WASHINGTON MARITIME blue

Acceleration, Incubation & Investment

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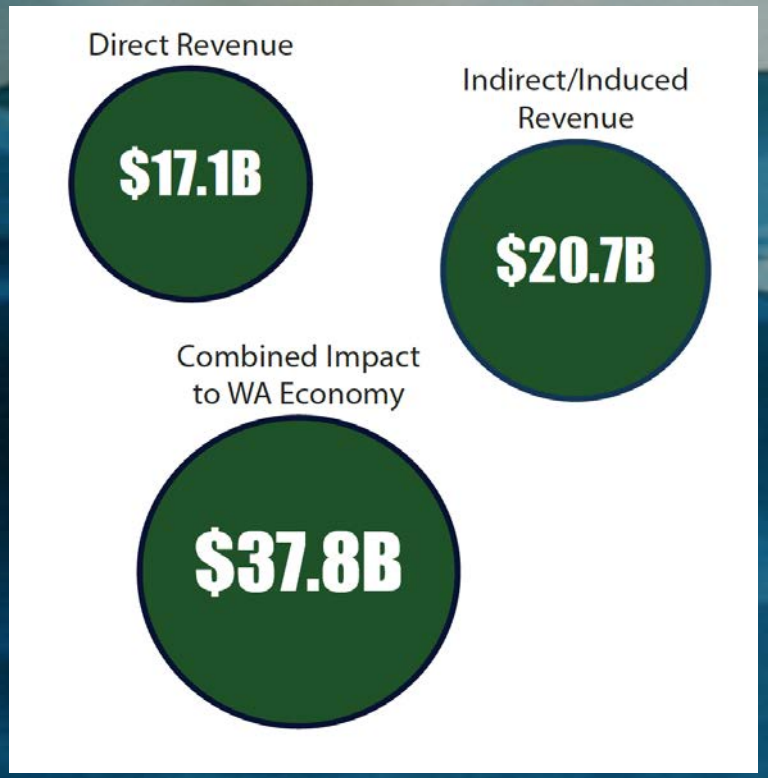
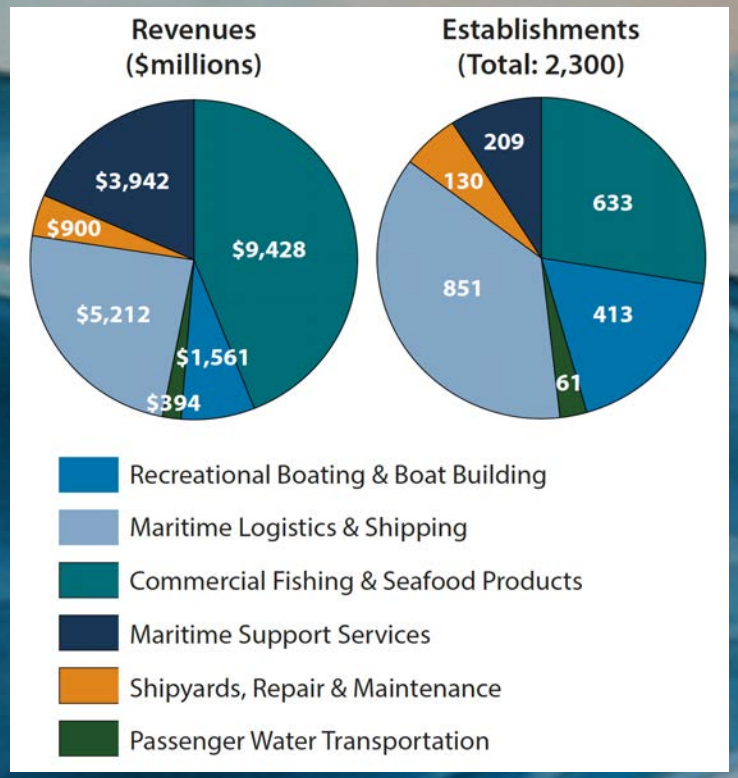
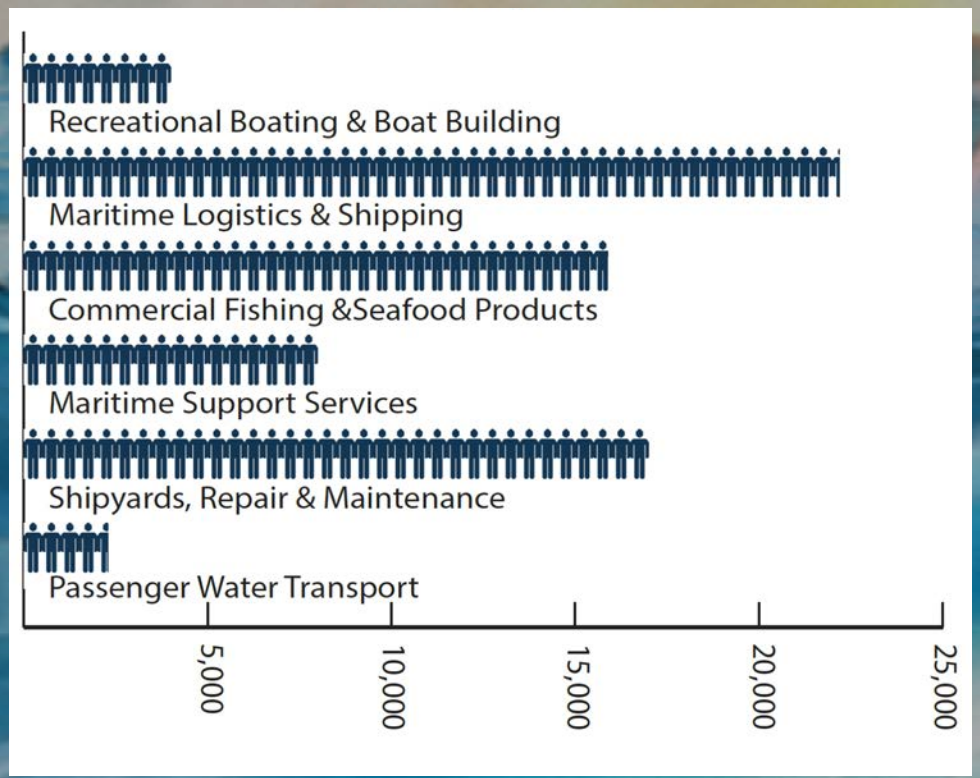






The maritime industry paid nearly **$4.5 billion** in wages in 2015 with average salaries of **$65,300**. In comparison, the state's average wage in 2015 was **$56,700** (does not include benefits).

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%**.

2016 Economic Impact Study, Community Attributes

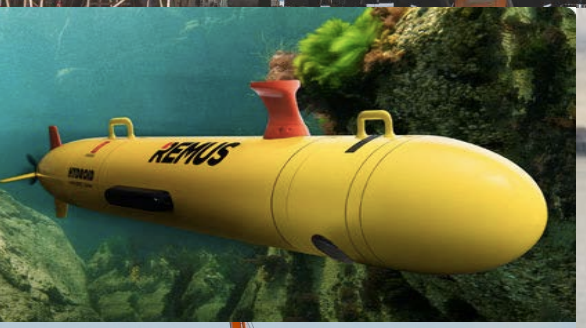
Maritime Sector's Economic Impact


educate


inspire


empower


BLUE NORTH


REMUS


TOTE Maritime

The Blue Economy

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

The Blue Economy

“Will double to $3 Trillion by 2030 – but if, and only if, we are focused on innovation and sustainability.”–
OECD

WASHINGTON MARITIME blue

Washington State's Strategy for the Blue Economy

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


Thriving, Low Carbon Industry
Global Innovation Hub
Growing Gateways
21st Century Workforce
World-Class Cluster
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
8 DECENT WORK AND ECONOMIC GROWTH
4 QUALITY EDUCATION
13 CLIMATE ACTION
17 PARTNERSHIPS FOR THE GOALS
Washington State's Strategy for the Blue Economy
WASHINGTON MARITIME blue
SUSTAINABLE DEVELOPMENT GOALS

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

13 CLIMATE ACTION

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

9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

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

8 DECENT WORK AND ECONOMIC GROWTH

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

4 QUALITY EDUCATION

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

17 PARTNERSHIPS FOR THE GOALS

*Joint Industry Projects (JIP)

WASHINGTON MARITIME blue

Innovation Clusters

Formal Ocean/Maritime Clusters have emerged as organizational entities that enhance competitiveness and collaboration.

Industry Members

Wärtsilä · SSA Marine (A Carrix Enterprise) · LAVLE · ABB · TOTE Maritime · SPEAR Power Systems · CROWLEY (People Who Know) · Glosten · Schwabe Williamson & Wyatt · Kongsberg · DNV·GL · PugetLNG · VIGOR · Corvus Energy · ioCurrents · CETS · Puget Sound Pilots (Protecting Puget Sound Since 1935) · PMG Pacific Mobility Group · eOdyn (Ocean in motion) · Wennberg Engineering LLC · SIEMENS · numurus (Smart System Solutions) · Elliott Bay Design Group · MER Equipment · First Mode · Janicki Industries · ssi Strategic Solutions Inc. · Ballard · The Mobile Boat Guys (Professional Yacht Detailing) · Bieker Boats · PureWatercraft · Beam Reach · eOceans · Discovery Health · Freeboard · EQULL · oneTANK from Glosten · CalWave Power Technologies · Net Your Problem · SPBES · One For Neptune · Ramboll · ecoSPEARS

Organizational Partners

IMPACT Washington · Green Marine · Goodwill (Because jobs change lives) · Working Waterfront Coalition of Whatcom County · EDASC (Economic Development Alliance of Skagit County) · NWSeaport Maritime Heritage Center (Preservation + Heritage + Education + Skills) · Sound Experience (Aboard the Schooner Adventures) · Northwest Straits Foundation · Northwest School of Wooden Boat Building · NAMEPA · CleanTech Alliance Washington · Norwegian Centres of Expertise NCE Maritime CleanTech

Washington Maritime Blue

A Strategic Alliance for Maritime Innovation and Sustainability

A partnership to implement Washington State's Strategy for the Blue Economy - a thriving maritime economy, a healthy ocean & marine environment, equitable & resilient communities.

Research Institutions

Pacific Northwest National Laboratory · PMEC (Pacific Marine Energy Center) · Applied Physics Laboratory University of Washington · PMEL (Pacific Marine Environmental Laboratory)

Public Partners

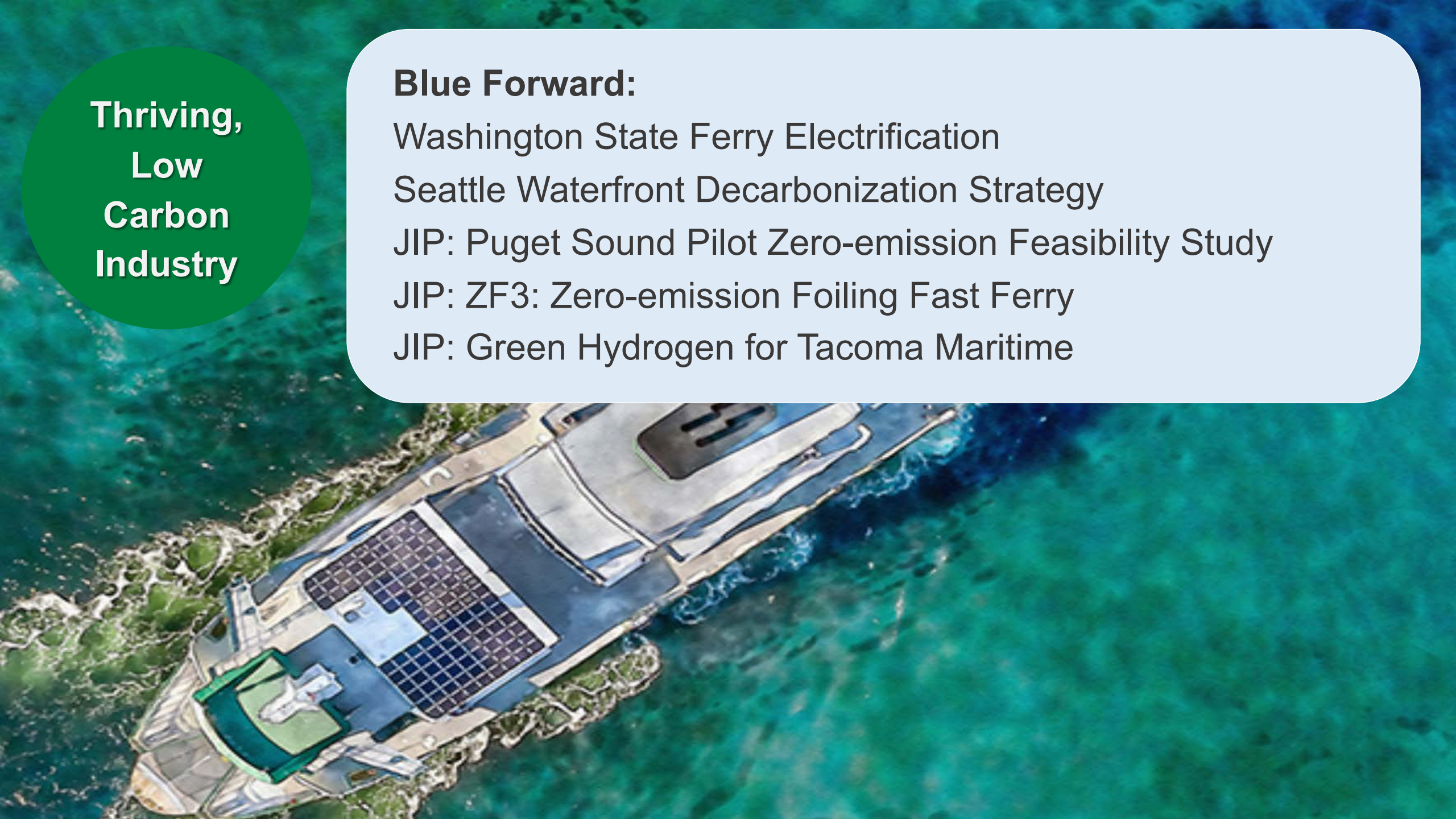
Washington State Department of Commerce · Port of Seattle · The Northwest Seaport Alliance (Gateway to Solutions) · Washington State Department of Transportation · Center of Excellence for Marine Manufacturing & Technology · Washington State Ferries · Seattle Office of Economic Development · Sea Grant Washington · PUGETSOUND PARTNERSHIP · Port of Skagit · Seattle Public Schools · EDA Jamestown S'Klallam Tribe Economic Development Authority · Skagit County Washington · Washington Workforce Training and Education Coordinating Board · Port of Bellingham Washington State Building A Strong Community · Tacoma · Port of Whitman County

Blue Focus	Blue Forum	Blue Forward
Marketing & Communications	Networking & Knowledge Sharing Events	R&D, Joint Innovation Projects,

Blue Force	Blue Finance	Blue Facility
Career Connected Workforce Development	Public & Private Funding, Access to Capital	Innovation Center & Entrepreneurship

WASHINGTON MARITIME blue

Scope of Work & Quadruple Helix



Thriving, Low Carbon Industry

Blue Forward:

Washington State Ferry Electrification

Seattle Waterfront Decarbonization Strategy

JIP: Puget Sound Pilot Zero-emission Feasibility Study

JIP: ZF3: Zero-emission Foiling Fast Ferry

JIP: Green Hydrogen for Tacoma Maritime

Growing Gateways & Working Waterfronts

Blue Forums

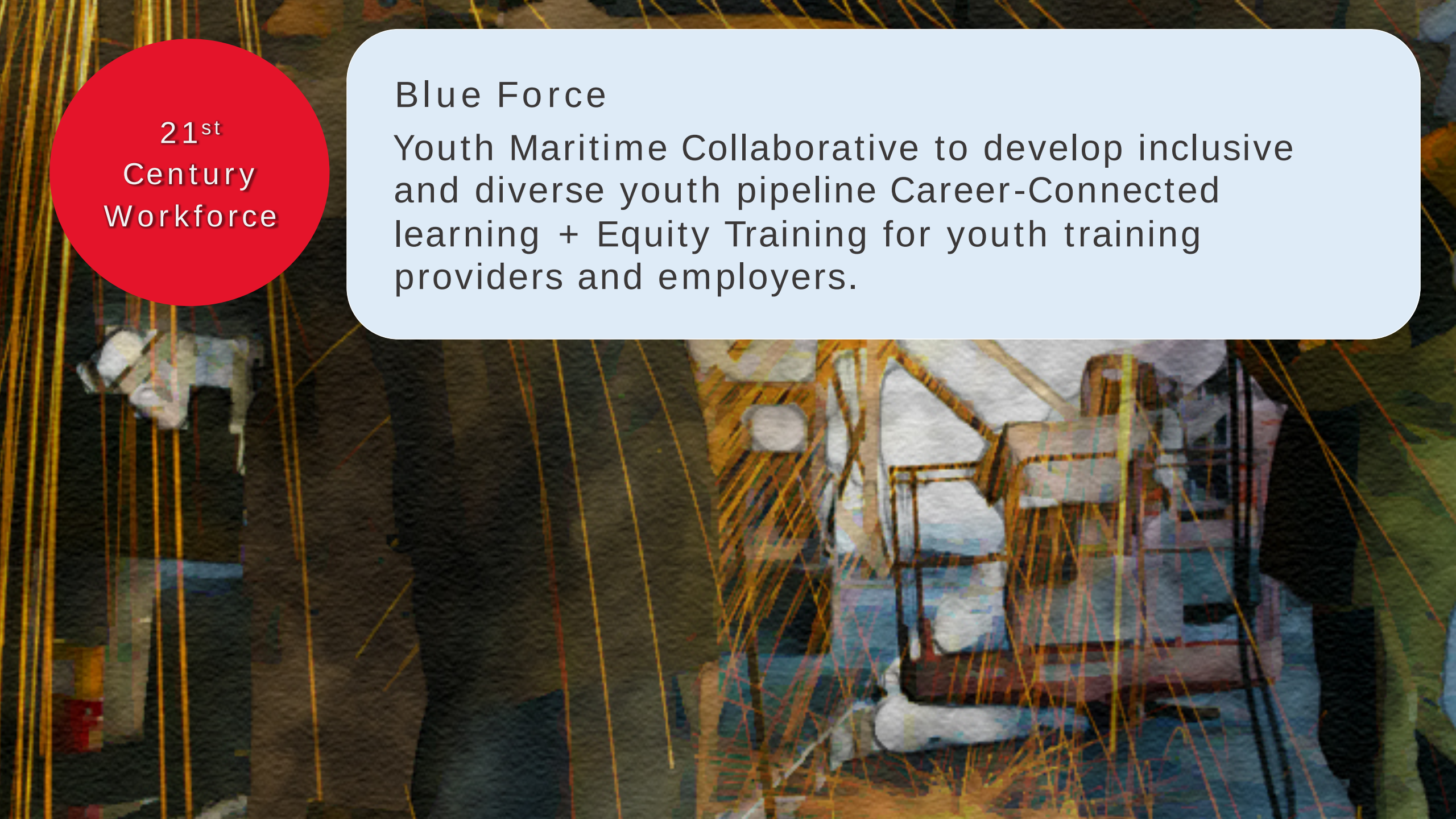
Uptown Tech Meets the Working Waterfront

R&D Pathways for Maritime Energy Solutions

Equity in a 21st Century Maritime Workforce

Investing in the Blue Economy

Coastal Community Economic Resilience



21st Century Workforce

Blue Force

Youth Maritime Collaborative to develop inclusive and diverse youth pipeline Career-Connected learning + Equity Training for youth training providers and employers.

World-Class Cluster

Blue Focus

Growing membership and leadership
International recognition and speaking engagements
Cluster to Cluster relationships

Global Innovation Hub

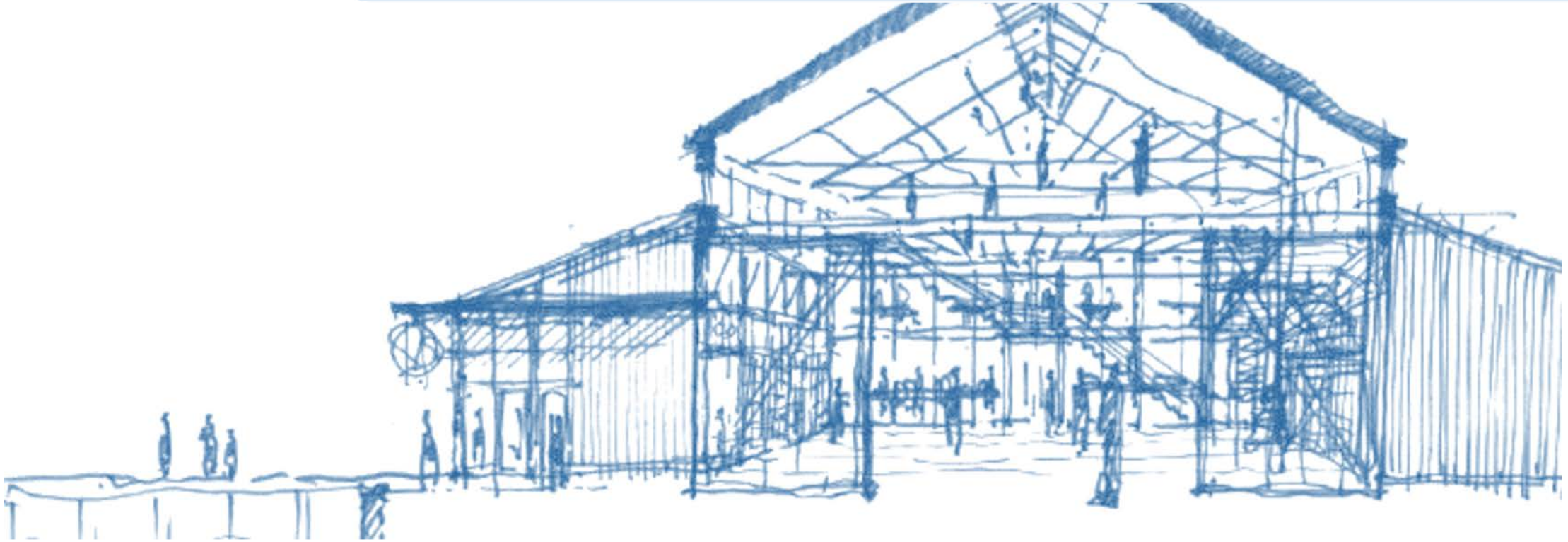
Blue Facility / Blue Finance

Developing Maritime Innovation Center w/ Port of Seattle

Maritime Blue Innovation Accelerator

Capital Landscape Study for WA's Blue Economy

Hub & Spoke Incubation around the State



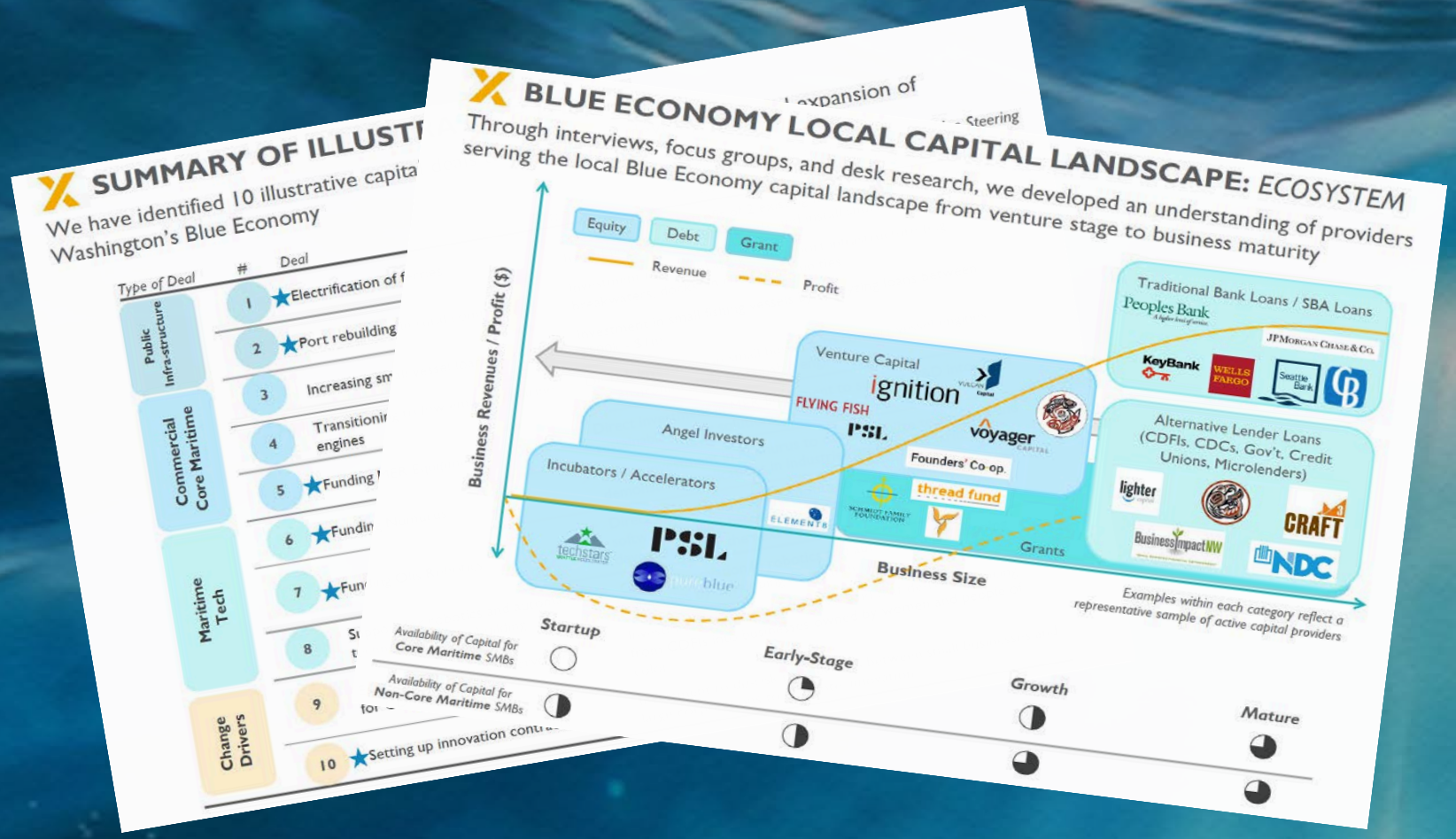
Capital Landscape Study

Venture Capital is NOT seeking out Maritime.

There is a particular need for early-stage capital.

Government and philanthropic grants can help de-risk investments.

Clusters, incubators, & accelerators can create vetted and supported pipelines of new deals.



Maritime Blue Innovation Accelerator

Four-month program taking no equity.

Diverse stages and sectors.

Mentors from business development and maritime/ocean.

Attracting diverse funding and capital; public, debt, equity, VC, Impacts, grants, etc…

ecoSPEARS

DISCOVERY HEALTH

eOceans

Beam Reach

oneTANK from Glosten

EQULL

SPBES

NET YOUR PROBLEM

ONE FOR NEPTUNE

PUREWATERCRAFT

FREEBOARD

Funding and Investing in the Blue Economy

- Global Market and Consumer Demand
- Converging Ocean Sectors
- Global Regulation from UN to Regional
- Reducing Technology Costs
- Cooperative Approach

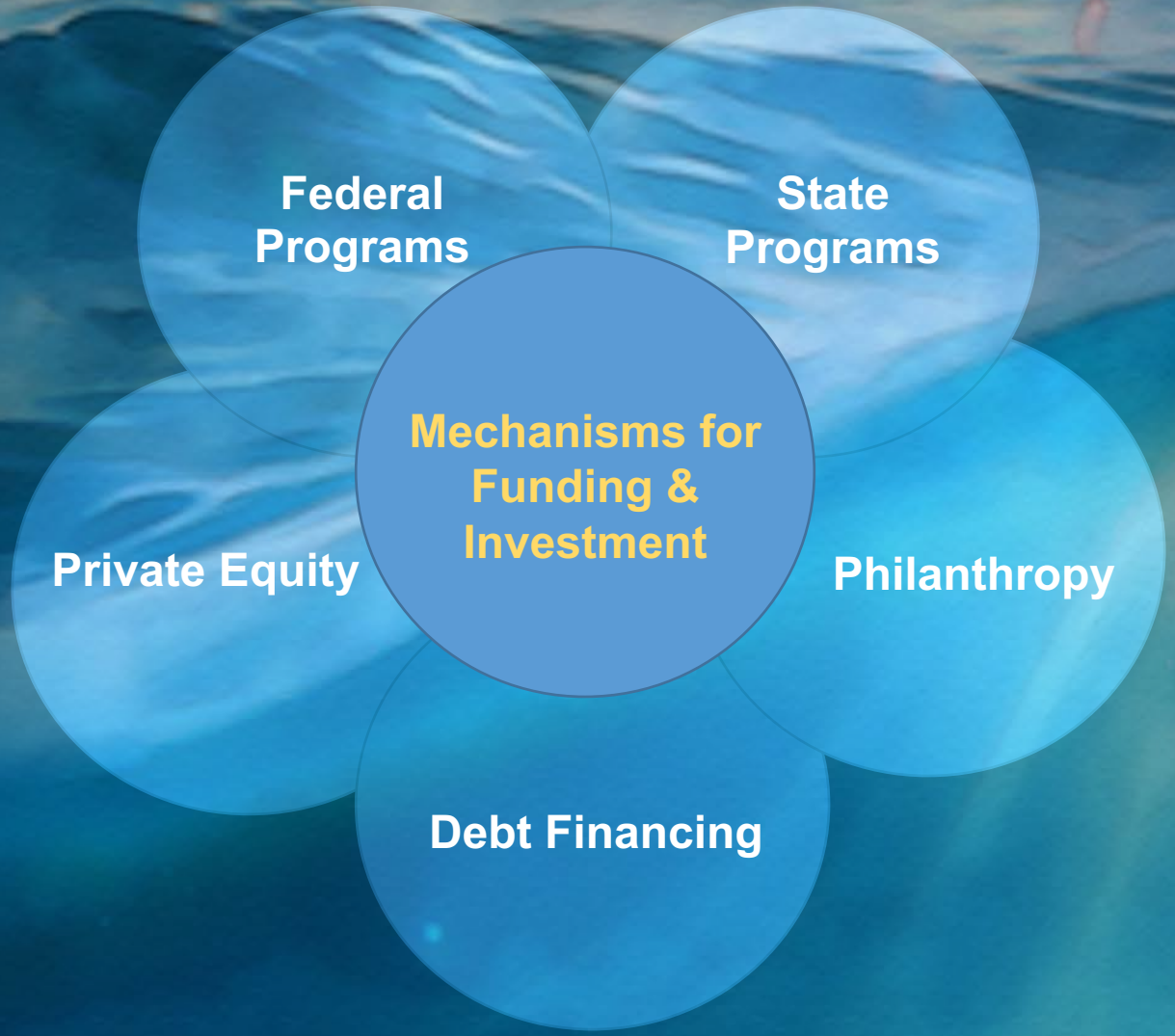
Hybrid Funding & Investment Opportunities

May need to buy down risk for new technology

Many forms of private debt and equity

Look towards new ways to invest in public infrastructure

Growth in Impact Investing - individual and institutional



Global Enterprise for the Blue Economy

WASHINGTON MARITIME blue

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www.maritimeblue.org
#WaMaritimeBlue

Joint Innovation Program (JIP)

Zero-emission Pilot Boat

A feasibility Study for Puget Sound Pilots

Managed by: DNV·GL

CHALLENGE

Puget Sound Pilots will need to replace or retrofit two existing Pilot boats operated from the Port Angeles Pilot Station. The goal is to evaluate options for a design that will can operate with zero emission and minimize the environmental impact on marine life, while still fulfill the mission objectives, and ensure safe operation for crew and pilots.

SOLUTION

- Develop the relevant operational and mission profiles
- Establish a design basis and initial operation requirements
- Evaluate options for hull, machinery and propulsion, based on performance and operational criteria, as well as infrastructure
- Analyze the environmental, financial and social benefits; including noise
- Provide a concept specification for design/build phase

BENEFITS

An innovative and environmentally friendly Pilot Boat that aims to eliminate the GHG emissions, ocean discharges, reduce the underwater noise while exploring current, proven and innovative technology. The boat also need to perform its mission under the relevant environmental conditions and be operationally flexible and safe. The options concerning efficiency, economy, emissions, and community impact over the boat's lifetime will be evaluated.

VALUE

The project will evaluate options to introduce a new safe, efficient and environmentally friendly Pilot boat for Puget Sound and Strait of Juan de Fuca. It is also expected that this concept might be relevant for other pilot boats and similar vessels, and hence facilitate WA companies to develop state of the art technology and competence.

Joint Innovation Program (JIP)

ZF^3: Zero-emission Foiling Fast Ferry

Development of an innovative Hydrofoil craft

Managed by: DNV·GL

CHALLENGE

A zero-emission, clean transit concept for a high-speed hydrofoil craft using lightweight carbon fiber hull construction, to help relaunch the "Mosquito" fleet. A collaborative approach is needed to identify and solve the challenges related to technical, safety, operational risks and financial feasibility.

SCOPE

This Joint Innovation Program will be addressed in distinct phases or programs, including:

- Complete design using a Technology Qualification Design Process.
- Review of environmental benefits and impacts including acoustic impacts to marine mammals and strike avoidance.
- Terminal and Infrastructure needs with technology assessment
- Regulatory and permitting needs
- Materials and construction
- Routes and operations
- Hybrid funding model for first demonstration

BENEFITS

More efficient vessel, reduced emissions, improved commuter and transit options, WA innovation and economic development, quieting to reduce impacts on SRKW's, platform for technology innovation.

VALUE

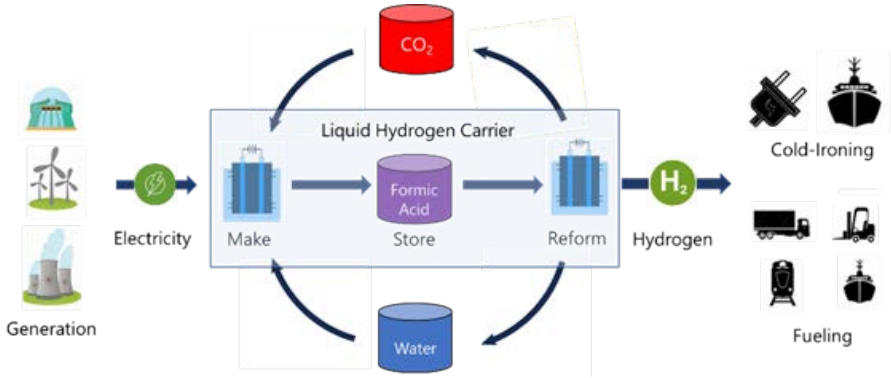
A zero-emission high speed waterborne transportation alternative in the Puget Sound that can offer a safe, reliable and cost-effective option, while minimizing the environmental impact on air and water quality as well as marine life. Washington companies to develop state of the art technology and competence to support our region as a center of excellence for maritime decarbonization.

Joint Innovation Project (JIP) - DRAFT

Zero-Carbon Maritime Hydrogen Ecosystem through Formic Acid Storage Pathways

CHALLENGE

Alternative fuels and energy are needed to reduce emissions from transportation and port operations. Hydrogen shows great promise, if it can be generated at scale in our region from renewable energy, as well as stored and transported in a safe manner. Tacoma Power has excess clean hydropower generation that can be utilized to make Green Hydrogen. They also need to provide energy for cold-ironing services to berthed vessels, which have large variances in power demand and timing.



SOLUTION

- Build and scale a Maritime hydrogen ecosystem through a project at the Port of Tacoma that demonstrates the concept of a port-based hydrogen (H2) solution utilizing Formic Acid for lower cost and safer storage and movement.
- This demonstration features a system that creates a liquid H2 carrier, formic acid, directly from green renewable electricity, water and recycled CO_2. This unique technology is provided by two of the partners: OCO Inc., whose electrolyzer technology creates the formic acid as a liquid H2 carrier and the Pacific Northwest National Laboratory, that provides a reformer technology to decompose and release the H2 from formic acid when needed.
- A local utility will provide the green electricity, which comes primarily from hydroelectricity and is 97% carbon free. They will also be the end user of the H2, to generate energy on demand for cold-ironing services to berthed vessels.
- DNV GL will provide techno-economic modeling so that this demo can be used to provide the anchor application for scaling-out hydrogen use in other maritime applications like hydrogen fueling for trucks, trains, vessels and a wide variety of cargo handling applications.

VISION

Regional collaboration to make Tacoma, WA the production and distribution nerve center for scaling up the use of clean hydrogen for port and maritime applications.

BENEFITS

This approach provides a large-scale local production and use for Hydrogen in maritime ports that can be stored as a liquid carrier in the form of Formic Acid, overcoming some of the key storage and movement challenges. This demonstration has the potential to show ports, utilities, and numerous maritime end-users what can be achieved when H2 is used at scale