PEER: Prefabricated Exterior Energy Retrofit

Ottawa Community Housing Pilot –IURC Presentation, November 22, 2023

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OCH LCO

Ressources naturelles Canada

Natural Resources Canada

Ottawa Community Housing

- Ottawa's largest landlord
- 15,000 units
  - 100 high to mid rise buildings
  - 60 townhouse communities
- 2/3 of our buildings are 50+ years old
- In 2019, OCH spent $23M on utilities

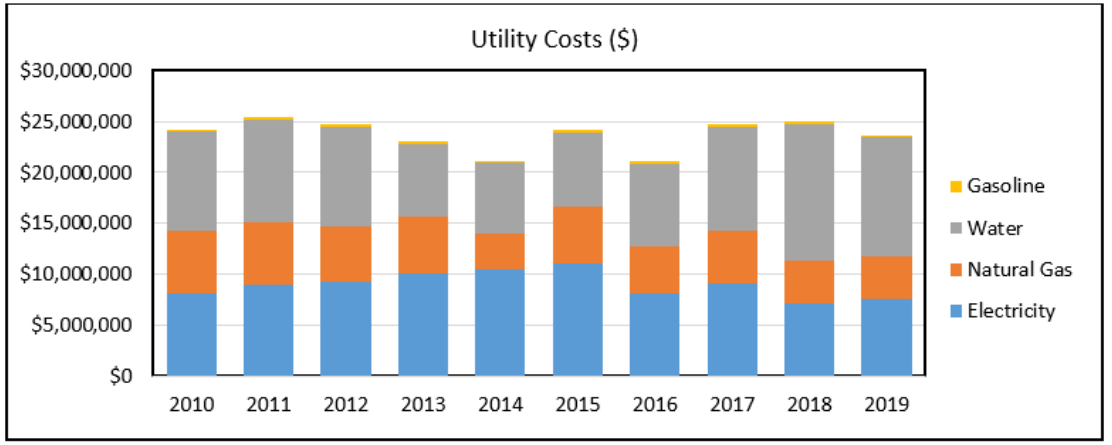
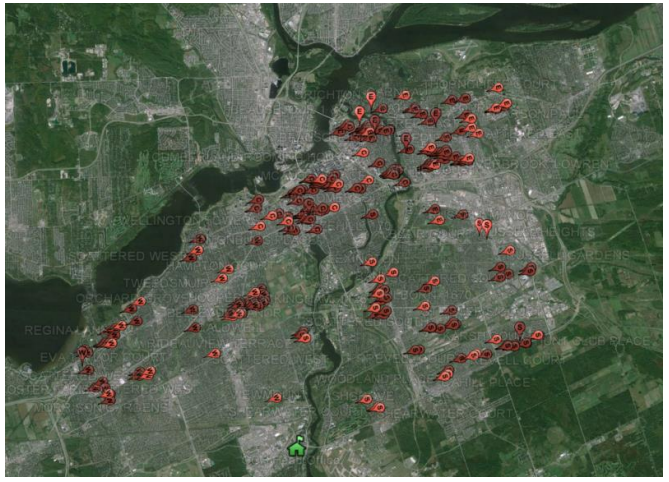
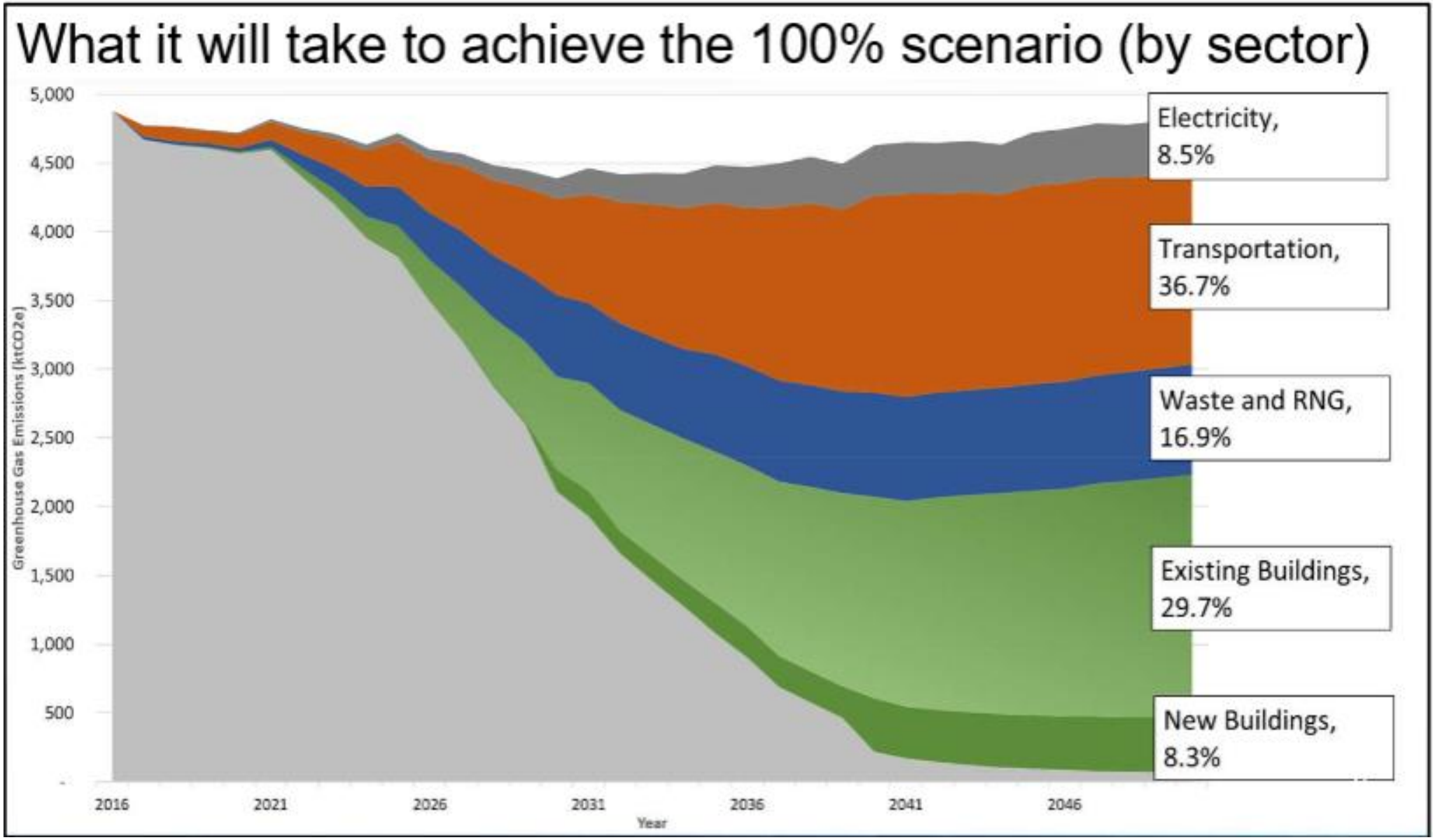


Figure 1 - 2010 - 2019 Utility Costs

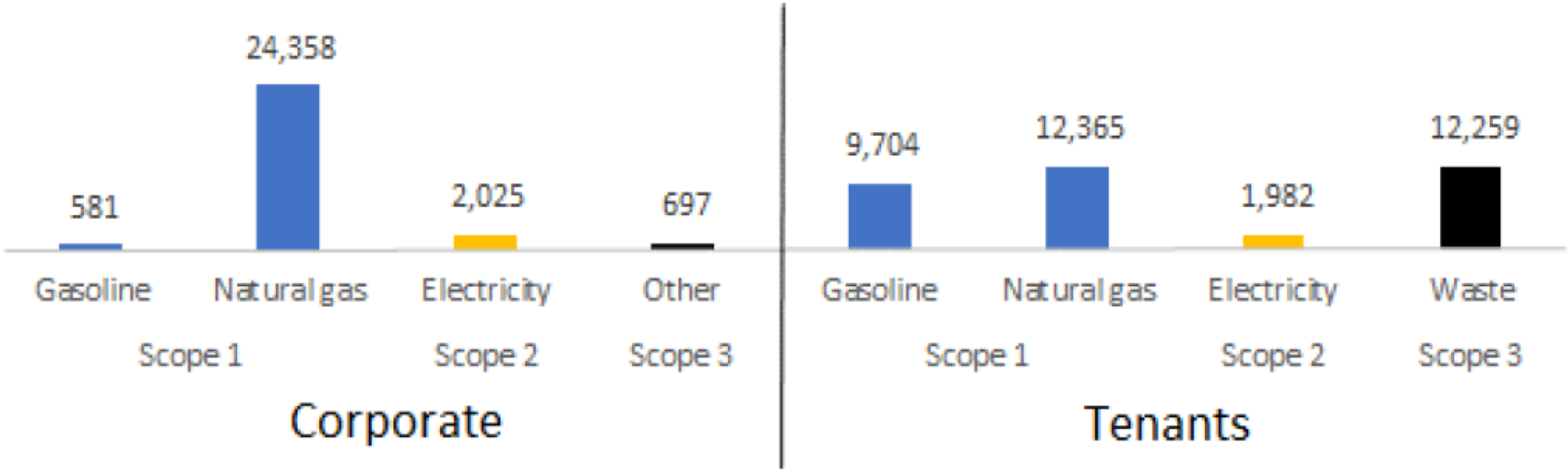




Source: City of Ottawa Climate Change Master Plan

OCH's Direct and Tenant GHG Inventory

Figure 1: OCHC Carbon Footprint by scope, source and payer in t CO2e



OCH Strategic Planning Requirements

$600M

Asset Renewal: Capital backlog

96%

GHG Reduction by 2040

1,600 tCO2/yr

Required annual reduction to meet our goals

800+ homes

Need to be retrofitted each year

< 0 Vacants

Housing Crisis across the country

10,000

People on the Ottawa waiting list. Housing Crisis across the country

Strategic Deep Energy Retrofits will be a cornerstone of our portfolio

Canada-wide Challenges

11 %

GHGs from heating homes and buildings

2 %

GHGs from building and renovating

600,000

Homes that need to be deep retrofit each year (4x the current rate and 2x the current depth)

3.5M

Canada's target for additional new homes by 2030

30,000

Projected shortage of construction trades by 2027

Increasingly severe and frequent extreme weather events and power outages

Presland PEER Pilot

4 units, 3 bedrooms each
Built in 1960
7200$ in utilities annually
18 tons of CO2 emitted annually

4 units, 3 bedrooms each
Renewed in 2020
Net-Zero Energy annually
0 tons of CO2 emitted annually
Tenants in-suite during retrofit

Funded by the OERD's Green Infrastructure Program

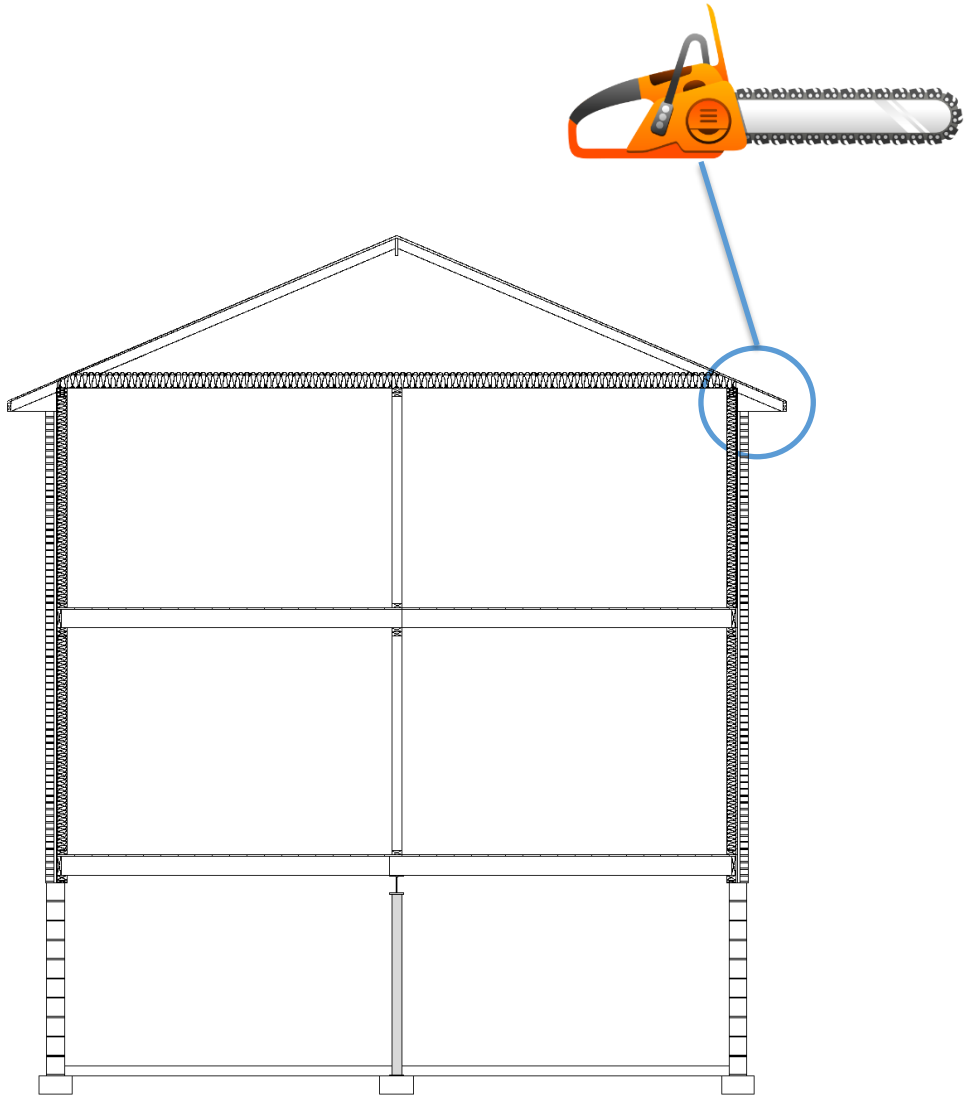
Ressources naturelles Canada
Natural Resources Canada

Ottawa Community Housing
Logement communautaire d'Ottawa

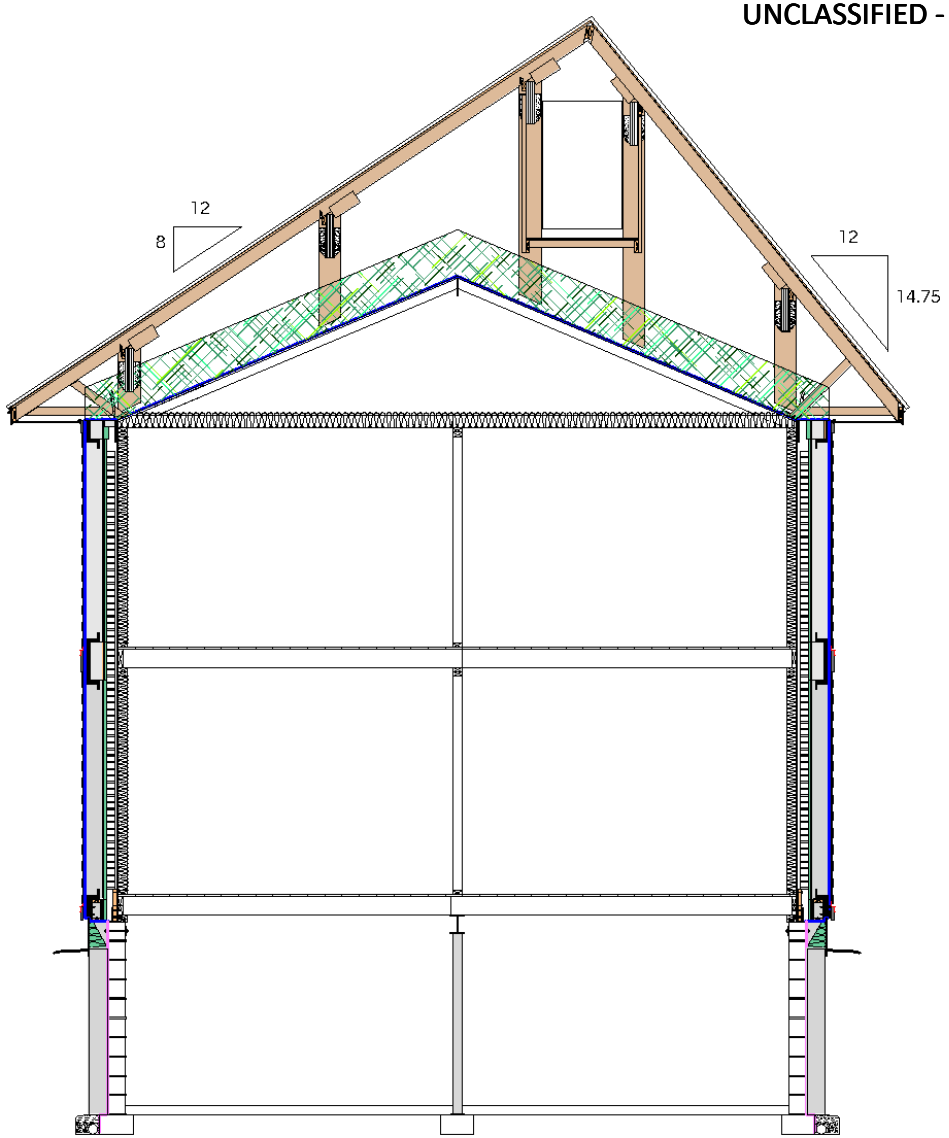
Assemblies and Systems

	BaseCase	Net-Zero Retrofit	
Attic	27.6	60.0	*Eff. R-value, ft2.F/Btu*
Walls – Above Grade	13.7	45.4	*Eff. R-value, ft2.F/Btu*
Walls – Below Grade	1.3	32.5	*Eff. R-value, ft2.F/Btu*
Airtightness	7.5	2.3	*ACH@50Pa*
Space Heating / Cooling	90% AFUE gas / N/A	ASHP HSPF 9.0 / SEER 25	
Ventilation	N/A	ERV, SRE 84% (OC) 65 (-25C)	
DHW	Gas. EF 0.56	Hybrid HP. EF 2.7	
Renewables	N/A	35 kWp	

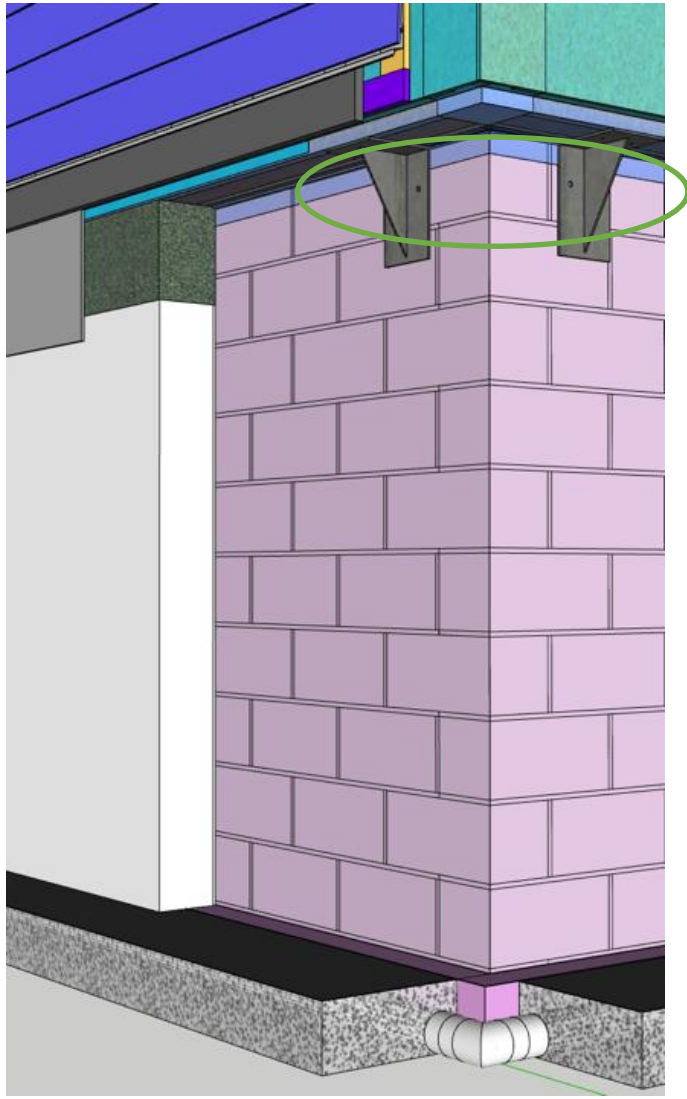

South Elevation (Point Cloud)
3/8" = 1'-0"
North Elevation (Point Cloud)
3/8" = 1'-0"
if<>then
<architecture>
inc.
017-019
PEER Prefabricated Exterior Energy Retrofit Project
197 Presland Road
Ottawa, ON
EXTERIOR ELEVATIONS (POINT CLOUD)
A201a

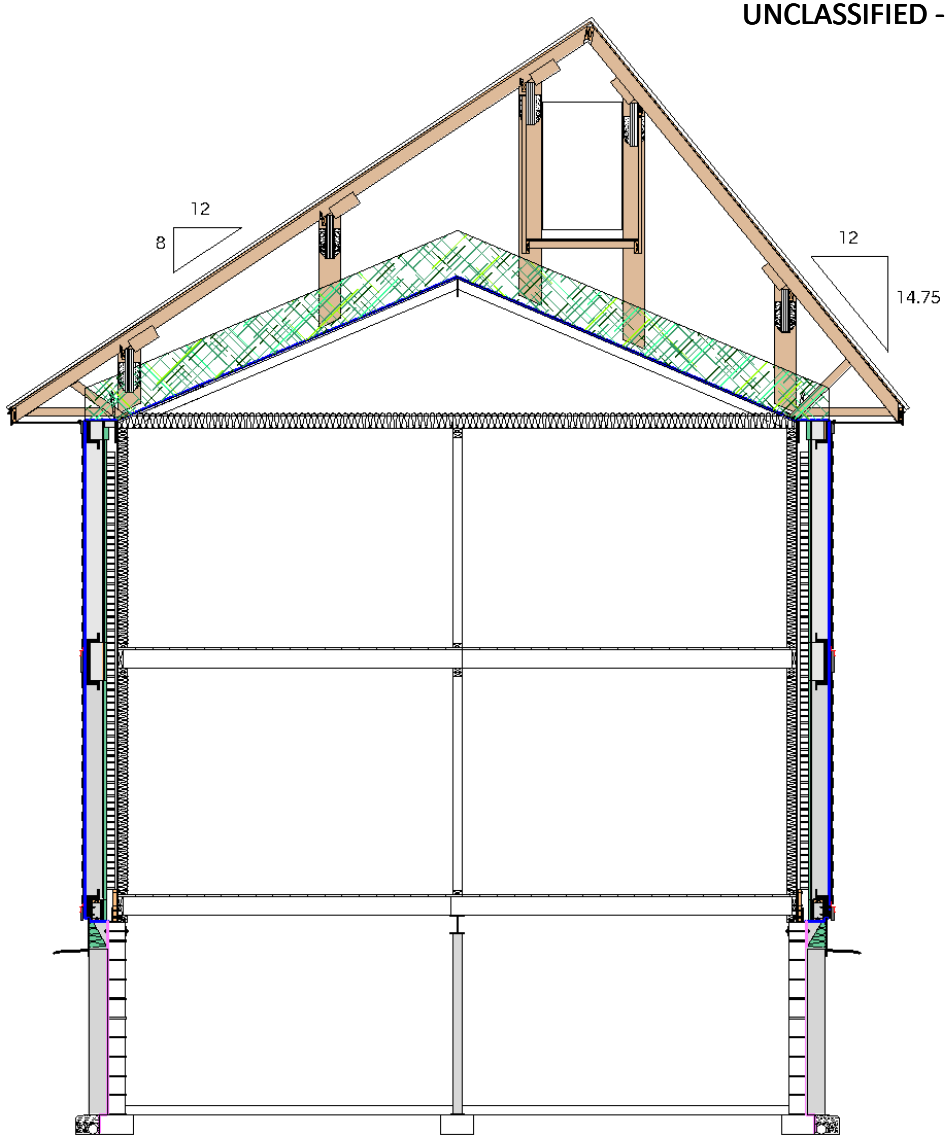


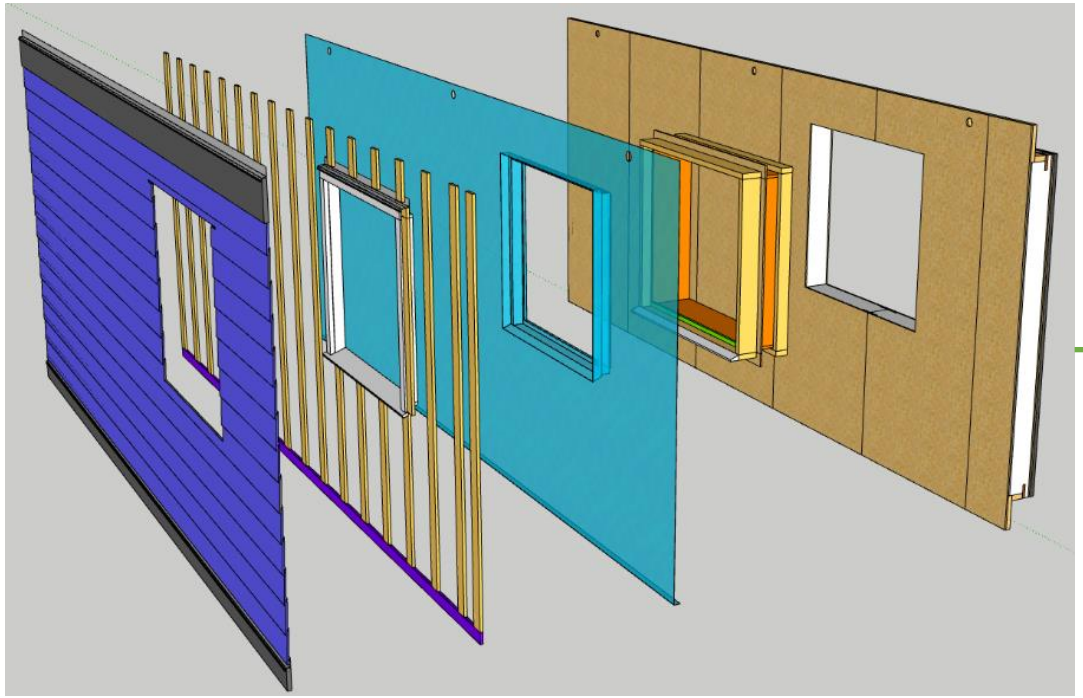
Before

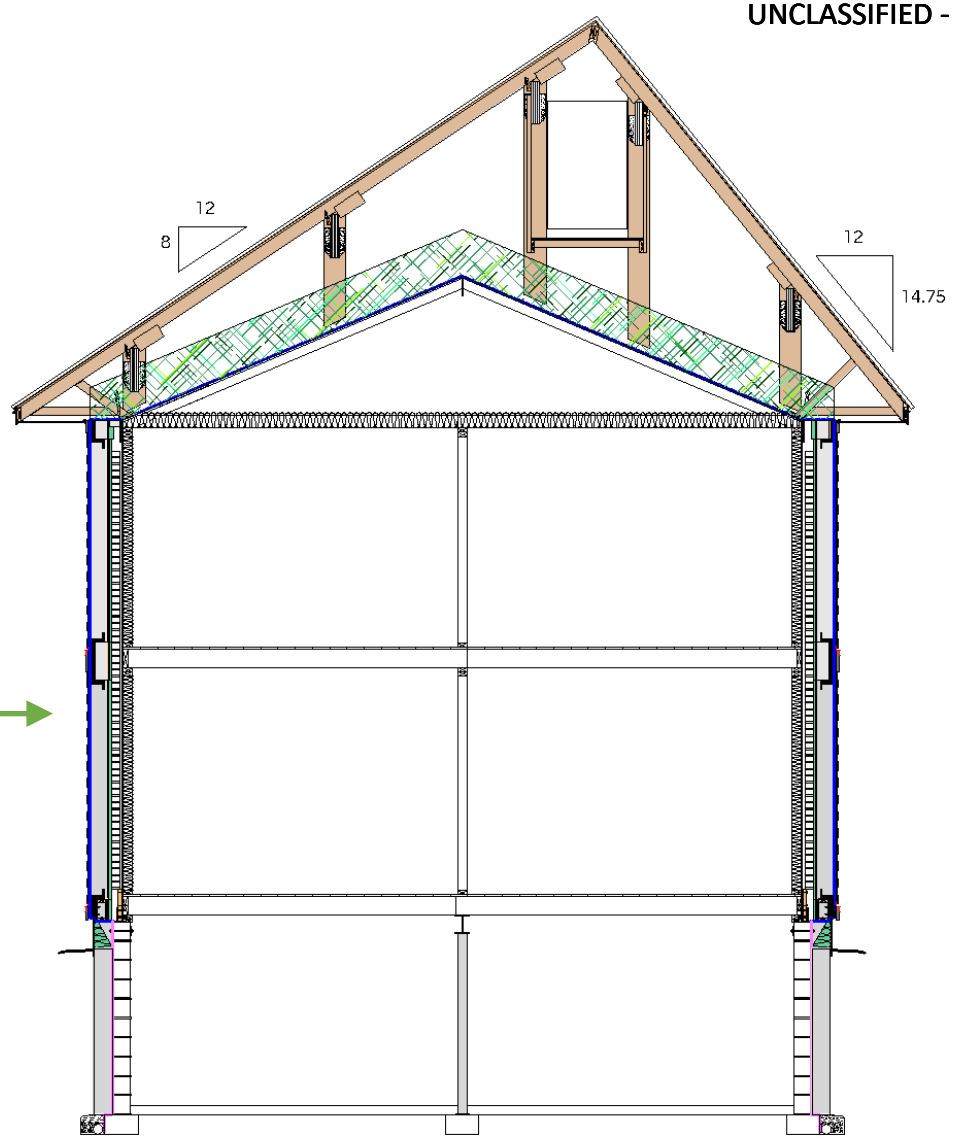


After




12
8
12
14.75

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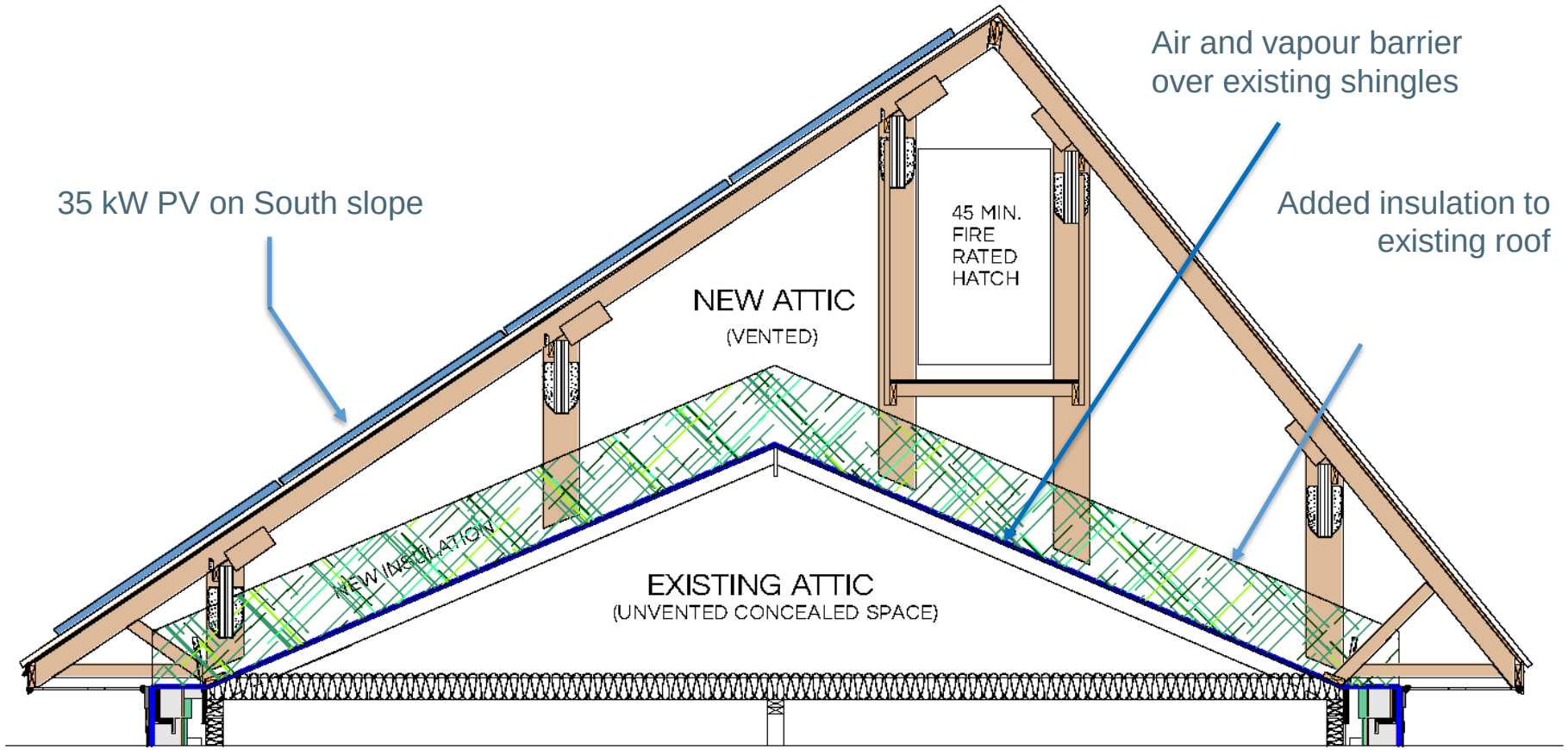

35 kW PV on South slope
Air and vapour barrier over existing shingles
Added insulation to existing roof
45 MIN. FIRE RATED HATCH
NEW ATTIC
(VENTED)
NEW INSULATION
EXISTING ATTIC
(UNVENTED CONCEALED SPACE)

Mechanical Upgrade

Natural Gas

vs.

Heat Pump & ERV

Electrical Upgrade

Type	Manufacturer	Model	Quantity
Module	Canadian Solar Inc.	CS1H-335MS (HiDM)	104
Inverter	SolarEdge Technologies Inc.	SE7600H-US	4

Timelapse Video

Measurement and Verification

Blower Door Test

ENERGUIDE

Rating: 0 gigajoules per year (GJ/year)

Heated floor area: 533.5 m² (5742.5 ft²)

Rated energy intensity: 0.23 GJ/m²/year

Evaluated by: Stephen Magneron

Quality assured by: Homesol Building Solutions Inc.

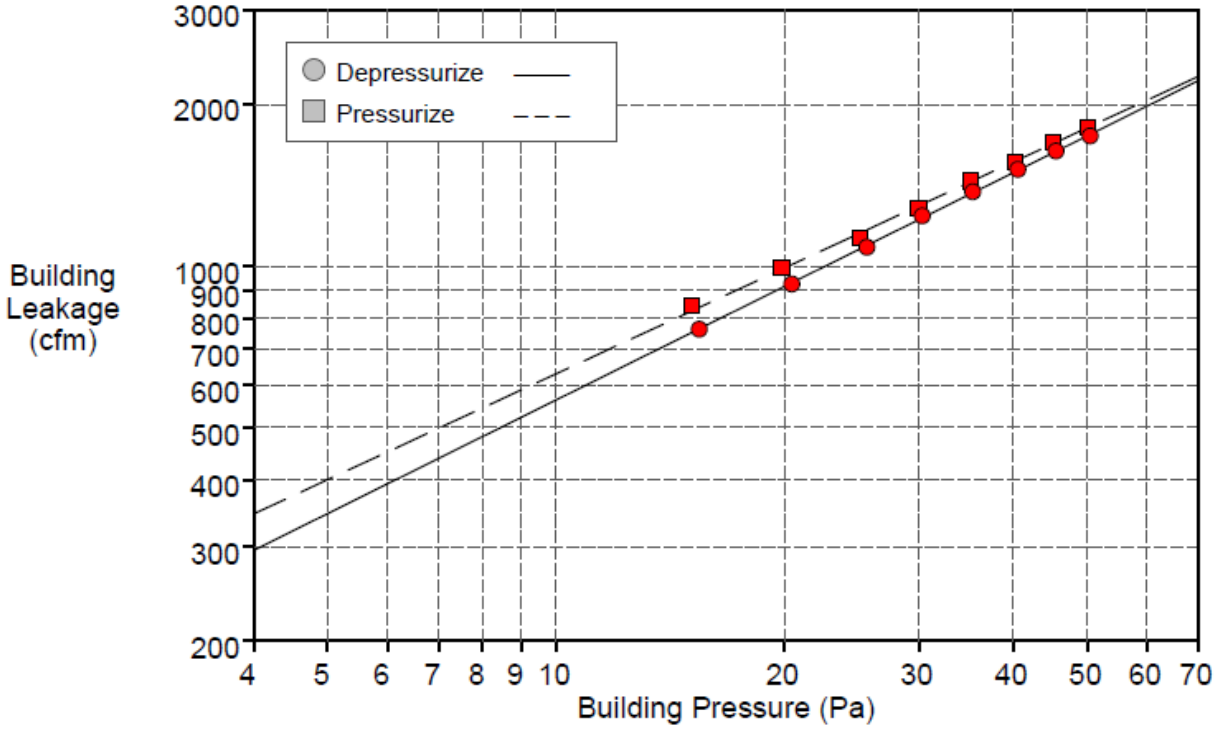
File number: 4G35D00000

Data collected: September 17, 2021

Year built: 1960

NRCan.gc.ca/myenerguide

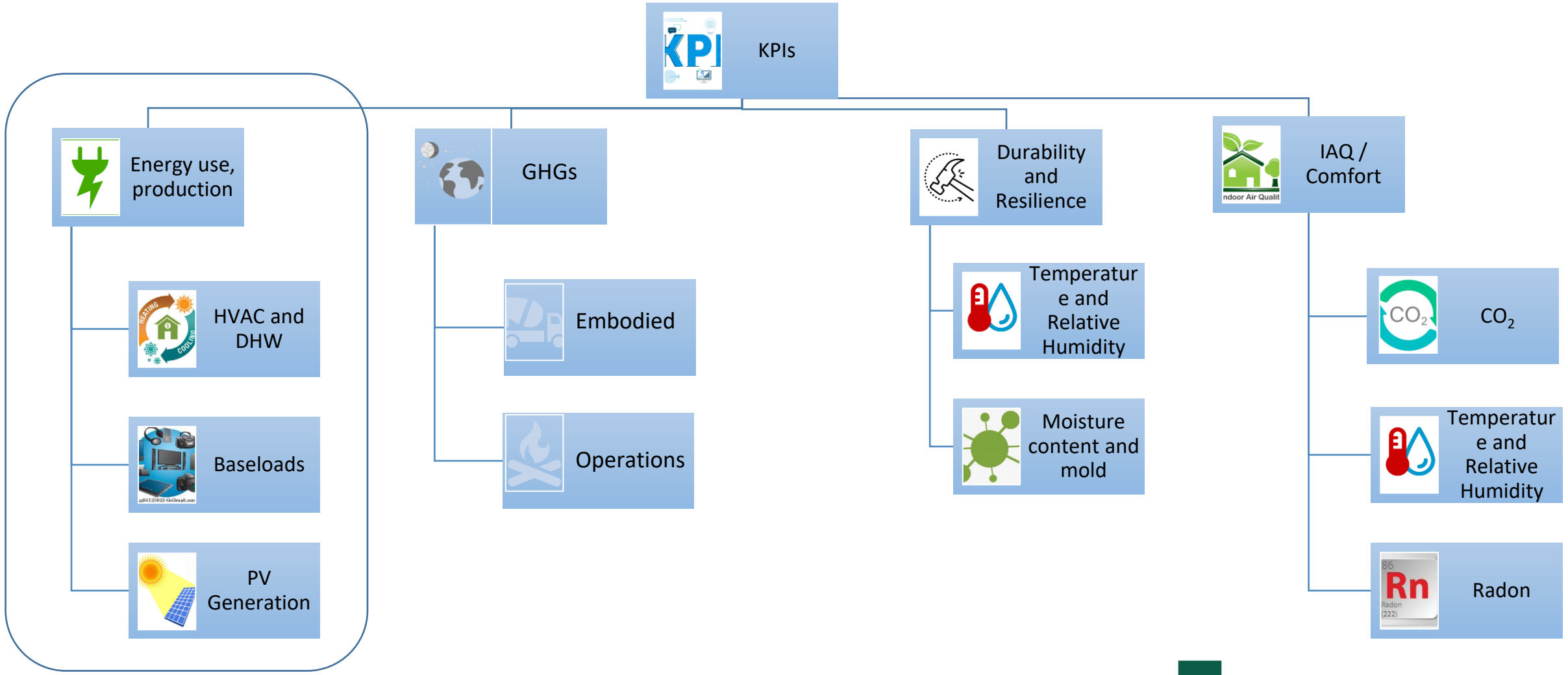
Test Results at 50 Pascals:	Depressurization	Pressurization	Average
cfm (Airflow)	1748 (+/- 0.3 %)	1809 (+/- 0.5 %)	1778
ACH50	2.27	2.35	2.31
cfm/ft² (Surface Area)	0.1950	0.2018	0.1984
Leakage Areas:			
Canadian EqLA @ 10 Pa (in²)	165.5 (+/- 0.9 %)	185.1 (+/- 1.4 %)	175.3
in²/ft² Surface Area	0.0185	0.0206	0.0196
LBL ELA @ 4 Pa (in²)	83.9 (+/- 1.6 %)	98.1 (+/- 2.4 %)	91.0
in²/ft² Surface Area	0.0094	0.0109	0.0101
Building Leakage Curve:			
Flow Coefficient (C)	111.4 (+/- 2.5 %)	139.3 (+/- 3.9 %)	
Exponent (n)	0.704 (+/- 0.007)	0.655 (+/- 0.011)	
Correlation Coefficient	0.99971	0.99917	
Test Standard:	CGSB		
Test Mode:	Depressurization and Pressurization		



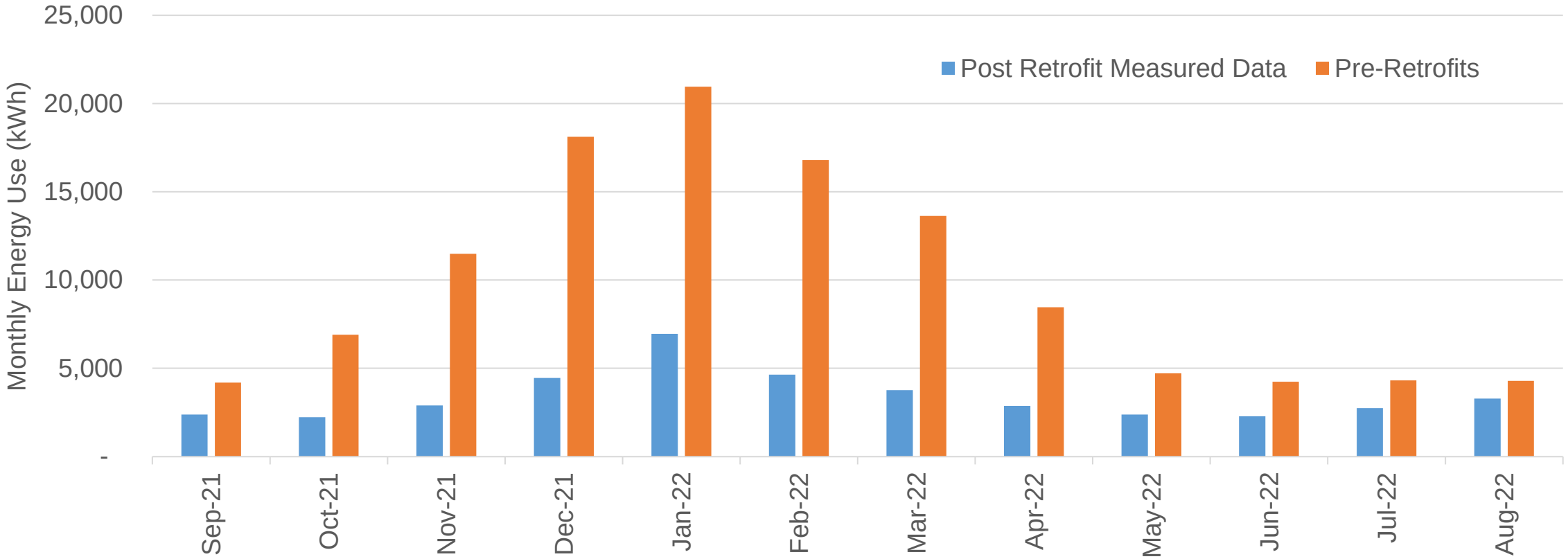
Ressources naturelles Canada

Natural Resources Canada

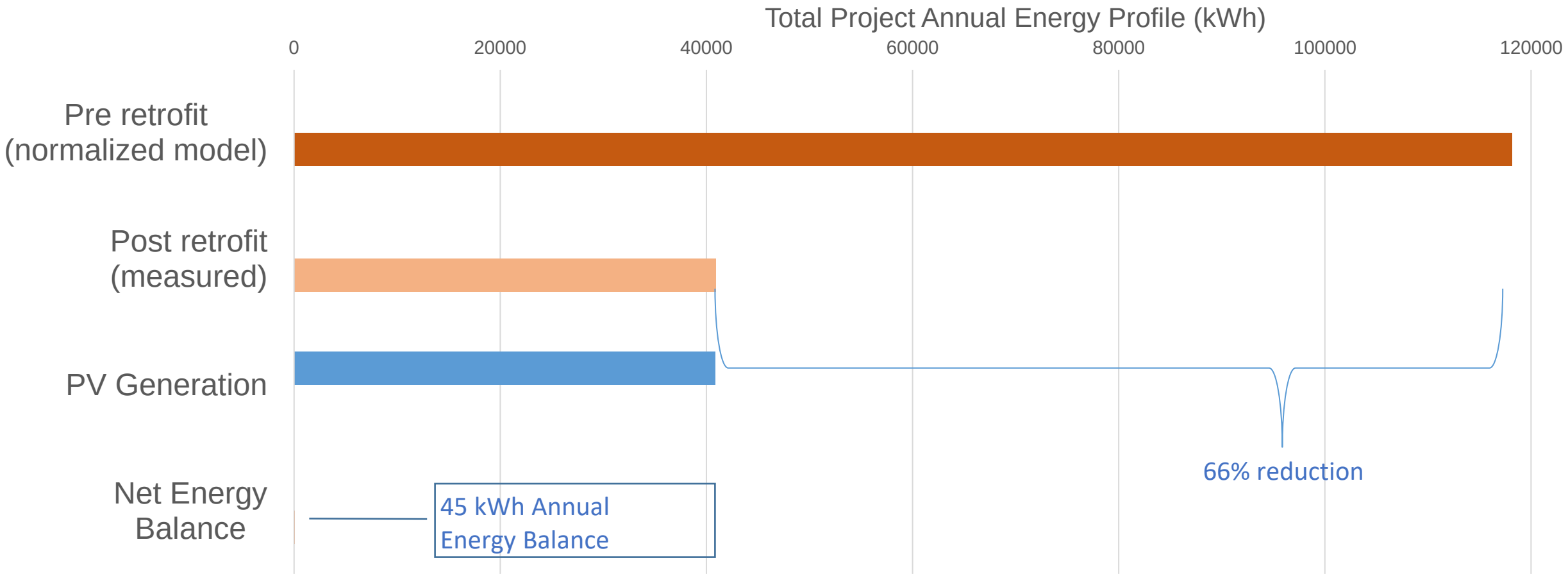
Monitoring Plan: Key Performance Indicators



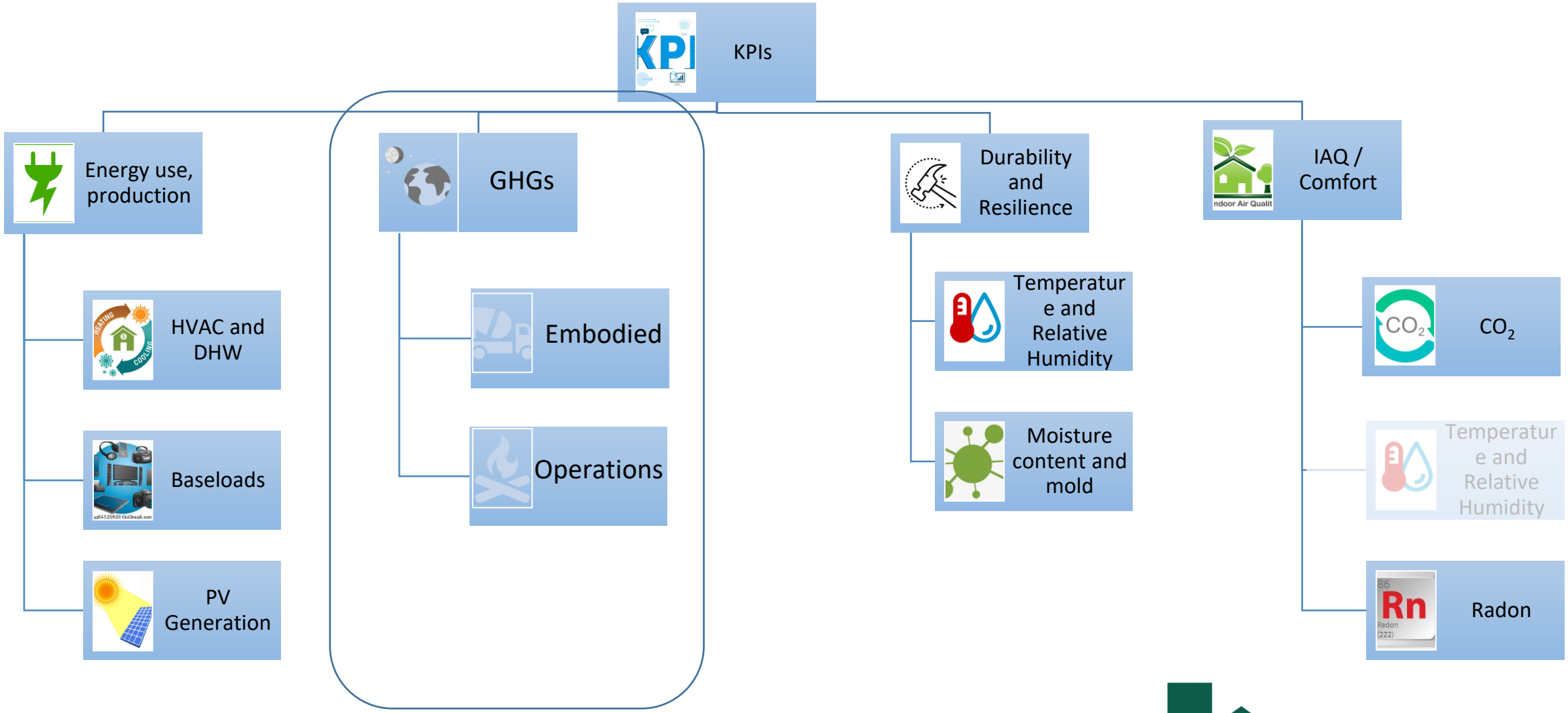
Pre vs. Post Retrofit Energy Performance – Monthly Profile



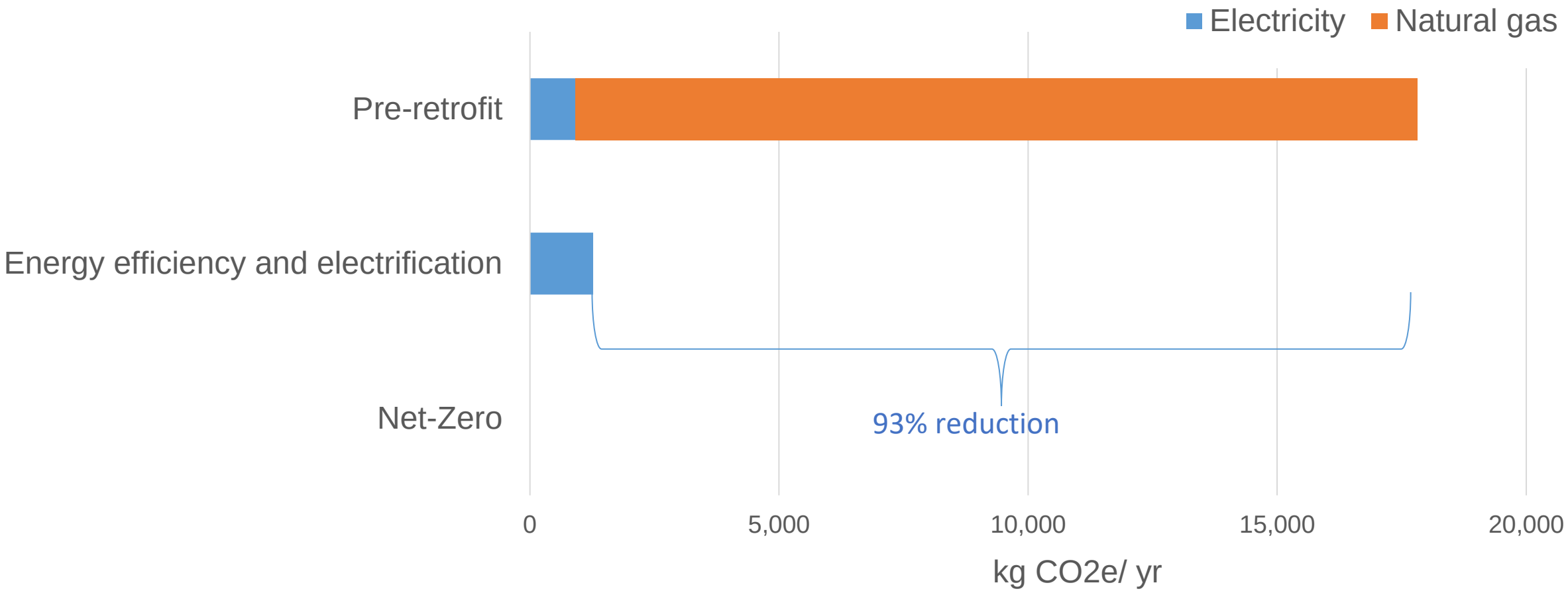
Annual Energy Performance (September 2021 – August 2022)



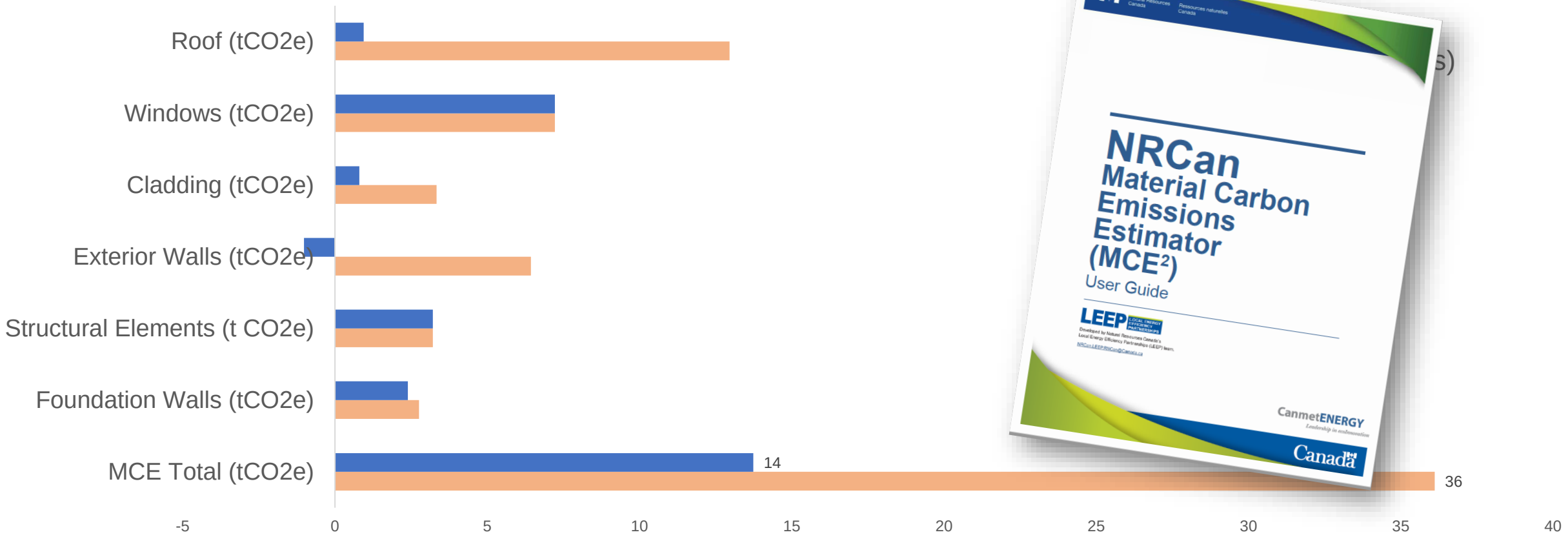
Monitoring Plan: Key Performance Indicators



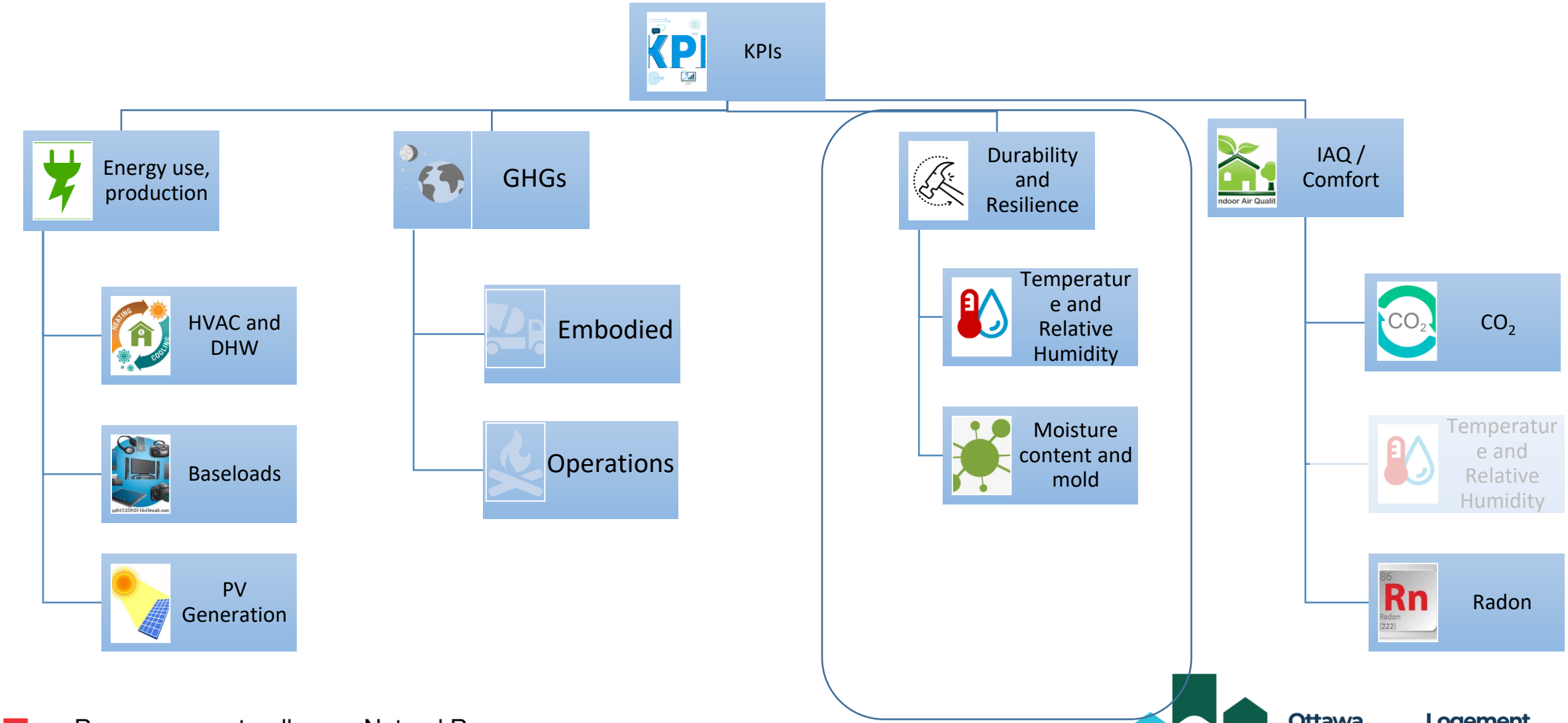
Operating Emissions



Building Enclosure Embodied Emissions (t CO_2e)



Monitoring Plan: Key Performance Indicators



Hygrothermal Monitoring

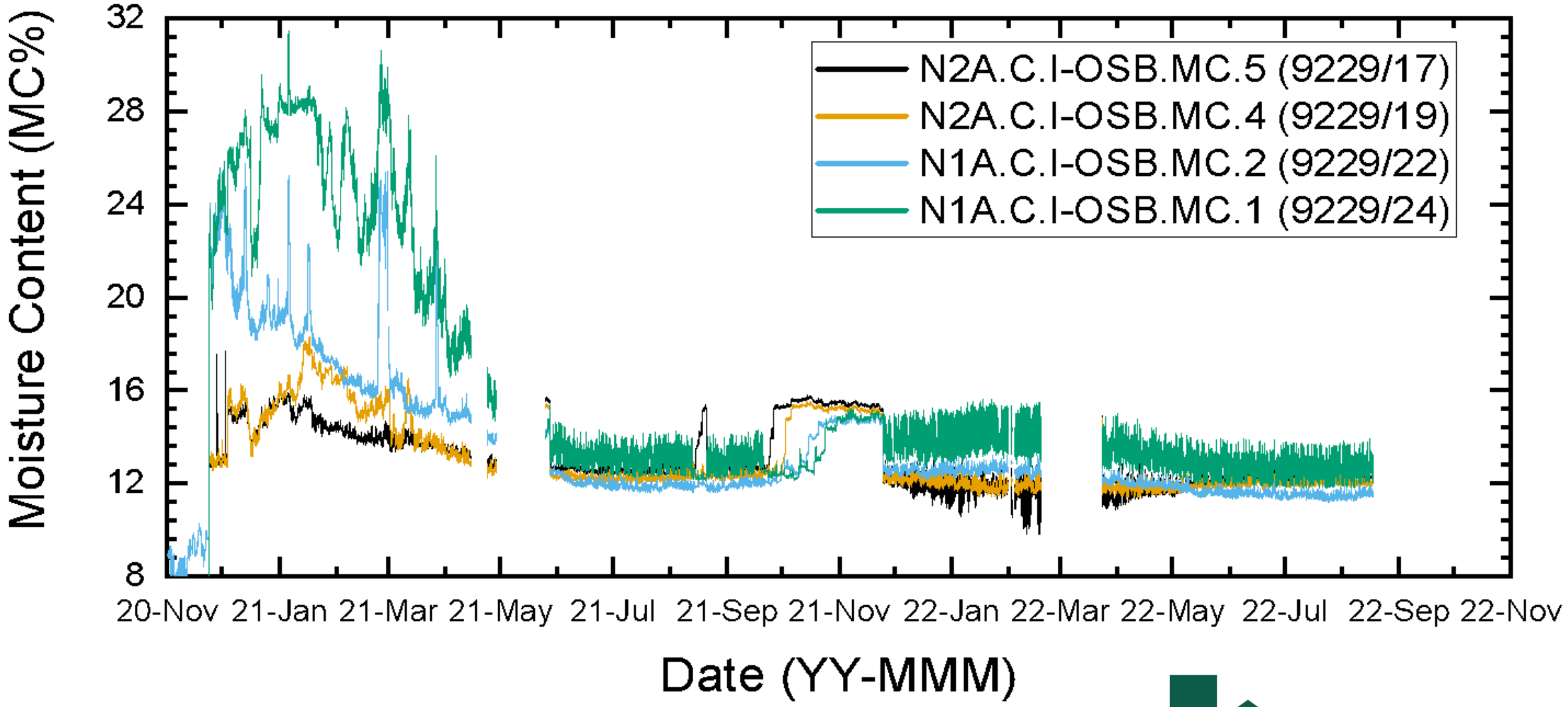
Objectives:

- Assess moisture risk and durability
- Validate models

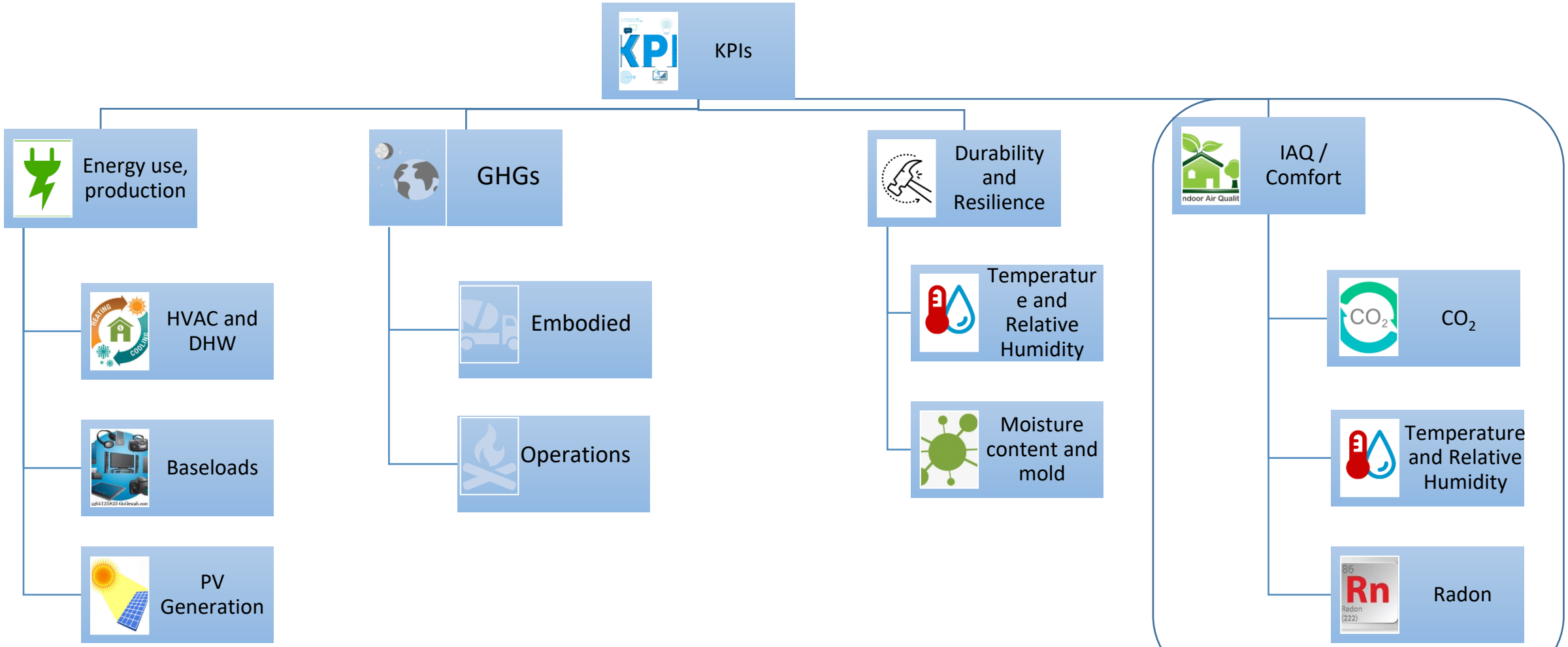
Performance metric:

- Mould growth index at specific surfaces

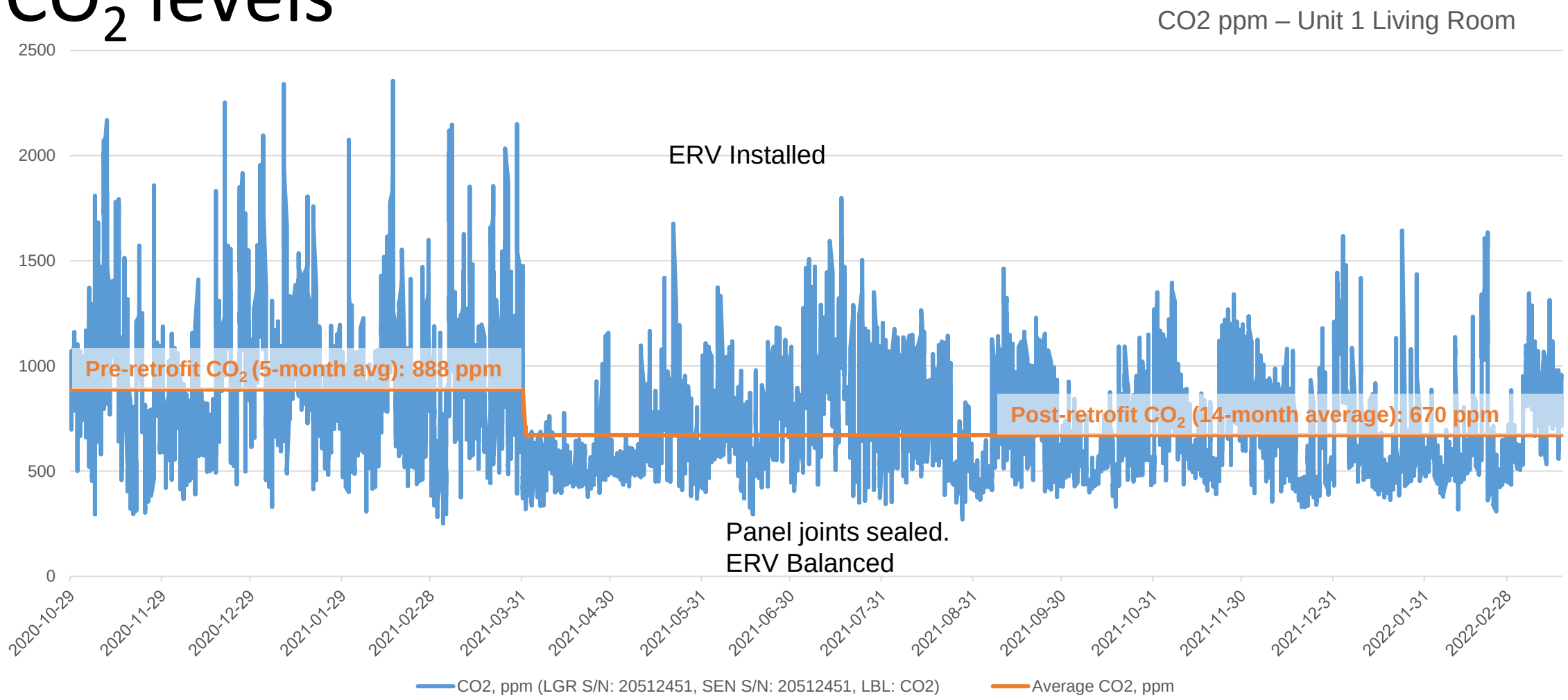
North Wall – Moisture Content @ Inner OSB



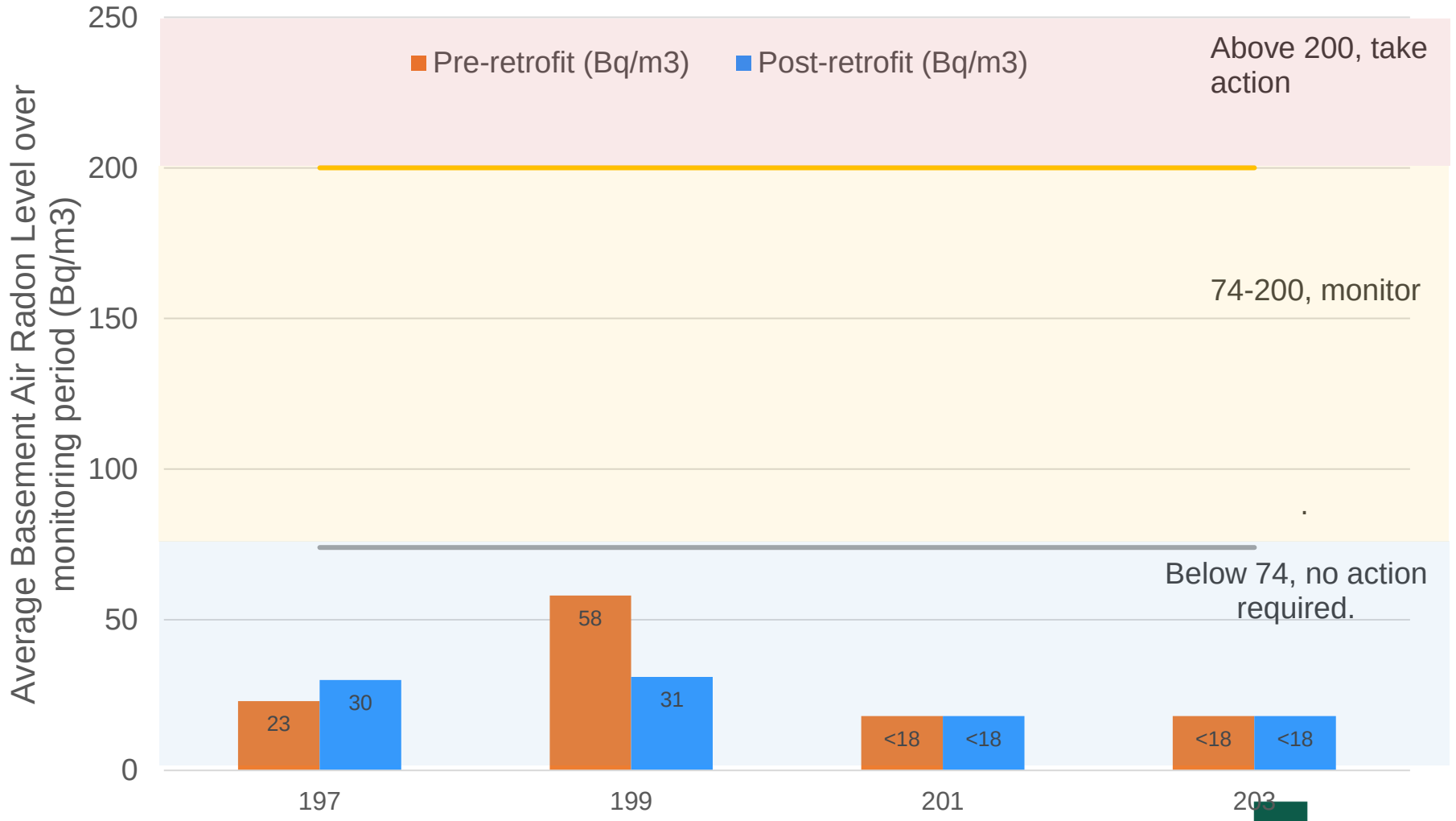
Monitoring Plan: Key Performance Indicators



CO_2 levels

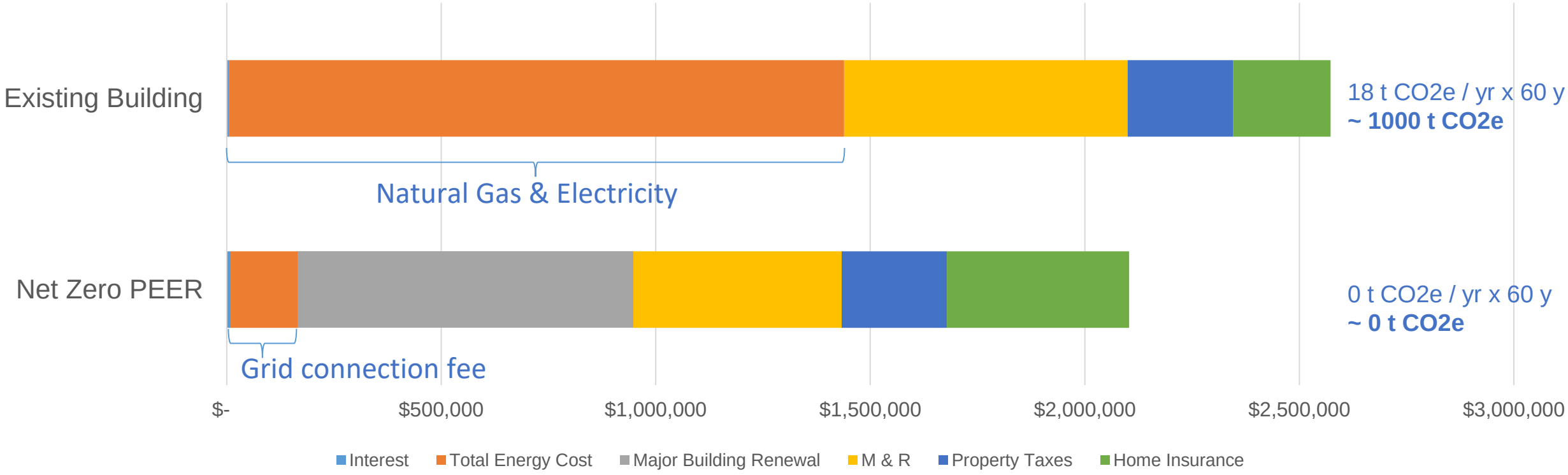

CO2 ppm – Unit 1 Living Room
2500
2000
1500
1000
500
0
ERV Installed
Pre-retrofit CO2 (5-month avg): 888 ppm
Post-retrofit CO2 (14-month average): 670 ppm
Panel joints sealed.
ERV Balanced
2020-10-29
2020-11-29
2020-12-29
2021-01-29
2021-02-28
2021-03-31
2021-04-30
2021-05-31
2021-06-30
2021-07-31
2021-08-31
2021-09-30
2021-10-31
2021-11-30
2021-12-31
2022-01-31
2022-02-28
CO2, ppm (LGR S/N: 20512451, SEN S/N: 20512451, LBL: CO2)
Average CO2, ppm

Radon Levels

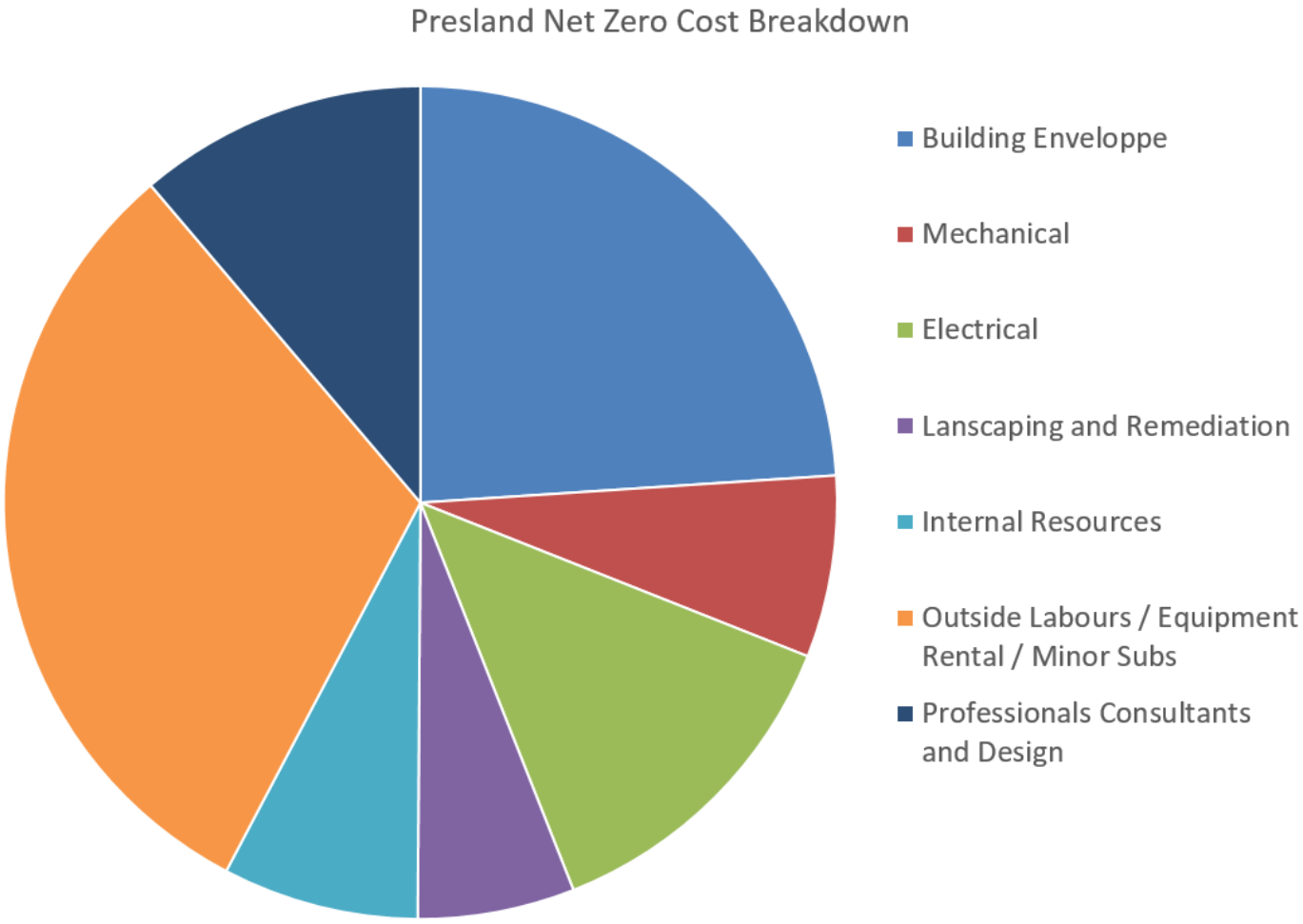


Retrofit Costs and Total Cost of Ownership Analysis

60 year Total Cost of Building Ownership



Financial Monitoring

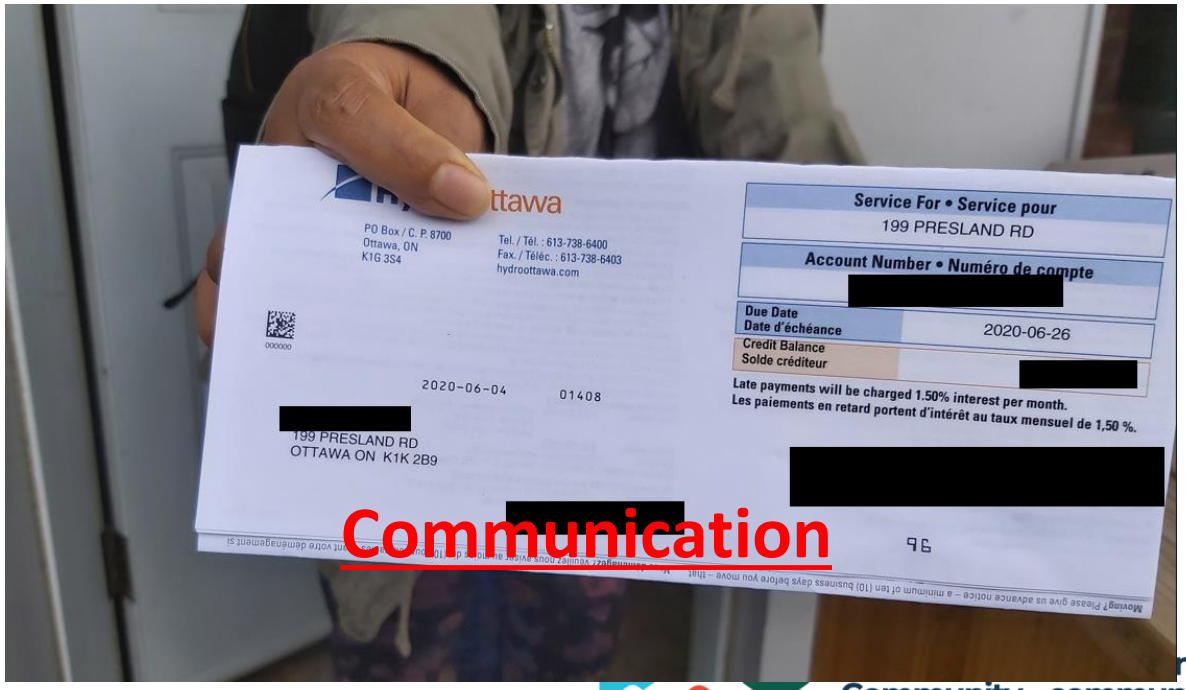


Tenant Logistics


Outages


Access / Egress


Operation


Service For • Service pour
199 PRESLAND RD
Account Number • Numéro de compte
Due Date
Date d'échéance
2020-06-26
Credit Balance
Solde créditeur
Late payments will be charged 1.50% interest per month.
Les paiements en retard portent d'intérêt au taux mensuel de 1,50 %.
199 PRESLAND RD
OTTAWA ON K1K 2B9
Communication

What's Next?

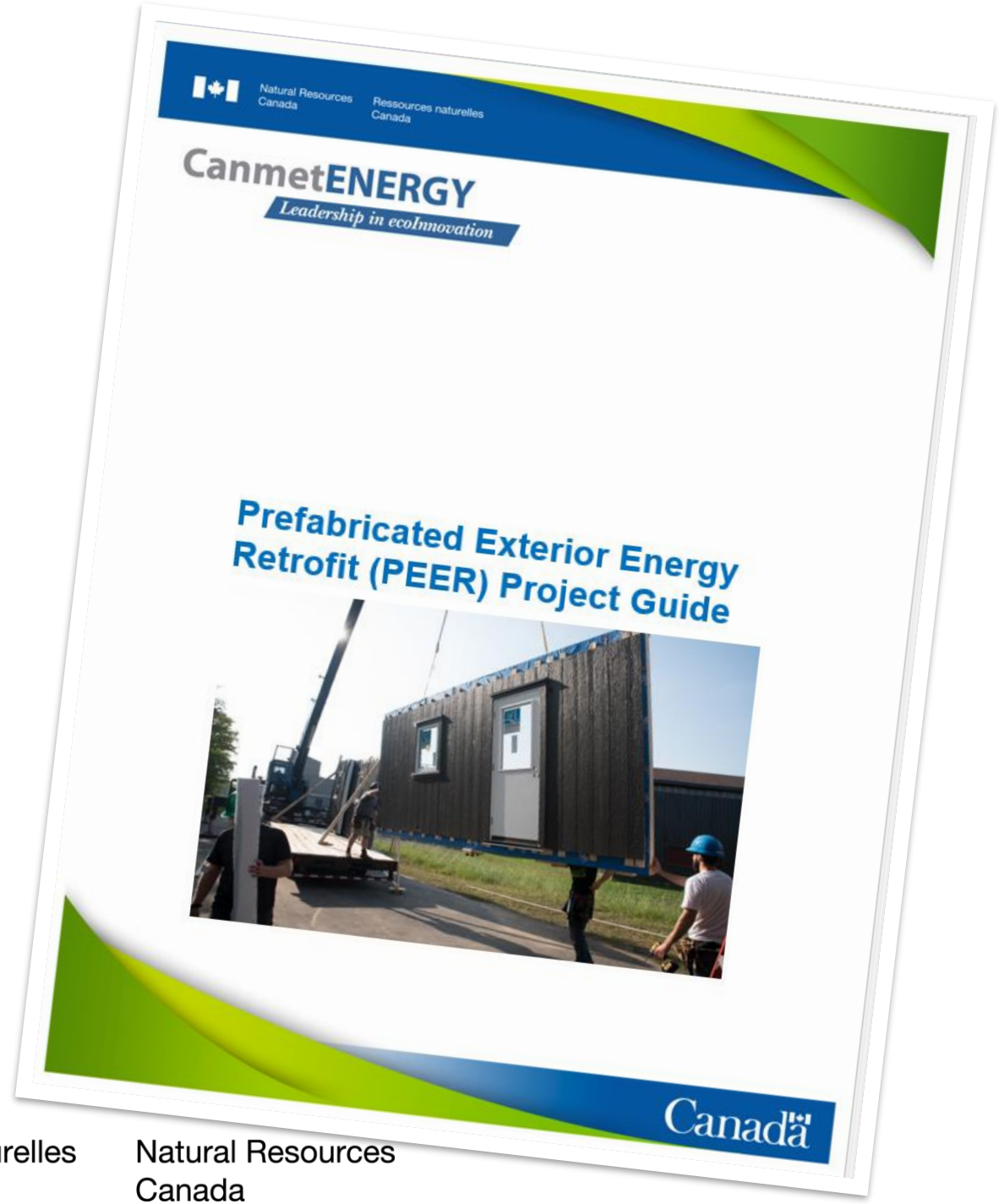
OCH

- Developing strategy to eliminate its 27 kT of CO2 emissions while addressing its capital needs
- Scaling PEER to mid/high rise

NRCan

- PEER Project Guide 2023
- Greener Neighbourhoods Pilot Program 2023

PEER Guide



Covers:

1. Project Selection
2. Design of Panelized Retrofit Systems
3. Hygrothermal Risk Assessment
4. Building Measurement
5. Preparing Documentation
6. Panel Fabrication
7. Installation

Resources

- Material Carbon Emissions Estimator (MCE2)
- PEER M&V protocol
- PEER Guide
- Illustrated Guide for Northern Housing Retrofits

Canadian Federal programs and funding

Natural Resources Canada (NRCan)

- Canada Greener Homes Grant
- Greener Neighbourhoods Pilot Program (GNPP)
- Deep Retrofit Accelerator Initiative (DRAI)

Canadian Mortgage and Housing Corporation (CMHC)

- CMHC National Housing Co-Investment Fund
- Canada Greener Affordable Housing Program

Thanks!

For more info, please visit:

- och-lco.ca/och-eco2-plan/peer-presland-prefabricated-exterior-energy-retrofit/
- nrcan.gc.ca/energy/efficiency/data-research-and-insights-energy-efficiency/housing-innovation/peer-prefabricated-exterior-energy-retrofit/19406

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Special thanks to:
Keith Gagnier, Ottawa Community Housing
Anthony Leaning, CSV Architects
Jeff Armstrong, Cold Climate Building
The Office of Energy Research and Development's EIP, PERD and GI funding.