Deep Retrofit Discovery Session

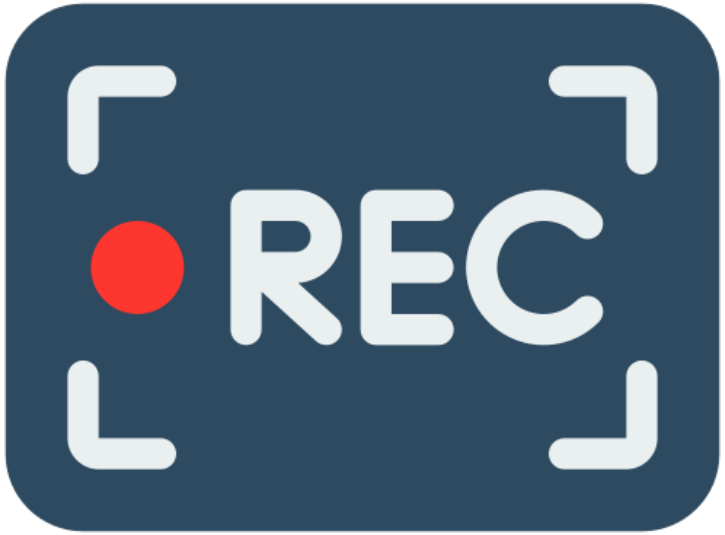
Session 6: Commercial Deep Retrofit Research Findings

Review of current codes, market incentives, training opportunities, and regulatory considerations

March 10 | 11:30 AM - 1:00 PM | Virtual

ALBERTA ecotrust

SAIT

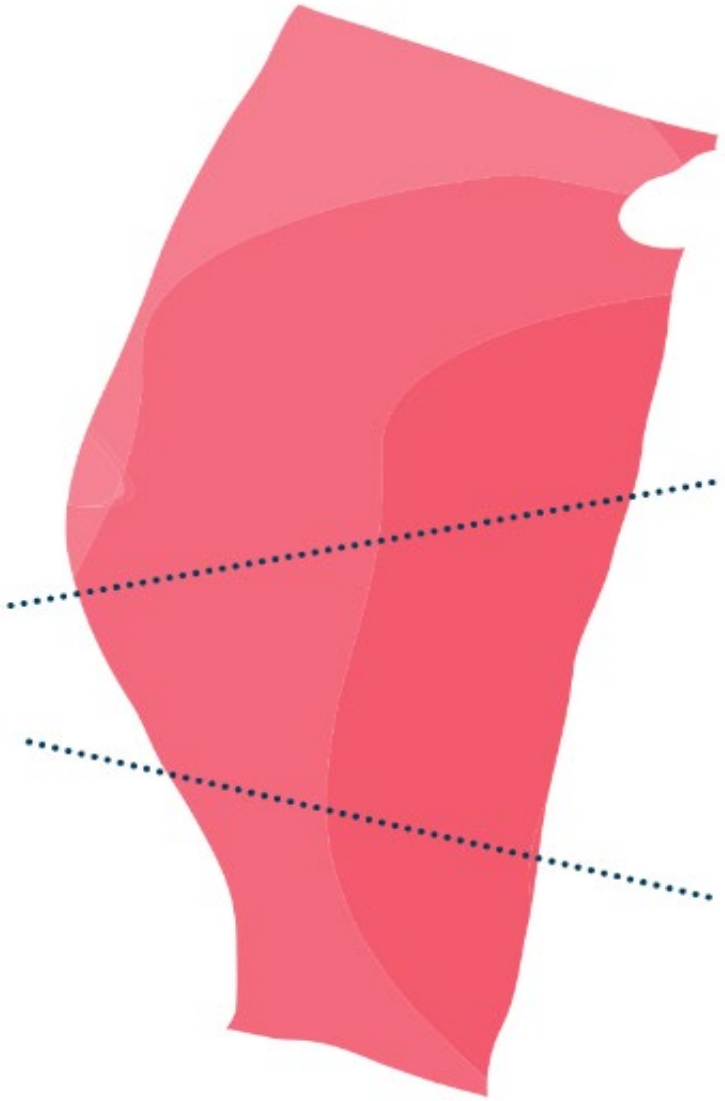


This Session is Being Recorded.

Discovery Session Agenda

- → Welcome to Discovery Session #6
- → Land Acknowledgement
- → Alberta Ecotrust - Retrofit Accelerator Program
- → SAIT Green Building Technology Access Centre
- → Presenter Introductions
- → WSP Canada presentation
- → RFS Energy presentation
- → Question & Answer + Discussion

TREATY 8
Signed in 1899



TREATY 6
Signed in 1876

TREATY 7
Signed in 1877

ALBERTA ecotrust


ALBERTA
ecotrust
Retrofit
accelerator

ABOUT

What we offer

Programs & Initiatives

Impact Investing

Grants

Strategic Engagement

ABOUT

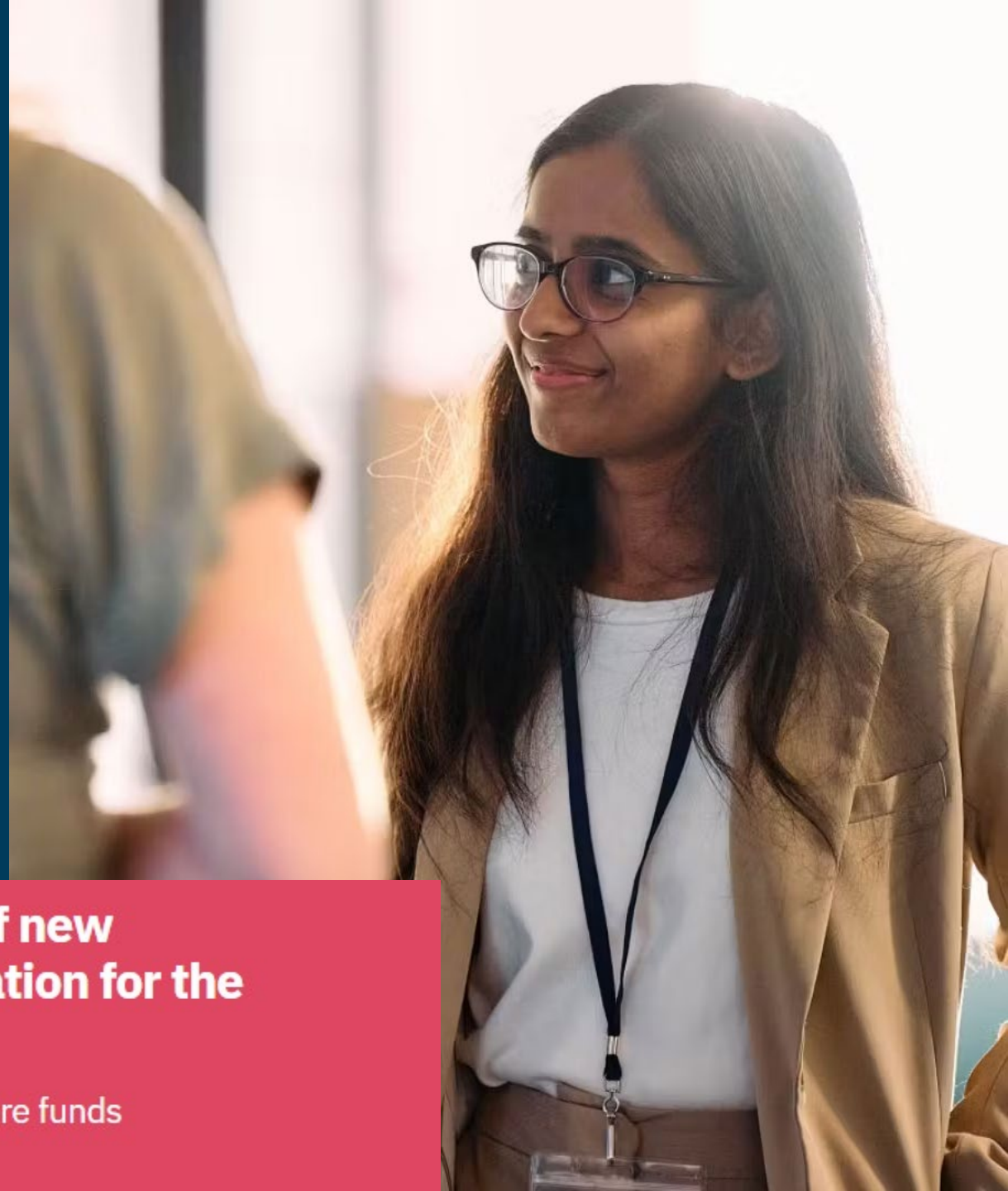
Our Buildings Initiatives

RETROFIT ACCELERATOR

For building owners

Free coaching support for deep energy retrofits

- ➔ Guide owners through the entire retrofit process
- ➔ Support the development of tailored retrofit plans and business cases
- ➔ Help identify service providers
- ➔ Partially fund studies



February 2026 Update: We have paused intake of new applicants as we have reached our funding allocation for the time being.

Interested applicants can **join our waitlist** to be notified if and when more funds become available.

THE PROGRAM

Why is it free?

The **Alberta Ecotrust Retrofit Accelerator** program is an initiative funded by Natural Resources Canada under the Deep Retrofit Accelerator Initiative (DRAI).

This program is also made possible from RBC Foundation's Tech for Nature program.

FUNDERS

Canada

RBC

NETWORK

Alberta ENERGY EFFICIENCY ALLIANCE

SAIT

PEMBINA Institute

GREEN BUILDING TECHNOLOGY ACCESS CENTRE

DRAI: Retrofit Discovery Sessions and Market Analysis

GBTAC MISSION

- To prove, implement, and commercialize new building materials, systems and methods that lead to the construction or retrofit of buildings to be higher efficiency, lower emission, healthier, and more environmentally friendly.
- Collaboratively create and de-risk holistic high-performance building solutions to address environmental, social and economic realities.
- To develop and provide training and support systems to upskill the residential and commercial construction industries.

SAIT

GBTAC DEMONSTRATION LAB

Energy Management and Renewable Energy Integration

Advanced Building and Material Science

Environmental and Architectural Ecology

SAIT

GBTAC DEMONSTRATION LAB

Environmental Weathering Chamber

E72 Structural Testing Apparatus

SAIT

RETROFIT DISCOVERY SESSIONS

- Free educational and networking sessions.
- Foundational information and data for deep energy retrofits in Part 3 buildings in Alberta.

8 Discovery Sessions

- 3 In-Person sessions in Calgary
- 3 In-Person sessions in Edmonton
- 2 Online sessions

Potential Future Discovery Session Topics:

- Showcasing Retrofit Case Studies
- Identifying the Skills, Training and Gaps in the Market
- Available Technologies and Solutions for DER's
- Understanding Return on Investment (ROI) for DER's
- Other topics and lessons learned that need to be shared as the multi-year project progresses

SAIT

MARKET AND GAP ANALYSIS

Training Needs Identification (building owners, industry professionals, and policymakers)

Identifying skill building needed, accessible training, gaps in available training.

Learning from Other Jurisdictions

Identifying best practices and lessons learned that can be applied to Alberta's program.

Financial Needs Assessment

Collection of data to quantify the need for financial support and incentives.

Code and Regulatory Impact Analysis

Understanding impacts that support or create barriers for retrofit projects.

Barriers and Risks to Accelerating Retrofit Activity in the Alberta Market

Identify potential opportunities for made in Alberta solutions, (including supply chain identification and technology options for local market).

SAIT

Presenter Introductions

ALBERTA ecotrust | Retrofit accelerator

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ALBERTA ecotrust | Retrofit accelerator

WSP Canada

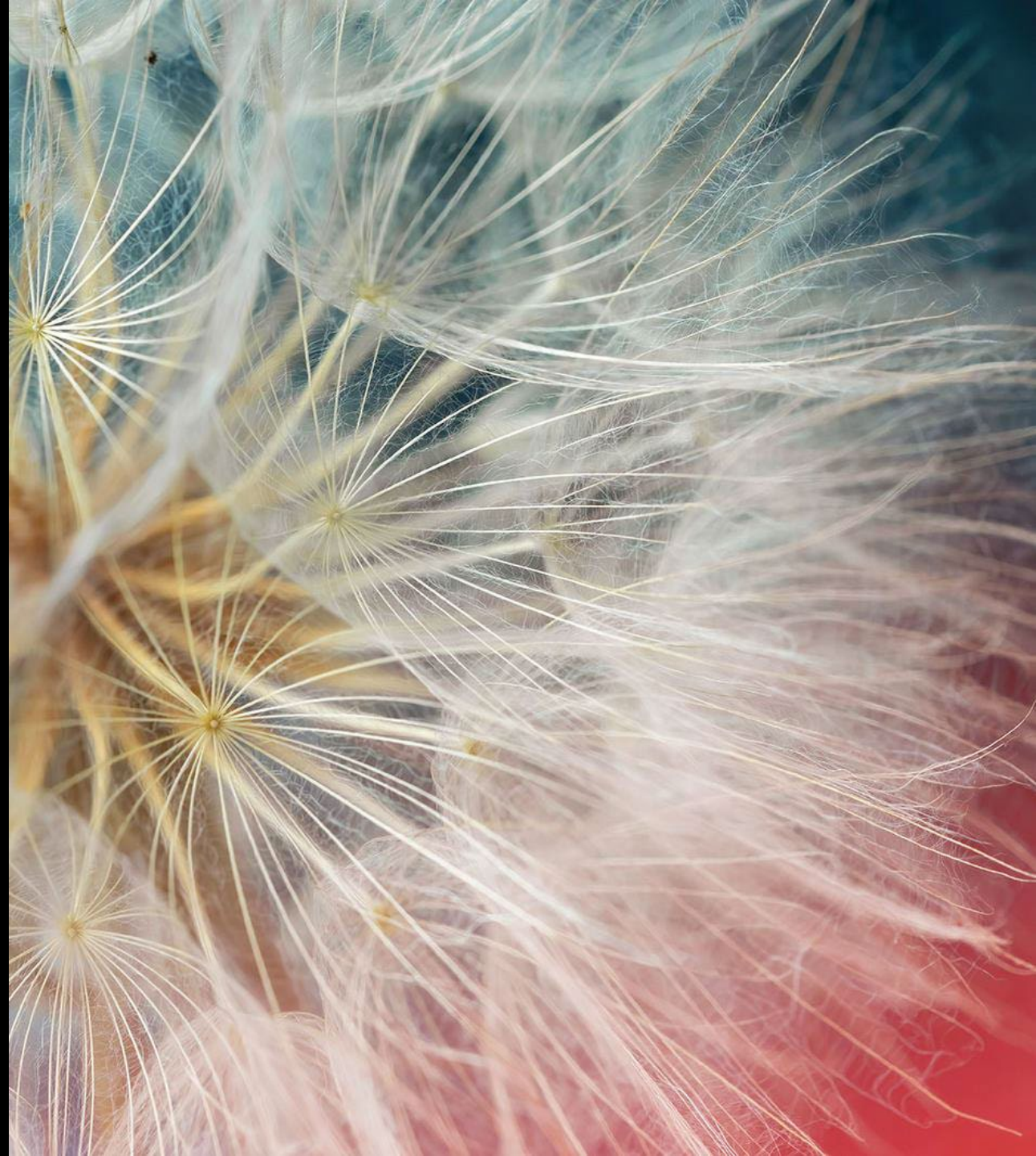
Presentation

ALBERTA ecotrust | Retrofit accelerator

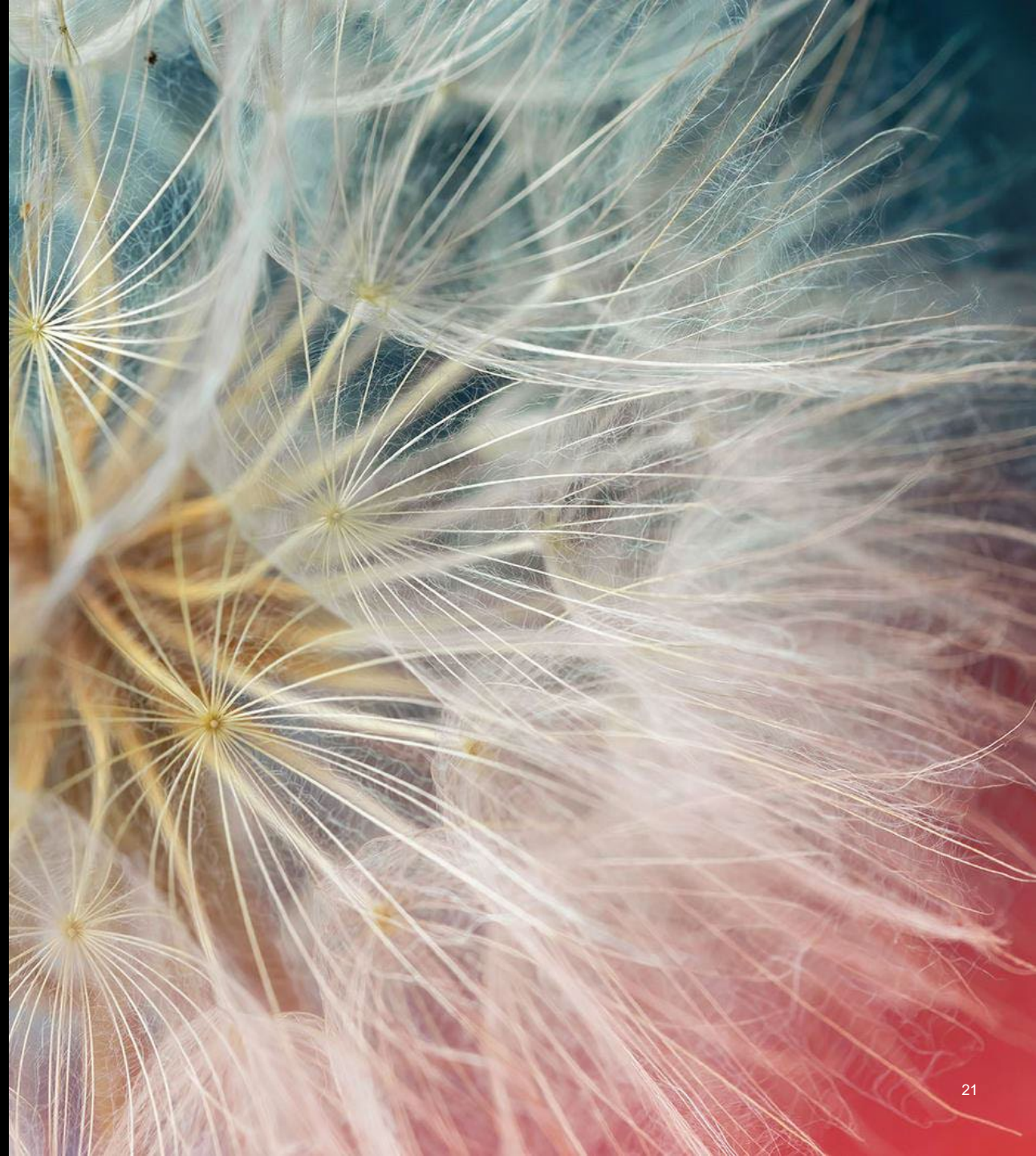
DEEP ENERGY RETROFITS: CODES, TECHNOLOGIES, AND SKILLS INSIGHTS FOR ALBERTA

SAIT DRAI DISCOVERY SESSION #6

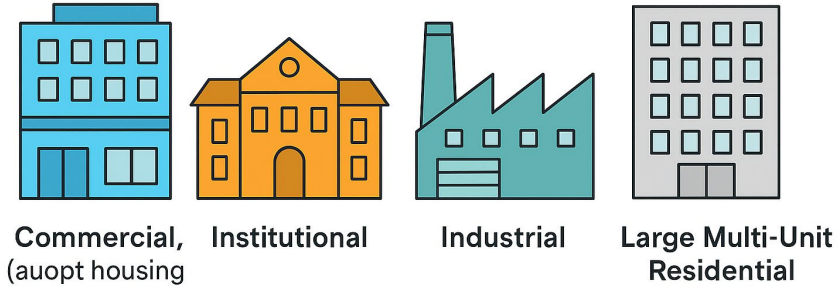
Presented by Hana Lapp & Andrew Russell | March 10, 2026



CODE & REGULATORY REVIEW



National Energy Code of Canada for Buildings



Relationship to National Building Code:

- Companion to NBC, specific to Energy Efficiency and GHG requirements
- Provinces / Territories choose whether to adopt, modify or integrate requirements to own building Codes
- AB / BC / SK / MN / QC / PEI / NS all have adopted NECB 2020
- Adoption is not automatic—each jurisdiction decides whether to adopt, amend, or delay implementation.
- Typical adoption cycles range from 1–5 years depending on regulatory review, industry readiness, and alignment with climate or energy-efficiency goals

Alteration of Existing Buildings – NECB 2020 vs 2025

Component	NECB 2020	NECB 2025
Application	Lacks specific section on Alteration of Existing Buildings	New **Part 13** introduces specific application to Alteration of Existing Buildings
Compliance Trigger Point	Determined by AHJ on case-by-case interpretation of the retrofit	Prescribed thresholds in each Part 13 building system category.
Compliance Path	• Prescriptive Pathway (Sections 3.2, 4.2, 5.2, 6.2, 7.2) • Performance Pathway (Part 8) BUT its complicated!	• Part 13.2 through 13.7 • Performance Pathway (Part 8) BUT still complicated!

NECB 2025 – Part 13 – Compliance Triggers

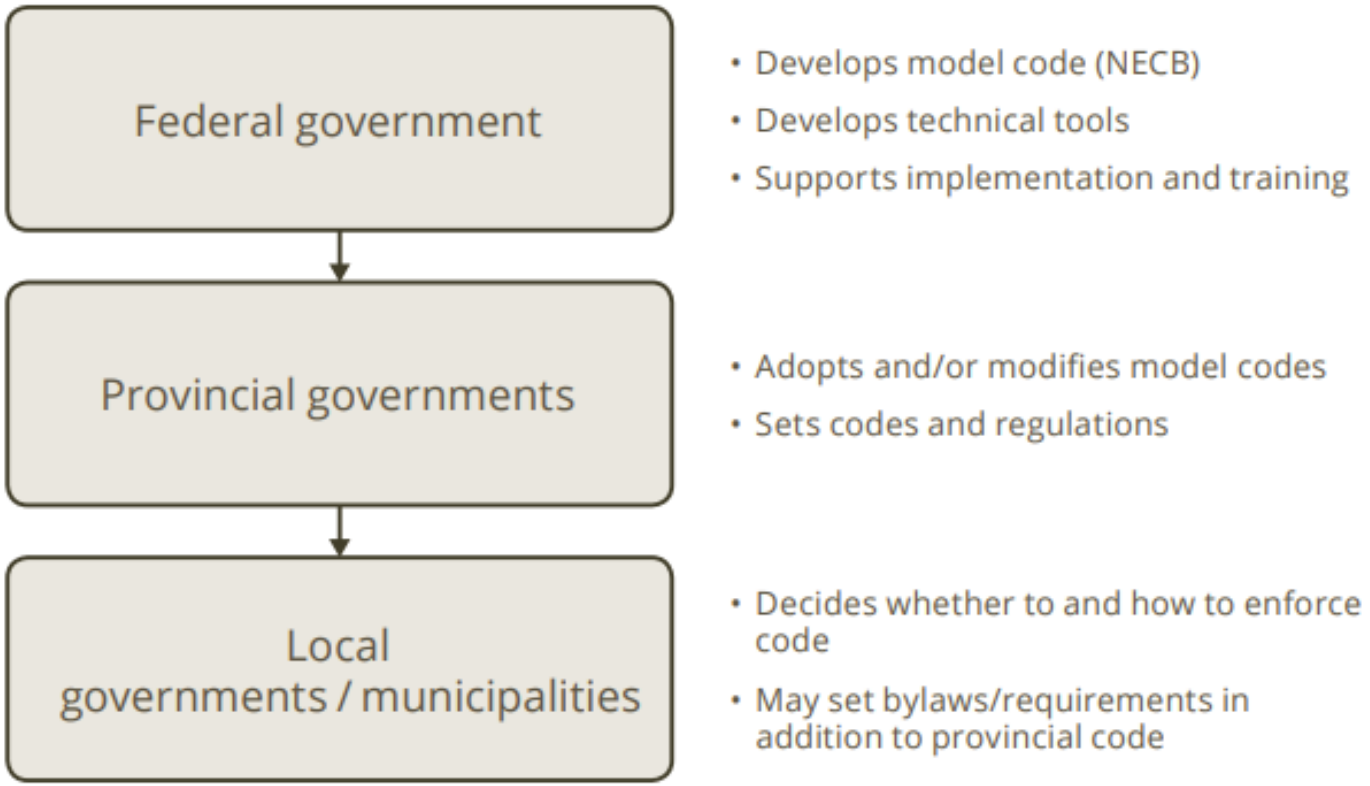
Comply with Prescriptive Requirements if….

	13.3 Building Envelope	13.4 Lighting	13.5 HVAC
Example Compliance Trigger	Roof / Wall / Floor cavities not insulated to full depth with insulation having RSI value of 0.53 per 25mm	Total wattage of all new & existing luminaries >= 2 kW	Added thermal load > 60% of the peak design load supplied by existing system Added replacement ductwork or piping > 60% of the existing distribution system.

NECB 2025 – Part 13 – SWOT Analysis

S Strengths	W Weaknesses	O Opportunities	T Threats
• Targets only altered components, avoiding unnecessary whole-system upgrades. • Establishes clear upgrade triggers. • Ensures alterations do not reduce overall building energy performance.	• Does not establish a flexible performance compliance pathway • Cross-references multiple NECB Parts (3–7), increasing complexity for designers. • 60% HVAC upgrade thresholds may trigger large unplanned system replacements • Does not ensure alterations reduce GHG emissions.	• Supports phased deep-retrofit strategies, enabling incremental efficiency improvements. • Drives modernization of HVAC, lighting, envelope, and service water systems. • Allows alternative solutions, helping address heritage or complex building conditions. • Aligns easily with GHG reduction programs and energy-transition policies.	• Higher costs may discourage compliance or delay needed upgrades. • Older buildings may have physical constraints limiting full compliance (space, structure, access). • Legacy equipment may be incompatible with modern efficiency standards, forcing broader upgrades.

Municipal Boundaries



Source: Pembina Institute's Energy Regulations for Existing Buildings

2023 City Charter amendments for Edmonton and Calgary removed municipal authority to require:

- **Energy consumption standards**
- **Heat retention requirements**

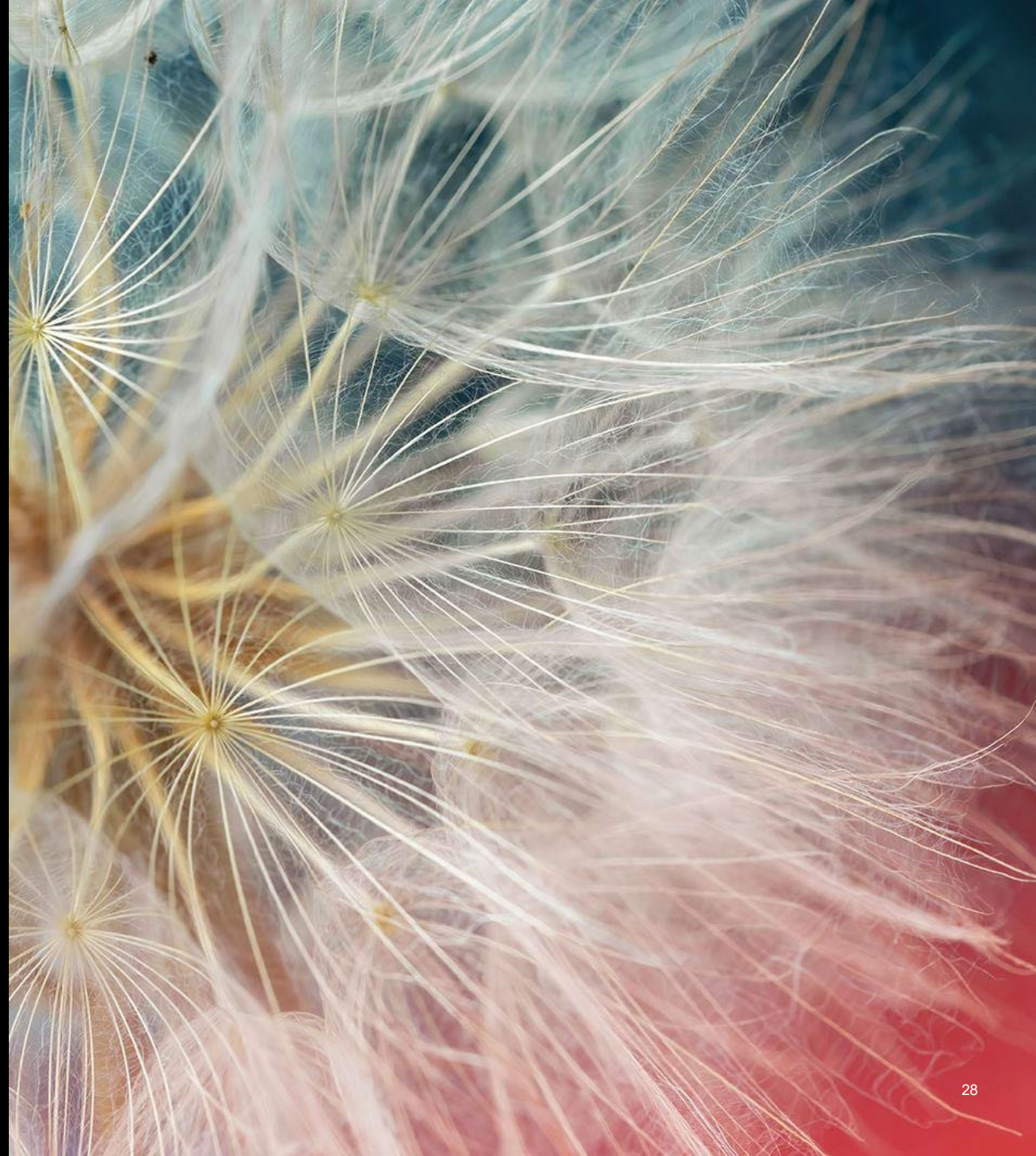
Municipalities cannot mandate energy upgrades, only encourage them (through incentives, education, voluntary programs).

Positive Momentum in Calgary & Edmonton

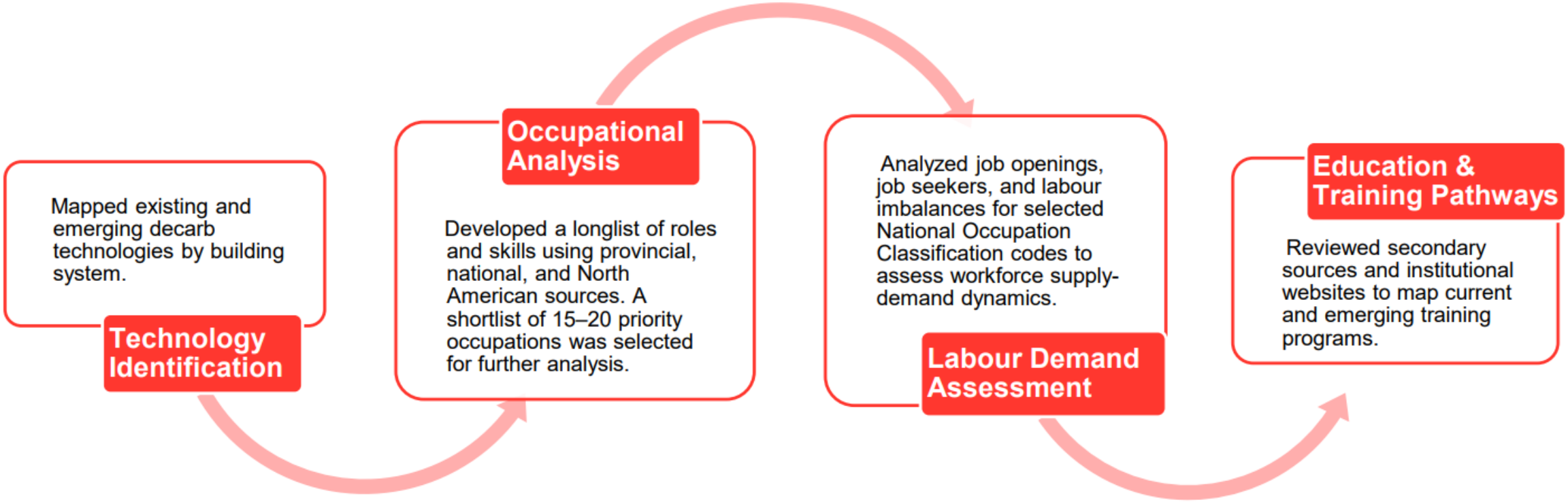
Despite legislative constraints, Alberta's two largest cities are leading on retrofit enablement:

- **Edmonton**
  - Building Energy Benchmarking (BEB) program supports hundreds of buildings with performance data, coaching, and retrofit planning resources.
  - Client Liaison Unit streamlines permitting for complex retrofits.
  - Integrating benchmarking data with retrofit planning tools (e.g., Ecotrust's planning tool).
- **Calgary**
  - BenchmarkYYC engages large buildings in voluntary benchmarking and emissions reduction planning.
  - Clean Energy Improvement Program (CEIP) enables PACE financing for deep residential upgrades.
  - Home Upgrades Program (HUP) delivers free deep retrofits for income-qualified homes.
  - Strong outreach, guidance, and resource development for retrofit applicants.
- **Shared Leadership**
  - Both cities advancing data-driven planning despite limited authority.
  - Use of incentives, education, and enabling tools helps close the gap left by regulatory limits.

TECH & SKILLS REVIEW



Project Approach



Technology Landscape:
Existing & Emerging Technologies

Key Concepts for Holistic Decarbonization

Measures are broken up into four categories and present a holistic review of the systems of the building to support a decarbonization mandate.

1. Occupant-Connected Systems & Equipment

Occupant-Connected Systems & Equipment measures look at how knowledge of usage patterns can help reduce equipment loads at a space level and reduce the need for HVAC through enhancements to building automation systems.

2. Supportive Enclosures & HVAC Delivery

HVAC Delivery measures recommend more efficient ways to condition and ventilate spaces, with a focus on air-side energy recovery and improvements to HVAC system configuration.

3. Optimal Fuel-Switching

Fuel-Switching measures aim to convert all or most fossil-fuel consuming services to electricity or other decarbonized fuels.

4. Grid Stewardship

Grid Stewardship measures lower the facility's dependence on the grid by reducing its peak electrical demand requirements through renewable technologies and energy partnerships.

#1 – Building Automation Systems-Controls & Analytics	#2 – Daylighting and Occupancy Controls	#3 – Variable Frequency Drives	#4 – Demand Controlled Ventilation	#5 – Bi-Directional Electric Vehicle Chargers
#1 – Energy Recovery Ventilation	#2 – Thermal Bridging Mitigation	#3 – Air Leakage Mitigation & Testing	#4 – Dedicated Outdoor Air Systems + Distributed Design	#5 – High Performance Glazing System
#1 – Air-source Heat Pumps - Central	#2 – Air-source Heat Pumps - Distributed	#3 – Cascading/ Hybrid Systems	#4 – Geo-exchange Integration	#5 – Waste Heat & Energy Sharing
#1 – Decarbonized Combined Heat & Power (CHP)	#2 – Facility Wide Demand Management (Microgrid Controllers)	#3 – Solar Photovoltaics	#4 – Battery Energy Storage	#5 – Thermal Energy Storage

WSP developed the **'Top 20 Decarbonized Solutions'** to help guide the most impactful actions for achieving net zero buildings.

Why these 20?

- They represent proven, scalable technologies applicable in Alberta
- They balance ambition with feasibility
- They offer a clear, actionable framework for aligning workforce training, policy decisions, and investment strategies.

Trends in High Performance Building Technologies

In Alberta, the adoption of net-zero high-performance building technologies is **progressing unevenly across building types**, reflecting differences in scale, complexity, and economic considerations.

Part 9 (low-rise residential)

Showing early momentum in adopting high-performance, low-carbon technologies

- Air-source heat pump adoption
- Simpler installation and smaller thermal loads
- Consumer incentives and utility programs
- Envelope upgrades
- Daylighting, occupancy controls, and rooftop solar PV
- Bi-directional EV chargers

Part 3 (large commercial & institutional)

Adoption remains cautious and uneven

- Net-zero adoption is often limited to pilots and new construction projects
- Operational optimization is advancing
- Ventilation efficiency is improving
- Advanced energy systems are being piloted
- Battery storage and microgrid controllers are gaining interest
- Solar PV adoption is slower than for residential buildings

Future Technology Trends in Net Zero Buildings

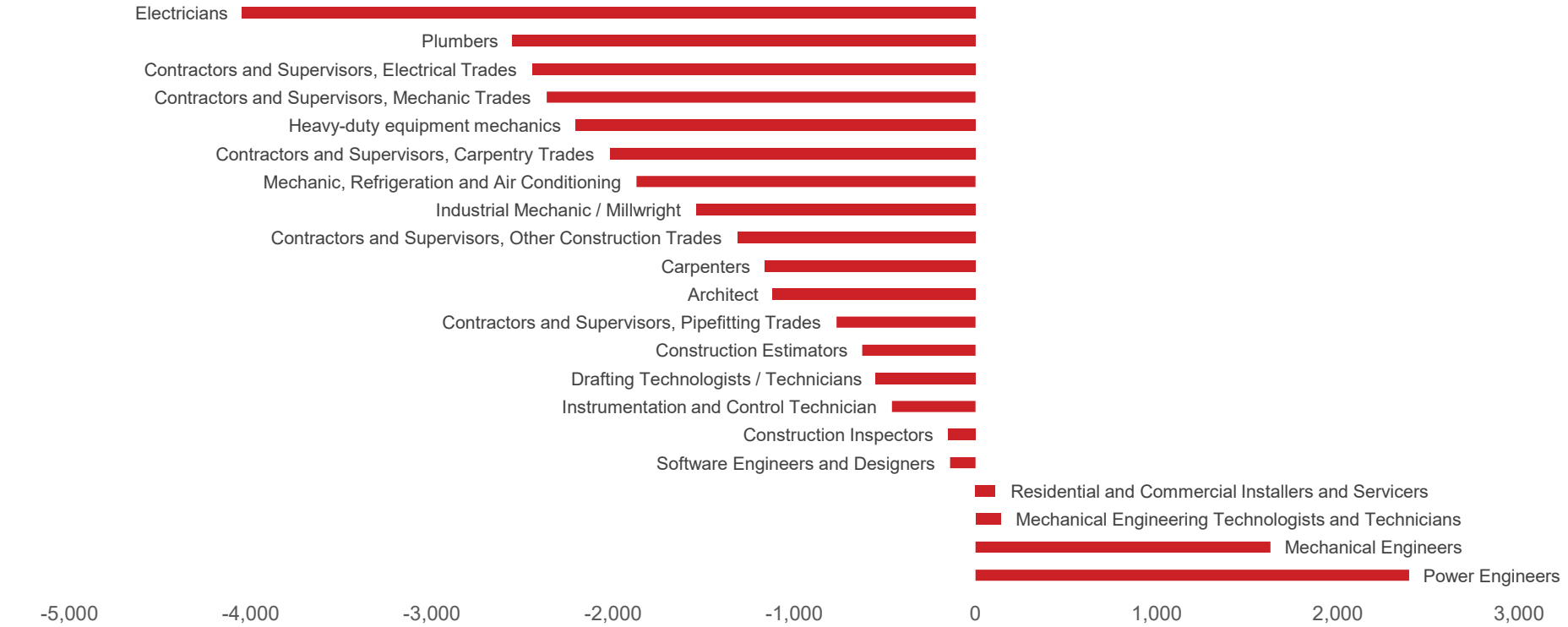
In Alberta, the harsh climate and carbon-intensive electricity grid present challenges and opportunities for building decarbonization.

Early trials of technologies are underway for the following:

- **Phase Change Materials (PCMs) -** show strong potential for reducing HVAC loads; early testing at SAIT demonstrates effectiveness in buffering indoor temperature swings.
- **Electrochromic / Photochromic Glass -** is gaining traction, with pilots at the Calgary Cancer Centre and the University of Calgary to optimize daylighting and reduce heat gain.
- **Modular Ice-Based Energy Storage -** tested by Alberta Health Services, supports peak load reduction and improved grid responsiveness in large institutional buildings.

Labour Demand

Percent (%) Expected High Supply Cumulative Imbalance Occupational Clusters, Alberta 2030



- Electricians face the largest cumulative gap
- High demand for HVAC technicians, plumbers, and construction supervisors.
- Gaps linked to electrification (heat pumps, EV charging), controls/BAS, envelope performance.

Source: (Alberta Government, 2024)

Skills Gaps

A skills gap occurs when available candidates lack the specific skills employers need.

Information Technology

- Digital tools (smart sensors, AI, data analytics) now support collaboration across the building lifecycle.
- Need stronger technical + digital literacy, especially data analysis.
- Growing demand for digitally fluent workers (software, cybersecurity, data systems, systems integration).

Modular Construction & Pre-Fabrication

- Shift toward manufacturing-style construction requires earlier design decisions and new digital/technical skills.
- Workforce roles evolving toward factory-based, automated environments, requiring coordination, repeatability, and comfort with automation.

Deep Energy Retrofit

Professionals often lack competencies needed for high-performance retrofits, including:

- Building science (envelopes, airtightness, moisture).
- Energy modelling + performance verification.
- Systems integration (structural, mechanical, electrical).Retrofit sequencing + existing conditions assessment.
- Energy & carbon management.
- Controls/BAS, digital literacy, IoT.
- Retrofit technologies (heat pumps, PV, electrical systems)
- Climate risk mitigation.
- Regulatory familiarity (NBC, NECB, permitting).

Key Findings

Technology Adoption is Uneven

Alberta is adopting high-performance building technologies such as air-source heat pumps, smart building controls, and solar PV systems, but uptake is uneven. Part 9 (residential) buildings are progressing more rapidly than Part 3 (commercial and institutional) buildings due to differences in complexity, cost, and regulatory support

Labour Shortages Are Widespread

Electricians are expected to face the most significant cumulative shortfall (over 4,000 workers by 2030) followed by plumbers, HVAC technicians, and construction supervisors. These gaps are driven by increased demand for retrofits, electrification, and renewable energy integration.

New Roles Are Emerging

The sector is seeing the rise of hybrid roles such as solar energy installation managers, geothermal technicians, and energy auditors. These positions require a mix of traditional trade skills and new competencies in digital controls, energy modeling, and systems integration.

Education and Training Systems Are Misaligned

Alberta's post-secondary institutions offer relevant programs, but gaps remain in curriculum content, credentialing, and access to hands-on learning—particularly for trades and mid-career professionals. Recent cuts to college programs due to international enrollment caps have further strained the talent pipeline.

Skill Gaps Span Technical and Soft Skills

Gaps are evident across all occupational clusters, including construction trades, design and engineering professionals, and regulatory specialists. These include both technical gaps (e.g., in building automation, modular construction, and renewable systems) and soft skills (e.g., interdisciplinary collaboration, digital communication, and systems thinking).

Grid-Interactive and Demand-Side Solutions Are Underutilized

Alberta's emissions strategy emphasizes supply-side technologies, while demand-side solutions, such as smart controls, envelope upgrades, and grid stewardship, remain underleveraged despite their high potential for near-term carbon reductions.

Future Research Is Needed

Primary research is required to validate occupational gaps, map skills to specific technologies, and model the workforce impacts of technology adoption. Additional focus is needed on training for building operators and homeowners, who play a critical role in long-term building performance.

THANK YOU

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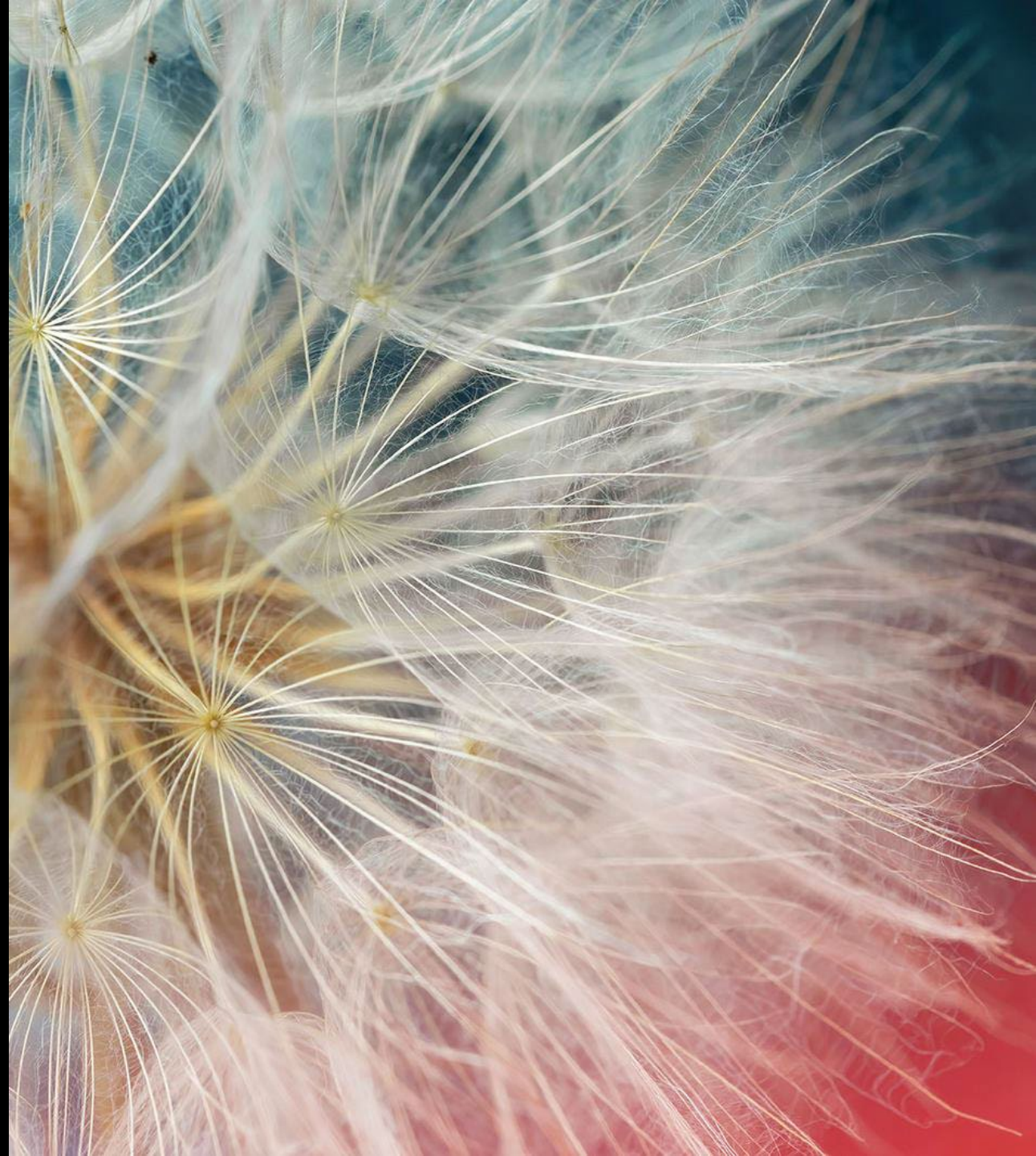

RFS Energy Consulting & Research Group

Presentation

ALBERTA ecotrust | Retrofit accelerator

SAIT Discovery Session #6

March 10, 2025

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ASK

Alberta's Incentive Landscape

Alberta Snapshot *2014 to early 2025*

55 unique incentives identified

54.5% (30) incentives are still active

21 closed or paused

Who is funding these programs?

80% by government entities

14 municipal programs (primarily rebate or grants) - average maximum award <$70,000

15 provincial programs (mix of rebates, grants, loans, and direct installs e.g., Energy Efficiency Alberta Residential Direct Install)

15 federal programs (loan models), with a few grant programs deployed since 2014

Commercial Building Funding Gap

Ony 36% of incentives applied to commercial buildings – while 62% applied to residential buildings

Limited support available for comprehensive, whole-building DER projects

Lack of information and clarity for those incentives available to Albertans

A decline in commercial building incentive availability

Key Findings on Incentives

British Columbia

Stronger support system for energy efficiency, including incentives relevant to DER projects

Collaboration across provincial government (CleanBC), utilities (BC Hydro, Fortis BC) and municipalities supports an ecosystem needed for DERs

Provincial climate-focused programs also target large buildings outside of savings focus

BC Hydro

$37 Million *(approximately 50.6%)* of **$73 Million**

Energy Efficiency DSM program expenditures dedicated specifically to commercial and industrial programming in fiscal 2024

Fortis BC

$21 Million *(approximately 13.2%)* of **$159 Million**

DSM Utility expenditures dedicated to commercial and industrial programming in 2024

Key Findings on Incentives

Ontario

Combination of provincial system operator (IESO), local distributors, and municipal initiatives to support the incentive availability

Mandatory energy use report for large buildings by the province, a useful data source to build a business case for investing in retrofit projects

Enbridge Gas offers the Commercial Custom Retrofit Program with incentives for custom efficiency measures (building automation, HVAC, and / or heat recovery)

IESO

IESO programs support a range of aspects for DERs in large buildings - rebates for upgrades, energy performance incentives, building recommissioning, and energy manager hiring support

IESO 2019 - 2023

At Least **$420.5 Million** *(approximately 74%)* of **$567.8 Million** total

of total energy efficiency budget dedicated to programming relevant to DER projects for commercial, industrial, and institutional customers

DER Investment: ON, BC, AB

Province	Utility	Fiscal Period	Total DSM Expenditures (M)	Commercial & Industrial Program Expenditures (M)	% for DER-related programs
BC	BC Hydro	2024	73	37	50.6%
	Fortis BC	2024	159	21	13.2%
ON	IESO	2019 - 2023	568	421	74%
AB*	*Aggregate Incentives*	2014 - 2025	21.8	-	-

**Alberta data reflects the total maximum advertised funding from 55 incentive programs targeted to large buildings available between 2014 and early 2025. Only publicly available values from currently active programs in 2025 were used.*

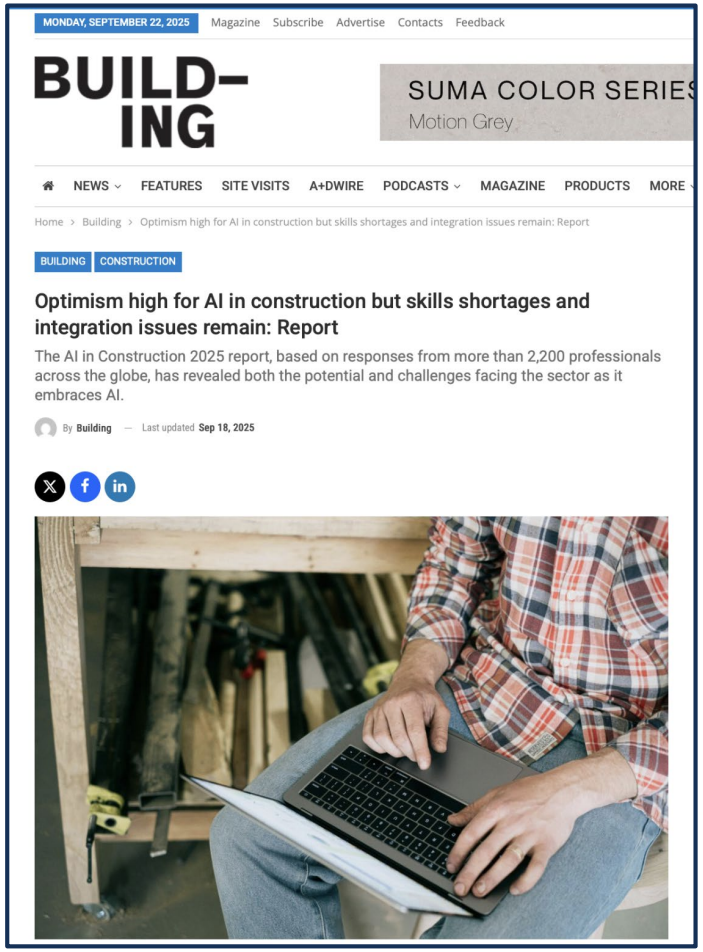
Key Findings on Training & Skills Development

Constant Refrain: SKILLS SHORTAGE

The Design & Construction industry has a major skills / experience shortage — and it's not going away.

There are many "Crises" the construction industry is struggling with (Housing, Escalation, Tariffs, Supply Chain).

Integrated Design and busting silos between architects, engineers, contractors, trades is a work in progress.



Key Findings on Training & Skills Development

British Columbia

- ➔ Has always been ahead of the curve on sustainable design, retrofits, energy efficiency, policy
- ➔ BCIT is a major training hub for Western Canada
- ➔ ZEBx / ZEIC have facilitated a clearinghouse of built environment information and programs (and thus, has been an excellent model for ENBIX)

Ontario

- ➔ CIET - major “virtual” training hub for the built environment industry
- ➔ Canada Green Building Council has provided training nationally for 2 decades
- ➔ Canadian Construction Association has recently provided training on “Low Carbon Buildings”
- ➔ City of Toronto has been a long-time leader in building retrofits; Toronto is a centre of expertise

Reflection: Universities provide broad theory in learning & technical/trade schools provide very specific training/skills.

Gap Analysis on Training & Skills Development

- Political climate & policy changes are problematic for encouraging training in sustainable building and DERs.

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Gap Analysis on Training & Skills Development

- Political climate & policy changes are problematic for encouraging training in sustainable building and DERs.
- Eroding of sustainable policies and wholesale departments in municipalities show lack of prioritization of the environment- and a greater shift to "cost reductions"

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Gap Analysis on Training & Skills Development

- Political climate & policy changes are problematic for encouraging training in sustainable building and DERs.
- Eroding of sustainable policies and wholesale departments in municipalities show lack of prioritization of the environment- and a greater shift to "cost reductions"
- Elimination of consumer carbon tax hurts the business case for deep energy retrofits, deteriorating the market for DERs

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Gap Analysis on Training & Skills Development

- Political climate & policy changes are problematic for encouraging training in sustainable building and DERs.
- Eroding of sustainable policies and wholesale departments in municipalities show lack of prioritization of the environment- and a greater shift to "cost reductions"
- Elimination of consumer carbon tax hurts the business case for deep energy retrofits, deteriorating the market for DERs
- All of these indicators/signals push the market to consider other training priorities like "A.I. tools"

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Bottom Line: We Need More People.

Job vacancy rate in Alberta

ATB Economics

Seasonally adjusted

Note: Data during Q2 2020 and Q3 2020 are not available. Seasonal adjustment by Haver Analytics.
Source: Statistics Canada/Haver Analytics and ATB Economics

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Bottom Line: We Need More People.

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CONSTRUCTION BUILDING

Ontario Investing Over $60 Million in Skilled Trades Apprentices

This investment, through the In-Class Enhancement Fund (IEF), will create up to 4,000 new training seats each year, and help apprentices access in-class training more quickly while covering their $10-per-day Level 1 classroom fees.

By Building — Last updated Oct 20, 2025

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Market Opportunity: Will Industry Rise to the Challenge?

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Best Practices from BC & ON Incentives

Alongside major utility offerings (BC Hydro, FortisBC, IESO, Enbridge) - other provincial, municipal, or regional initiatives creates **multiple pathways for DER projects and reduces barriers across building types and regions.**

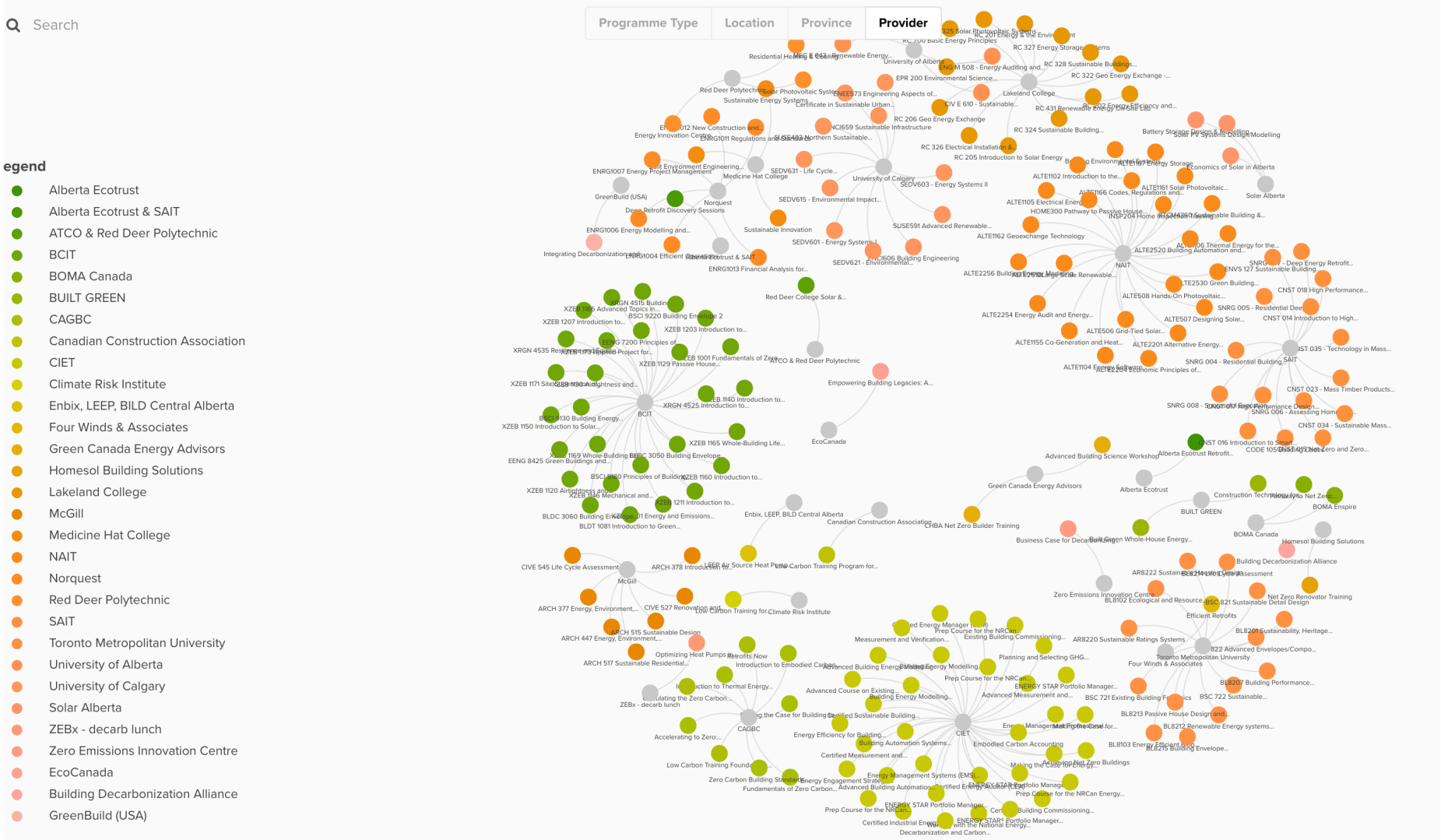
Whole-building or custom retrofit programs, paired with energy manager and energy assessment programs ensure there is **internal capacity and expertise being built up** for planning and implementing DERs.

Performance-based programs encourage the desire for pursuing deeper upgrades - linking these participants with available incentives captures further opportunities.

Programs **targeting building recommissioning or continuous optimization** (e.g, IESO Existing Building Commissioning, FortisBC/BC Hydro Co-op Program) provide pathways for older or complex buildings for longer term projects.

Encouraging or requiring energy use reporting for large buildings provides a valuable data source for retrofit business case, understanding energy use, and identifying opportunities for upgrades.

Refinement of TSD Heat Map (on Kumu)



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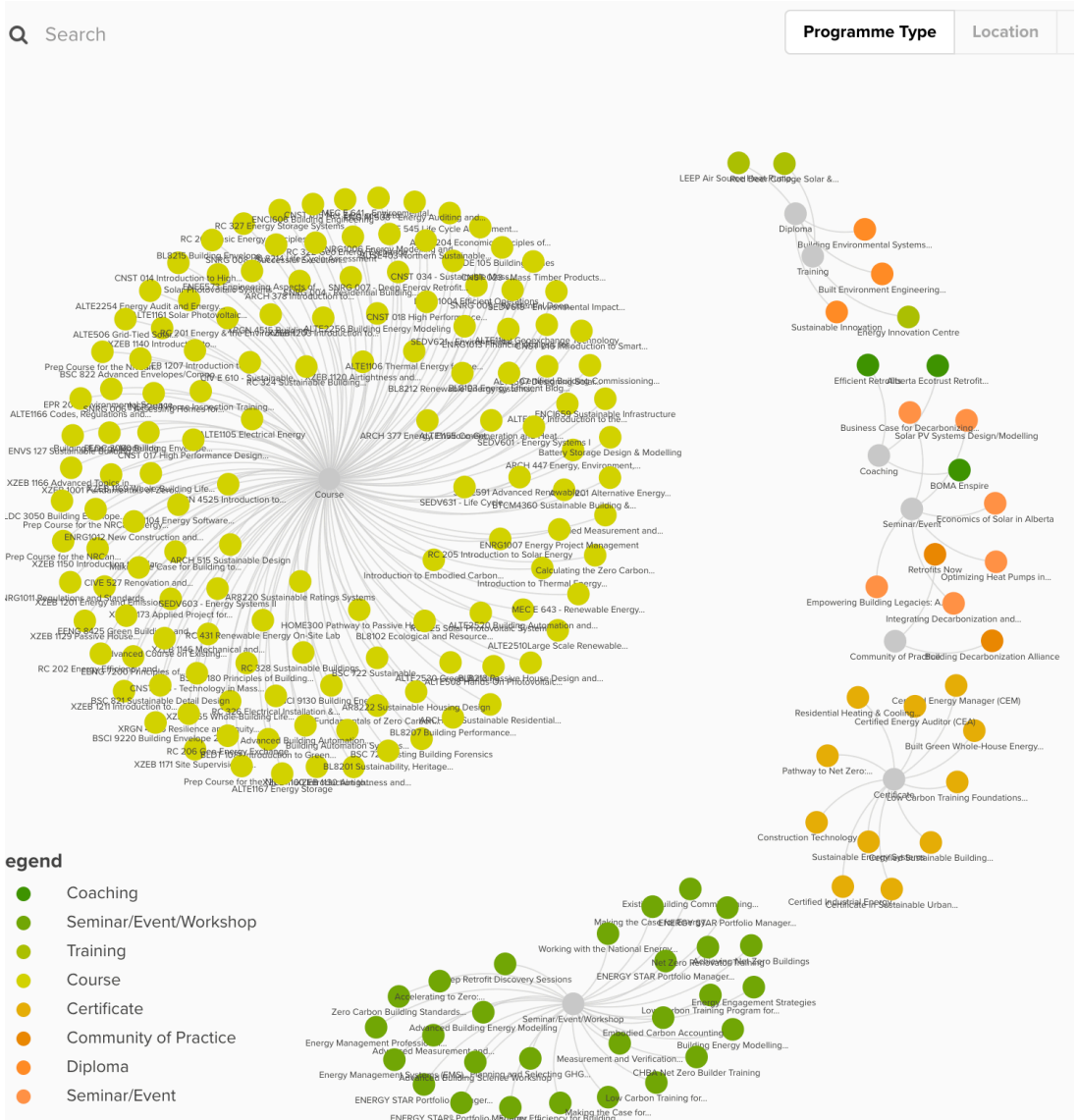
Refinement of TSD Heat Map (on Kumu)



RFS

Thank you!

For more information, please contact:

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Q & A
Panel Discussion

ALBERTA ecotrust | Retrofit accelerator

WSP

Where do you see the biggest risk of misalignment between code requirements and practical feasibility in Alberta's building stock, as related to retrofit projects?

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WSP

Given Alberta municipalities cannot mandate deep retrofits, what tools or market levers do you believe are most effective to drive voluntary adoption?

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Where could advocacy efforts focus or be strengthened to further accelerate deep energy retrofits in Alberta?

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RFS

Looking at other jurisdictions, what mechanisms or program structures could strengthen Alberta's incentive offerings for deep energy retrofits?

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Are you aware of any active funding that is available, either Provincially and /or Federally, for employers / employees to enroll in training programs to upskill in the retrofit market?

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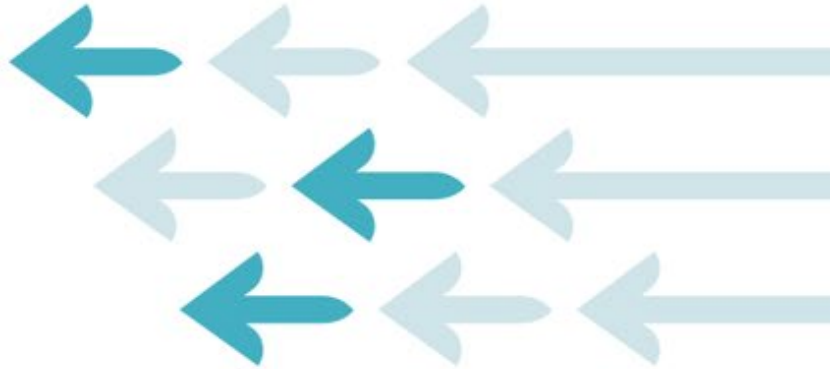

Open to all presenters

Based on your experience, what are the key barriers and challenges that building owners face when considering more progressive upgrades, such as a deep energy retrofit?

Ex) Skilled workforce? Financing? Codes and regulations? Other?

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How should training programs (e.g., SAIT, industry certifications) evolve to support emerging technologies like heat pumps, BAS optimization, or advanced envelope systems?

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Thank You

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