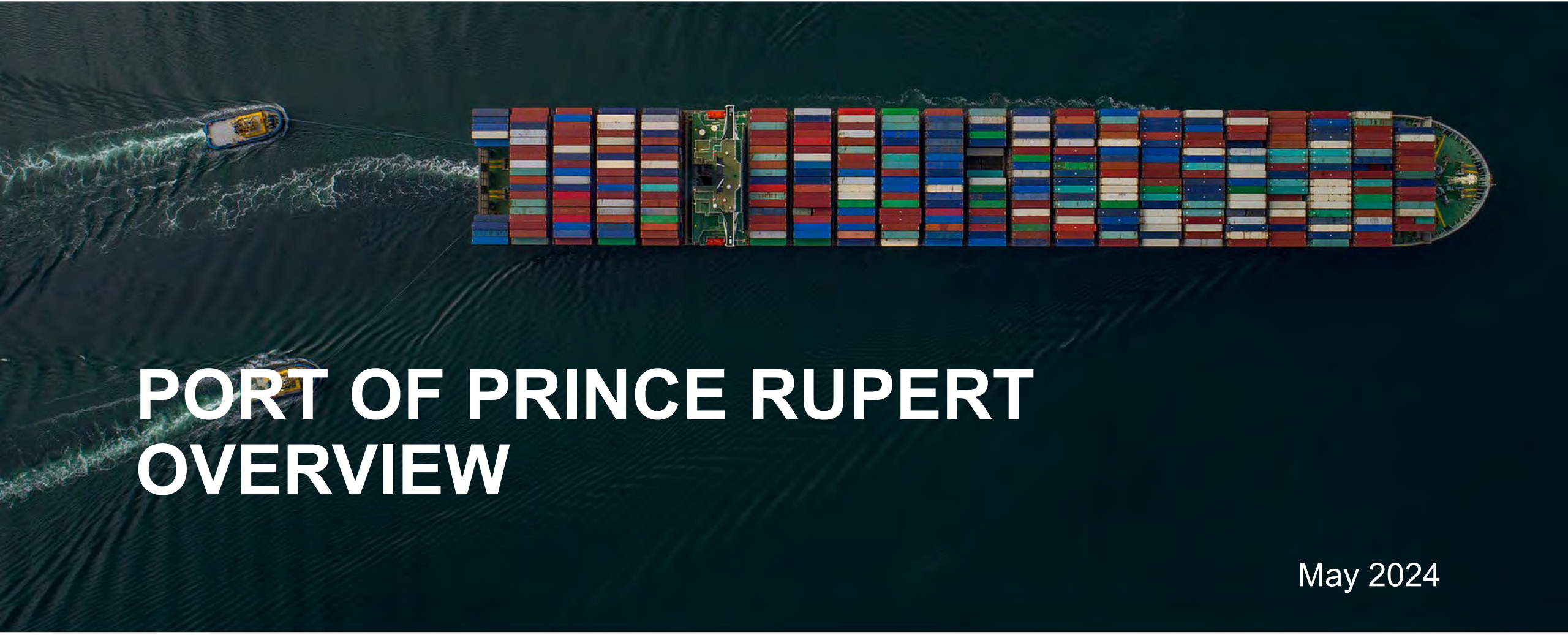


PORT OF PRINCE RUPERT OVERVIEW

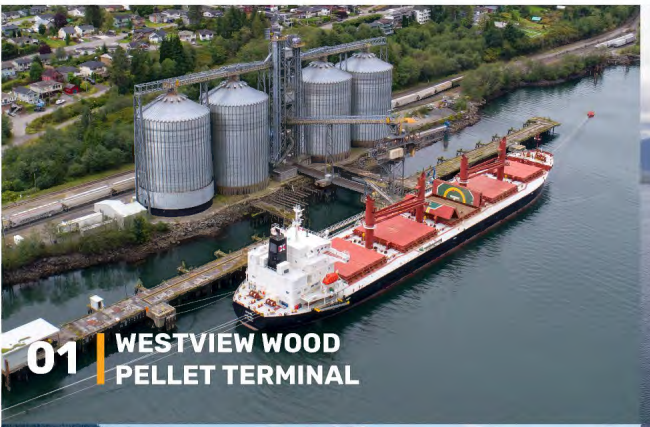
May 2024

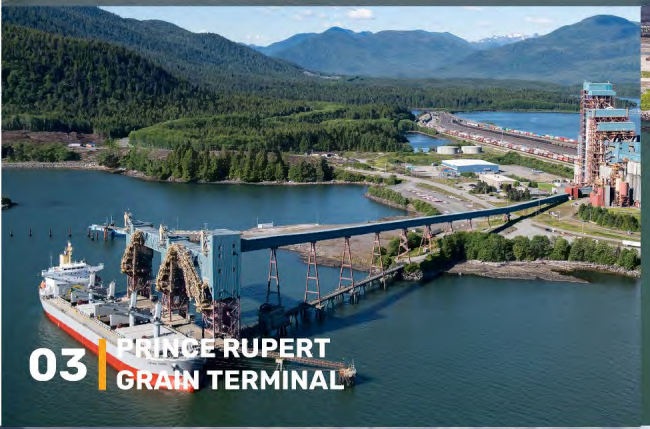
CILTNA

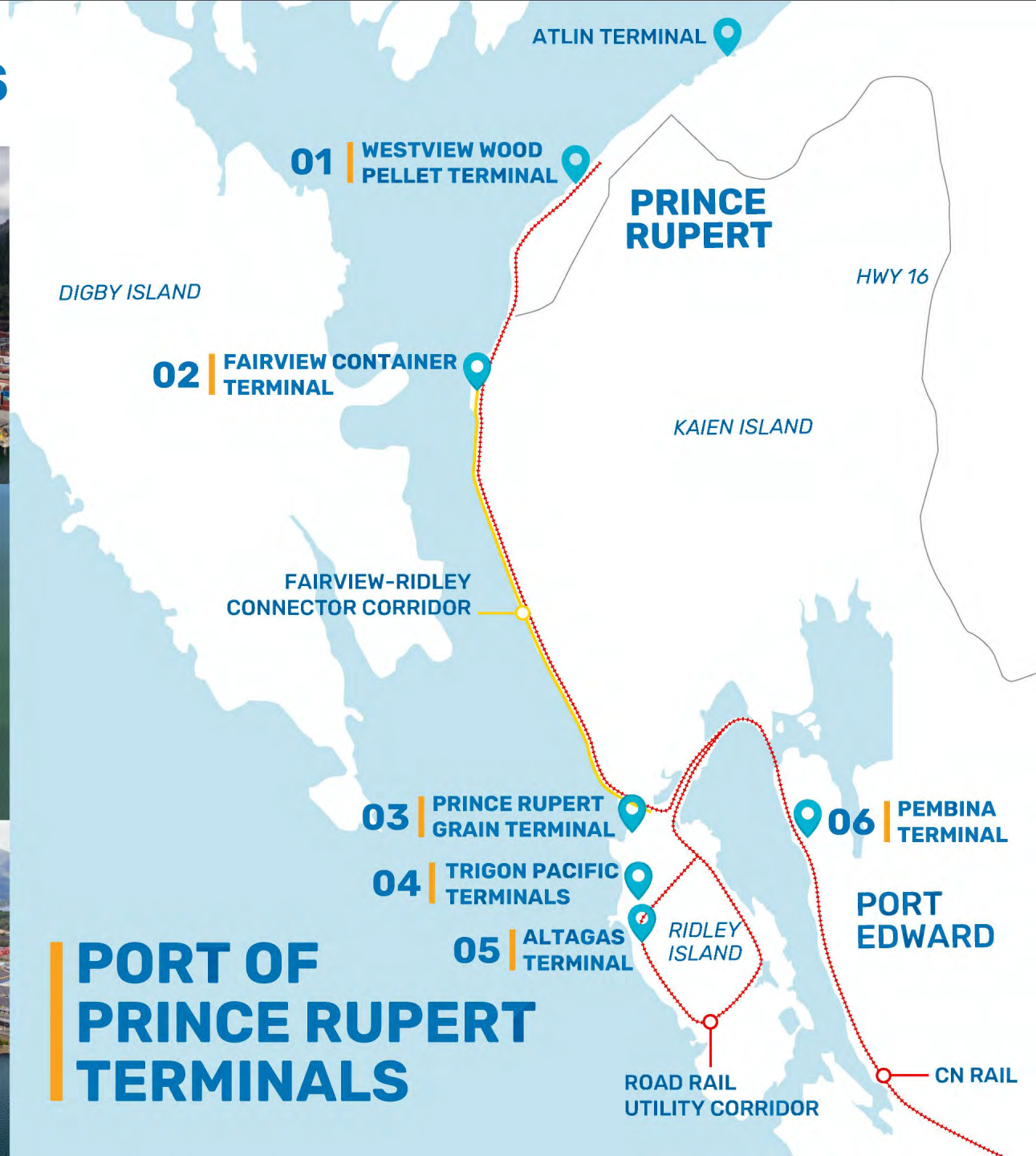
SHAUN STEVENSON – President & CEO

PRINCE RUPERT Port Authority
CANADA'S LEADING EDGE

PORT OF PRINCE RUPERT TERMINALS







2023 PORT VOLUME

23.5 Million Tonnes (-5%)

PORT OF PRINCE RUPERT STRATEGIC ADVANTAGES

SAFE ACCESS

Sheltered harbour with direct passage to open Pacific Ocean.

COMMUNITY SUPPORT

Strong local connections to port operations and development

DEEPEST HARBOUR

Easily accommodates the largest vessels trans-Pacific trade

TRANS-CONTINENTAL RAIL

CN's North American network provides direct market reach.

PRINCE RUPERT Port Authority

ECONOMIC IMPACT 2022

$60 BILLION
TRADE VALUE

5500 JOBS
DIRECT & INDIRECT

$500 MILLION
LABOUR & WAGES

$790 MILLION
BC GDP CONTRIBUTION

Employment

- Gateway operations provided much needed stability during the pandemic, but softer container volumes have impacted recent employment
  - From 2020 to 2022, direct FTEs dropped by 11% to 3300 employees
    - Rail & Trucking account for 41% of FTEs
    - Terminal & marine account for 54% of FTEs
  - Direct and Indirect employment decreased 10% to 5500 jobs

Higher Wages & Benefits

- Total wages from direct & indirect employment decreased 6% to $500 Million
- Average annual wages increased by 2% to $97,100
- 37% of direct workforce is Indigenous

Economic Engine

- Economic output remained steady at $1.4 Billion
  - Total value of sales of gateway goods and services
- Contributed $790 million to BC GDP from direct operations, a 7% increase over 2020
- Awarded over $137.7 million in contracts to local Indigenous businesses and First Nations joint ventures

TRIGON 2ND BERTH

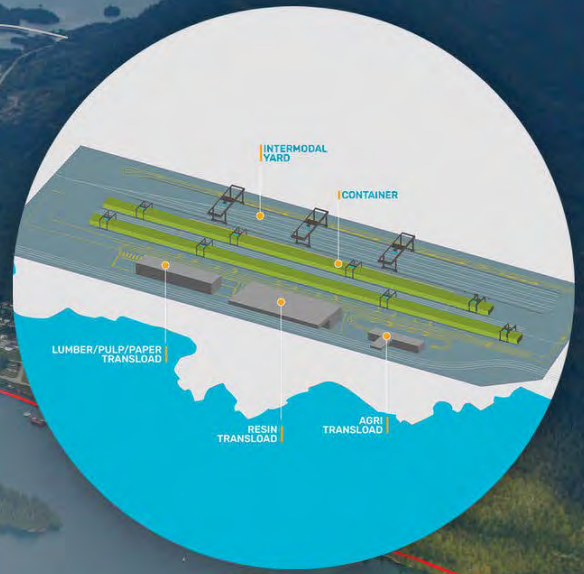
TRIGON EXPANSION AREA

Trigon

TRIGON TERMINALS INC.

SECOND BERTH

CANXPORT



Vopak AltaGas

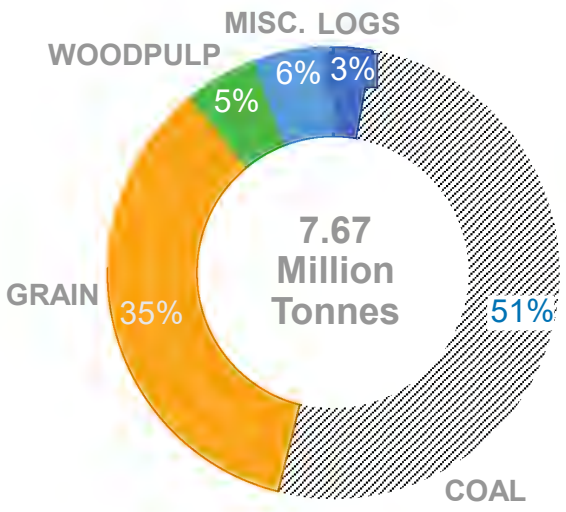
RIDLEY ISLAND ENERGY EXPORT FACILITY

CANXPORT

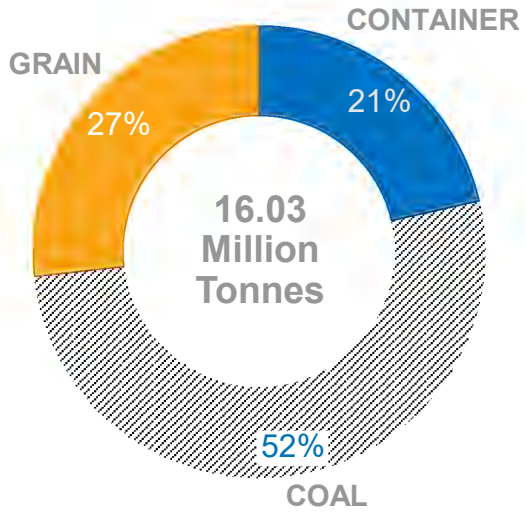
CANXPORT LOGISTICS CENTRE

RIDLEY ENERGY EXPORT FACILITY

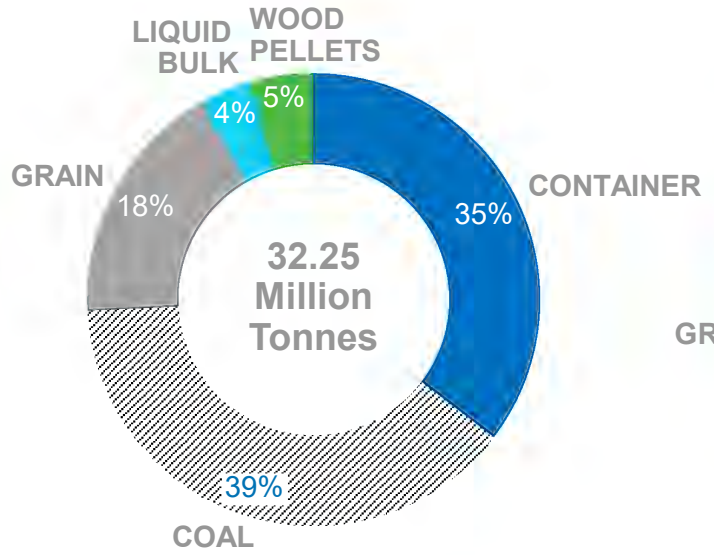
PORT CARGO GROWTH & DIVERSIFICATION



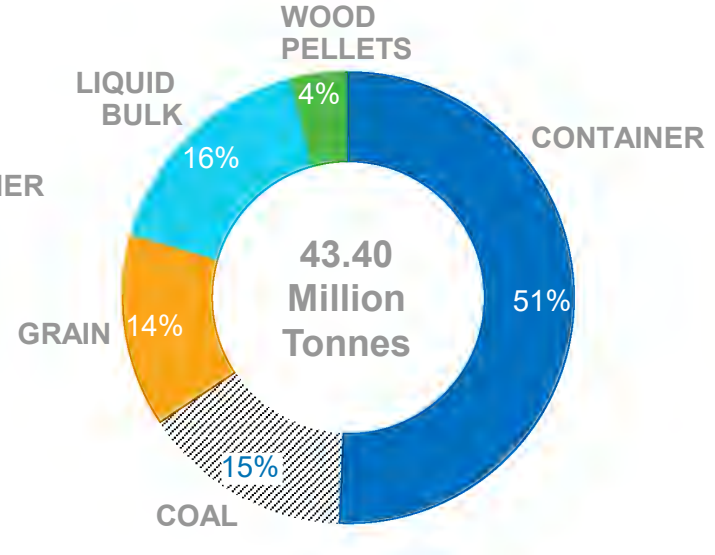
2000



2010



2020



2030

CANADA'S
LEADING
EDGE

@rupertport

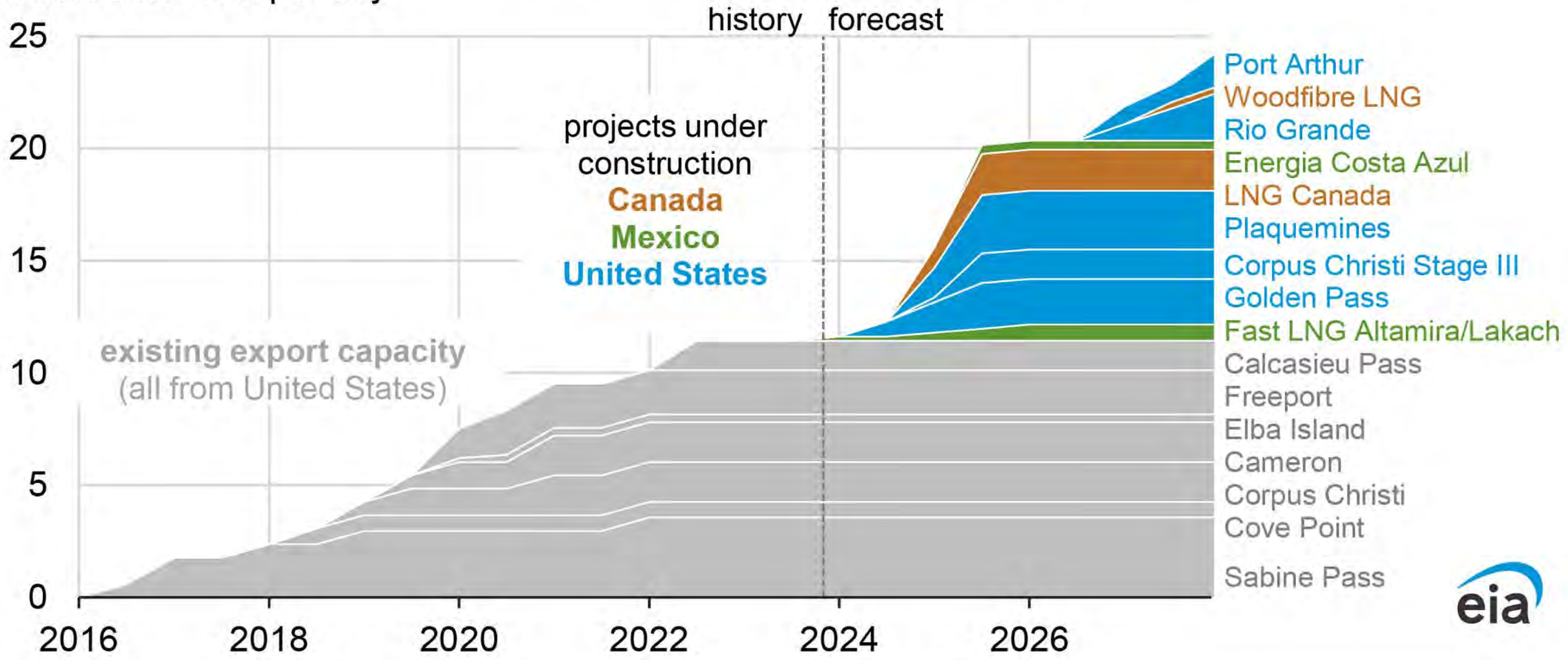
RUPERTPORT.COM

Resource Works

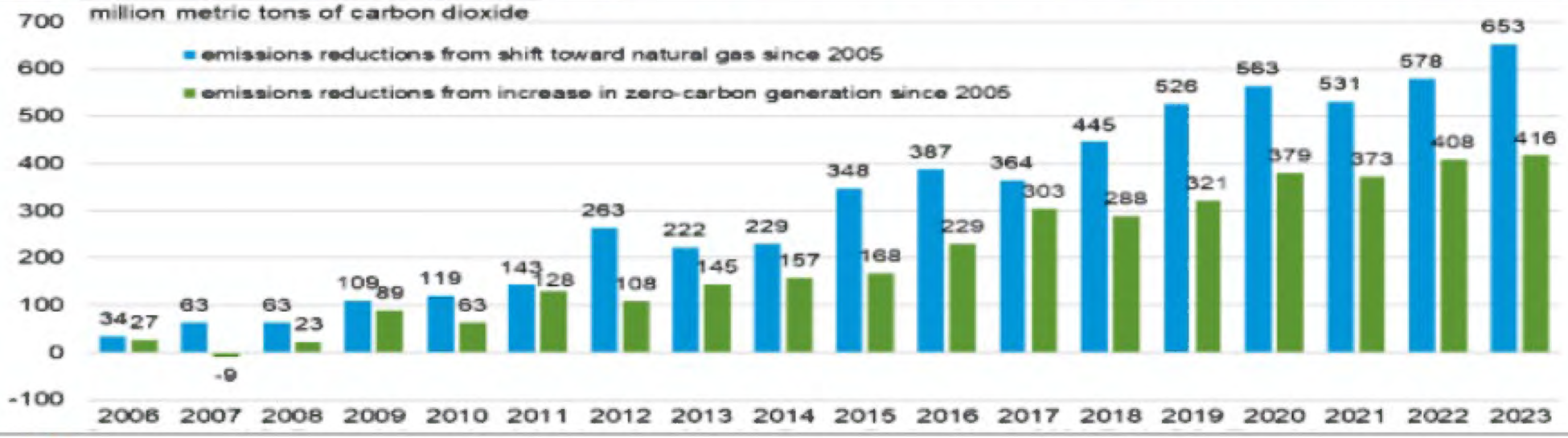

HAISEA WESTIT
HAISEA WAMIS

Annual North American liquefied natural gas export capacity by project (2016–2027)

billion cubic feet per day



ESG Image of the Week: Switching Power Generation Fuel Mix Reduces Emissions…

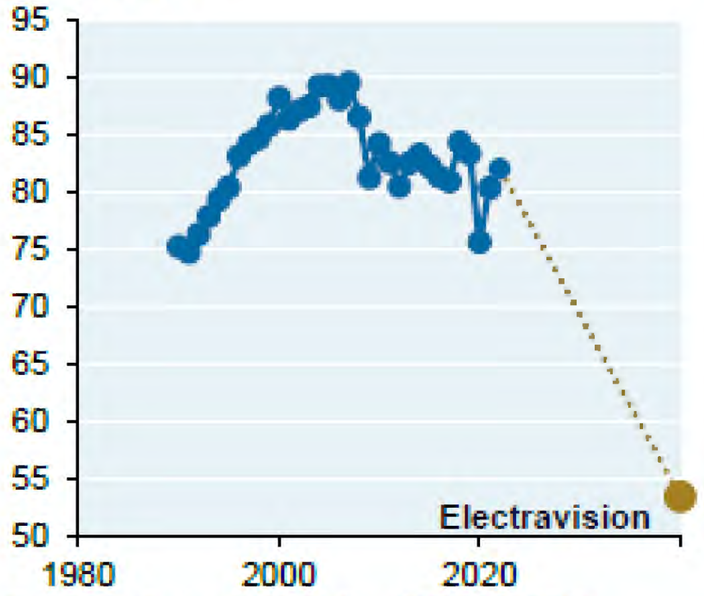


Source: NBF, EIA


CANADA PLACE
at the port of vancouver
VANCOUVER CONVENTION
FRACK FREE BC
END FRACKING
LNG FUELS CLIMATE DISASTERS
113,987 say no to
LNG and fracking
LNG FUELS CLIMATE DISASTERS
11000 SAY NO LNG+FRACKING

US fossil fuel consumption

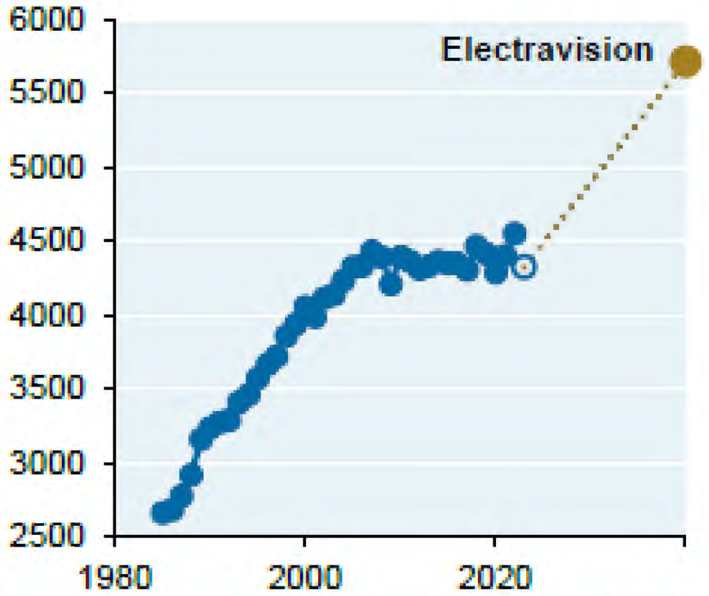
Quad BTUs



Source: Energy Institute, JPMAM, 2023

US electricity generation

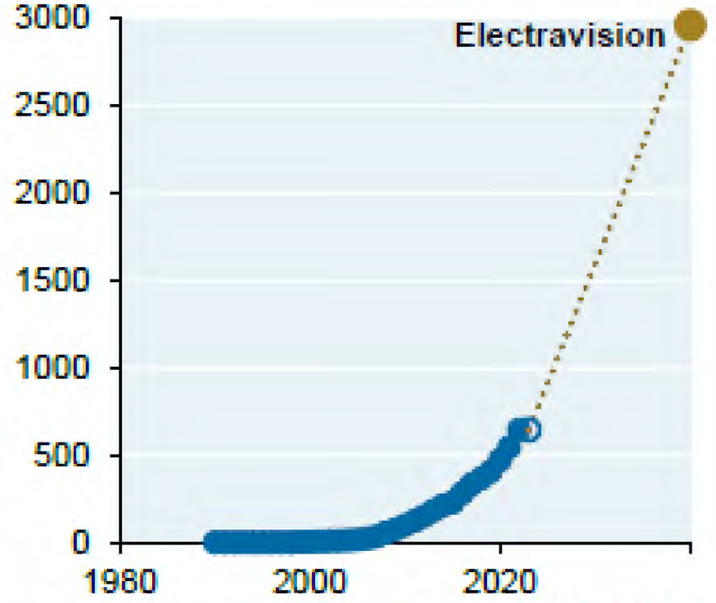
TWh



Source: Energy Institute, IEA, JPMAM, 2023

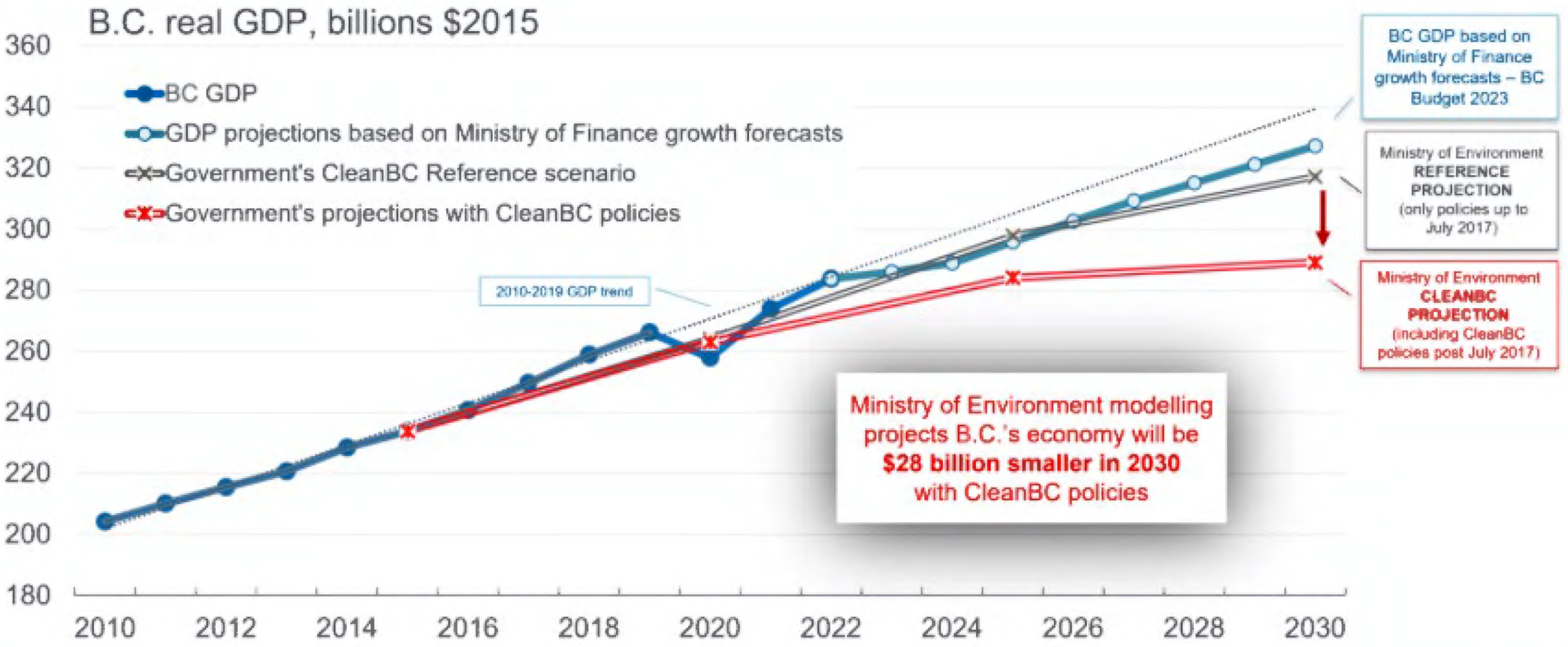
US wind & solar electricty generation

TWh



Source: Energy Institute, IEA, JPMAM, 2023

GOVERNMENT'S MODELLING SHOWS CLEANBC POLICIES RESULT IN $28 BILLION OF LOST INCOME



GDP at factor prices rebased to $2015 to align with Modelling CleanBC data; 2023-2024 forecasts are bank consensus projections and 2025-2027 based on expenditure-based GDP growth from BC Budget 2023 p.105. GDP history: Statistics Canada, Table: 36-10-0402-01.

MERCEDES-BENZ / CARS / TRANSPO

Mercedes-Benz backs off plan to only sell EVs by 2030

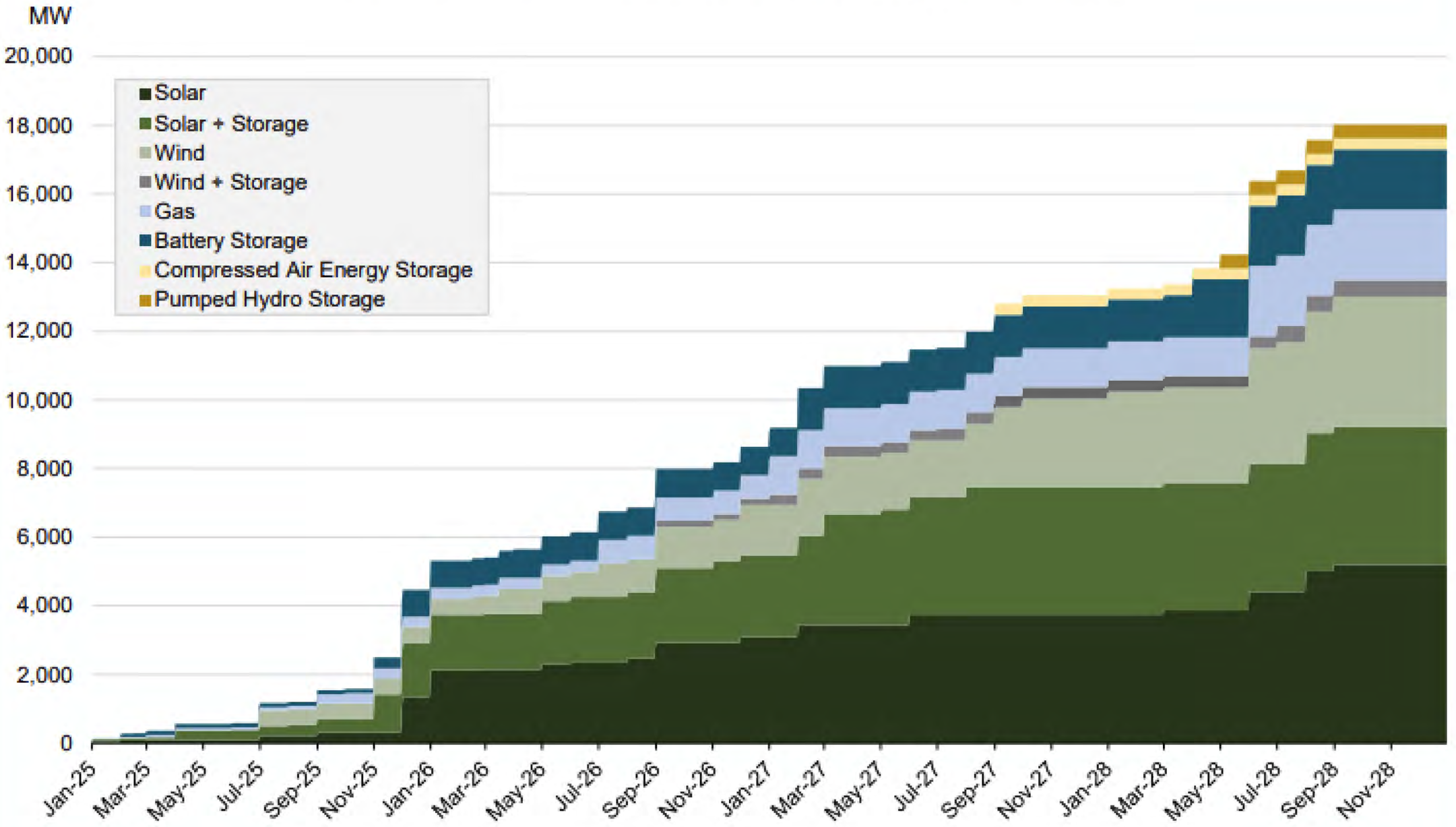
Image: Mercedes-Benz

/ ‘It’s not going to be 100 percent in 2030, obviously’

By Andrew J. Hawkins, transportation editor with 10+ years of experience who covers EVs, public transportation, and aviation. His work has appeared in The New York Daily News and City & State.

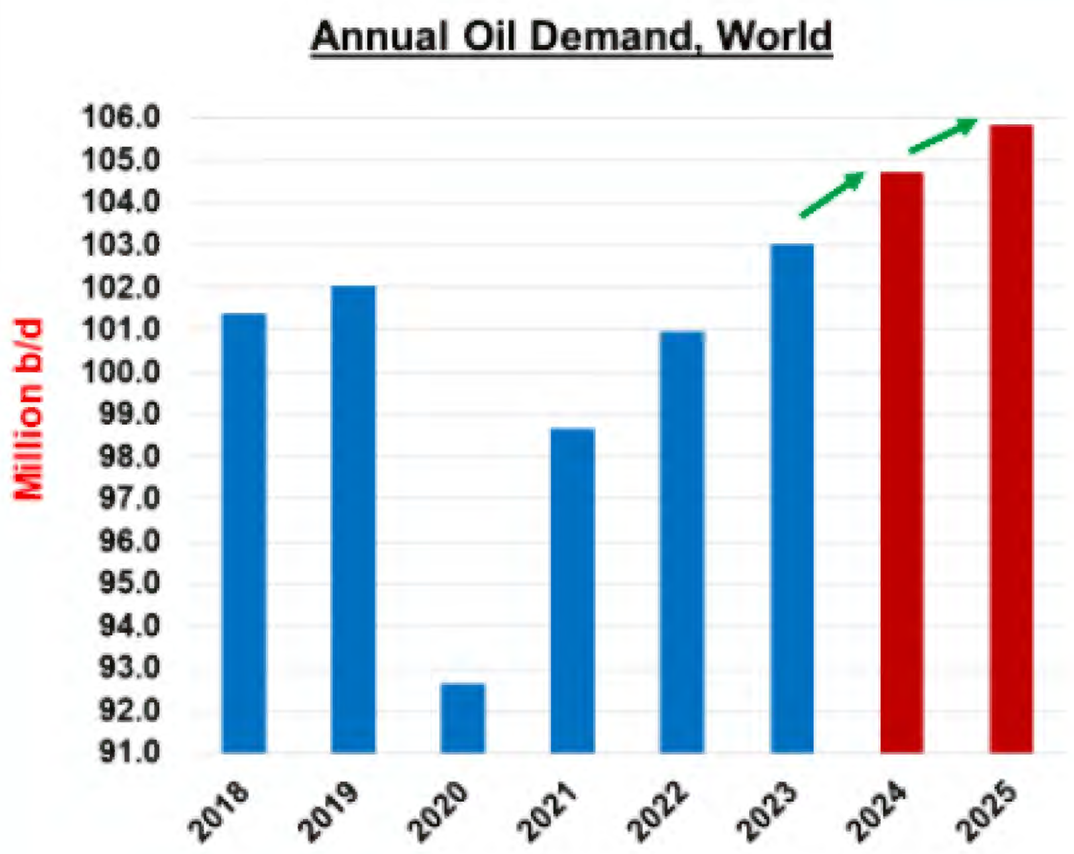
Feb 22, 2024 at 10:50 AM PST

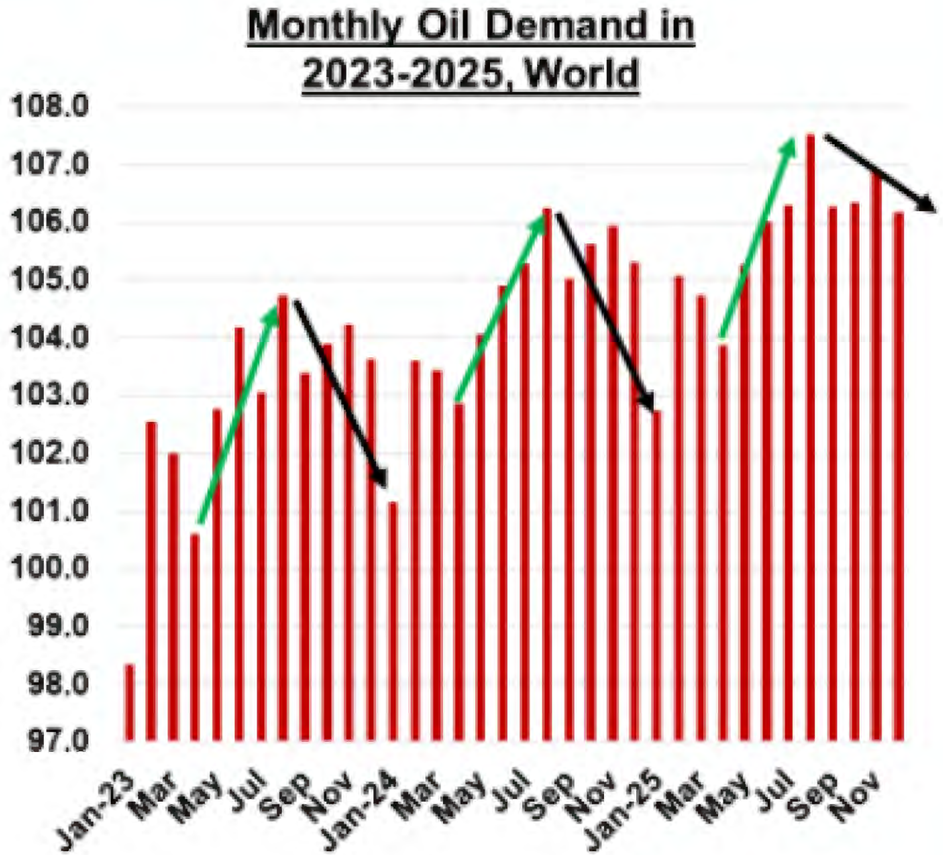
Alberta Power Generation Capacity Additions



Source: AESO, NBC

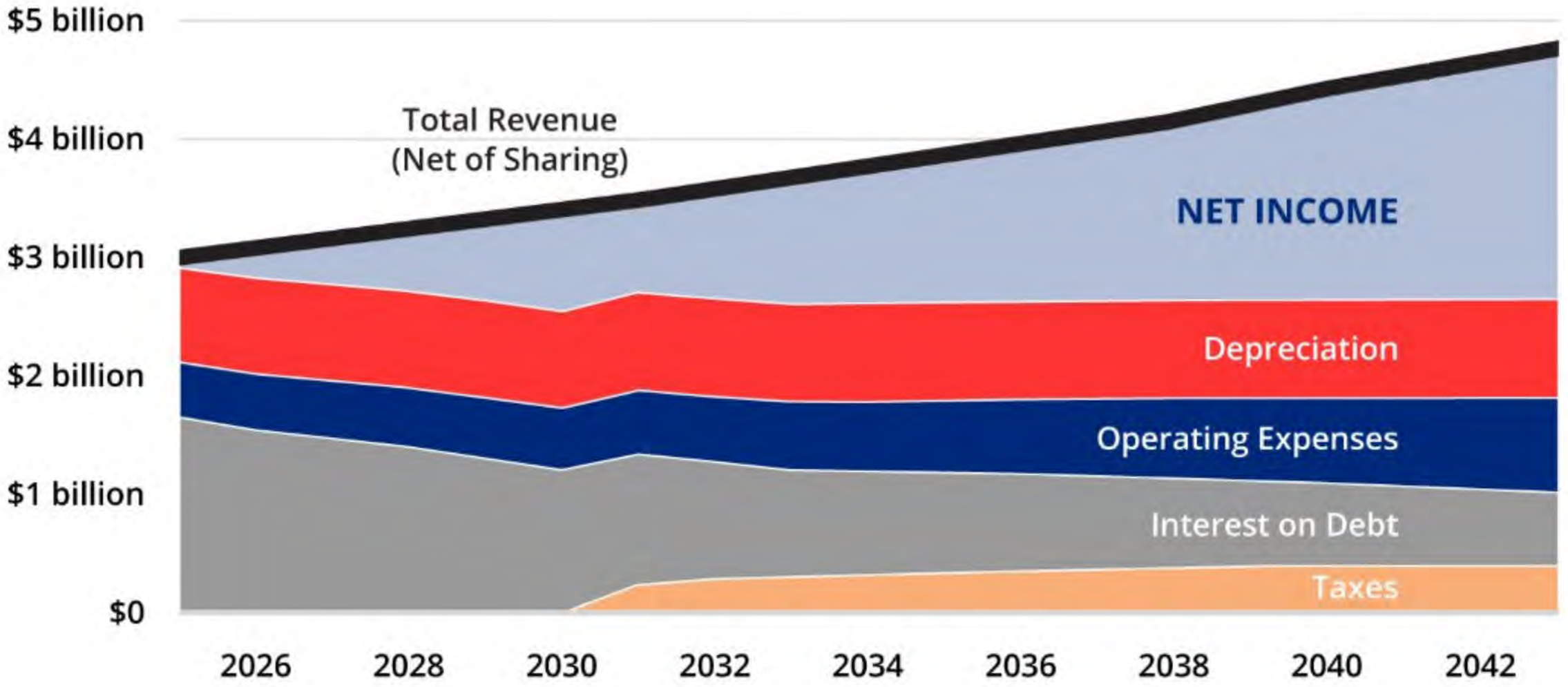
Globally, oil demand is set to reach an all-time high in 2025 despite the growth moderation, with seasonal swings influencing oil prices





S&P Global Commodity Insights

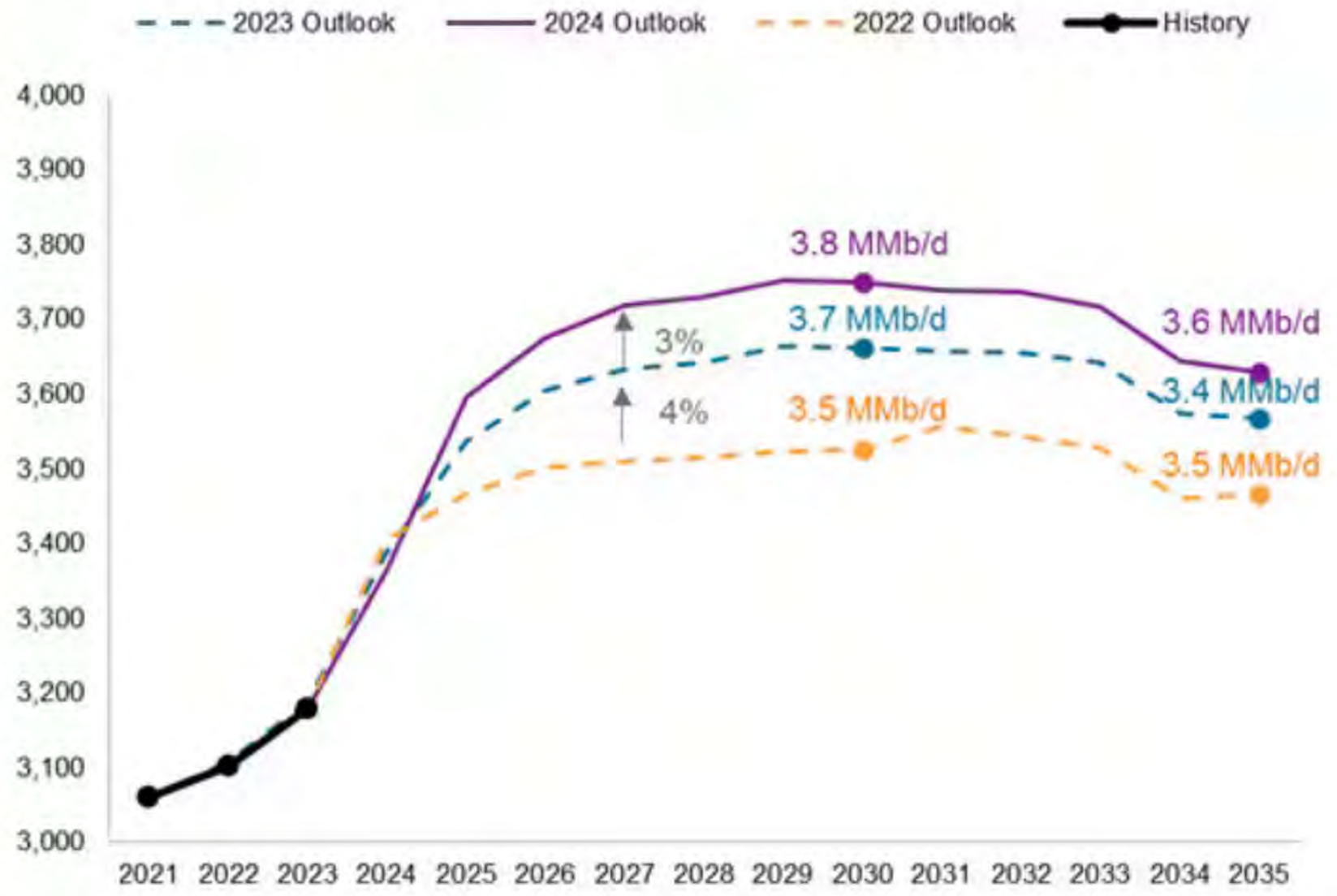
Trans Mountain Pipeline System Financial Outlook



Source: Trans Mountain Pipeline ULC, Response to CER IR No. 2, Attachment 2.1(a), February 2024.
Based on forecast utilization rates and estimated final tolls.

Stephane Guilbeault's Emissions Cap

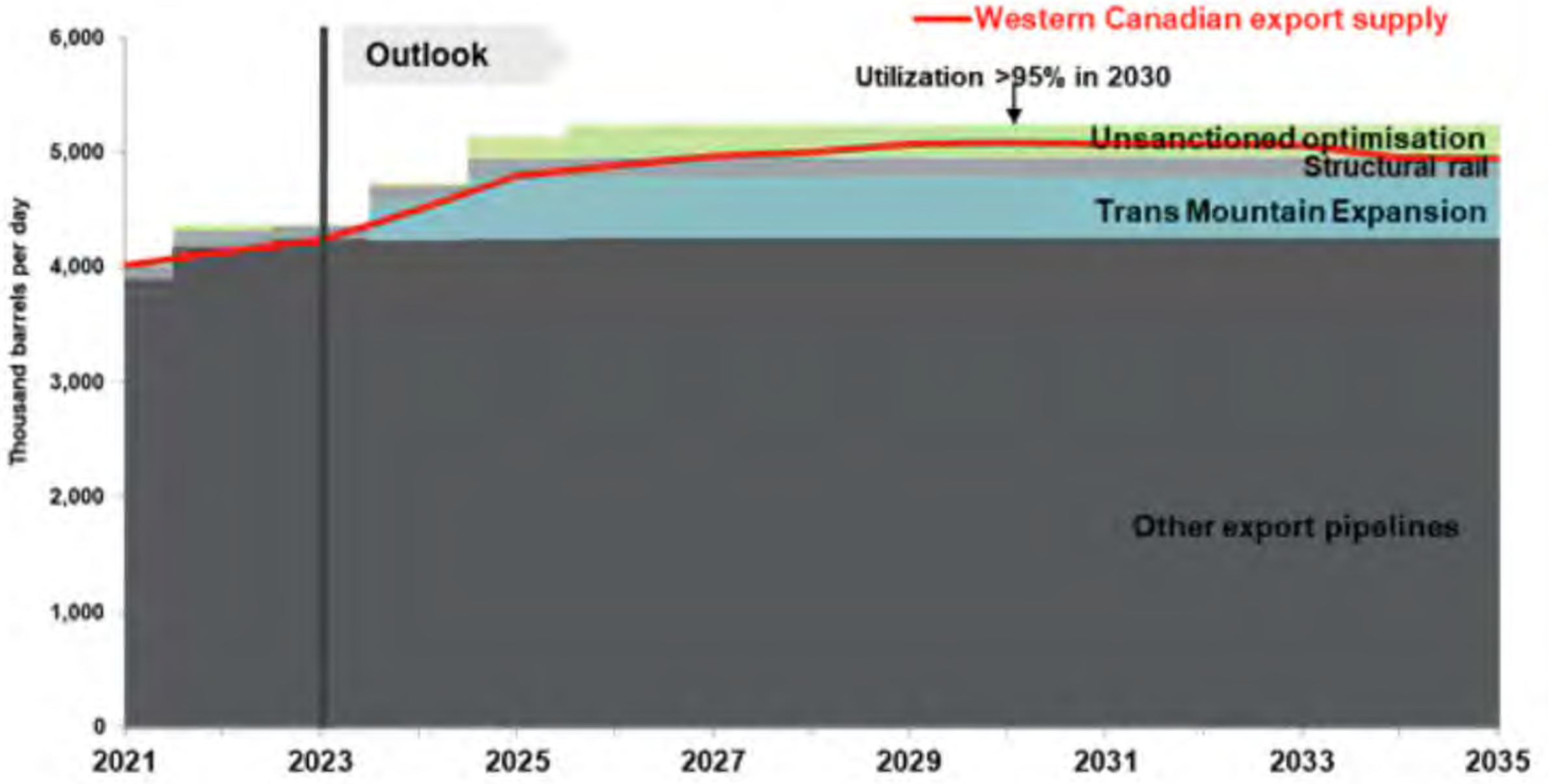
S&P Global Commodity Insights oil sands 10-year production outlook (thousand b/d)



Data compiled May. 10, 2023.

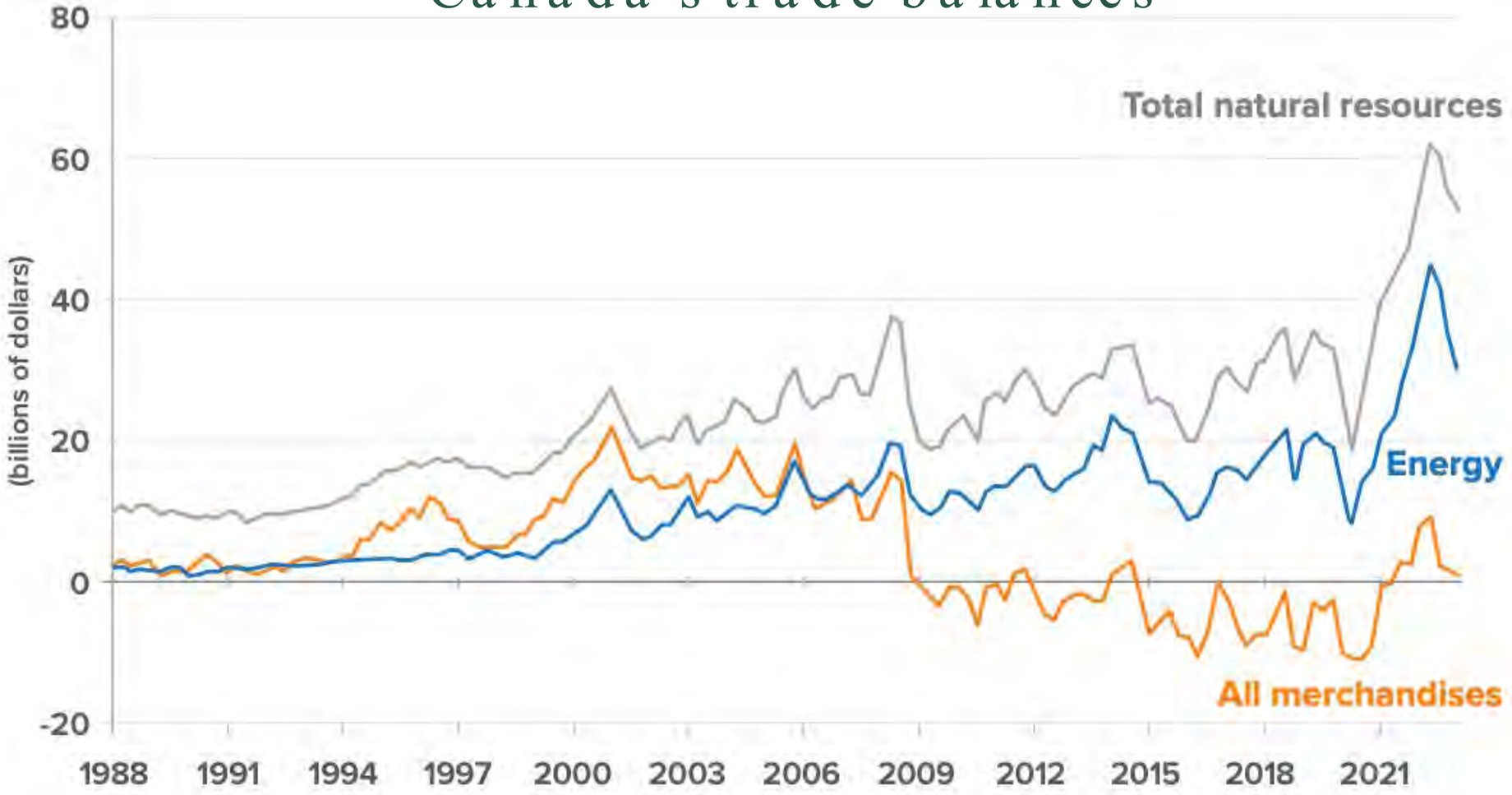
Source: S&P Global Commodity Insights

Western Canada crude oil takeaway capacity (thousand b/d)



Source: IHS Markit

Canada's trade balances



Source: Statistics Canada 2023c, table 12-10-0122-01.

“Russia and China sent large naval patrol off coast of Alaska”

August 6, 2023

CILTNA Annual Spring Outlook Conference

Hydrogen Deployment in Metro Vancouver

HTEC

FUELING THE DRIVE TO HYDROGEN

www.htec.ca

HTEC By The Numbers

155+
Employees

5
Open H_2 stations

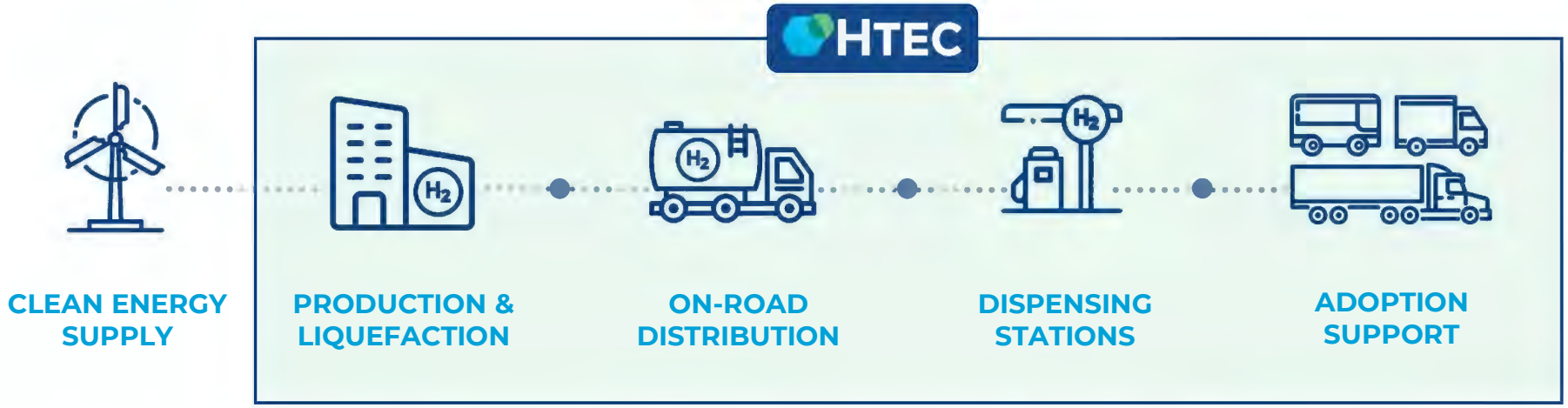
$237M
Equity raised

>75,000
KG of hydrogen delivered & dispensed
avg 80kg/day

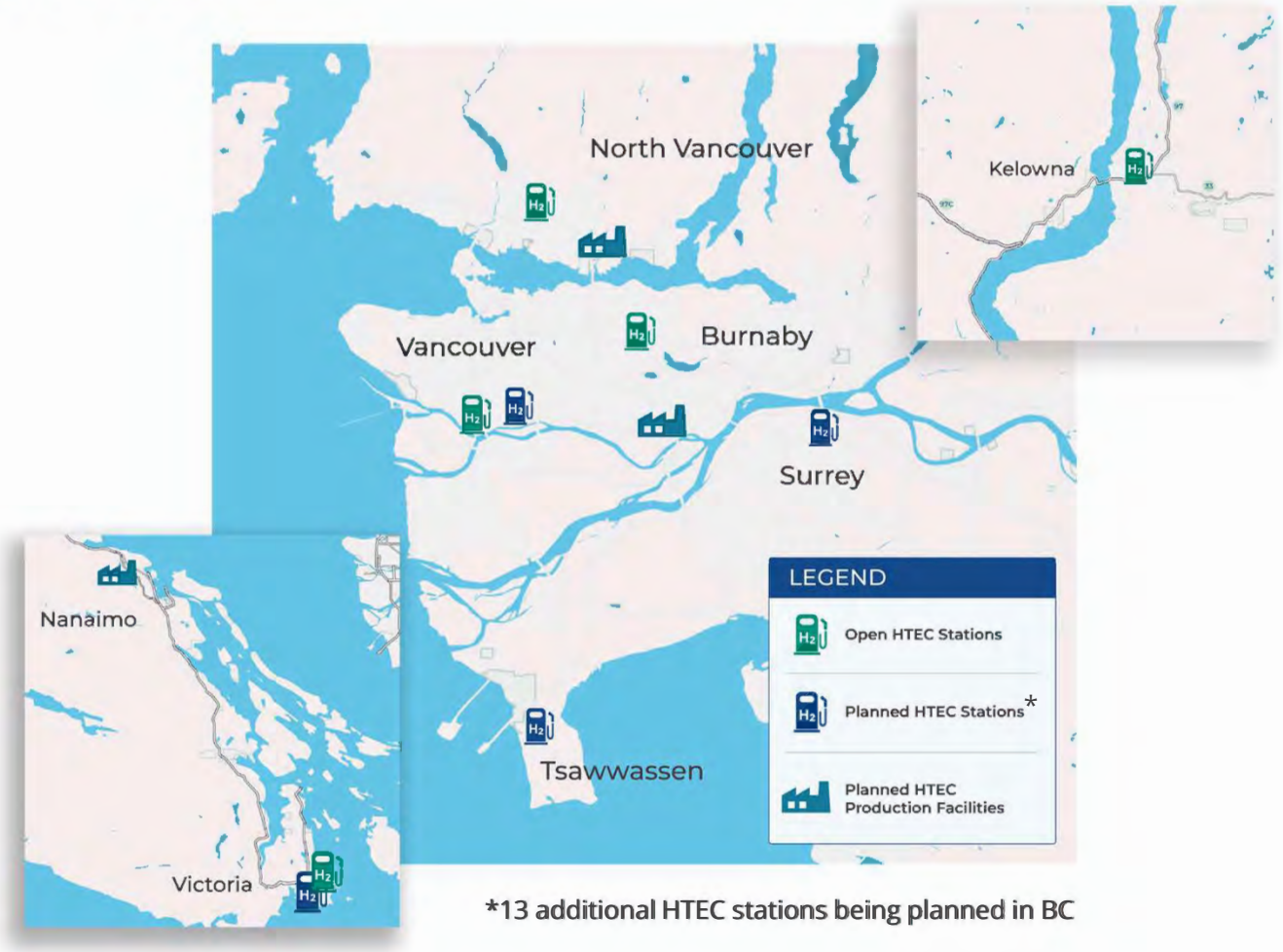
>1,000
Tonnes of CO_2 abated

300
FCEVs supported

HTEC and the Clean Hydrogen Value Chain



HTEC Assets in BC: 2024

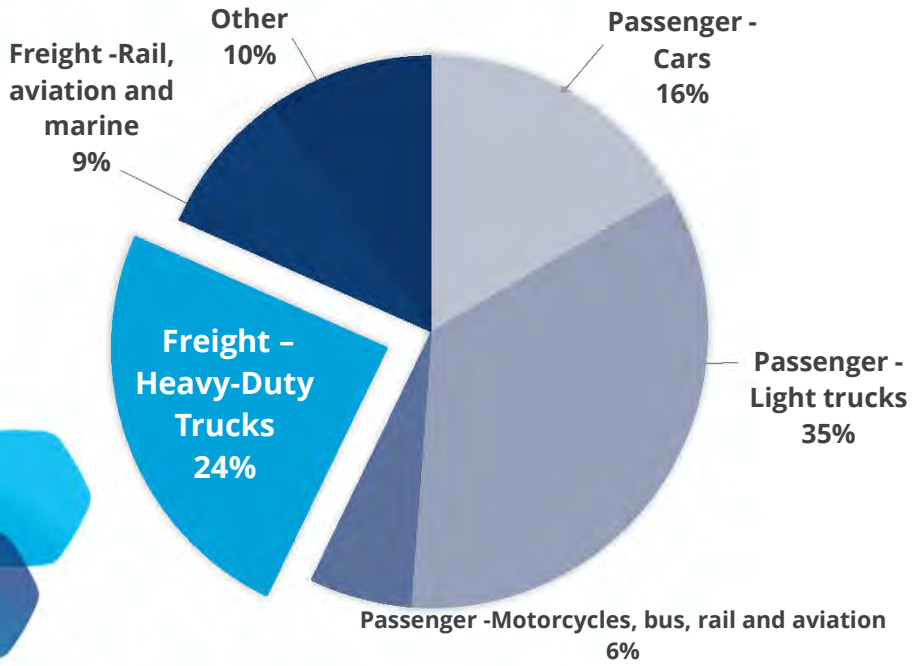


*13 additional HTEC stations being planned in BC

Why Hydrogen Electric Trucks?

Canada's 2021 GHG Emission from the Transportation Sector

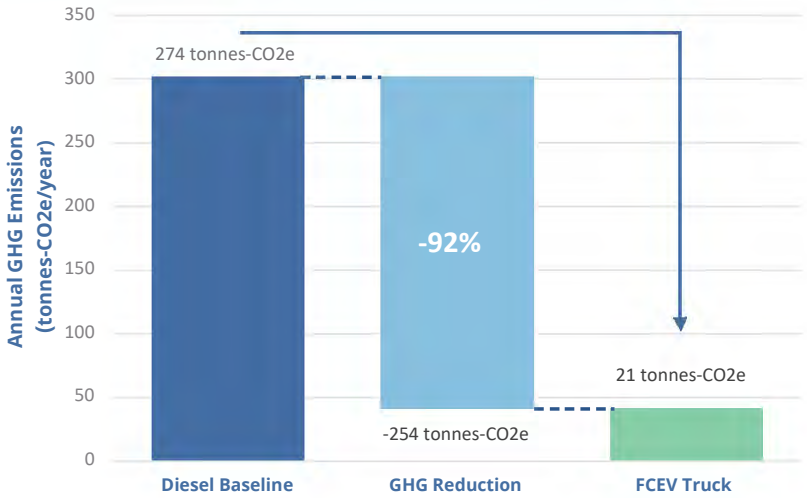
In 2021, **heavy-duty trucks** were accountable for **24% of the overall greenhouse gas (GHG) emissions in the transportation sector**



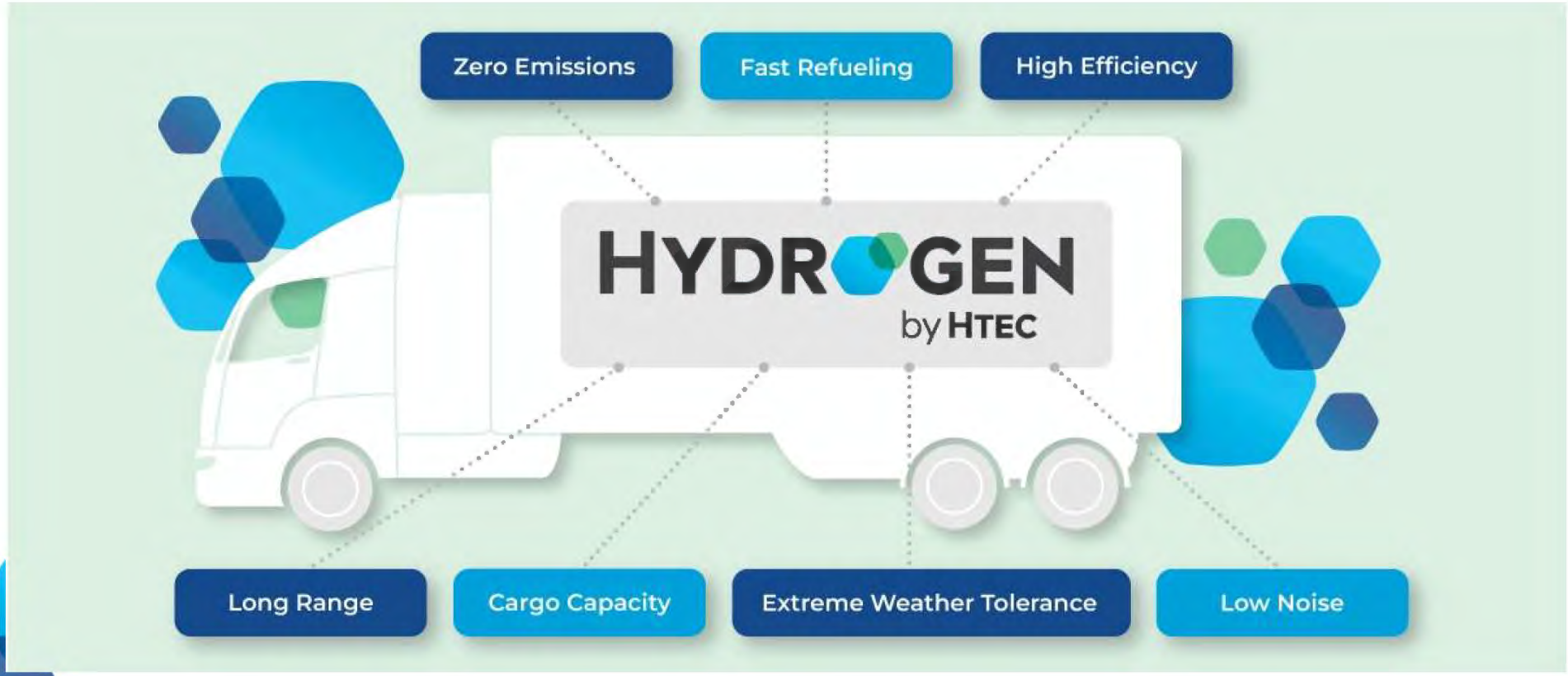
https://www.canada.ca/en/environment-climate-change

GHG Reduction Potential from FCEV Trucks

When using low carbon intensity produced hydrogen, **FCEV trucks can emit ~92% fewer emissions per year than a standard diesel truck**



Benefits of Fuel Cell Electric Trucks



Demonstration Projects: BC Hydrogen Ports Project Pilot

Hydrogen Provider	Station Host & Owner	Fuel Cell Developer	Fuel Cell Truck OEM's	Port Operations
HTEC FUELING THE DRIVE TO HYDROGEN	PARKLAND; HTEC FUELING THE DRIVE TO HYDROGEN; scəwaθən məsteyəxʷ TSAWWASSEN FIRST NATION	BALLARD	HEXAGON PURUS; HYUNDAI; NIKOLA	HARBOUR LINK CONTAINER SERVICES INC.; AQUATRANS DISTRIBUTORS INC; HTEC FUELING THE DRIVE TO HYDROGEN
1TPD Burnaby H2 Production Plant	Combined Commercial & Light Duty fueling 350 bar/700 Bar Capability	FC move HD+ Engine 8th Generation Heavy-Duty Fuel Cell Module	6 Fuel Cell Electric Trucks	Trucks Operated by HarborLink, Aquatrans and HTEC operations during Trial

BRITISH COLUMBIA
Supported by the Province of British Columbia

PORT of vancouver

Demonstration Projects: BC Hydrogen Pilot Truck Project

Hydrogen Provider	Hydrogen Distribution	Hydrogen Station	Fuel Cell Truck OEM's	Hydrogen Truck Maintenance Services
HTEC FUELING THE DRIVE TO HYDROGEN	HTEC FUELING THE DRIVE TO HYDROGEN	PARKLAND; HTEC FUELING THE DRIVE TO HYDROGEN; scəwaθən məsteyəxʷ TSAWWASSEN FIRST NATION	Peterbilt; NIKOLA; KENWORTH; Elemental Trucks; REFIRE; HYUNDAI	VELOCITY TRUCK CENTRES
1TPD Burnaby H2 Production Plant	Transported in HTEC PowerCube Trailers	Combined Commercial & Light Duty 350 bar/700 Bar Capability	6 OEM Class 7/8 Trucks	Upgraded Hydrogen Safe Maintenance Bay in Abbotsford

BRITISH COLUMBIA
Supported by the Province of British Columbia

PORT of vancouver

Demonstration Projects: RTG Crane

Hydrogen Supply & Distribution	Hydrogen Storage	Hydrogen Fuel Cell & Electric Drive	RTG Crane
HTEC FUELING THE DRIVE TO HYDROGEN	HTEC FUELING THE DRIVE TO HYDROGEN	TYCROP Bringing IDEAS to Life; LOOP ENERGY	DP WORLD
Burnaby 1TPD Electrolyzer Plant Transported in HTEC PowerCube Trailers	Supply & Integration of RTG Onboard Hydrogen Storage	RTG Crane Fitted with a TYCROP system Powered by Two of Loop Energy's T505 Fuel Cell Systems	DP World's Rubber-Tired Gantry Crane

Key Takeaways for the Logistics and Transport Sector

H2 infrastructure is coming in 2024

- Production at scale
- Distribution at scale
- 1st heavy-duty commercial fueling station
- 1st fuel cell electric trucks licensed in BC
- Class 7/8 fuel cell electric trucks will be on BC roads in 2024
    - RTG's, yard trucks and other logistics applications will follow

Thank you!

HTEC

FUELING THE DRIVE TO HYDROGEN

MARITIME TRANSPORT

DECARBONIZATION

Vida Ramin, VP Policy and Partnerships

CILTNA Conference - May 10, 2024

CHAMBER OF SHIPPING

The Chamber of Shipping is the unified voice of the marine transportation industry operating on the west coast of Canada.

Our Vision:

A strong and competitive marine transportation sector that moves goods and people in an environmentally sustainable and socially responsible manner.

Areas of Focus:

Marine Operations

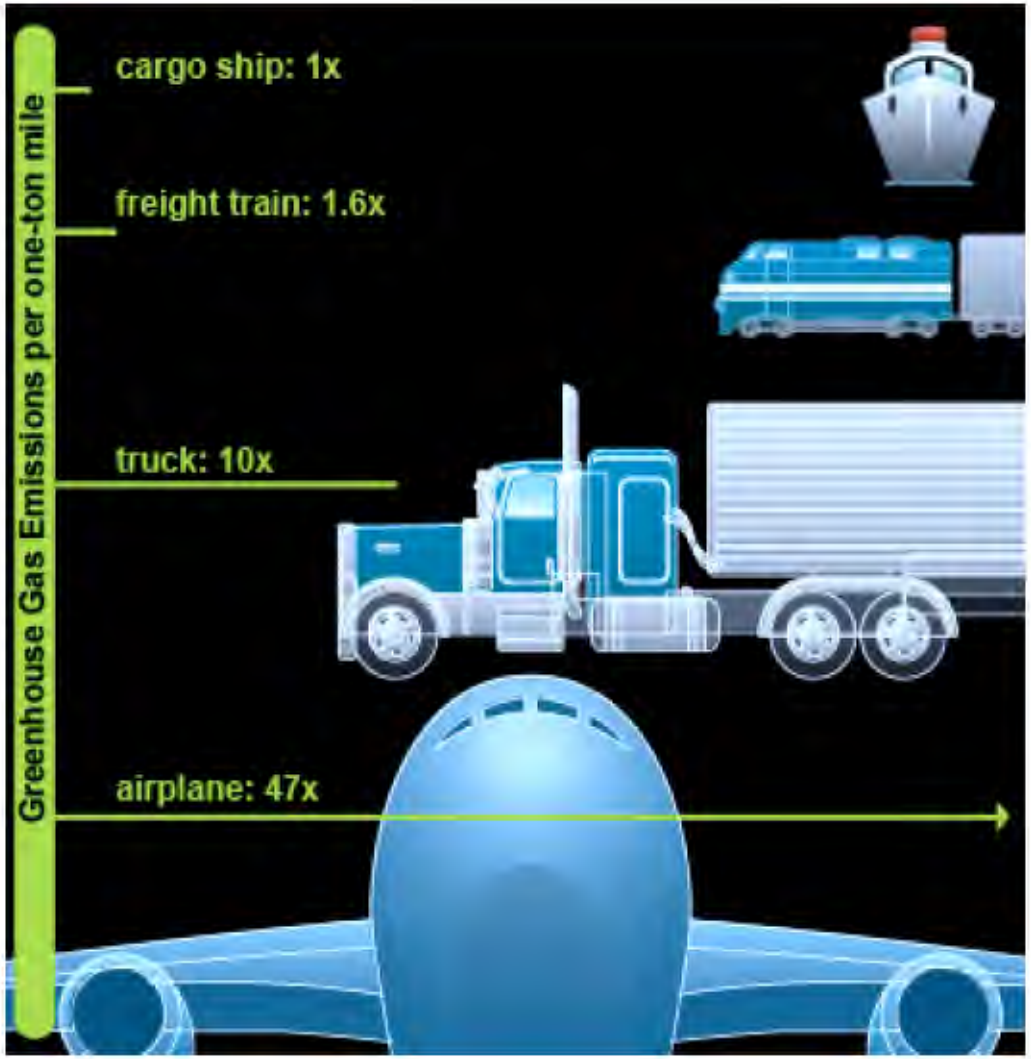
Supply Chains

Environment and Sustainability

Reconciliation

BACKGROUND AND CONTEXT

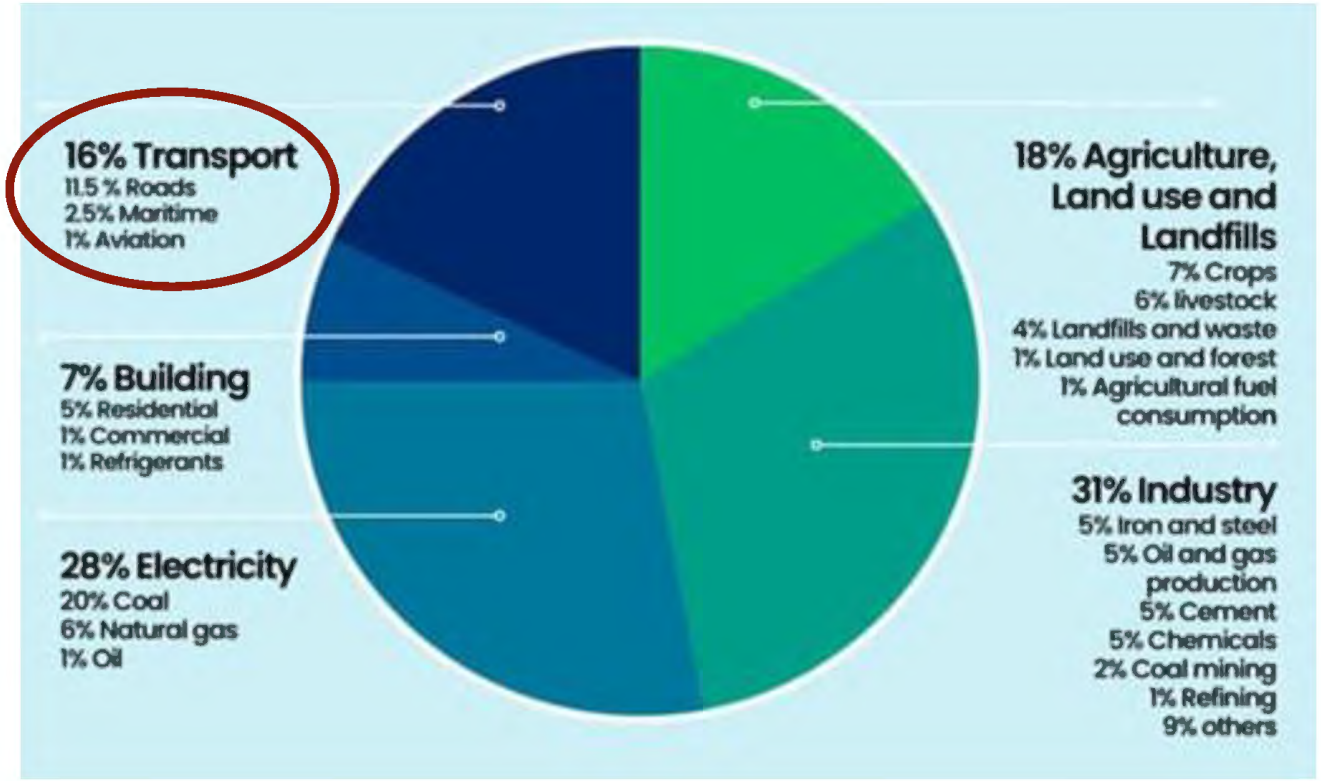
A cargo ship is the most energy efficient mode of freight transport.



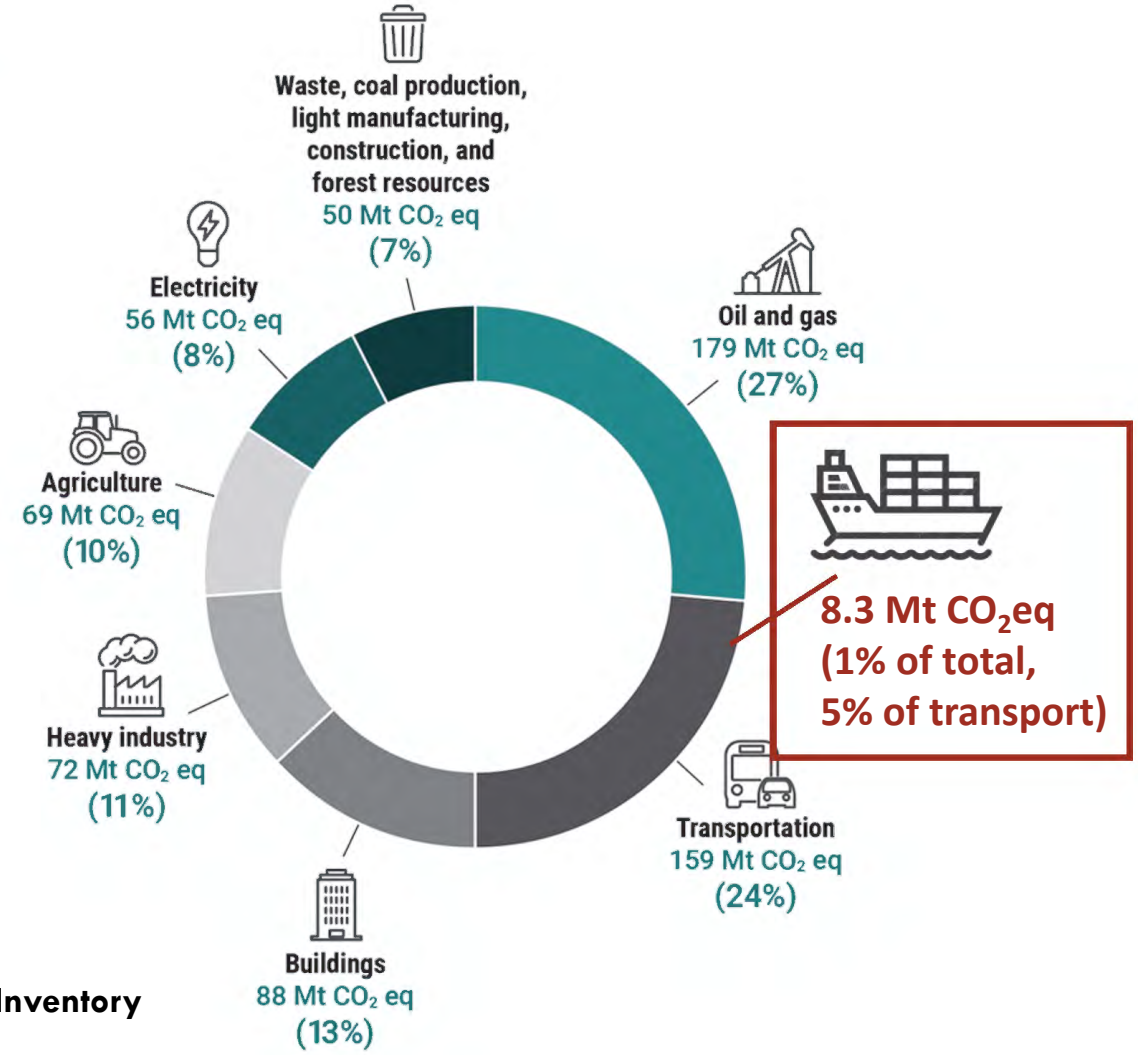
Source: Simchi-Levi, 2010

Despite its transport efficiency, shipping accounts for 3 percent of global CO_2 emissions and 1 percent of Canada's GHG emissions.

Global CO_2 Emissions by Sector, 2020



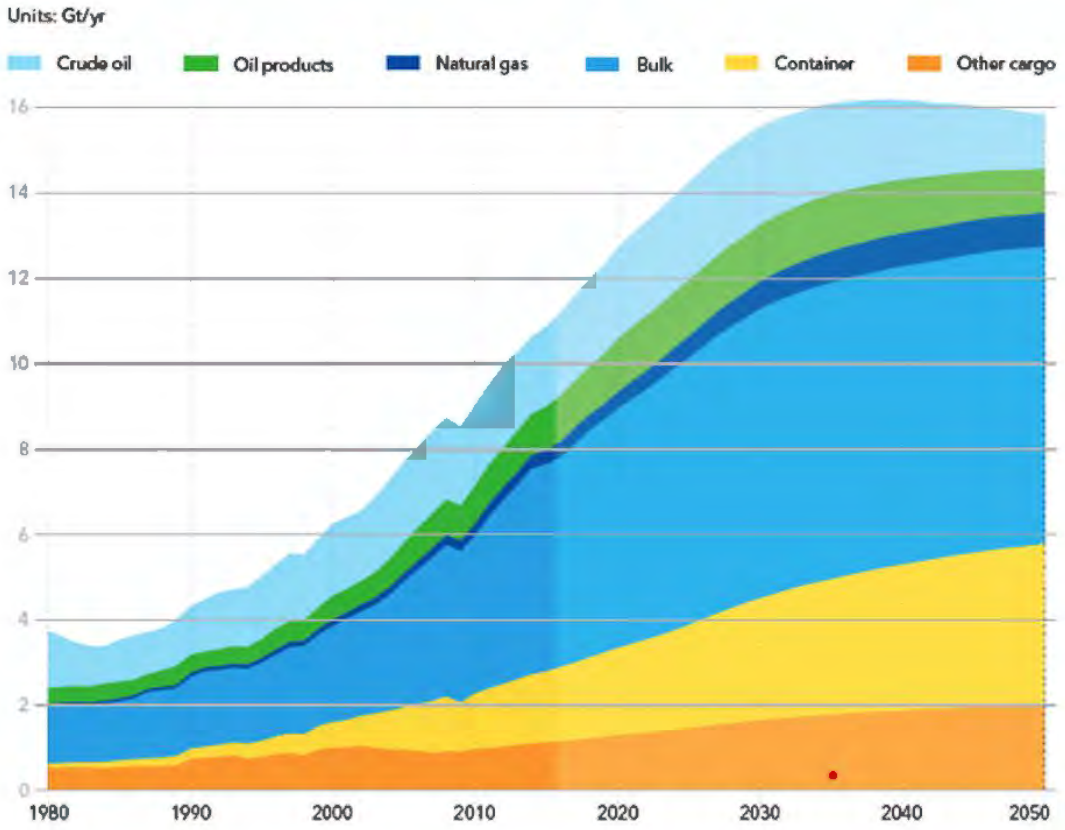
Canadian GHG Emissions by Sector, 2020



Sources: Zadeh et al, 2023; Auditor General of Canada, 2023 and EC Marine Emissions Inventory

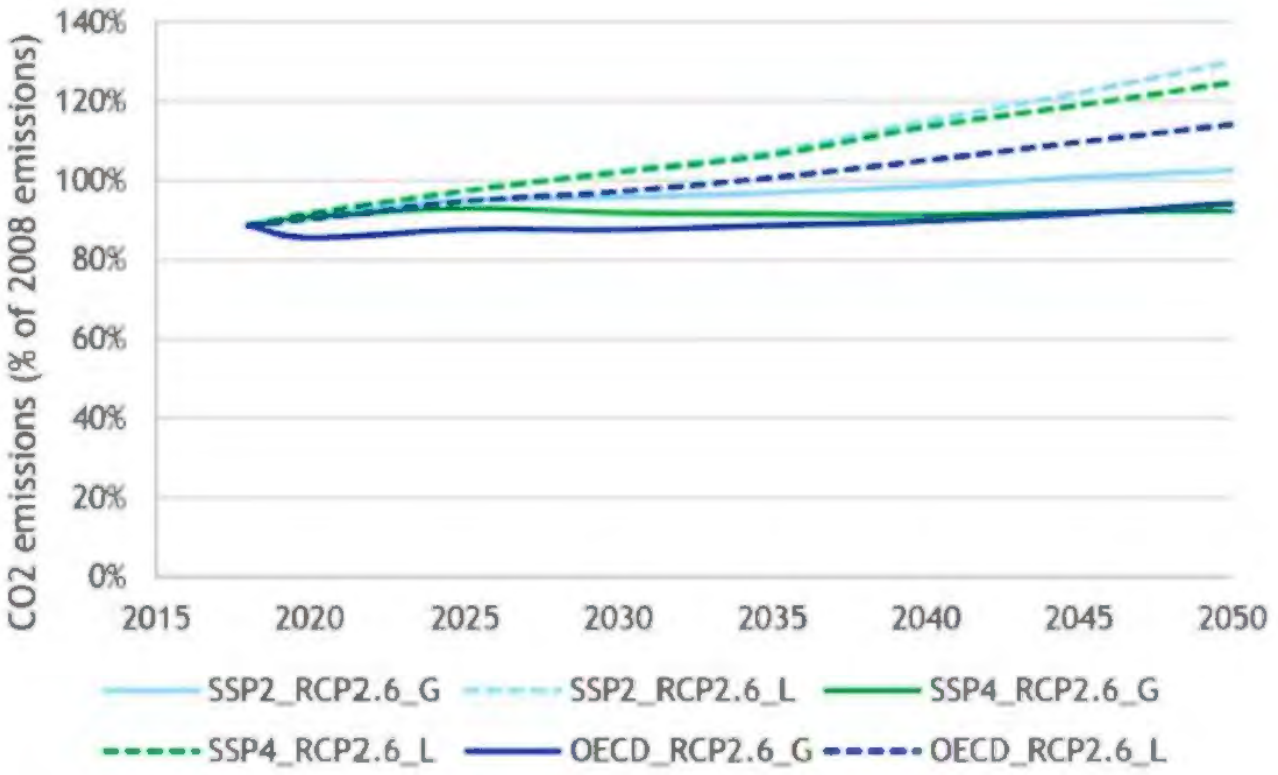
Business as usual is not an option. Decisive action is required.

Anticipated growth in trade and shipping traffic



World Seaborne Trade, Tonnage. Source: DNV GL, 2018

90 -130% increase in CO_2 emissions if status quo is maintained



Source: Fourth IMO GHG Study (2020)

Net zero, by 2050, targets have been established by international and Canadian regulators.

International Maritime Organization

Key Elements	2018 GHG Strategy	2023 GHG Strategy
Absolute emission reduction	2050: at least 50%	2030: 20%, striving for 30% 2040: 70%, striving for 80% 2050: Net Zero
Emission intensity reduction	2030: at least 40% 2050: at least 70%	2030: at least 40%
Uptake of zero emission fuels and technologies	N/A	5%, striving for 10%
Just and equitable transition	Not included	Included
Policy measures	- Lists potential short- and mid-term measures. - Advanced EEXI, EEDI & CII.	- Develop mid-term measures (carbon price, fuel standard) by 2025 and Adopt by 2027.
Scope	Tank-to-wake carbon emissions	Well-to-wake GHG emissions

Government of Canada

Emissions Reduction Plan (2022)

- 40-45% reduction by 2030 and net zero by 2050
- Commits to developing marine action plan

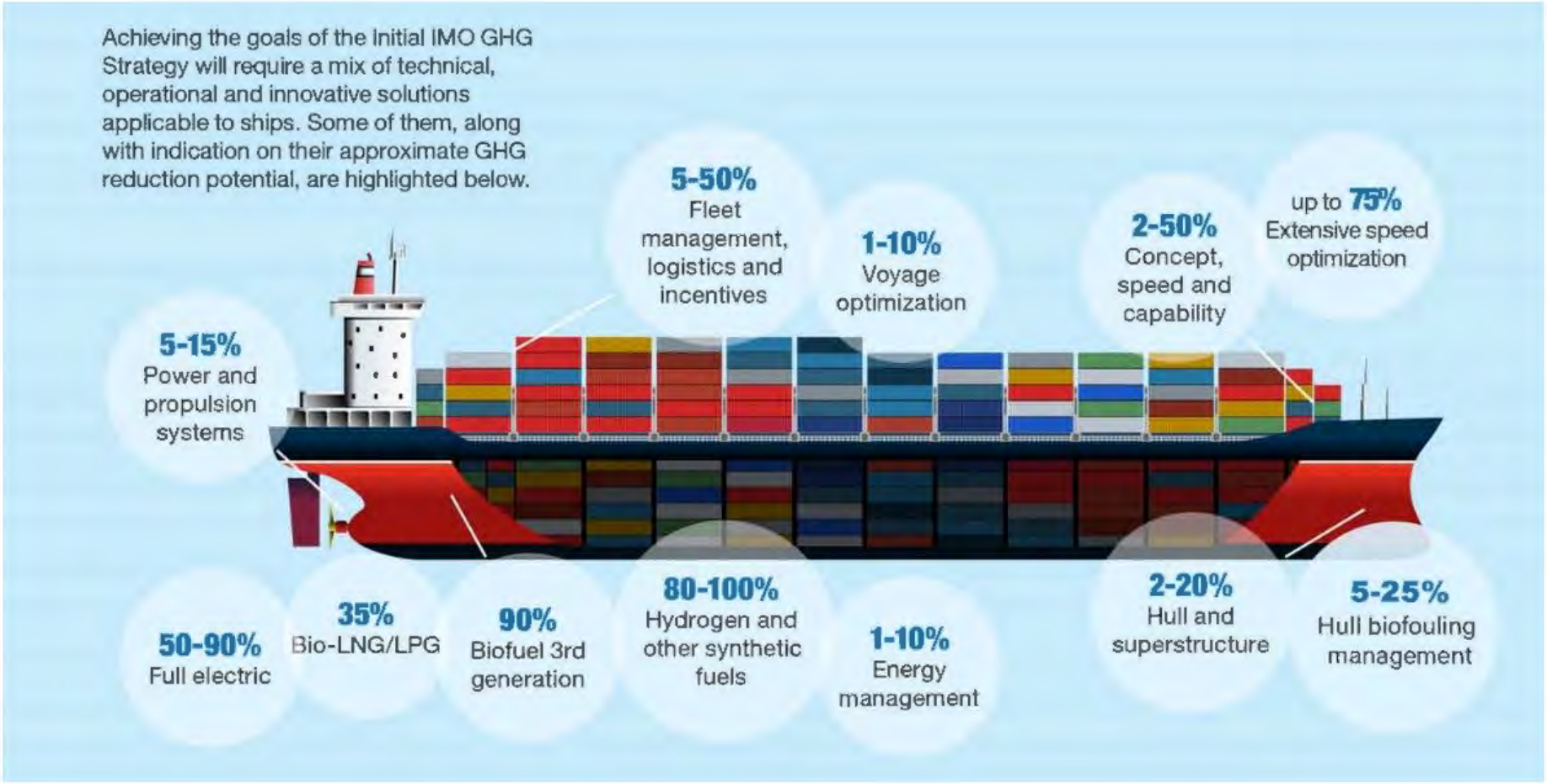
Key Policy Measures:

- Carbon pricing (2019)
- Clean fuel regulations (2022)
- Several investment tax credits

Marine Climate Action Plan

- 2024/25?

Shipping companies are evaluating and pursuing a range of pathways to reduce emissions from their operations.



Source: IMO

Decarbonization Pathways:

1. Energy efficiency;
2. Bridging fuels, such as LNG and biofuels;
3. Blue and green fuels using CCS and renewable electricity;
4. Onboard carbon capture, viewed as bridging technology.

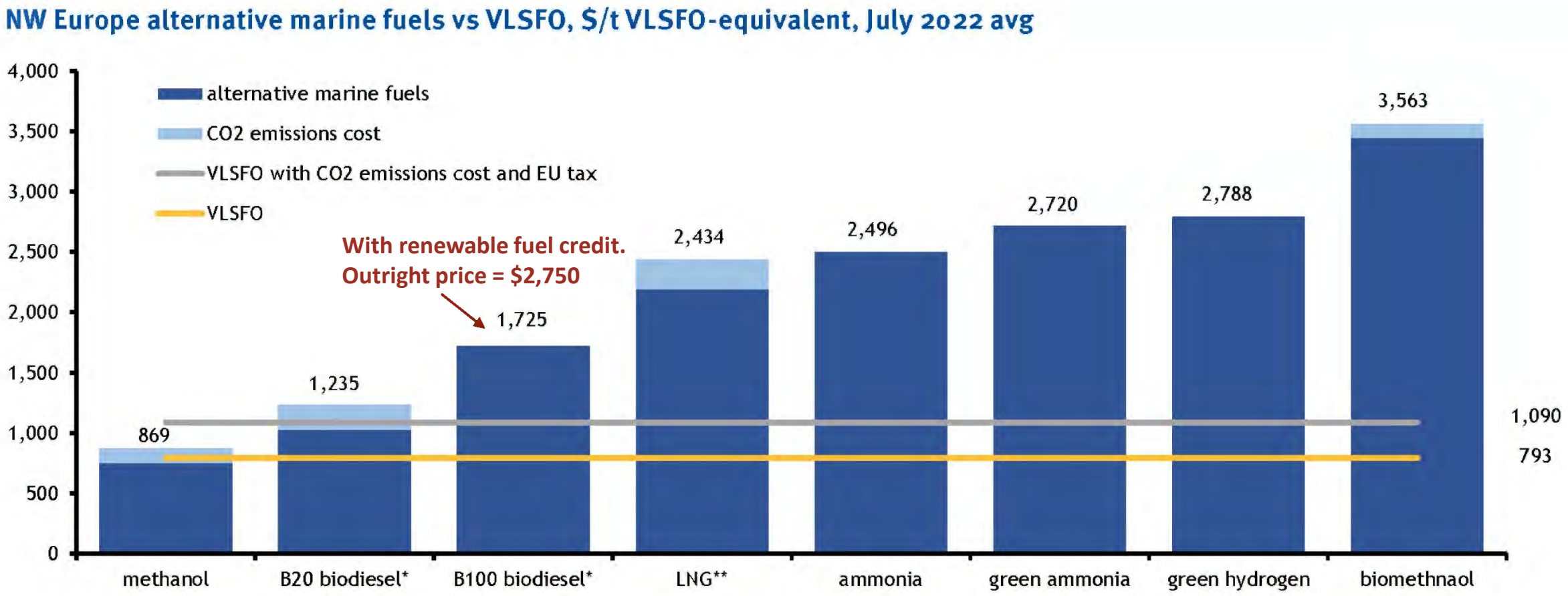
Green shipping corridors can serve as a catalyst for action through demonstration and testing of new tech, clean fuels and innovative business models.

Source: ABS

- Serve as route-specific decarbonization pathways, between 2 or more ports, aimed at accelerating action with respect to emissions reductions.
- Can support the development of targeted regulatory measures, financial incentives and safety measures and standards.
- Currently over 50 announced green shipping corridor projects, with the majority still in early stages.

OBSTACLES AND SUCCESS FACTORS

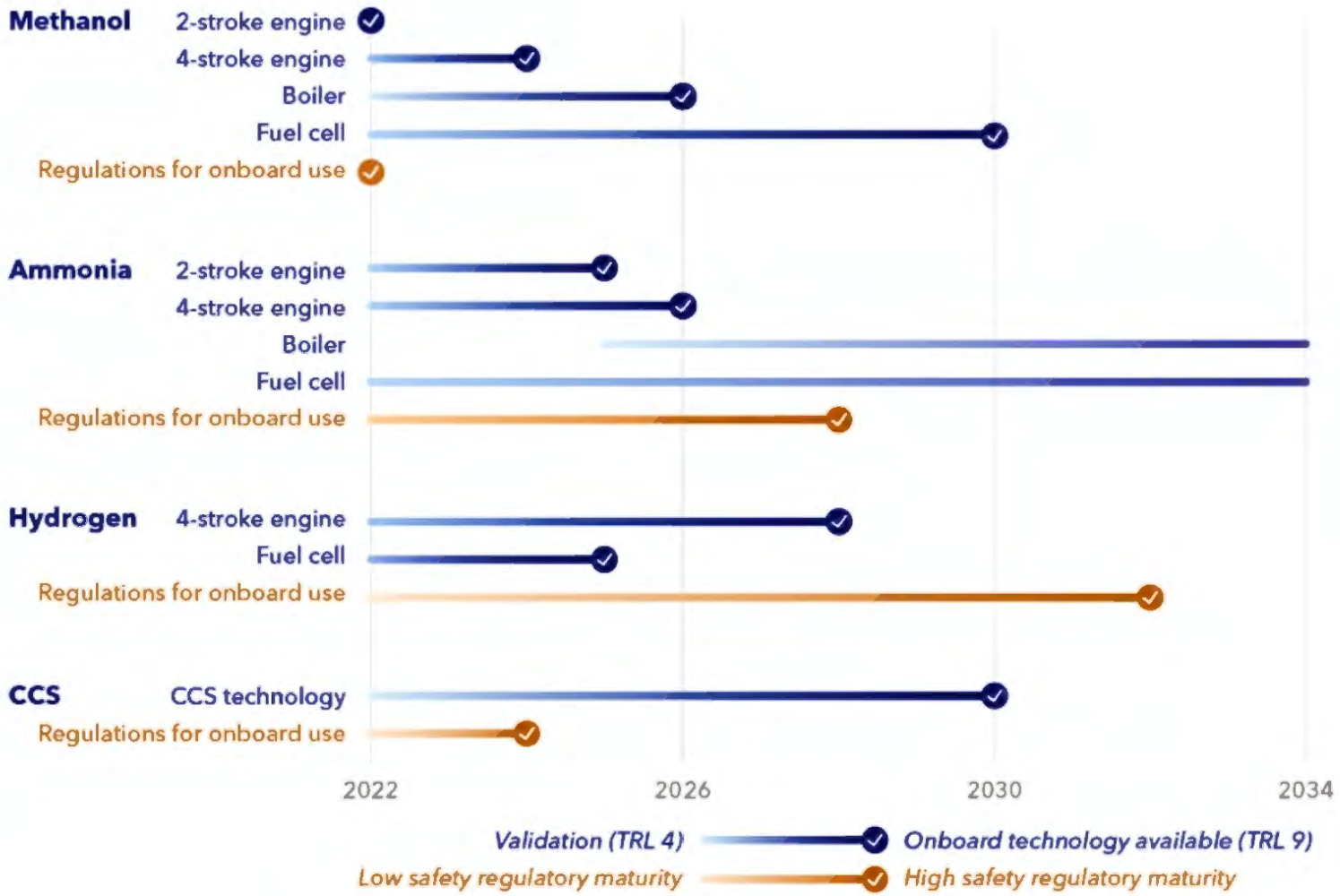
Obstacle 1: Price gap between conventional marine fuels, bridge fuels and future fuels.



* biodiesel: Amsterdam-Rotterdam-Antwerp advanced FAME, less Netherlands renewable fuel credit, plus delivery and blending
**LNG price includes CO2 emissions cost and EU tax on LNG for bunkering
Source: *Argus Marine Fuels*

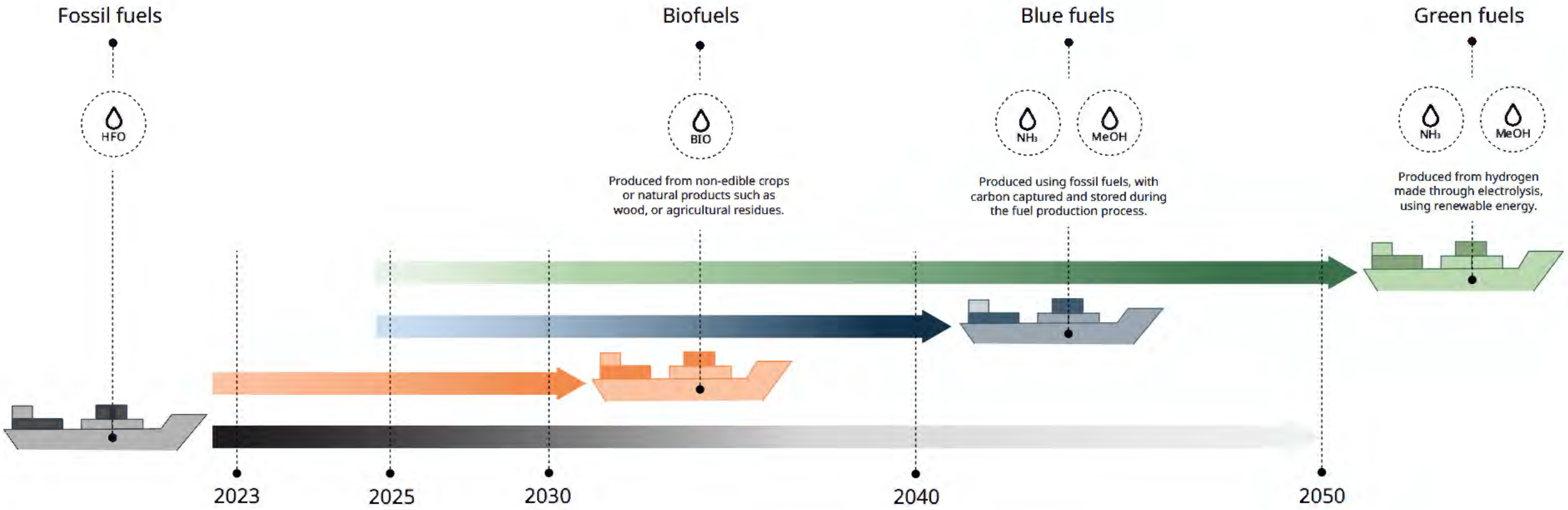
Obstacle 2: Technological immaturity and regulatory gaps.

Estimated maturation timelines for future fuels, onboard CCS technologies, and corresponding safety regulations



Source: DNV

Obstacle 3: Tension between fuel availability timelines, vessel lifespans and fleet retrofits and/or renewal.



Source: Wartsila, 2024

Several political and socio-cultural behaviors and ways of thinking also serve as barriers.

Unproductive behaviors and ways of thinking include:

- A one-size-fits-all mentality;
- Ignoring complexity and uncertainty in the interests of political expediency;
- Fragmented and disconnected approaches; and
- Equating actions, including increasing ambition, with outcomes.

Progress and success require:

- Ambition and strategy backed by ***decisive actions**** that:
  - Account for context (legal/regulatory, social, cultural), regional differences and variable time horizons;
  - Acknowledge the complexity and uncertainty associated with climate change as well as climate mitigation
  - Employ holistic, integrated and systems-based approaches
  - Close the cost gap for clean fuels and promote supply and demand alignment
  - Provide policy certainty re: life-cycle analysis and what constitutes “clean”
- Effective policy design that recognizes the need for monitoring, performance evaluating and adjustment → cyclical process rather than one-and-done approach

*** “Decisive” is used instead of “urgent” to highlight the need for <u>results-oriented actions.</u>**

Progress and success require:

- Framing strategies and policies in recognition that this is a transition, which will take collective effort and time
- Improved operational efficiency being a prerequisite to a full transition
  → increased efficiency = decreased fuel use
- Collaboration among, and between, sectors
- Public-private collaboration to reduce risk and costs
- Ensuring a just and equitable transition, with an emphasis on seafarer welfare and disproportionately affected communities, including coastal Indigenous nations
- Learning from trials/pilots, and each other, to promote innovation and continuous improvement

Thank You

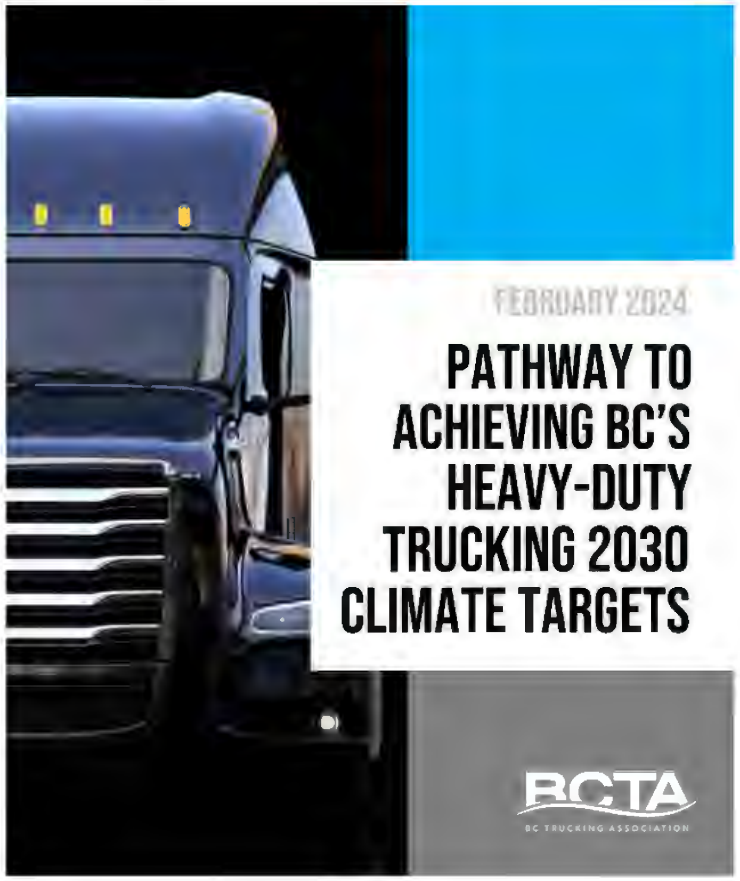
Vida Ramin, MPA
Vice President, Policy and Partnerships
Chamber of Shipping
vida@cosbc.ca

BC'S ZEV LANDSCAPE

Dave Earle
President

BCTA
BC TRUCKING ASSOCIATION

PATHWAY TO 2030



BCTA white paper:

Pathway to Achieving BC's Heavy-duty Trucking 2030 Climate Targets

BCTA
BC TRUCKING ASSOCIATION

BC'S ZEV LANDSCAPE

50%

TRANSPORTATION GHG EMISSIONS

come from medium– and heavy-duty vehicles

~285,000

MEDIUM-DUTY VEHICLES

~75,000

HEAVY-DUTY VEHICLES

92%

CONSUMER GOODS (BY WEIGHT)

in BC are moved by truck

Increase of

7,000

VEHICLES PER YEAR

on BC's roads

BCTrucking.com

BCTA

BC TRUCKING ASSOCIATION

THE CURRENT LANDSCAPE

Heavy-duty Vehicles
(>11,794 KG)

- Average Age: 2010.33
- Turnover: 4.5%
- Annual growth rate: 2.2%

Medium-duty Vehicles
(>3,899 KG <11,705 KG)

- Average Age: 2010.28
- Turnover: 4.0%
- Annual growth rate: 1.7%

Period	Avg. Annual GHG Increase MHD
2012-2021	1.5%
2002-2021	2.2%
1992-2021	2.5%

BCTA
BC TRUCKING ASSOCIATION

THE CURRENT LANDSCAPE

Canada—US Heavy Truck Vehicle Comparison

Configurations and Gross Weight Allowances

Payload is taken into account; the average Canadian tractor-trailer has a **22% advantage** over the average US tractor-trailer in both the amount of fuel consumed and GHG emitted.

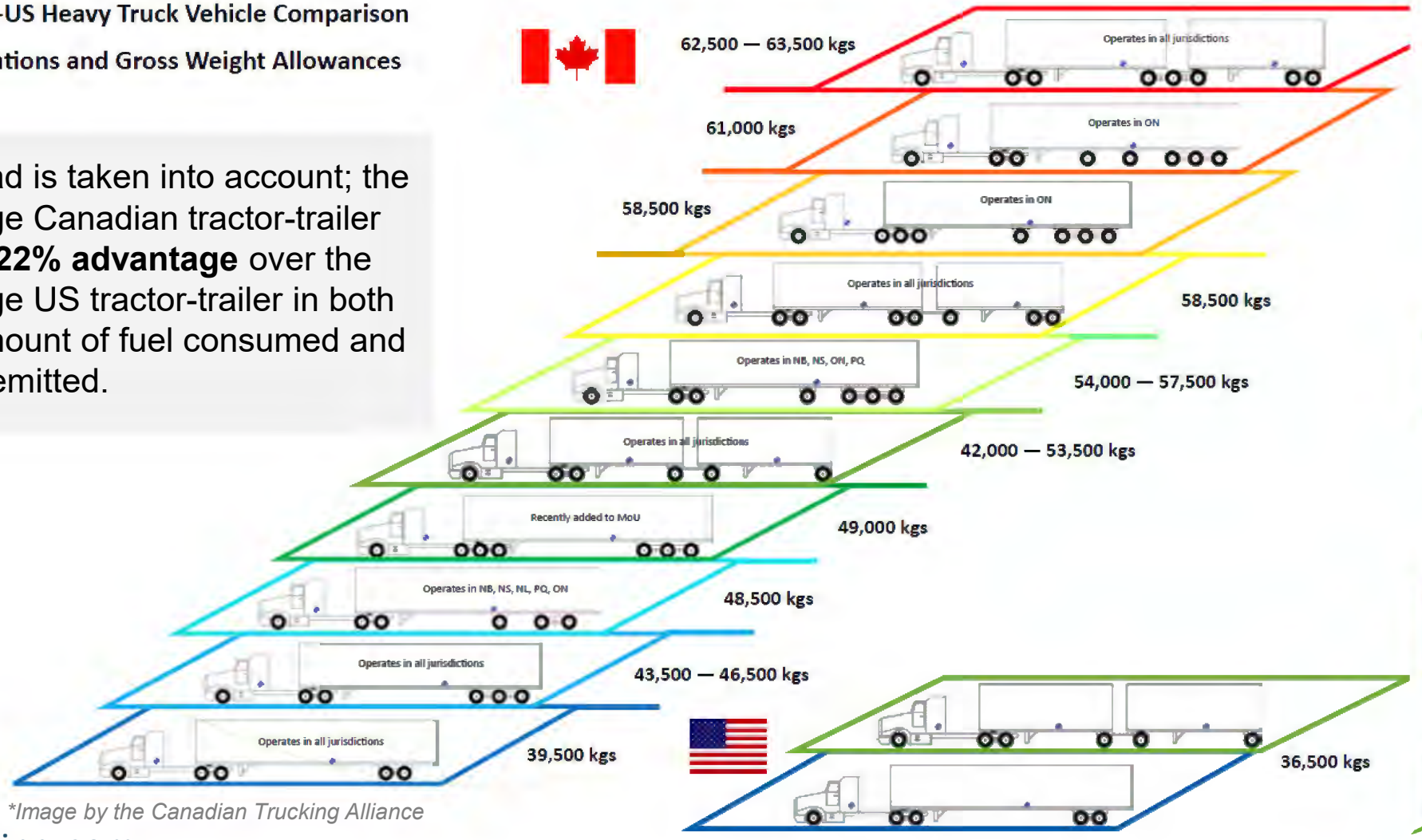
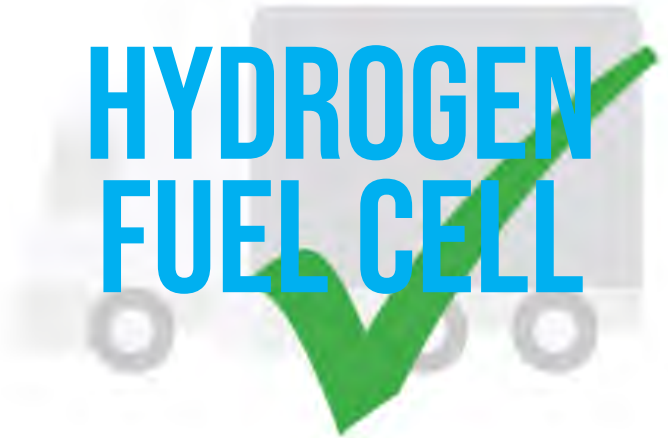


*Image by the Canadian Trucking Alliance

BC TRUCKING ASSOCIATION

THE GOOD NEWS

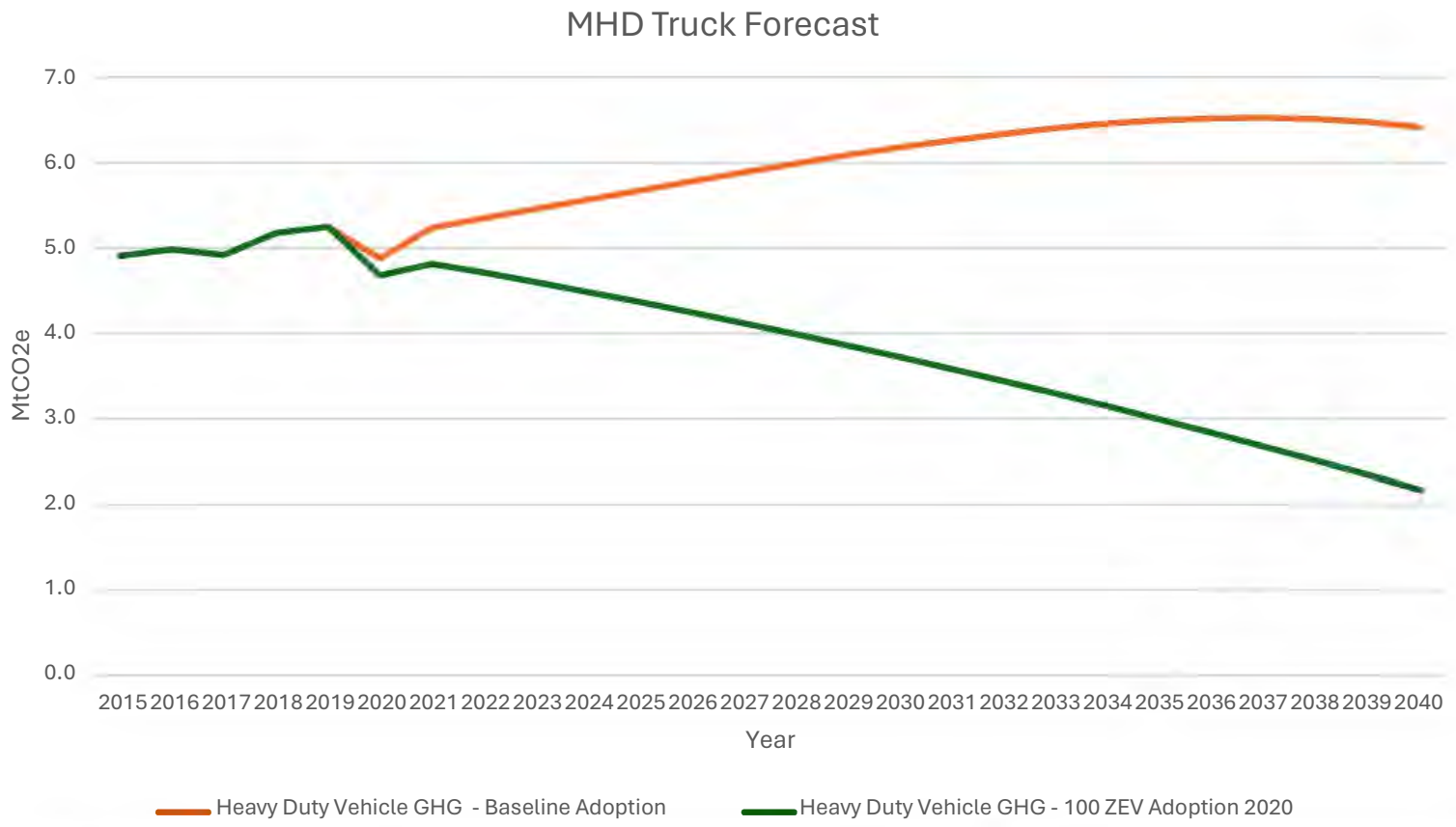


BCTA
BC TRUCKING ASSOCIATION

THE NOT-SO-GOOD NEWS

BCTA
BC TRUCKING ASSOCIATION

2040 FORECAST

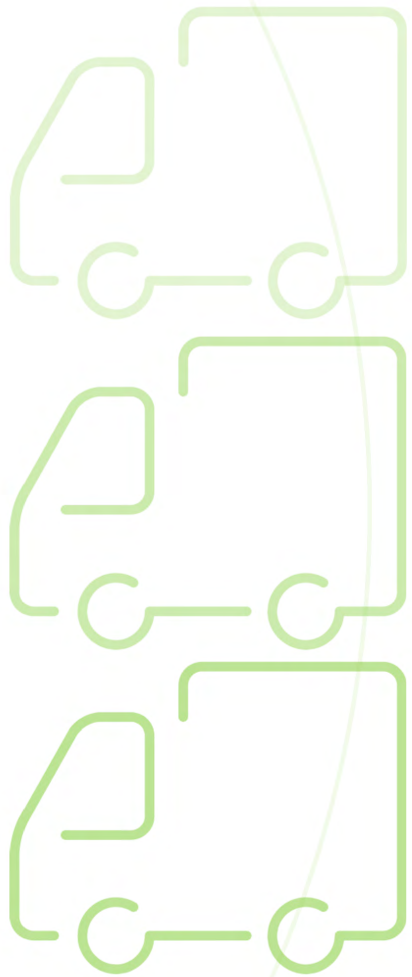


78-88% of heavy-duty trucks in 2040 will be DIESEL

BCTA
BC TRUCKING ASSOCIATION

ZEV MANDATE

- Heavy-duty vehicles will do more harm in the fight against climate change
  - 83% of carriers will run diesel for longer
  - 16.6% of heavy-duty vehicles can transition today based on the current market available ZEV
- Medium-duty have more opportunity
  - Not limited to payload
  - Majority are not limited to range constraints



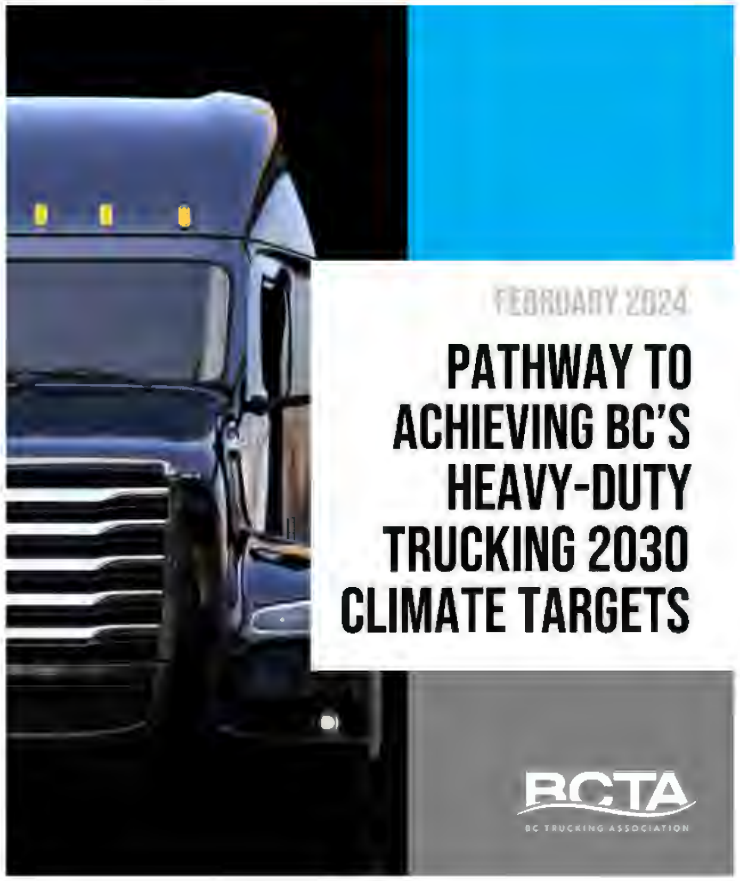
BCTA
BC TRUCKING ASSOCIATION

PATH FORWARD

- Heavy-duty province-wide idle management regulation (1800 hours idle emission)
- Promote long combination vehicles (41%)
- Power off-takes for hybrid/electric reefers and ZEV (10-100%)
- Carrier Fleet Fuel Management (~35%)
- Accelerate Vehicle Turnover (20.5%)
- Hybrid vehicles
- Encourage alternative fuels (RNG 91%, HDRD 72%, Diesel-hydrogen co-combustion 63%)
- Shippers must include rate, safety, and environment in their hiring process
  - Clean Carrier (16.8%)

BCTA
BC TRUCKING ASSOCIATION

PATHWAY TO 2030



BCTA white paper:

Pathway to Achieving BC's Heavy-duty Trucking 2030 Climate Targets

BCTrucking.com

BCTA
BC TRUCKING ASSOCIATION

DECARBONIZATION PANEL DISCUSSION

Jessica Dunn
Head of Marketing & Public Affairs

Who is Harbour Air Why Electrification?

Harbour Air is the largest seaplane operator in the Americas

A huge part of our success is due to the beauty of the West Coast experience, which is why we're strongly committed to being an industry leader on sustainable initiatives and mitigating our climate impact

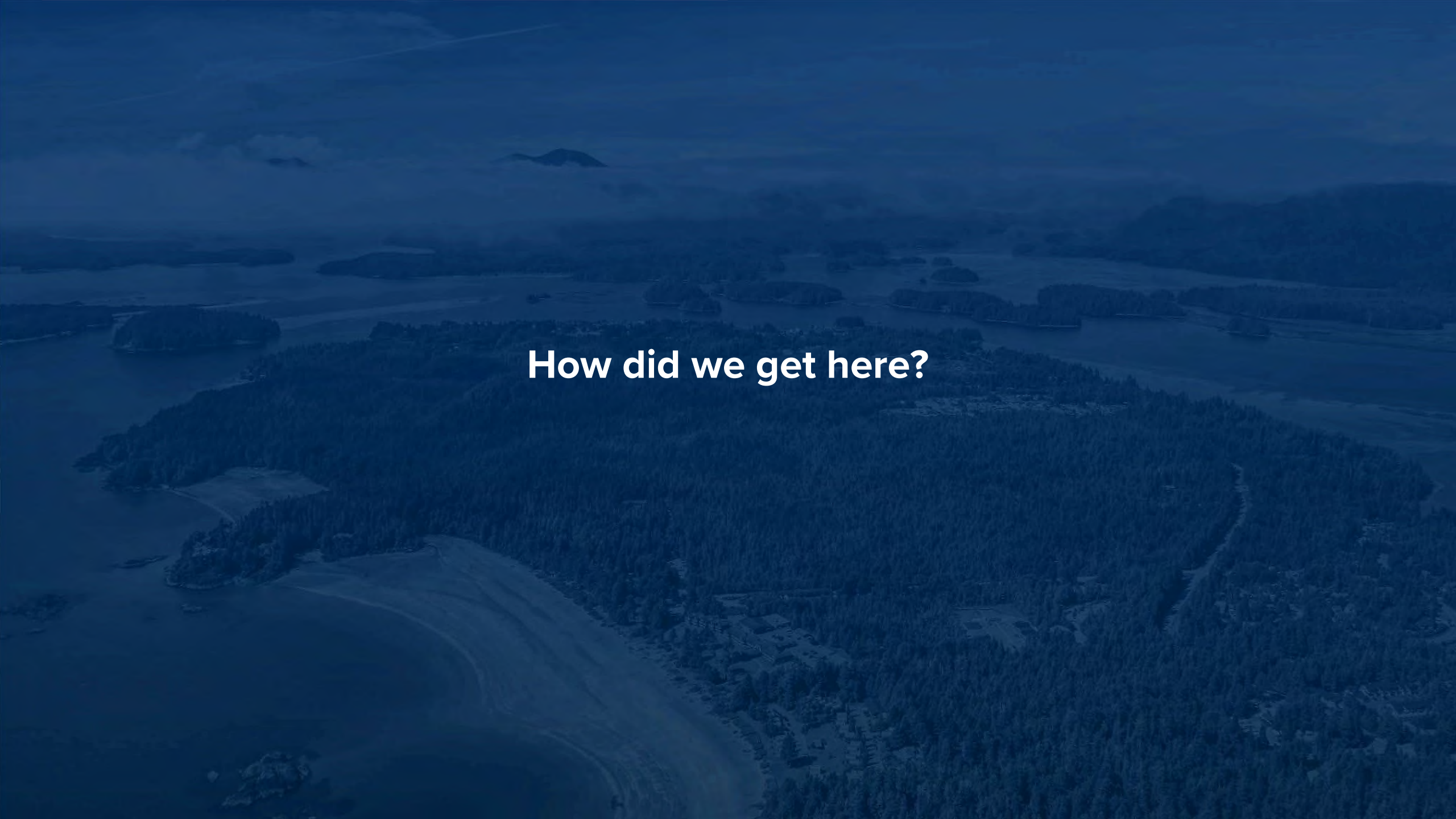
- **≈280 Flights per day**
- **≈500,000 passengers per year**
- **Unique product**
- **45 Aircraft**
- **+12 destinations**
- **Distinct service levels and employee engagement**
- **470 employees**
- **First airline in the world to fly an ePlane**
- **On-time performance**

Positioned to be the first Canadian airline to utilize GPS IFR flying directly to water runways

We are uniquely positioned to be a leader in commercial electric flight.

- Short flight missions – average 30 minutes
- Typically, low altitude flights
- Results in low energy requirements of our aircraft
- Don’t need to build an aircraft around technology, just have to change the propulsion system

Never a question of ***if*** we would do this, but ***how***.


How did we get here?

Harbour Air's E-Plane Journey and Progress Since 2019 – Phase 1 & 2

Harbour Air developed two E-Plane prototypes that have allowed us to safely test, learn, and modify our approach to electrification of regional flying

May 2019
Greg McDougall inducted to Canadian Aviation Hall of Fame and announces Harbour Air Electrification Program

April 2021
Harbour Air, magniX, and H55 announce partnership to certify world's first all electric commercial airplane

April 2023
First flight to downtown Vancouver

June 2023
Application for Design Approval Organization submitted to Transport Canada to develop in-house electric aircraft design approvals

2019 | **2020** | **2021** | **2022** | **2023**

January 2019
Harbour Air and magniX partner to lead the way in electrifying commercial regional aviation

December 2019
Electric DHC-2 Inaugural Flight

October 2021
BC Ministry of Energy, Mines, and Low Carbon Innovation Clean BC Go Electric ARC Program Announces $1.6M to support Harbour Air's Electrification

August 2022
First point-to-point flight to Victoria International Airport

May 2023
First multi-leg flights to Salt Spring Island and Victoria Inner Harbour

Experimental Development Vehicle

Flight Testing to Date

Since December 2019 Harbour Air has performed nearly 80 flights exploring:

- Take-off performance
- Cruise performance
- Range / Endurance
- Climb performance
- Noise testing
- Cooling system performance
- Balked landing performance
- Loss of power simulations

Operational
Point-to-Point Flights
YVR to Vancouver
YVR to Saltspring
Saltspring to Victoria

Purpose:

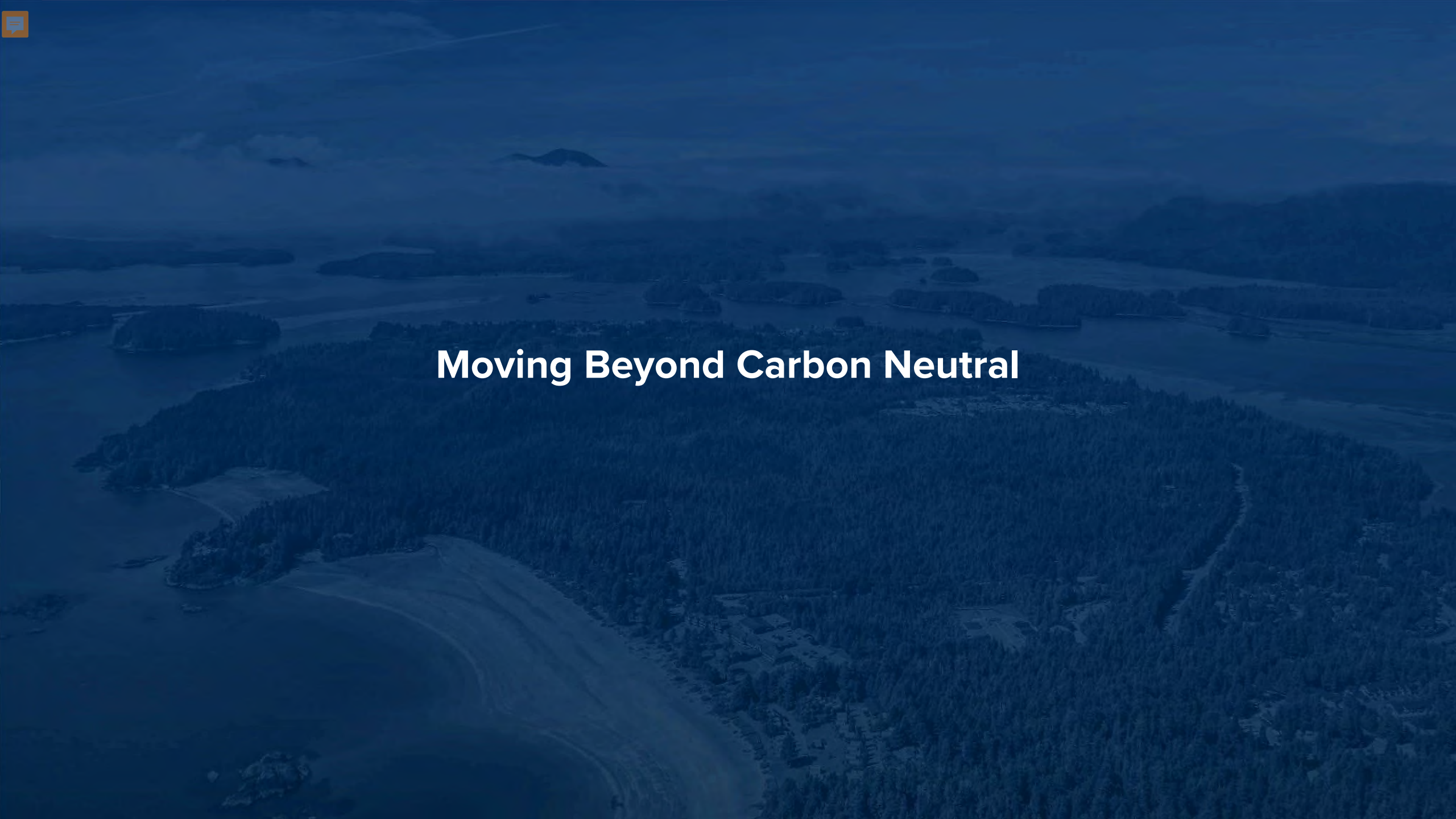
- To test the aircraft under operational conditions
- Show scheduled points can be accomplished
- Test charging capabilities/challenges at various locations
- Evaluation of overall reliability

Current Steps

- magniX Letter of Intent – 50 engines
  - Secures supply chain
  - Intended for HA Beaver fleet plus 3rd party operators
- Continuing to work with various battery suppliers to optimize final configuration
- Commercial Certification 2026
- Additional upgrade to the battery system targeted for 2027 – market version of the aircraft.

Future Steps

- Design and certify fully electric conversions for the DHC-3 Otter and C208B Caravan
- Investigate hybrid technologies, specifically for platforms such as the DHC-6 Twin Otter
- Sustainable Aviation Hub
  - BC has a strong hydrogen presence
  - Opportunity to create a hub of sustainable aviation technologies on the West Coast
  - Attract additional companies – magniX Canada?


Moving Beyond Carbon Neutral

Moving Beyond Carbon Neutral

“Since 2007, Harbour Air has proudly reached carbon neutrality by investing in high quality voluntary carbon offsets on behalf of our customers. Now, we are entering a new chapter in our environmental commitment by INSETTING TO MOVE BEYOND CARBON NEUTRAL.”


What’s Insetting?

Insetting

“According to the International Insetting Platform, “Insetting represents the actions taken by an organization to fight climate change within its own value chain in a manner which generates multiple positive sustainable impacts.” As per the World Economic Forum, “…carbon ‘insetting’ focuses on doing more, good rather than doing less bad within one’s value chain.”

At Harbour Air, we are Insetting by taking “actions or investments within our own operations, production or value chain for long-term, sustainable mitigation or avoidance of emissions.”

Investing in the E-Plane Initiative: A Strategic Approach to Combatting GHG Emissions

“Much like Tesla revolutionized the realm of passenger vehicles, Harbour Air’s e-plane initiative aims to make electric flight technically feasible, economically viable, and drastically reduce emissions linked to air travel. This underscores the critical nature of our investment in the e-plane program. It’s not just about electrifying Harbour Air’s own fleet; it’s about supporting other operators in electrifying theirs as well. With our inaugural commercial flight scheduled for 2026, Harbour Air’s e-plane initiative stands at the forefront of global aviation innovation.”

Thanks for joining us!

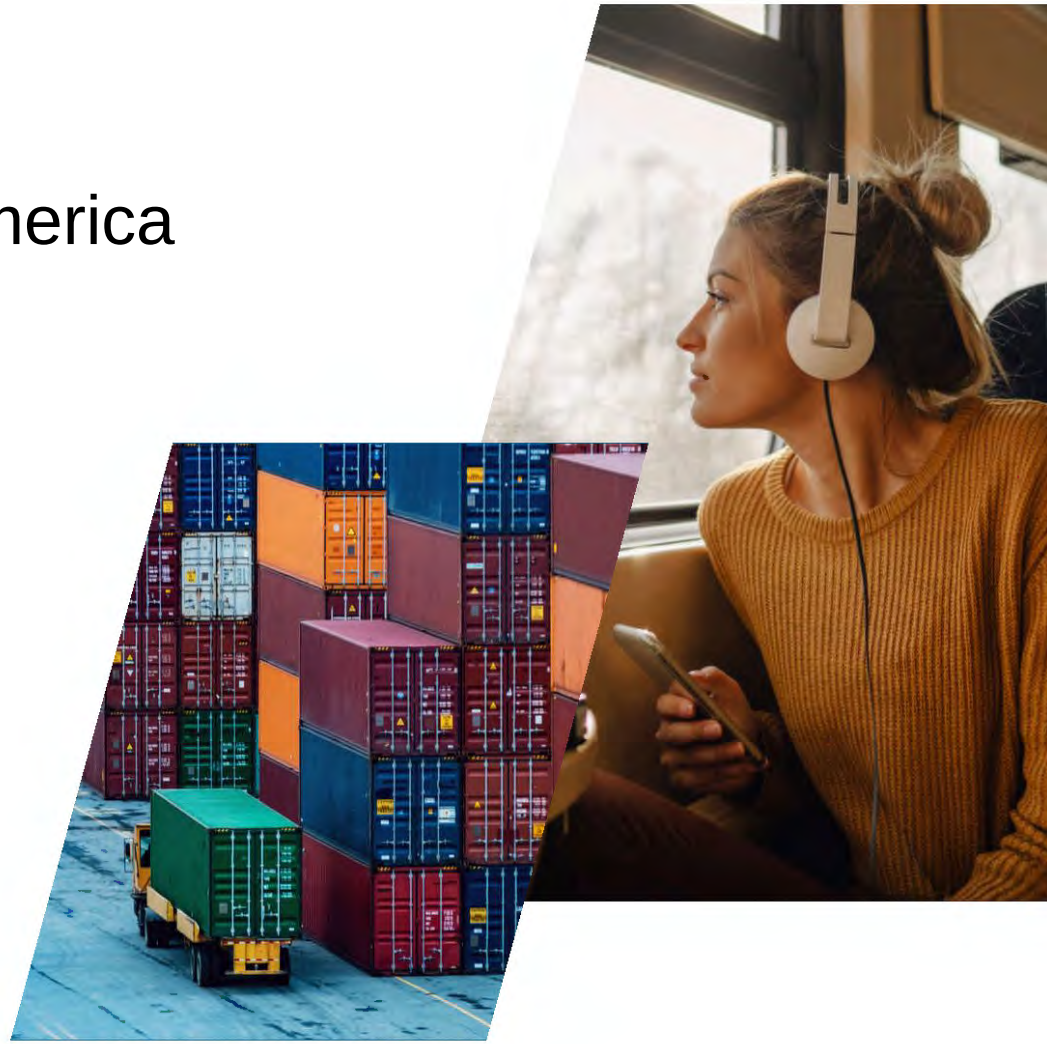
Railway Association of Canada

Canada's Railways: Well positioned to meet future demand

May 10, 2024

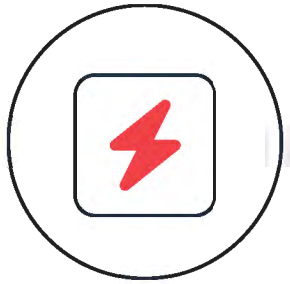
Enabling Growth

- Extending our reach throughout North America
- Shortlines: First Mile, Last Mile
- Ports and Terminals
- Also Helping Move People

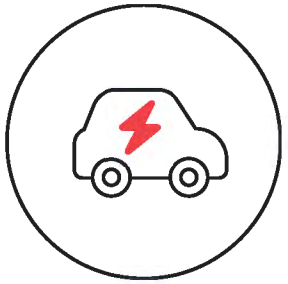


Delivering What's Needed to Canadians and the World

Data shows safer than ever; safest in NA

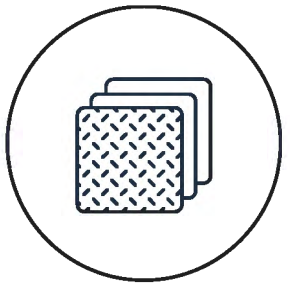


Critical Minerals



EV vehicles

Precious metals



Food

Driving Decarbonization

- Alternative propulsion (Hydrogen, battery, hybrid, electrification)
- Alternative Fuels (biodiesel)
- Memorandum of Understanding
- Sustainable operations

Driving Safety through Innovation

- Detectors and Portals
- Track safety and resilience
- Training and simulators
- Autonomy and AI

Headwinds

- Labour disruptions
- Extreme weather conditions
- Regulatory burdens
- Lack of investments

Thank you!

If you have questions, please reach out to Marc Brazeau at **mbrazeau@railcan.ca**

Railway Association of Canada

HaiSea Marine

A Haisla - Seaspan partnership

How Community Collaboration is Impacting West Coast Marine Operations

Sharing HaiSea Marine's Journey as a Modern Marine Startup

2024 CILTNA Spring Outlook Conference
May 10, 2024
Vincent Percy

About HaiSea Marine LP: It started with a promise

- The Haisla, meaning “dwellers downriver”, have occupied lands for over 9000 years. Today, the Haisla people are centered on Kitamaat Village. Kitamaat Village sits at the head of the Douglas Channel in British Columbia.

- Living and working on the water has always been important to the Haisla. The Haisla people have always lived off the resources of the Douglas Channel, and protection of those resources for future generations is the paramount commitment.

HaiSea Marine
A Haisla - Seaspan partnership

About HaiSea Marine LP: It started with a promise

- Joint venture, majority owned by the Haisla Nation in partnership with Seaspan ULC. Our work together dates back to 2004.
- Ship-assist and escort towing services to LNG carriers calling at the new export facility in Kitimat, in the unceded traditional territory of the Haisla Nation.
- Formed in 2019, the commitment from the Haisla for our partnership to operate the greenest tugboat fleet in the world was the start of an innovative and industry leading new battery-powered and low emissions tugboat build program.

HaiSea Marine
A Haisla - Seaspan partnership

The HaiSea Fleet

Designed in collaboration with

- Robert Allen Naval Architects (RAL)
- Industry Experts
- Seaspan Mariners
- LNG Canada

❖ Community Input

- **<u>The ElectRA harbour tugs</u>** are battery electric, with more than 5,200 kWh of installed battery capacity on each tug. This will allow them to perform all their missions on battery power alone, with shore charging between missions from the local hydroelectric grid.

- **<u>The RAstar escort tugs</u>** are dual fuel (LNG and diesel) with an exhaust after-treatment system. Even though these tugs will use gas for their regular operations, the after-treatment system will make them compliant with the highest IMO Tier III emissions standards.

HaiSea Marine
A Haisla - Seaspan partnership

The HaiSea Fleet

Kitimat Maintenance Facility

Custom-built floating maintenance, operations and workspace, including kitchen, crew lounge and fitness centre.

HaiSea Marine
A Haisla - Seaspan partnership

Emission Reductions - Well to Wake

Ship Docking Tugs (Batteries/Diesel)

- 98% or more of operations will be on batteries.
- HaiSea Wamis, Wee'git and Brave will displace "Well to Wake" GHG emission of **3000-5000** MT of CO_2 equivalent per year.
- Elimination of pollutants (SO_x, NO_x, PM).

Ship Escort Tugs (LNG/Diesel)

- HaiSea Kermode and Warrior will displace "Well to Wake" GHG emission of **3000-4000** MT of CO_2 equivalent per year.
- The escort tugs will also be capable of full pollution response, with dedicated oil recovery booms and significant recovered oil tankage onboard.

- We have gained significant experience in use of LNG as a fuel on our 4 LNG powered cargo ferries.
- Through partnership with UBC Engineering over the last 4 years, we've conducted a program of onboard emissions testing and reduction.
- Testing proved that potential "methane slip" emissions during low engine load operations, can be reduced through the following:
  - Engine optimization (with OEM) for LNG: Including cylinder de-activation, "GHG kit" calibration, pilot optimization.
  - Operations: Operating parameters to reduce LNG use during low load operations, shore power usage.
- Compared to diesel operation, state of the LNG operations shows significant reduction in $PM_{2.5}$ and NO_x emissions.

A Step Into The Future

HaiSea Marine
A Haisla - Seaspan partnership

Seaspan Marine – Keys to Engagement

- To have effective, transparent and meaningful communications with the Haisla Nation as Seaspan's business partner.
- To have effective, transparent communications with Local Area First Nations on HaiSea Marine's project, to share information and obtain input.
- To meet the responsibilities and deliverables under the HaiSea and LNGC agreements including exclusivity, employment and training opportunities, revenue sharing and project engagement.
- To build and strengthen Seaspan's relationships with its Indigenous partners.
- To increase knowledge and awareness within Seaspan of its Indigenous relationships and partnerships.
- To engage and continue to build partnership opportunities with Indigenous communities.
- To build capacity and enhance opportunities within the Indigenous communities.

HaiSea Marine
A Haisla - Seaspan partnership

First Nations Stewardship

- BC First Nations people **are** playing a greater role in safety, security and emergency preparedness/response for west coast marine operations, through active involvement in maritime business

HaiSea Marine
A Haisla - Seaspan partnership

HaiSea Marine

A Haisla - Seaspan partnership

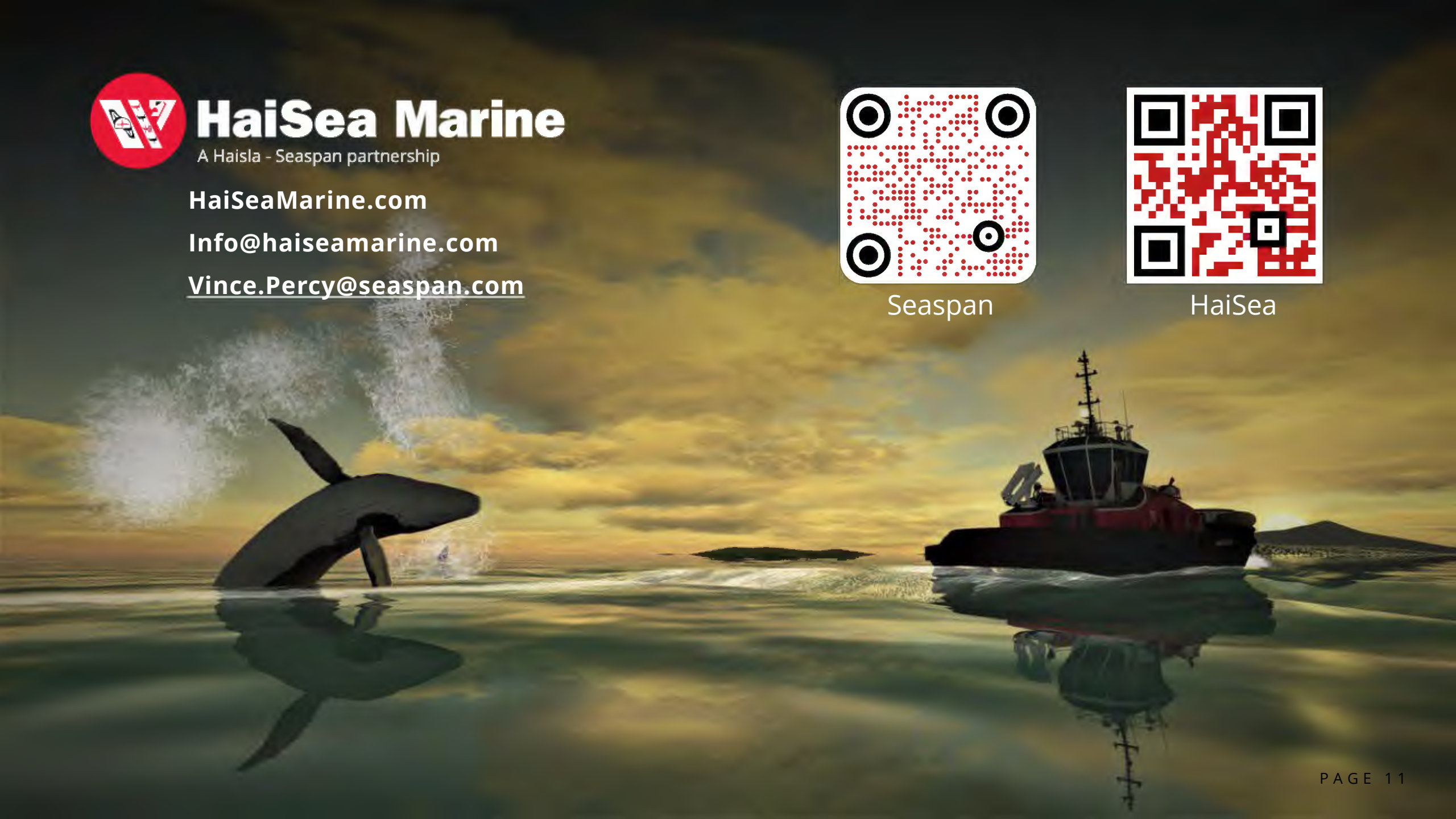
HaiSeaMarine.com

Info@haiseamarine.com

Vince.Percy@seaspan.com

Seaspan

HaiSea



CILTNA
Indigenous Representation in the Marine Industry

Canadian Coast Guard | Garde côtière canadienne

Canada

Overview

- My Story
- Indigenous Marine Emergency Response
- Planting a Seed
- Protecting Our Future
- Successes and Challenges
- Transformation
- Closing

My Story

- Attended the Coastal Nations Search and Rescue Course in 2018, beginning my career with CCG later that year
- Have been part of the Instructional team in our Indigenous Community Response Training team for 6 years
- 2 years experience in Marine Environmental Response
- Bridge Watch Student at BCIT

History of Indigenous Search and Rescue (ISAR)

"The current structure for marine response is too 'fragmented'

I'm confident with the political leadership and the will with the communities to do this."

- Joe Spears, Marine Safety Expert

ISAR Objectives

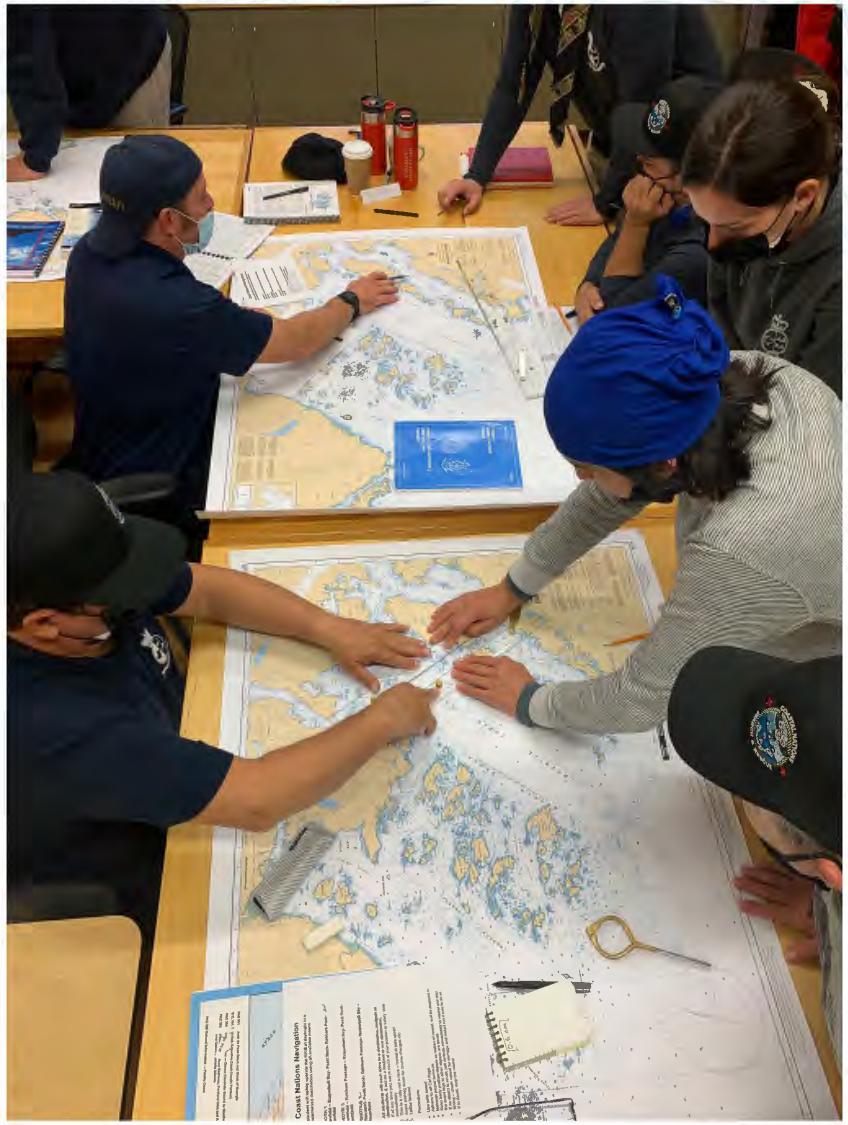
Save 100% of lives at sea

How do we achieve this?

- We weave threads of maritime safety to create a fabric of search and rescue across Canada
- Help empower Indigenous communities and build capacity for maritime safety
- Piece together the ‘fragmentation’ of SAR

Panel 3

- “BC First Nations people are playing a greater role in safety, security and emergency preparedness/response for west coast marine operations. What is the status, outlook and benefits of their participation, and what is being done to achieve its full potential?”



Ancient Spirit, Modern Mind

Investments in Indigenous Mariners

- Stewards of the land
- Local knowledge
- Sense of pride

How do we remove barriers to help merge Indigenous knowledge and values with a modern maritime industry?

Successes & Challenges

- Building relationships
- Creating an identity, empowering communities
- Removing barriers

- Remoteness
- Impacts of colonialism

Protecting our Future

- Stimulating local economies
- Investing in future generations
- Cross pollination between marine partners
- Recognizing the importance of self determination and community-based solutions

Left: Robert Johnson, Zone Coordinator CNCGA
Right: Derek Moss, Assistant Commissioner, CCG

Transformation

- 7+ years of a dedicated Indigenous Search and Rescue Program
- ~ 700 mariners trained
- Relationships with over 51 communities
- Coastal Nations Coast Guard Auxiliary created, 9 units signed on with 5 active
- Recognized on an international level
- True Truth and Reconciliation

Closing

Jordan Wilson, Heiltsuk Nation

Jordan.Wilson898@gmail.com

(250) 957 - 8243

Questions?

CILTNA Climate Change Preparedness Panel

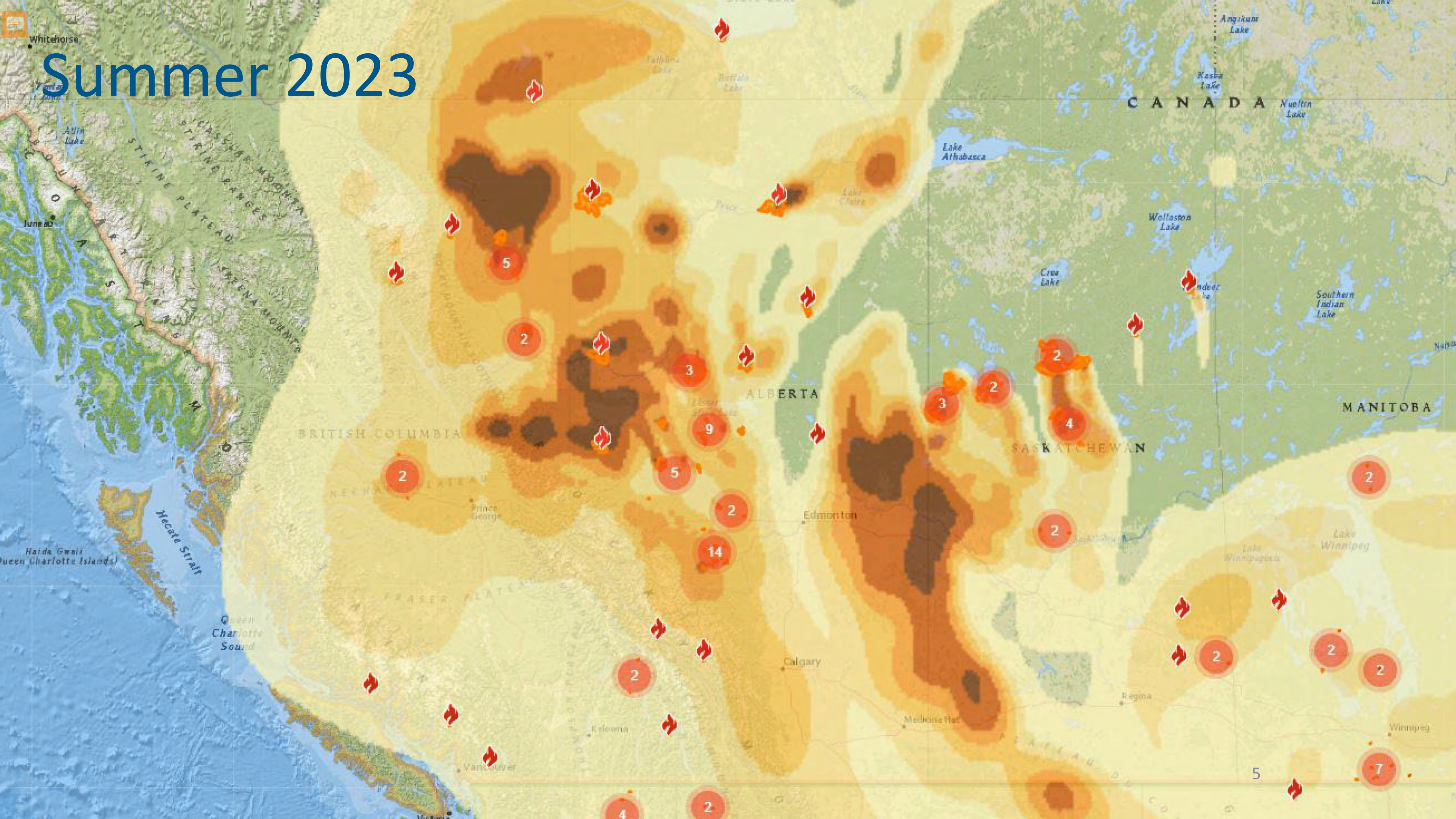
Peta Wolmarans – Director, Planning

Vancouver Airport Authority

November 2021

November 2021

Summer 2023


Whitehorse
Juneau
Atlin Lake
CANADA
Angikuni Lake
Kasba Lake
Nueltin Lake
Lake Athabasca
Wollaston Lake
Cree Lake
Southern Indian Lake
MANITOBA
SASKATCHEWAN
ALBERTA
BRITISH COLUMBIA
Edmonton
Calgary
Regina
Winnipeg
Medicine Hat
Kelowna
Vancouver
Prince George
Lake Winnipeg
Lake Winnipegosis
Haida Gwaii
(Queen Charlotte Islands)
Hecate Strait
Queen Charlotte Sound

Airport Risk and Resilience

Regional Projections

- Sea level rise and storm surge
- More intense rainfall events
- Less snow, but unpredictable
- Warmer temperatures, hotter temperatures will occur more often
- Drier summers

YVR Climate Change Adaptation Plan

Climate Risk and Resilience Report

Sea Level Rise and Storm Surge

More Intense Rainfall Events

Ensuring operational safety

Stormwater and drainage modelling

Infrastructure upgrades

Enhanced maintenance

Flood design levels

Unpredictable Snowfall

YVR Report & Action Plan

DECEMBER 2022 TRAVEL DISRUPTION

Real-Time Situational Awareness: Digital Twin and Dashboards

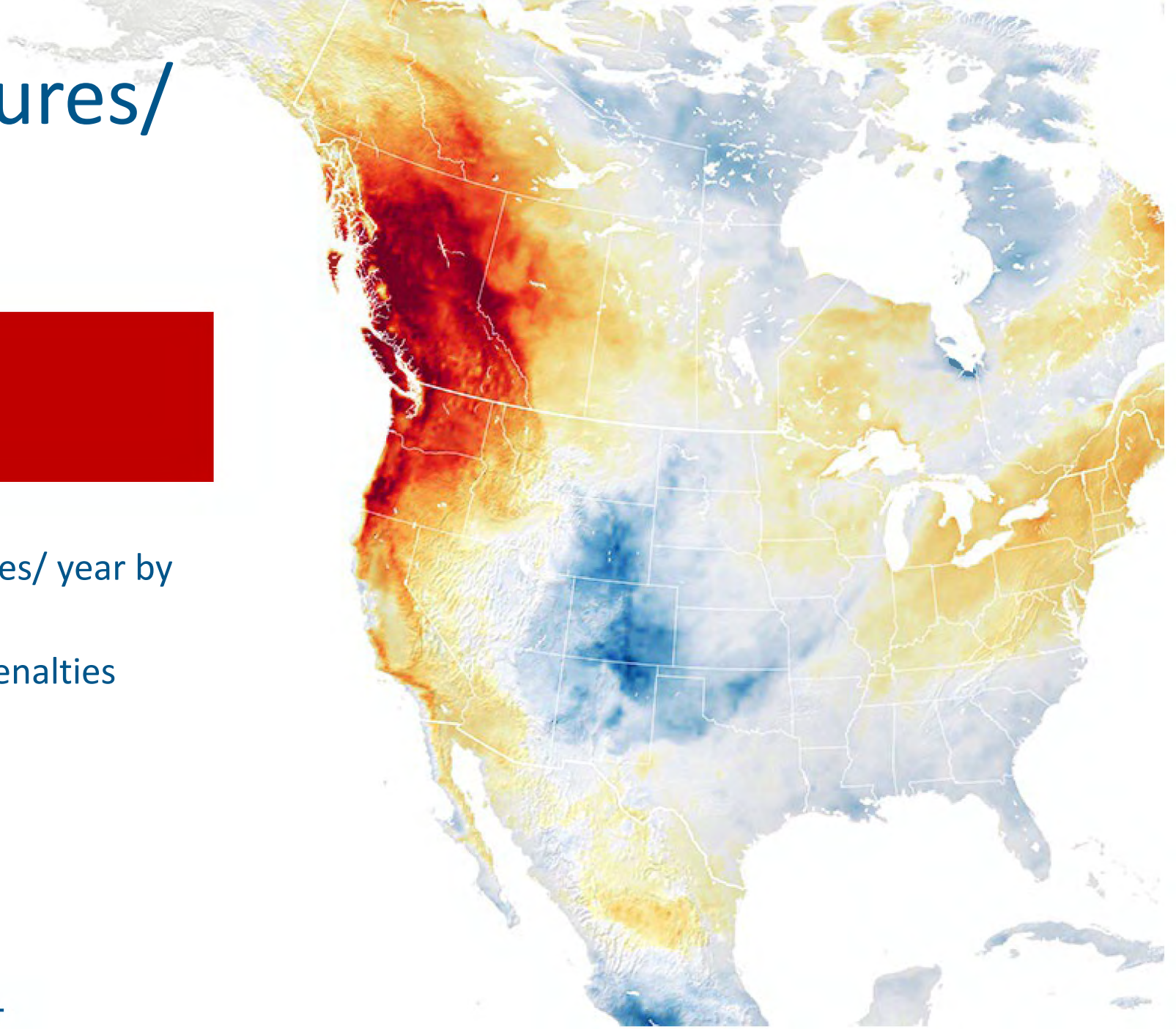
Warmer Temperatures/ Extreme Heat

June 2021 Heat Dome

- Temperatures 20° C above normal
- 4 days in June 2021 exceeded 30° C

Temperatures > 30° C forecast 14 times/ year by 2050

- Runway performance / payload penalties
- Pavement resilience
- Changing migratory bird patterns



Drier Summers

Wildfire evacuation and firefighting

Low visibility conditions

Water use

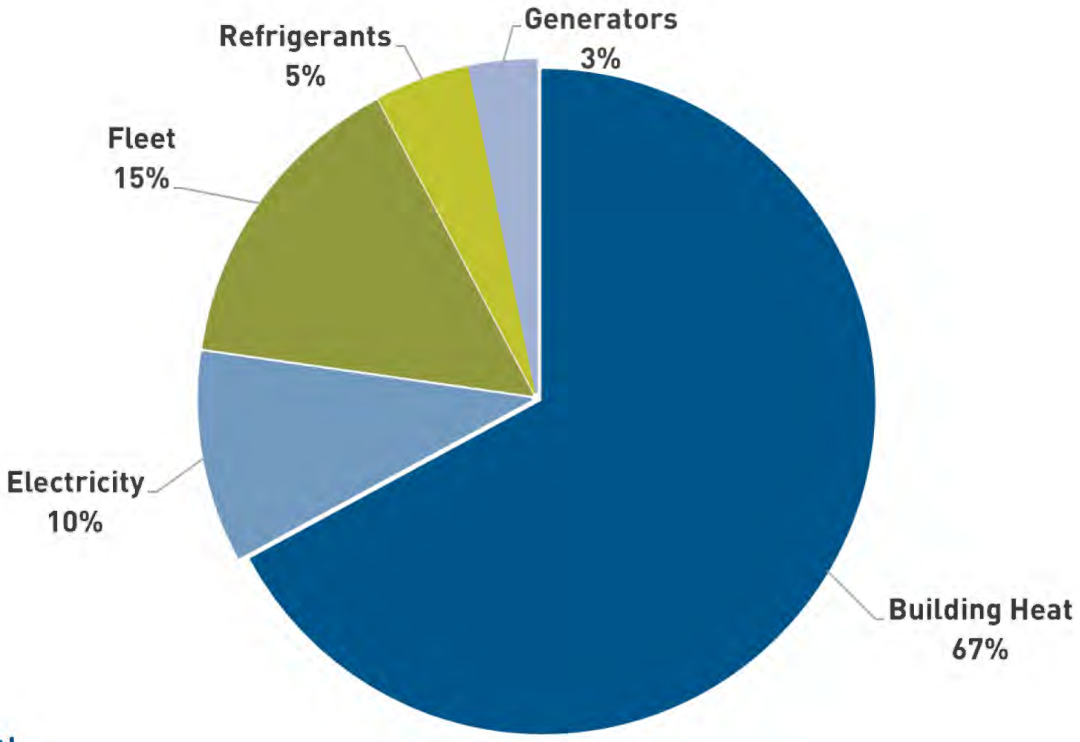
Availability of hydro power

Aviation accounts for 2.5% of global CO_2 emissions

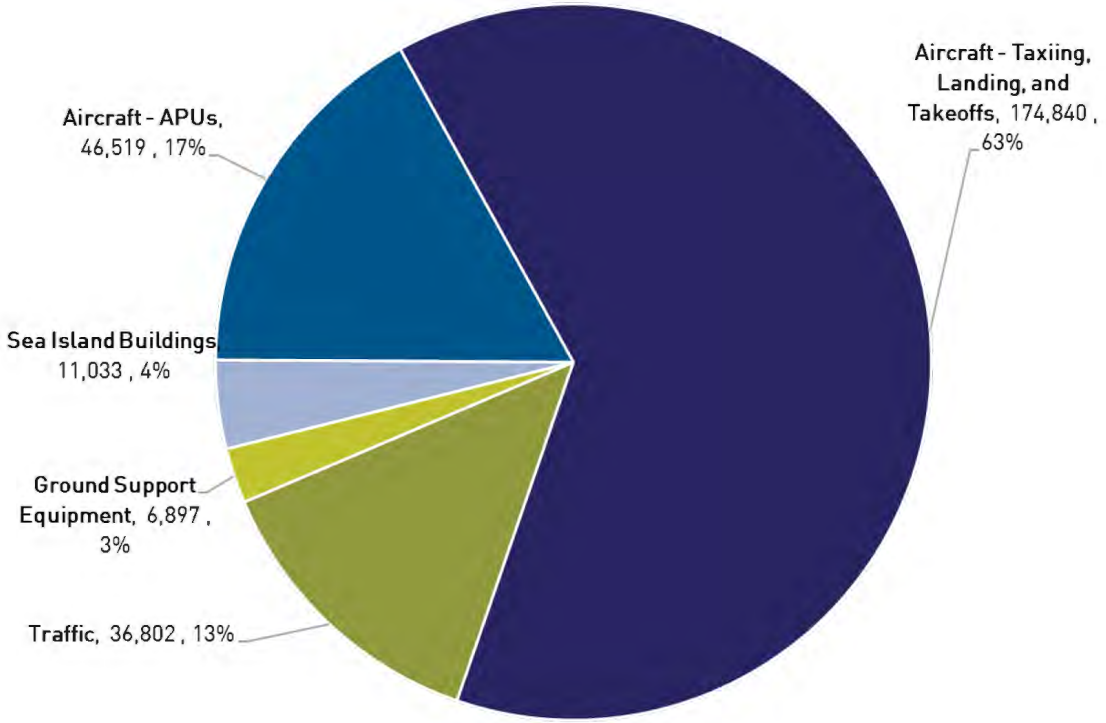
YVR - Net Zero by 2030

YVR's GHG Footprint

Airport Authority Emissions (2022)
Scope 1 & 2 = 11,437 tonnes



Airport Supply Chain Emissions (2022)
Scope 3 = 276,091 tonnes

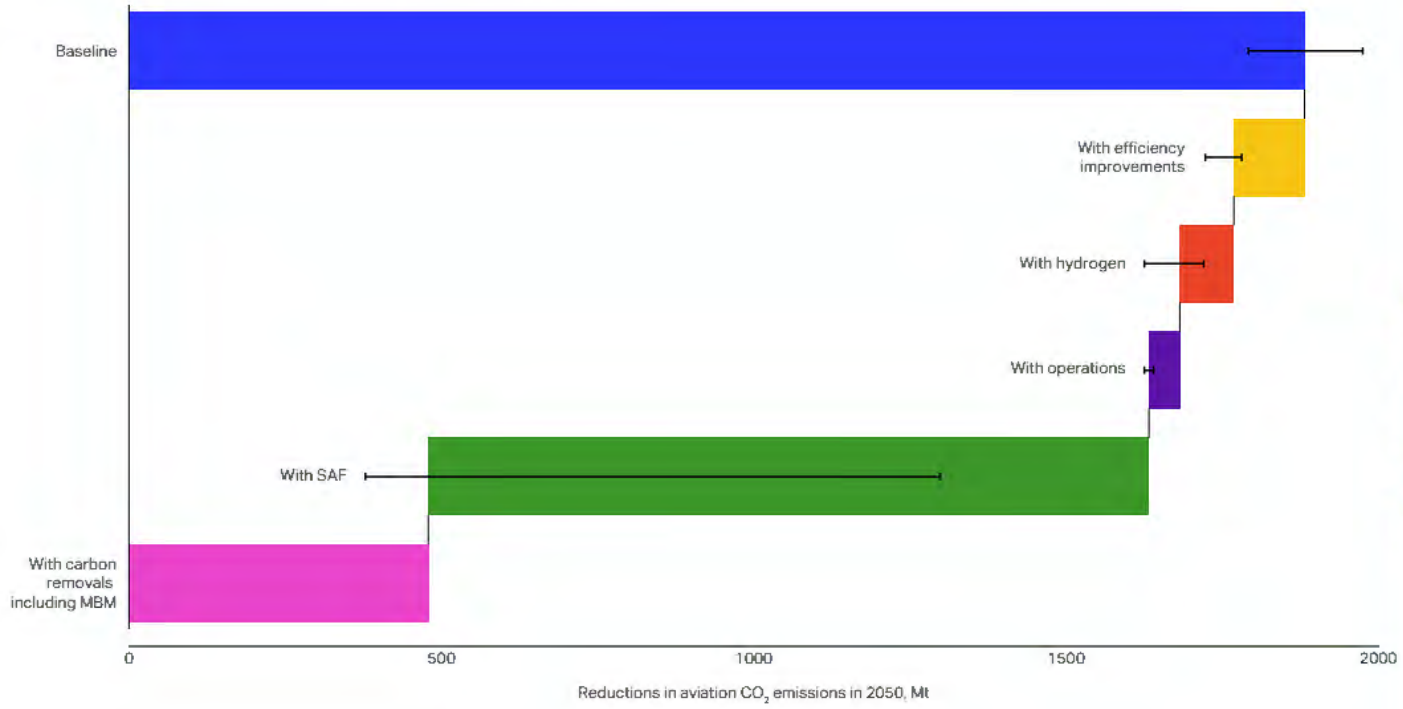


Decarbonizing Aviation

PROJECT GREEN YVR

Getting to Net Zero by 2050

Chart 2: Reduction in aviation CO_2 emissions in 2050 achieved through the different levers of action. The solid bar indicates the central case and the black lines indicate maximum and minimum reductions based on the scenarios modeled.



Planning for Aircraft of the Future

THANK YOU

Climate Resilience for Container Terminals

May 10, 2024

Presentation for Chartered Institute of Logistics and Transport

GCT Global Container Terminals Inc.

HQ in Vancouver, 3.5 million TEU capacity at Canada's Pacific Gateway

GCT Deltaport

Key Highlights

Detail	Canada's flagship marine terminal
Size	210 acres
Capacity	2.4 million TEUs annually
Berth	3 megaship equipped
Rail	On-dock, 8,334 metres (27,350')
Rail Service	Daily to US Midwest; approximately 300,000 TEUs delivered to US markets annually
STS Cranes	2 new Megamax, 10 Super Post Panamax; 12 total

GCT Vanterm

Key Highlights

Detail	Strategically located in the inner harbour. Highest productivity in the Port of Vancouver.
Size	76 acres
Capacity	950,000 TEUs annually
Berth	2
Rail	On-dock, 2,926 metres (9,600')
Rail Service	Daily to Canada & US Midwest
STS Cranes	2 new Megamax; 5 Super Post-Panamax

GCT – Global Commitment Program

Our Global Commitment program makes sustainability a priority

- Environmental Stewardship
- Innovation & Emission Reduction
- Community Partnership and Reconciliation

GCT 5- Year ESG Strategy

Strategy focuses on ten agreed upon ESG priority performance areas

Environment	1. Energy & Carbon 2. Marine Health 3. Climate Change Resilience
Social	4. Human Capital Management 5. Community Engagement & Impact 6. Sustainable Procurement 7. Indigenous Reconciliation
Governance	8. Compliance & Government Relations 9. Stakeholder Partnering & Innovation 10. ESG Governance

Our Investor Targets

2030: 40% reduction [1,2]

2050: Net Zero GHG Emissions

2025: 45% reduction [1,3]

2030: 67% reduction [1,3]

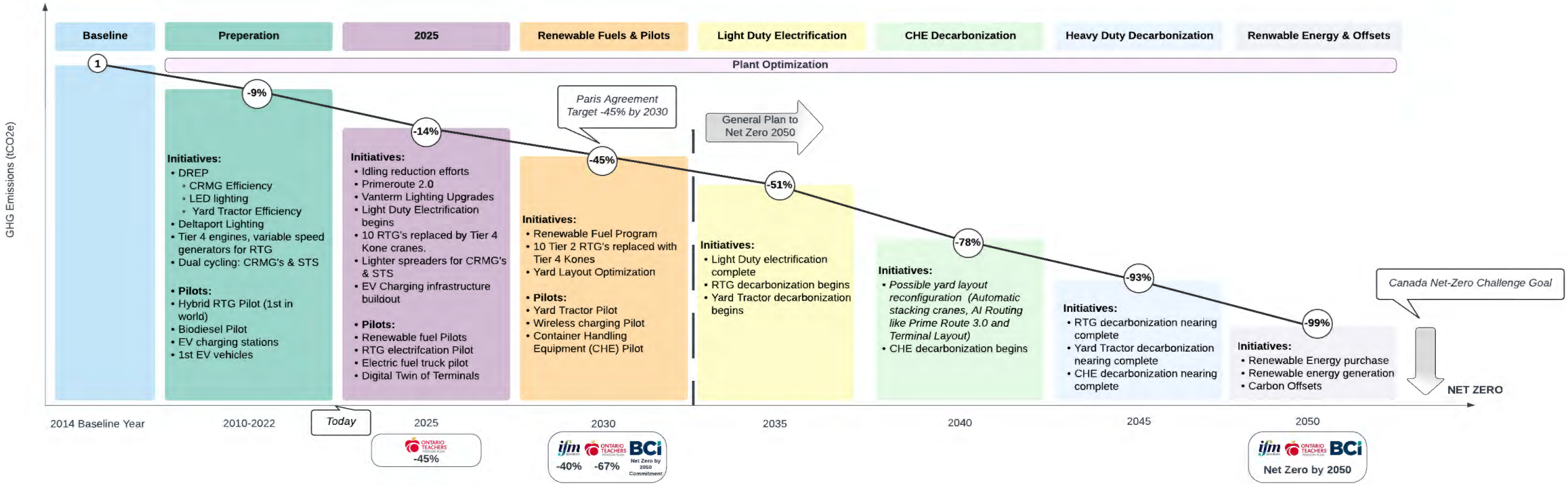
2050: Net Zero GHG Emissions

2030: 80% of carbon intensive investments have mature net zero aligned commitments(...)[4]

2050: Net Zero GHG Emissions[5]

1. In GHG Emissions as compared to a 2019 baseline
2. IFM press release, Oct 2021: LINK
3. OTPP press release, Jan 2021: LINK
4. BCI Climate Action Plan 2022, Page 5 : LINK
5. BCI Climate Action Plan 2022, Page 5 footnotes : LINK

GCT Emission Reduction Roadmap

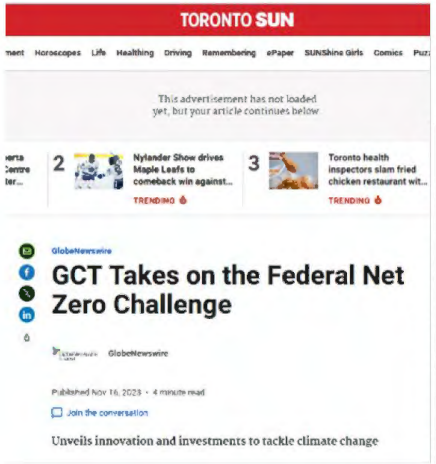


2050 Net-Zero-Challenge

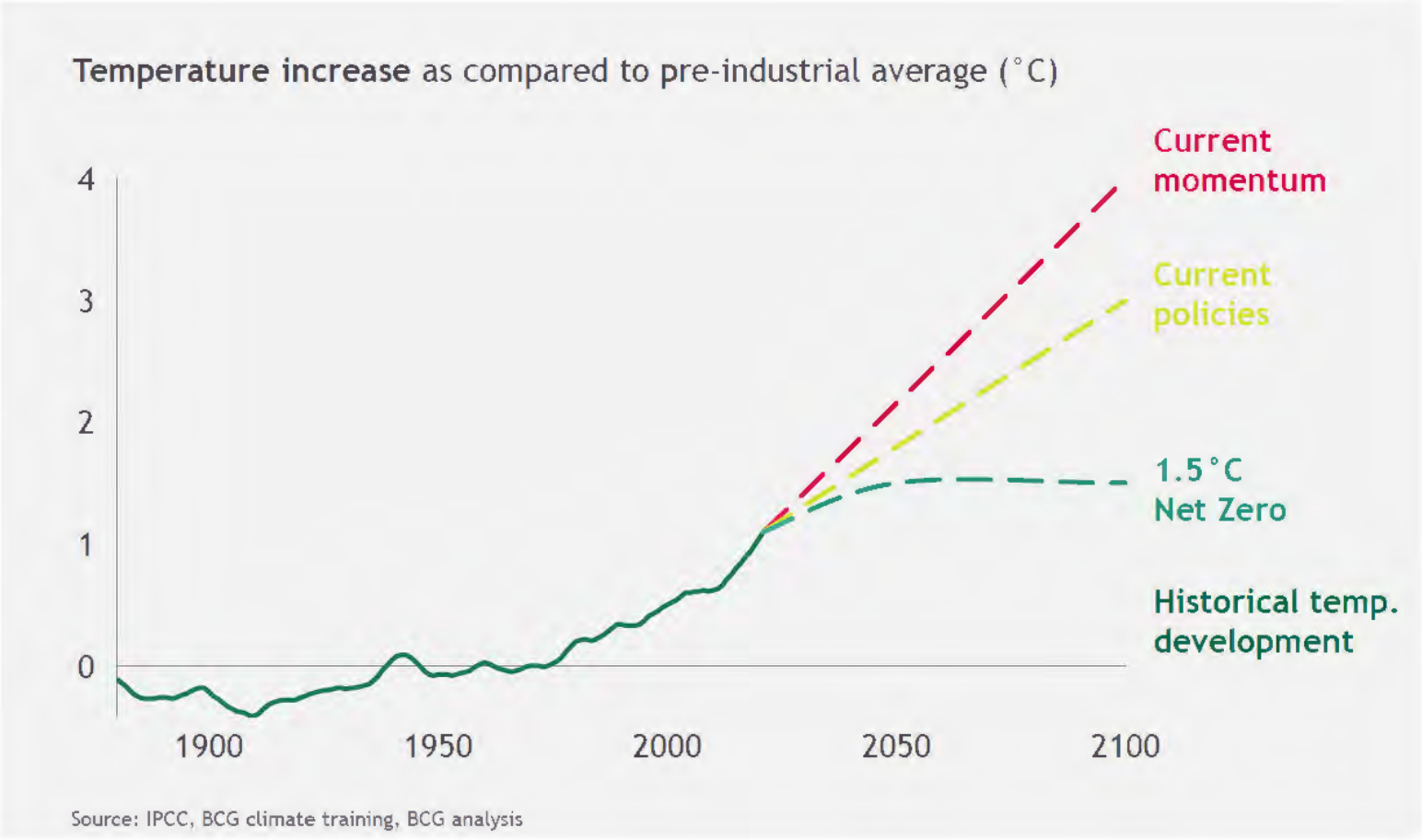
Government of Canada | Gouvernement du Canada

The Net-Zero Challenge

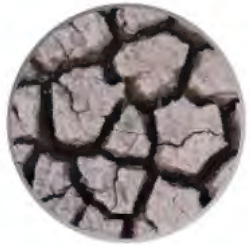
Committed to a clean future



Global average temperature trends



Impacts of a Changing Climate



	Increase in the level of oceans[1]	More and longer droughts[2]	Intensification of extreme weather	Threatened food security	… and related economic impact
1.5°C	+50 cm	4x more	11% more intense	2x poor harvests	…
4°C	+100 cm	9x more	30% more intense	4x poor harvests	…

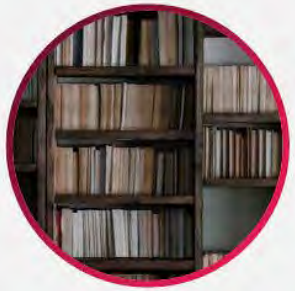
1. In 2100 as compared to 2000 2. In dry regions. In other regions, possibility for instance of intensification of heavy rains
Sources: GIEC, Carl-Friedrich Schleussner et al. Earth System Dynamics

Risks and Opportunities

Value protection

Market risks

Notably, **company valuation with financers & investors** (e.g., credit rating)



Transition risks

Notably, costs of compliance **with new regulations**, asset depreciation, etc.

Physical risks

Notably, **acute risks** (e.g., assets damage) or **chronical risks** (e.g., resource availability)

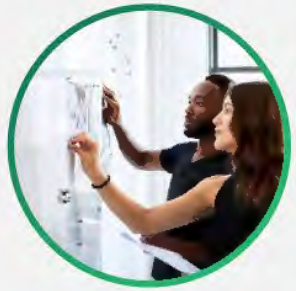
Value creation

New business

Notably, B2C/B2B demand **for environment-friendly products & services**

Financial

Efficiency investments and **better access to capital, higher value creation**



People

Notably, by responding to the **younger generations' ESG priorities**

Our approach to Climate Resilience

- Select Climate scenarios and time horizons
- Identify exposure and opportunities
- Quantitative climate risk and resilience study with modelling of terminals
- Climate adaptation planning

Climate Scenarios

IPCC scenarios

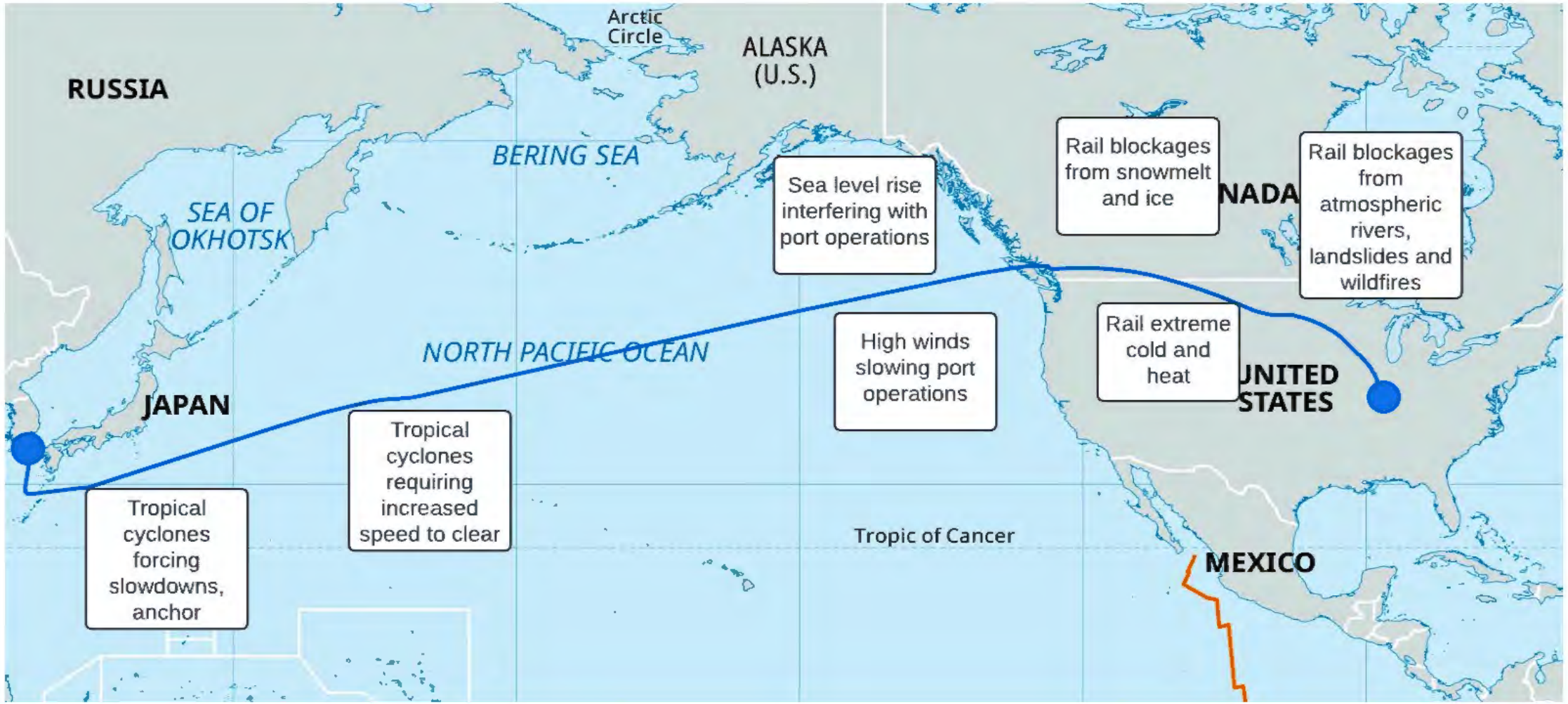
Scenarios based on assumptions regarding GHG emissions and their effect on global warming, sea levels, and other planetary physical factors

SSP1-1.9	SSP1-2.6	SSP2-4.5	SSP3-6.0	SSP5-8.5
1.4°C	1.8°C	2.7°C	3.6°C	4.4°C

Reference for assessment of climate-related **physical risks**

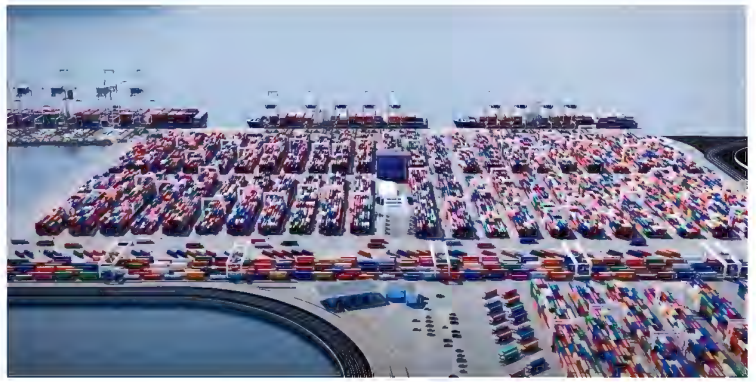
Note: IPCC scenarios prioritized here are those from the 6th Assessment Report. Most of them are in line with a RCPy scenario from the previous ARs: SSP1-2.6 is in line with RCP2.6, SSP2-4.5 is in line with RCP4.5, SSP5-8.5 is in line with RCP8.5
Source: IEA; IPCC; BCG project experience

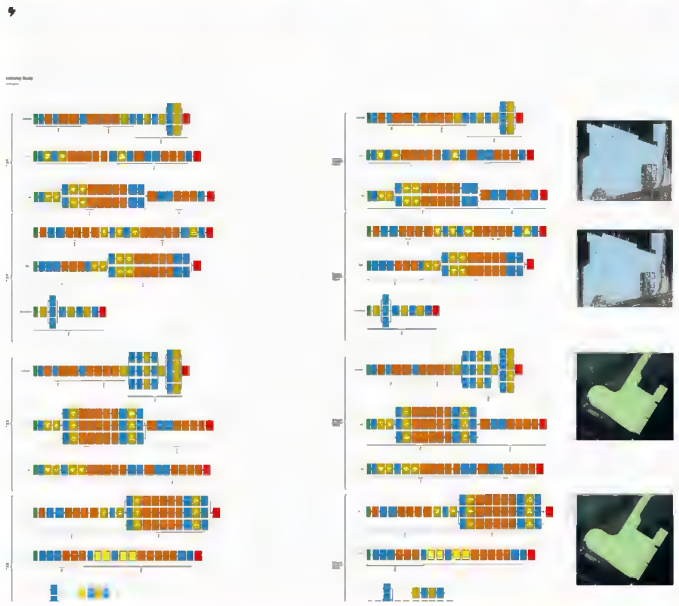
Container Journey Disruptions

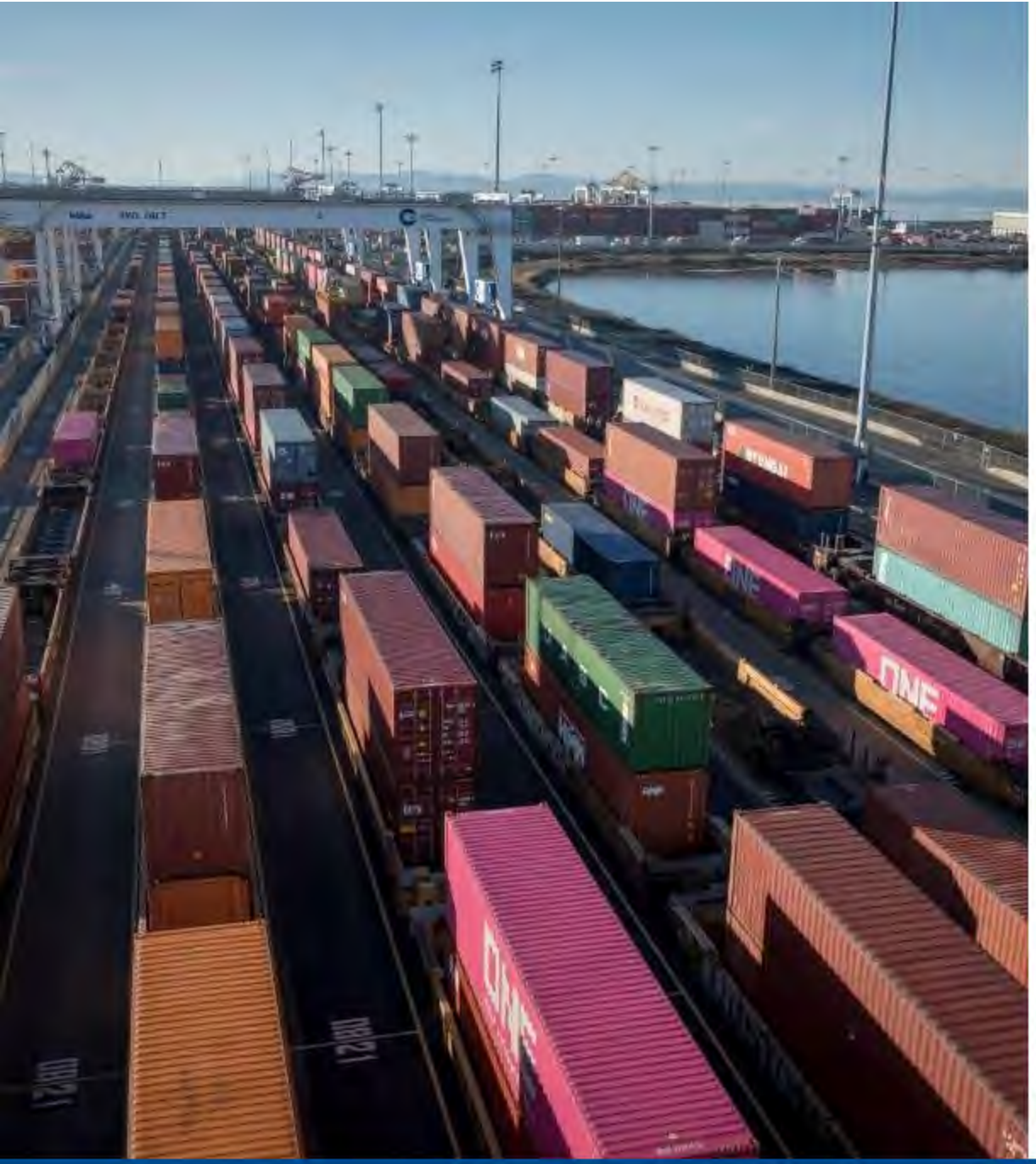


Climate Resilience Study questions

- Tropical storms
- Atmospheric rivers
- High winds
- Heavy rains
- Flooding
- Sea level rise
- Extreme temperatures
- Wildfire







Climate Adaptation Measures

- Equipment design considerations
- Infrastructure upgrades to meet future needs
- Operating procedure based on best practices
- Building contingency by increasing capacity within an existing footprint
- Stakeholder and community engagement
- Working with partners to handle volume surges by providing resiliency and recovery speed

A strong community means
a strong future.

Thank You

M.K. Anand, Energy and Sustainability Manager

Email: manand@globalterminals.com

Climate Change

Mekdam Nima

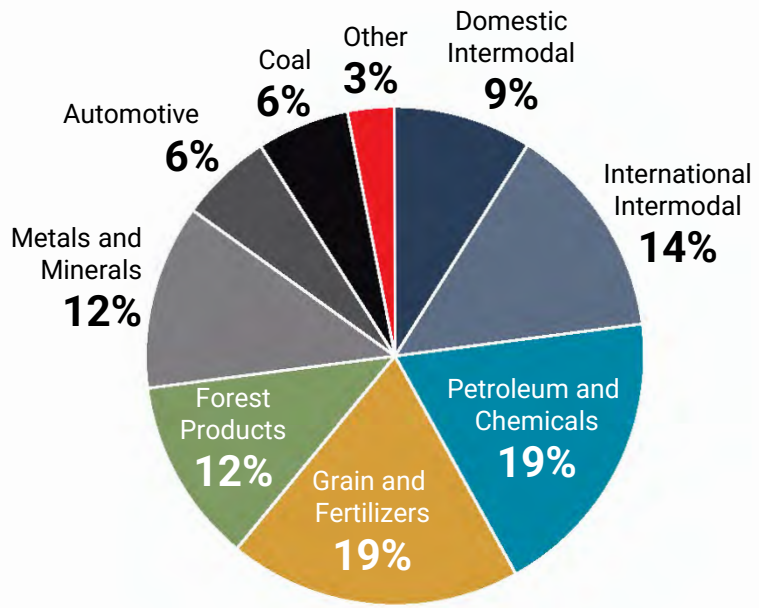
Senior Manager, Western Region, Canada
Bridge Initiatives and Climate Change

2024 CILTNA Annual Spring Outlook Conference

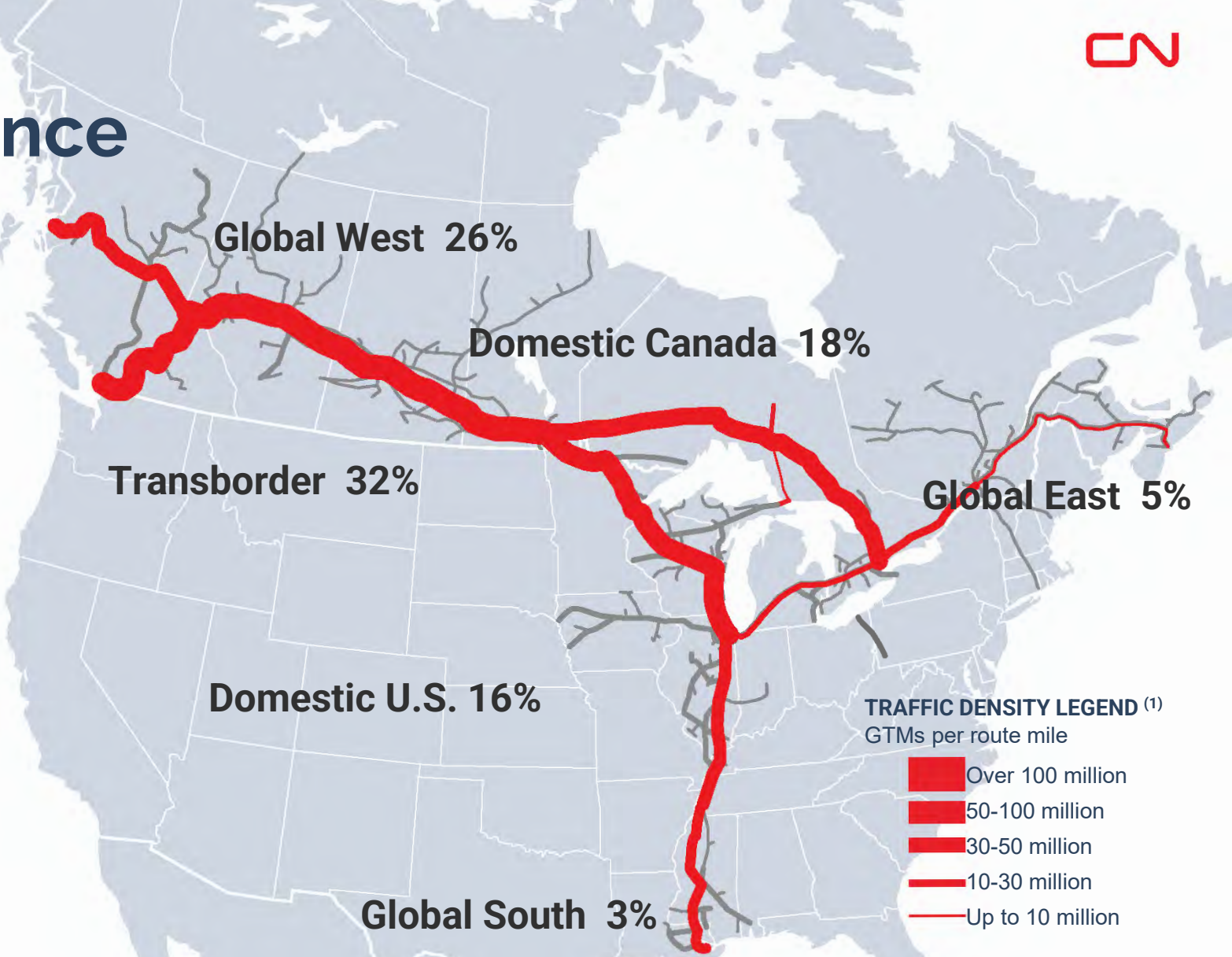
May 10, 2024

Our business at a glance

A diversified portfolio



Based on 2023 revenues



Playing an essential role in moving the North American economy and enabling global trade

Increasing Our Level of Ambition

Our climate is changing, businesses must not merely adapt, but be part of the solution

Delivering responsibly

Environment	Safety	People	Community	Governance
Conduct our operations in a way that seeks to minimize environmental impact, while providing cleaner, more sustainable transportation services to our customers	Be the safest railroad in North America by establishing an uncompromising safety culture and implementing systems designed to minimize risk and drive continuous improvement	Provide a safe, supportive and diverse work environment where our employees can grow to their full potential and be recognized for their contributions to our success	Build safer, stronger communities by investing in development, creating socioeconomic benefits, and ensuring open dialogue with all stakeholders, including Indigenous peoples	Continuously improve our culture of integrity and ethical business, building trust and confidence with all our stakeholders

Our approach to a more sustainable future

New Vancouver-based group builds green pathway between Canada and Asia (April 2024)

The North Pacific Green Corridor Consortium (NPGCC) aims to decarbonize transportation between Canada, Japan and South Korea

A new Vancouver-based not-for-profit aims to make the transportation corridor between Canada, Japan and South Korea greener.

The NPGCC which announced its formation in April 2024, said its members and partners will work together to support the decarbonization of transportation, clean energy security and supply chain resilience on multiple commodities, including agricultural products, metal concentrates and steelmaking coal.

The North Pacific Green Corridor Consortium (NPGCC)

CN Battery-Electric Collaborations

Shifting to Alternative Propulsion

- In 2021, we announced the purchase of Wabtec's first 100% battery-electric heavy-haul locomotive.
- We anticipate significant efficiencies and emissions reductions from the technology, in turn reducing overall locomotive fuel consumption and emissions of a train.

Industry R&D co-ordination driving the locomotive(s) of the future

The effects of climate change and extreme weather present risks to our customers/markets, the economy, our infrastructure and our operations.

Impact to Our Customers/Markets

Coal	Grain	Lumber
		

Risks to Rail by Climate Event

Climate Event		Impact on Rail Transportation
	**Extreme Temperature**	•Extreme heat: rail misalignments and track buckling •Extreme cold: ineffective braking, track and wheel breakage, frozen switches
	**Extreme Precipitation**	•Flooding •Damaged rail bed support, tracks and bridges •Washouts and obstructions
	**Sea Level Rise**	•Flooding •Damaged rail bed support and tracks •Washouts and obstructions
	**Extreme Wind**	•Rail car blow-over •Damaged signalization equipment •Rail line obstructions and visibility issues
	**Warming Trend / Drought**	•Wildfire •Permafrost thaw, leading to damaged rail bed support and damaged tracks
	**Snowfall**	•Risk of avalanches •Obstructions

Analysis Input

IPCC WGI Interactive Atlas was selected as the data source for the analysis:

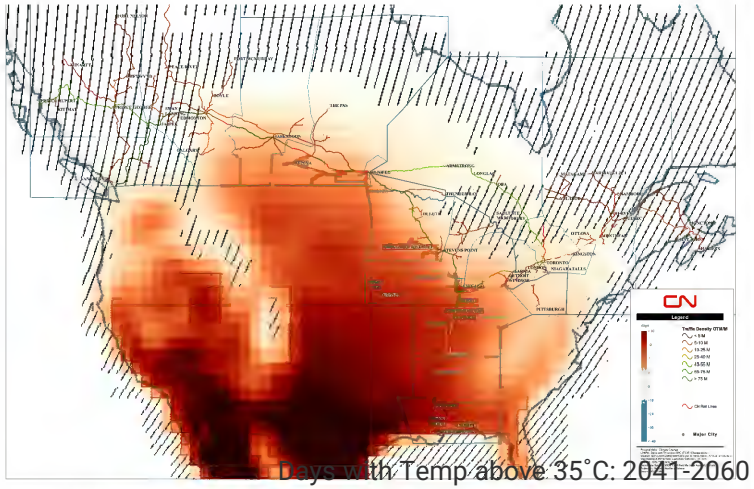
- Credible: International authority on science related to climate change
- Offers a single, consistent source of data for CN's network

"Variables" within the IPCC tool were selected to represent each of the categories of physical risk confirmed as relevant to CN by the Working Group:

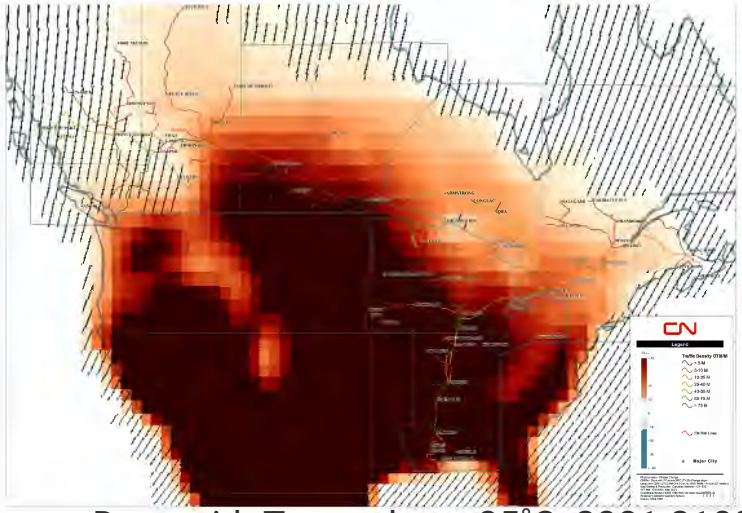
IPCC Variable	Physical Risk Category	Potential Impacts to CN
Days with temperature above 35˚C	*Extreme Temperature*	Rail misalignments, buckling
Standardized Precipitation Index	*Warming Trend / Drought*	Wildfire
Change in Maximum 5-day Precipitation	*Extreme Precipitation*	Flooding, washouts
Surface Wind	*Extreme Wind*	Asset damage, obstruction
Snowfall	*Snowfall*	Obstruction
Sea Level Rise	*Sea rise*	Asset loss

The Working Group reviewed outputs from the tool against CN's network to formulate conclusions and made recommendations for next steps.

Example of Output:



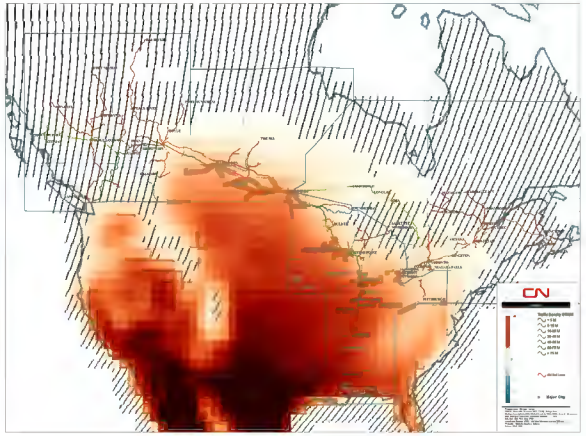
Days with Temp above 35˚C: 2041-2060



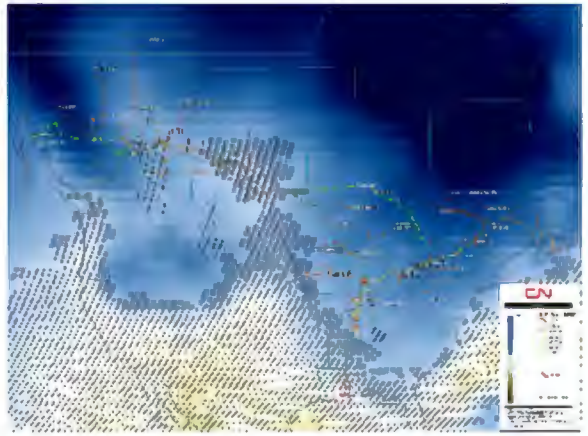
Days with Temp above 35˚C: 2081-2100

Climate Change

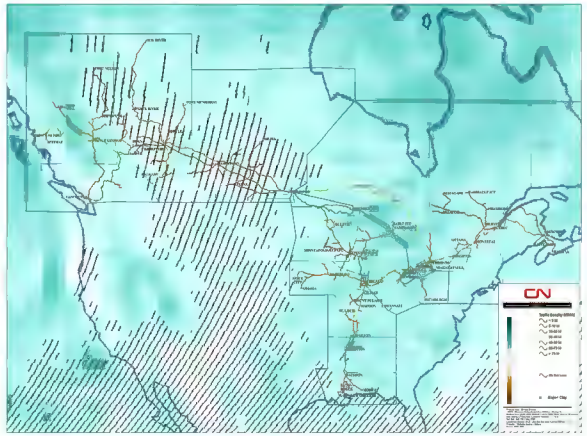
Physical Risks of Climate Change Working Group



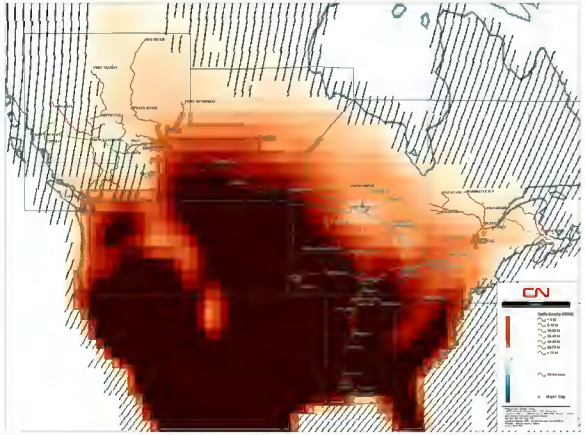
Days with Temp above 35˚C: 2041-2060



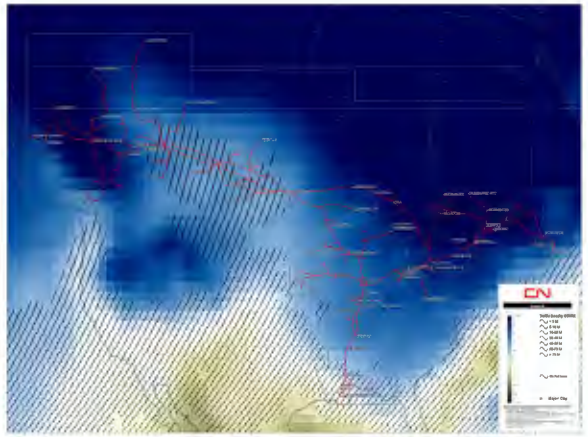
Standardized Precip Index: 2041-2060



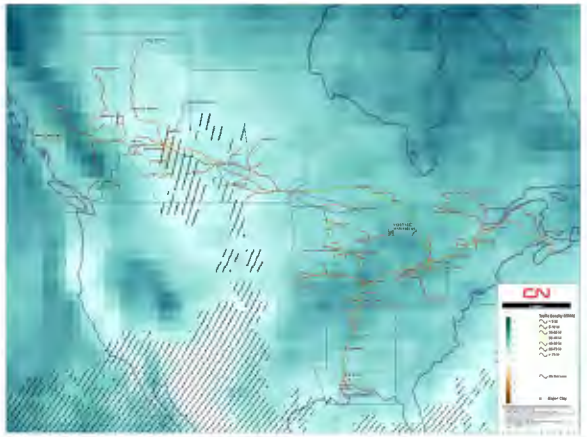
Maximum 5-Day Precipitation: 2041-2060



Days with Temp above 35˚C: 2081-2100



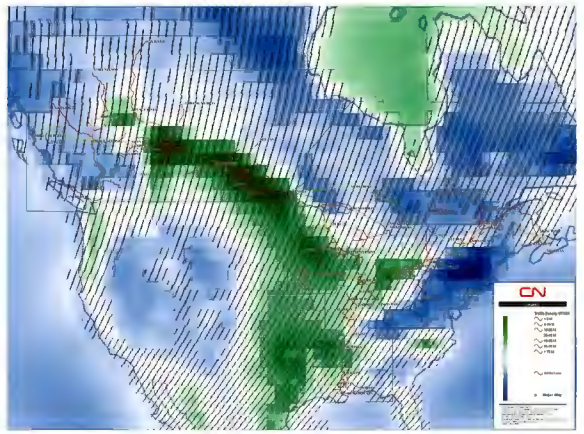
Standardized Precip Index: 2081-2100



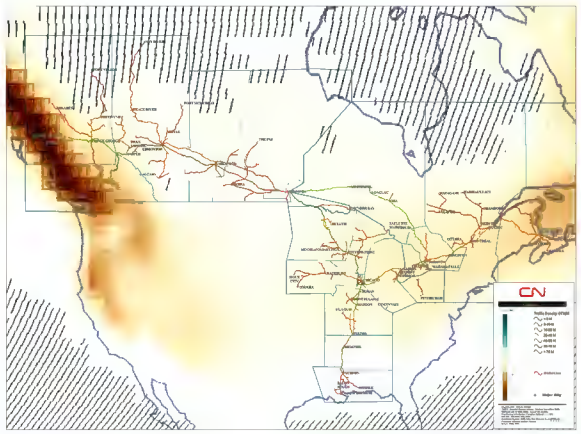
Maximum 5-Day Precipitation: 2081-2100

Climate Change

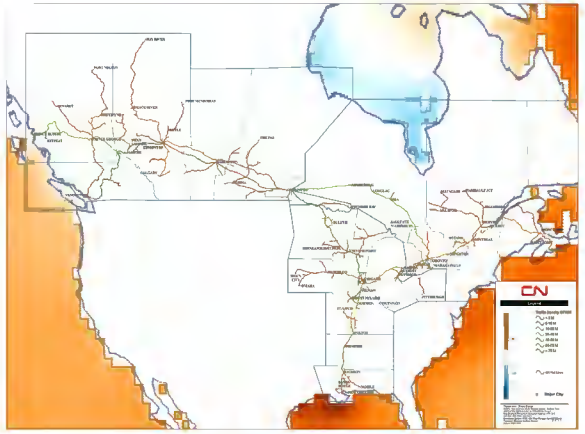
Physical Risks of Climate Change Working Group



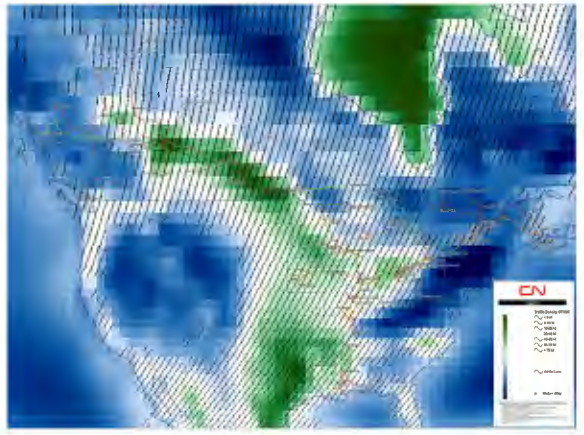
Surface Wind: 2041-2060



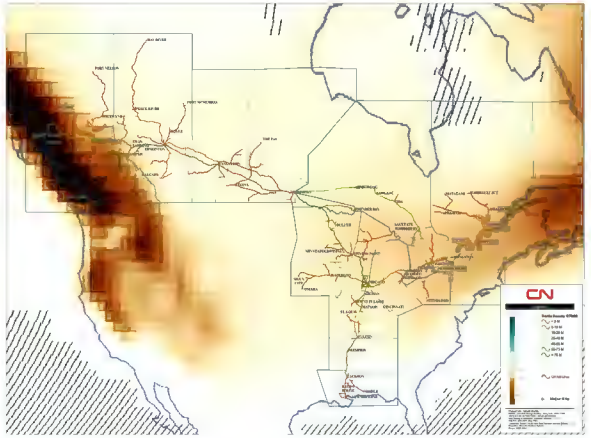
Snowfall: 2041-2060



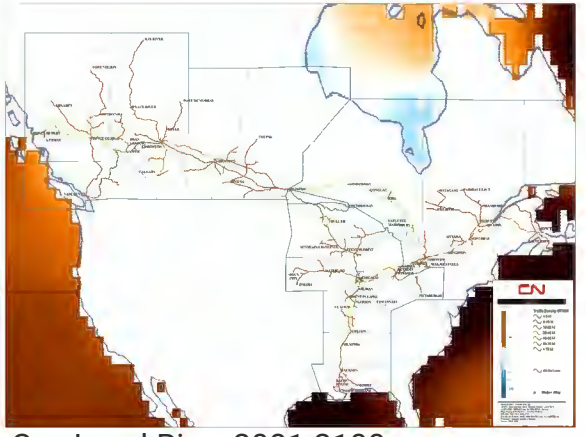
Sea Level Rise: 2041-2060



Surface Wind: 2081-2100



Snowfall: 2081-2100



Sea Level Rise: 2081-2100

2023 Challenges

Wildfires

Fort Nelson, B.C. – June 9, 2023

2023 Challenges

Extreme precipitation

Northwest from Edmonton, AB - June 19, 2023

2023 Challenges

Extreme precipitation

Northwest from Edmonton, AB - June 19, 2023

2023 Challenges

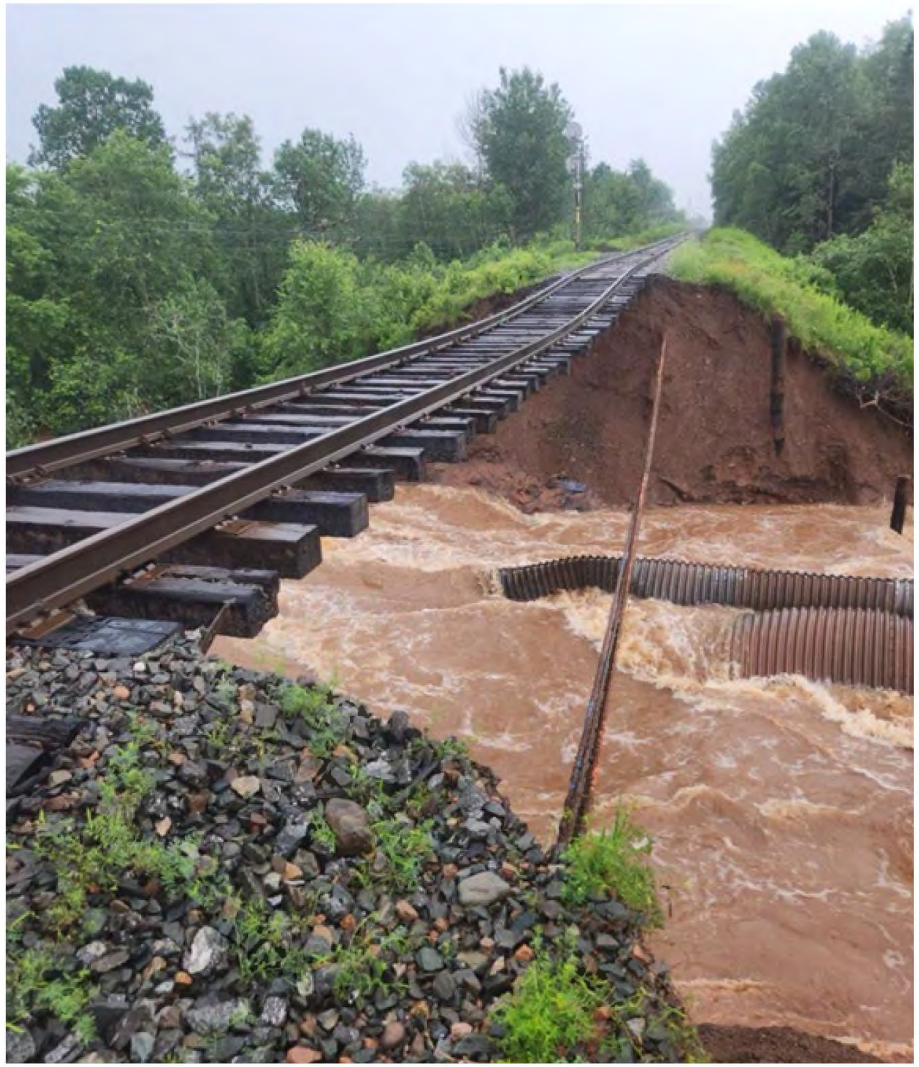
Wildfires

Matagami, QC - June 29, 2023

2023 Challenges

Storm

Truro, NS - July 22, 2023



Improving Our Resiliency

Improving Our Resiliency

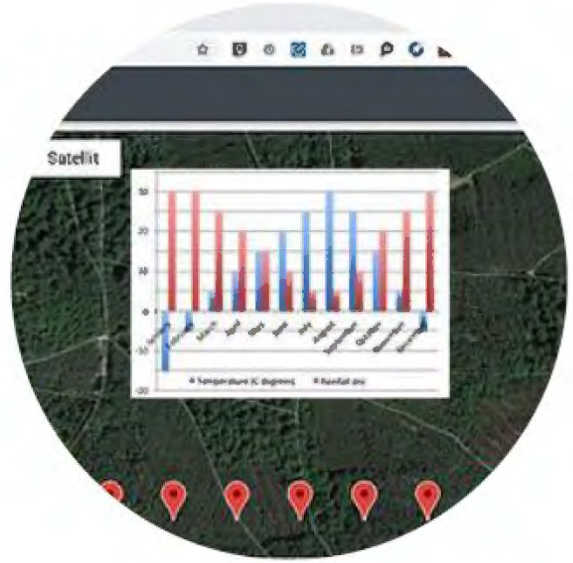
Fire Sensors:

- Dryad
- SneseNet

Wildfire Sensor

Mesh Gateway

Border Gateway



Cloud Platform

1990

SO, THIS CLIMATE CHANGE THING COULD BE A PROBLEM...

1995

CLIMATE CHANGE: DEFINITELY A PROBLEM.

2001

YEP, WE SHOULD REALLY BE GETTING ON WITH SORTING THIS OUT PRETTY SOON...

2007

LOOK, SORRY TO SOUND LIKE A BROKEN RECORD HERE...

2013

WE REALLY HAVE CHECKED AND WE'RE NOT MAKING THIS UP.

2019

IS THIS THING ON?

TAP TAP TAP

R.McRae. 28/9/19

Thank you

T'Sou-ke First Nation:

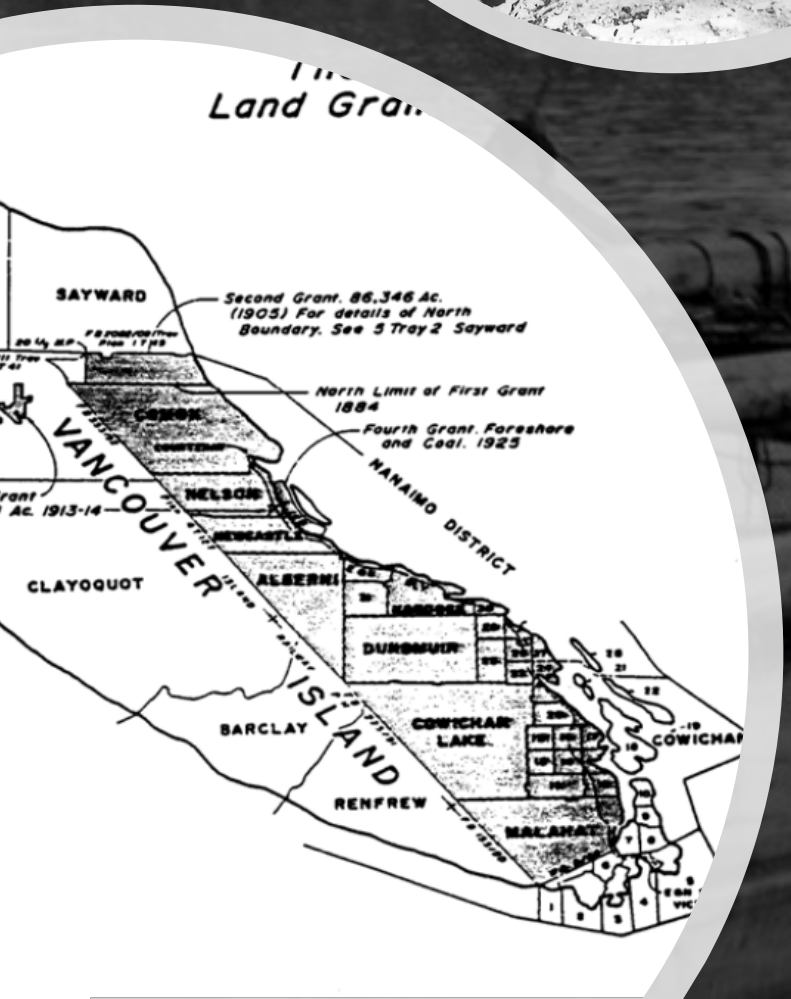
Stewards of the Territory

Driving Growth in Canada's Blue and Green Economies

T’Sou-ke First Nation

- Located on the south coast of Vancouver Island between Port Renfrew and Victoria
- Member of the Te’mexw Treaty Association
- 2 reserves in the District of Sooke
- ~300 members

Current T'Sou-ke First Nation Reservation Land
VS
T'Sou-ke First Nation Traditional Territory

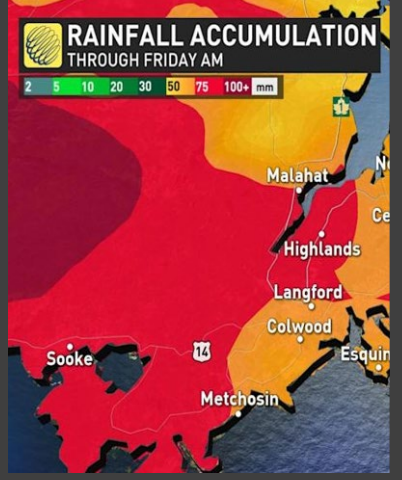


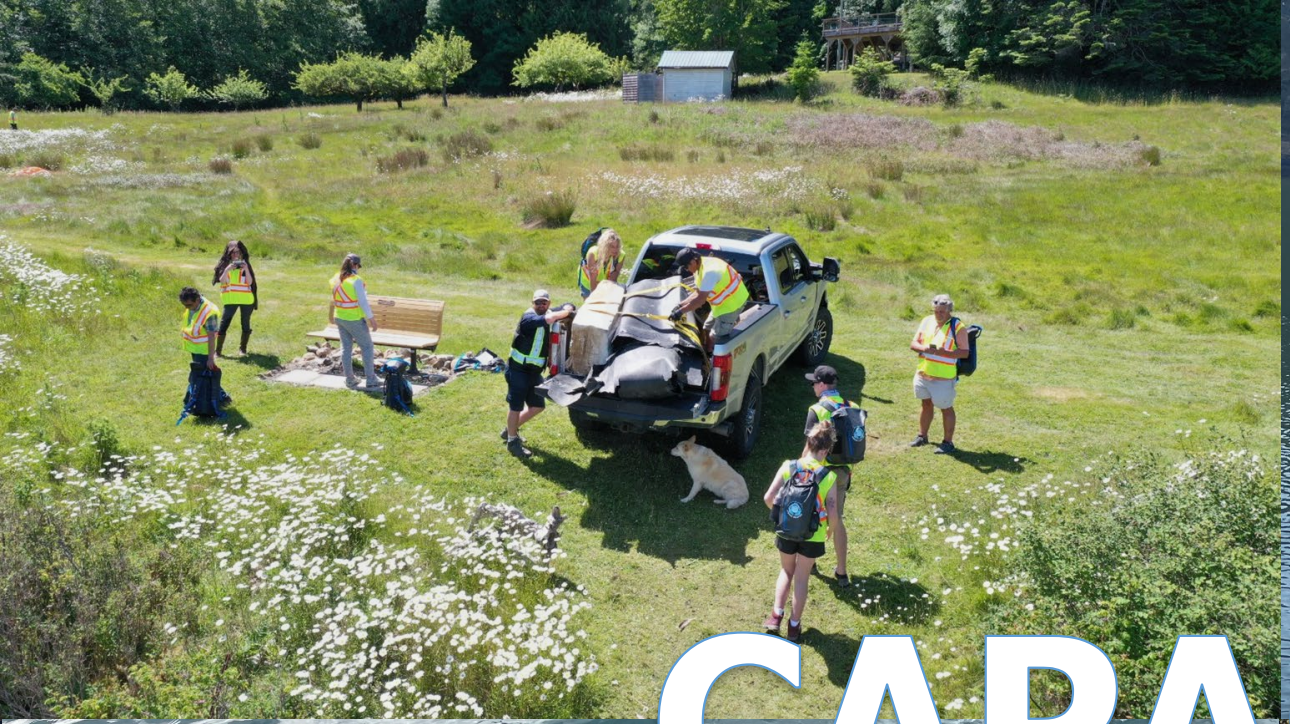
A Legacy of Institutional Colonialism

- CNR Land Grant
- Old Growth Logging
- Over-Fishing
- Over-Harvesting
- Mining and Extraction
- Habitat Degradation

Current Challenges

- Invasive Species
- Climate Change Pressures
- Vessel Groundings
- Derelicts and Liveaboards
- Ghost Gear and Marine Debris
- Population Pressures
- Development and Construction
- Improper Harvesting and Slash and Burn
- Species at Risk
- Vessel Noise

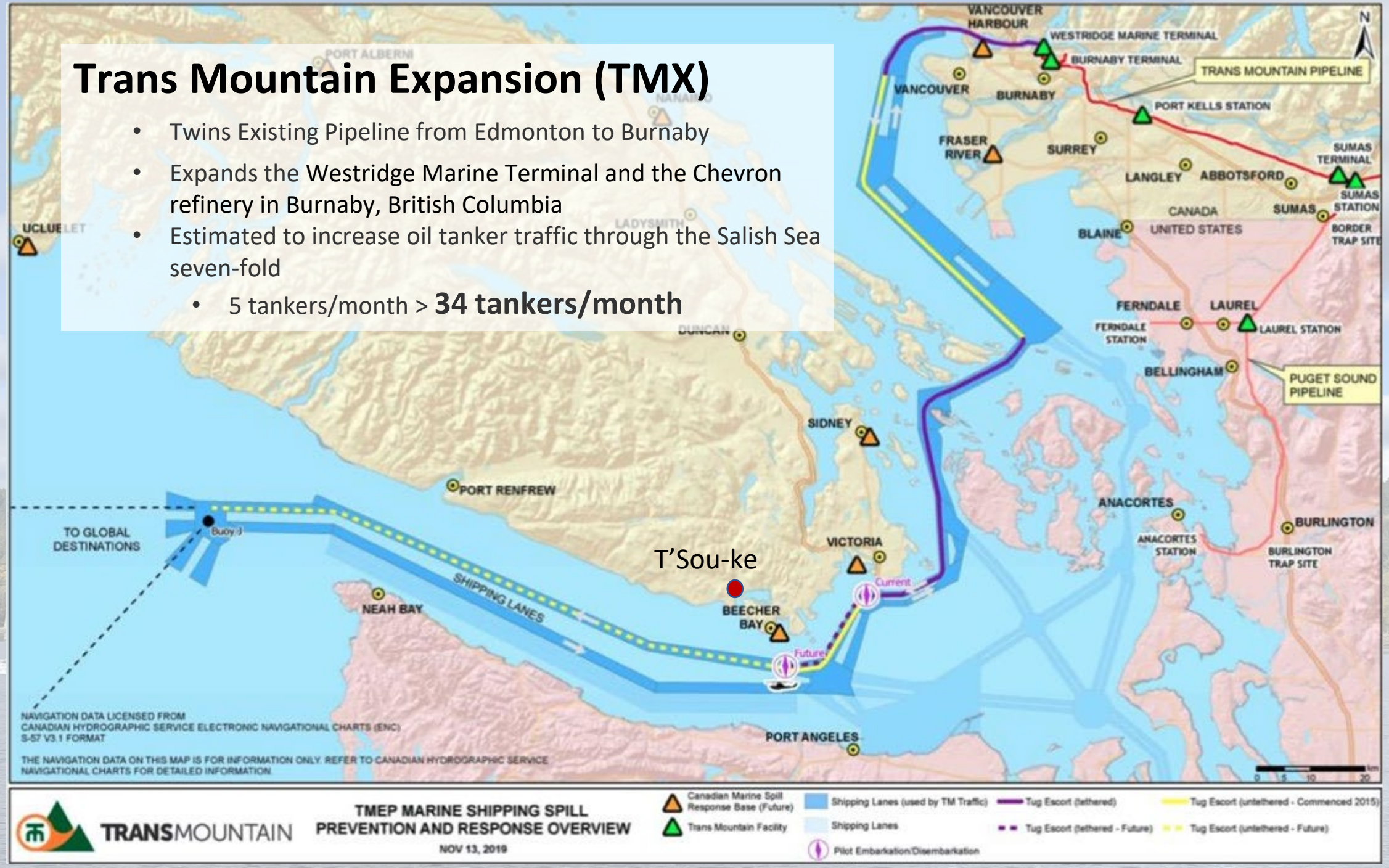




CAPACITY!

Trans Mountain Expansion (TMX)

- Twins Existing Pipeline from Edmonton to Burnaby
- Expands the Westridge Marine Terminal and the Chevron refinery in Burnaby, British Columbia
- Estimated to increase oil tanker traffic through the Salish Sea seven-fold
  - 5 tankers/month > **34 tankers/month**



Community Development – 4 Pillars

Energy Autonomy

Cultural Renaissance

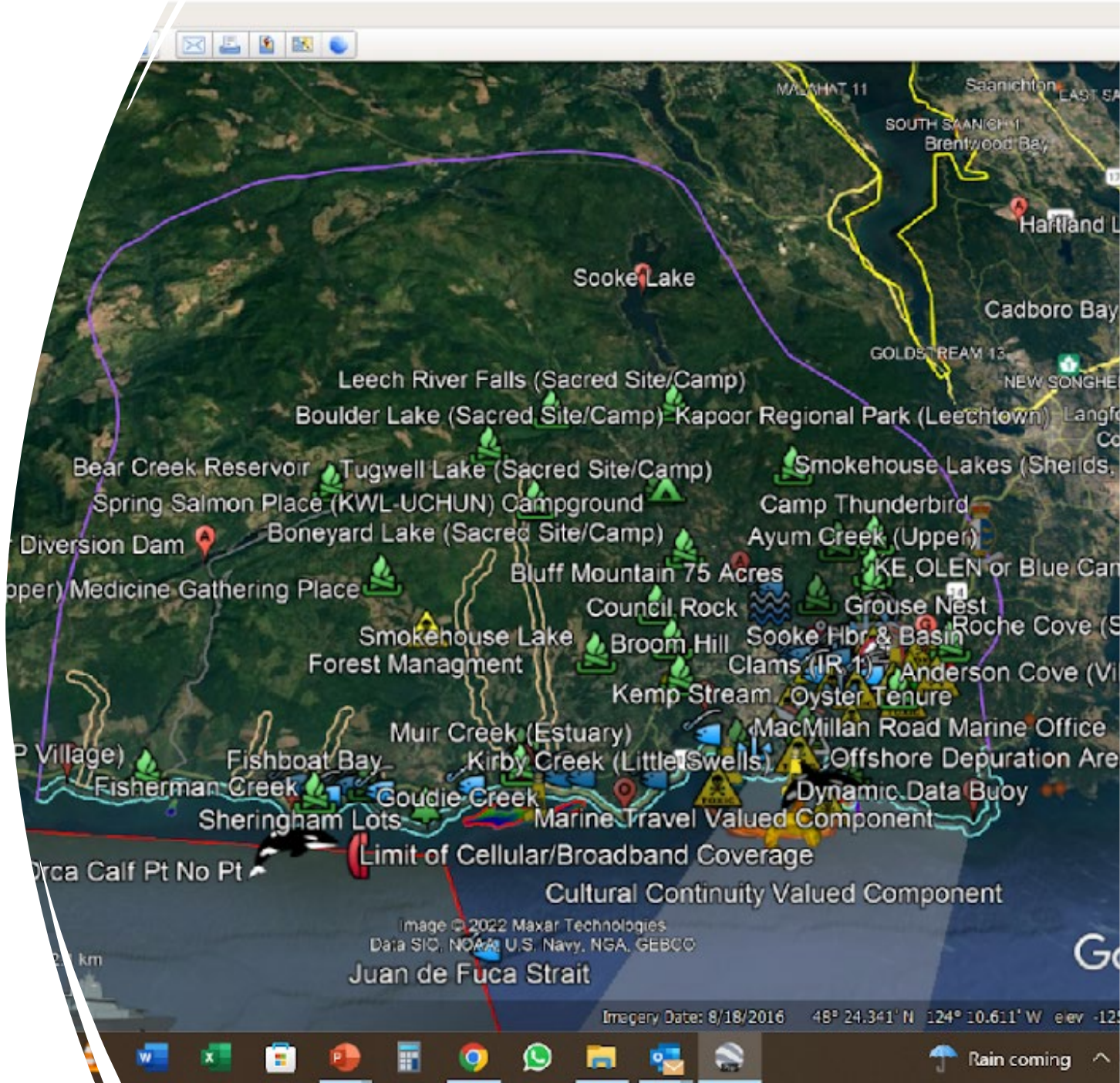
Food Self-Sufficiency

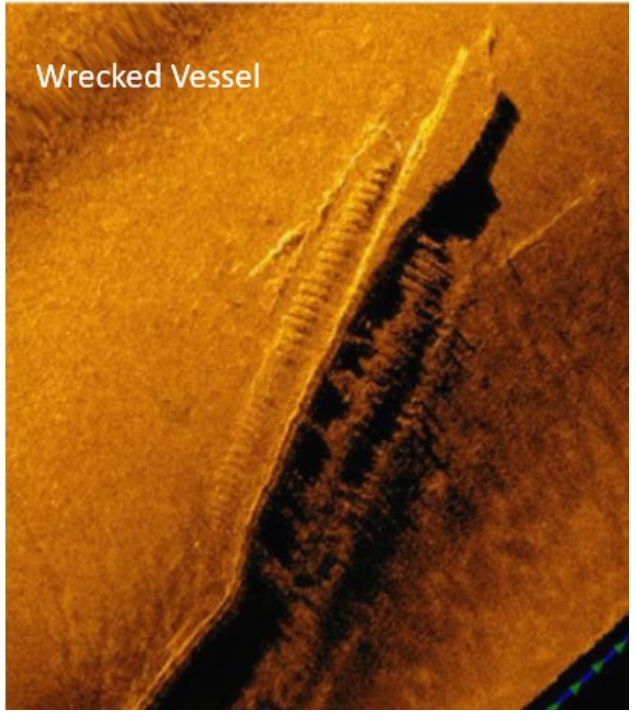
Economic Development

- Marine Stewardship
- Training and Skills Development
- Marine and Field Services
- Innovation in the Blue and Green Economy

Our Data Driven Approach

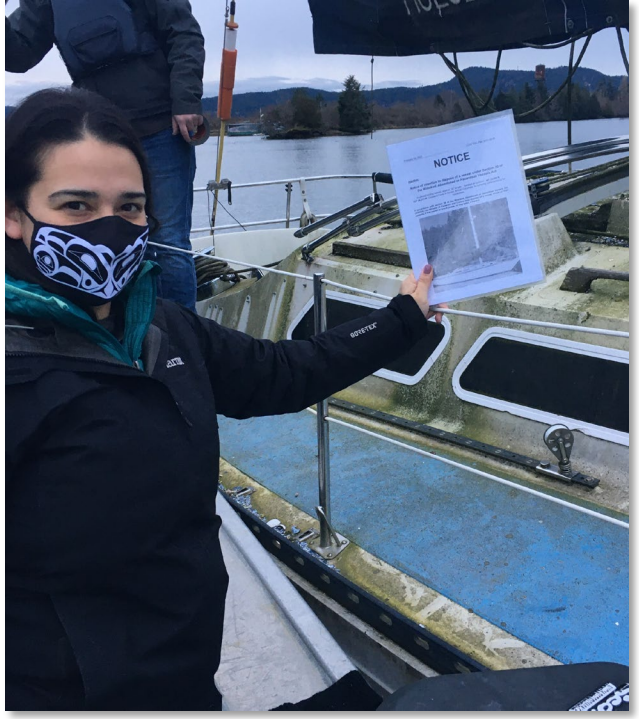
- We rigorously collect, fuse and analyze and integrate Traditional Knowledge with modern methods to create knowledge, understanding and ultimately wisdom to inform risk-based decisions. Working together with like-minded partners we are ensuring that the needs of the present can be met while providing for our the future





Marine Monitoring and Data Collection

- Community Fishers CTD
- Marine Labs Sensor Bouys
- Hydrophone and Vessel Noise
- BRNKL Derelict Monitoring
- Photogrammetry
- Trail Cameras
- Bioscan eDNA monitoring
- Lidar, Multibeam and Sidescan Imagery
- Guardian Watchmen Program

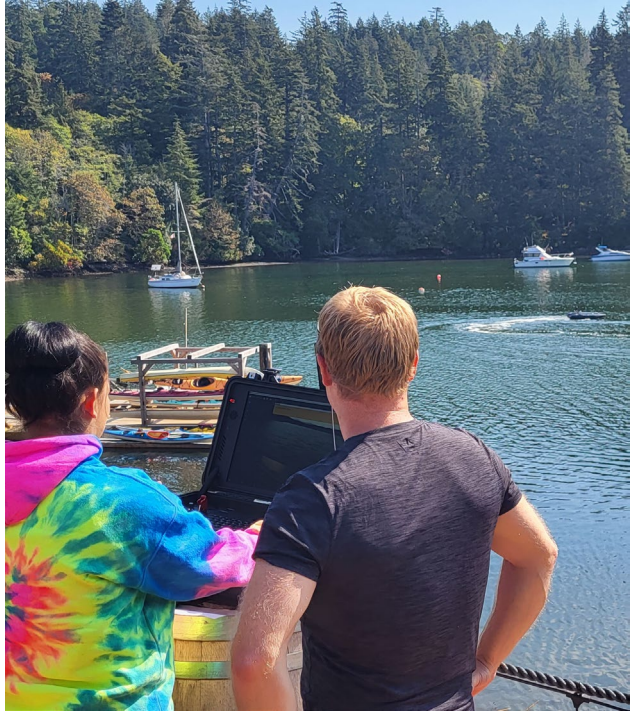


Marine and Field Services

- Derelict Removal
- Shoreline Cleanup
- Ghost Gear Removal
- Salmon Stocking and Restoration
- Invasives Removal
- Dock and Anchor Chain Inspection
- Vessel Noise Certification
- Environmental Incident Response
- Vessel manufacturing
- GRS Planning and Ground Truthing

Technology Innovation

- Coastal Incident Management System
- BRNKL Vessel Noise Monitoring + Vessel Surveillance Systems
- Southern Resident Killer Whale monitoring tools
- Enhanced Maritime Situational Awareness
- Communications Portal for Integrated Incident Response



Training and Skills Development

- Emergency Preparedness
- Incident Command Systems
- EMOST, MOSR, SCAT
- Vessel management
- Boom Deployment
- Drone Training
- SVOP
- Monitoring and Surveying Techniques

Into the Future