Retro Song: Snaring River - Moods

RR-2

CITY OF VANCOUVER

POLICY REPORT
DEVELOPMENT AND BUILDING

Report Date:	July 5, 2016
Contact:	Sean Pander
Contact No.:	604.871.6542
RTS No.:	11195
VanRIMS No.:	08-2000-20
Meeting Date:	July 12, 2016

TO: Vancouver City Council

FROM: Green Building Manager, Sustainability Group

SUBJECT: Zero Emissions Building Plan

RECOMMENDATION

A. THAT Council approve the Zero Emissions Building Plan (attached as Appendix A) and adopt a target to reduce emissions from new buildings by 90% as compared to 2007 by 2025 and to achieve zero emissions for all new buildings by 2030 including intermediary time-stepped GHG emission and thermal energy demand targets as described in the Plan.

B. THAT Council direct staff to report back with specific recommendations to reflect the first step of these limits in the Rezoning Policy for Green Buildings and Vancouver's Building Bylaw along with any synergistic updates to Neighbourhood Energy connection requirements by Q1 2017.

C. THAT Council direct staff to build all new City-owned and Vancouver Affordable Housing Agency (VAHA) projects to be Certified to the Passive House standard or alternate zero emission building standard, and use only low carbon fuel sources, in lieu of certifying to LEED Gold unless it is deemed unviable by Real Estate and Facilities Management, or VAHA respectively, in collaboration with Sustainability and report back with recommendations for a Zero Emissions Policy for New Buildings for all City-owned and VAHA building projects by 2018.

D. THAT Council direct staff, in consultation with industry, to develop a three year, $1.625 million Zero Emissions Home Program for detached and row houses ($325K in 2017 from the Climate Action Rebate Incentive Program Reserve, $650K in 2018 and $650K in 2019 from a funding source to be determined and reported back to Council), and report back to Council with specific recommendations for tools to catalyze leading builders to demonstrate cost effective approaches to building zero emissions homes by 2017.

F. THAT Council approves in principle $700,000 over three years ($300K in 2017, $200K in 2018, and $200K in 2019 from the City's 2017 Innovation Fund, subject to Council approval of the 2017 Innovation Fund budget) towards establishing a non-governmental **Zero Emissions Building Centre of Excellence** with the mission to facilitate the compilation and dissemination of the knowledge and skills required to design, permit, build and operate zero emission buildings in BC, and direct staff to engage partners, secure matching funding, consult with stakeholders and report back with recommendations for implementation in 2017.

August 30, 2018

Vancouver launches Zero Emissions Buildings Exchange

JULY 2018

As part of its Zero Emissions Building Plan, the City of Vancouver and its partners, including Passive House Canada, recently announced a Zero Emissions Building Exchange (ZEBx) – a local support centre located in Gastown, BC, to help the construction industry to meet Vancouver's ambitious clean-building targets.

The Zero Emissions Building Plan, which requires most new buildings to be near zero emissions by 2025 and all new buildings to be zero emissions by 2030. Also, in 2017, British Columbia released the BC Energy Step Code, which sets the path for all new buildings to be net zero ready by 2032. ZEBx is dedicated supporting the industry through this transition, acting as a catalyst that transforms the entire design and construction value chain, and at the same time increasing knowledge, interest and capacity for effective, attractive, low-energy residential and commercial buildings.

At ran

Credit: Suspencewl

The first of its kind in Canada, ZEBx aims to boost knowledge among residential and commercial building operators

The October civic election is destined to result in a new-look city council running Vancouver, but it's still been business as usual for Mayor Gregor Robertson and his team. For example, Robertson will be on hand on

VANCOUVER SUN

Commercial Real Estate

Commercial Real Estate: Vancouver launches Zero Emissions Buildings Exchange

Evan Duggan
Jul 26, 2018 • July 26, 2018 • 3 minute read • Join the conversation

Zero Emissions Building Exchange opens in Vancouver

Peter Caulfield August 13, 2018

ZEBX — From left to right, Vancouver Mayor Gregor Robertson; Sean Pander, City of Vancouver green building manager; Fiona Famulak, VRCA president; Christian Cianfrone, ZEBx executive director; Eesmyal Santos-Brault, Regenerative Applications CEO; and Rob Bernhardt, Passive House Canada CEO.

B2E

Building to Electrification Coalition

B2E

Events Resources FAQ About ZEBx Contact **Get Involved**

Become a Member

Becoming a member of B2E is simple and free. As a member you will enjoy the following benefits:

- Numerous collaboration opportunities with industry leaders through working groups, subcommittees, B2E events, case study development, and publishing online articles;
- Early access to building electrification news, updates and events;
- Recognition on B2E website and acknowledgement that your organization is fully engaged in the decarbonization of the building sector.

Join B2E

What is Building Electrification?

Building electrification is about making the shift away from fossil-fuels and using low-carbon electricity for space heating, hot water and cooking.

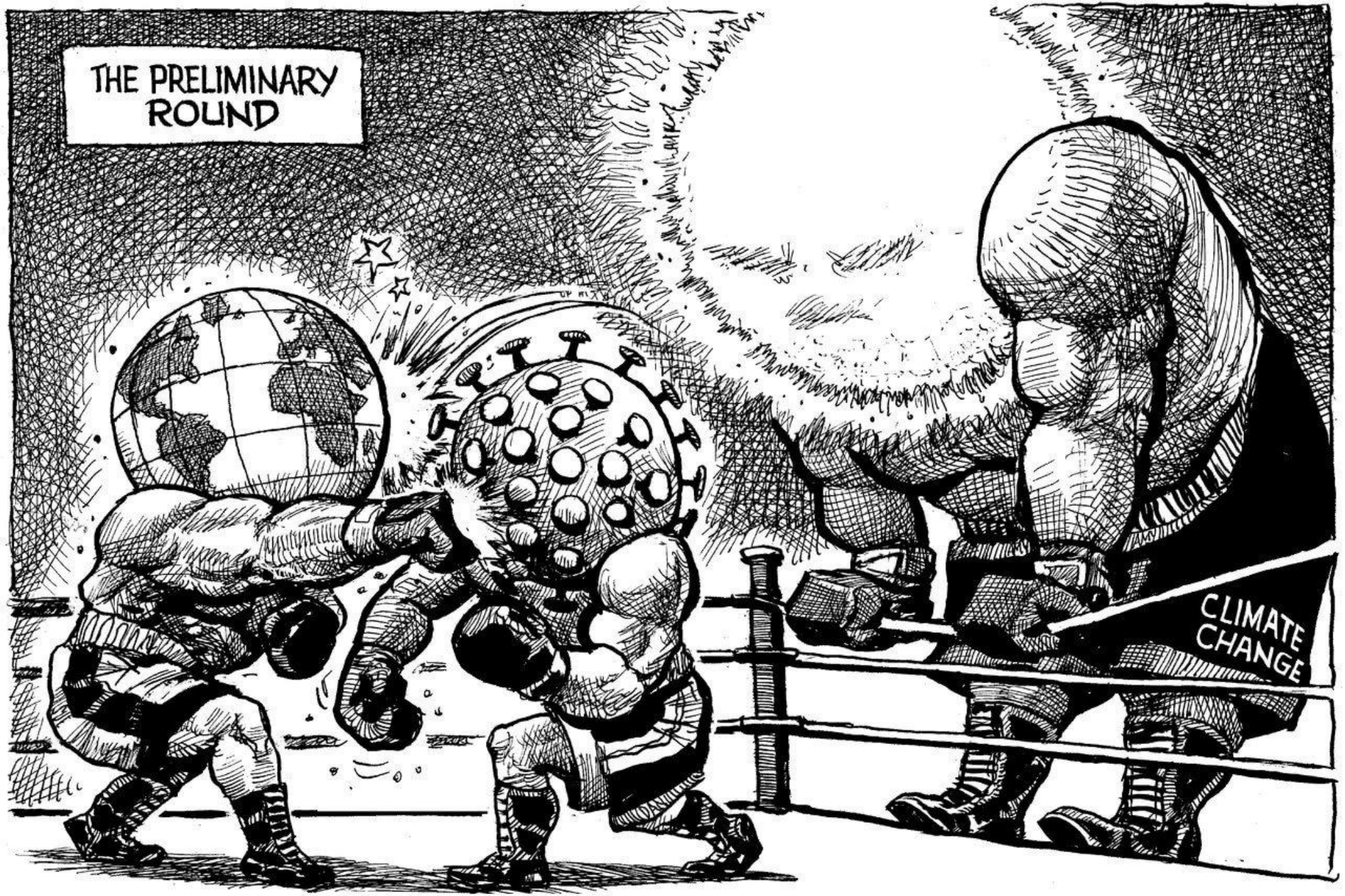
Instead of using natural gas or propane to run appliances like furnaces, kitchen stoves, washers and dryers, everything is electric.

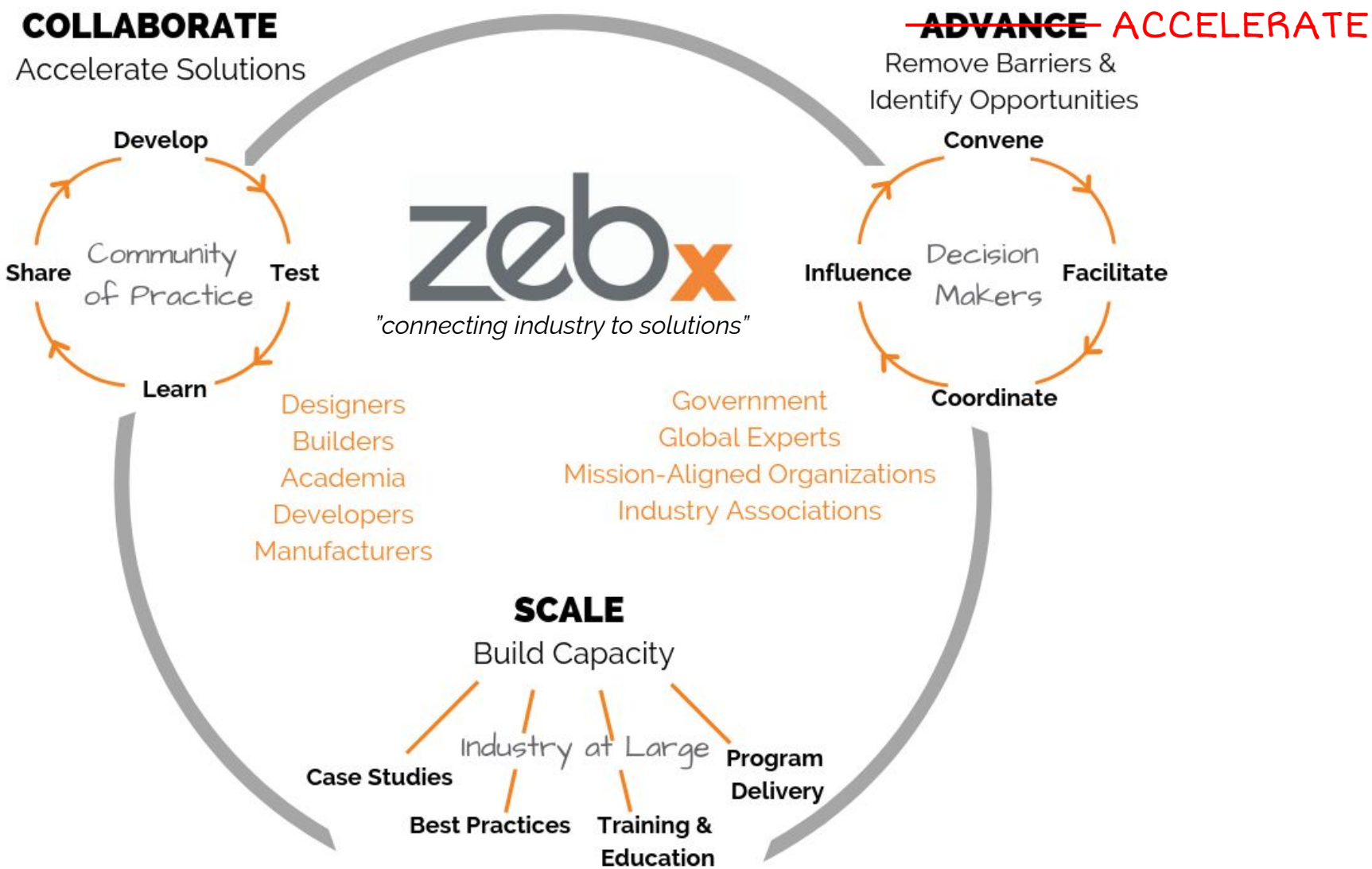
Read more about building electrification on our FAQ page.

View FAQ

b2electrification.org

Kevin Kallaugher of the Economist




COLLABORATE
Accelerate Solutions
~~ADVANCE~~ ACCELERATE
Remove Barriers &
Identify Opportunities
Develop
Convene
Share
Community of Practice
Test
Influence
Decision Makers
Facilitate
Learn
Coordinate
zebx
"connecting industry to solutions"
Designers
Builders
Academia
Developers
Manufacturers
Government
Global Experts
Mission-Aligned Organizations
Industry Associations
SCALE
Build Capacity
Industry at Large
Case Studies
Best Practices
Training & Education
Program Delivery

PLAYBOOK

www.zebx.org/resources

cleanBC BETTER BUILDINGS

NET-ZERO ENERGY-READY CHALLENGE PLAYBOOK SERIES

- Ventilation Strategies for High-Performance MURBs
- Planning Airtight Buildings
- LCA Practice to Estimate Embodied Carbon
- Thermal Bridging
- Low-Carbon Energy Systems
- Planning for

www.zebx.org

Podcast Overview
This launch event featured speakers from BC Hydro, California's Building Decarb Coalition, and the Mechanical Contractors Association of BC (MCABC) and highlighted much of BC's BERM.

Listen here : B2E's Launch Event

0:00 / 54:33

Slide Resources

See the slide show here

www.zebx.org/resources

Colliers + zebx

GOLDEN PROPERTIES + zebx

www.zebx.org/resources

CONSTRUCTION COST ANALYSIS OF HIGH-PERFORMANCE MULTI-UNIT RESIDENTIAL BUILDINGS IN BRITISH COLUMBIA

zebx.org/resources

Zebx

JUNE 2021

ARTICLE

Marketing the High-Performance Home

Sep 2021

www.zebx.org/resources

The BC Green Building Calendar

Welcome to the BC Green Building Calendar.

Here you will find all of the latest events and training related to green building subject matter, including: emissions, energy efficiency, resiliency, high-performance design, and more.

If you would like to submit an event or for more details on submission guidelines, see the bottom of this page.

Filters

January 2022

Webinar | **Presented by: HPSC**

Jan
18
Tuesday
1:00 - 2:00pm

HOME PERFORMANCE STAKEHOLDER COUNCIL

Home Performance Contractor Network: Q&A and Feedback Session

Course | **Presented by: BCIT**

Jan
18
Tuesday
6:00 - 9:00pm

BCIT BRITISH COLUMBIA INSTITUTE OF TECHNOLOGY

CESA 1505 – Zero Energy Buildings All-In-1

To submit events for your organization:

Join our community

bcgreeneventcalendar.ca

POLL 1

Tell us about yourself!

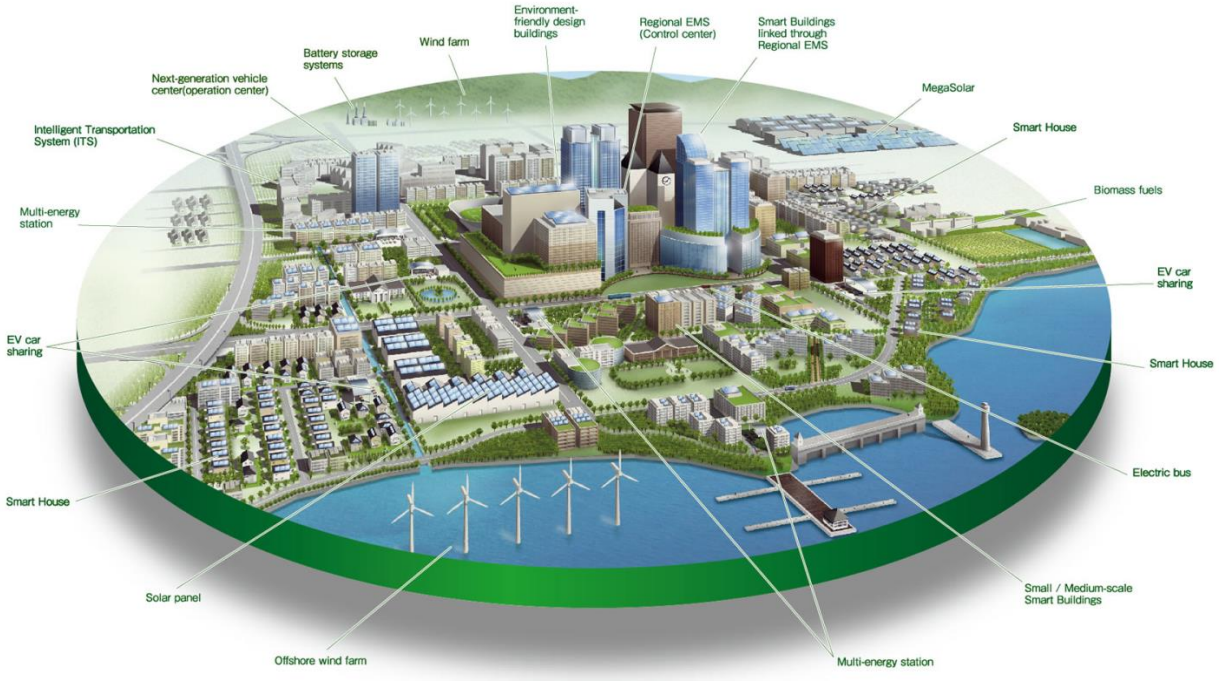
Three-part anonymous poll

zebx

BC Hydro
Power smart

A Clean Future Powered by Water

Introducing BC Hydro's Electrification Plan



Robyn Wark,
Manager, Advanced Demand Side Management Strategies

BC Hydro
Power smart

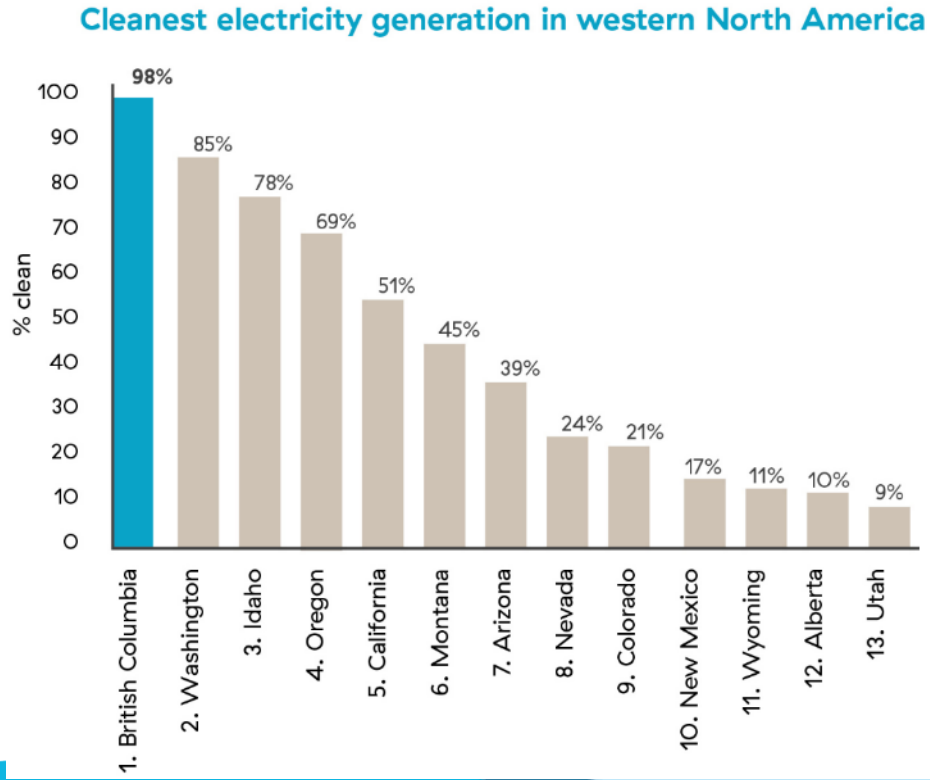
BRITISH COLUMBIA

cleanBC

our nature. our power. our future.

Roadmap to 2030

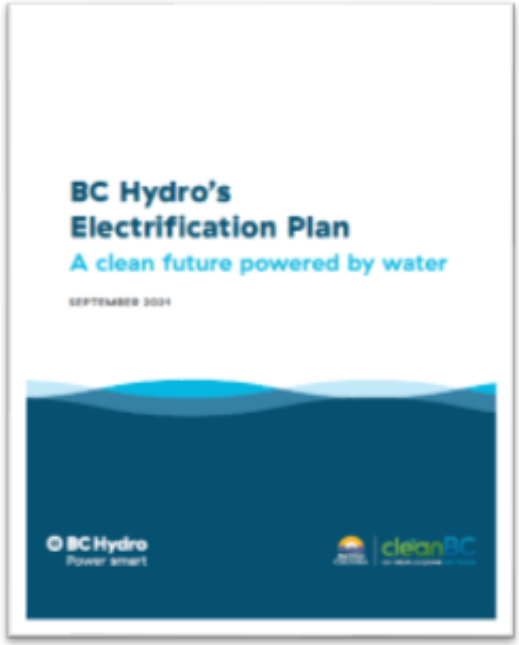
The water advantage

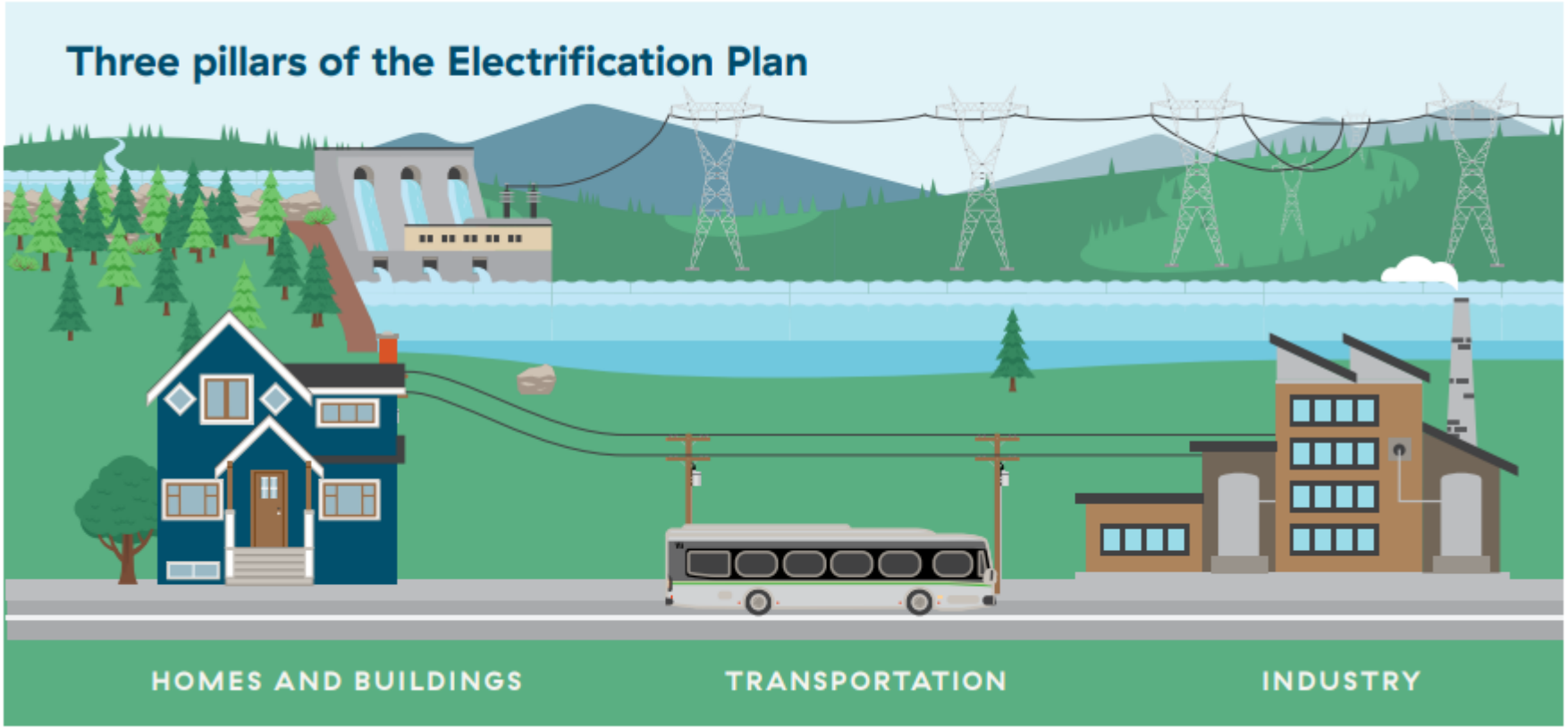


BC Hydro's Electrification Plan

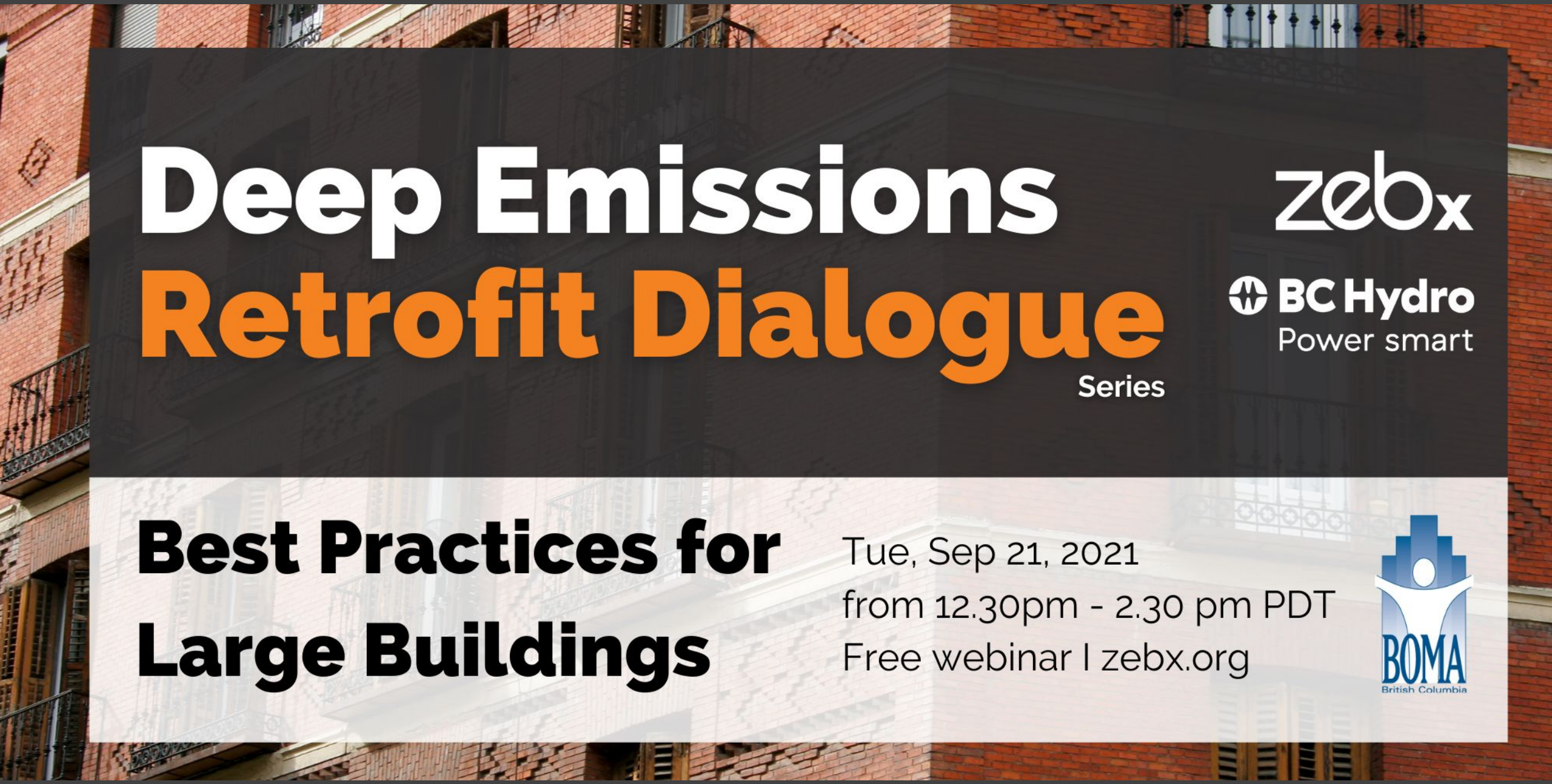
5-year $260m Plan, supporting CleanBC targets through:

- Helping customers **switch to clean** electricity
- Attracting **new businesses to B.C.**
- Making it easier for customers to **connect to our grid**




Three pillars of the Electrification Plan
HOMES AND BUILDINGS
TRANSPORTATION
INDUSTRY


VANCOUVER ECONOMIC COMMISSION
CANADA GREEN BUILDING COUNCIL
CONSEIL DU BÂTIMENT DURABLE DU CANADA
CITY OF VANCOUVER
PASSIVEHOUSE CANADA
Build better. Feel better.
TECHNICAL SAFETY BC
FRESCo
Building Efficiency
zebx
ENGINEERS & GEOSCIENTISTS
BRITISH COLUMBIA
AMEGroup
BC HOUSING
BCNPHA
BC Non-Profit Housing Association
BC Hydro
Power smart
PEMBINA institute
RDH
Making Buildings Better™
VRCA
Vancouver Regional Construction Association


Deep Emissions
Retrofit Dialogue
Series
zebx
BC Hydro
Power smart
Best Practices for
Large Buildings
Tue, Sep 21, 2021
from 12.30pm - 2.30 pm PDT
Free webinar I zebx.org
BOMA
British Columbia


Deep Emissions
Retrofit Dialogue
zebx
BC Hydro
Power smart
CITY OF
VANCOUVER
Series
Deep Emissions
Retrofits of Homes:
How to Get it Right
Tue, Oct 26, 2021
from 12.30pm - 2.30 pm PDT
Free webinar I zebx.org
HOME PERFORMANCE
STAKEHOLDER COUNCIL

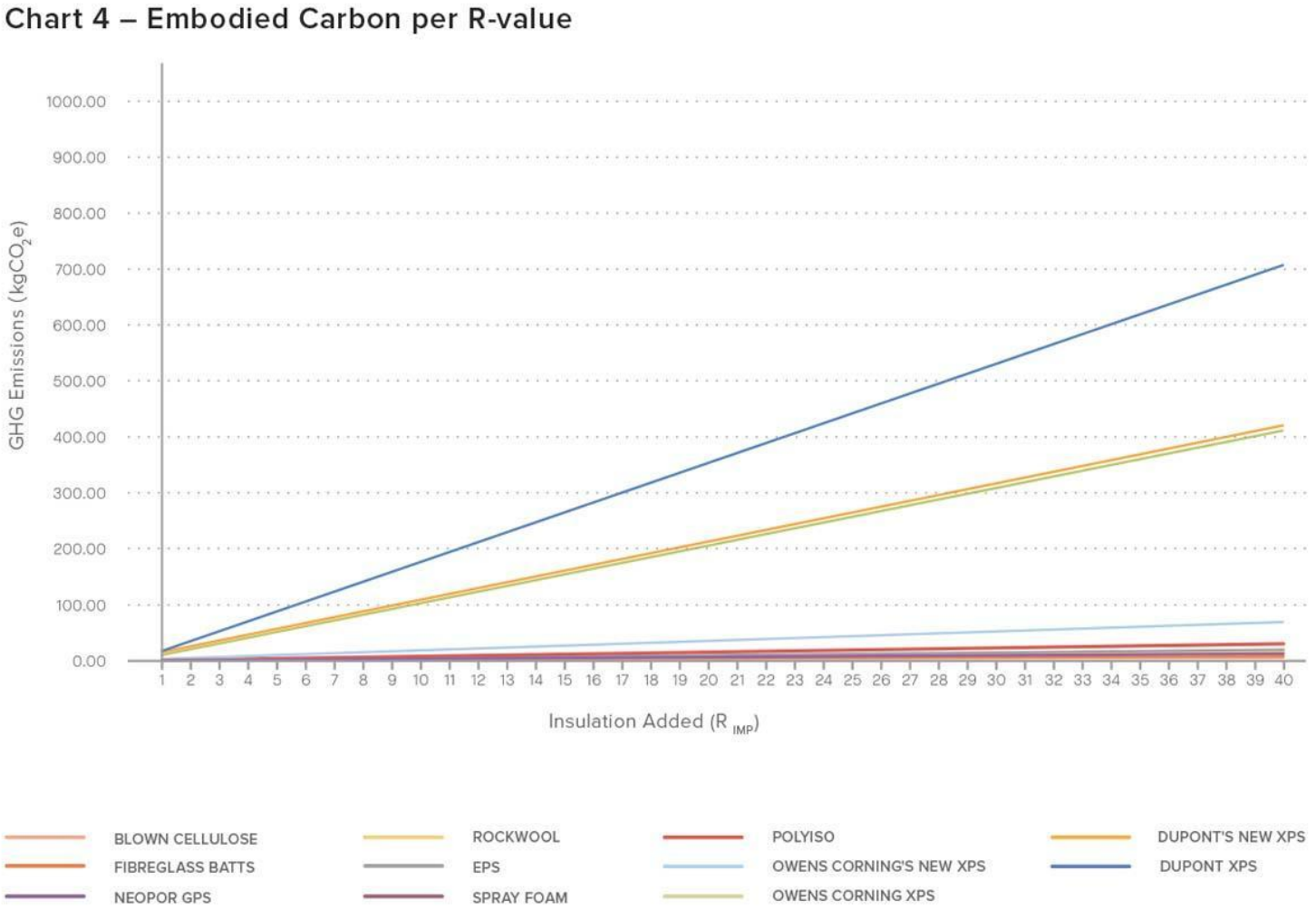

Deep Emissions
Retrofit Dialogue
Series
zebx
BC Hydro
Power smart
CITY OF
VANCOUVER
Are we Ready?
Supply Chain and
Labour Force Capacity
Wed, Nov 24, 2021
from 12.30pm - 2.30 pm PST
Free webinar I zebx.org
Canada Green Building Council
Every Building Greener

At 1”, XPS is vapour-permeable. At 1.5” or more, XPS becomes vapour-retarding. Polyisocyanurate insulation (polyiso) and closed-cell spray foam (SPF) at 1” or more is also vapour-retarding.

https://www.wrmeadows.com/air-barriers/the-air-barrier-debate-permeable-or-non-permeable/

Technical: Embodied carbon values of common insulation materials

KPMB Lab analyzes the embodied vs. operational carbon trade-offs for XPS, polyiso, spray foam, stone wool, GPS, fibreglass batts, and blown cellulose.



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OAA, LEED AP, CPHD
PRINCIPAL

Sahana Dharmaraj
LEED Green Associate
INTERN ARCHITECT

Apr 23, 2021

#4

1. Managing Refrigerants As BC Scales Up Deep Emissions Retrofits
2. Exploring the Affordability Impacts of Deep Emissions Retrofits on Low-Income Households
3. BC Hydro's Integrated Resource Plan – Flexible Resources for an Uncertain Future

POLL 1

What did you tell us about yourself?

ZEBx

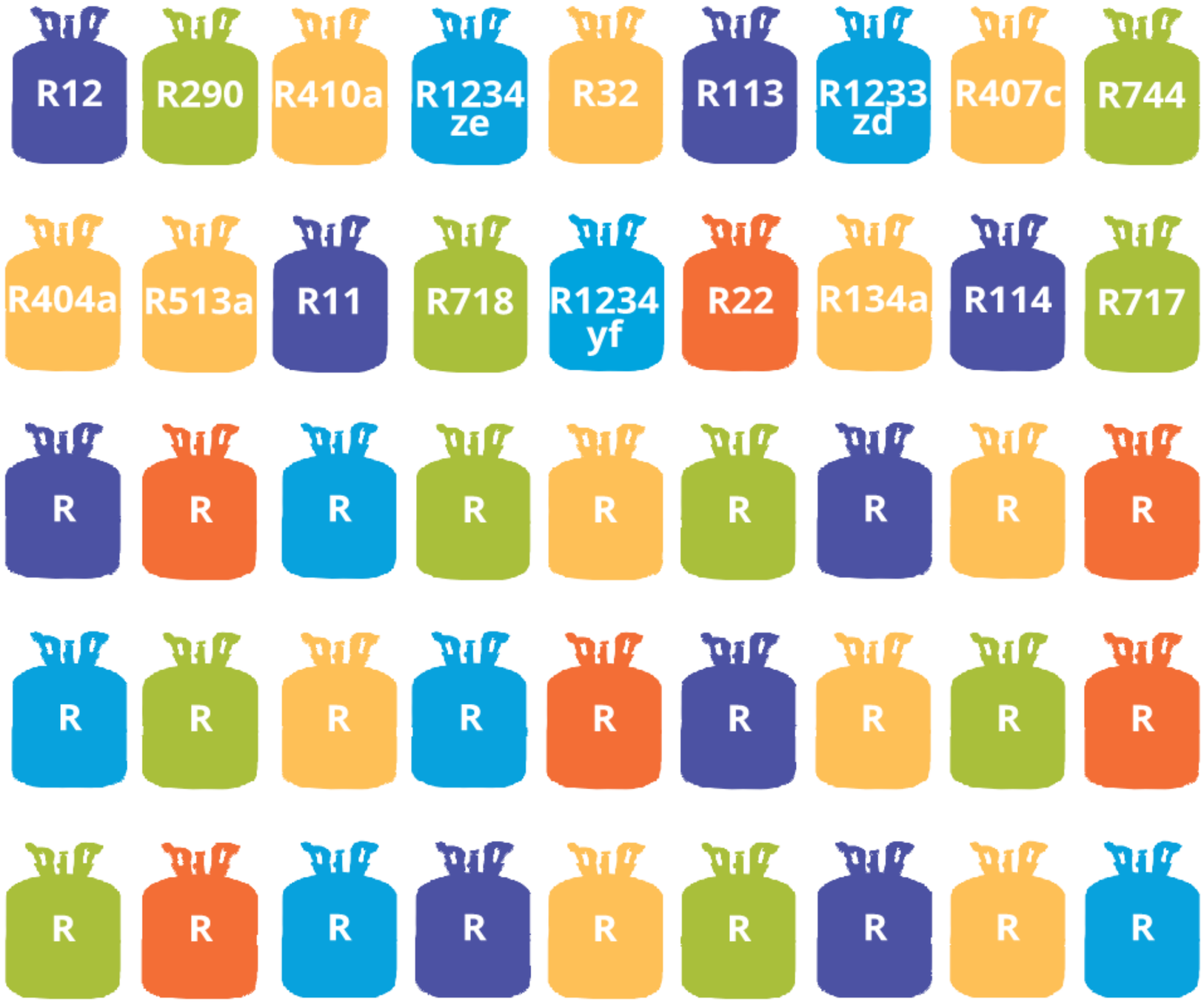
Deep Emissions
Retrofit Dialogue

January 20, 2022

Bhavin Degadwala
Associate Principal
bdegadwala@integralgroup.com

Justin T K Chin
Principal
jtkchin@integralgroup.com

INTEGRAL



Deep Emissions Retrofit Dialogue

Bhavin Degadwala
Associate Principal

Justin TK Chin
Principal

If we could reduce refrigerant leakage to 0.4% of refrigerant used over the next 30 years, it would save

89.7 gigatons of CO_2e

207,674,462,755

barrels of oil consumed

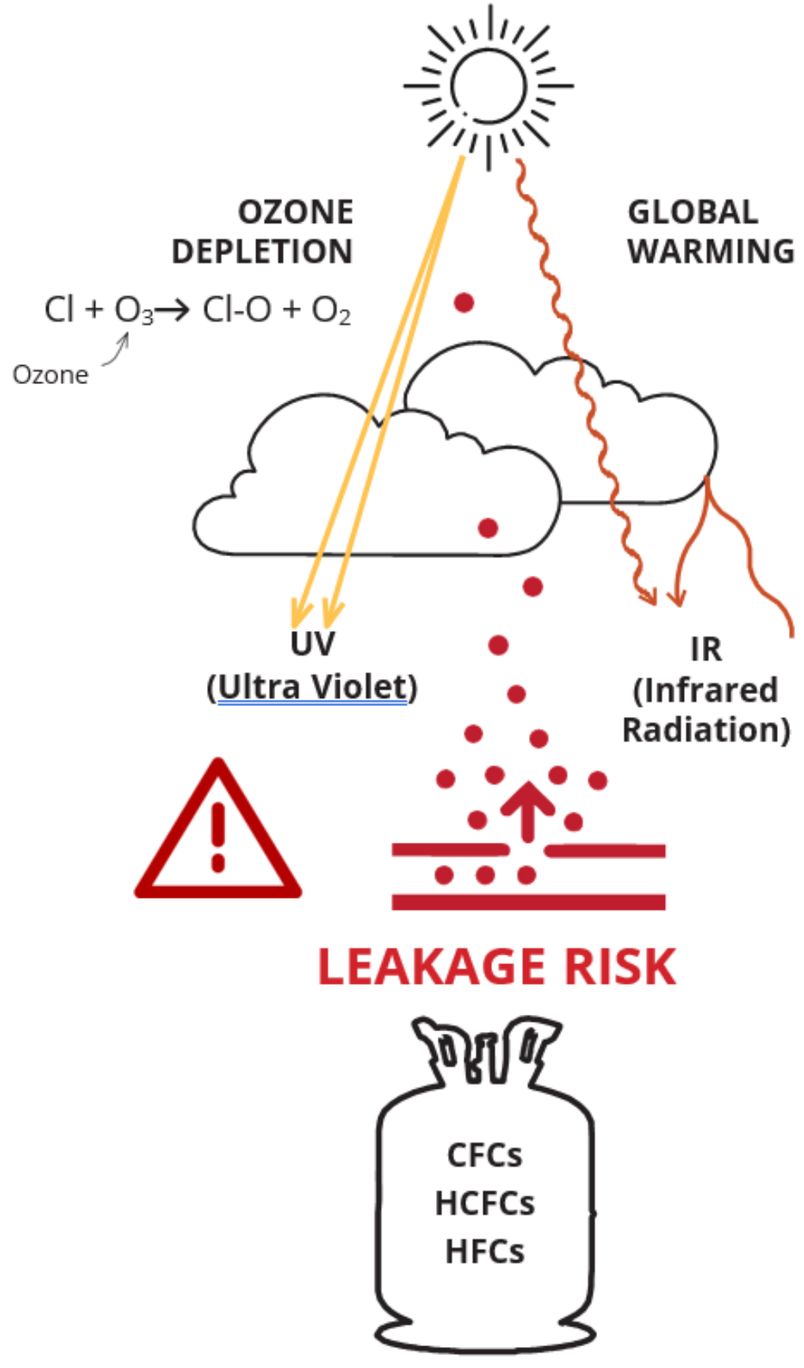
OR

19,507,948,167

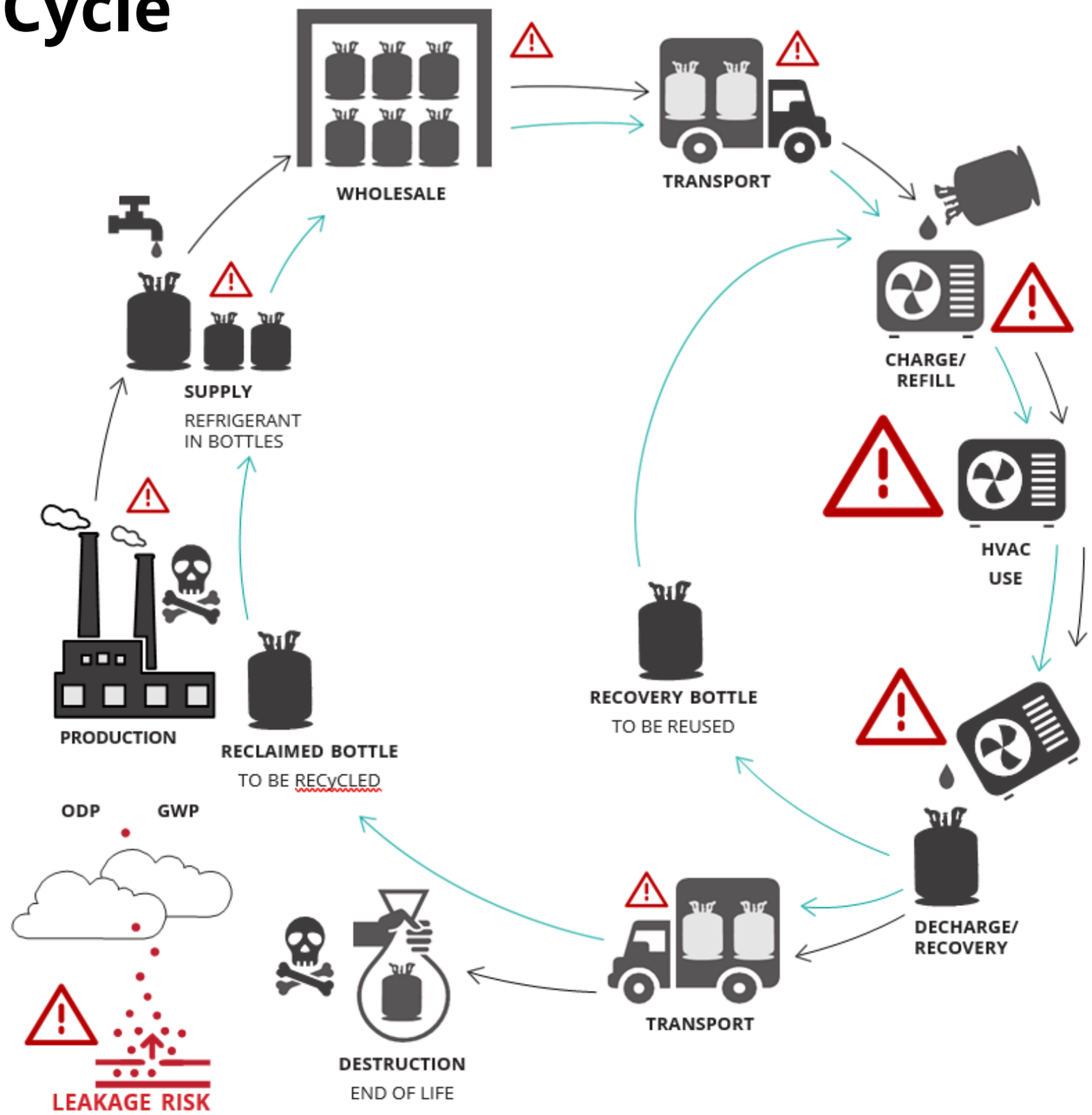
Passenger vehicles driven for one year

*** Based on data from US EPA Greenhouse Gas Equivalency Calculator**

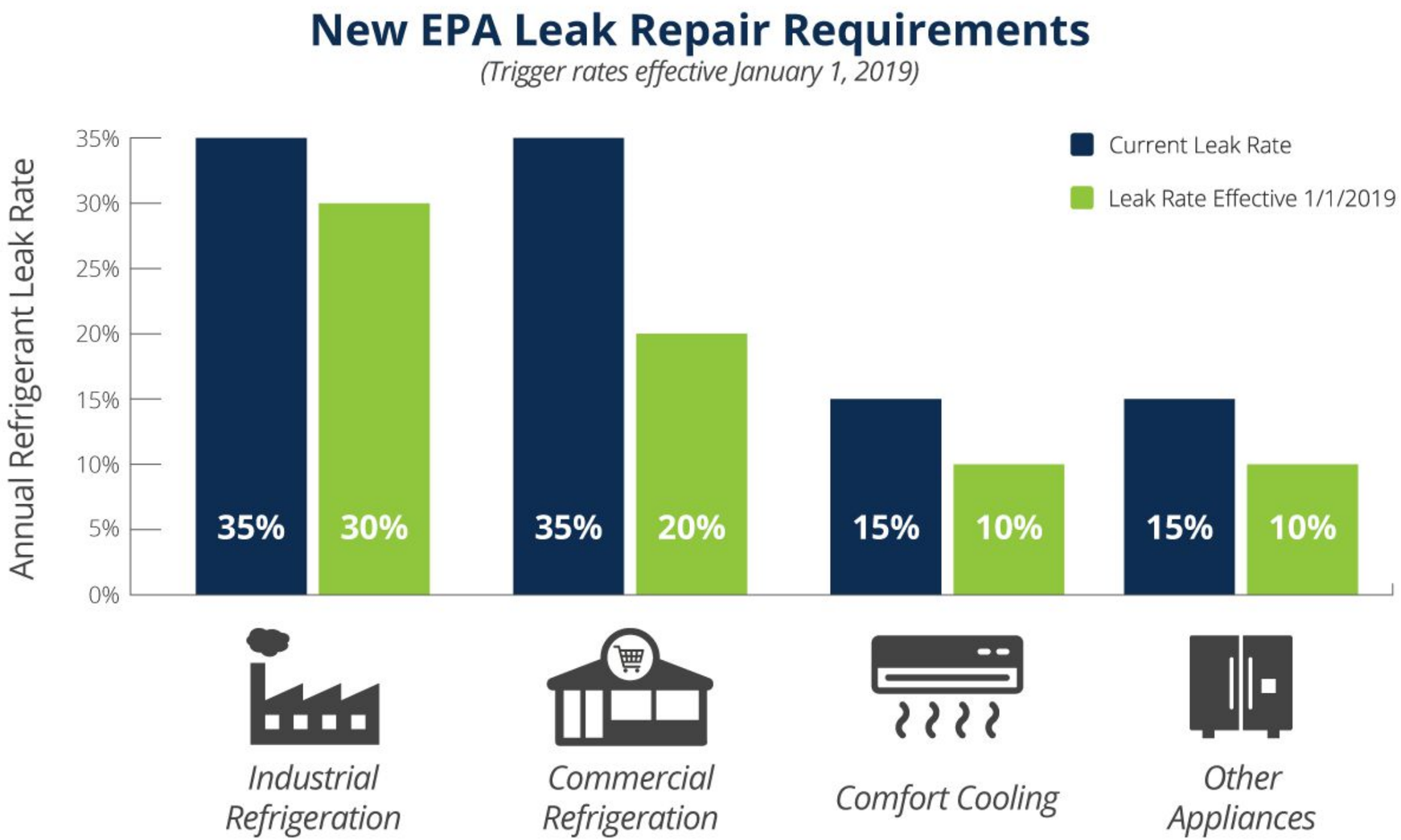
Environmental Impacts of Refrigerants



Refrigerant Life Cycle



Potential Leakage Rates | Reference



Mitigate Refrigerant Leakage

- Installation and maintenance by a registered installer/contractor with the manufacturer of the system
- Leak test systems

System Charge	Leak Test Frequency for Systems with no fixed leak detection	Leak Test Frequency for System with fixed leak detection
5 to <50 tonnes CO_2e *	Once per year	Once every two years
50 to 500 tonnes CO_2e *	Twice per year	Once per year
>500 tonnes CO_2e *	N/A	Twice per year

Table 2 : Leak Test Frequency requirements by F6Gas Regulation

* CO_2 equivalent relates to GWP, e.g. 5 tonnes CO_2 equivalent equals 5 tonnes of CO_2e or 2.4kg of R410a.

- Report and record any emissions that are accidental or during replacement per Federal Halocarbon Regulations, 2003 (FHR 2003) and all the amendments—strict enforcement is needed

Recovery, Reuse, Reclaim, and Recycle

- Current regulations in Canada and BC are not stringent enough to enforce onsite Reuse, Recycling or Recovery (ORRR) of the refrigerants from existing systems that are being decommissioned.

- Lessons to learn from a very successful recovery program from UK:
  - "It is against the law to let F gas get into the atmosphere on purpose where it is not technically necessary". Prosecution is handled by the Environment Agency.
  - Must be undertaken by a qualified technician
  - Up to 2030 recycled refrigerant doesn't count towards quota volumes
  - All recovered refrigerant must be processed to achieve 'virgin' quality

Refrigerant Options | GWP & Atmospheric Life

Refrigerant Choices

This table compares various properties of both current and next-generation refrigerants. The efficiencies and capacity changes shown are based on the theoretical properties of the refrigerant alone, with all design variables held constant for objective comparison.

		Low Pressure			Medium Pressure				High Pressure				
		R-123	R-1233zd	R-514A	R-134a	R-513A	R-1234ze	R-1234yf	R-22	R-410A	R-452B	R-454B	R-32
Flammability	ASHRAE Class BV (cm/s)	Non (1) n/a	Non (1) n/a	Non (1) n/a	Non (1) n/a	Non (1) n/a	Slight (2L) 0.0	Slight (2L) 1.5	Non (1) n/a	Non (1) n/a	Slight (2L) 3.0	Slight (2L) 3.8	Slight (2L) 6.7
Toxicity[1]	ASHRAE Class OEL	Higher (B) 50	Lower (A) 800	Higher (B) 320	Lower (A) 1000	Lower (A) 650	Lower (A) 800	Lower (A) 500	Lower (A) 1000	Lower (A) 1000	Lower (A) 870	Lower (A) 850	Lower (A) 1000
Efficiency (COP)		8.95	8.85	8.91	8.47	8.28	8.45	8.17	8.48	7.99	8.14	8.15	8.22
Capacity Change		baseline	~35% gain	~5% loss	baseline	similar	~25% loss	~5% loss		baseline	~2% loss	~3% loss	~9% gain
GWP[2]		79	1	2	1300	573	1	1	1760	1924	675	466	677
Atmospheric Life		1.3 years	*26 days*	*22 days*	13.4 years	5.9 years	16 days	11 days	11.9 years	17 years	5.5 years	3.6 years	5.2 years

[1]None of the refrigerants shown in the table are considered "toxic" or "highly toxic" as defined by the International Fire Code (IFC), Uniform Fire Code (UFC) and OSHA regulations.

[2]GWP values reported are per the Fifth Assessment Report (AR5) of the IPCC (Intergovernmental Panel on Climate Change).

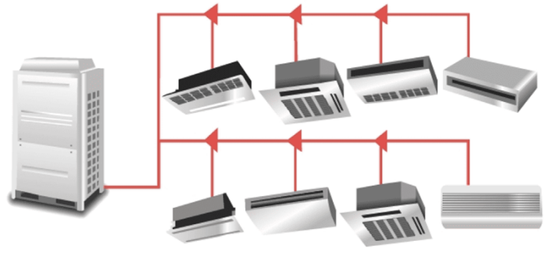
**Table courtesy of Trane (www.trane.com)*

Refrigerant Options | Equipment Types

Refrigerant Choices

This table compares various properties of both current and next-generation refrigerants. The efficiencies and capacity changes shown are based on the theoretical properties of the refrigerant alone, with all design variables held constant for objective comparison.

Low Pressure			Medium Pressure				High Pressure				
R-123	R-1233zd	R-514A	R-134a	R-513A	R-1234ze	R-1234yf	R-22	R-410A	R-452B	R-454B	R-32



Key Takeaways| Challenges

- Lack of reliable data for leakage rates or amounts
- Code & regulations not yet adapted to accept all new generation refrigerants
- Lack of regulations to limit the use of refrigerant
- No limits on system charge
- No restrictions to “high” GWP refrigerants

Key Takeaways | Recommendations

- Employ low-GWP refrigerants
- Select systems with low or medium pressure
- Select packaged systems where refrigerant is contained
- Adapt codes & regulations for mandatory refrigerant use reporting
- “Enforce” or “encourage” building design practices that mitigate fugitive emissions associated to refrigerant

January 20, 2022

Deep Emissions Retrofits & Affordability in Low-Income Households

Jordan Fisher

Sr. Program Manager

FRESCo Building Efficiency

www.frescoltd.com | info@frescoltd.com | 778-783-0315

Who are we?

Jordan Fisher
Sr. Program Manager
jfisher@frescoltd.com

FRESCo - *Building Efficiency*

- Energy assessments
- Engineering
- Project management
- Program/policy development

What is driving *retrofits*?

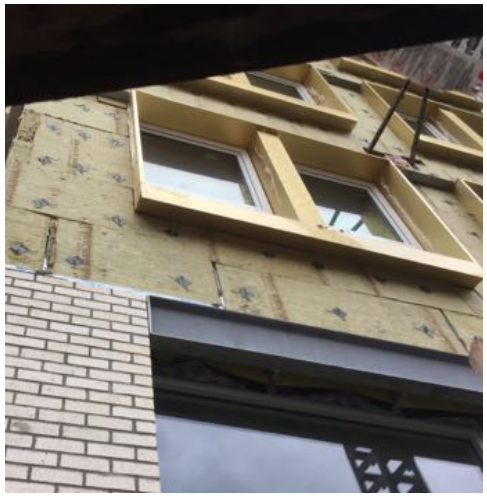
Aging building stock 

Operating costs 

Emissions reductions 

Health & comfort 

Retrofit Approaches for Deep Emissions Reductions



FRESCo Building Efficiency

Overheating

As a health risk

"The 'heat dome' event that BC experienced this summer has shifted the conversation about indoor air temperatures and air quality in social housing from 'thermal comfort' to 'thermal safety"

– BC Housing

595 people were killed by heat in B.C. this summer, new figures from coroner show

More than 231 died on June 29 alone, during 'heat dome' that caused record temperatures, data says

Rhianna Schmunk · CBC News · Posted: Nov 01, 2021 9:17 AM PT | Last Updated: November 1

FRESCo Building Efficiency

Overheating

The invasion of the portables

Temporary solution?

- Low efficiency portable AC units
- Higher electrical bills
- Potential safety risks

FRESCo Building Efficiency

Challenges to Deep Emissions Retrofits

- Organizational capacity
- Project timeframes
- Capital costs
- Operating costs
- Tenant impacts

FRESCo Building Efficiency

Potential Solutions

Funding for *studies/support* and *capital*

Provincial

cleanBC

BC HOUSING

BCNPHA
BC Non-Profit Housing Association

National

CMHC SCHL

FCM FEDERATION OF CANADIAN MUNICIPALITIES

Utilities

FORTIS BC™
Energy at work

BC Hydro

FRESCo
Building Efficiency

Potential Solutions

- ARI for landlords
- Direct financial support to tenants
- Rate design
- Maximize equipment efficiency
- Reduce loads in conjunction with mechanical upgrades

FRESCo Building Efficiency

Issues For Discussion

- Who pays?
- Value of cooling and improved air quality?
- Role of different fuel sources?
- Grid readiness and impacts?
- Role of regulations?
- Value of preserving our housing stock?
- Impact of not doing it?

FRESCo Building Efficiency

Related work…

- VEC Heat Pump Attraction Study
- Pilot projects
- New regulations
- Low-income BERM
- Phase 2 of MURB Electrification Project

FRESCo Building Efficiency

Thank You

778-783-0315

jfisher@frescoltd.com

FRESCo
Building Efficiency

www.frescoltd.com

Clean Power 2040

Powering the future

BC Hydro's Integrated Resource Plan

Flexible resources for an uncertain future

Prepared by: Alex Tu, BC Hydro

ZEBx Deep Emissions Retrofit Dialogue
January 20, 2022

BC Hydro
Power smart

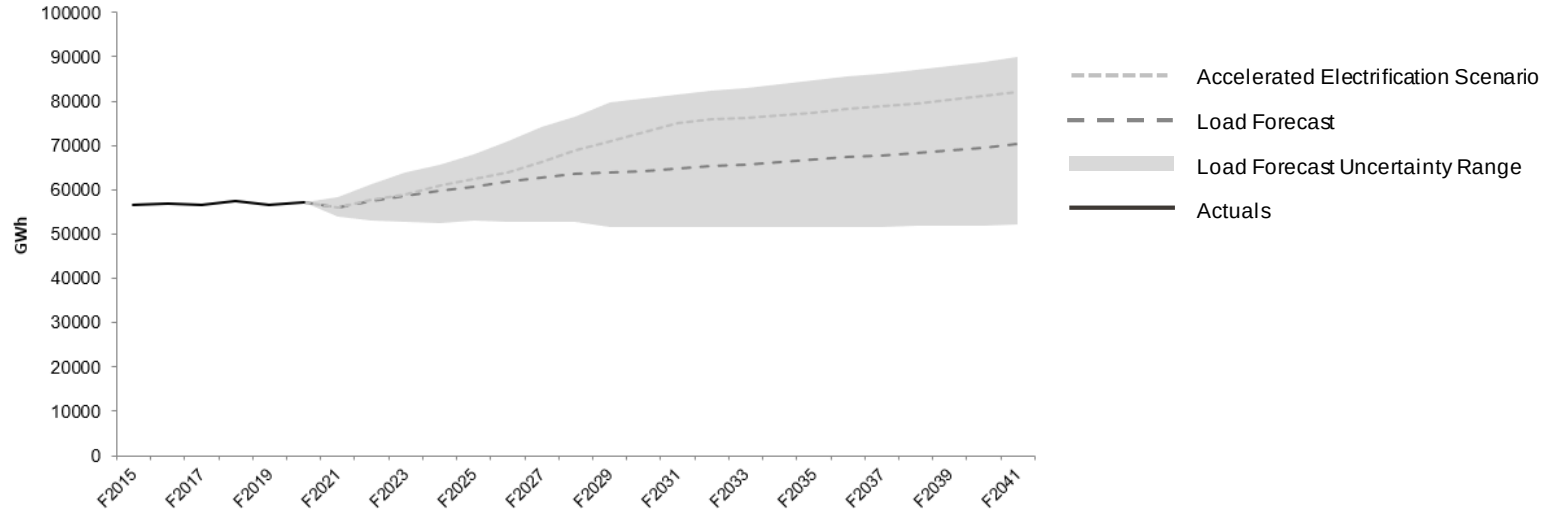
What is an Integrated Resource Plan?

The actions BC Hydro needs to take to meet customers' future need for electricity

- BC Hydro's plan for the integrated power system
- Addresses any gap between forecast electricity demand and BC Hydro's supply
- Relies on scenarios to address the many uncertainties
- Guided by Provincial legislation and policy, such as the Clean Energy Act and CleanBC Plan
- Involves public, Indigenous, and technical consultation throughout
- Was submitted to the BC Utilities Commission, with review over the next year

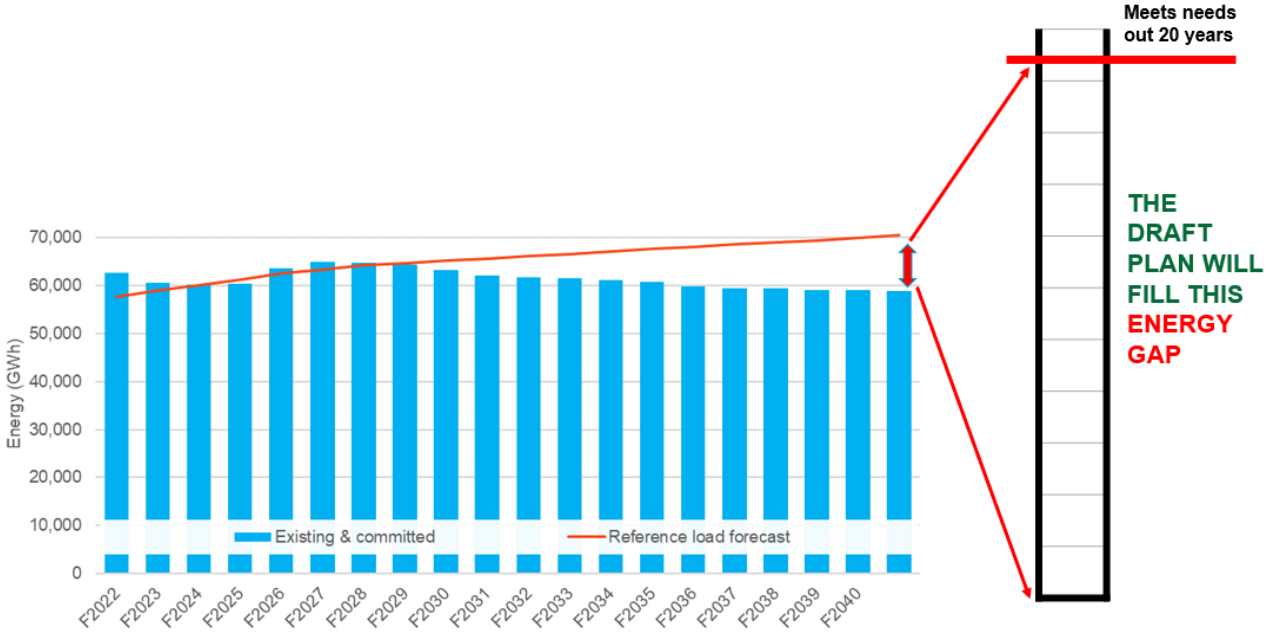
The load forecast

Our long-term load forecast defines the Reference Load we expect to serve, and the Contingency Load Scenarios we must be prepared to serve



Energy: 20-year outlook of supply and demand

We expect to have enough resources to meet B.C.'s energy needs for about 10 years

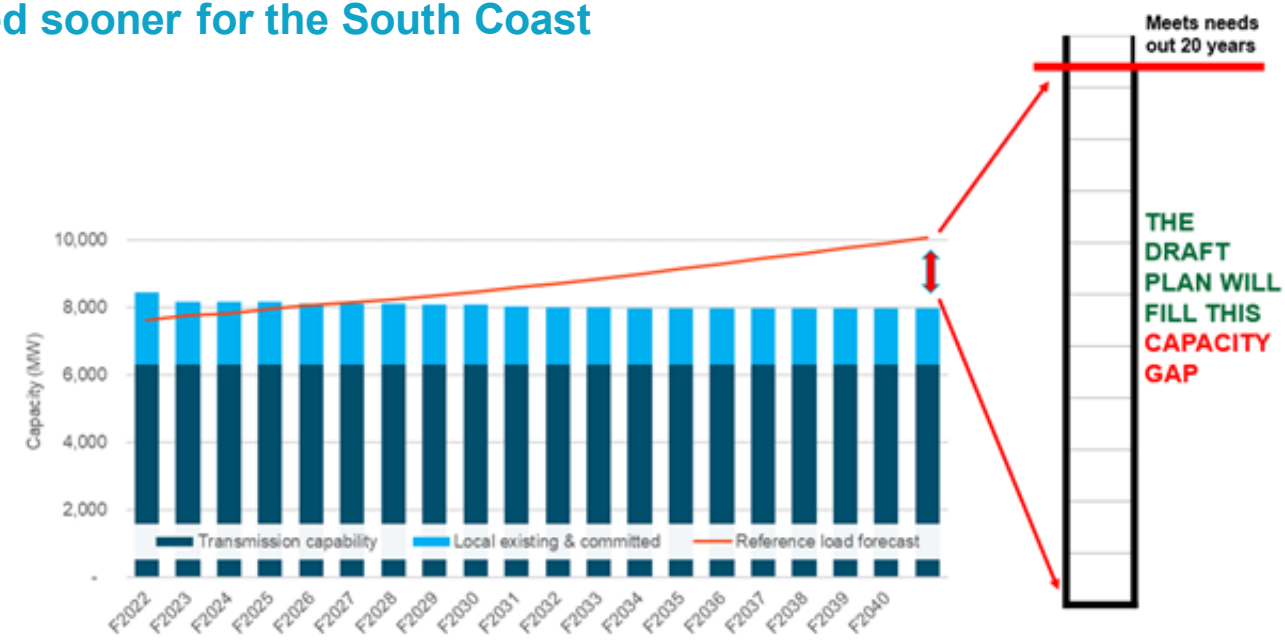


Clean Power 2040
Powering the future

BC Hydro
Power smart

South Coast capacity: 20-year outlook

We expect to have enough system capacity for more than 10 years, however, it will be needed sooner for the South Coast



Clean Power 2040
Powering the future

BC Hydro
Power smart

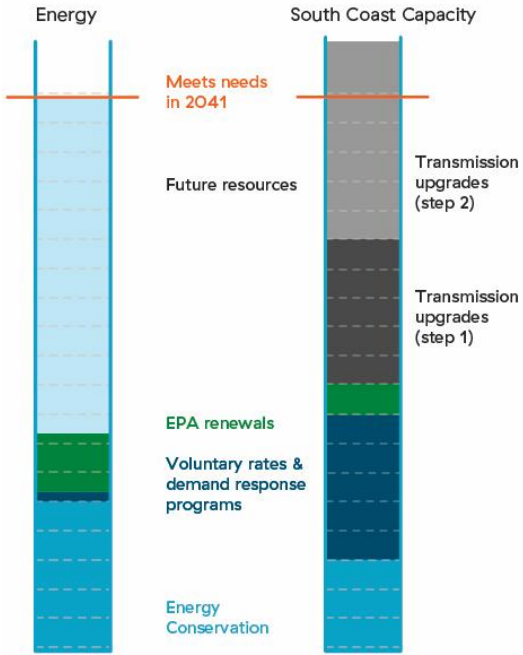
How we will meet expected load and prepare for uncertain future

Flexible demand-side measures (DSM), renew near-term clean electricity purchase agreements (EPAs), transmission upgrades to serve South Coast, and be prepared for new supply

DSM grows over time, is low cost, and can ramp up/down

- Includes customer incentive programs for efficiency, voluntary time-varying rates to shift consumption out of peak periods, load curtailment programs for large customers, demand response programs for space and water heating end-uses, and a combination of rates and programs to shift home electric vehicle charging out of peak periods
- At this time, does not include incentives for rooftop solar or new construction programs due to cost
- DSM programs, with some EPA renewals, would be enough to serve expected loads until ~2033

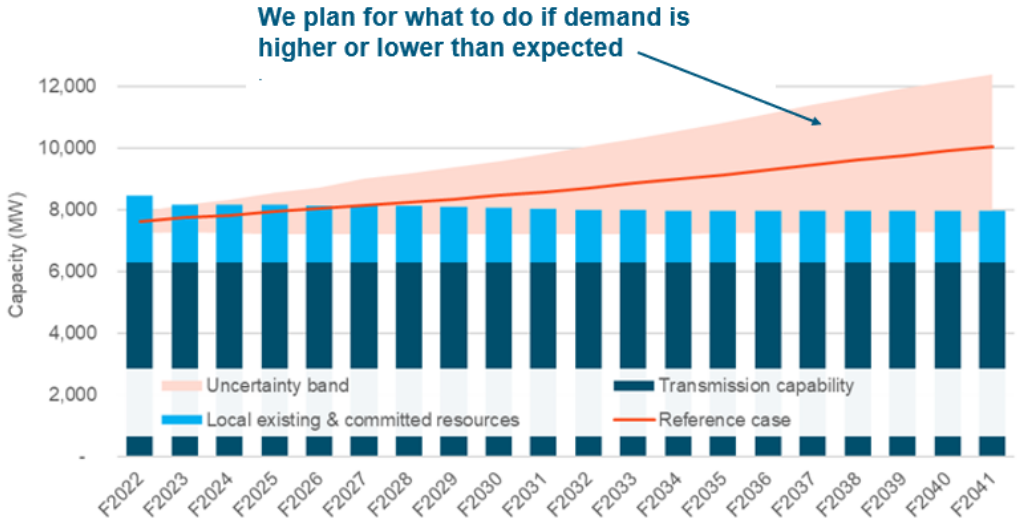
We expect to require new future resources to be determined in our next integrated resource plan, e.g., call for power, more EPA renewals, new DSM programs, or BC Hydro upgrades



Clean Power 2040
Powering the future

Planning for the unexpected

We will monitor signposts, and be prepared to execute Contingency Plans and a new IRP



If we see signs of accelerated electrification scenario:

- Batteries in the South Coast
- More and higher levels of DSM
- Call for power / more EPA renewals / upgrades at existing generation facilities

If we see signs of low load scenario:

- Less DSM
- Deferred upgrades to transmission

BC Hydro

Power smart