

# AGENDA

## NEW ENERGY MARKETS IN WEST COAST SHIPPING

A curated discussion on decarbonizing trade and transportation on Canada's West Coast

November 3, 2023 • 8:30-11:00 AM • JW Marriott Parq Vancouver



OCEANS  
NORTH

ARUP



### 1. Welcome: Oceans North, Vancouver Maritime Centre for Climate, ARUP, and C40

With actors along the supply chain in the room (including major energy producers) we ask you to connect your zero-emission targets, projects, and energy demand with the opportunities presented by energy export projects along the West Coast. We look forward to moving beyond a general discussion of barriers and opportunities to talk specifically about lessons from your successes and failures and your future decarbonization plans in the maritime sector.

Our goal is to leave the conversation with stronger relationships and new connections, as well as insights to bring back to our respective organizations. We want you to bring advice to decision-makers in Canadian federal and provincial governments about how to ensure the maritime sector is well-positioned in a queue of decarbonization incentives.

Chatham House rules of non-attribution are in place.

### 2. Shipping Sector Energy Outlooks and Assessing Demand

To ground the conversation, the International Energy Agency and Lloyd's Register Maritime Decarbonisation Hub will present current work and modelling on getting to net zero. In September 2023, the International Energy Agency released an updated report, *Net Zero Roadmap: A Global Pathway to Keep the 1.5 °C Goal in Reach*; their shipping analyst joins us to unpack the pathway for shipping. Lloyd's Register will scale that discussion to the West Coast, and present their methodology and results for quantifying energy demand at the Ports of Vancouver and Prince Rupert.

- Policy Scenario and Energy Needs to Tracking Clean Energy Progress in Shipping 2023 – **Laurence Cret, International Energy Agency**
- Zero Carbon Fuel Monitor – **Ahila Karan, Lloyd's Register Maritime Decarbonisation Hub**

### 3. Aggregating Demand and Cross Value-Chain Collaboration for Zero-Emission Shipping

With customers, financial institutions, and shareholders setting expectations for emissions reductions, including scope 3, many shippers are looking for innovative ways to reduce emissions in transportation and shipping. How can we help these efforts succeed and expand?

- The coZEV (Cargo Owners for Zero Emission Vessels) Approach — **Selena Elmer, The Aspen Institute**
- Green Shipping Corridors as a tool for creating decarbonized commodity, trade, and transportation agreements — **Brent Dancey, Oceans North**
- Discussion

### 4. Scaling Solutions: Ports as Energy Hubs

We talk about ports as the key connector up and down the supply chain, as the multi-modal transportation hub where water, rail, and road converge, and therefore as one of the best-positioned locations and authorities to drive decarbonization. Where and how is this being demonstrated? How can we convert the potential of ports to energy and decarbonization solutions?

- Energy industry, utility, and community partnerships — **David Fujimoto, Port of Seattle**
- Lessons on early deployment and scalability through hydrogen hub development — **Jeff Grant, HTEC**
- Discussion

### 5. Leveraging Major Energy Projects to Decarbonize Ports and Shipping

Analyses and forecasts indicate that the sector will need to accommodate a flexible, polyfuel future and not a single fuel or technology. How will we leverage energy export-market projects to decarbonize the port and marine sector, including ocean-going vessels, and can we also use energy hubs to help decarbonize regional economies?

- Planning large-scale production in a maritime context — **Andy Ralph, ARUP**
- Transition Fuels: making short-term progress on emissions while avoiding lock-in or stranding assets
- Financing decarbonization in the shipping sector
- Discussion

### 6. Wrap-Up and Next Steps

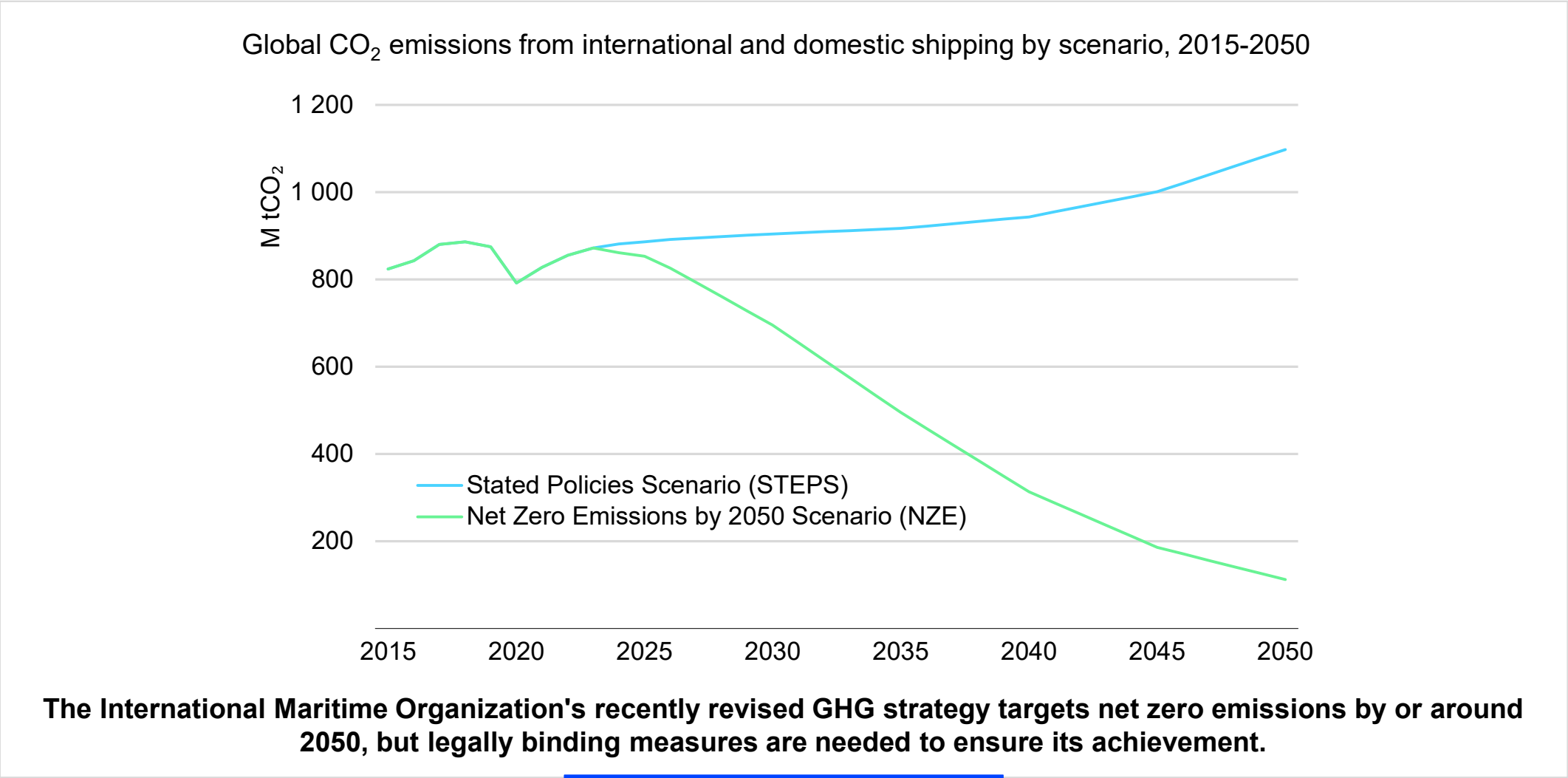


# Shipping in the Net Zero Emissions by 2050 Scenario

Laurence Cret

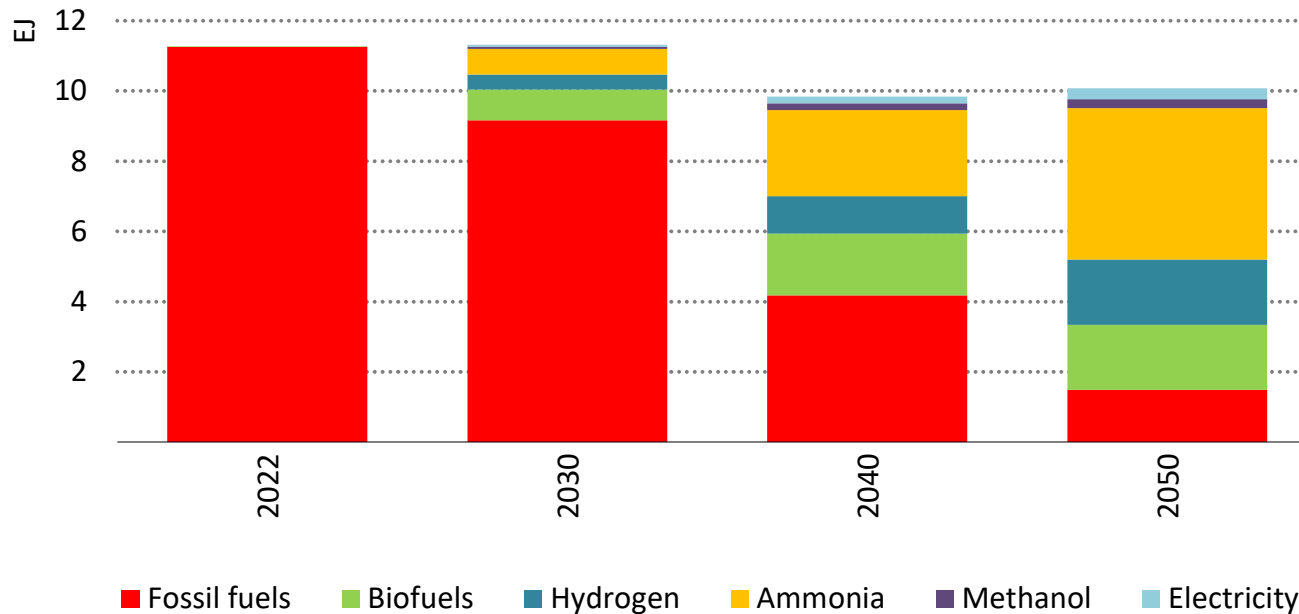
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# Ambitious policies are needed in the shipping sector



# Oil consumption decreases by 85% in 2050 in the NZE

Energy consumption of international and domestic shipping in the Net Zero by 2050 Scenario (NZE), 2022-2050

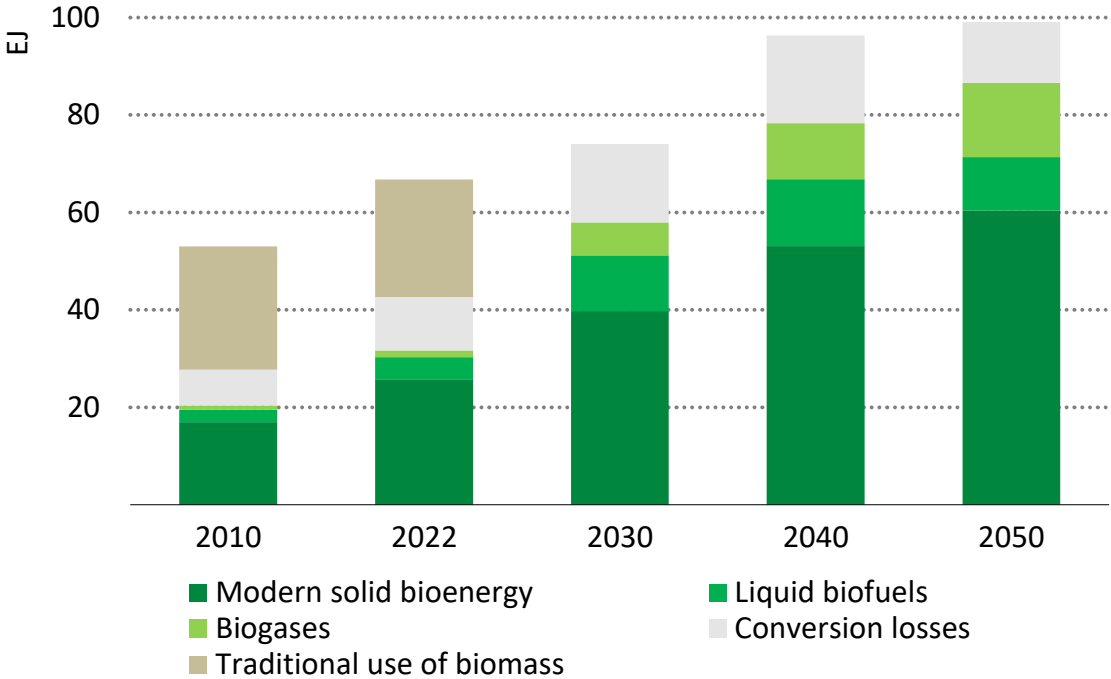


**Biofuels are constrained by the availability of sustainable biomass; hydrogen-based fuels are key to sector decarbonisation.**

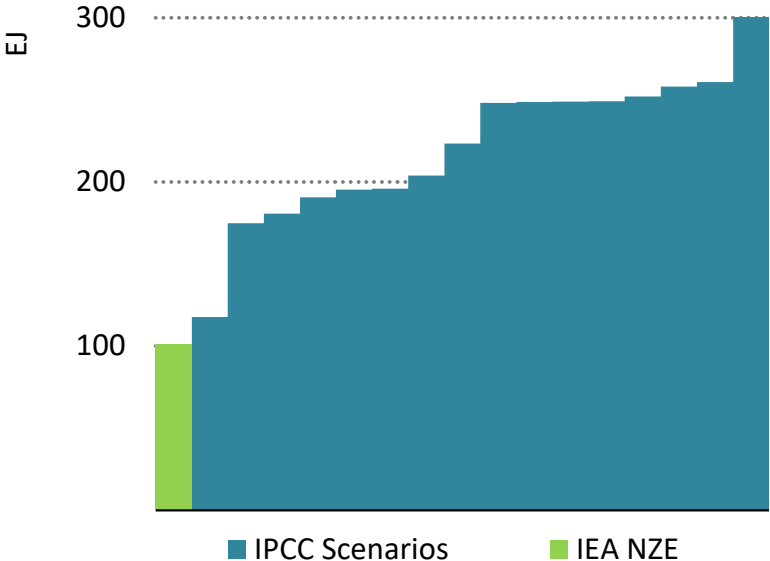
# Bioenergy supply in the NZE is limited to 100 EJ



Bioenergy supply by source in the NZE Scenario, 2010-2050



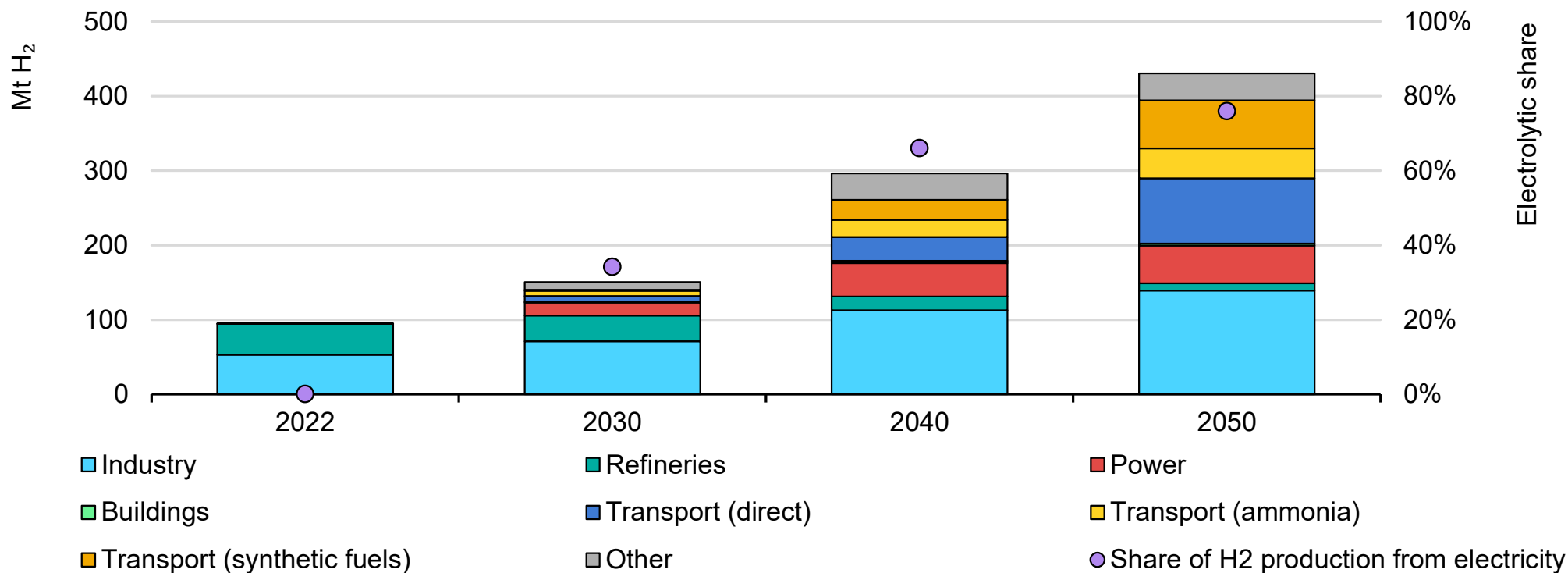
Comparison of bioenergy supply in selected IPCC scenarios and the IEA NZE Scenario in 2050



**The median IPCC scenario reaching net zero emissions by 2050 sees around 235 EJ of bioenergy demand, over twice the level in the NZE.**

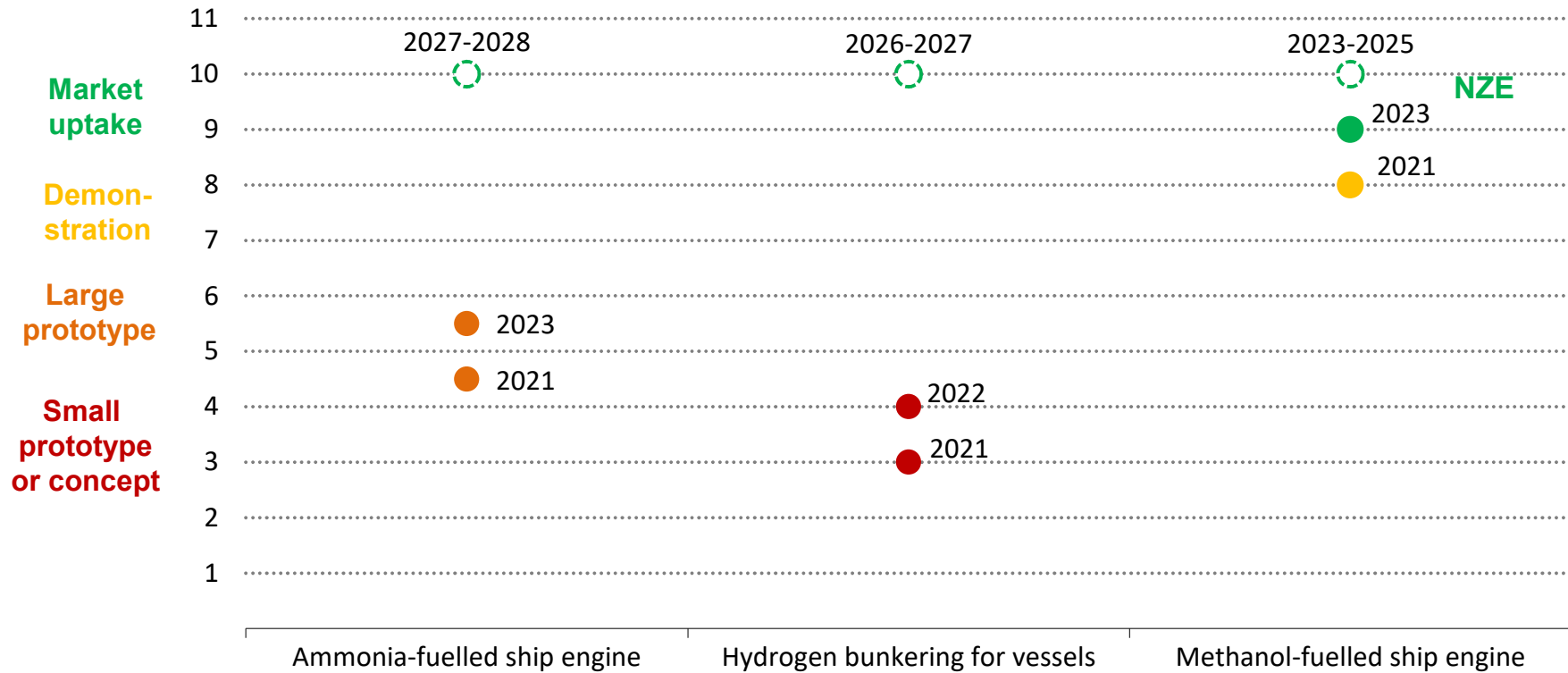
# Hydrogen-based fuels demand for transport

Hydrogen demand by sector in the NZE, 2022-2050



**Over 45% of hydrogen demand in 2050 in the NZE goes to support transport, either directly or in the form of hydrogen-based fuels.**

# Technology innovation is critical for the Net Zero pathway



**Key technologies for shipping must be commercialised this decade to be in line with the NZE Scenario.**



**iea**



# **Estimating demand and scalability**

**Lloyds Register  
Maritime Decarbonisation Hub**





# Port case studies & demand estimation

## Agenda

- What we discussed
- High level demand estimation
- Findings
- Recommendations for phase 2



Link to paper:  
<https://www.arup.com/perspectives/publications/research/section/canadian-green-shipping-corridors-preliminary-assessment>

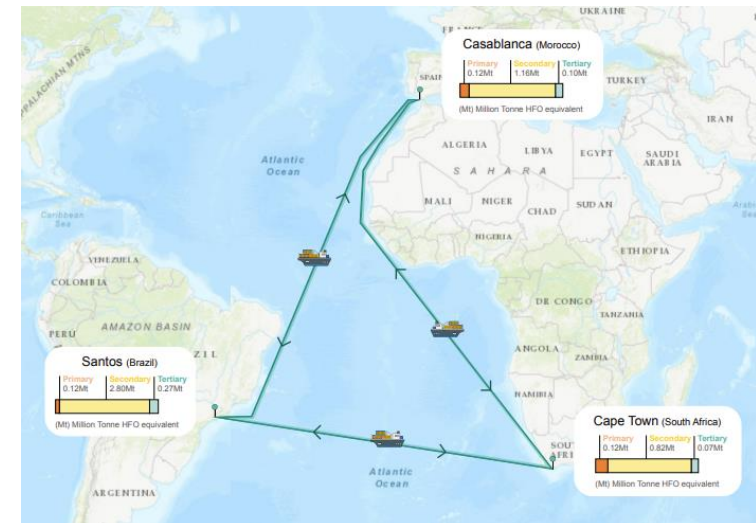
# Learnings from green corridors and clusters

- How can we aggregate demand and demonstrate scale?
- Other corridors and studies looking at a range of factors to determine scale of demand.
  - Frequency of local/regional port calls
  - Time spent in a defined region
  - Ship operating profile
- Refinement & stakeholder engagement
- Sequencing (e.g. exercise for Silk Alliance Green Corridor Cluster in Singapore)
  - Age, operational efficiencies, size, etc.

## Silk Alliance green corridor cluster initiative



## Green Shipping Triangle: Brazil, South Africa and Morocco



# High level demand estimation (Canadian ports context)

## Parameters for categorisation

- Port-to-Port Routes/Port Calls and the Time Spent in the Region (TSR) are ways of identifying vessels in scope
- Vessel type is also indicative of a first mover or “primary” fleet (e.g. containers and bulk carriers)

**3,300** vessels  
active in West Coast  
Canada in 2021



## Regional includes:

- locations where vessels can re-route to Vancouver or a local bunkering network feasibly
- vessels may not bunker in Vancouver today but have the optionality to refuel in the Vancouver area in future
- the reason for using Oregon as a cutoff, is Los Angeles Long Beach is a major competitor location so trade flow south of Oregon has a natural refuelling location of LA.
- Including activity around Haida Gwaii

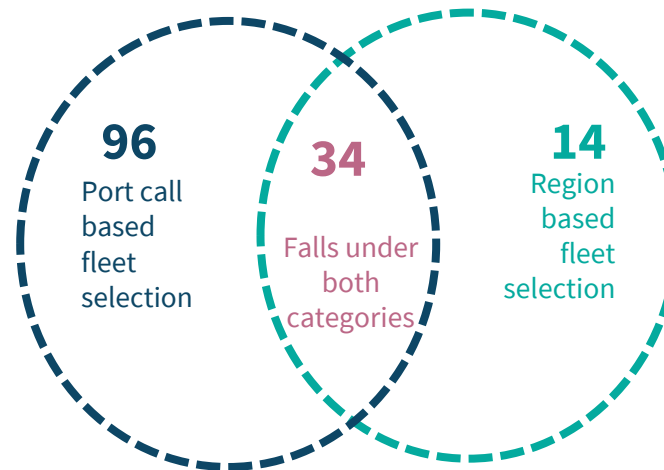
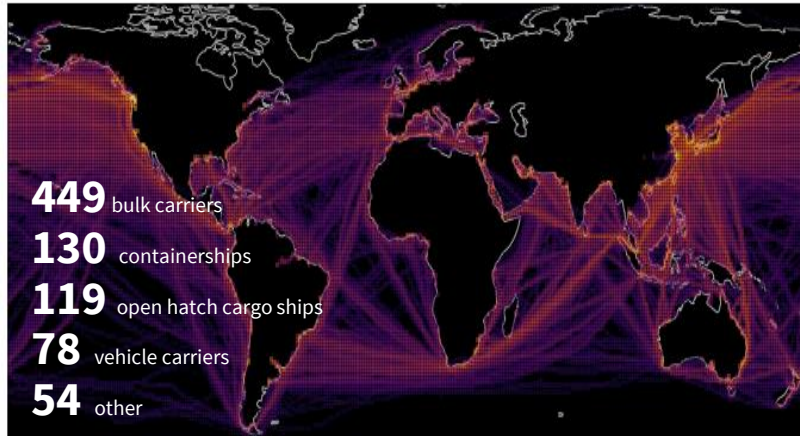
# Findings from Canada examples

## Port of Vancouver example:

**830** vessels berthing at ports in the Vancouver area from the 3,300 vessels captured in the region

**144** vessels falling “in-scope” as baseline fleet  
**820 ktpa**

Probability of bunkering applied based on time spent in the region  
**231 ktpa**

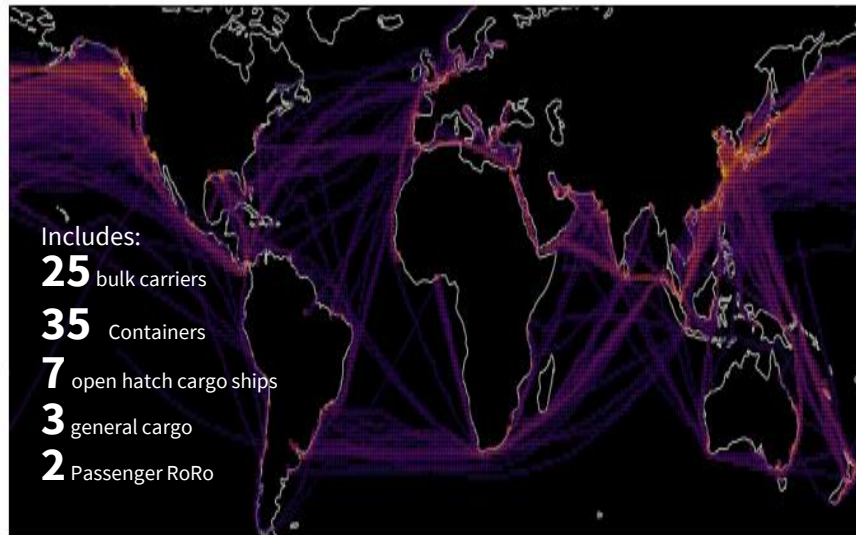


(28% of fleet’s annual demand)

# Findings from Canada examples

## Port of Prince Rupert example:

**72** vessels calling at Prince Rupert from the 3,300 vessels captured in the region



**10** vessels using same methodology as Vancouver area, as very little time spent in region

**93 ktpa**

Probability of bunkering applied based on time spent in the region

**24 ktpa**

(26% of fleet's annual demand)



# Looking ahead to Phase 2

- Stakeholder engagement on likelihood and frequency of bunkering patterns (going beyond historical patterns)
- Pre-selected individual port case studies extended to understanding how a network of ports would bunker
- Links to other green shipping corridors and ports (see *table of port inbound and outbound port calls*)
  - 48 containership arrivals from Okpo, South Korea and Zhoushan, China
  - Regionally, Port Orchard and Wilmington, USA on onward legs
  - LA-SH and other Trans-Pac (e.g. Busan) corridors in discussion
- Cross sector demand aggregations and synergies
- Exploration of regional energy hubs to achieve scale
- Feasibility of bunkering from a safety perspective

Figure: different types of routes/clusters/hubs

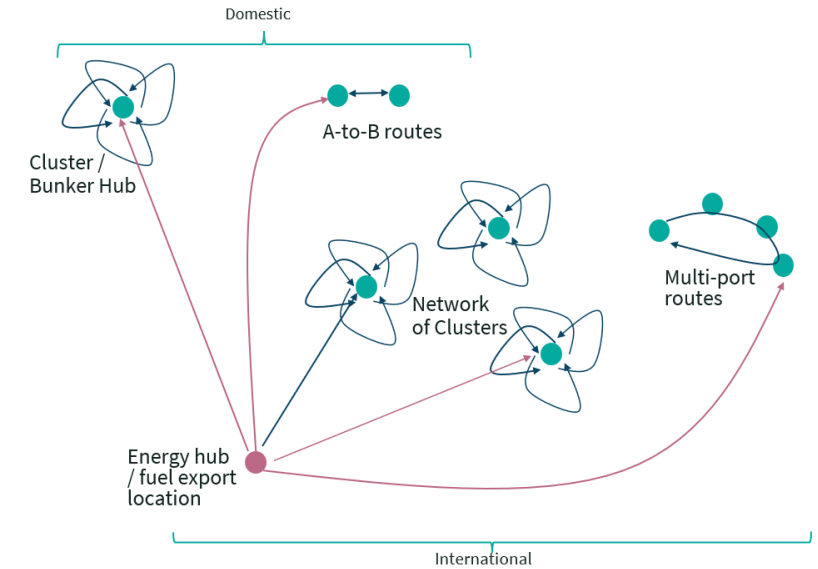


Table: port calls to/from port of Prince Rupert

Previous port call	Next port call
Okpo, South Korea	Vancouver, Canada
Zhoushan, China	Masset, Canada
Masset, Canada	Wilmington, USA
Port Edward, Canada	Port Orchard, USA
Yokohama, Japan	El Segundo, USA
	Yantian, China





**CO  
ZEV**

CARGO OWNERS FOR  
ZERO EMISSION VESSELS

  
**ZEMBA**

# Climate-Leading Companies Creating a New Market for Zero-Emission Shipping

Selena Elmer, Senior Program Manager, Shipping Decarbonization Initiative, Aspen Institute



# Cargo Owners for Zero Emission Vessels



coZEV is a **cargo owner-led** platform designed for climate-leading customers of the shipping industry to come together to undertake high impact initiatives that accelerate the transition to zero-emission (ZE) maritime shipping.



Send **demand signals** for ZE shipping



Support shipping decarbonization **policy**



Advise **green shipping corridors**



Join the **Zero Emission Maritime Buyers Alliance**



# Our theory of change to accelerate the transition to ZE shipping



If cargo owners come together to make sufficiently large and multi-year advanced market commitments for ZE shipping now, carriers will:



enter into ZE fuel offtake agreements



invest in ZE-capable vessels



work with ports and other actors to ensure the ZE maritime supply chain is ready for business




**ZEMBA** is a simple, scalable platform offering a **low-risk** process for negotiating a **green premium** that accounts for the added cost of ZE fuels and harnesses economies of scale

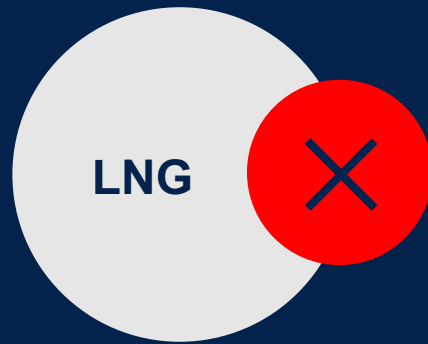


1. There will be no fee in 2023; however, a membership fee may be introduced in future rounds

# We're focused on ASAP deployment of long term, scalable ZE solutions. What's in scope for ZEMBA?

 **ZEMBA** defines ZE fuels as those that:

- Have **90% less emissions** than LSFO, feedstocks produced using **renewable** or other non-fossil, low-cargo energy source
- In aggregate, are sufficiently **scalable** to make a meaningful contribution to maritime shipping decarbonization
- And for which **safety** concerns have been addressed



0 – 20%<sup>1</sup>

Emission reduction over LSFO

## Liquified natural gas

- Fossil-LNG does not reduce GHGs on a lifecycle basis due to issues with methane slip
- Risk of further tech lock-in
- Market exists today



40 – 80%

## Bio-diesel<sup>2</sup>

- Useful as part of mix, helpful to support UNTIL scalable ZE solutions available
- Insufficiently scalable for a massive industry, so prices will rise
- Cannot achieve zero-emissions
- Market exists today

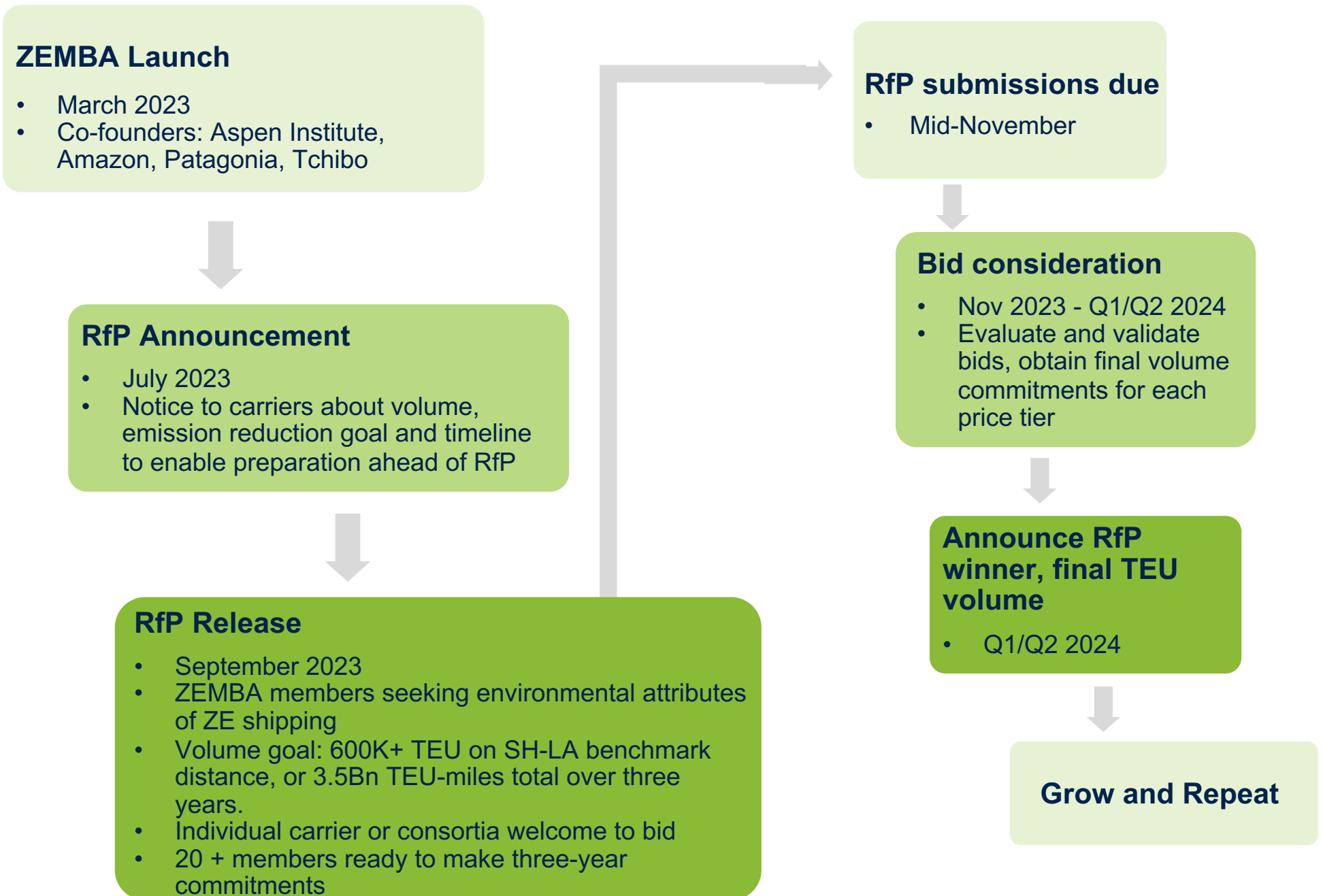


>90%<sup>3</sup>

## Bio-Methanol E-Methanol<sup>3</sup>      E-Methane<sup>3</sup> Green ammonia

- Markets for these new fuels need development
- ZEMBA demand will speed up deployment and scale

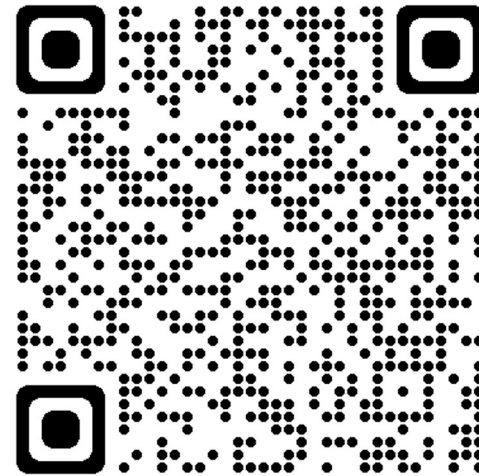
1. 0% on a well-to-tank basis, 20% on a tank-to-wake basis  
 2. Bio-diesel options: FAME: Fatty Acid Methyl Ester; HVO: Hydrotreated Vegetable Oil  
 3. E-Methanol and E-Methane CO2 feedstock options: Point source biogenic CO2, Direct Air Capture







# Thank you!



[www.coZEV.org](http://www.coZEV.org)

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