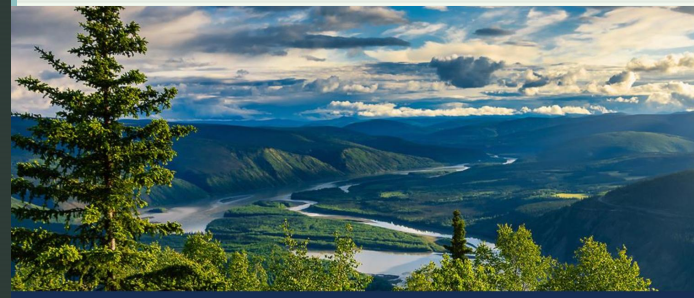
NRCan LEEP Case Study Project

Final EA Presentation

2025.03.14



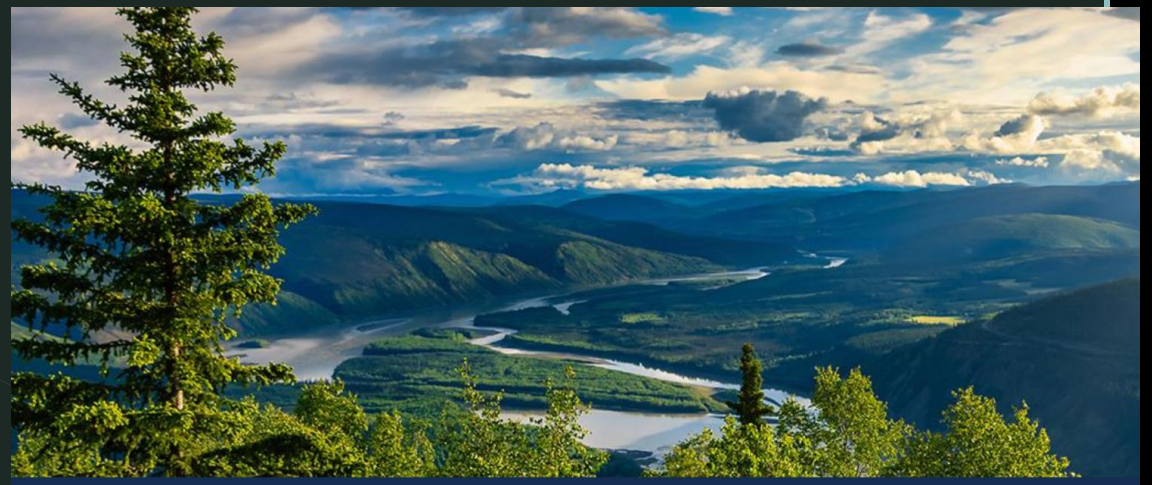
LEEP Sustainable Resilient Homes
Case Study Project

CAPITAL HOME ENERGY

www.capitalhomeenergy.com

LEEP

LOCAL ENERGY EFFICIENCY PARTNERSHIPS



LEEP Sustainable Resilient Homes Case Study Project

eenergy.com

Luke Dolan

Capital Home Energy

Licensed Service Organization servicing British Columbia

- 15 years of EnerGuide evaluations
- Master Energy Advisor
- Home Inspector
- Building Science instructor
- Personally Evaluated over 6000 homes
- Team of Professionally trained Energy Advisors
- Founded trade association - CACEA Canadian Association of Consulting Energy Advisors

CAPITAL HOME ENERGY

Tommy Byun

Capital Home Energy

Licensed Service Organization servicing British Columbia

- General Manager
- Senior Energy Advisor
- EA Trainer
- Technical Advisor for EnerGuide New and Existing Homes
- Service Organization Manager

CAPITAL HOME ENERGY

Agenda

- Project Introduction
- Builders
- Findings
- EA Perspectives
- Q&A

The LEEP Team

- Stefanie Coleman
- Patric Langevin
- Austin Selvig
- Introba Consultants

Builder Participants

Gavin McLeod

- High performance builder in the Lower Mainland

Case study project:

- New construction
- Vancouver, BC
- Duplex
- CHBA Net Zero

Doug Langford

- High performance builder in the Lower Mainland

Case Study project:

- New construction - Single Family
- Burnaby, BC
- BC Energy Step Code 5
- Zero Carbon Step Code EL 4
- CHBA Net Zero

Erik Lacey

High performance builder
in the Fraser Valley, BC

Case study project:

- New Construction
- Agassiz, BC
- Single Family
- BC Energy Step Code 4
- CHBA Net Zero Ready

Kevin Hatch

- High Performance builder in North Shore, BC

Case study project:

- Deep Energy Retrofit
- North Vancouver, BC
- BC Energy Step Code 4
- Zero Carbon Step Code EL 4
- CHBA Net Zero

LEEP Sustainable Resilient Homes

The purpose of this project

Engage with local energy advisors, builders and renovators.

identify affordability and buildability challenges when integrating mitigation and adaptation measures in low-rise housing in Vancouver Lower Mainland area

LEEP Sustainable Resilient Homes

Energy Efficiency

Operational Carbon

Climate Resilience

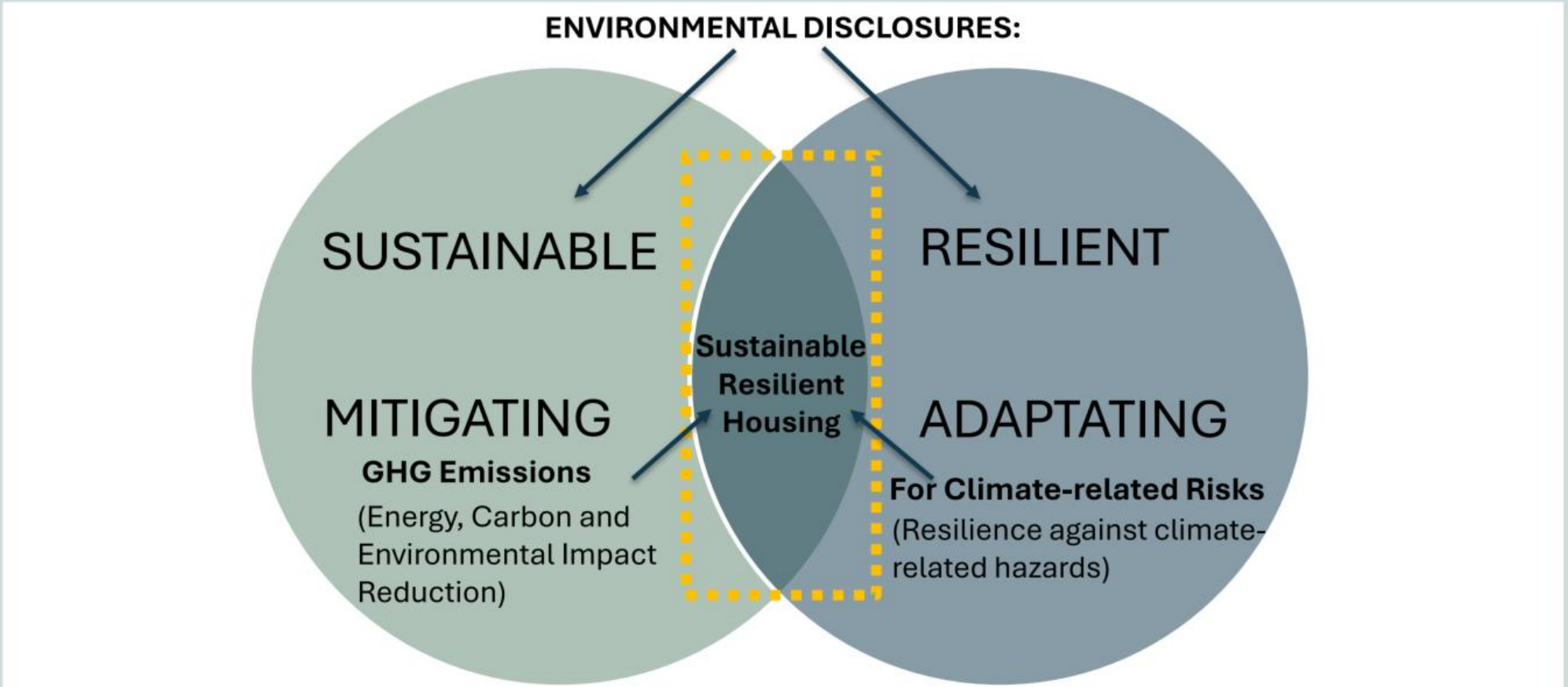
Embodied Carbon

What is Sustainable Resilience ?

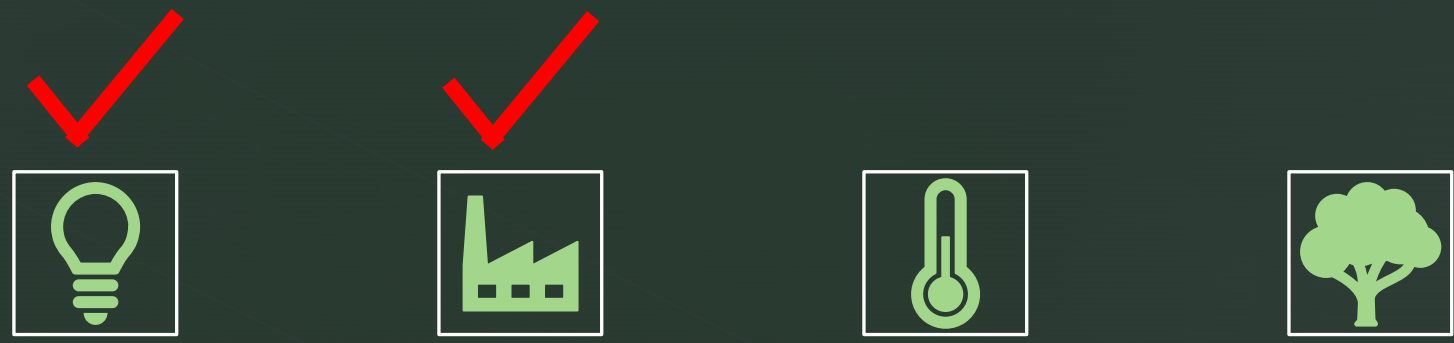
Sustainable Homes have reduced energy demands and carbon emissions.

Resilient Homes have reduced risks from climate-related weather impacts

MARKET DIRECTION



LEEP Sustainable Resilient Homes



Energy Efficiency

Operational Carbon

Climate Resilience

Embodied Carbon

BC Energy Step Code
- Step 1-5
- came into effect in 2018
- mandatory step code 3 in 2023

BC Zero Carbon Step Code
- EL 1-4
- introduced in 2023
- EL-1 mandatory in 2025

VBBL
- Unique to City of Vancouver
- Prescriptive & Performance
- Mandatory EnerGuide Ratings since 2015 (Pre, mid, final)

LEEP Sustainable Resilient Homes

Energy Efficiency

Operational Carbon

Climate Resilience

Embodied Carbon

LEEP Sustainable Resilient Homes Tool

Module 1	Module 2	Module 3	Module 4	Module 5
Climate Context	Requirements & Impacts	Land Use Strategies	Building Strategies	Comparison Matrix

Guided interactive workshops with roundtable discussions

Learnings from workshops shared with others for consideration

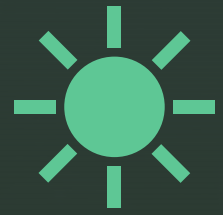
CLIMATE RESILIENCE

KEY FINDINGS

Flooding

Overheating

Wildfire

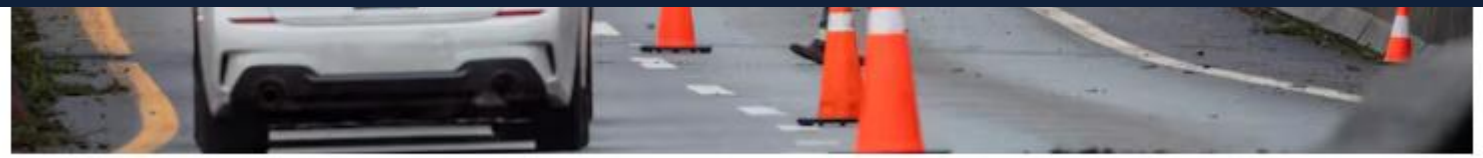


High wind

British Columbia

B.C. village mourns deaths of 2 longtime residents in landslide

CityNews Everywhere News



Crews are pictured cleaning up debris just days after a landslide on the Sea to Sky highway near Lions Bay, B.C. (Ben Nelms/CBC)

NBC NEWS TRUMP ADMIN POLITICS LOCAL U.S. NEWS WORLD HEALTH EDITORS' PICKS SHOPPING TIPLINE WATCH

CALIFORNIA WILDFIRES

California wildfires: What we know about L.A.-area fires, what caused them, who is affected and more

Fueled by powerful winds and dry conditions, a series of ferocious wildfires erupted the second week of January and roared across the Los Angeles area.

Sustainable Resilience

Key Findings

BC Case Study Findings: Flooding

Common Practice or Existing Regional Requirements	Emerging Practice	Limited Adoption (buildability/ costs/ uncertainty)
Greater than 75% of participants	*Between 40 and 75% of participants*	*Less than 40% of participants*
• Limiting development in areas with high groundwater levels or areas with overland flooding • Use lot grading and drainage to direct water away and reduce pooling • Provide surface flood prevention of exterior stairwells • Site-level stormwater infiltration features • Avoid installation of window wells or provide drainage/sealing • Use of gutter guards • Fasten downspouts to foundation walls • Seal flood entry points and cracks • Foundation drainage access points • Install of sump pit/pump system • Backup power for sump pump and alarm system • Grading of pipes	• Impermeable cap on backfill area • Exaggerate grade next to foundation • Design downspouts to discharge over the ground surface and beyond line of excavation/backfill • Raise building entrances above flood elevation • Foundation drainage does not drain into sanitary or combined sewer system • Use of hydraulic break or backwater valve • Geotextile filters to prevent accumulation of silt/clay in foundation drainage • Provide owner education about operating and maintaining sump pump • Secondary sump pump • Sanitary sewer backflow prevention	• Battery powered sump pumps • No plantings above or near sewer laterals • Enhanced grade (3-8%) on mainline backwater valve

BC Case Study Findings: High Wind

Common Practice or Existing Regional Requirements	Emerging Practice	Limited Adoption (buildability/ costs/ uncertainty)
Greater than 75% of participants	*Between 40 and 75% of participants*	*Less than 40% of participants*
• Install thicker roof sheathing • Use enhanced post base and cap connections • Building bracing complies with Section 7 of CSA S520 • Install high impact siding	• Install roof cover rated for high wind resistance and user more fasteners • Adhere shingles to manufacturer's installation min. temp. requirements • Enhancements to the secondary water barrier and self-adhering water barrier • Roof sheathing and fastening complies with CSA S520 • Connect walls to floor through strong connections to resist uplift • Anchor sill plates to the foundation • Utilize a continuous load path in compliance with CSA S520 • Brace cantilevered roof overhangs to comply with CSA S520 • Install wind-borne debris-resistant windows and skylights • Install single bay and/or wind-resistant doors	• Install roof sheathing fasteners using a 6" spacing on edge and intermediate supports • Roof sheathing fasteners provide a certain level of withdrawal resistance (unsure) • Include structural connections to enhance the uplift resistance of roof-to-wall connections • Gable end wall bracing complies with CSA S520 • Protect roof penetrations with additional measures • Wind-resistant roof vents • Over framing for hip and gable roof systems follows CSA S520 • Solar Panel follows CSA S520

BC Case Study Findings: Overheating

Common Practice or Existing Regional Requirements	Emerging Practice	Limited Adoption (buildability/ costs/ uncertainty)
Greater than 75% of participants	*Between 40 and 75% of participants*	*Less than 40% of participants*
• Enhanced building envelope and air tightness • High-efficiency lighting • Back-up energy system for essential loads • Optimize glazing for solar heat gains • Operable windows • Deep roof overhangs • Minimize thermal bridging • Low SHGC windows • Deciduous vegetation • Install mechanical cooling	• Orient building, indoor spaces, and windows/skylights to balance light and solar gain • Use of ceiling fans • Exterior shades on windows • Install ERV or HRV system • Design mech systems for future design values (2070s)	• Install high surface reflectivity cladding/roof system • Provide extra space to upsize ductwork, piping, etc. for future mech cooling systems (2070s)

BC Case Study Findings: Wildfire

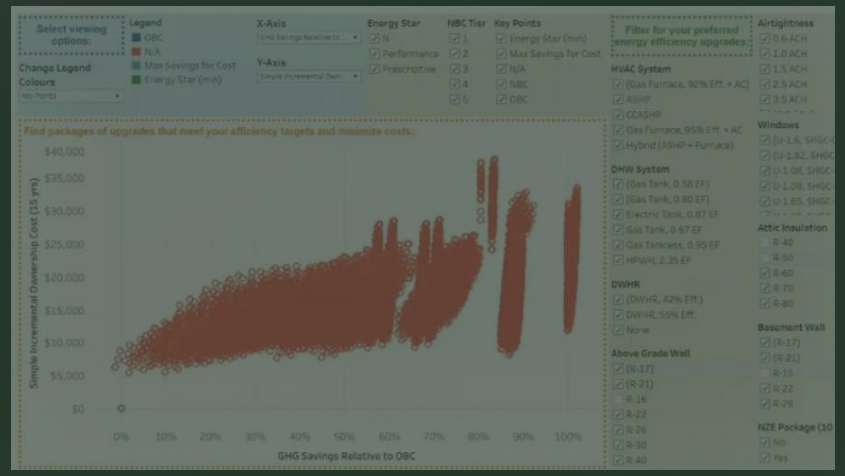
Common Practice or Existing Regional Requirements	Emerging Practice	Limited Adoption (buildability/ costs/ uncertainty)
Both participants	*One participant*	*No participant*
• Metal screens for soffit or roof venting • Fire-resistant decking • Non-combustible surfaces below decks, balconies, porches, and raised buildings • Fire-resistant doors • Minimize gaps in envelope • Fire-resistant shingles and following roofing underlayment • A 1hr fire rated assembly tested • Fibre cement cladding • Cast in place foundation walls • Double pane, tempered windows • Vegetation setback 1.5m perimeter	• Eaves, fascia, and roof projections are finished with non-combustible materials • External fire suppression system • Water efficient irrigation systems • Fire-resistant vegetation • Tree setback from buildings by 10m	• Operable windows fitted with metal screens and frame

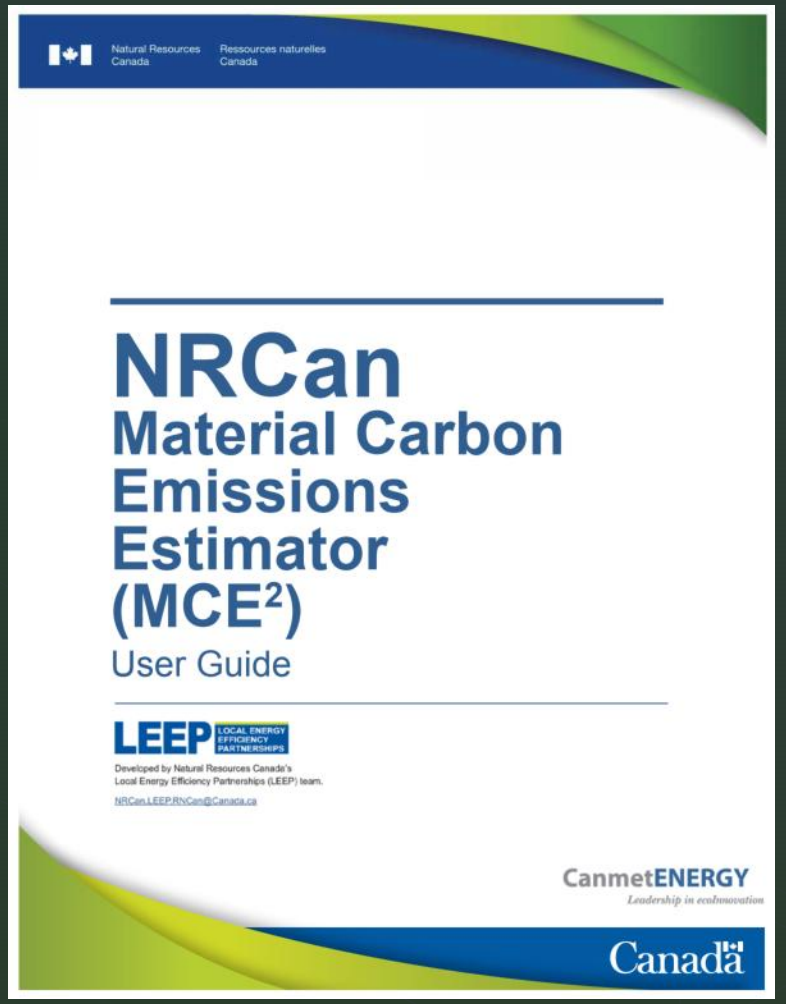
Barriers & Challenges

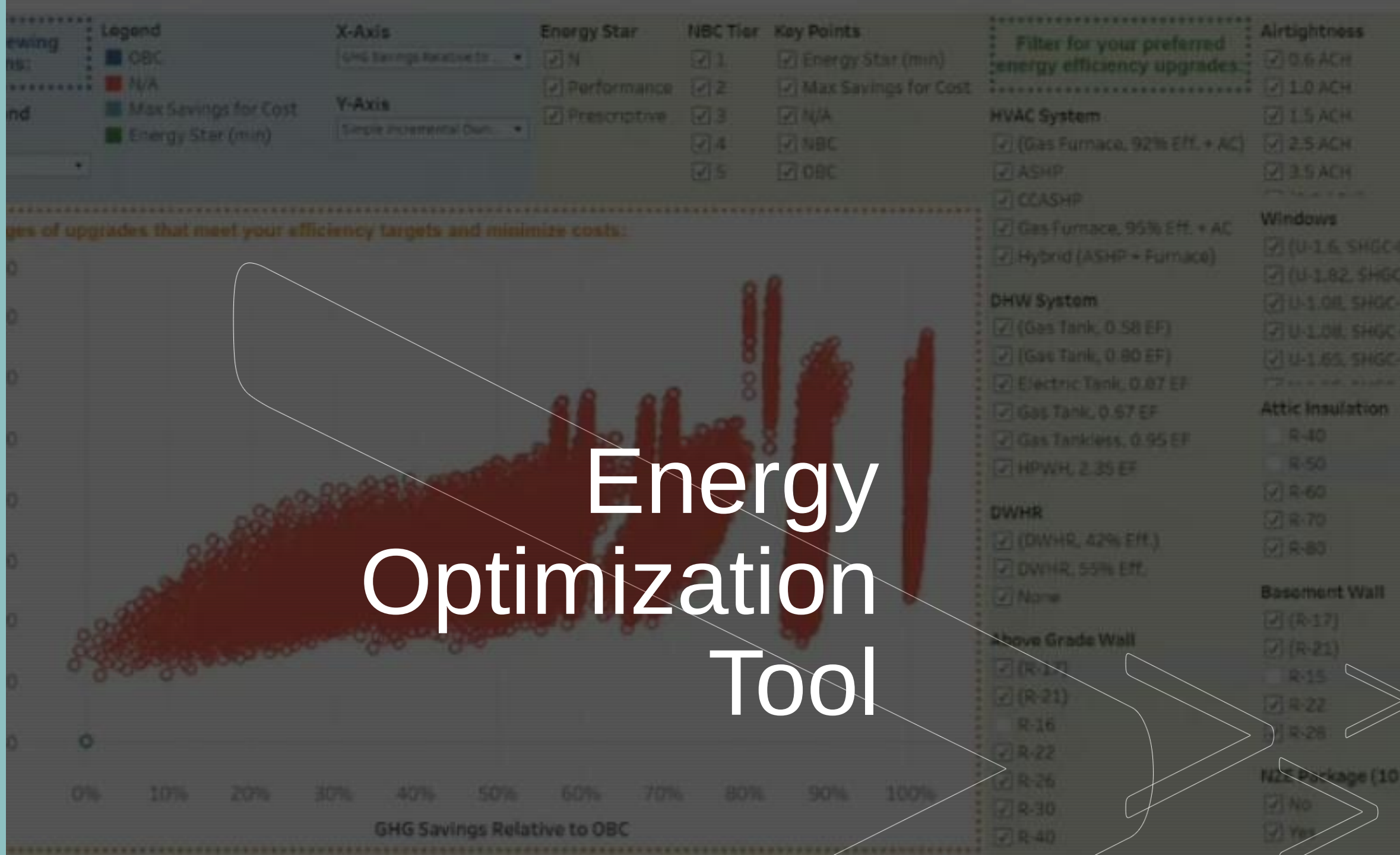
Actions for Successful Implementation

Optimization Tools

LEEP Dashboards for Interactive Home Optimization



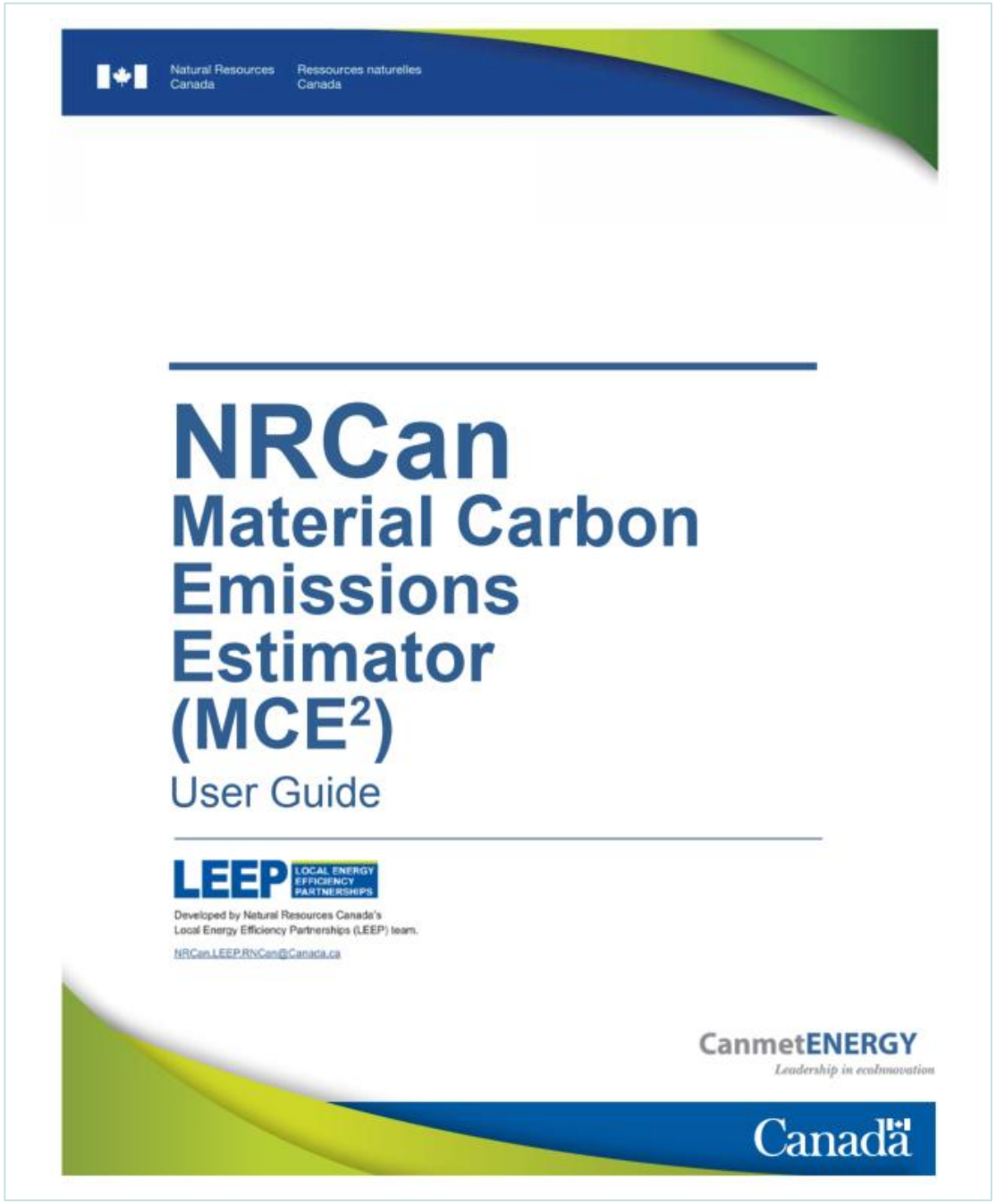




Energy Optimization Tool

www.capitalhomeenergy.com

The elephant in the room



Embodied Carbon

$$Net\ Carbon\ Emission$$

$$= \sum(Amount\ of\ Material\ Used \times Material\ GWP\ Factor)$$

BC – Tier 5

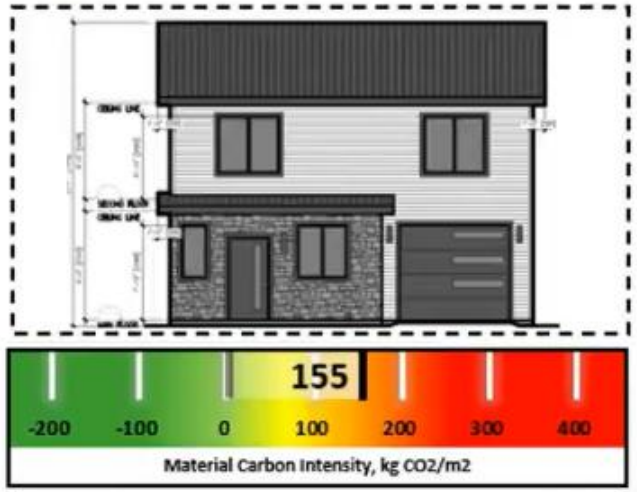
- Tier 5 increases <u>embodied</u> emissions by 10%
- Tier 5 reduces <u>operational</u> emissions by 96%
- How much embodied carbon for Resilience measures (BC - Wildfire, Flood, Overheating, High Wind)?
- How far can we go on Embodied?

Material Carbon Emissions Estimator (MCE2)

Project Carbon Emissions Estimates

Save This Scenario

PROJECT SUMMARY



Project:	Riva Construction
Evaluator:	Patric
Location:	British Columbia
Home description:	2 story single
Building Size:	1844 ft2 above grade (plus 824 ft2 basement)

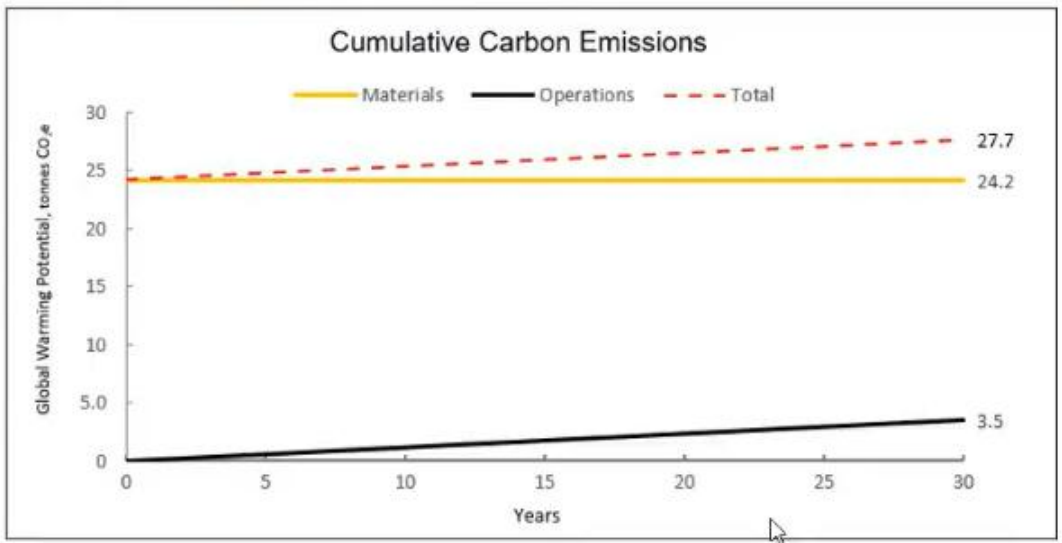
Material Emissions

tonnes CO2e	kg CO2e / m2
24.2	155

Operational Emissions

tonnes CO_2e / yr	t CO_2e / 30 yrs
0.1	3.5

PROJECT EMISSIONS TIMELINE

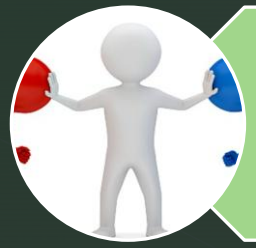


EA Perspectives

Valuable Homes

Regulation Consistency

Resiliency vs. Embodied carbon



Conflicts

Eventual Adaptation

New Learnings

Are we doing more harm than good ?

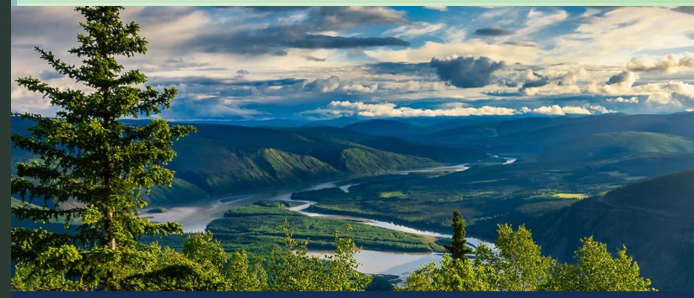
Conflicts ?

Operational Carbon vs Embodied Carbon vs Resilience

Available materials ?

Q & A Session

Thank you!



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