

EverWind Fuels: first-to-market ammonia exports from Canada's Maritime provinces



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Vice President Power,
EverWind Fuels



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AMMONIA ENERGY
ASSOCIATION

Thursday, February 6
4PM CET (10AM EST)

House rules



- Please post your questions for the speakers in the Q&A section. Your questions will be answered by text by the speakers or will be discussed live.
- The recording of this webinar will be shared with all registrants after the webinar, and will be available at www.ammoniaenergy.org
- An article summarizing this webinar will be posted on www.ammoniaenergy.org in the coming days.



Eastern Canada-Europe Corridor



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- Eastern Canada has among the best wind resources globally
- The proximity to European ports makes Eastern Canada an ideal export location for renewable ammonia from wind, for RFBNO-compliant ammonia for the European market
- Politically, Europe and Canada are well positioned for long-term low-emission ammonia off-take



Justin Trudeau (Canada) and Mark Rutte (The Netherlands) receive a Monia. Image courtesy of Adam Scotti, 2018.



<https://ammoniaenergy.org/lead/plants/>

The H2Global mechanism is flexible and can be customized according to funders' objectives

To date, **€5.83bn billion** have been committed or earmarked for the H2Global tenders

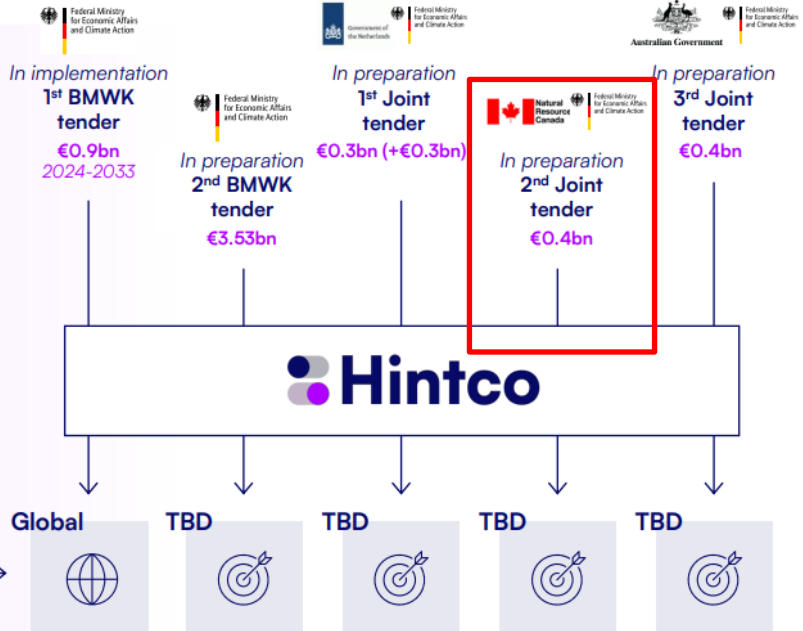
Customized regarding:

- Geography (global, regions, countries)
- H2 product selection
- Product and sustainability criteria

Adaptable to targets:

- Price optimization
- Promotion of green technologies
- Energy security
- Decarbonization of specific sectors
- Development policy

Customized tenders



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Vice President – Power



Dr. Michael Goff
*Technology Manager
Sustainable Fuels & Chemicals*



EverWind Fuels | Atlantic Canada's Premier Green Fuels Hub

- 
- ✓ Deepest ice-free port on the East Coast of Canada
 - ✓ 3-5 year permitting advantage from deep-water port
 - ✓ Team with 100s of years of experience & a safety culture
 - ✓ Hazardous material experience
 - ✓ Jones Act exempt & bonded warehouse
 - ✓ One of four Oil Spill Response Organizations in Canada

Leveraging Existing Site to Deliver High Growth Green H2 Platform

Multi-site, multi-phase interconnected hub – Phase 1 is the most advanced green ammonia project in North America



- ### Nova Scotia – Phase 1
- FID: 2025
 - 800MW onshore wind & solar + BESS
 - 240ktpa green ammonia (42ktpa H2)

- ### Nova Scotia – Phase 1
- FID: 2026
 - 3GW onshore wind & solar
 - >180ktpa green hydrogen

- ### Newfoundland
- FID: 2026/2027 (multiphase)
 - 12GW+ onshore wind & solar
 - >600ktpa green hydrogen (full scale)

- ### Offshore Wind – Limitless Scale
- >100GW fixed bottom capacity
 - Nova Scotia auctioning offshore wind starting 2025

Nova Scotia Phase 1 | The Most Advanced Project In North America

- Integrated green hydrogen project on track for a 2025 final investment decision (“FID”)
- Owned onshore renewables, permitted & engineered production facility – 42ktpa green hydrogen converted into 240ktpa green ammonia
- Power supply structure confirmed RFNBO-compliant

Fully Permitted Hydrogen & Ammonia Production

- Black & Veatch as EPC Contractor
- 1st permitted green hydrogen facility in North America
- FEED/FEL3 engineering completed in March 2024 (1st in North America)



Nova Scotia Phase 1 Renewables

- 650MW onshore wind, 150MW AC solar, 50MW/100MWh BESS
- Environmental permits complete, land control, turbine supply advanced
- Meaningful First Nations partnership & ownership





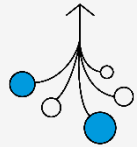
BLACK & VEATCH

We Know Infrastructure

- **Engineering, procurement, consulting and construction company**
- **100-year legacy of sustainably solving global infrastructure challenges**
- **Commissioned/building 365 MW electrolysis capacity**
- **Decades of experience in ammonia plants**

Black & Veatch Solutions Portfolio

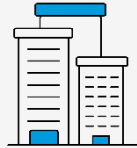
Integrated, innovative solutions for infrastructure projects that shape the fabric of organizations, populations and communities.



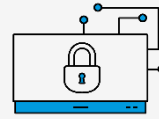
Advanced Power Generation



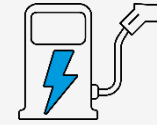
Advisory Services



Commercial & Industrial Facilities



Cybersecurity



Distributed Infrastructure



Environmental Services



Federal



Grid



Operating Asset



Process



Water



Design Considerations

- Data on renewable electricity profile
- Optimize capacity of units
 - ASU capacity
 - Electrolyzer capacity
 - Demin water
 - Ammonia capacity
- Battery storage
- Hydrogen storage
- Evaluate metal fatigue and avoid pressure and temperature cycles

Controls

- Different ramp rates
 - ASU
 - Electrolyzer
 - Ammonia loop
- Buffers offer operational flexibility
 - N2 storage
 - Battery
 - H2 storage
- Prediction of renewable power availability
- Level of process control





Lessons Learned from Green Ammonia

- Don't underestimate complexity
- Power source
 - Availability
 - Carbon intensity
 - Cost
- Offtake agreement and specs
- Optimize capacities
- Codes weren't written for large scale electrolysis
- Bankable technology suppliers
- Leak detection
- Water source



Questions

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