



WAVE POWERED
SUSTAINABLE DESALINATION

**Make the oceans a sustainable and
affordable source of fresh water**



Presented by : Daniel O'Brien
Product Manager at Oneka Technologies
September 13th 2023

PRESENTATION AGENDA

1. **Water Access: A Global Challenge**
2. **Context in Barrington**
3. **Oneka's Background & Solutions**
4. **Glacier Project**
 - a. **Project example & partners**
 - b. **Social, environmental & economic impact goals**
 - c. **Permitting Efforts**
 - d. **Considerations for project locations**
5. **Next Steps**
6. **Q&A**



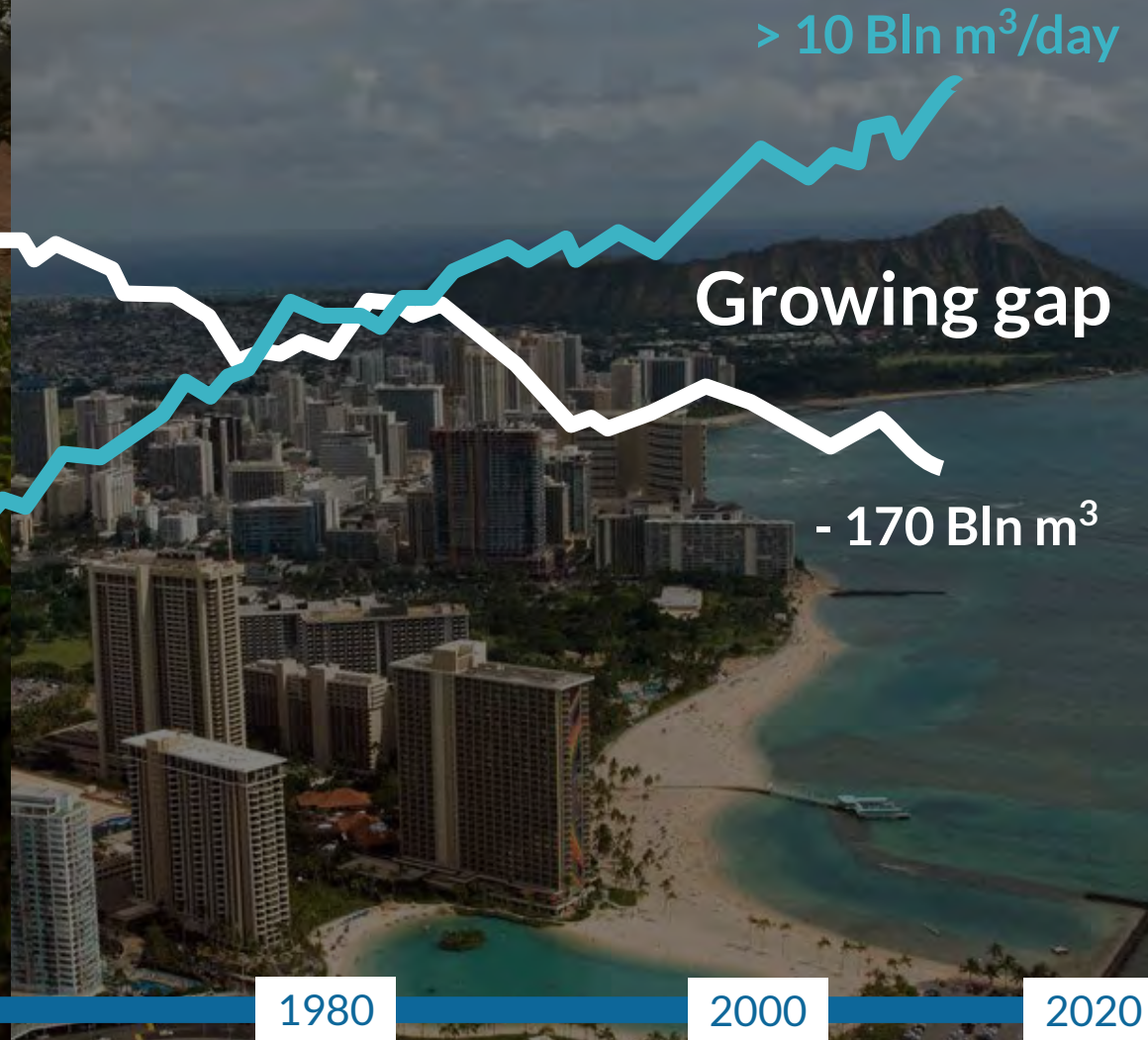
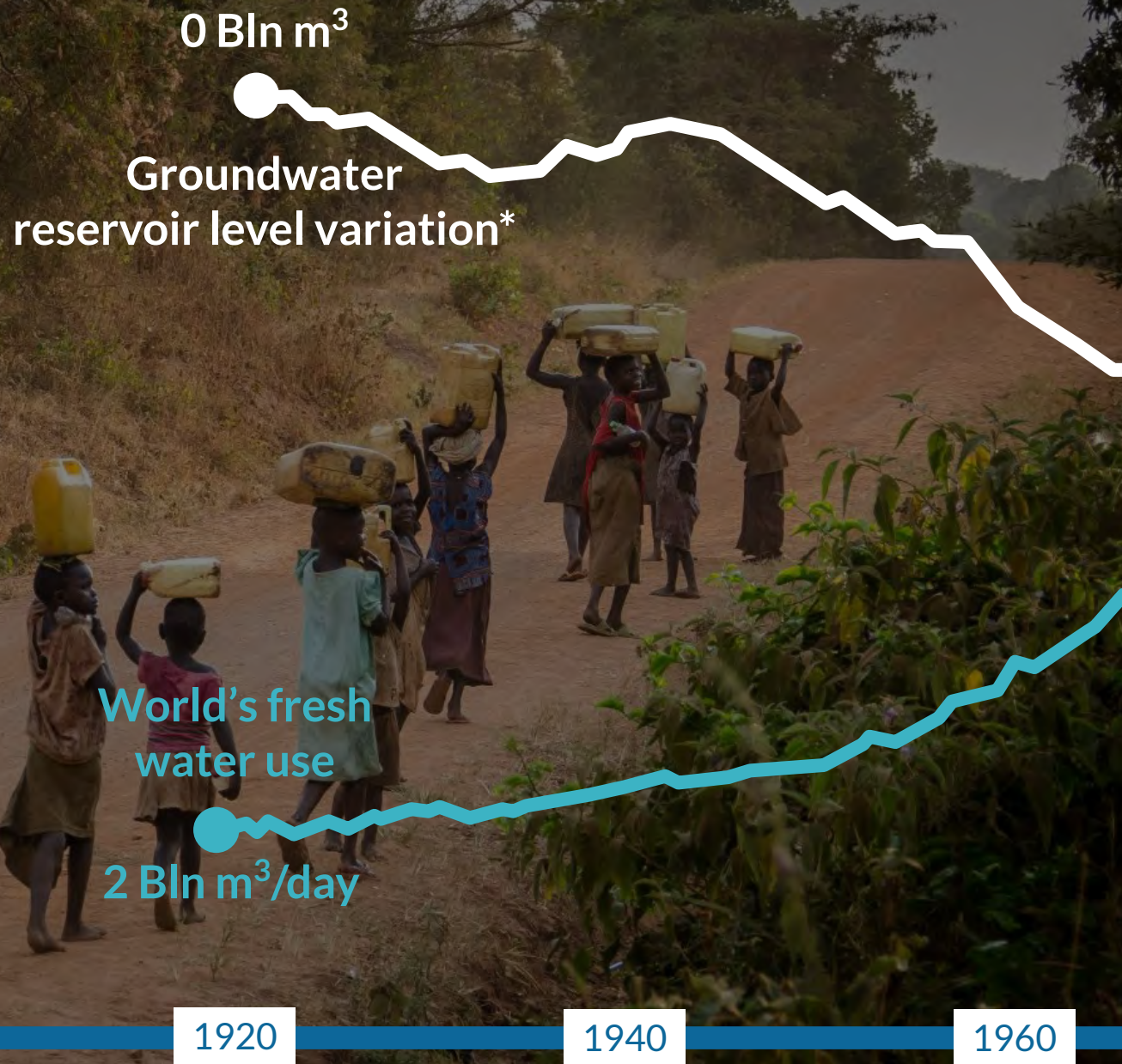


WATER ACCESS: A GLOBAL CHALLENGE

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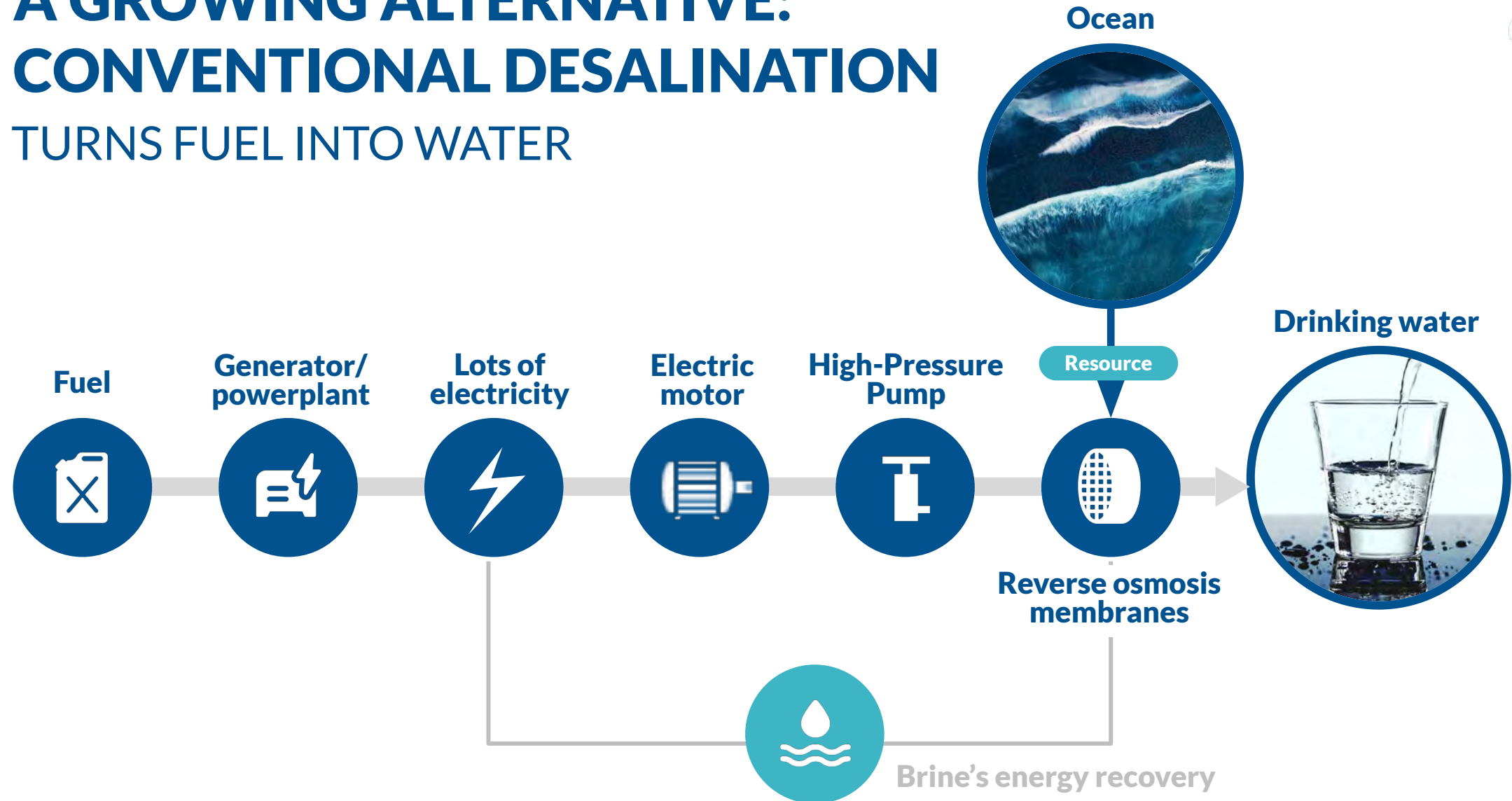
Coastal zones have special problems

> 55% of the world populations live along the coast





A GROWING ALTERNATIVE: CONVENTIONAL DESALINATION TURNS FUEL INTO WATER





WE NEED TO ELIMINATE FOSSIL FUELS FROM THE PRIMARY ENERGY SUPPLY



2020

2050

~1%
of world's population
lives on desalinated
water

=

~0,5%
of world's CO₂
emissions

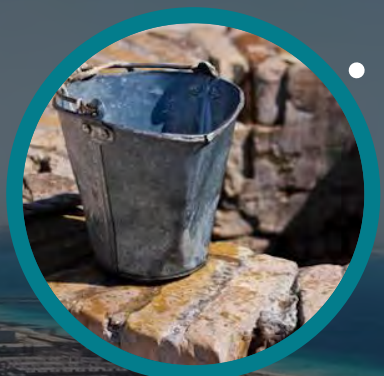
10%
of population
desalination expected to
increase at current
growth rate

=

~5%
of today's world's CO₂
emissions
about twice the
aviation industry

CONVENTIONAL DESALINATION IS NOT SUSTAINABLE

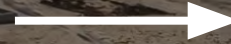
**WATER
SCARCITY**



**CONVENTIONAL
DESALINATION**



**CLIMATE
CHANGE**





CONTEXT IN BARRINGTON

OnekaWater.com

Freshwater Access : A Challenge in Southwest Nova Scotia

- Droughts conditions in four of the last seven years (dating back to 2016)
- 300 wells went dry
- Five fire stations have had to deliver freshwater by truck to local residents
- Implementation of a Water Supply Upgrade Lending Program : loans to construct or update wells
- Water access = Municipal responsibility

Partnership:



An ocean of opportunity



Cape Sable Island, Nova Scotia

- 3000 residents
- Seven commercial fishing ports for hundreds of fishing vessels
- Many commercial enterprises in the fishing industry





ONEKA'S BACKGROUND & SOLUTIONS

OnekaWater.com



Oceans, the perfect Match for a sustainable source of drinking water

RESOURCE
(Water)

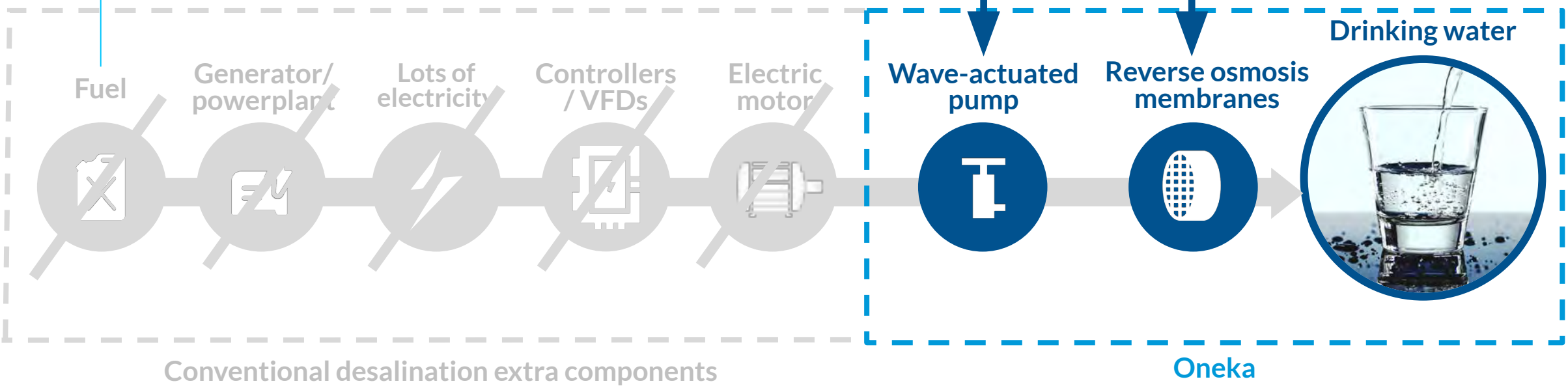
ENERGY
(Waves)

PROXIMITY
(to coastal
populations)

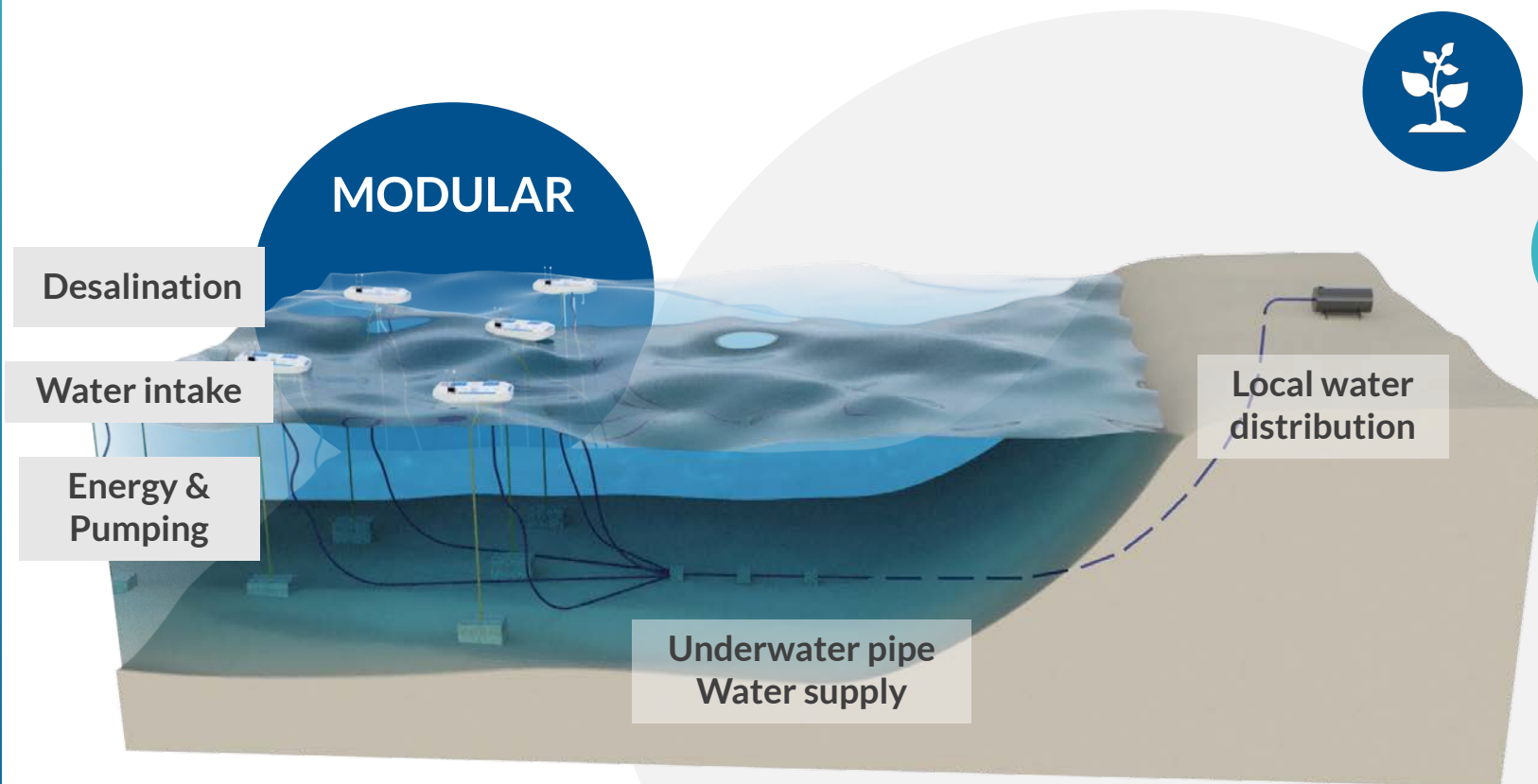
ONEKA SUPPLIES FRESHWATER SUSTAINABLY TO COASTAL COMMUNITIES & INDUSTRIES



30-50% of cost eliminated



ONEKA'S WATER TAP FROM THE OCEAN



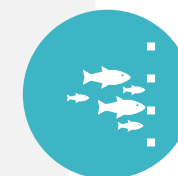
ZERO GHG EMISSIONS



ZERO LAND USE FOR
DESALINATION PLANT



RESPONSIBLE BRINE
DISCHARGE



SAFER INTAKES



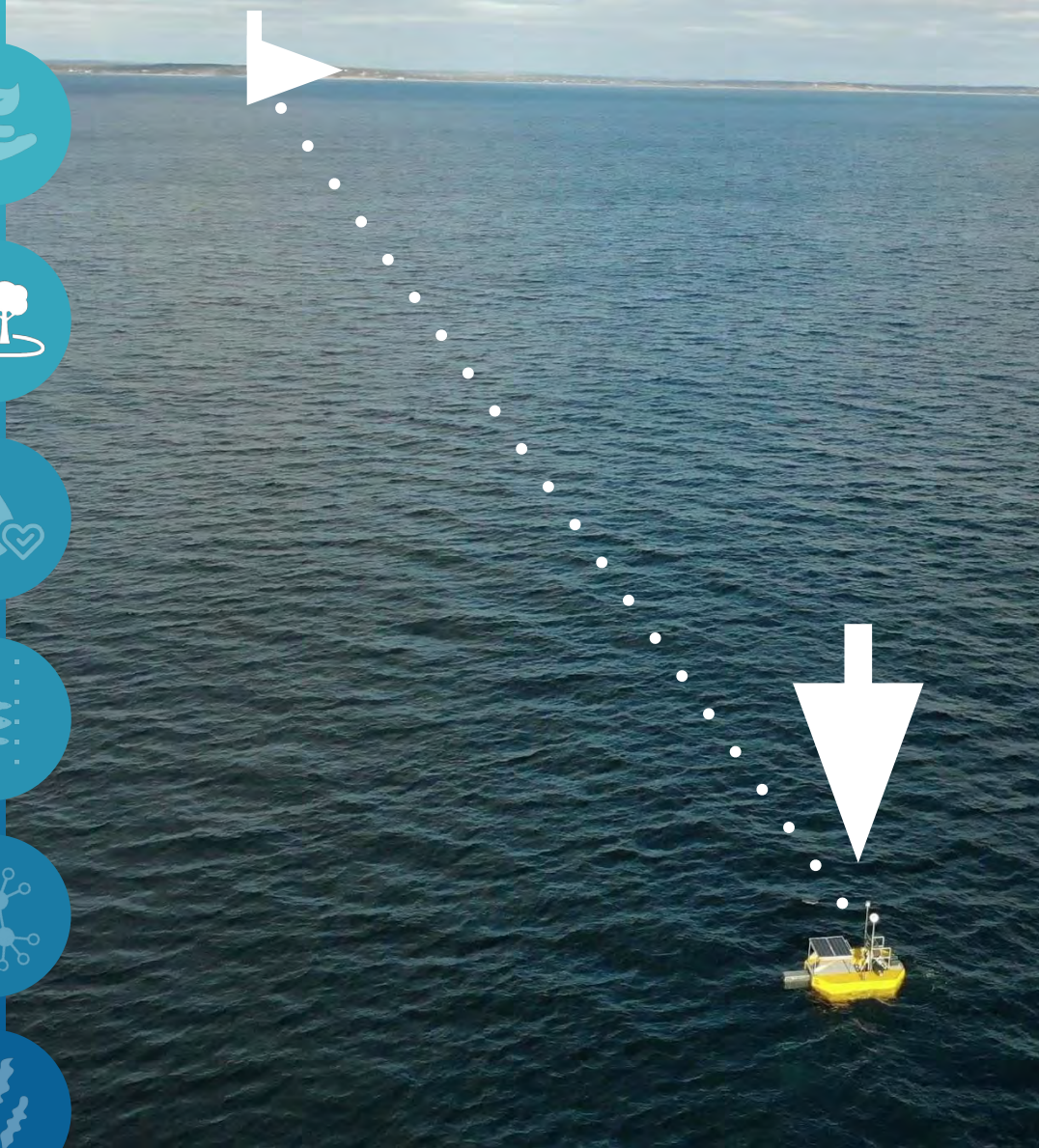
DECENTRALIZED -
GRID INDEPENDENT



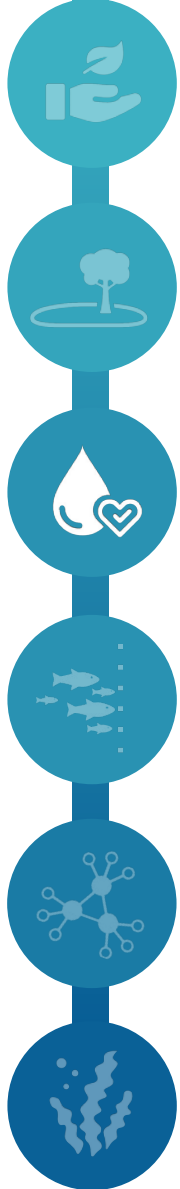
PROMOTES NEW MARINE GROWTH

Minimal Land or Visual Impact

- 
- 
- 
- 
- 
- 



Responsible Brine: Low Concentration + Effective Diffusion



	WAVE POWERED DESALINATION	CONVENTIONAL DESALINATION
Salinity	$\pm 35\%$ higher salinity than seawater	$\pm 100-150\%$ higher salinity than seawater
Diffusion	Brine released over a vast area	Localized brine released zone
Result	The salinity variation is extremely limited.	Localised salinity increase can be significant in some cases

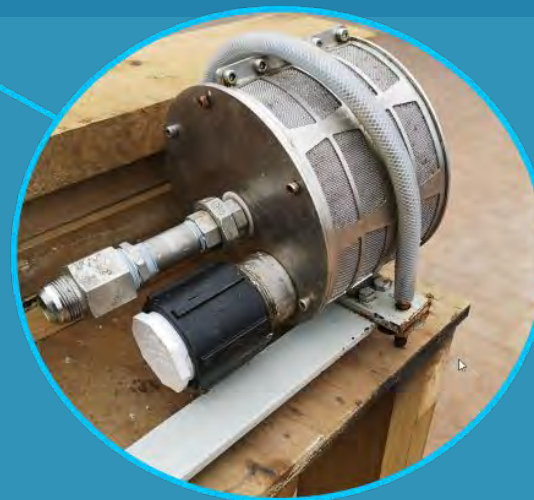
Brine from Oneka's devices is a lot less salty than that from conventional desalination plants.

Safer Intakes

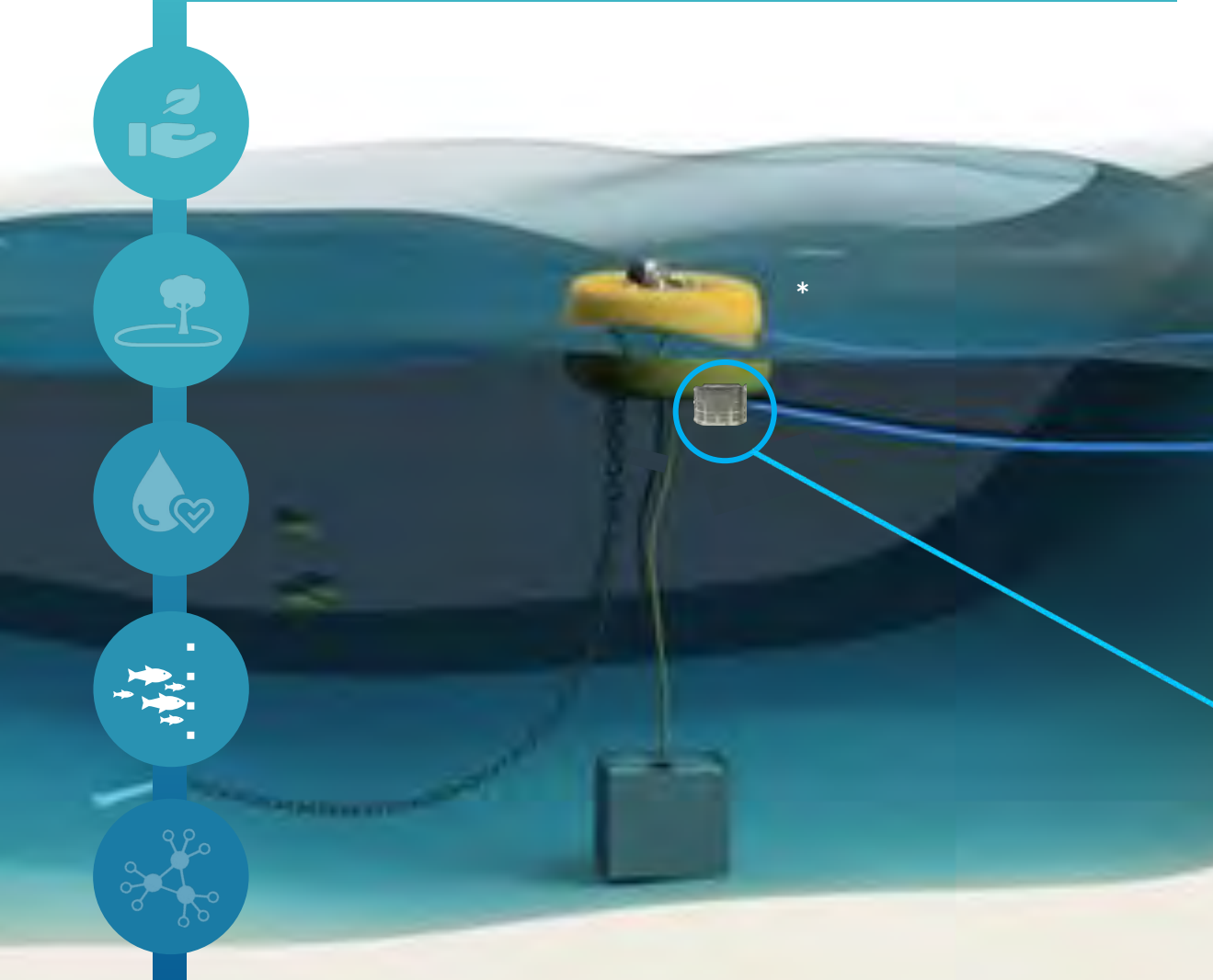
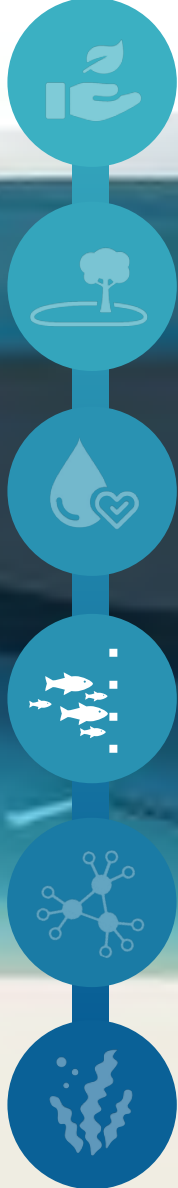


Engineered to protect sea life:

- ✓ 50-micron-size intake holes to prevent harmful impact on ecosystems (adjustable)
- ✓ Backwashed to reduce maintenance and ensure enhanced suction protection



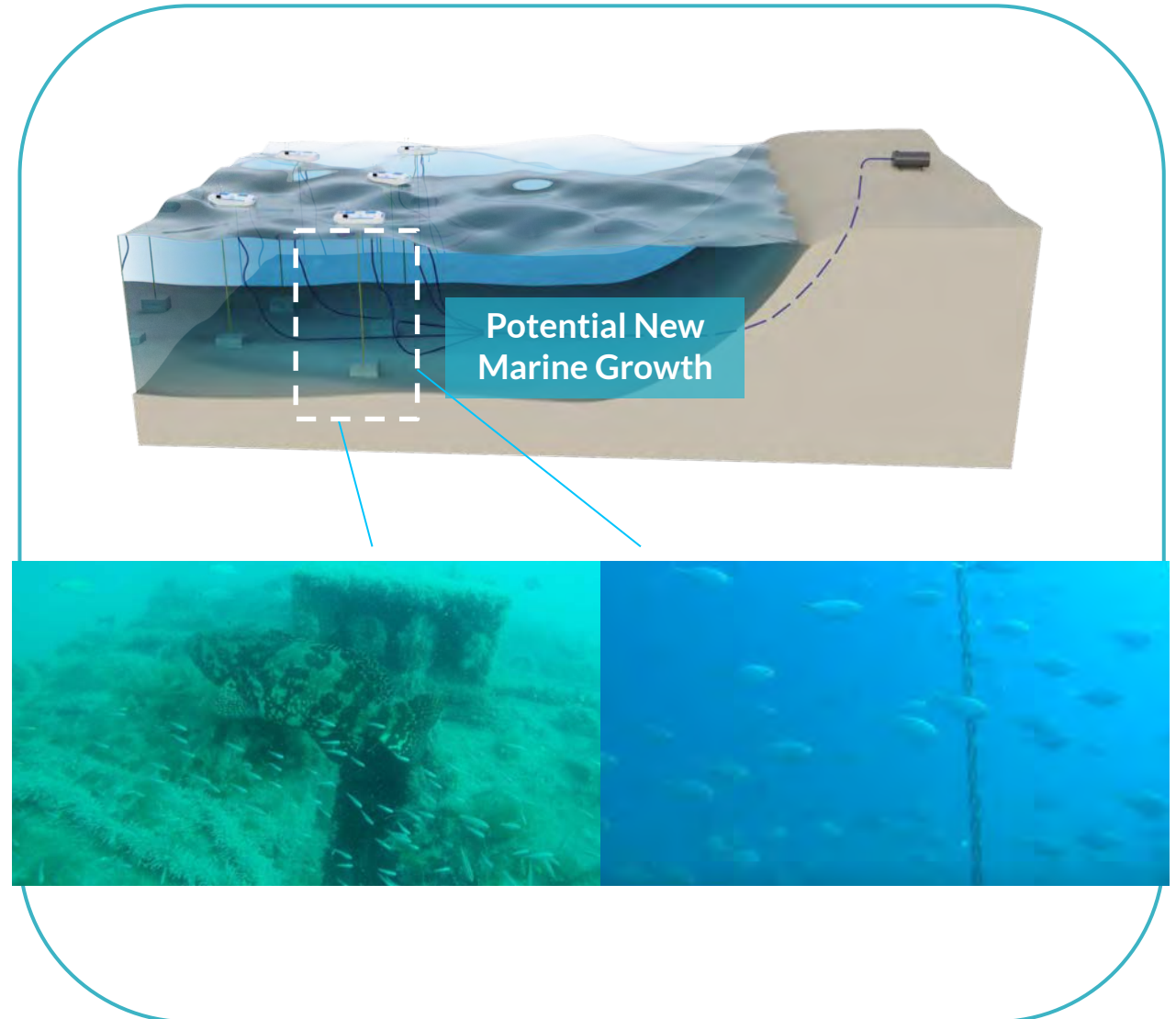
*ONEKA ICECUBE UNIT
AS AN EXAMPLE
(EMERGENCY RELIEF)



PROMOTES NEW MARINE GROWTH



- ✓ Seabed footprint used positively for the ocean
- ✓ Can be adapted to a specific site needs (marine life, hardbottoms, corals etc.)
- ✓ Opportunity to use the buoy as a platform for marine observation and data acquisition



PROVEN AND ROBUST TECHNOLOGY



- #1 trial: Extreme wave conditions in Canada
- #2 trial: Tough feed water in Florida
- #3 trial: Deployment at user site in Chile



Survived Storms with
14 ft Hs Waves (near 20ft max)



10 m³/d capacity



Patented technology

Ocean-Test Early
Learn and Iterate Rapidly



V1



V2



V3



V4



V5

Cofradia Nautical Del Pacifico

ALGARROBO, CHILE

World's first fully deployed
wave powered system



Full system including piping to
shore and water reservoir



More than 6 months of nominal
operations



Survived 10-years storm (2022)



ICEBERG DEMONSTRATOR UNIT

Ft. Pierce, FL, USA



up to
50 m³/d

Production capacity

Status:

- Operational

50 TCO₂/yr saved

Baseline : conventional
desalination solution at
nominal capacity



Showcase for the Caribbean
market, strategically located.



AWARD WINNING TECHNOLOGY

GLOBAL FRESHWATER CHALLENGE WINNER

WORLD
ECONOMIC
FORUM

HCL

- Among the 10 winners named Top Innovators from hundreds of applicants
- Total of \$250k CAD in grant
- Member of UpLink Innovation Network

US DOE - WAVE TO WATER PRIZE GRANDPRIZE



- World renowned competition
- Total of \$1,3M CAD in winnings
- 1st place among 70 participants
 - Highest water production
 - Best water quality
 - Fastest assembly & deployment

PEERS RECOGNITION



**2022
Innovation
Award**



Innovative game-changing desalination or water reuse technical solution reaching a commercial stage.

Voted by a panel of industry experts

MARKETS & PRODUCT CLASSES



READY FOR COMMERCIALISATION

SMALL-SCALE

Remote coastal bases, disaster recovery, coastal refugee camps



ICECUBE

1000 L/d per unit

- Diameter: 1.5 m



U.S. DEPARTMENT OF
ENERGY
Wave to Water
prize winner

MID-SIZE

Communities, Resorts/Tourism,
Small Industries.



ICEBERG

50 m³/d per unit

- < 2000 m³/d projects
- Eq. diameter: 7 m

IN DEVELOPMENT

UTILITY SCALE

Municipal, Mining, Large
industries, Ag.



GLACIER

500 m³/d per unit

- > 10 000 m³/d projects
- Eq. diameter: 10-12 m

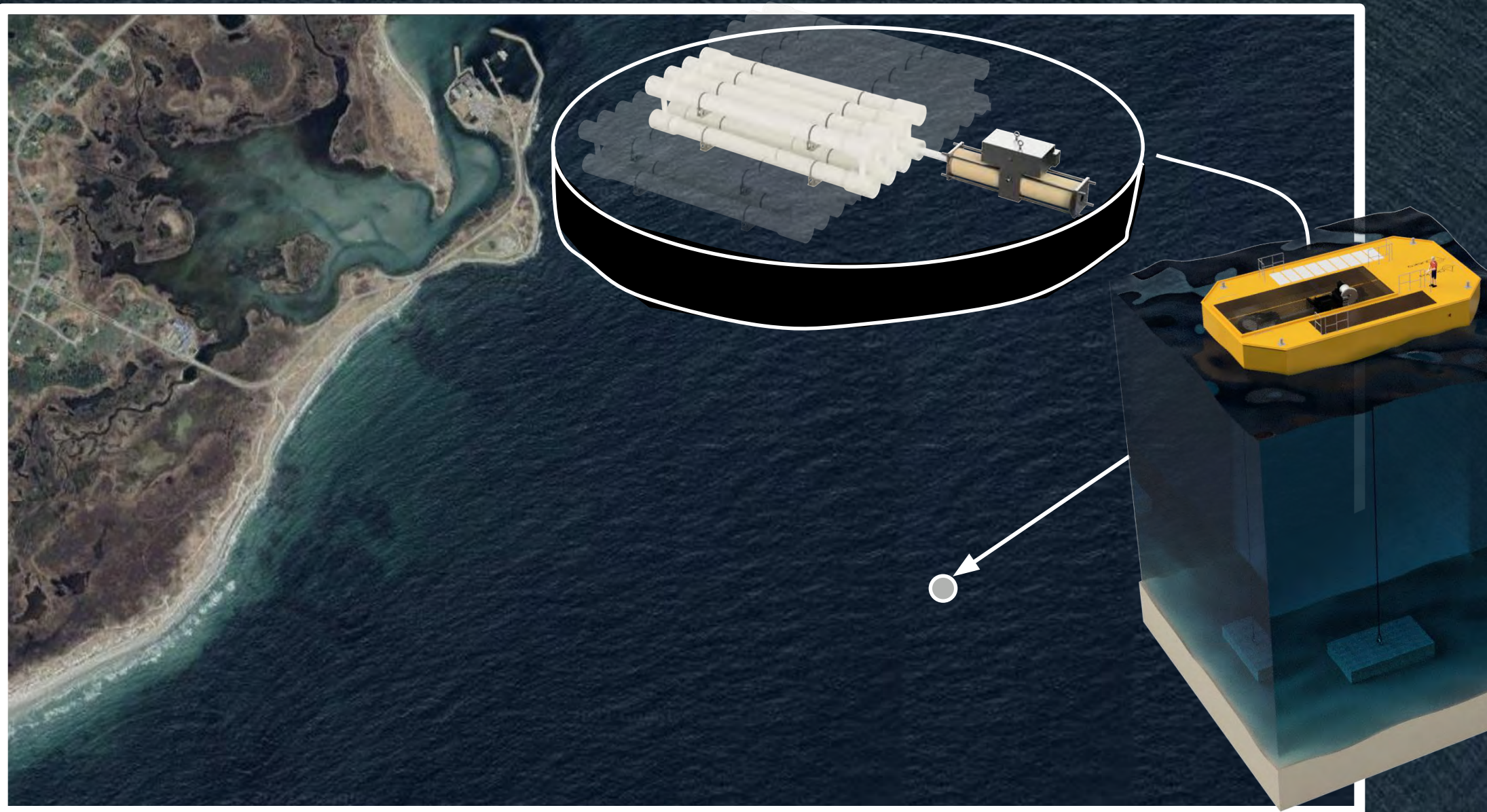
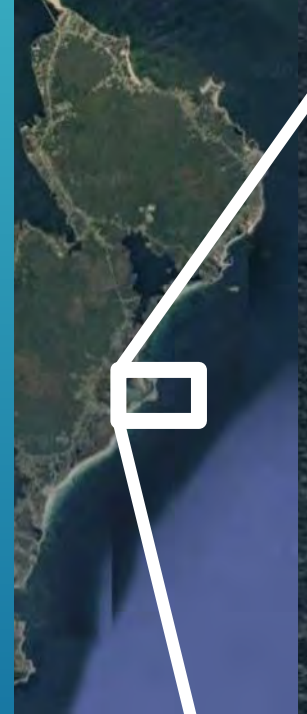


OBJECTIVES OF THE GLACIER PROJECT

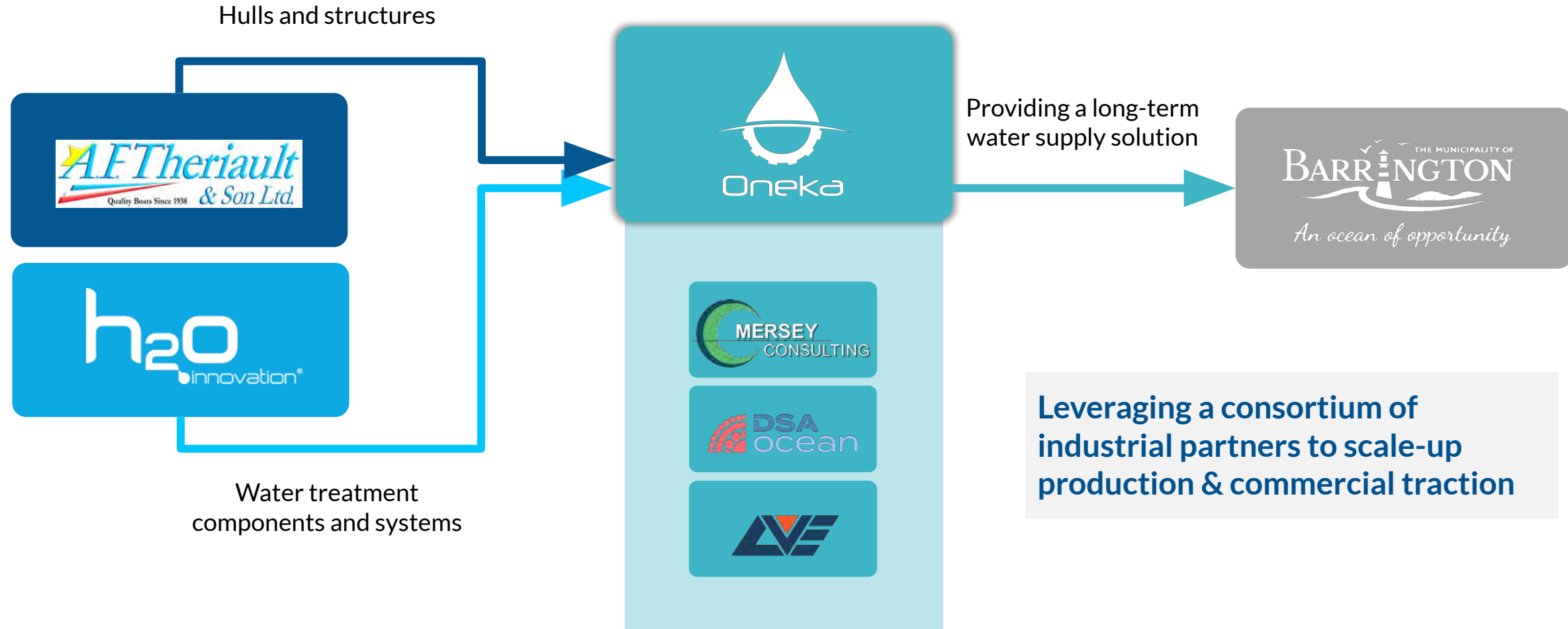
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GLACIER DEVELOPMENT PROJECT EXAMPLE

AT CAPE SABLE ISLAND, NOVA SCOTIA, CANADA



GLACIER UTILITY-SCALE DEVELOPMENT PROJECT



SUSTAINABLE DESALINATION PROJECT PROPOSAL



MUNICIPALITY OF BARRINGTON



Oneka would love to work with local partners to execute the project:



**Employment of
Local Contractors**



**Training Program for
Local Technicians for
O&M**



**Permitting with
Local Agencies &
Partners**



**Water Needs & Site
Analysis**



**Offshore
Installation**



**Monitoring of Water
Quality & System
Performance**

SOCIAL, ENVIRONMENTAL & ECONOMIC IMPACT GOALS



DESALINATION PROJECT IN PARTNERSHIP WITH THE MUNICIPALITY OF BARRINGTON



No Capital Expenses

For equipment purchase



Support economic development of the region



Water during the demonstration offered for free



Transition to Sustainable Desalination

Aligned with values and water needs of the region



Increases Community Resilience to Drought



Long Term Solution & Reduced Energy and Water Costs. No need to buy a new desalination plant

EXCELLENT TRACK RECORD IN PERMITTING

Past permitting sites

FORT PIERCE DEMO SITE, FL, USA (2017-2022)

5-year authorization used for V4, V5, P1, S1
(Approved or exempted by USCG, USACE, FDEP)

OCEAN VILLAGE, FL, USA (NOW-)

5-yr+ Commercial site permitting
Including pipe to shore
(Reviewed by USCG, USACE, FDEP, FWC, FWS, NFMS)

Steps completed: brine release, navigation hazards, animal entanglement, coral reefs (hard bottoms impacts), turtle nesting, public noticing etc. currently finishing the lease as the final step)



COFRADIA SITE, ALGARROBO, CHILE (2022)

1-yr Commercial demo permit including pipe to shore and optional on-shore process plant (led by our partner REDE)



MAGDALEN ISLANDS, QC, V1 TESTING

in partnership with CTMA - 1 week

NOVA SCOTIA



EASTERN PASSAGE, NS, P1 TESTING (2020-2021)

1 month testing, 1 year authorization

COW BAY, NS, S1 DEMO (2021)

7 months authorization, including pipe to shore and process plant on shore for Snowflake
(Approved or exempted by Transport Canada, NSLF, DFO & Municipality)

SCARBOROUGH BEACH, ME, V3 TESTING (2016-2017)

4 to 12 mth authorization for testing and improvements

WILMINGTON, NC, USA, V2 TESTING, (2016)

in partnership with local partner - 2 weeks

PAST PERMITTING EFFORTS



ENVIRONMENT: OCEAN

ENVIRONMENT: BEACH & COAST

NAVIGATION

AGENCIES



Fisheries and Oceans
Canada



NOVA SCOTIA
Natural Resources
and Renewables



Transports
Canada

Transport
Canada

KEY CONCERN(S)

- Impacts to fish or other marine animals
- Impacts to habitat of fish or other marine animals

- Habitat disturbance during pipeline installation
- Vegetation disturbance during installation leading to erosion

- Buoy location near navigable area
- Buoy visibility

MITIGATIONS

- Small mooring footprint
- No moving parts on exterior
- 50 micro screen on water intake

- Small diameter pipeline
- Minimal surface disturbance in intertidal zone
- Short installation time
- Surface restoration following pipeline installation

- Safety and visibility features added to the buoys
- Location added to charts

CONSIDERATIONS FOR PROJECT LOCATION

Cape Sable Island - Municipality of Barrington



Optimal Wave Conditions for Maximal Water Production



Minimum Water Depth of 20 m



Seabed Conditions for Mooring

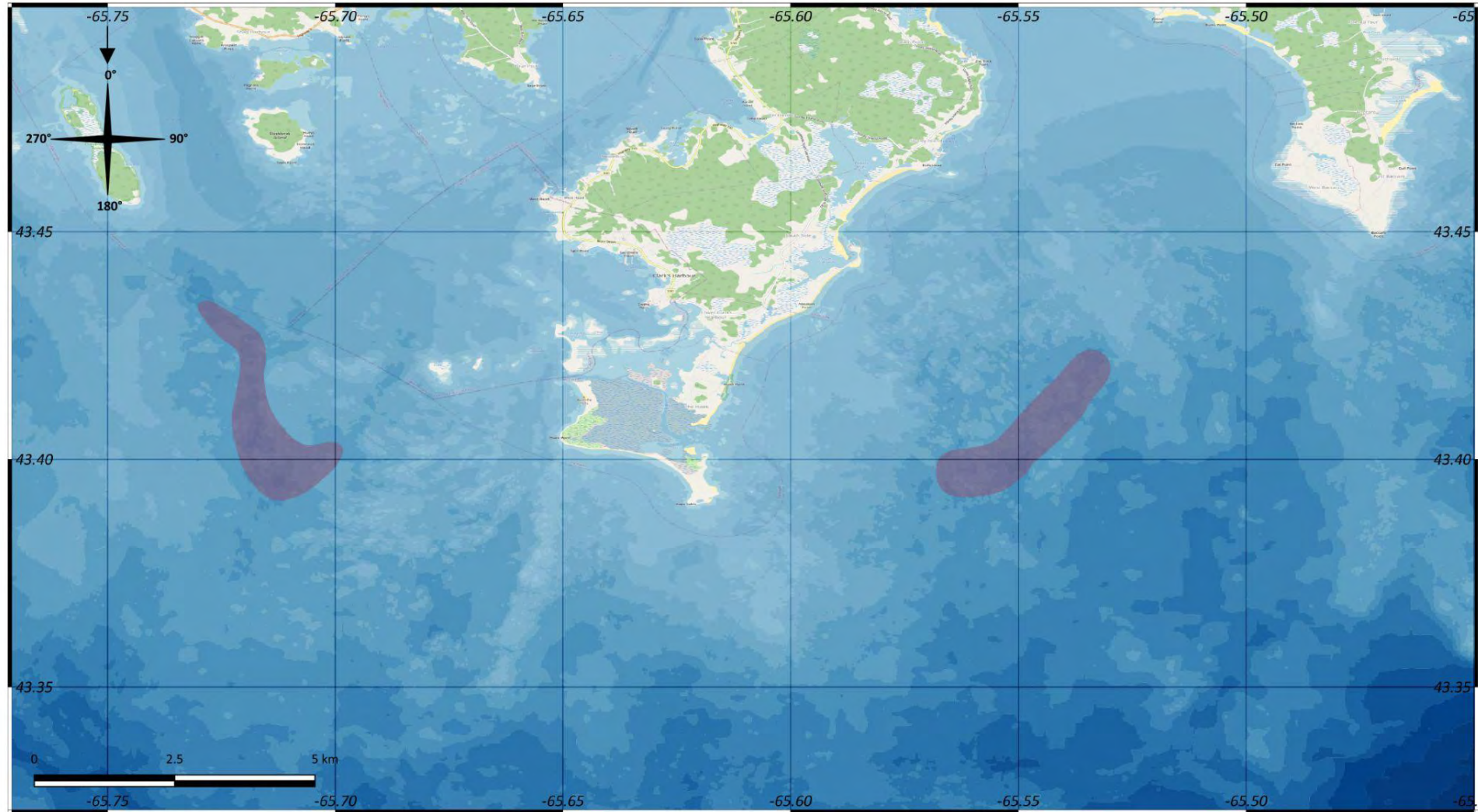


Strategic Location for Water Storage & Distribution



Incorporating Fishing and Other Community Feedback

POTENTIAL PROJECT LOCATIONS



Your feedback is welcome! Please get in touch.

NABIL AL-KAHLI, SENIOR PROJECT MANAGER

Based at the Centre for Ocean Ventures & Entrepreneurship (COVE), Dartmouth



- **+10 years of experience working in the marine energy sector**
- **Previously, Senior Project Engineer at Sustainable Marine Energy**
- **Skills: project management, project engineering, logistics, communication**



NEXT STEPS

[OnekaWater.com](https://www.OnekaWater.com)

GLACIER UTILITY SCALE PROJECT COMMISSIONING

Buoy Deployment 2024



Floating Structure
Construction & Assembly of the buoy at AFT



Site Preparation
Anchor Deployment & Maintenance facility setup



Buoy Deployment
Towed from AFT to the installation site



Operations & Maintenance
Ensured by local employees hired by Oneka

HOW THE PARTNERSHIP BETWEEN ONEKA AND BARRINGTON COULD SUPPORT CAPE SABLE ISLAND



TRANSITION

to a sustainable water solution



ALIGNMENT

with the values and freshwater access needs of the region



INCREASE

community resilience to climate change



OPPORTUNITY

to demonstrate a new scalable & sustainable desalination solution



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Share your thoughts!



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