



AMBITION 2035
DISCUSSION REPORT

**MARINE
HYDROGEN
ROUNDTABLE**

2023-2024



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AMBITION 2035

Growing Canada's Ocean Economy by 5X to \$220B by 2035

In 2016, the OECD evaluated the growth of the global ocean economy, projecting it would double in size by 2030 to \$4 trillion dollars Canadian, and outpace the growth of the broader economy by 20 percent. In context of this global ocean potential, and in developing ocean solutions urgently needed, Canada can achieve transformative growth with significant opportunities for Canadian businesses and workers, from coast-to-coast-to-coast. This requires a collective approach and being bold in our ambition.

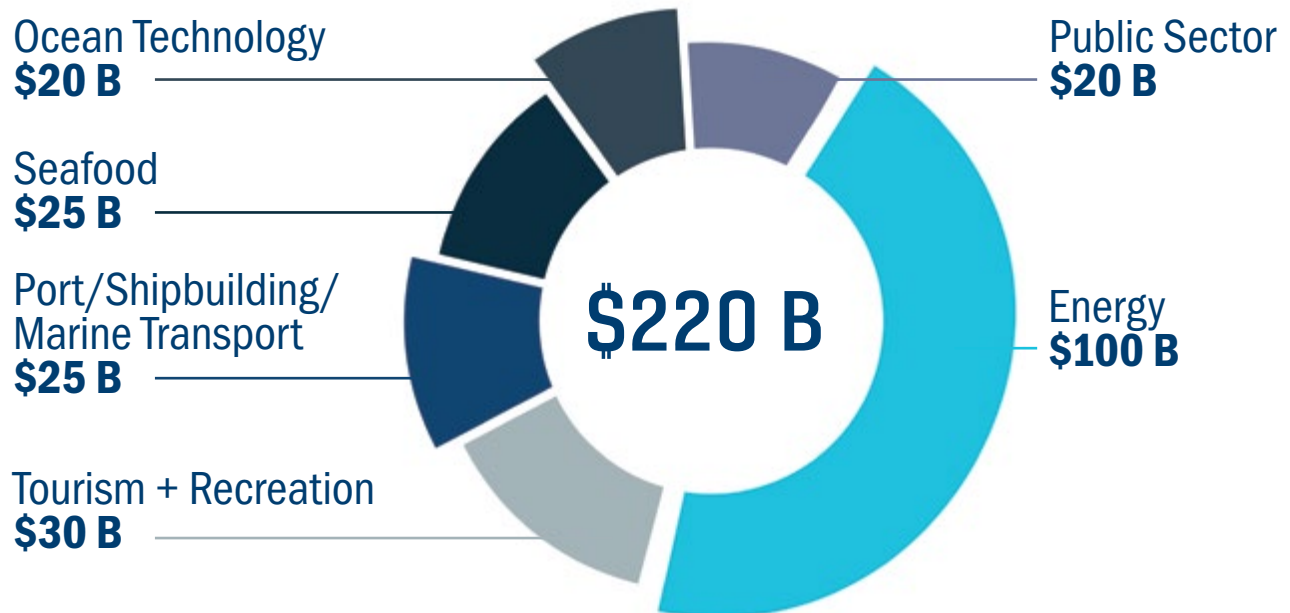
In the fall of 2022 Canada's Ocean Supercluster (OSC) released a discussion document introducing [Ambition 2035](#) - a 5X growth potential for Canada's ocean economy by 2035. Informed by more than 400 stakeholders and leaders from across the country as well as economists, it was developed to provide an ambition for all of Canada's ocean network to rally behind and consider the role they play in delivering on it. Following the Ambition 2035 event in Ottawa in the Spring of 2023, the OSC has released a next steps report which is available [here](#).

WE HAVE BIG
AMBITION FOR
OCEAN IN
CANADA

\$220
BILLION 5X
GROWTH
BY 2035

WHY HYDROGEN MATTERS

To achieve Ambition 2035, Canada must prioritize the ocean and increase its focus and leadership in six key growth areas.



In very simple terms, hydrogen is significant fuel option due to its potential as a sustainable, clean energy source that emits only water vapor when used, offering an alternative to fossil fuels.

Developing a complete supply chain for hydrogen's integration into the marine supply chain is important to achieving Canada's economic growth potential and net zero targets. This is not possible without:

- Pilots case studies are required to capture lessons learned and demonstrate multi-sectoral linkages on the benefits and co-benefits of the entire hydrogen ecosystem.
- Addressing the fundamental need to regulatory certainty.
- Investment that is critical to accelerate the required technology development.
- Collaboration to design, plan and build a sustainable supply chain and market.
- A more fully developed offtake market that's incentivized to lead in this change.
- Infrastructure for movement and storage must be designed and built for the range of possible hydrogen derivatives.
- Capacity building for the talent requirements of all participants within the supply chain.
- A sense of urgency to establish a pilot use case to identify gaps and opportunities within contained volumes.
- Support from the country's decision makers to influence faster migration from carbon power, including future penalties for long-term carbon usage.



DECEMBER 2023 REPORT

CURRENT SITUATION

- Canada requires national collaboration to advance marine hydrogen development, adoption and operations.
- International collaboration and alignment will be important for Canada's advancement and adoption, as other jurisdictions such as Norway as it moves to hydrogen fueled vessels.
- Many within the ecosystem are concerned about the slow pace of government and the time it will take for approvals and lack of clarity about a path forward. This will continue to delay investment.
- The marine hydrogen sector in Canada and globally is in its infancy. Canada is at risk of being an active participant or leader in marine hydrogen if there are delays in reviews and decisions will enable this new market development. Many are concerned with delays given the potential scale scale and locations of production, storage and use of hydrogen.
- There is considerable public misinformation about hydrogen, its potential applications, and the steps required for hydrogen to be a viable clean energy option. No single organization has the responsibility of educating the public, government and other stakeholders.
- While alignment about fuel options is necessary, not every hydrogen fuel option makes sense for every use case. As an example, the Canadian Coast Guard has decided to not pursue ammonia as an option for vessels, based on their needs. This is not comprehensive across all other use cases where ammonia remains a viable opportunity. At this point ammonia and hydrogen, in various forms, remain options.
- The current state of technology can allow the conversion of larger ocean-going fishing vessels to move to hydrogen as a fuel source but may not be a logical choice for smaller fishing boats, at this time.

CURRENT SITUATION

CONTINUED...

- Liquid organic hydrogen has momentum but has not received much attention. This should be explored in greater depth.
- At this point, there is no real data on blended hydrogen. This remains a viable option and monitoring effort globally and laboratory exploration in Canada is important.
- Production is the biggest unspoken issue. Fuel producers continue to explore opportunities and effort also must focus on production, storage and distribution.
- Today there are too many unknowns about all fuel types. A broad range of use case pilots need to show viability and contain safety in small volumes.
- The overall supply chain to support the movement and transportation of the fuel options needs significant exploration. As infrastructure is designed, it needs to be developed to handle the range of potential fuels. As an example, pipelines that carry only one type or form of fuel or gas are limited.
- ESG ratings may be a key enabler and driver to encourage future adoption of hydrogen fuel options. In addition, penalty systems for carbon may help advance the development and adoption of hydrogen fuel solutions faster. Nevertheless, there are no rules regarding carbon accounting and the current structure may allow for double counting.
- Incentives for hydrogen production and infrastructure development are limited. Many operators are already working within very tight margins and simply stating that the federal government is working towards net zero by 2050 is not incentive enough for companies to make that transition.
- Public engagement is critical. The final approval for the supply chain development will come down to municipal approval.



NEXT STEPS

- Canada's Ocean Supercluster will continue to engage with industry to identify potential innovation projects to maximize investment efforts and create critical pilots and use cases. This includes investments in associated technology development that will enable and bolster the entire supply chain.
- The OSC will host and support discussions to bring together parties required to expedite as many pilots as possible, with a focus on immediate or mid-term commercialization.
- Effort will be made to support collaboration among ports, developers and others within the supply chain who understand or are looking to better understand the potential of hydrogen.
- Time is of the essence as Canada is currently well positioned to lead new technology development required for the significant growth of global hydrogen production and use.
- Safety is paramount and will be a critical component of all future discussions, exploration and investment.





APRIL 2024 REPORT

CURRENT SITUATION

The April 2024 roundtable included a broad range of engaged voices prepared to explore new opportunities to advance the supply chain and use of hydrogen in Canada, with emphasis on the opportunity to advance the offshore wind and hydrogen and hydrogen derivative products such as ammonia, methanol, in the maritime sectors in Canada.

The discussion summary below is not intended to be exhaustive as conversations continue to support activity.

- **High Costs of Renewable Energy:** The cost barrier for renewable energy remains significant, even with financial options available through the Canadian Infrastructure Bank, highlighting the need for broader financial strategies.
- **Grid Electricity Price:** The price of electricity is the most significant piece of cost of hydrogen if produced using renewable energy and water electrolyzers. A strategic policy decision by the provinces and utilities is needed to help the industry in the early stages to subsidize the price for low-cost hydrogen.
- **Need for Political Leadership:** There is a strong call for political leadership to address and streamline regulatory barriers that currently slow the development of renewable energy projects like offshore wind and hydrogen in Canada.
- **Investment Attraction Risk:** Potential investors are currently ready but hindered by an ambiguous path forward regulatory uncertainty. This not only delays early pilot development and innovation investment but also could lead investors to diverting capital from Canada to more secure opportunities elsewhere globally.
- **Support for Early Adopters:** To increase the adoption rate of new technologies, there should be a focus on supporting early adopters financially to help overcome the initial high costs and stimulate market demand.
- **Challenges in Market Entry:** The difficulty of entering new markets without guaranteed purchasers for products like clean hydrogen emphasizes the need for more comprehensive and strategic market development.

CURRENT SITUATION CONTINUED...

- **Project Availability for Testing:** Identifying appropriate projects for testing innovations is challenging, indicating a need for a supportive mini-ecosystem that facilitates experimental development and application.
- **Collaboration Opportunities:** There is a noticeable lack of collaborative opportunities among companies, which if addressed, could enhance shared risk-taking and barrier reduction in the energy sector. Collaborations and joint meetings will be more successful if they focus on similar challenges.
- **Funding Gaps in Technology Development:** Funding is disproportionately allocated across the stages of technology development. Some feel there is strong support for early Technology Readiness exploration resulting in significant gaps in support for stages TRL 6 to 8 where technologies are being prepared for commercial scaling. Notably these tends to be when safety protocols are tested and developed.
- **Insufficient Operational Funding:** Although initial capital costs for projects like public transit may be supported through various programs, operational costs lack sufficient funding, which could jeopardize exploration and early adoption.
- **Advocating for Incentives:** The sector would benefit from shifting from a penalty-focused approach to one that offers incentives for adopting and advancing renewable energy technologies.
- **Demand-Driven Savings:** By incentivizing usage, demand escalates, enabling producers to scale up and achieve cost savings through increased production volumes. Offering incentives directly to consumers rather than producers encourages manufacturers to strive for long-term cost optimization and efficiency improvements. This approach ensures that market forces drive innovation and cost reduction, fostering a sustainable economic model for production.
- **Strategic Sector Coordination:** There is a critical need for an integrated approach, such as developing an Atlantic Strategy, to lead and synchronize efforts across various levels of government and the broader developing supply chain. There must be engagement and support from all government departments, including Transport Canada, DFO and Canadian Coast Guard.
- **Understanding Sector Challenges:** It is crucial to have clarity on which problems partners in the sector are addressing, as this knowledge will enhance our collaborative efforts and prevent duplicative work.
- **Diverse Energy Sources:** Acknowledging the future of energy will involve multiple sources, such as batteries and hydrogen, is crucial for developing adaptable energy strategies.
- **Domestic Hydrogen Plan:** Developing a domestic market strategy or plan for hydrogen is essential to ensure that Canadian-produced hydrogen benefits Canadian consumers, highlighting the need for incentives that encourage local sales.
- **Public Education and Awareness:** Increasing efforts to educate government officials at all levels about renewable energy potentials and requirements can facilitate more informed decision-making and policy development.
- **Sharing of Learning and Data:** Encouraging the sharing of data and experiences across the industry can help accelerate technological advancements and regulatory approvals, fostering a more cooperative sector environment.

NEXT STEPS

- Canada's Ocean Supercluster continues to engage with industry to identify potential innovation projects to maximize investment efforts and create critical pilots and use cases, in collaboration with others that invest in these pilots like ACOA, NRC IRAP, NRCan, TC, provincial groups, etc.
- The OSC will continue to work with the ecosystem to host and support discussions to bring together parties required to expedite as many pilots as possible, with a focus on pilots, innovation and commercialization.
- Continued dialogue to facilitate the consolidation and sign of requirements and expectations from provincial and federal governments.
- Canadian Hydrogen Safety Centre (CH2SC) will consult on safety aspects of hydrogen project being developed by OSC or other.
- Effort will be made to support collaboration among ports, developers and others within the supply chain who understand or are looking to better understand the potential of hydrogen.
- Time is of the essence as Canada is currently well positioned to lead new technology development required for the significant growth of global hydrogen production and use.





**CANADA'S OCEAN
SUPERCLUSTER**

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