manufacturing

Demonstration Projects:

Establish maritime innovation validation zone for R&D, testing, & evaluation of safety & performance of digitally-assisted operations.

Establish shared data platform and standardized model to enable pilot for blue-ware and blockchain applications.

Joint Industry Project to implement low impact vessel design for NOAA Marine Sanctuary Program.

Create model for advanced manufacturing techniques and materials in shipbuilding while increasing jobs and training programs.

Initiative 3: Modernization of Fishing, Seafood, & Ocean Innovation Demonstration Projects

Increase in-state seafood processing with full utilization technology.

PNNL's Macroalgal NOMAD project, demonstration phase.

Initiative 4: Collaborative R&D, Incubation, & Commercialization for Innovation & Demonstration Projects

Demonstration Projects:

Development of new gear and marketing strategies for harvest of hatchery salmon in the lower Columbia for harvest of hatchery fish and release of wild fish.

Design & build a Maritime Innovation Center to house cluster programing, co-working space and support commercialization of technology.

Global
Innovation
Hub

Blue Innovation

WA State Policy Recommendations

Develop incentives and finance mechanisms for maritime innovation in shipbuilding & manufacturing, including vessel replacement for ferries, modernizing fishing fleet, noise reduction, and water quality.

Designate a maritime innovation validation zone to perform R&D, testing, and evaluation of safety and performance for digitally-assisted operations.

Fund and develop incubation, R&D, and commercialization platforms for maritime innovation facilities and research centers.

Detailed Policy Statements

Hybrid finance model: Leverage state money for overcoming challenges, attract private capital with scale.

Support state agency efforts in adopting innovation and technology based economic development activity for recruitment, retention, expansion, rural economic development, and small business export assistance.

Ensure public funds directed towards clean energy and carbon mitigation are available for maritime clean technology applications.

Strategic Direction: Growing Gateways



Strategic Goal: Growing Gateways

Washington will be a premier region for imports, exports and maritime industrial activity with a reputation for safety, transparency, efficiency, and sustainability.

Pathway: Working Waterfronts

Washington will lead the nation in efficient, clean, and safe maritime practices across all maritime communities and sectors of the industry.

Initiative 1: Smart Ports

1.1 Digitalized processes

1.2 Clean & efficient operations

1.3 Attracting and Training the Future Workforce of our ports

Initiative 2: Infrastructure and Regulatory Strategy

2.1 Long-term maritime infrastructure & transportation strategy

2.2 Regulatory predictability & land use

Demonstration Projects:

Support development of common platform, standards for data sharing across terminals & provide incentives to encourage participation.

Modernization of port infrastructure across the state including electrification of Northwest Seaport Alliance cargo terminals.

Host future of maritime workforce summit addressing growing needs of our ports.

Create holistic long-term infrastructure and transportation strategy to plan for future needs and technology developments for freight mobility

Work with regulatory agencies to create pilot permitting process for innovation that meets sustainable economic development criteria.

Regulatory bodies to leverage agreed upon certifications, best practices and standards to create incentive-based regulatory scheme.

Initiative 3: Blue Gateway

3.1 Attracting business activity through sustainability

3.2 Maritime sector Stewardship & Corporate Social Responsibility

3.3 Increase eco-tourism & recreational boating

Demonstration Projects:

Develop an optimization tool for maritime applications to gauge sustainability indicators like ROI, jobs & emissions impacts (for vessels, infrastructure, operations).

Maritime Non-governmental & Community Based Organization partnerships for conservation supporting Corporate Social Responsibility and social licence

Build up shore power/ wastewater infrastructure to reduce emissions and impact.

Growing Gateways

Working Waterfronts

WA State Policy Recommendations

Investment in critical Port and maritime infrastructure to maintain and increase modernization and competitiveness.

Align and simplify the regulatory and permitting process to improve, speed, efficiency and predictability in shoreside maintenance, remediation and construction.

Develop regional collaborations & partnerships that promote competitiveness and reduce ecological impact.

Detailed Policy Statements

Secure funding for infrastructure & digitalization development for port terminal operations & freight mobility.

Work with regulatory agencies to create pilot permitting process for blue innovation projects that meet sustainable economic development criteria.

Support inclusion of West Coast/Asia air emission targets/incentives.

Secure funding to implement goals of Puget Sound Partnership recommendations and other mitigation/conservation priorities.

Secure regulatory predictability and transparency for maritime infrastructure development.

Support participation in collaborative approaches to align on ecological goals (global, regional, local).

Secure port & state incentives for international and coastwise ship owners using established best practices and voluntary certifications.

Promote authority within Office of Regulatory Innovation & Assistance (ORIA) to improve permitting timelines and efficiency.

Coordinate with other ports in the region (West Coast) to increase use of incentives to decrease emissions and impacts (including noise).

Secure state funding for broadband initiatives to ensure cities and communities have access to a vibrant broadband or fiber system.

Secure maritime industrial lands through integrated planning for industrial zoning & economic development (Growth Management Act & Shoreline Master planning). Use "Industrial Sanctuary" & "Essential Public Facilities" designations.

WA State to continue to push Congress to address Harbor Maintenance Tax imbalance.

Strategic Direction: 21st Century Workforce



Strategic Goal: 21st Century Workforce

A technologically adaptable and inclusive workforce with a sustained stream of high-caliber entrants will be developed

Pathway: Workforce Development

Next generation of an inclusive and diverse maritime workforce with technological expertise and access to clean, healthy, living-wage jobs.

Initiative 1: Career pipeline, pathways, & connections

Demonstration Projects:

1.1 Skill demand forecasting & strategy for workforce pipeline

1.2 Mapping career pathways in & through the industry

1.3 Career-connected learning

Skill demand forecasting and creation of a forward-looking strategy framework that consolidates efforts to date.

Launch marketing campaign for maritime careers leveraging integrated website with mapped pathways & forecasts.

Leverage existing registered apprenticeship programs to increase training across the maritime supply chain

Youth Maritime Collaborative housed within Maritime Blue Cluster & sustained with funding to expand opportunities.

Initiative 2: Inclusivity, support, & outreach

Demonstration Projects:

2.1 Create broader opportunities for equitable & inclusive participation

2.2 Outreach and engagement

Develop an equity framework for maritime employers & training providers with Community Based Organizations.

Host a Maritime Blue Forum between workforce organizations, industry, & ambassadors for under-represented communities.

WA State Policy Recommendations

Dedicate funding for maritime specific training, education, and workforce development at the K-12, community college and 4-year universities; including expansion of registered apprenticeships in youth programs.

Support initiatives for state wide workforce development that encourage alignment and efficiency of programs according to community and industry sector based priorities.

Adopt recommendations of Career Connected Washington and regional efforts to define and support maritime career pipeline development.

Detailed Policy Statements

Leverage existing registered apprenticeship programs to increase training across the maritime supply chain.

Align with initiatives from the State Board for Community and Technical College (SBCTC), Office of Superintendent of Public Instruction (OSPI), Workforce Training Board (WTB), Career-Connect Washington Task Force, and Workforce Development Council (WDC).

Secure change in RCW to include Port investments in workforce development.

Secure funding according to the Workforce Training Board (WTB) proposal for incumbent worker training.

Support federal designation and funding for Domestic Maritime Center of Excellence for Maritime Workforce Training and Education.

Development of training certification that is more consistent across the state and preferably across multiple states

Secure Washington State University funding for marine electrical engineering program.

Washington State Policy Recommendations



For the Maritime Blue Strategy, the key support from local, state, and federal governments is their capacity to convene stakeholders and to create and regulate a policy regime that is supportive of the vision and goals of the Blue Strategy – particularly when it impacts the rate at which industry can accelerate innovation and living-wage job creation.

Combined Policy Recommendations for Blue Goals			
 Thriving, Low Carbon Industry	Secure funding to develop and support vessels & shore side infrastructure for electric operations and cleaner low-carbon fuels.	Adopt policies and incentives to create market conditions that reduce carbon (and other) emissions from maritime applications.	Ensure public funds for clean energy and carbon mitigation are directed towards maritime, clean technology applications.
 Global Innovation Hub	Develop incentives & finance mechanisms for maritime innovation in shipbuilding & manufacturing, including vessel replacement for ferries, modernizing fishing fleet, noise reduction, & water quality.	Designate a maritime innovation validation zone to perform R&D, testing & evaluation of safety and operational performance for digitally assisted operations.	Fund and develop incubation, R&D and commercialization platforms for maritime innovation facilities and research centers.
 Growing Gateways	Invest in critical Port and maritime infrastructure to maintain and increase modernization and competitiveness.	Align and simplify the regulatory and permitting process to improve, speed, efficiency and predictability in maritime infrastructure projects.	Develop Regional collaborations and partnerships that promote competitiveness and reduce ecological impact.
 21st Century Workforce	Dedicate funding for maritime specific training, education and workforce development, including expansion of registered apprenticeships and youth programs.	Support initiatives for statewide workforce development that encourage alignment and efficiency of programs according to community and industry sector-based priorities.	Adopt recommendations of Career Connect Washington and regional efforts to define and support maritime career pipeline development.

These recommendations are intended to be complimentary and aligned to parallel or connected policy initiatives when they are supportive of the Blue Strategy Goals. However, please note that even if a particular policy or aspect of a recommendation may be highlighted in the Blue Strategy, it is not necessarily an endorsement of an entire initiative. Other initiatives that share at least some alignment include:

- Governor Inslee's Clean Energy Future for Washington State
- Washington Maritime Federation 2019 Legislative Priorities
- Washington State Ferries 2019 Long Range Plan
- Puget Sound Partnership Agenda
- Northwest Ports Clean Air Strategy
- Southern Resident Killer Whale Task Force Recommendations
- Career Connect Washington Policy Agenda
- Other State Agency policy and funding requests
- Local municipality and ports policy agendas

Strategic Direction: World-Class Cluster



Strategic Goal: World-Class Cluster

An organized cluster of competitive companies and partners will continuously drive sustainable economic development for the maritime industry

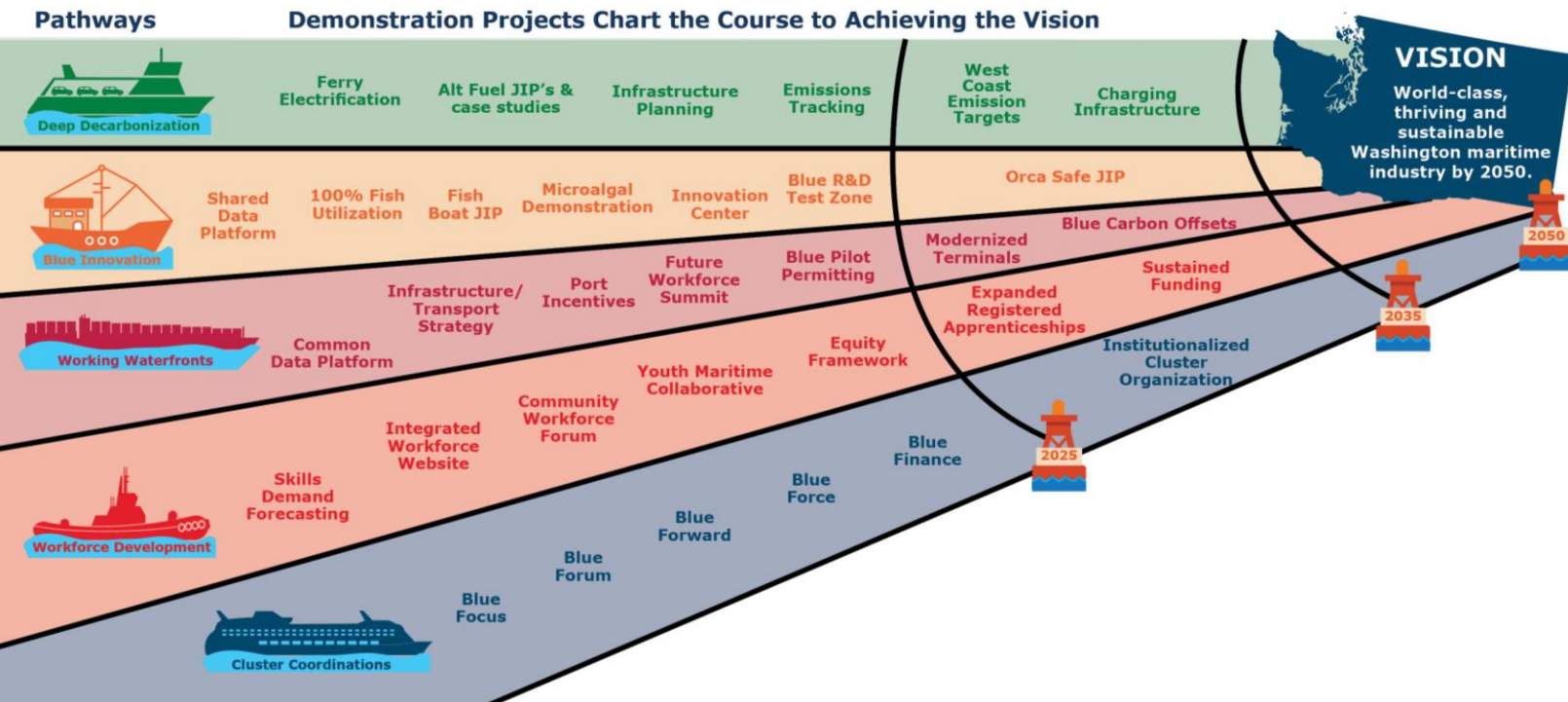
Pathway: Cluster Coordination

A formal Cluster Organization will drive implementation of the WA Maritime Blue strategy & collaboration to ensure a strong maritime industry founded on competitive maritime companies and an attractive business environment.

Blue Focus	Blue Forum	Blue Forward	Blue Force
Implement a communications and marketing campaign plan in conjunction with partner organizations, to raise visibility & connect with opportunities.	Networking and strengthening of the knowledge base: Host workshops, provide market data,	Platform for collaborative R&D projects, Joint Industry Projects (JIP), and teaming for grant opportunities.	Cooperation to enable the workforce of the future through coordination, funding & public forums.
Establish website to serve as a focal point for information about & for WA's Blue Economy.	Cooperation with authorities to create a better framework to develop new technology.	Cross sector engagement and coordination with other clusters	Incubation to drive early stage innovation to commercialization. Guidance and mentoring for start-ups & businesses looking to expand into the Blue economy.
			Scholarships for workforce development. Job board. Fostering internship & apprenticeships. Mentor-mentee relationships. Hands on learning for K-12.

Blue Finance	Blue Facility	Blue Federation
Conduit for public and private funding opportunities. Attract investors and connect the dots on the value proposition for innovators.	The Maritime Innovation Center houses incubation, acceleration, co-working, and public meeting space. It acts as a hub to the many spokes in rural maritime communities across the state.	Partnered with the Washington Maritime Federation to ensure continued support and coordination of industry priorities.
Establish Maritime Innovation Fund for capital investment in innovation-based startups with a potential for high growth and job creation		

Maritime Blue: Charting a Course for 2050



Maritime Blue Key Demonstration Projects



Electrification of state and regional ferries to reduce air & noise emissions & establish competitive edge in sustainable vessel design & manufacturing:

- Conversion of 2 existing state ferries
- WSF to construct 2 new electric ferries
- Planned Skagit County all-electric ferry
- High-speed passenger ferries across the region

Design and build a Maritime Innovation Center to house cluster programing, co-working space, incubation & support commercialization of technology. The Center will serve as a focal point for the blue economy and support early stage companies through hub-and-spoke model of collaboration across the entire maritime sector in the state.



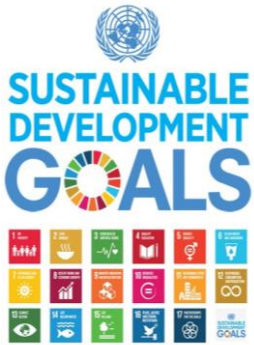
Work with regulatory agencies to create a process for Blue innovation projects that meet sustainable economic development criteria .This could include establishment of a maritime innovation validation zone; and a designated in-water location with streamlined permitting to allow for research, demonstration, testing, and evaluation of new technologies.

Youth Maritime Collaborative is committed to guiding today's youth toward maritime-related careers. With a focus on reaching underrepresented communities through experiential events and high school internships, the Collaborative works to connect companies with the next generation of workers.



An independent WA Maritime Blue Cluster organization is launching and will be charged with implementation of the strategy through an alliance of maritime businesses, public entities, community organizations, research and training institutions that are ready to proactively accelerate innovation and growth.

Strategic Alignment with Global Goals



Sustainable Development Goals (SDGs):

The United Nations (UN) has identified 18 sustainability goals that are a call for action by all countries to promote prosperity while protecting the planet. They recognize that ending poverty must go hand-in-hand with strategies that build economic growth and address a range of social needs including education, health, social protection, and job opportunities, while tackling climate change and environmental protection.

In a disruptive, rapidly-evolving environment for industry, the SDGs provide a clear framework to structure sustainability efforts for the public and private sectors and for civil society. As a response to some of the biggest challenges facing modern society, the SDGs can present valuable opportunities for innovation and growth in new markets.

All of these challenges present opportunities for public and private partnerships to develop innovation to address the needs. The maritime industry has a critical role to play in meeting many of the SDGs in terms of facilitating of sustainable economic growth, delivering benefit to society and safeguarding the marine ecosystem. The Washington Maritime Blue Strategy has been developed to align with the SDGs to ensure innovations developed in Washington can address global challenges, and lead to competitive success.

Alignment of Washington Maritime Blue goals and 5 SDGs:

- An energy transition to a Thriving, Low Carbon Industry will deliver real **climate action**.
- Creating a Global Innovation Hub will bring benefits to **industry, innovation and infrastructure**.
- Making Growing Gateways will secure **decent work and economic growth**
- Developing a 21st Century Workforce will create a demand for **quality education**.
- The course towards these goals will be steered by a World-Class Cluster in **partnership for the goals**.



Blue Goals



Values

What guides our actions

Growing BLUE Economy

Healthy Ecosystems

Engaged & Resilient Communities

Project Overview



Governor's Maritime Innovation Advisory Council



Governor Jay Inslee announced his Maritime Innovation Advisory Council on December 17, 2017. In his letter endorsing the Blue initiative, he stated the following: "This Washington Maritime Blue: 2050 Vision for Accelerating Innovation project will leverage the strong connections created through our Sector Lead program to develop a diverse workforce, stronger businesses and new technology to meet the challenges ahead. Our goal is to build a green, efficient and sustainable maritime sector that will serve as a model for the rest of the country."

Co-Chairs

Rep. Gael Tarleton, WA State Legislature

Frank Foti, CEO Vigor

Dennis McLerran, Cascadia Law Group, Former EPA Administrator Region 10

Members

Sen. Ann Rivers, WA State Legislature

Chairman Leonard Forsman, Suquamish Tribal Council

Commissioner Fred Felleman, Port of Seattle

Mayor Laurie Gere, City of Anacortes

Secretary Roger Millar, WSDOT

Director Brian Bonlender, Dept. of Commerce

Director Sheida Sahandy, Puget Sound Partnership

Director Craig Kenworthy, PS Clean Air Agency

Director Eleni Papadakis, Workforce Training Board

John Wolfe, Northwest Seaport Alliance

Paul Stevens, Saltchuk

Joe Ritzman, SSA Marine

Stefanie Moreland, Trident Seafoods

Vince O'Halloran, Maritime Trades / AFL-CIO

Bob Miyamoto, UW Applied Physics Lab

John Dwyer, USCG Sector Puget Sound

Bruce Anderson, Starcrest Consulting

Barbara "b.g." Nabors-Glass, Seattle Goodwill

Stakeholder Process Overview



Facilitation, Coordination, and Communication: WA Department of Commerce & DNV GL

Washington Maritime Blue Initiative Overview



Stakeholder Engagement and Staffing

Task Force Steering Committee

Ann Avary, Center of Excellence for Marine Manufacturing and Technology
Eleanor Kirtley, Green Marine
Nan McKay, Northwest Straits Commission
Steve Sewell, Washington Maritime Federation
Andy Stewart, University of Washington – Applied Physics Lab

The Task Force and Pathway Workgroups were supported by hundreds of stakeholders from WA State and beyond. While the list is too extensive to include, the strategy would not have been possible without the contributions from all of the participants.

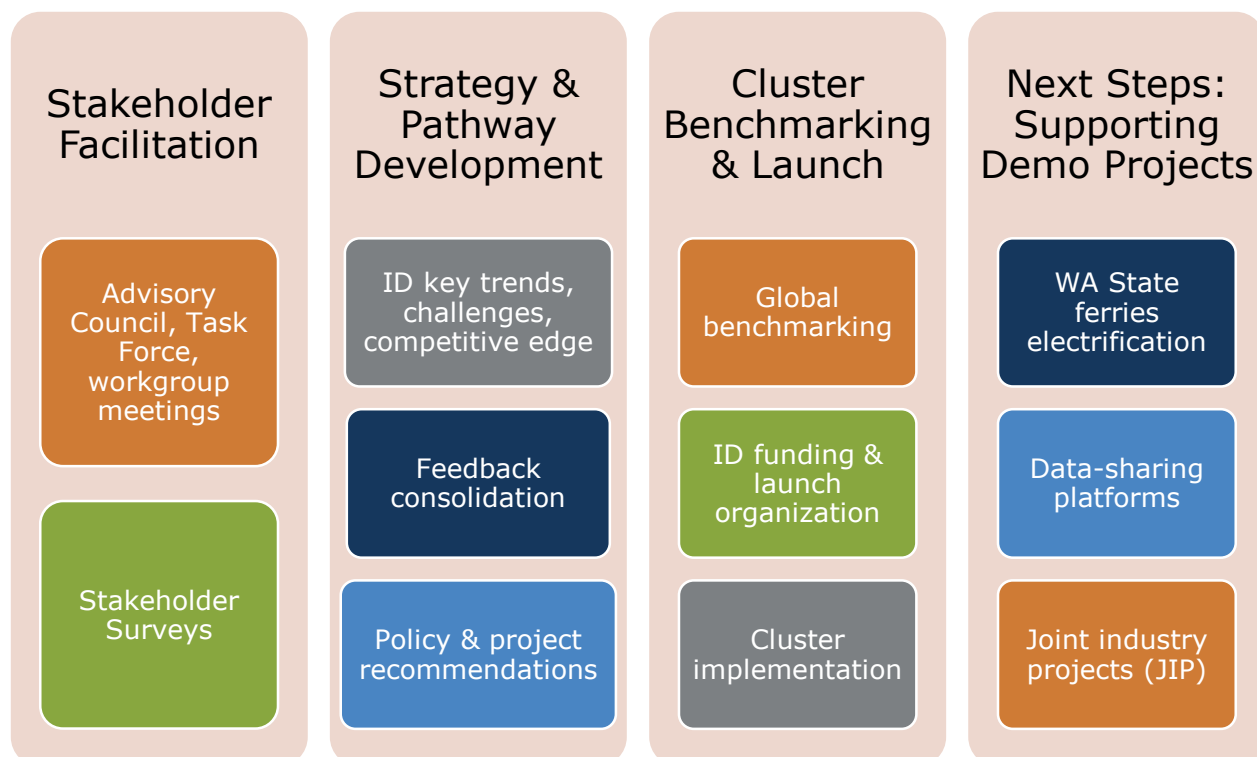
Department of Commerce Staff

Joshua Berger, Governor's Maritime Sector Lead
Sarah Lee, Project Director – Industry Sector Development Program

Key DNV GL Staff Support

Jennifer States, Senior Consultant and Business Development Manager – Energy Advisory
Simon Mockler, Head of Section - Maritime Advisory
Anders Mikkelsen, Business Development Director – Maritime

Initiative Overview



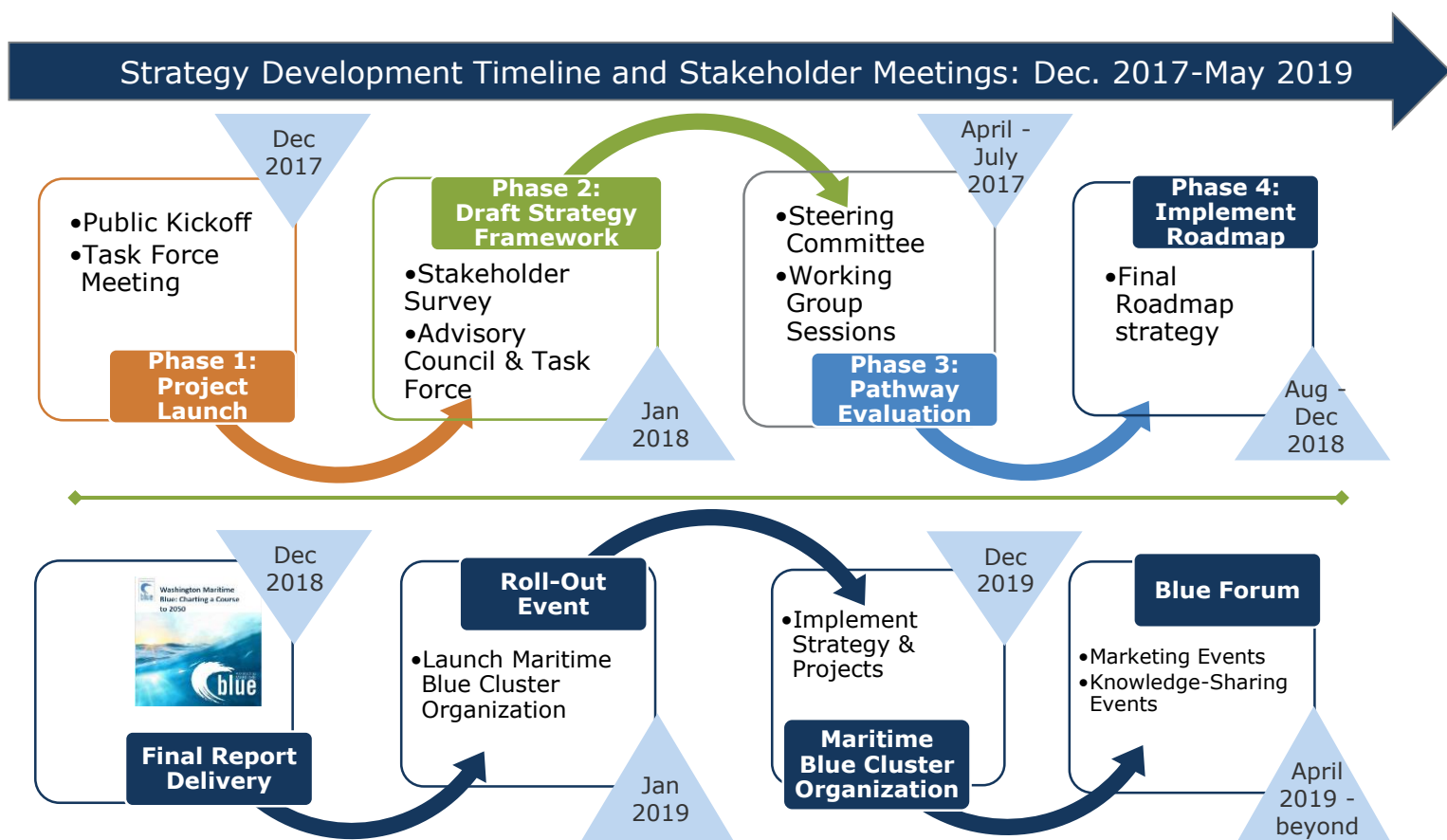
Maritime Blue Strategy Timeline



The Maritime Blue strategy launched in December 2017 and has completed four primary phases prior to report delivery in January 2019, as illustrated in the figure below.

It is important to note that the Advisory Council and Task Force has been participating in meetings since December 2017 and throughout the entire strategy process to support the realization of this strategy.

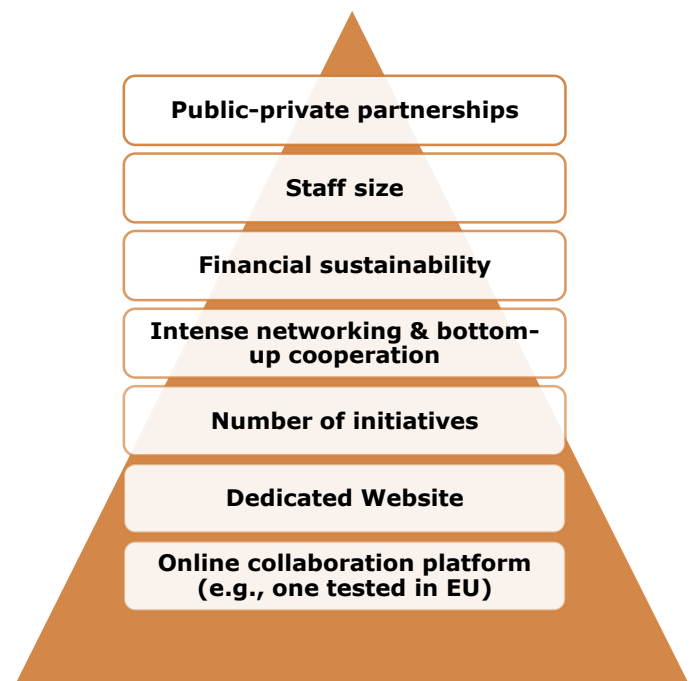
In January 2019, the Governor's Innovation Advisory Council will deliver the final strategy report to Governor Inslee at a roll-out event. At the same time, the Maritime Blue Cluster Organization will officially launch and begin implementing the strategy and demonstration projects. In April 2019, the cluster plans to host a Blue Forum event for knowledge sharing and networking.



Cluster organizations are truly public-private partnerships. The public-private partnership status is also underlined by the fact that typically 40% of funding comes from private sector with 60% from contribution from the public. Having formal membership is strongly associated with financial sustainability and improved collaboration among firms.

Cluster initiatives with large staffs perform better in every aspect, both internally and externally.

Having a dedicated cluster website is strongly associated with many performance measures. Cluster initiatives with a website perform better in terms of innovation, competitiveness, meeting deadlines and goals, being financially sustainable and attracting new members than the very few that do not have a website. They are also better at improving collaboration with other clusters and global markets.



Key Observations

Cluster organizations globally are established with different structures, forms, sizes and follow various set of priorities; and therefore, it is not feasible to provide a universal definition that will be common to each cluster organization. In some occasions, trade/sector associations act as a form of cluster organization that connect different stakeholders together under one umbrella in order to archive their common objectives; it's also recognized that formation of highly successful cluster organizations can be done as a result of government induced programs (e.g. NCE in Norway).

The EU further describes cluster organizations as "structures or organized groups of independent parties (such as innovative start-ups, small, medium and large enterprises, as well as research and knowledge dissemination organizations, non-for-profit organizations and other related economic actors) designed to stimulate innovative activity by promoting sharing of facilities and exchange of knowledge and expertise and by contributing effectively to knowledge transfer, networking, information dissemination and collaboration among the undertakings and other organizations in the cluster" [source: ESCA].

It has become evident that the implementation of a cluster organization is needed to support accelerated development and strengthening of the maritime industry in WA. This is further elaborated in the following pages.

Washington Maritime Blue Cluster Organization



Key to accomplishing the WA Maritime Blue vision is a cluster organization that develops and supports maritime business development, technology innovation and best practices promoting a sustainable future and contributing to the values of economic growth, ecological health, and thriving communities.

As an organized cluster of partners, the WA Maritime Blue Cluster will continuously drive sustainable economic development for the maritime industry to:

- Implement the goals of the Washington Maritime Blue Strategy for a Blue Economy.
- Develop into a competitive and internationally-ranked maritime cluster.
- Create shared ownership for the industry founded on economic, environmental and social added-value.
- Leverage and optimize collaboration within the industry and build links across adjacent industries and clusters.
- Lead in public and private investments and partnerships.

Tours, Global Outreach, and Cluster to Cluster Engagement



Washington Maritime Blue Cluster Organization



Operating as an independent, non-profit cluster organization , this strategic alliance will implement the following strategic action areas:

- Blue Focus: Acting as a communication and marketing hub
- Blue Forum: Hosting events to broaden the knowledge base and connect resources
- Blue Forward: Facilitate R&D and Demonstration Projects, impact and market analysis
- Blue Force: Connecting employers to workforce development and training opportunities
- Blue Finance: Develop Maritime Innovation Fund & connections to financial resources
- Blue Facility: Management of the Maritime Innovation Center, incubation and acceleration services

Specifically, industry members and organizational partners will have access to:

- Knowledge sharing events
- Research centers and institutions
- Funding and financing opportunities
- Partners, costumers, and supply chain vendors
- Maritime Blue Incubator/Accelerator
- Business services consultation
- Joint industry projects
- Visiting delegations
- B2B introductions
- Trade shows and trade mission eligibility
- Marketing and communications campaign
- Industry focused workforce initiatives



WA State delegation to Norway, Sept. 2018

This will be accomplished by building on the successful engagement of businesses, governments, academic institutions, ports, labor organizations, economic and workforce development entities, tribal nations, and community-based organizations. Because Washington's maritime industry is located in a mix of urban and rural areas, Washington Maritime Blue will deploy a hub-and-spoke model that will ensure that entrepreneurs and small and medium-sized businesses in underserved and rural communities can access services, research, and networking.



A Strategic Alliance for Maritime Innovation & Sustainability

Washington Maritime Blue is an independent 501c6 nonprofit *Cluster Organization* charged to implement the Washington Maritime Blue Strategy as a partnership between Public Entities, Private Industry, and Research & Training Institutions.

Washington State will be home to a world-class, thriving, and sustainable maritime industry by 2050: this is the vision for the Washington Maritime Blue strategy. The strategy framework was built from the ground up leveraging direct stakeholder input and stewardship from the Advisory Council. Stakeholder engagement included input from representatives of industry, workforce, research, academic, government, tribes, trade, labor, and environmental organizations and across maritime and related sectors such as clean tech, information communication technology, aerospace, financial, and more.

The Task Force, its Steering Committee, and the Pathway Workgroups have dedicated numerous hours in collaborative meetings and providing content review and shaping. The strategy is a product of what participants brought to the table, and a direct outcome of the collaborative nature of the discussions and innovating thinking that was brought to the process.

Key to accomplishing this strategy is a cluster organization that develops and supports maritime business development, technology innovation, and best practices that promote a sustainable future and contribute to the values of economic growth, ecological health, and thriving communities. Coordinated outreach will help showcase the industry's efforts and engage with society at-large to agree common approaches to meeting environmental and societal challenges.

By modernizing the fleet with low-carbon technologies and low-impact vessel designs, the sector can establish a competitive edge in sustainable vessel construction and develop an ecosystem for innovation.

The development of new mechanisms to provide focused investment in maritime innovation will build an attractive basis for future growth and attract new sources of capital.

Coordinated policy and lobbying efforts by the cluster regulatory bodies will help to mitigate the most critical of regulatory challenges.

A broad, strategic approach to infrastructure planning will secure sufficient land for the industry's needs while holistically managing environmental and societal impacts.

Securing sustainable investment in infrastructure and nurturing a high skilled, high-value workforce and will present a compelling benefit case and enable the sector to capitalize on Washington's other advantages.

A concerted effort is needed to engage the next generation of maritime workforce. A targeted skills strategy will ensure not only a sustainable supply of appropriate talent, but enable the industry to manage the transition to new operating models in a just and fair manner.

Community outreach and engagement in all areas of society will be critical to aligning the development of industry to the expectations and priorities of the public and ensure that all in Washington State have a stake in the future success of the sector.

A well-coordinated approach to policy-setting, the adoption of standards, and development of funding mechanisms will ensure a level playing field for fair competition. Promoting collaboration on issues of common interest across government, industry, and academia

The Washington Maritime Blue Steering Committee has been instrumental to the development of the Strategy. They have each brought significant leadership to the process and represent multiple perspectives. They have driven towards consensus and represented their respective stakeholders.

Ann Avary is Director of the NW Center of Excellence for Marine Manufacturing & Technology for Washington State. She is current Chair of the Marine League of Schools, a national consortium of 14 marine technology education providers. Ann works directly with the marine industries of Washington State, standards organizations, and state and national partners, to embed industry-based technologies, processes and best practices in the classroom and lab to support the marine industries workforce. Ann has led multiple research projects focused on the marine industries workforce, emerging technologies and the development of industry-recognized skill standards. As Principal Investigator for the Composite Recycling Technician Education Program (CRTEP), she took a leadership role in the introduction of innovative curriculum for technician education, and applied research for professional-technical students. Ann holds a BA in Economics.

Dr. Eleanor Kirtley is the West Coast & US Program Manager for Green Marine, North America's leading environmental certification program for the maritime industry. Dr. Kirtley joined the program and opened their Seattle office in 2014. She supports their membership located on Canada's West Coast and throughout most of the United States and manages the ship owners' technical committee. In addition to responsibility for the certification criteria on the vessel side, Eleanor oversees air emissions for the landside programs. Prior to joining Green Marine, she was a consultant and project manager at Glosten for six years. Within their ocean engineering and analysis group, she led vessel traffic and risk assessment studies. Eleanor completed her BS in Mechanical Engineering from Tufts University in 2004 and her PhD in Naval Architecture and Marine Engineering from the University of Michigan in 2008.

Nan McKay was appointed by Gov. Jay Inslee to serve on the Northwest Straits Commission. Early in her career she worked for associations of local governments in the Pacific Northwest on issues including growth management, energy policy and election law. From 1985 to 2002, she served three Washington governors as deputy director and executive director of the Puget Sound Water Quality Authority and later chair of the Puget Sound Action Team. Nan developed and led the environmental sustainability program for The Russell Family Foundation, managing hundreds of grants to nonprofit organizations. She has also worked as Service Corps Director at 501 Commons and now serves as a senior advisor to the program. Nan has served on a variety of public and nonprofit boards. She was a founding member of the Association of National Estuary Programs and is past president of the Environmental Education Association of Washington. She currently chairs the boards of the Center for Sustainable Infrastructure and the Sustainable Path Foundation and serves on the boards of the North Cascades Institute, Earth Economics and Western Rivers Conservancy. She is serving her second term on the Northwest Straits Commission and on advisory groups for the Salish Sea Institute and Curriculum for the Bioregion.

Steve Sewell currently serves as Board Secretary of the Washington Maritime Federation and is the former Maritime Sector Lead at the Washington State Department of Commerce. Steve draws on a career of over 25 years of experience in the transportation industry. Steve was Senior Vice President and a founding executive of LoadStar—a subsidiary of Hutchison Port holdings, the world’s largest container port operator. Steve held executive management positions at the Port of Seattle, including Managing Director of the Seaport, where he was responsible for marketing, development and operations of all port facilities, including container terminals, cruise ship terminals, recreational and fishing marinas, warehousing and distribution facilities and commercial real estate. Steve began his career as an attorney, serving as King County Senior Deputy Prosecuting Attorney and then General Counsel for the Port of Seattle. Steve earned his Bachelor of Arts degree from the University of Washington and his Juris Doctorate from Willamette University, and has served on the Board of Directors of a number of public and charitable organizations.

Dr. Andrew Stewart is an Assistant Director of the University of Washington Applied Physics Laboratory and an Associate Director of the Pacific Marine Energy Center. His work supports the development of next-generation ocean science technology and the creation of new tools to advance capabilities and maintain strategic advantage for the U.S. Navy. Focus areas include vehicles, marine renewable energy technologies, undersea instrumentation, and robotics. Through employing design methodologies rooted in fundamental principles, Stewart contributes to all phases of project development from conceptual design to fabrication, testing, and deployment. In addition to conducting federally-funded research, Dr. Stewart is actively commercializing technology developed within the Laboratory and regularly collaborates with industry to identify and harness economic impact opportunities. Dr. Stewart received the B.Sc. degree in mechanical engineering from the University of California San Diego, La Jolla, in 2006 and the M.A. and Ph.D. degrees in mechanical and aerospace engineering from Princeton University, Princeton, NJ, in 2008 and 2011, respectively.

University of Washington graduate student, Tressa Arbow, wrote her master's thesis on "Workforce Sustainability in the Washington Maritime Industry" alongside the stakeholder process for Washington Maritime Blue. The White Paper is referenced in the Final Report.

Tressa Arbow is a master’s student in the School of Marine & Environmental Affairs at the University of Washington. Her research explores the ways local communities contribute to and are impacted by the use of the marine environment, with an emphasis on social justice and sustainability. Tressa is a Foreign Language and Area Studies Fellow at UW and has also worked as a NOAA Science Camp and Orca Bowl education coordinator for Washington Sea Grant. Prior to beginning her graduate studies, she was an Assistant Principal in Austin, Texas and served as a Peace Corps Volunteer in Rwanda.

The Washington State Department of Commerce is the one agency in state government that touches every aspect of community and economic development: planning, infrastructure, energy, public facilities, housing, public safety and crime victims, international trade, business services and more. We work with local governments, businesses and civic leaders throughout the state to strengthen communities so all residents may thrive and prosper.

The Office of Economic Development & Competitiveness (OEDC) supports the needs of small businesses, entrepreneurs, startups, exporters and investors in order to create living wage jobs and grow local economies throughout Washington State. The OEDC offers a suite of services and programs focused on six specific areas: business development, retention and expansion; foreign investment; key sector strategic growth; export assistance; marketing, and rural development.

The Industry Sector Development Program (ISDP) mission is to grow and strengthen communities by promoting a strong business climate, promote public/private partnerships, and support the development of a 21st century workforce through targeted high demand industry sectors.

Joshua Berger – Governor’s Maritime Sector Lead

As the Governor’s Maritime Sector Lead for the State of Washington, Joshua works as the liaison between maritime industry interests, Governor’s office, legislature and state agencies. As Sector Lead he focuses on economic development, building public/private partnership, and ensuring a 21st century workforce. In his role, Joshua has facilitated the development of Washington’s strategic vision for a sustainable, decarbonized maritime industry alongside the development of a Maritime Innovation Center. Previously, Joshua served as Director of the Washington Maritime Federation and brings extensive maritime industry experience to his position. He earned a Master’s Degree from Antioch University Seattle in Participatory Planning. Joshua is also a professional Merchant Mariner having worked in the towing industry and spent six years as captain, of the historic schooner Adventuress.

Sarah Lee – Program Director, Industry Sector Development Program

Sarah Lee runs a national program that helps small- and medium-sized manufacturers find and secure the resources they need to be more competitive and productive. Before joining the WA State Dept. of Commerce, she worked for the Puget Sound Regional Council, and previously served as press secretary to a U.S. Congressman, director of public affairs at EPA Region 10, deputy executive director of a housing authority, and as senior vice president of an international multimedia firm. She holds a BA in Journalism from Western Washington University and a Master of Public Affairs degree from the University of Washington, and several executive certificates from Harvard Business School. She goes sailing whenever she has time.

Department of Commerce Interns

A group of interns have supported the Washington Maritime Blue initiative since its kick-off in December of 2017. Their dedication to learning, support and input throughout the process has been invaluable. Thank you.

**Kate Merifield
Hannah Martin
& Anika Vroom**

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[In the maritime industry](#)

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[Washington Maritime Blue Staff](#)

Jennifer States - Co-Project Manager

Jennifer is Business Development Manager and Senior Consultant specializing in development and management of cross cutting opportunities for DNV GL – Energy North America. She brings 20 years of renewable energy and clean tech experience in industry, non-profit, government and research environments. Her greatest accomplishments include launching of a start-up in advanced materials recycling, the implementation of renewable energy policy, and driving development of sustainable maritime, renewable energy and storage projects across the U.S. In addition to her work for DNV GL, she serves as City Councilor for the City of Sequim, WA

Simon Mockler, Co-Project Manager

Simon is Head of Section for DNV GL Maritime Advisory Americas. He is an experienced marine risk consultant with extensive operational experience from technical and safety risk management. He has over the past five years been delivering and developing risk management and fleet management advisory services to ship owners, ship managers, regulators, port and terminal operators and charterers across all marine industry sectors in the Americas. His specialties lie within project risk management, the qualification of new technologies, safety management and fleet performance management.

Anders Mikkelsen, Project Sponsor

Anders is Business Development Director for DNV GL Maritime with focus on West Coast North America. He has a MSc degree in Naval Architecture from Norwegian NTNU and NUS in Singapore and 15 years of experience ranging from working in the world's largest shipyards in Asia, to market entry studies, large strategy and capability building projects for ship owners, yards, equipment makers and government bodies. He has been living and working in Norway, Korea, China, Singapore and Canada.

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