CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

WHO'S DOING WHAT?
And is it enough to get us there?

Frank Lohmann
Senior Director, Building Science, CHBA

Local Energy Efficiency Partnership (LEEP) - Natural Resources Canada

Ericha Moores
Senior Policy Analyst, Infrastructure Canada

Janette Meyrick
Evaluation Officer, Canadian Construction Materials Centre, NRC

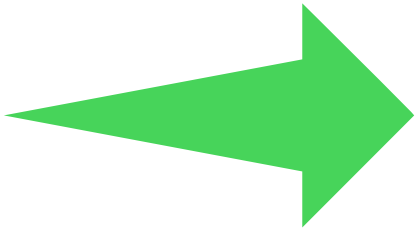
Wilma Leung
Senior Manager, Technical Research & Education, BC Housing

CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

Frank Lohmann, Senior Director, Building Science, CHBA

2 Sessions

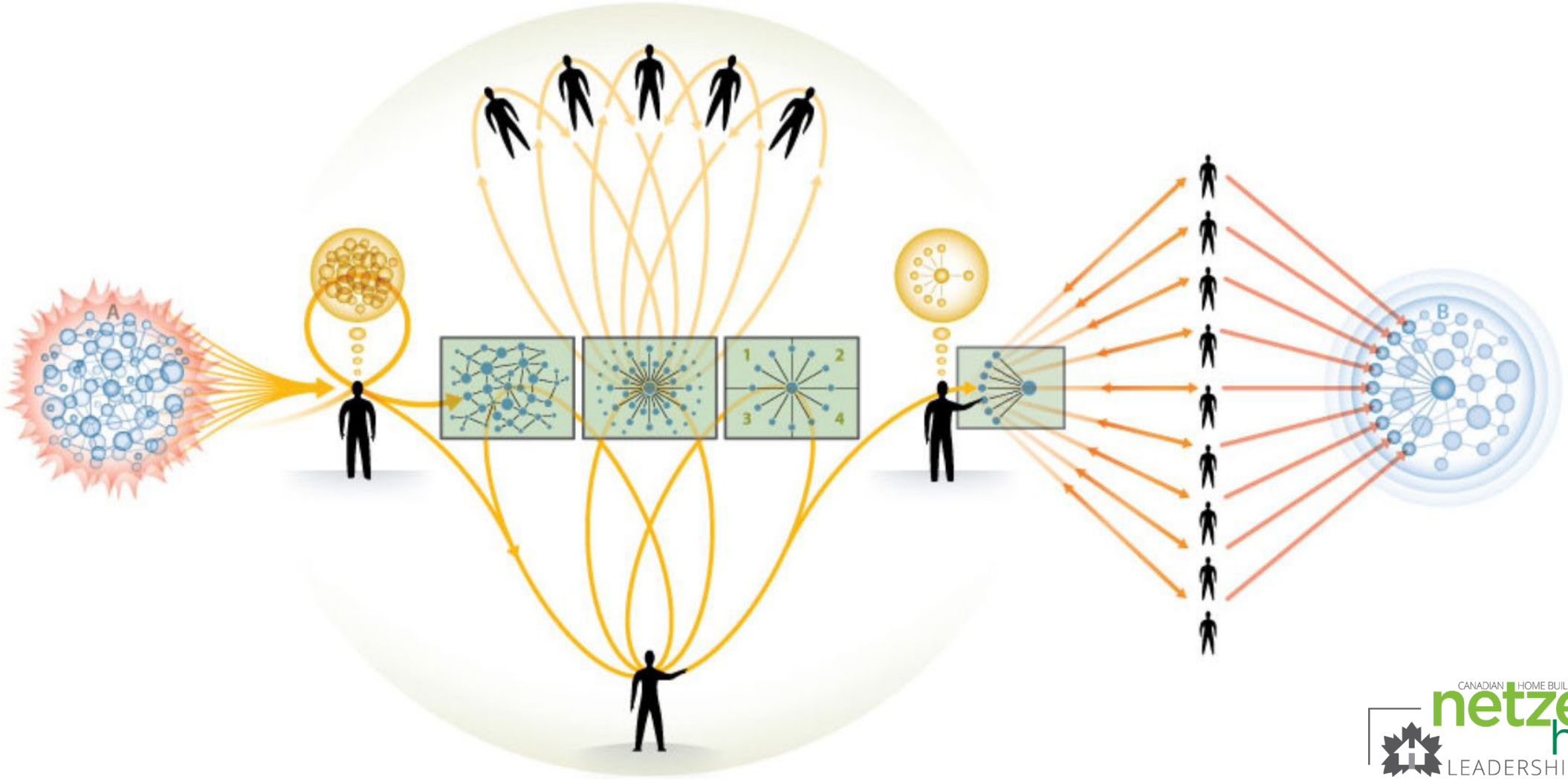
Integrating Resilience and Adaptation



CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIP SUMMIT

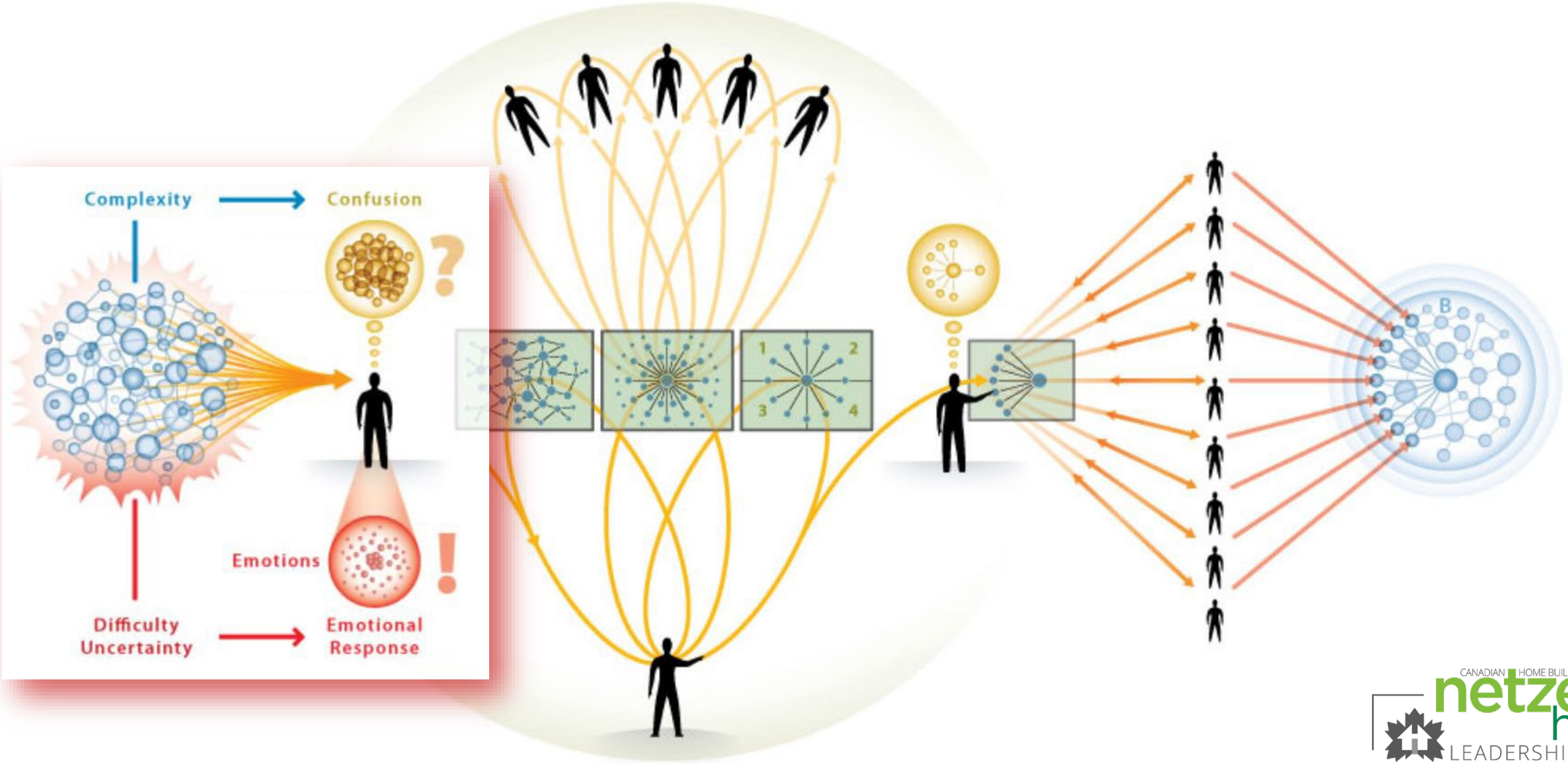
2 Sessions

Integrating Resilience and Adaptation



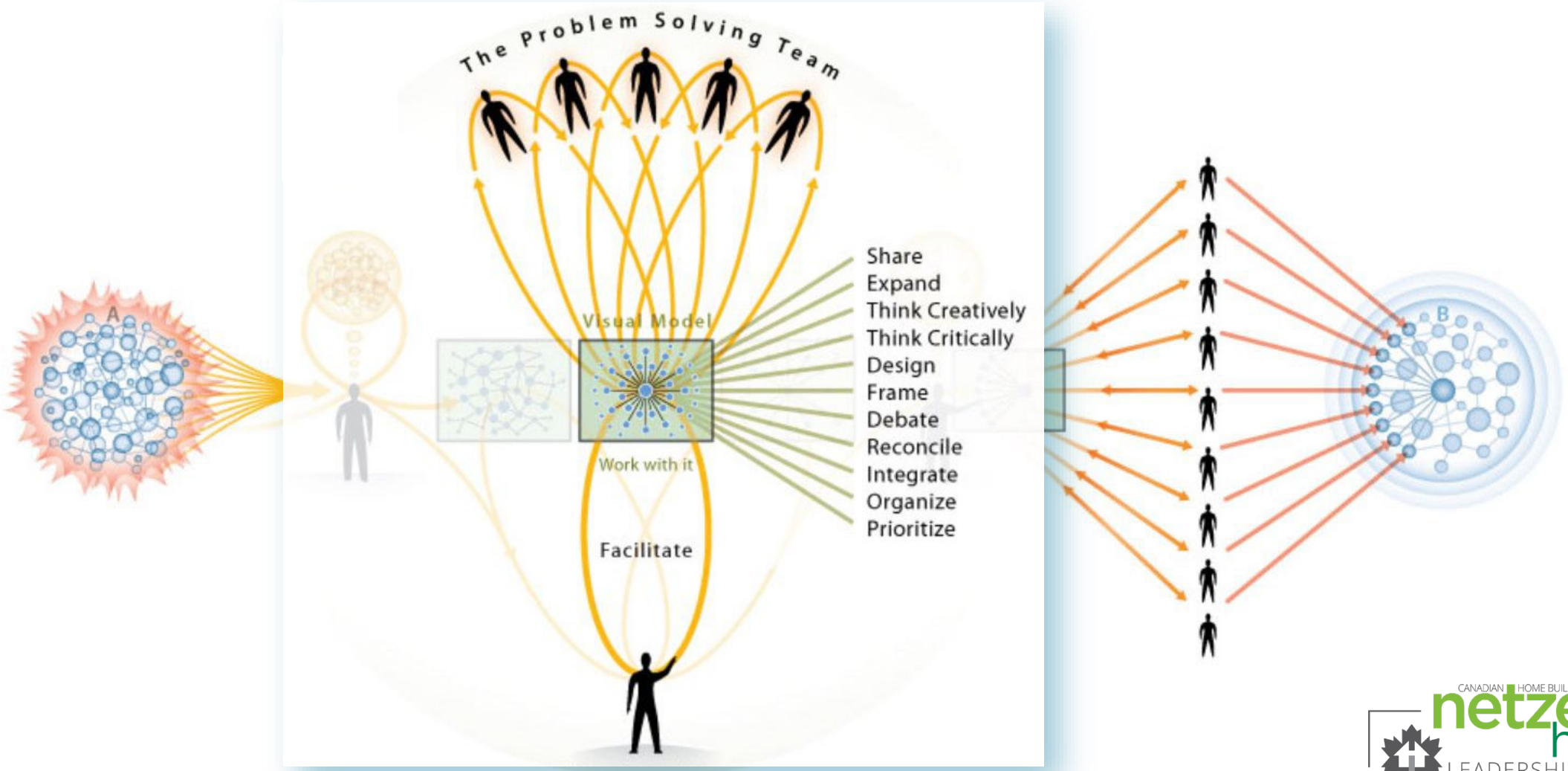
2 Sessions

Integrating Resilience and Adaptation



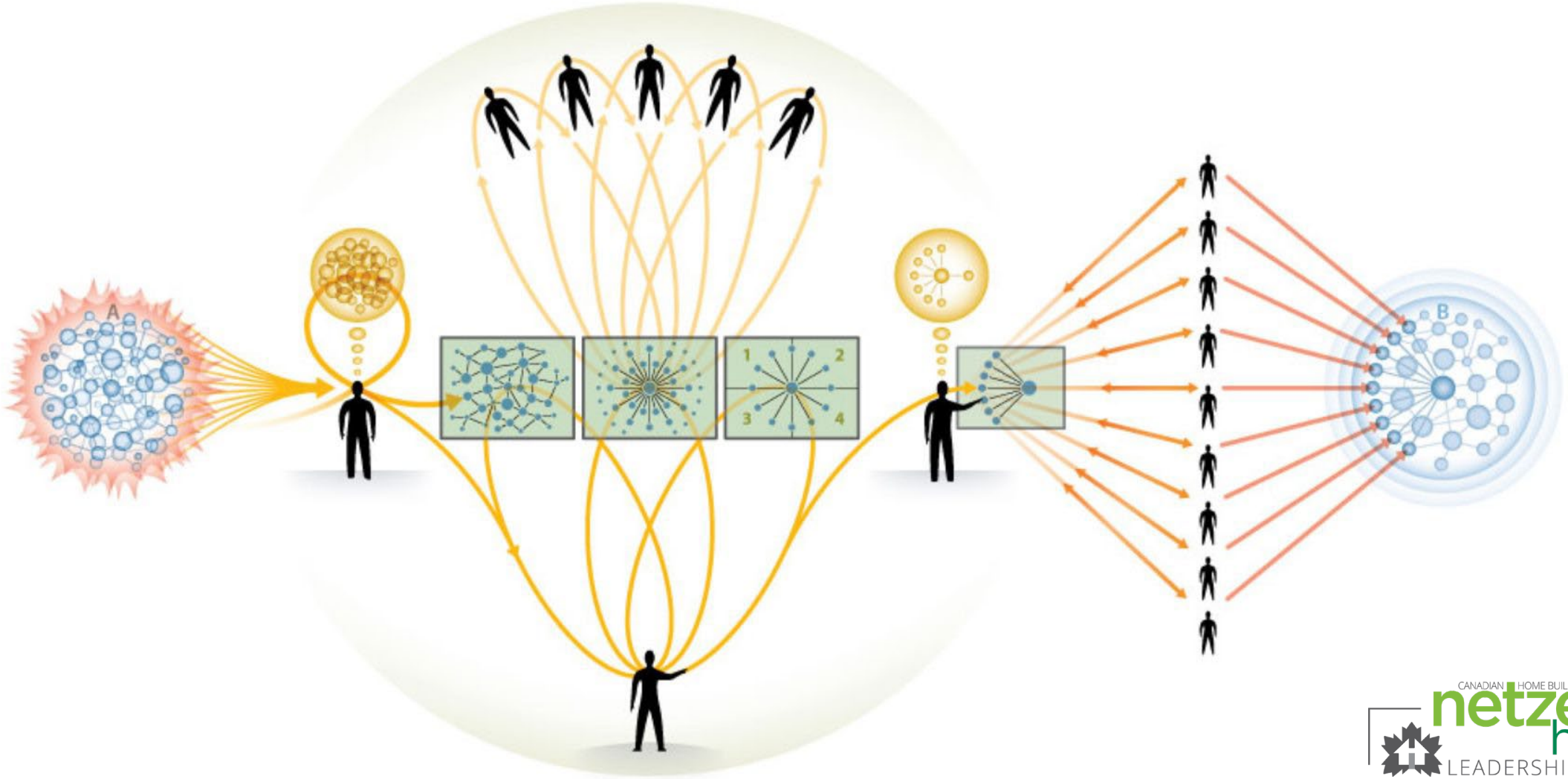
Session 3

Integrating Resilience and Adaptation



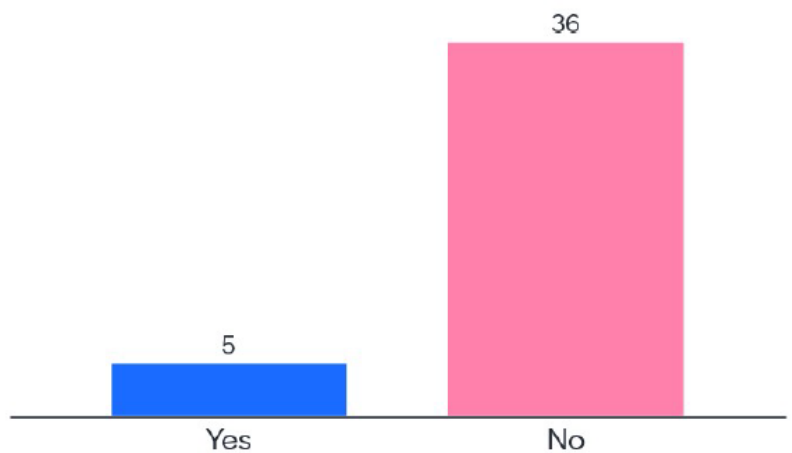
Session 3

Integrating Resilience and Adaptation



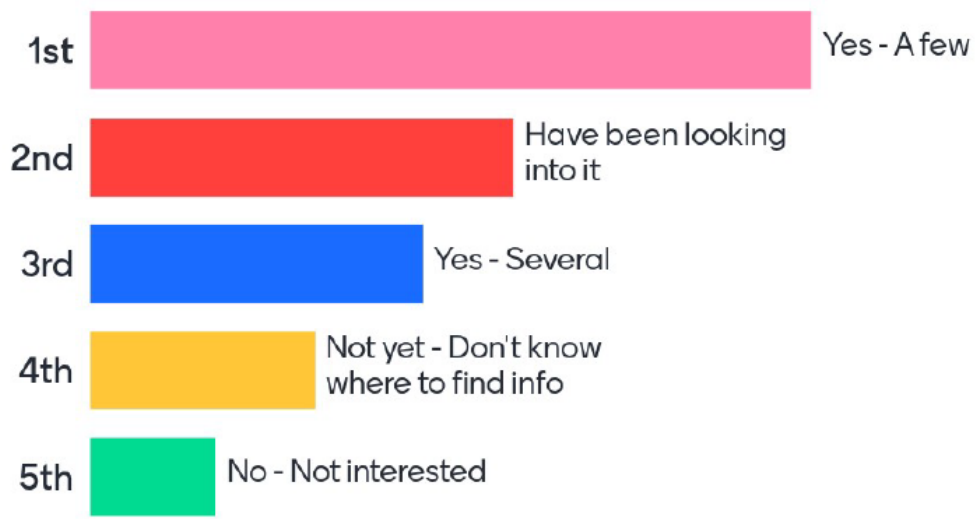
SESSION 3 - WHO'S DOING WHAT?

Have you experienced a loss in insurance/you can't get insurance due to climate related risks?



SESSION 3 - WHO'S DOING WHAT?

Have you implemented resilience measures in your new builds/renos



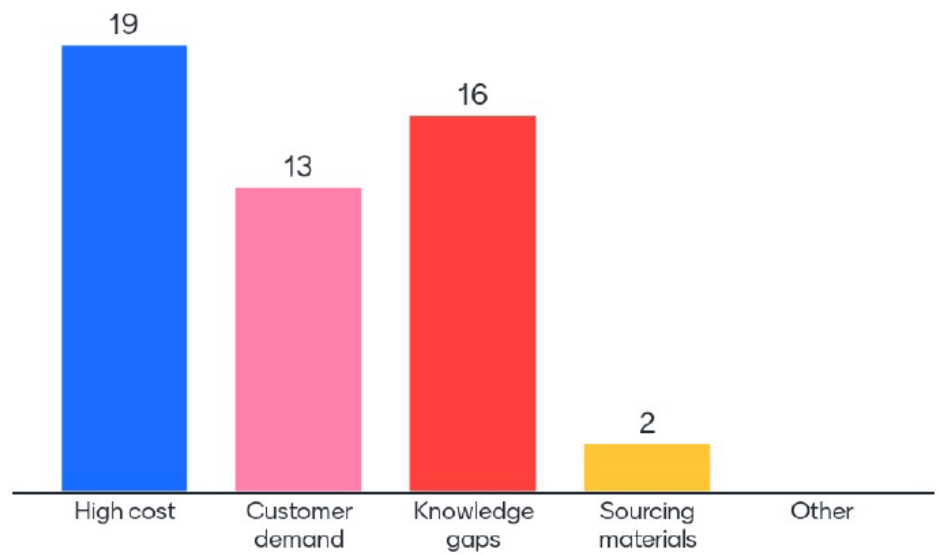
SESSION 3 - WHO'S DOING WHAT?

If you have implemented resilience measures, which ONE was the easiest to do?

47 responses

SESSION 3 - WHO'S DOING WHAT?

If you have implemented resilience measures, what were the roadblocks?



SESSION 3 - WHO'S DOING WHAT?

Name your best source for information on resilience

61 responses

CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

Stephanie Coleman, Sustainable and Resilient Housing Industry Lead, LEEP, NRCan

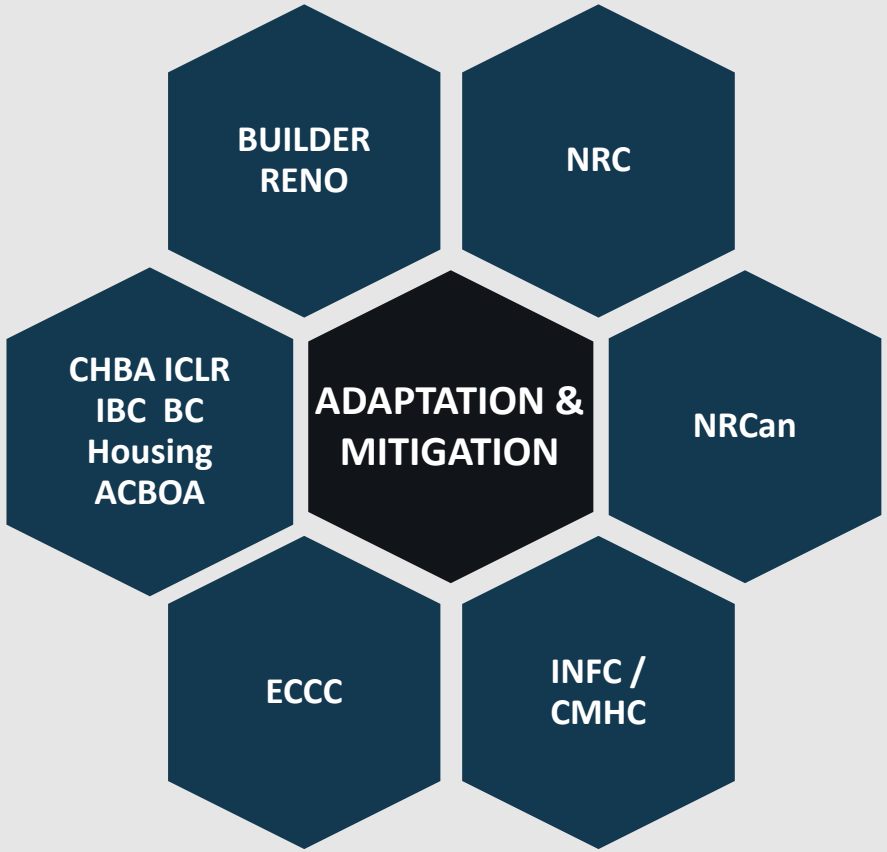
LEEP Sustainable Resilient Housing Tool

Stefanie Coleman: Stefanie.coleman@nrcan-rncan.gc.ca

Natural Resources Canada | Ressources naturelles Canada

Canada

LEEP SUSTAINABLE RESILIENT HOUSING TOOL STEERING COMMITTEE



ECCC (Environment & Climate Change Canada)
NRC (National Research Council)
INFC (Infrastructure Canada)
CMHC (Canada Mortgage and Housing Corp)
NRCan (Natural Resources Canada)

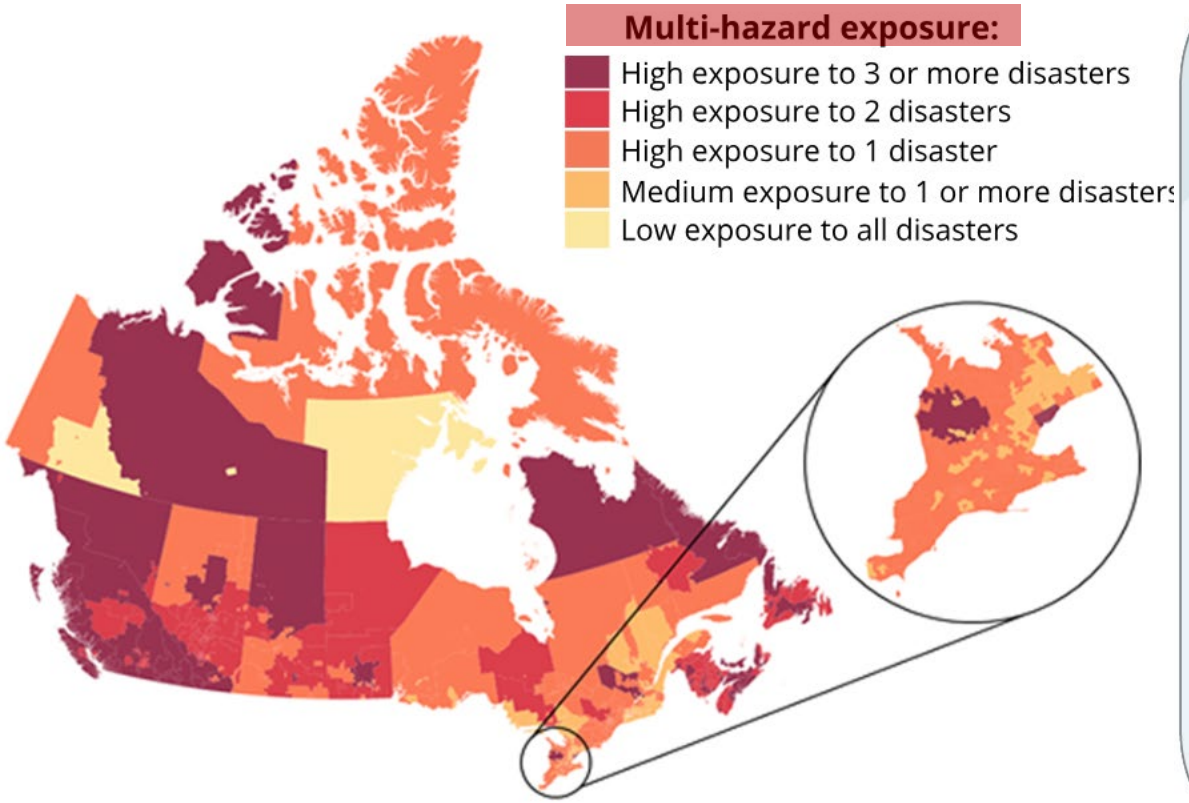
4 Largest Residential Home Builders
CHBA (Canadian Homebuilders' Association)
ICLR (Institute for Catastrophic Loss Reduction)
BC Housing
New: ACBOA (Alliance of Canadian Building Officials' Association)
New: IBC (Insurance Bureau of Canada)
New: Others to be announced

LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

ESCALATING CLIMATE-RELATED CATASTROPHIC EVENTS

Chart 2: Exposure to different types of natural disasters varies by region across Canada

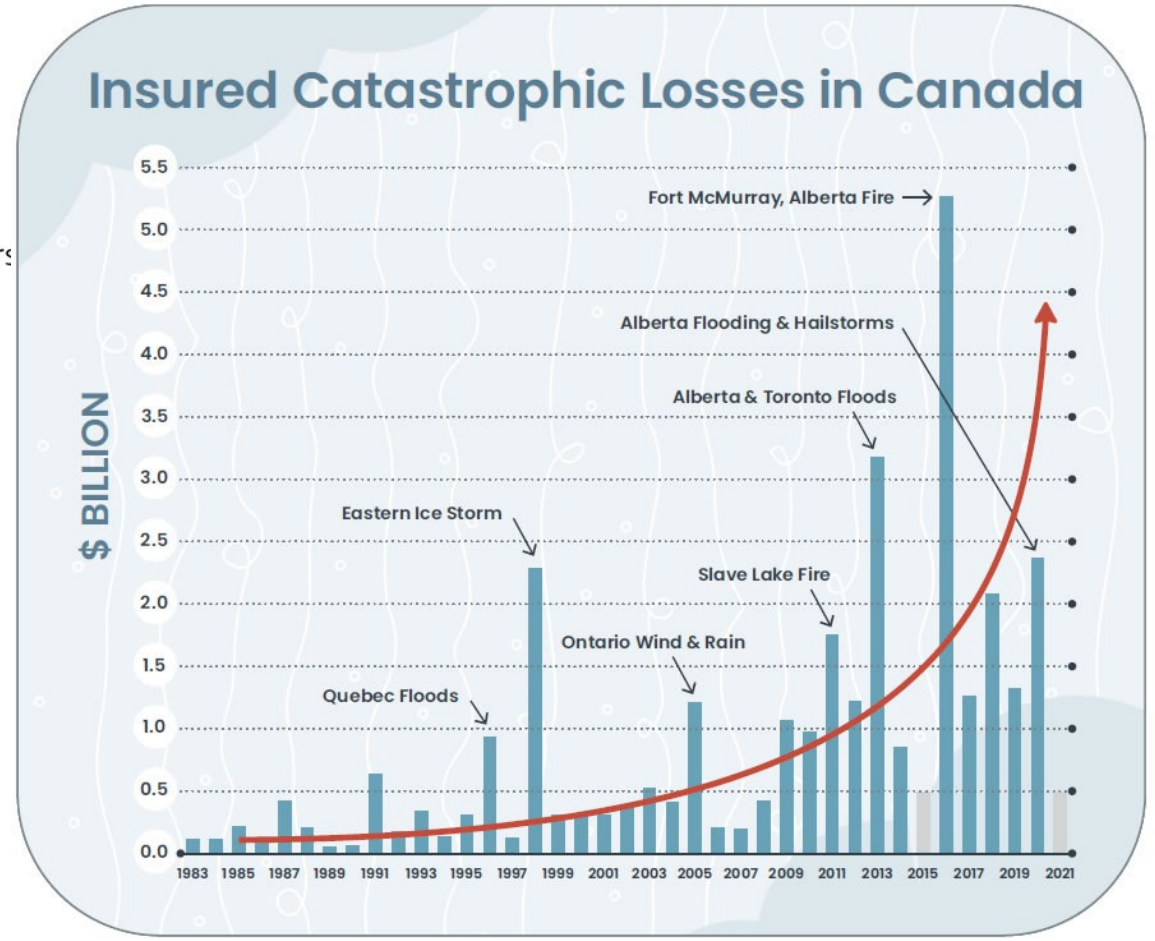
Multi-hazard exposure index, by forward sortation area



Data available as: **CSV**, **JSON** and **XML**

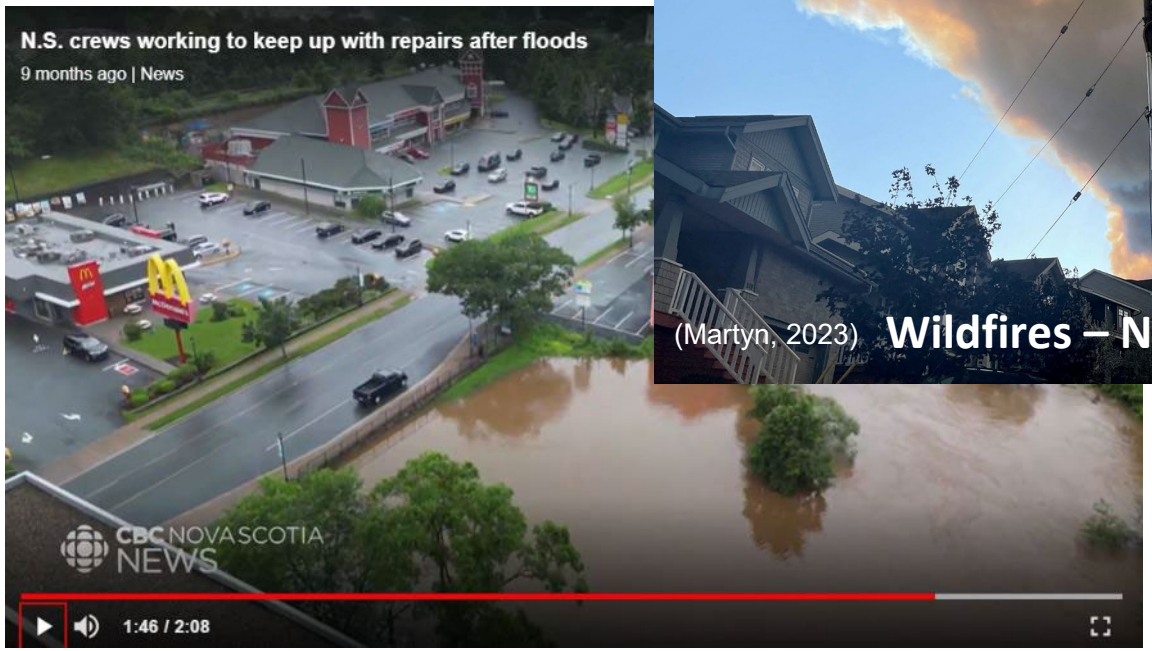
Sources: Canadian Disaster Database and Bank of Canada calculations

(Bank of Canada, 2021)



(Crew, n.d.)

CLIMATE-RELATED DISASTERS: TRIPLE THREATS



(Aalders, 2023) **Flooding – Nova Scotia**

(Martyn, 2023) **Wildfires – Nova Scotia**

(Theoret, 2022) **Hurricane Fiona – Nova Scotia**

LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

CLIMATE-RELATED DISASTERS UNDERMINE NET ZERO GAINS

HOW MANY TONNES OF CARBON WERE SAVED?

(Phillips, 2023)

Tornado - Barrie

(Hayward, 2016)

Wildfire – Fort McMurray

About LEEP's Sustainable Resilient Housing Tool

- First of its kind
- **Builder/renovator-centric**
- Guided approach to **navigate complex information**
- Explores **buildability** and **affordability**
- **Enables builders** to provide feedback that informs future policy

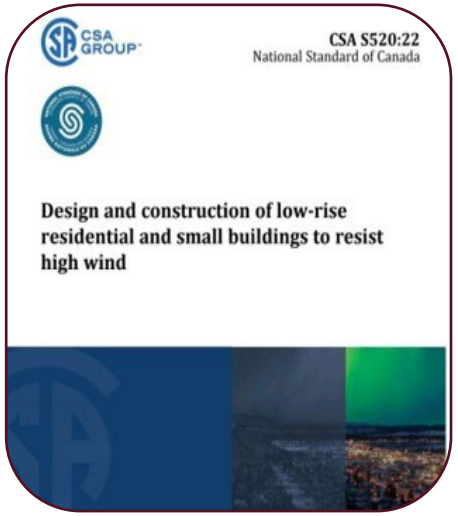
LEEP LOCAL ENERGY EFFICIENCY PARTNERSHIPS

CanmetENERGY
Leadership in ecoInnovation

LEEP SUSTAINABLE RESILIENT HOUSING TOOL / WORKSHOP

Module 1	Module 2	Module 3	Module 4	Module 5
Hazard Exposure and Climate Projections	Risk Identification	Land Use Planning & Considerations	Adaptation Measures	Implementation Plans & Pilots

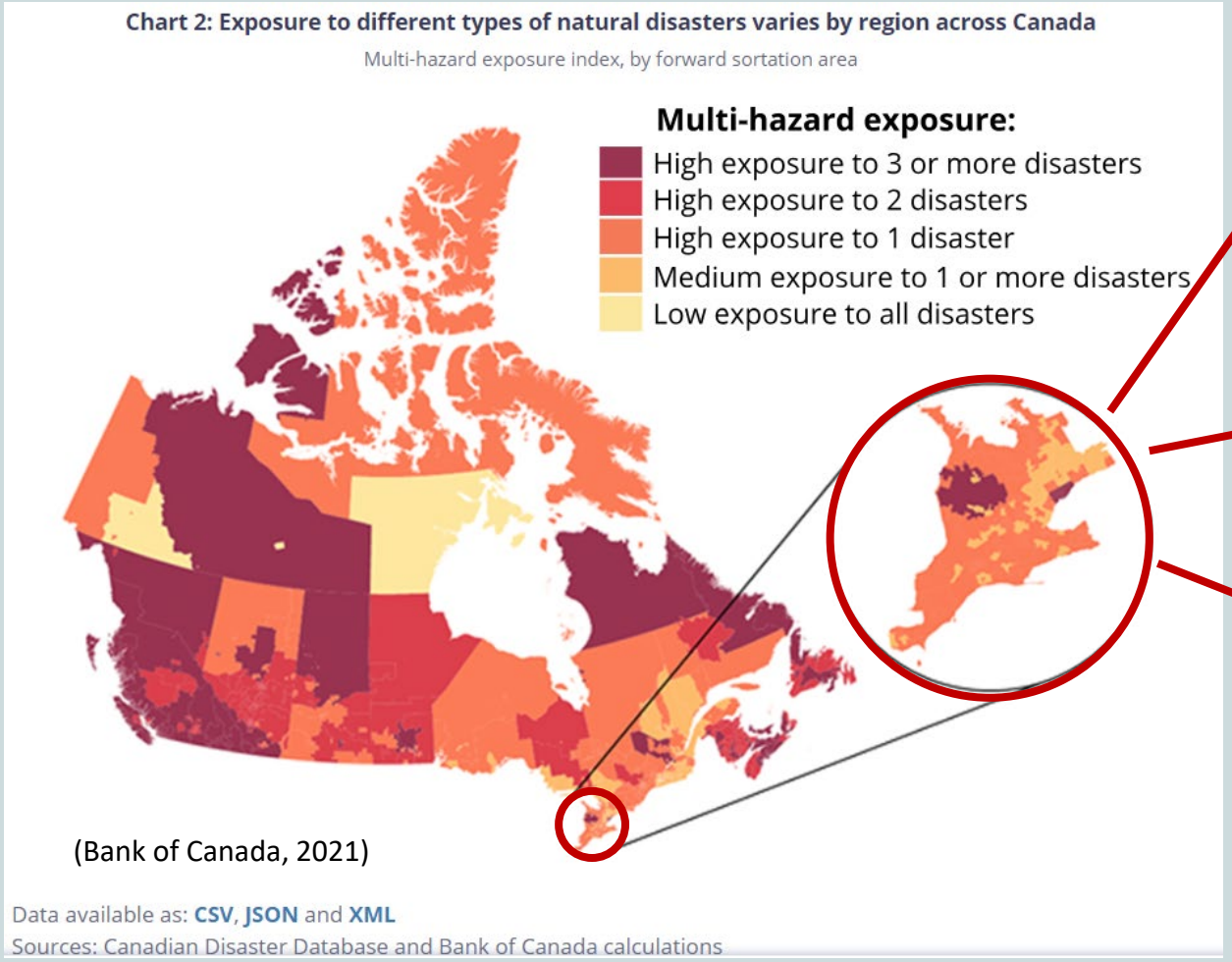
Guided interactive workshops with roundtable discussions



Learnings from workshops shared with others for consideration

LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

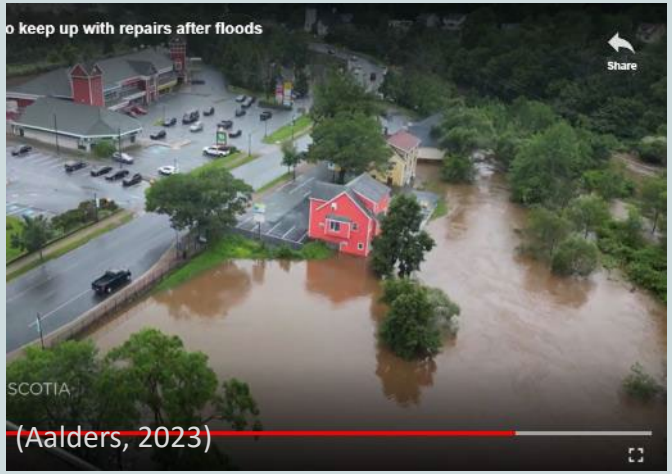
MODULE 1 – IDENTIFY HAZARDS IN YOUR REGION



Warming Temperatures & Extreme Heat	**Heavy Rainfall & Urban Stormwater Flooding**	**Heavy Snow, Increased Ice & Freeze-Thaw**
Water Shortage & Drought	**Interface Wildfire**	**Wildfire Smoke & Air Quality Impacts**
Coastal Flooding (sea level rise, saltwater spray/intrusion, erosion)	**River Flooding** (debris flow, ice jamming, erosion	**Lake Flooding** (erosion)
High Winds & Storms (high winds, conductive storms, hail)	**Extreme Storms** (tornado, hurricane, post-tropical storms)	**Thawing Permafrost**
	Slope Instability & Landslide	**…and more?**

MODULE 2 – IDENTIFY RISKS TO HOMES

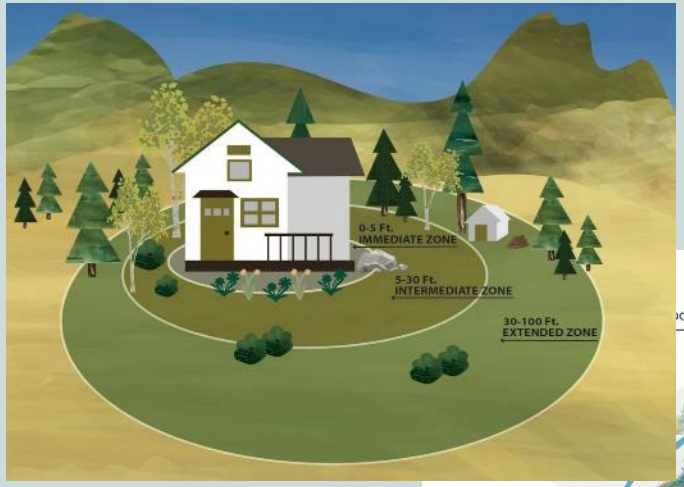
- **Warming Temperatures & Extreme Heat**
- **Interface Wildfire & Smoke**
- **Heavy Rainfall & Urban Stormwater Flooding**
- **High Winds & Storms** (high winds, conductive storms, hail)
- **Extreme Storms** (tornado, hurricane, post-tropical storms)



(Aalders, 2023)

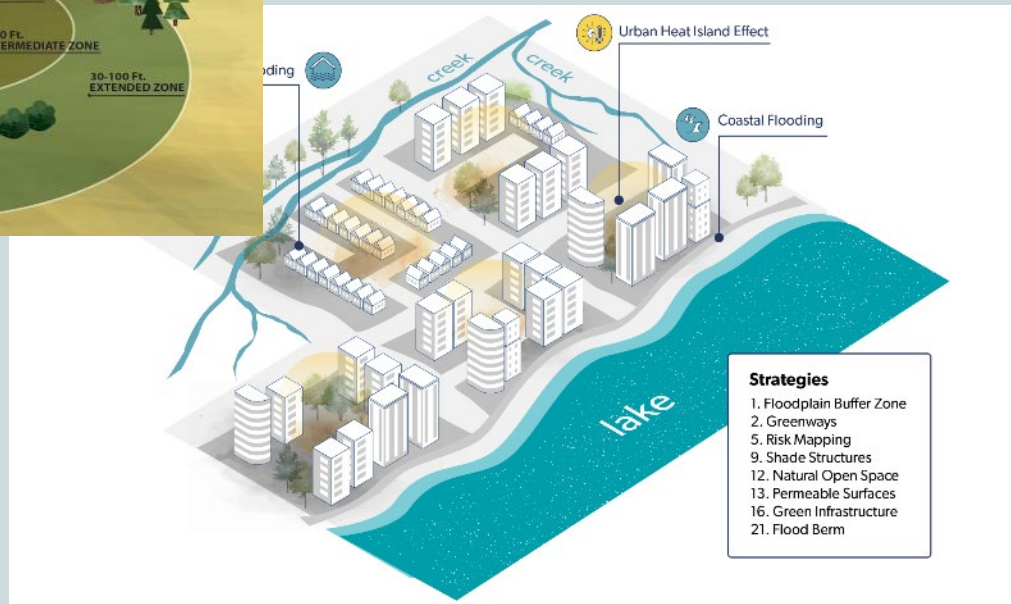
MODULE 3 – CLIMATE-CHANGE IMPACTS ON LAND USE, PLANNING & DEVELOPMENT CONSIDERATIONS

- **Warming Temperatures & Extreme Heat**
- **Interface Wildfire & Smoke**
- **Heavy Rainfall & Urban Stormwater Flooding**
- **High Winds & Storms** (high winds, conductive storms, hail)
- **Extreme Storms** (tornado, hurricane, post-tropical storms)



On the lot/site

In the neighbourhood/subdivision



LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

MODULE 4 – CLIMATE-RELATED HAZARD-SPECIFIC STANDARDS & GUIDELINES

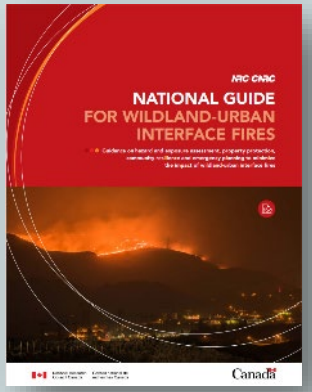
Warming Temperatures & Extreme Heat

Interface Wildfire & Smoke

Heavy Rainfall & Urban Stormwater Flooding

High Winds & Storms
(high winds, conductive storms, hail)

Extreme Storms
(tornado, hurricane, post-tropical storms)



Considerations:

- **Buildability**
- **Affordability**
- **Co-Benefits/Maladaptation**
- **Trade-offs**
- **Implementation Plans**

Wildfire Resistant Housing

British Columbia – April-June 2024

Lucas Coletta, Senior Engineer – LEEP Team
Email: lucas.coletta@nrcan-rncan.gc.ca

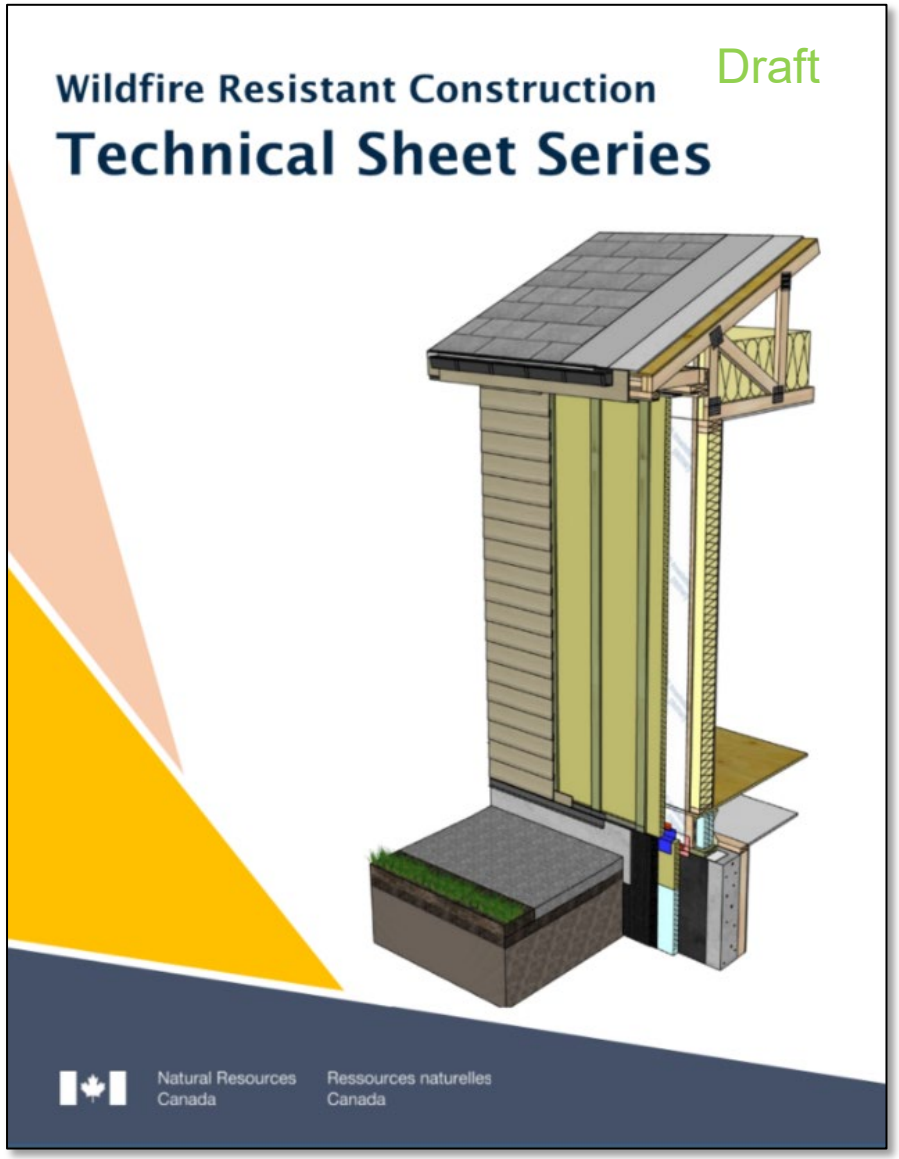
LEEP LOCAL ENERGY EFFICIENCY PARTNERSHIPS

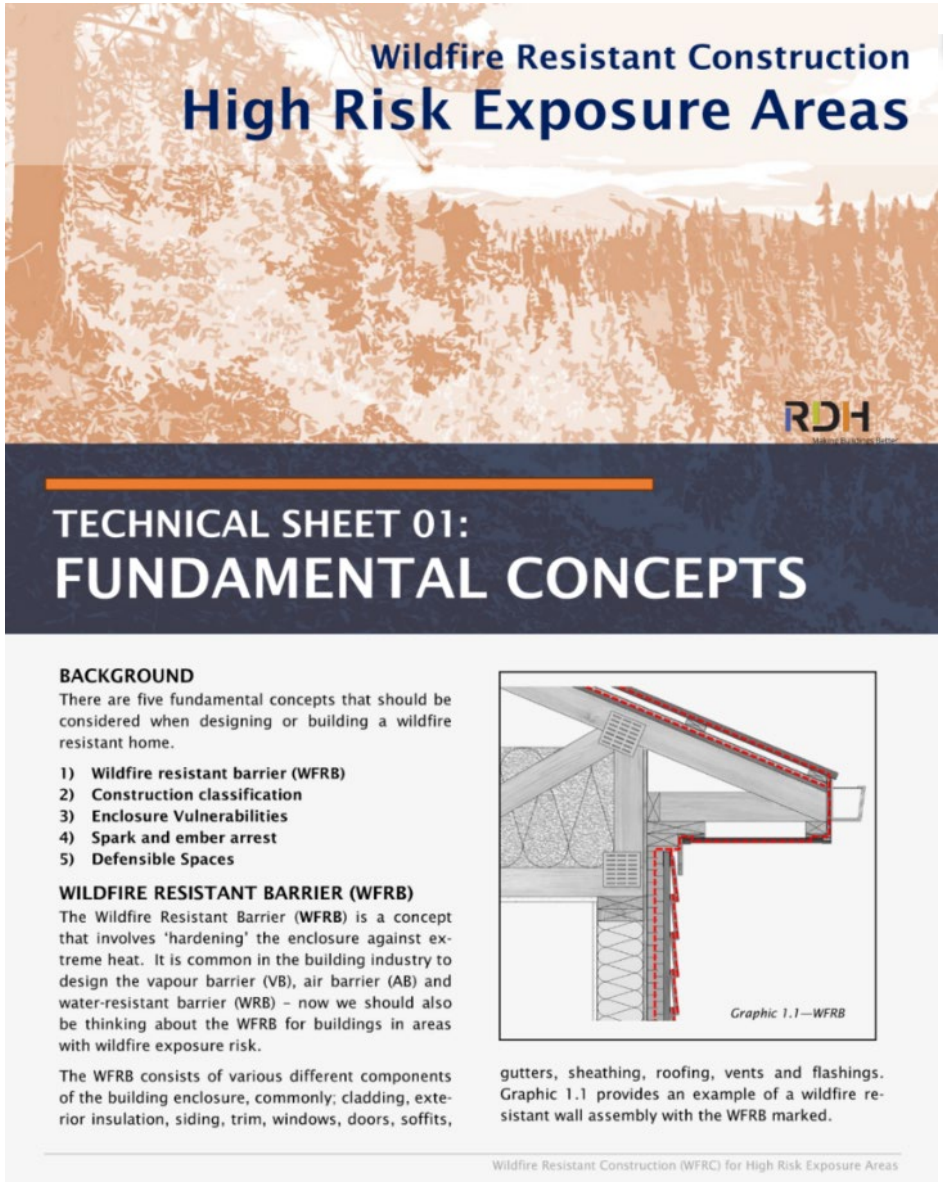
CanmetENERGY
Leadership in ecoInnovation

NRCan Resource Guides

First of its kind.

U.S. is using this Info.





LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

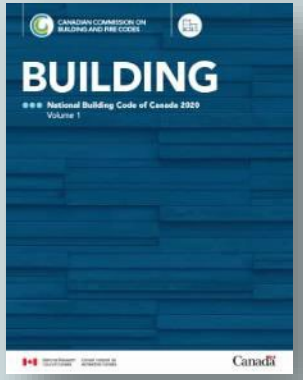
MODULE 5 – BRINGING IT ALL TOGETHER

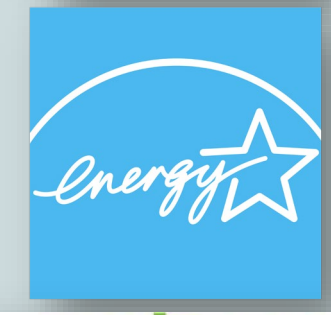
- Warming Temperatures & Extreme Heat
- Interface Wildfire & Smoke
- Heavy Rainfall & Urban Stormwater Flooding
- High Winds & Storms (high winds, conductive storms, hail)
- Extreme Storms (tornado, hurricane, post-tropical storms)

Adaptation

+

Mitigation





Considerations:

- **Buildability**
- **Affordability**
- **Co-Benefits/Maladaptation**
- **Trade-offs**
- **Implementation Plans**

LEEP
LOCAL ENERGY EFFICIENCY PARTNERSHIPS

Workshop Pilot stage wrap-up – June 2024
Ready for roll out – Fall 2024
Proposed locations: London, Durham, Ottawa

Canada

CLIMATE RESILIENCE ACTIONS

Health Canada Santé Canada

EFFORTS TO DEVELOP MAXIMUM INDOOR TEMPERATURE GUIDANCE

- Supporting physiological research on the **health impacts of exposure to extreme indoor temperatures** and **safe indoor temperature limits**.
- Developing **evidence-based guidance** to protect exposure to unsafe indoor temperatures
- Collaborating with NRC on indoor heat considerations
- International collaboration (World Health Organization and Global Heat Health Information Network) to identify **evidence-based best practices** in protecting health from extreme indoor heat.

paddy.enright@hc-sc.gc.ca

Public Safety Canada | Sécurité publique Canada

INTEGRATED FLOOD RISK MANAGEMENT (IFRM)

Integrated flood risk management (IFRM) is a systems-based framework that promotes sustainable, long-term flood resilience by combining social, economic, financial, environmental, and institutional solutions.

IFRM requires coordination and complementarity across its elements, working toward common risk management objectives.

Public Safety Canada is advancing some components of IFRM, which were funded under Budget 2023 and the National Adaptation Strategy to:

1. Implement a **modernized DFAA*** program, which would incentivize mitigation efforts
2. Stand-up a low-cost **Flood Insurance Program** aimed at protecting high-risk households
3. Identify **Flood Risk Areas** to inform federal spending
4. Create a publicly accessible **online flood risk awareness portal** for Canadians
5. Conduct data-based **flood risk modelling** and complete **flood hazard maps** of higher risk area

*Disaster Financial Assistance Arrangements

Environment and
Climate Change Canada
Environnement et
Changement climatique Canada

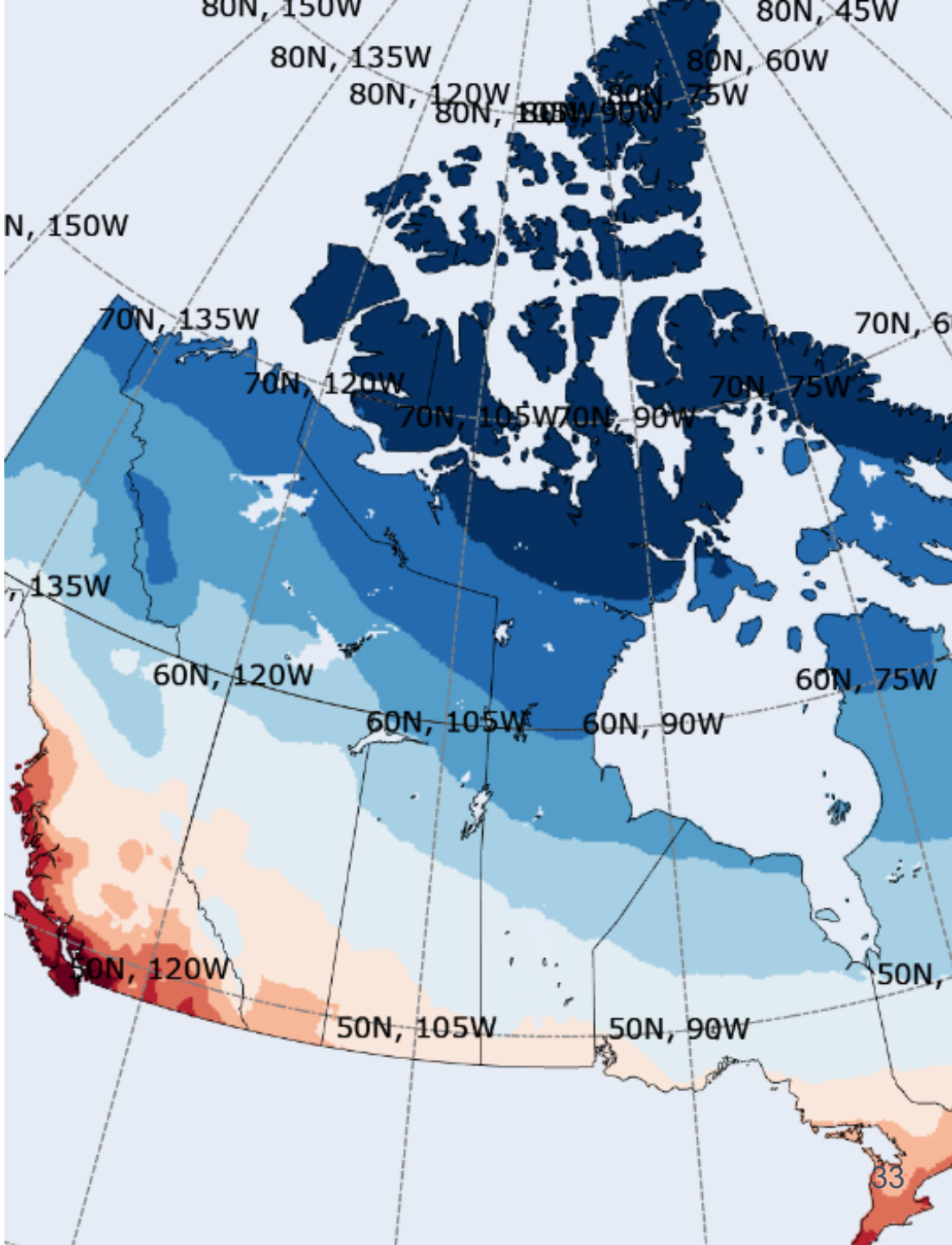
CANADIAN CLIMATE DATA

COMING SOON! Future Building Design Value Summaries: Future climate-adjusted design values for over 660 locations in Canada

ClimateData.ca Learning Zone - Designing Future-Ready Buildings: Educational resource covering the importance of incorporating future climate data into building design.

ClimateData.ca Building Sector Module: Guidance for the Canadian building sector in using climate data, highlighting the impacts of climate variability and change on buildings.

Building Climate Zones Maps: Maps guide energy-efficient building design, ensuring Climate Zones are accurately defined to meet future heating and weather demands.



Natural Resources Canada | Ressources naturelles Canada

Canadian Forest Services

WILDFIRE PROGRAMS

NEW! Canadian Wildland Fire Prevention and Mitigation Strategy

Wildfire Resilient Futures Initiative (2023):
Resilient Communities through FireSmart program: increase the use of the FireSmart Canada program

Build and Mobilize Foundational Wildland Fire Knowledge program: grants/contributions targeting risk reduction measures.

Coming Soon! Centre of Excellence for Wildland Fire Innovation and Resilience: Resource to advance wildland fire knowledge and technology mobilization.

WILDFIRE AND HUMAN BEHAVIOUR

Program of Applied Research on Climate Action (PARCA)

partnership between PCO-IIU, NRCan, and ECCC:

Research on Canadians' knowledge and behaviours related to wildfire risk and identifying ways to increase adoption of mitigation measures (e.g., FireSmart™).

Key Take Aways

Stefanie Coleman
Stefanie.coleman@nrcan-rncan.gc.ca

- Climate impacts are **escalating** and threatening homes, people, the economy and can undermine our energy and carbon reduction efforts,
- There is a lot of research being done,
- But, there are a lot of things we don't know, like the **affordability** and **buildability** of MITIGATION & ADAPTATION MEASURES,
- Consider **contributing to our collective learning** by participating in the LEEP Sustainable Resilient Housing Workshop / Tool project and share your perspectives that can inform future policy.

CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

Ericha Moores, Senior Policy Analyst, Infrastructure Canada

Infrastructure Canada

A Vision for Resilience: Policy Direction and Solutions

Ericha Moores
Infrastructure Canada

Canada

COMMUNITIES ACROSS CANADA ARE ALREADY EXPERIENCING IMPACTS OF CLIMATE CHANGE

The cost of damage to infrastructure has grown steadily higher - combined losses per Canadian weather-related disaster have increased by 1250% since the 1970s.

Top: thawing permafrost, Hershel YT 2021: Flash floods, McKay Section, NS, 2023.
Bottom: Wildfires, Lytton, BC, 2021; Hurricane Fiona, Port Aux Basques, NFL, 2022.

RESILIENCE IS A DRIVER FOR COLLABORATION BASED ON MUTUAL UNDERSTANDING OF URGENT NEED TO ADAPT

- Community-scale resilience projects are essential, but they are not sufficient – home-builders are an integral part of how we will achieve whole-of-society resilience.
  - Urban parks address extreme heat, but builders choose materials that keep home interiors safe and comfortable.
  - Stormwater management infrastructure, but builders choose the upfront cost of a backflow valve to prevent basement flooding.
- Resilience investments are also smart use of funds: proactive adaptation yields major benefits and can **return $13-$15 in benefits for every dollar spent** (CCI).

CANADA'S FIRST NATIONAL ADAPTATION STRATEGY SETS DIRECTION FOR DECADES TO COME

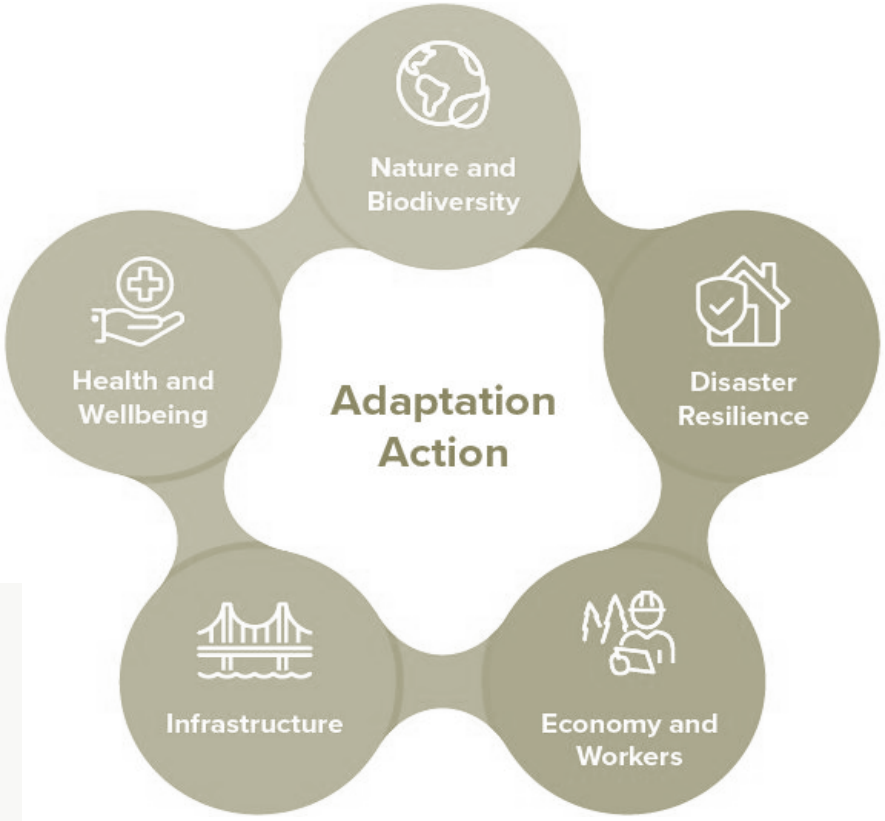
Overarching vision for resilience in Canada

All of us living in Canada, our communities, and the natural environment are resilient in the face of a changing climate. Our collective adaptation actions enhance our well-being and safety, promote justice, equity, and reconciliation with Indigenous Peoples, and secure a thriving natural environment and economy for future generations.

Underpinned by **guiding principles** for fair, inclusive, and equitable adaptation

- Respect jurisdictions and uphold Indigenous rights
- Advance equity and environmental justice
- Take proactive, risk-based measures to reduce climate impacts before they occur
- Maximize benefits and avoid maladaptation

Transformational **goals**, **objectives**, and **targets** under five key systems



FUTURE INVESTMENTS CAN ADVANCE THE GOALS & OBJECTIVES OF THE NATIONAL ADAPTATION STRATEGY

Transformational Goal

By 2050, all infrastructure systems are climate-resilient and undergo continuous adaptation to adjust to future impacts to deliver reliable services to all.

National Target

By 2030, 80% of public and municipal organizations have factored climate change adaptation into their decision-making processes.

New Priorities

To move towards **systems-based approaches** that consider assets within and across infrastructure systems, highlighting interdependencies and infrastructure services; and

To **prioritize benefits for marginalized communities** at highest risk of climate change impacts.

Target: By 2027, **70% of the members of relevant professional associations… have the capacity to apply climate change adaptation tools and information** and communicate the business case for adaptation measures…

BUILDERS IN THE VISION FOR RESILIENCE

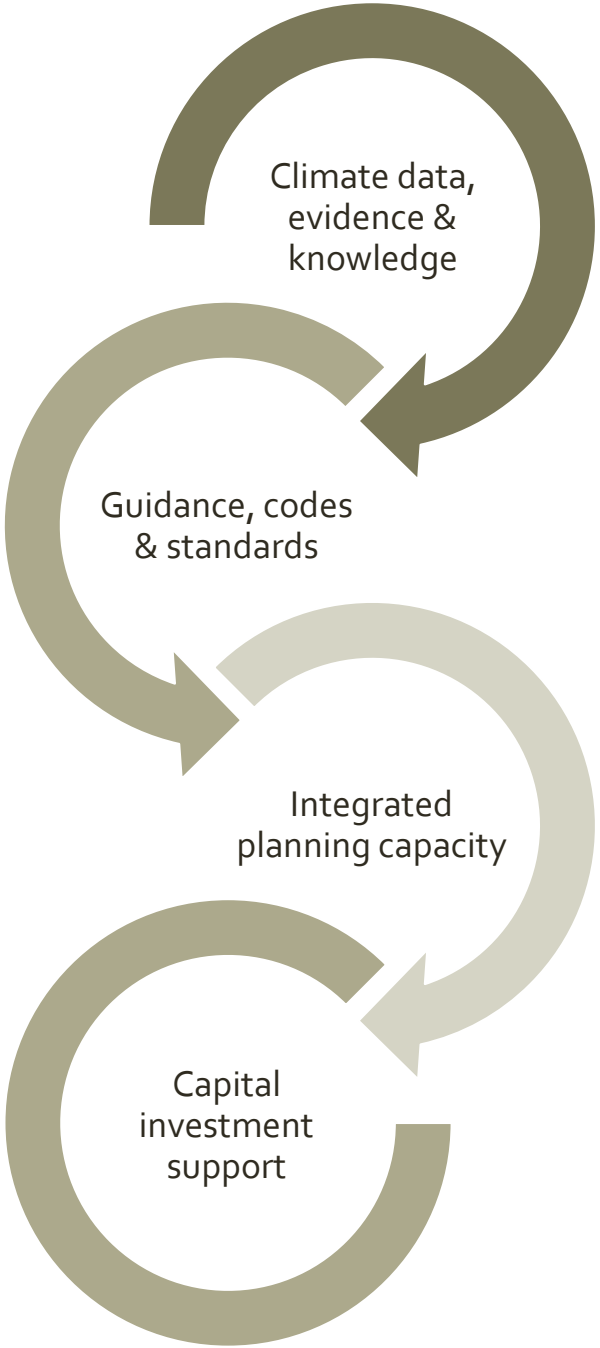
EVERY INFRASTRUCTURE ASSET – INCLUDING HOUSING – CAN INCREASE RESILIENCE OF COMMUNITIES

Keep new buildings out of high-risk areas and prioritize locally-specific knowledge on current and future hazards.

Build or adapt buildings that will be safe, healthy, and affordable under changing conditions.

If you think it's expensive to build it right, try building it twice.

The Honourable Sean Fraser
Minister of Housing, Infrastructure and Communities



A VALUE CHAIN APPROACH TO BUILDING RESILIENCE

Infrastructure Canada supports resilient infrastructure and communities by taking a 'value chain approach,' that moves knowledge to action through a strategic sequence of investments.

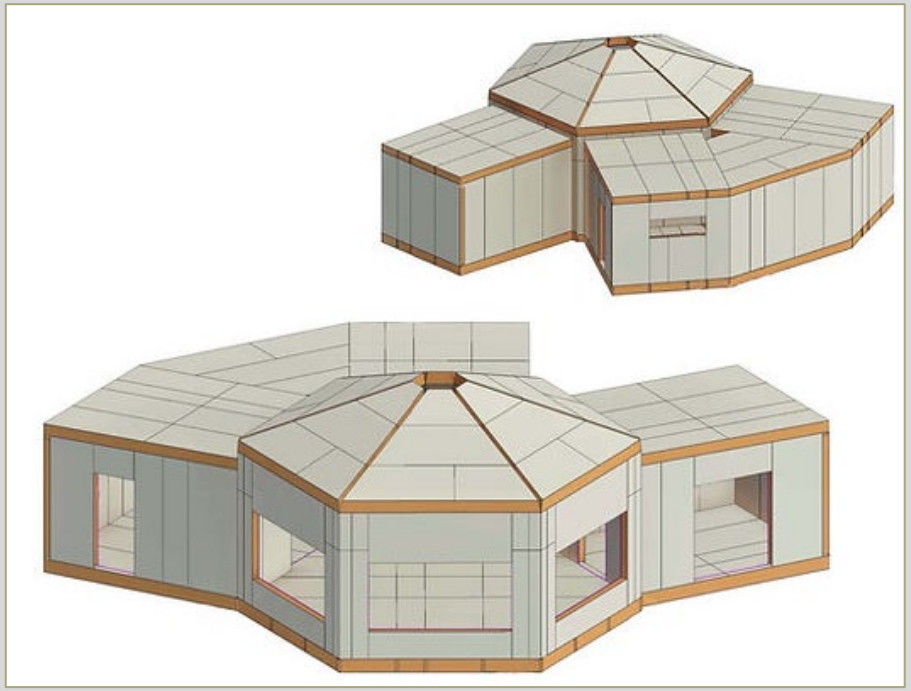
- **Resilience value chain**: A model that demonstrates key areas of work, and the relationship between them, to accelerate implementation of solutions.
- **Informed investor approach**: Encouraging infrastructure investors to make informed decisions.

RESEARCH AND DATA TO SUPPORT BUILDERS

- Research and Knowledge Initiative (RKI) is a national, merit-based contribution funding program ($10 million) **to support data and research** on issues related to public infrastructure and communities.
- There were 7 resilience-focused projects funded, including projects that have provided flood maps and other hazard data to help builders understand local hazards.

PROJECT SPOTLIGHT

Nunamiutuqaq (Building from the Land) is an RKI-funded project designed to build a robust knowledge base around effective, culturally-informed designs and materials.



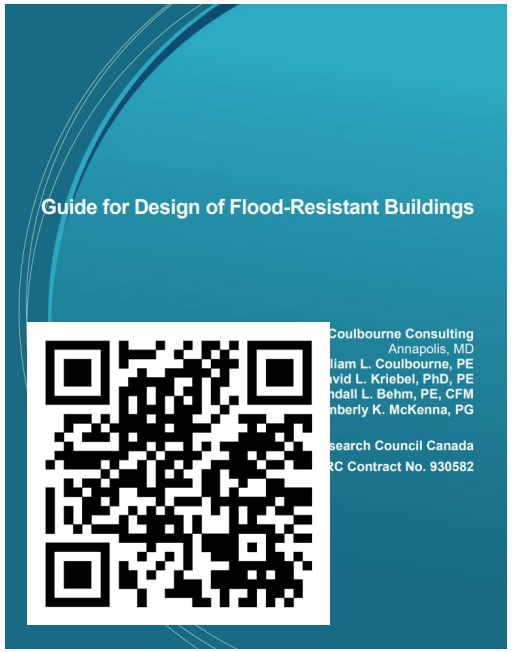
Source: Pitquhirnikkut Ilihautiniq

CLIMATE-INFORMED CODES, STANDARDS AND GUIDANCE TO SUPPORT COMMUNITY PROTECTION

- Since 2016, over $160 million invested to **integrate climate resilience** into national guidelines, standards and codes, and **create future-climate design values**.

- Priority areas: nature-based solutions, flooding, extreme heat, resilient dams, Wildland-Urban Interface design, transit, Northern region and integrated risk management.

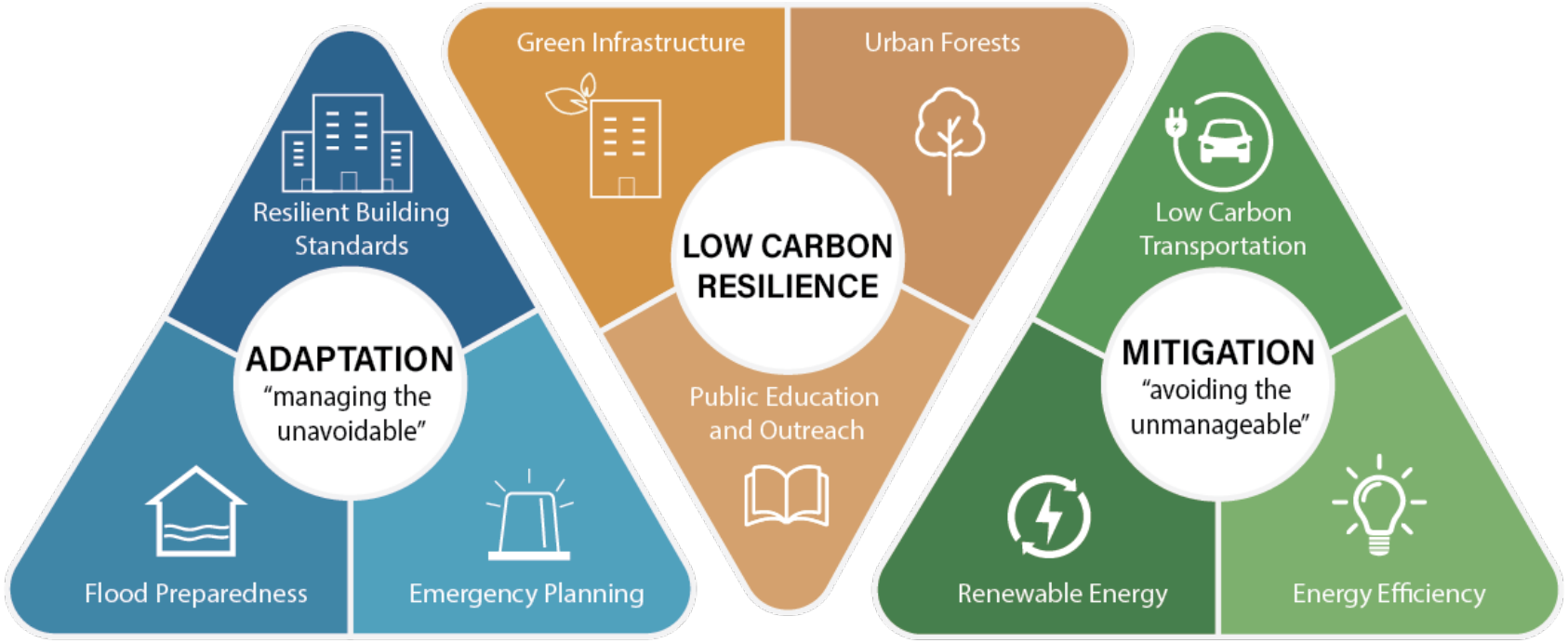
- There is guidance available right now :
  - 65 climate informed codes, standards, guidance, and decision-support tools
  - future-climate design data in 680 locations across Canada.



INTEGRATED PLANNING SUPPORTS AND SERVICES ARE FORTHCOMING

- The climate toolkit initiative is a five-year program (2023-28) **to support smart climate action for low-carbon and resilient infrastructure investments**.
- Support communities and practitioners to meet climate resilience and mitigation requirements across new infrastructure funding programs and enhance climate-informed guidance, standards, and codes.
- Enable practitioners, owners and investors with capacity through proven climate tools and supports to develop funding ready projects.
- Serve as a centre of expertise.

TOOLKITS TO SUPPORT LOCAL COMMUNITIES ACHIEVE LOW-CARBON, CLIMAE RESILIENT INFRASTRUCTURE



National Adaptation Strategy: Starting in 2024, resilience to climate change impacts factored into all new federal infrastructure funding programs.

2050 Net Zero Emissions: Reduce emissions by 40%-45% against 2005 levels by 2030. Achieve net zero emissions by 2050.

TOOLKITS WILL INVOLVE THREE CORE COMPONENTS

A new continuum of federal climate & infrastructure supports for local communities across Canada

New web-based open access tools & resources

Direct support for inquiries on tools & requirements

Advise municipalities on climate options for projects

HOW TO GET INVOLVED

Climate Toolkits and Solutions

Provide feedback, suggest useful tools and resources, receive updates:

Or email us at:
Climate-Infra-Climat@infc.gc.ca

Infrastructure & Buildings Working Group

Read the latest IBWG Adaptation State of Play Report here:

If you would like to join the group, attend showcases, and exchange leading practices, contact Chad Nelson at:
chad.nelson@infc.gc.ca

Infrastructure Canada

THANK YOU!

Resilience is a collective challenge, and INFC is committed to supporting the work of keeping our communities safe, healthy, and thriving.

If you have any questions or comments about the initiatives discussed here, please reach out to me at:

ericha.moores@infc.gc.ca

Canada

CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

Janette Meyrick, Evaluation Officer, CCMC, NRCan

NRC·CNRC

Climate Resilient Built Environment Initiative

Janette Meyrick BBSc, BSS

Evaluation Office; co-Lead - Climate Resilient Product Assessment Pilot
Canadian Construction Materials Centre (CCMC)
National Research Council (NRC)

CHBA NZ Summit
June 2024

WHO IS DOING WHAT?
Is it enough to get us there?

- How is government helping industry prepare?
- What work is being done to ensure that resilient homes are also affordable?
- And how are departments/agencies working together?

NRC's Climate Resilience Initiatives

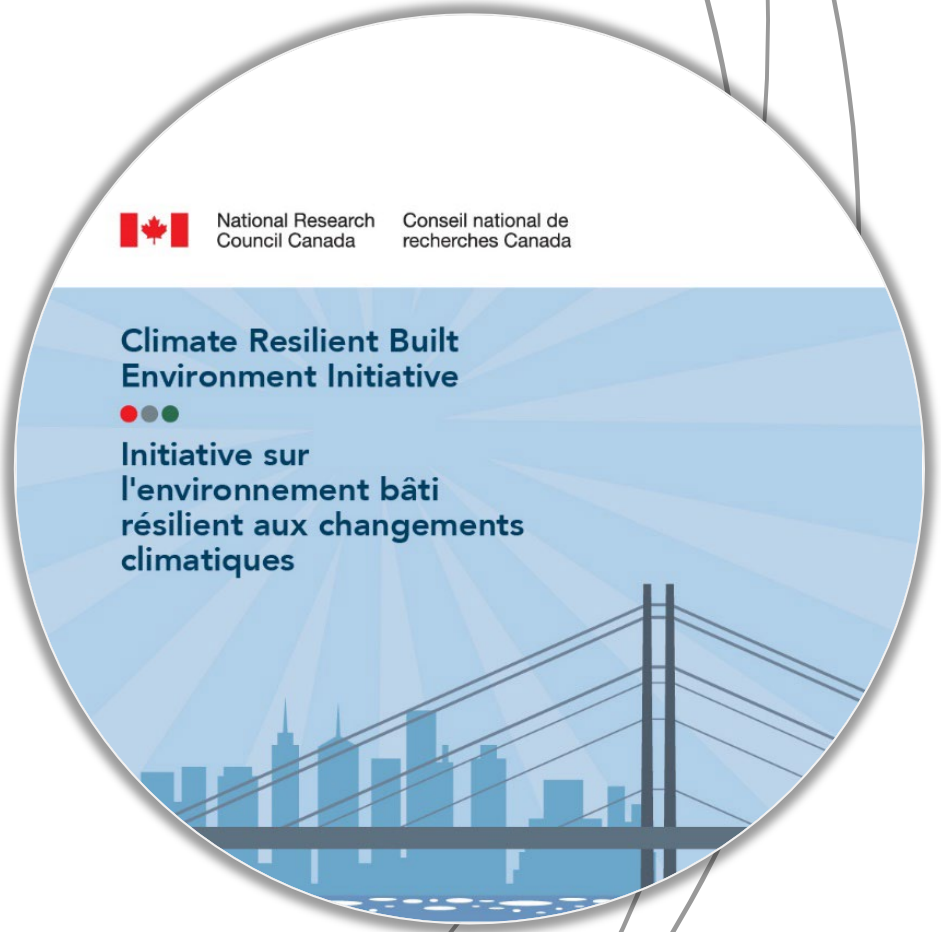
Climate Resilient Buildings and Core Public Infrastructure (CRBCPI)

2016 – 2021
Infrastructure Canada; $42.5M;

Climate Resilient Built Environment (CRBE)

2021 – 2026
Infrastructure Canada; $35M;

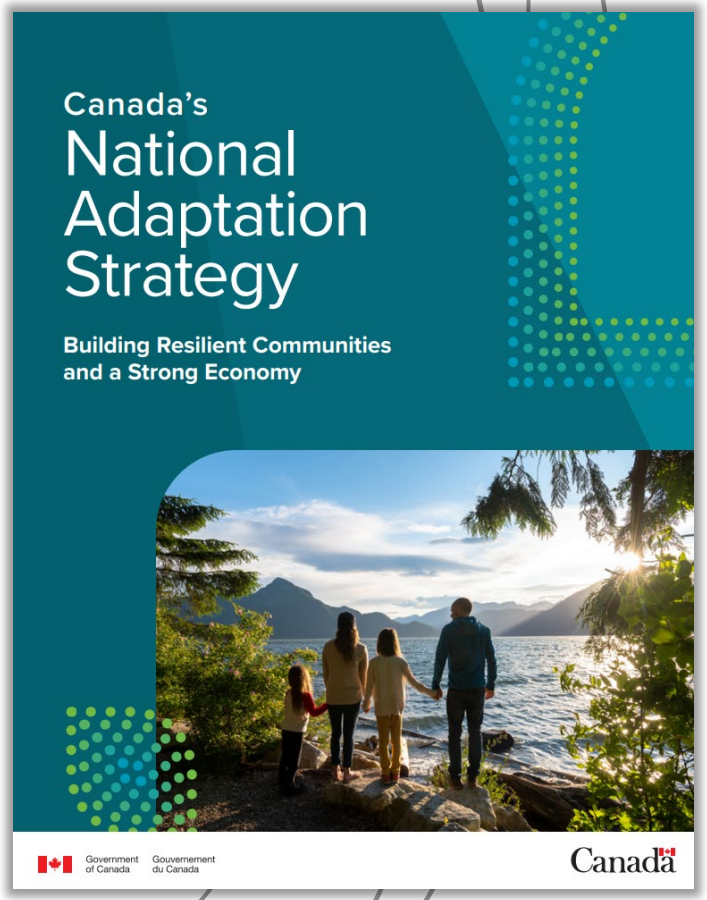
2023 – 2028
Government of Canada Adaptation Action Plan; $30.2M



National Adaptation Strategy & Government of Canada's Adaptation Action Plan

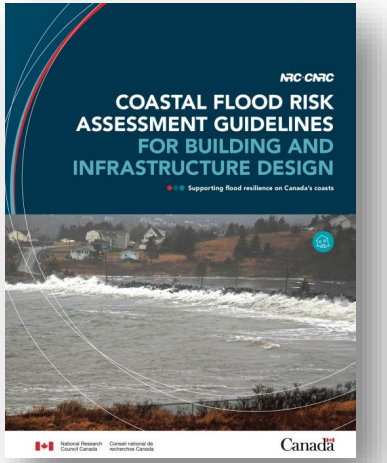
National Adaptation Strategy Infrastructure target:

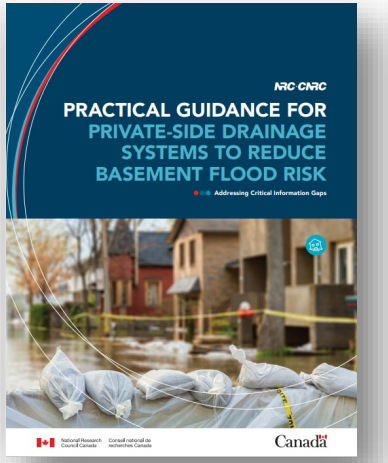
2030:	Robust guidance, codes, and standards addressing top climate change risks for key public infrastructure systems are available to all infrastructure decision-makers.

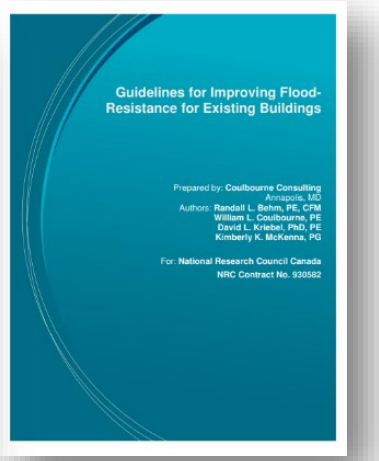


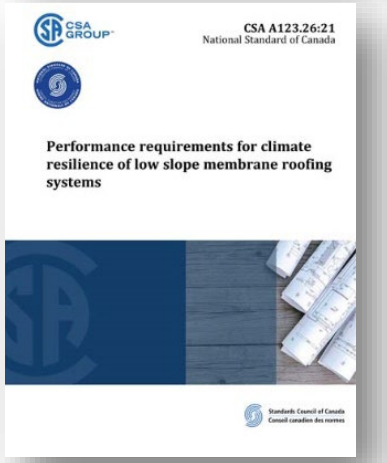
NRC Climate Resilient Research Areas

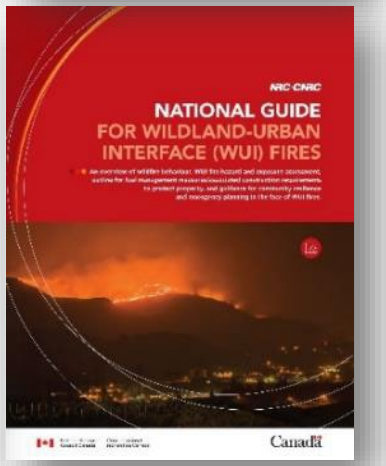
A suite of guides, data, and standards available to inform resilient construction in Canada

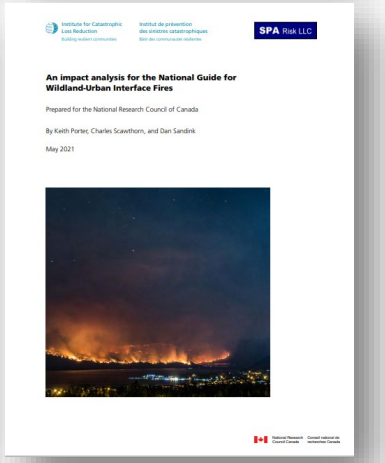


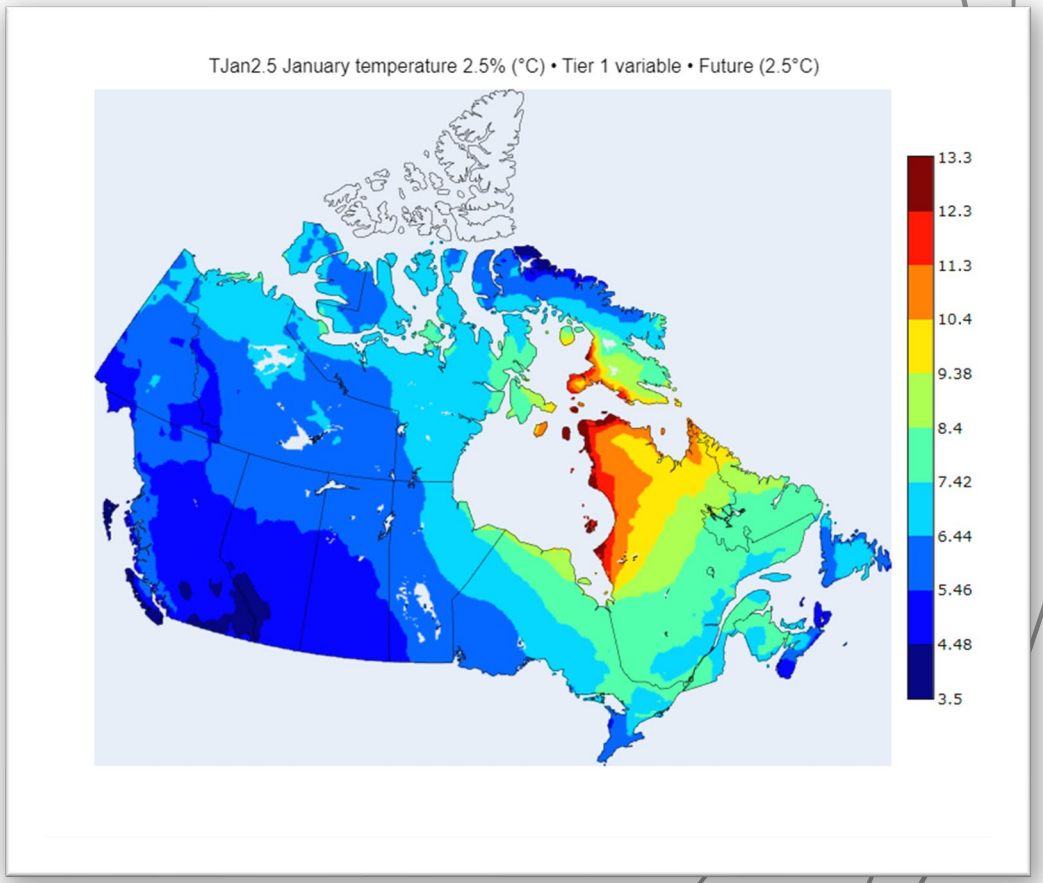






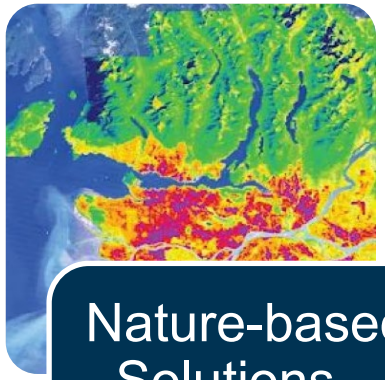






Ongoing Projects under Climate Resilient Built Environment (CRBE) Initiative

Nature-based Solutions - Flooding



Nature-based Solutions – Urban Heat

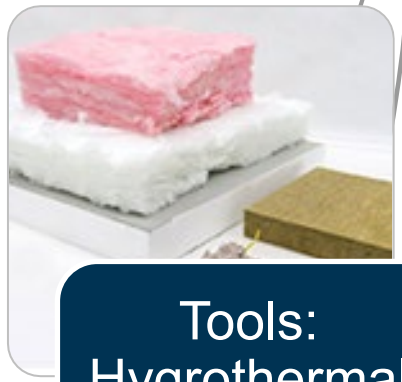
Guidance for Indigenous and Northern Communities

Core Public Infrastructure Management

Ocean & Riverine Flooding

Extreme winds and tornadoes

Tools: Climate RCI



Tools: Hygrothermal database

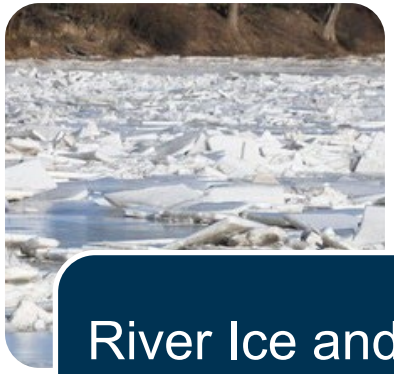
Newly Launched Activities and Focus Areas Under the National Adaptation Strategy funding

Climate resilient product evaluations

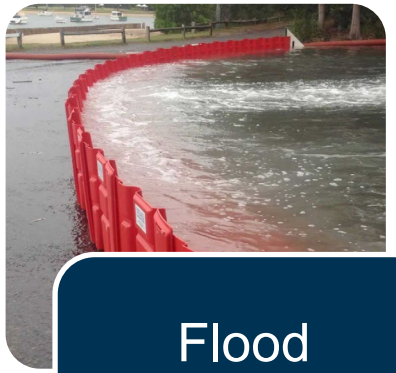
Resilient Residential Retrofit

Informing Resilient Building Codes

Tools for Asset Management

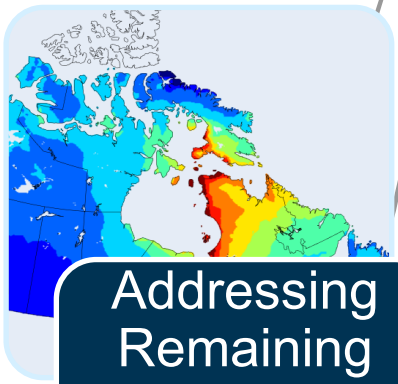


River Ice and Flooding



Flood Barriers

Accelerating Nature-Based Solutions



Addressing Remaining Climate Data Gaps

Enabling Resilience in the National Model Codes

In Summary

NRC Climate Resilient Initiatives

- Ongoing efforts over the last eight years
- Over 70 active projects
- Collaboration with other government agencies, national, and international experts
- New and updated guides, codes, tools, and standards
- Informing Codes and policy discussions




NRC·CNRC

Thank you

Janette Meyrick BBSc, BSS

Evaluation Office; co-Lead, Climate Resilient Product Assessment Pilot
Canadian Construction Materials Centre (CCMC)

Janette.Meyrick@nrc-cnrc.gc.ca

CANADIAN HOME BUILDERS' ASSOCIATION
netzero home
LEADERSHIPSUMMIT

Wilma Leung, Senior Manager, Technical Research & Education, BC Housing

Net Zero Leadership Summit 2024

Session 3 - WHO'S DOING WHAT? And is it enough to get us there?

June 11, 2024

Wilma Leung
Senior Manager, Technical Research & Education
BC Housing Research Centre

BC HOUSING RESEARCH CENTRE

MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Development, management and administration of affordable housing;

Licensing of residential builders, administration of owner builder authorizations, and research and education.

BC HOUSING

BC Housing Ready-to-Use Resources

BC HOUSING
RESEARCH CENTRE

MBAR
MOBILIZING
BUILDING ADAPTATION
AND RESILIENCE

BC Housing Ready-to-Use Resources

Illustrated Guide

Insulated Wood-Frame Vaulted and Flat Roofs

for Residential Construction in British Columbia

BC HOUSING
RESEARCH CENTRE

A Comparative Feasibility Study for Encapsulated Mass Timber Construction

BC Energy Step Code Compliant 7 to 12 Storey Buildings

BC HOUSING
RESEARCH CENTRE

Number 23

MAINTENANCE MATTERS

BC HOUSING
RESEARCH CENTRE

Electrical Planning for Multi-Unit Residential Buildings

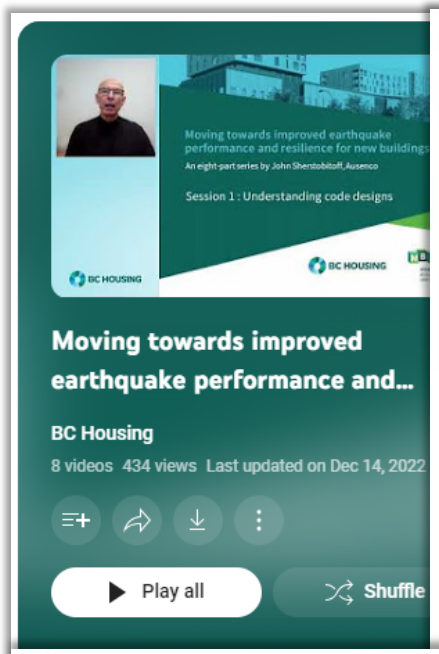
In British Columbia, strata corporations are regularly receiving requests from owners to approve upgrades, such as air conditioning, heat pumps, in-suite laundry and electric vehicle (EV) charging. New amendments to the Strata Property Act and Regulations are making it easier for people to request EV charging stations where they live. Additional, upcoming regulations will prioritize the use of high efficiency electrical equipment in an effort to phase out the use of fossil fuels in buildings.

Each of these upgrades will add electrical loads to the building. Since

Understanding electrical load and capacity to maintain safe, efficient, and reliable electrical systems in

BC HOUSING
RESEARCH CENTRE

BC Housing Ready-to-Use Resources

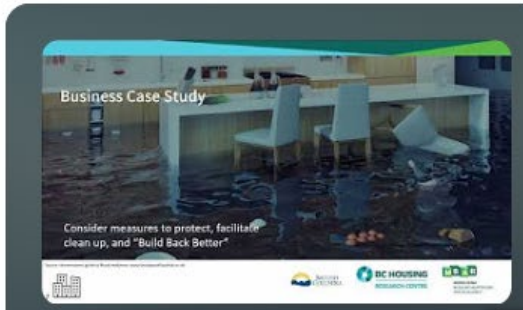


Moving towards improved earthquake performance and...

BC Housing

8 videos 434 views Last updated on Dec 14, 2022

Play all Shuffle



MBAR: Flood Resilience

BC Housing

4 videos 99 views Last updated on May 3, 2024

Play all Shuffle

1 

Flood resilience for new and existing buildings: Introduction Part 1 of 4

BC Housing • 50 views • 1 month ago

2 

Flood resilience for new and existing buildings: Single family homes. Part 2 of 4

BC Housing • 34 views • 1 month ago

What The BC Energy Step Code Means for Your Home

BC Housing

4 videos 58 views Last updated on Feb 28, 2024

1 

What The BC Energy Step Code means for Your Home - Invermere - Full Length CC

BC Housing • 207 views • 10 months ago

2 

What The BC Energy Step Code means for Your Home - Invermere - Short - CC

BC Housing • 57 views • 5 months ago

3 

What the BC Energy Step Code Means for Your Home – Williams Lake -Full Length

BC Housing • 705 views • 3 months ago

4 

What the BC Energy Step Code Means for Your Home – Williams Lake -Short

BC Housing • 77 views • 3 months ago

Building High Performance Homes through LEEP - Series Three

BC Housing

8 videos 635 views Last updated on May 31, 2022

1 

LEEP Vid

BC Housing

2 

LEEP Vid

BC Housing

3 

LEEP Vid

BC Housing • 411 views • 2 years ago

4 

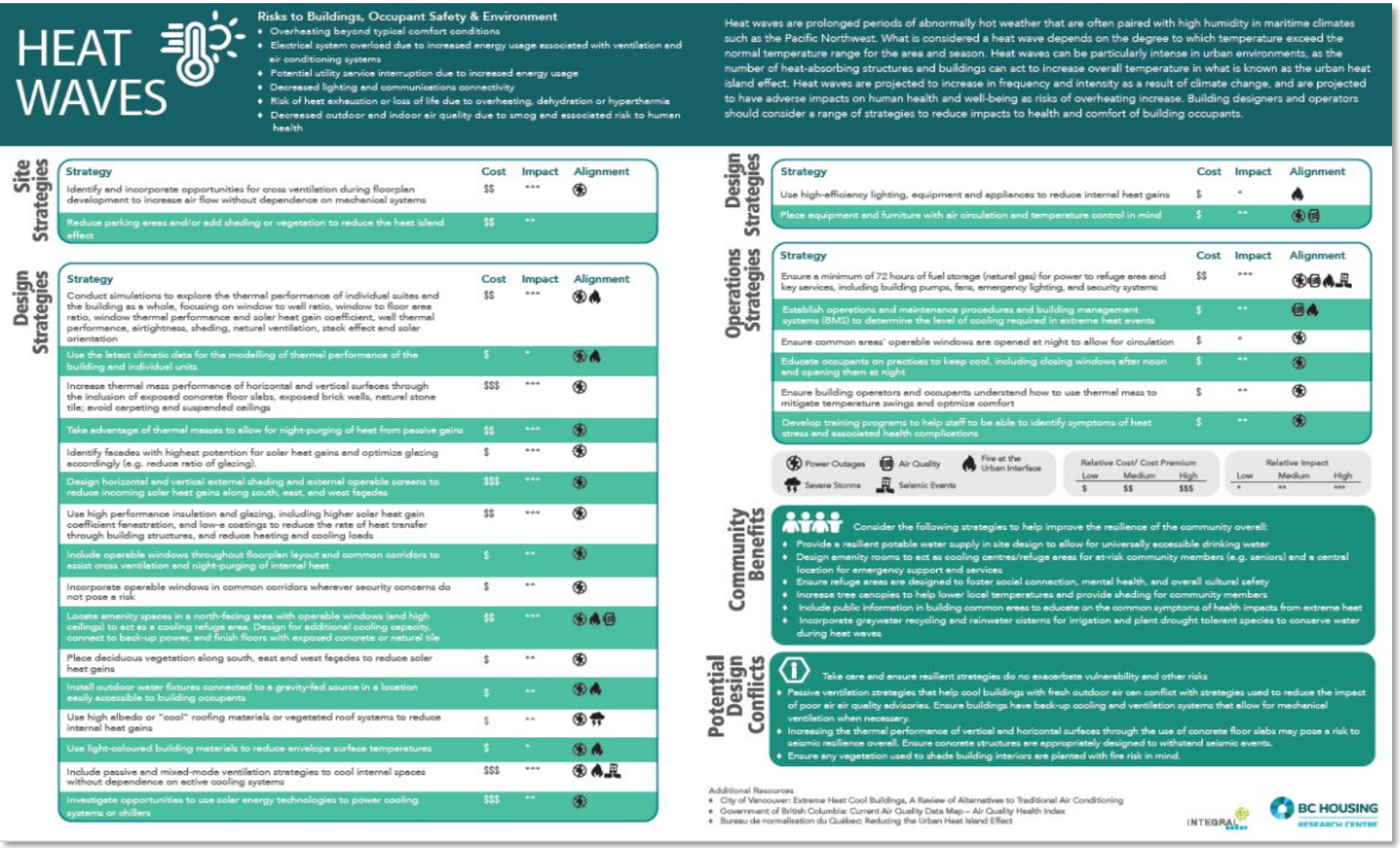
LEEP Video – Whistler

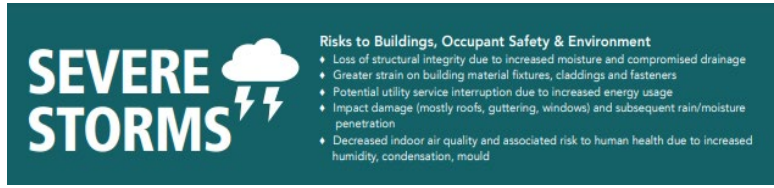
BC Housing • 221 views • 2 years ago

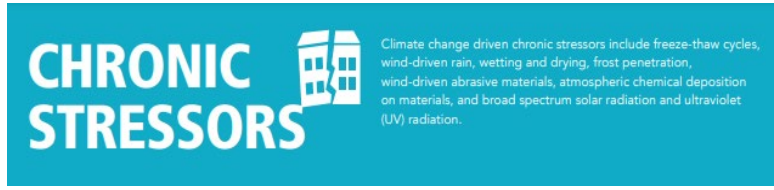
BC HOUSING RESEARCH CENTRE

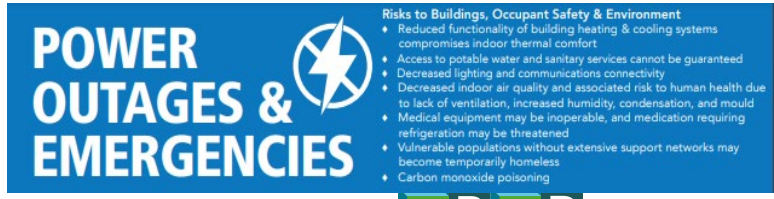
MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

BC Housing Ready-to-Use Resources



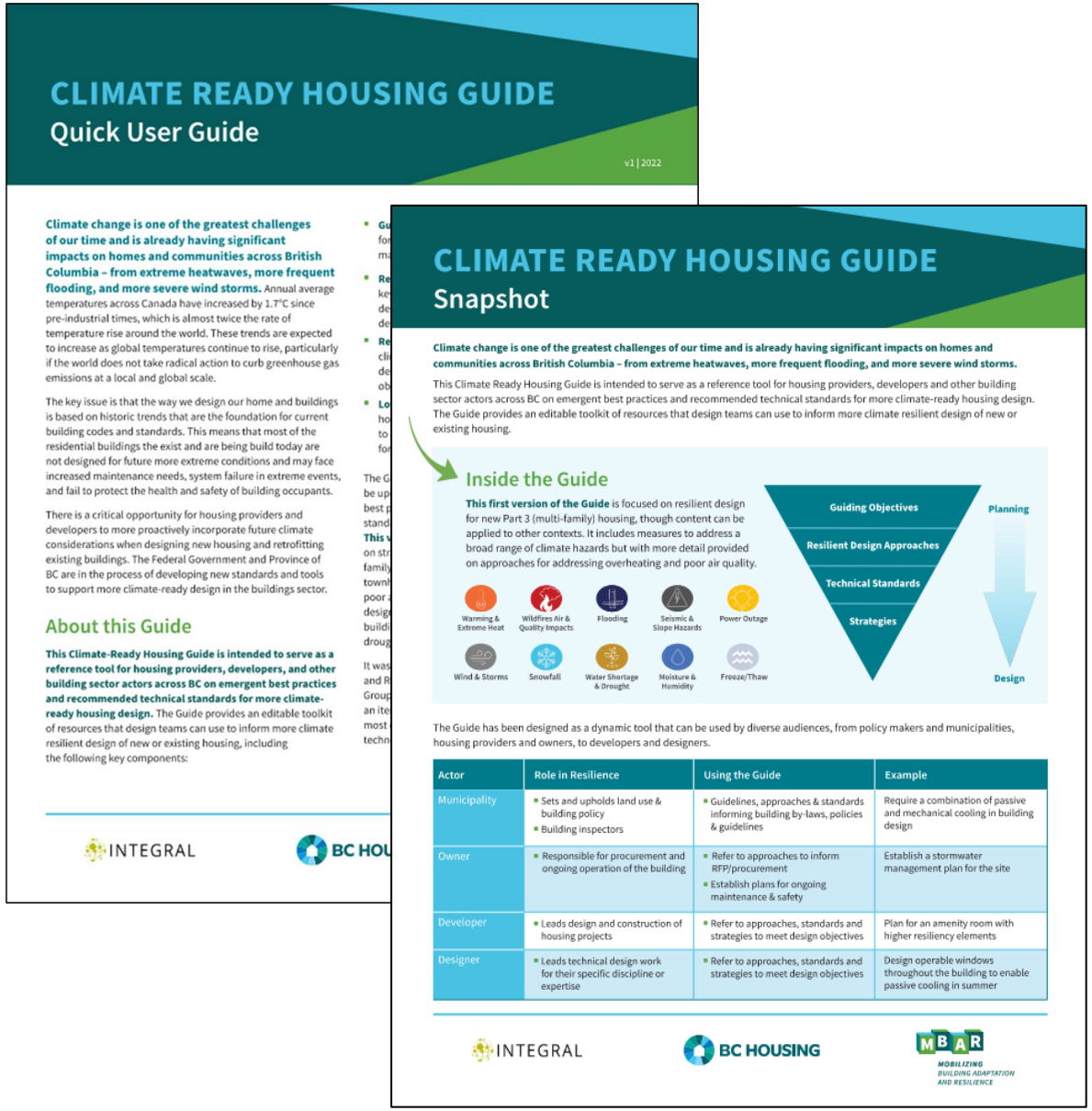






BC Housing Climate Ready Housing Guide

- **Reference tool** for designing more climate-resilient housing (focus on new-build)
- Sets **objectives, technical standards** and **resilience strategies** for resilient housing design
- Diverse applications:
  - Guideline for local governments
  - Framework for pilot projects
  - Reference for developers



CLIMATE READY HOUSING GUIDE
Quick User Guide
v1 | 2022

Climate change is one of the greatest challenges of our time and is already having significant impacts on homes and communities across British Columbia – from extreme heatwaves, more frequent flooding, and more severe wind storms. Annual average temperatures across Canada have increased by 1.7°C since pre-industrial times, which is almost twice the rate of temperature rise around the world. These trends are expected to increase as global temperatures continue to rise, particularly if the world does not take radical action to curb greenhouse gas emissions at a local and global scale.

The key issue is that the way we design our home and buildings is based on historic trends that are the foundation for current building codes and standards. This means that most of the residential buildings the exist and are being build today are not designed for future more extreme conditions and may face increased maintenance needs, system failure in extreme events, and fail to protect the health and safety of building occupants.

There is a critical opportunity for housing providers and developers to more proactively incorporate future climate considerations when designing new housing and retrofitting existing buildings. The Federal Government and Province of BC are in the process of developing new standards and tools to support more climate-ready design in the buildings sector.

About this Guide

This Climate-Ready Housing Guide is intended to serve as a reference tool for housing providers, developers, and other building sector actors across BC on emergent best practices and recommended technical standards for more climate-ready housing design. The Guide provides an editable toolkit of resources that design teams can use to inform more climate resilient design of new or existing housing, including the following key components:

INTEGRAL

CLIMATE READY HOUSING GUIDE
Snapshot

Climate change is one of the greatest challenges of our time and is already having significant impacts on homes and communities across British Columbia – from extreme heatwaves, more frequent flooding, and more severe wind storms.

This Climate Ready Housing Guide is intended to serve as a reference tool for housing providers, developers and other building sector actors across BC on emergent best practices and recommended technical standards for more climate-ready housing design. The Guide provides an editable toolkit of resources that design teams can use to inform more climate resilient design of new or existing housing.

Inside the Guide

This first version of the Guide is focused on resilient design for new Part 3 (multi-family) housing, though content can be applied to other contexts. It includes measures to address a broad range of climate hazards but with more detail provided on approaches for addressing overheating and poor air quality.

Guiding Objectives
Resilient Design Approaches
Technical Standards
Strategies
Planning
Design

Warming & Extreme Heat · Wildfires Air & Quality Impacts · Flooding · Seismic & Slope Hazards · Power Outage · Wind & Storms · Snowfall · Water Shortage & Drought · Moisture & Humidity · Freeze/Thaw

The Guide has been designed as a dynamic tool that can be used by diverse audiences, from policy makers and municipalities, housing providers and owners, to developers and designers.

Actor	Role in Resilience	Using the Guide	Example
Municipality	▪ Sets and upholds land use & building policy ▪ Building inspectors	▪ Guidelines, approaches & standards informing building by-laws, policies & guidelines	Require a combination of passive and mechanical cooling in building design
Owner	▪ Responsible for procurement and ongoing operation of the building	▪ Refer to approaches to inform RFP/procurement ▪ Establish plans for ongoing maintenance & safety	Establish a stormwater management plan for the site
Developer	▪ Leads design and construction of housing projects	▪ Refer to approaches, standards and strategies to meet design objectives	Plan for an amenity room with higher resiliency elements
Designer	▪ Leads technical design work for their specific discipline or expertise	▪ Refer to approaches, standards and strategies to meet design objectives	Design operable windows throughout the building to enable passive cooling in summer

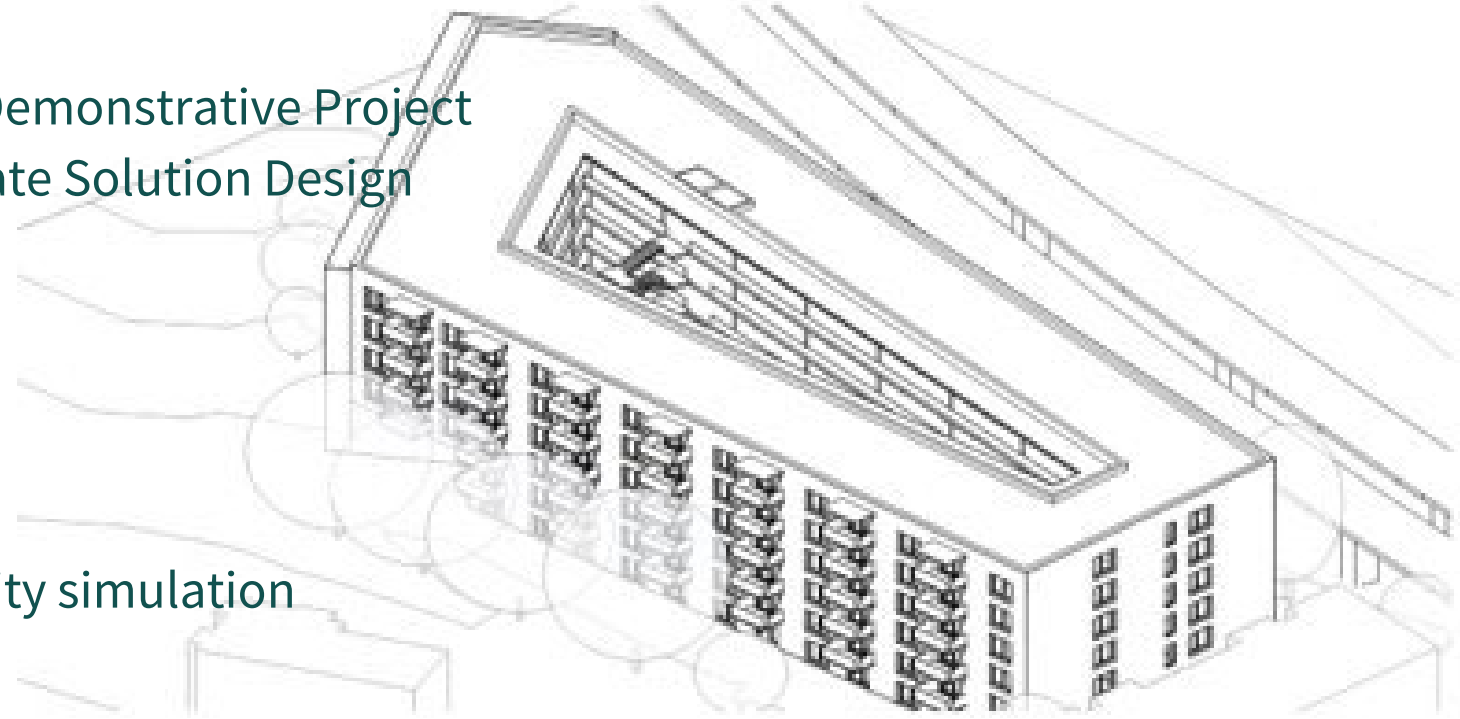
INTEGRAL · BC HOUSING · MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Introba

Vienna House Project

https://viennahouse.ca/about-the-project/research/

- Vienna House
  - In City of Vancouver
  - Innovative Affordable Housing Demonstrative Project
  - Used IBAMA Framework in Climate Solution Design Workshops
  - UBC documenting all research
  - Noise abatement
  - Summer cross ventilation
  - Exterior shading
  - Social resilience: FLUID Sociability simulation



- Vancouver House
  - In City of Vienna, Austria
  - Similar knowledge sharing

BRITISH COLUMBIA

BC HOUSING

MBAR
MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Financial Sector Actors in the Housing Sector and Climate Change

Mapping of financial sector actors in collaboration with UVic

- To develop a stronger understanding of how climate change risks are filtering through existing financial systems into the housing sector in B.C.

Research aims to identify:

•Where market failures exist or may exist (including information gaps/asymmetric information) related to climate change risks

•How these identified market failures will or could impact the residential construction sector and homeowners/homebuyers in B.C.

•What can be done to address the identified market failures most likely to harm residential construction and homeowners/home buyers

BC HOUSING RESEARCH CENTRE

MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

R2B Discussion Report & Local Government Toolkit

Data and information: Understand, Identify, Disclose and Communicate Risk

8 Recommendations

Awareness and capacity: Expand Labour, Industry, Owner and Government Capacity on Resilience

6 Recommendations

Policy development: Build Market Demand for Resilient Building

11 Recommendations

Financial mechanisms: Improve Investment and Financing Opportunities

7 Recommendations

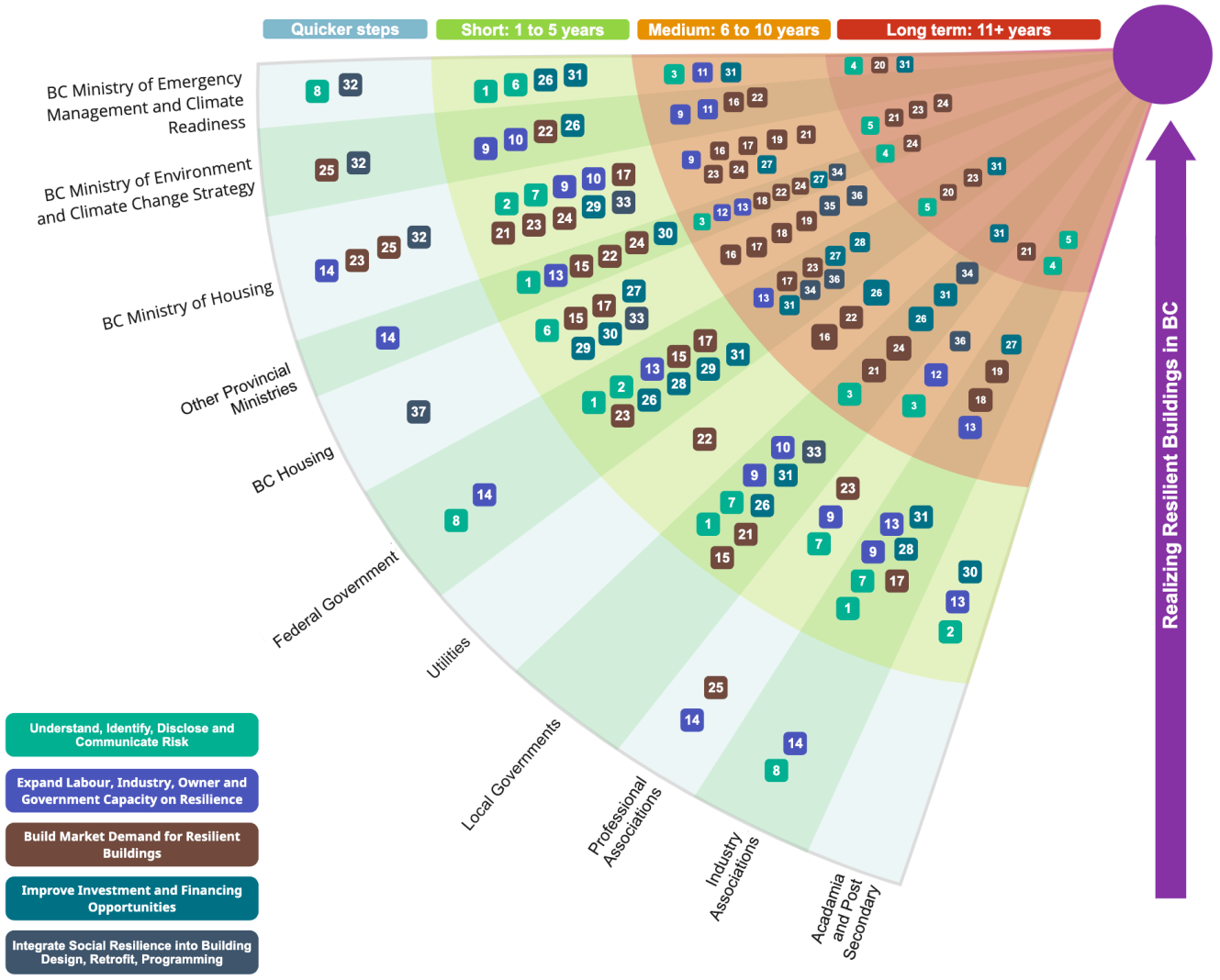
Social capacity: Integrate Social Resilience into Building Design, Retrofit, Programming

5 Recommendations

Pinna Sustainability

MBAR
MOBILIZING BUILDING ADAPTATION AND RESILIENCE

R2B Discussion Report & Local Government Toolkit



- the importance of collaboration and of each actor playing their role
- commitment (or at least thoughts) about what each organization can / will contribute to advance the issue
- examples to support overcoming barriers
  - ✓ through leadership in public sector procurement e.g. at BC Housing
  - ✓ use of contracting that supports integrated design and delivery
  - ✓ supporting / undertaking research on retrofit programs
  - ✓ assessing innovative materials and technologies

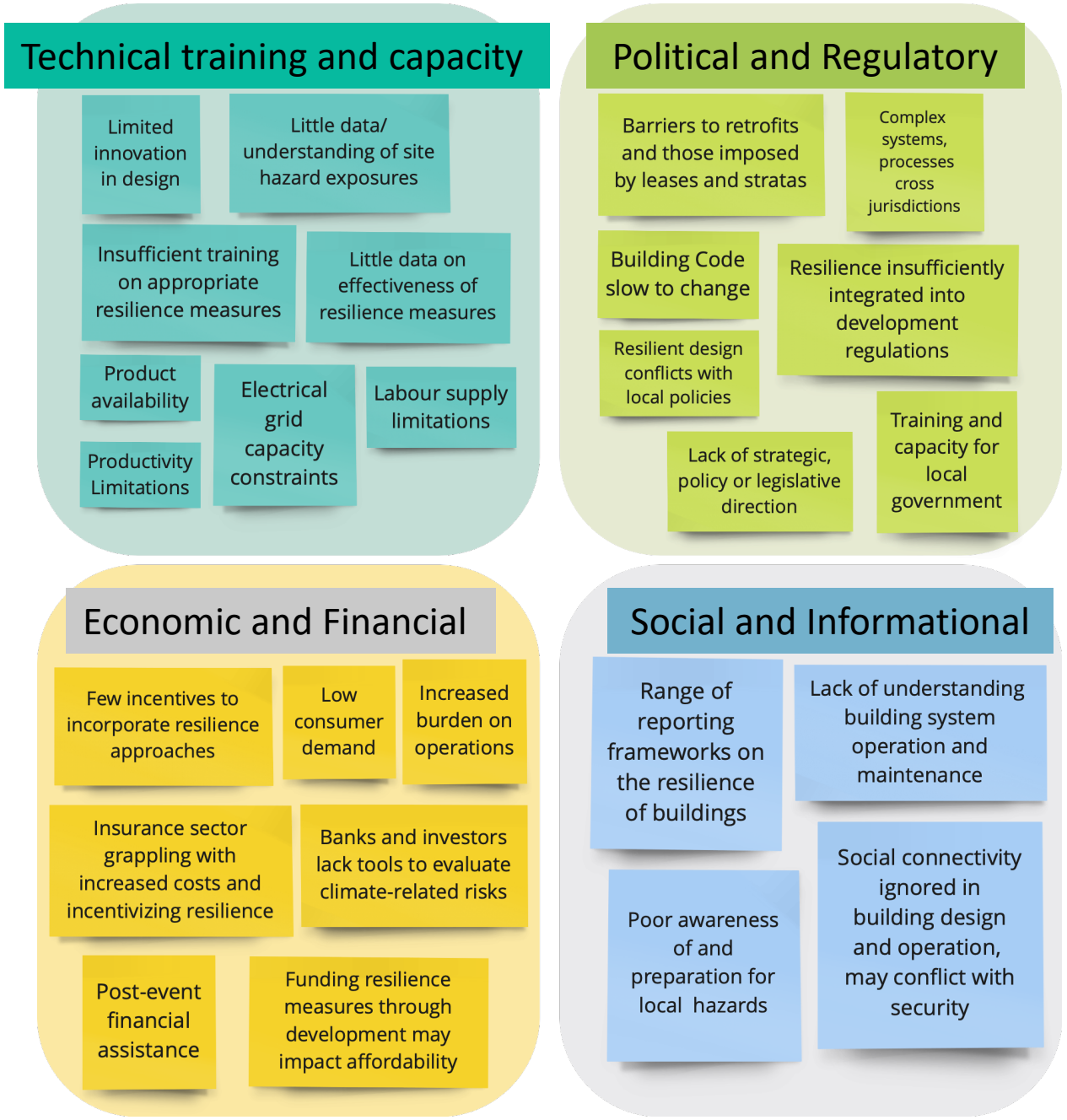
Pinna Sustainability

BRITISH COLUMBIA

BC HOUSING RESEARCH CENTRE

MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Overview: Primary Barriers



Pinna Sustainability

Climate Risk Assessment Framework (CRAF) - *for BC Housing projects only*

- Excel based Climate Risk Profiling/Assessment tool
- Uses existing data to estimate risks for BCH building projects
- Purpose:
  - Safety and health of residents, staff and guests
  - Integrity of the building and site
  - Functionality of residential programs
- Design objectives:
  - Useable for locations in BC
  - Simple and quick to learn and use
  - Able to provide assessment early in a project life

Risk Scores and Levels without Risk Mitigation Measures

Climate Risk Category	Risk Score (/25)			Risk Rating		
	Baseline	2050s	2080s	Baseline	2050s	2080s
Flooding & Rainfall	10.7	14.2	14.2	Medium	High	High
Extreme Heat Events	7.6	12.3	16.1	Medium	High	High
Wildfire Risk	25.0	25.0	25.0	Extreme	Extreme	Extreme
Emergency Power	8.3	7.9	7.9	Medium	Medium	Medium
General Air Quality	6.9	9.2	9.2	Medium	Medium	Medium
Wildfire Smoke	13.5	13.5	13.5	High	High	High

Risk Scores and Levels with Risk Mitigation Measures

Climate Risk Category	Risk Score (/25)			Risk Rating		
	Baseline	2050s	2080s	Baseline	2050s	2080s
Flooding & Rainfall	10.7	14.2	14.2	Medium	High	High
Extreme Heat Events	7.2	11.7	15.3	Medium	Medium	High
Wildfire Risk	23.9	23.9	23.9	Extreme	Extreme	Extreme
Emergency Power	7.5	7.2	7.2	Medium	Medium	Medium
General Air Quality	5.8	7.8	7.8	Low	Medium	Medium
Wildfire Smoke	11.1	11.1	11.1	Medium	Medium	Medium

BRITISH COLUMBIA

BC HOUSING

MBAR
MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Realizing Resilient Buildings? Learning to Multisolve

- Affordable
- Accessible
- Zero Carbon
- Support Health and Wellness
- Contribute to Complete Communities
- Climate Compatible

CLIMATE CHANGE

40% of global greenhouse gas emissions[a]

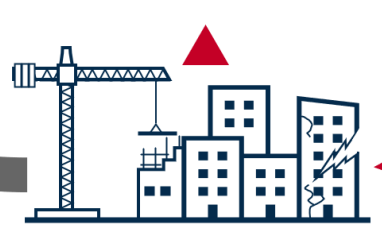
2021[b]

10,000 lives lost

US$ 280 billion losses

57% of losses uninsured

more frequent & more severe **CLIMATE HAZARDS**



BUILDINGS

GREEN

3% additional cost & a payback period of **3 years.**

RESILIENT

Every **US$ 1** invested can save **US$ 4.**

Source: World Economic Forum, 2022
Image: Ommid Saberi, Naz Beykan, IFC

British Columbia

BC HOUSING RESEARCH CENTRE

MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

MBAR
MOBILIZING
BUILDING ADAPTATION
AND RESILIENCE

More Resilient Homes Quicker in B.C.

Supported Implementation of "Future Shifted Weather Files"

Published Discussion Primers on All Climate Risks

Climate Ready Housing Design Guide v.1

Published Design Guide on Overheating and Air Quality to Complement Energy Step Code

Provided climate resilience technical support to 10+ major pilot projects

BC Housing/MBAR received NRCan research grant

MBAR is funded by BC Housing, the Province of BC, NRCan, BC Hydro, City of Vancouver, and the Lower Mainland Health Organizations, with participation and contribution from over 30 organizations, including national, provincial, and local agencies; and industry partners.

Digital Library & Peer Roundtables

R2B Toolkit for Local Gov v.1

Homeowner Protection Act: Research, Education & Licensing

BC Gov funded R2B study on barriers & enablers

BC Climate Resilience Framework and Standards for Public Sector Buildings v.1

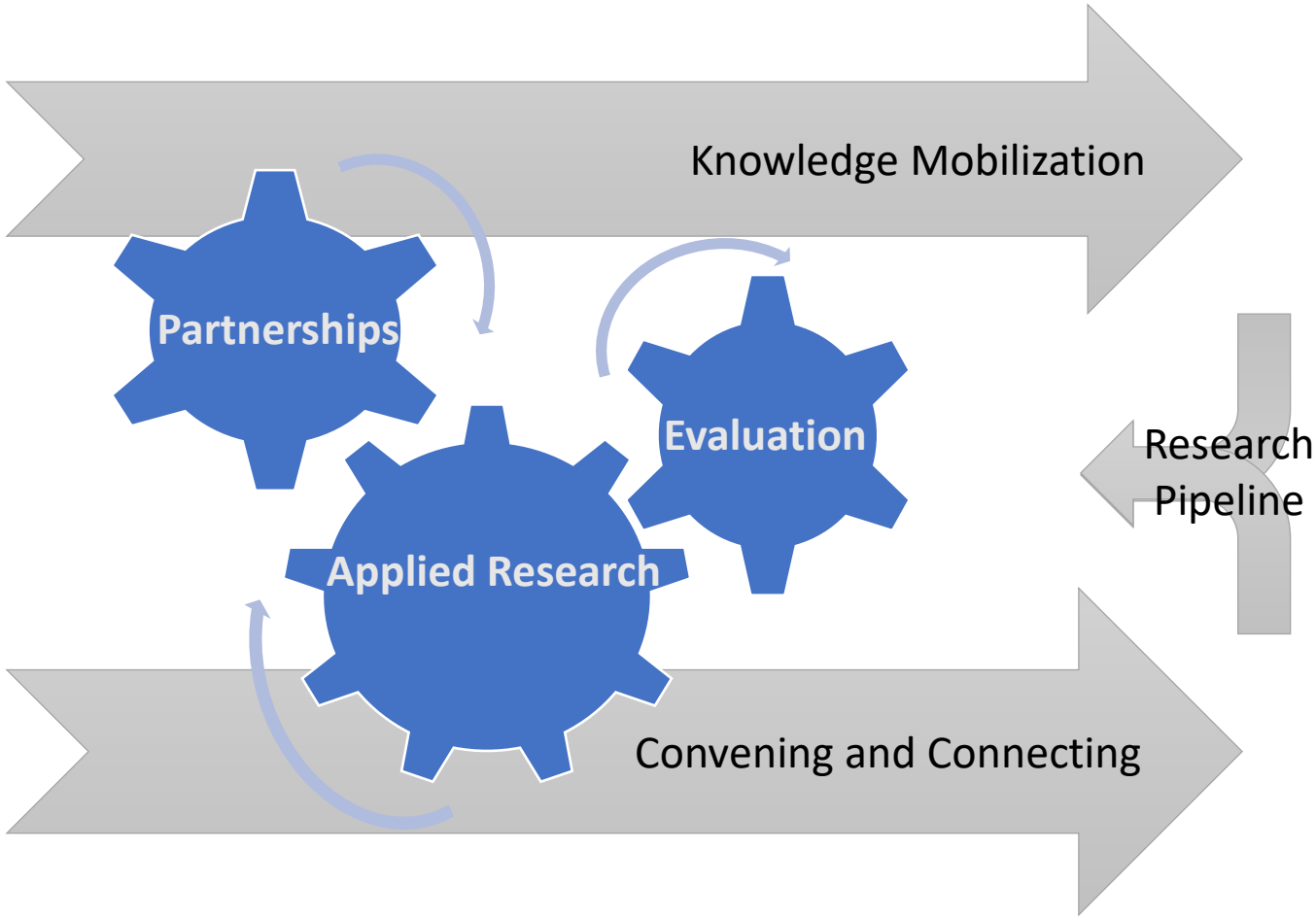
CleanBC + Climate Change Accountability Act + Climate Preparedness & Adaptation Strategy

MBAR started as a Research Initiative

MBAR being redefined as an Innovation Program

MBAR's Reimagined Model to Facilitate Multisolving

Conditions
- Resources
- Networks
- Political climate
- Reputation
- Expertise

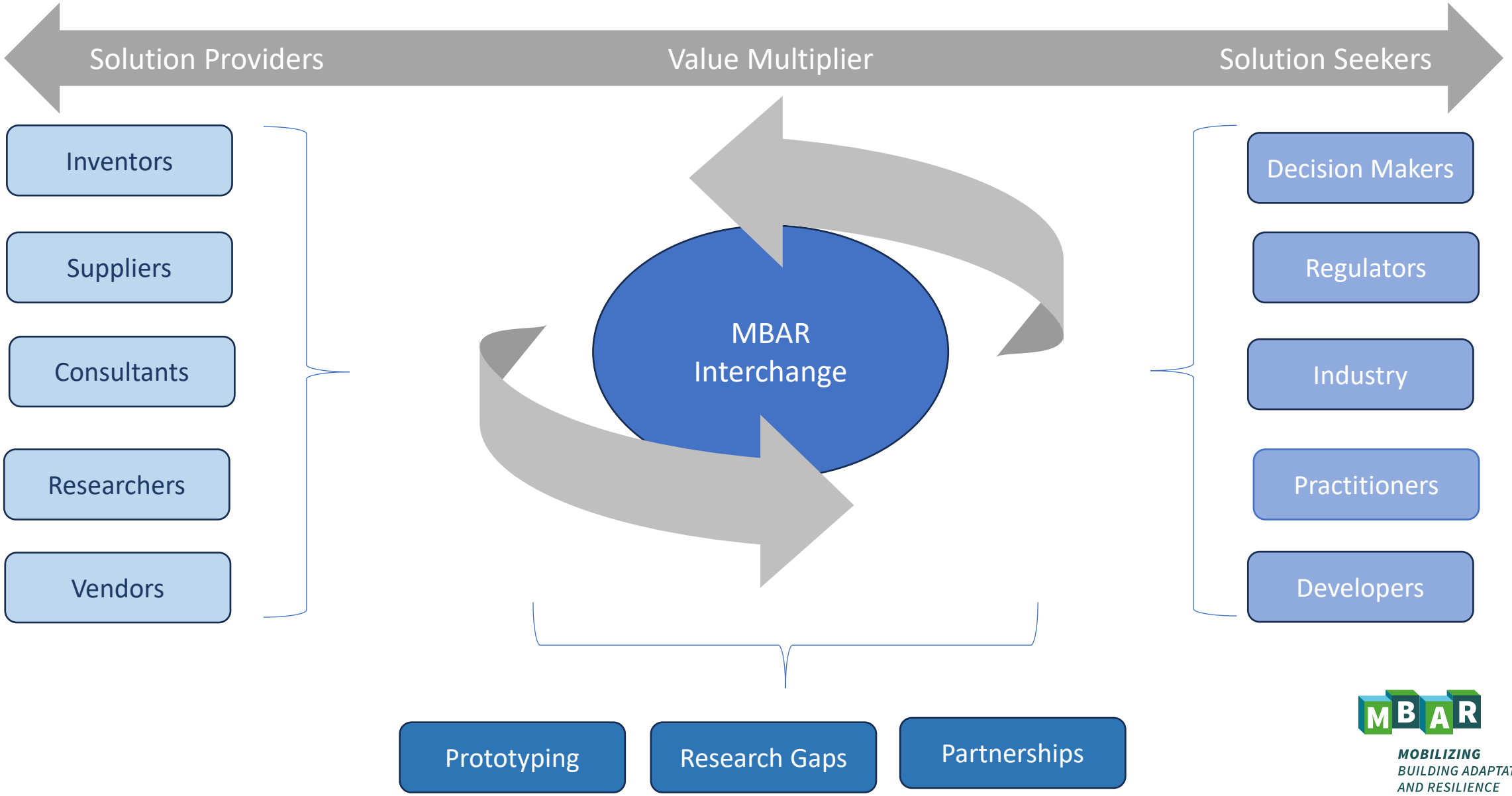


Outcomes
- Improved Infrastructure
- Increased Capacity
- Improved Resiliency
- Industry Transformation
- Social Change

BC HOUSING RESEARCH CENTRE

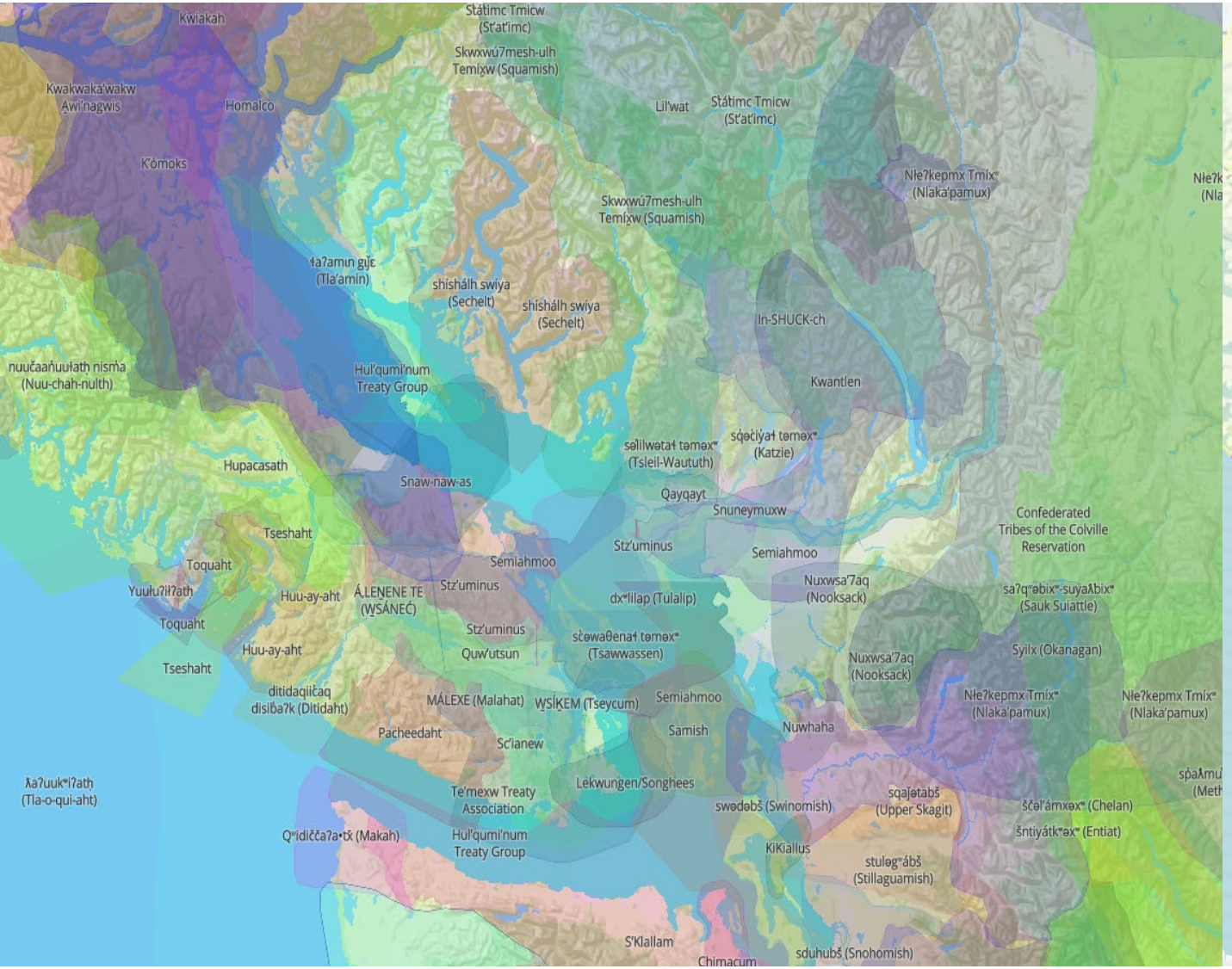
MBAR MOBILIZING BUILDING ADAPTATION AND RESILIENCE

. . . And Fostering Innovation



MBAR
MOBILIZING BUILDING ADAPTATION AND RESILIENCE

Also learning to do our part in Truth and Reconciliation



https://native-land.ca/ https://fpcc.ca/stories/first-peoples-map/

Thank You!

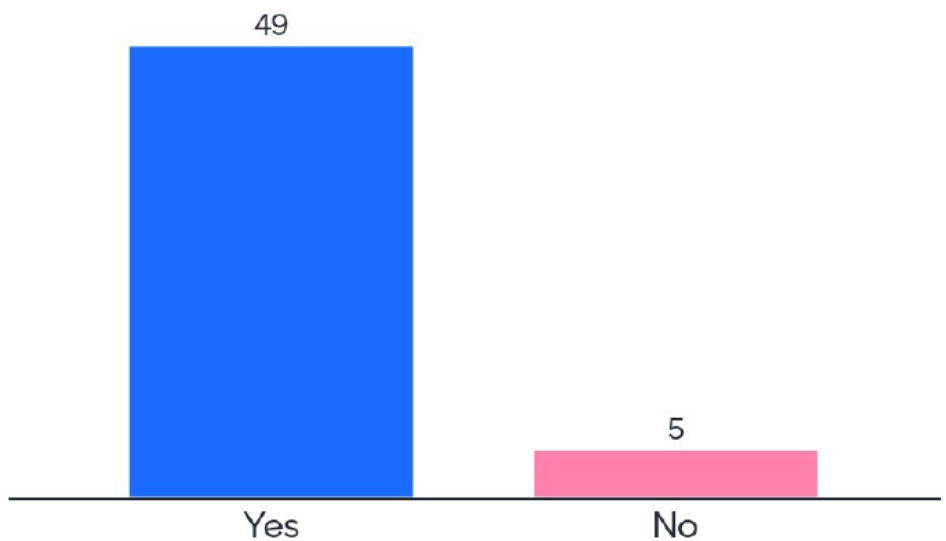
Email: **mbar@bchousing.org**

BC HOUSING
RESEARCH CENTRE

MBAR
MOBILIZING
BUILDING ADAPTATION
AND RESILIENCE

SESSION 3 - WHO'S DOING WHAT?

Have you learned anything today that helps you to understand resilience better?



SESSION 3 - WHO'S DOING WHAT?

What would you like more information on?