Canadian Home Builders Association

Net Zero Home Labelling Program

About Myself

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  - Net Zero Project Manager with NRG Inspections and Consulting
  - B.Sc. in Environmental Engineering
  - Energy Manager in Training certified by the Association of Energy Engineers
  - Registered Energy Advisor (EA) with Natural Resources Canada
    - Quality Assurance Specialist
    - Energy Star for New Homes
  - IDP facilitator
  - Member of the Saskatchewan Building Officials Association

Acknowledgements

- Some of the information in this presentation originates from the Canadian Home Builders Association (CHBA)

Background

- **Every building on the planet must be ‘net zero carbon’ by 2050 to keep global warming below 2°C**

https://worldgbc.org/article/every-building-on-the-planet-must-be-net-zero-carbon-by-2050-to-keep-global-warming-below-2c-new-report/

Background

- “To achieve universal net zero carbon in the building sector by 2050, renovation rates must increase by 3 per cent every year starting in 2017 and must accelerate for every year of delay”
  - - WGBC

Background - Regulation

- Canada has introduced regulations that will require all newly constructed homes to be Net Zero Ready starting in 2030

What is the Net Zero Home Labelling Program

- Initiative led by the CHBA to build and renovate homes to meet better than energy code requirements and produce as much energy onsite as they use
- NRCan Funded
- Requirements to make homes more comfortable and healthier than a standard home
- Started in 2015 for new homes, pilot program from 2015-16
- Pilot for renovations in 2020, launched in 2021

netzero readyhome
The ultimate in comfort and efficiency

Net Zero vs Net Zero Ready

- A Net Zero certified home is designed, modelled and constructed to produce as much energy (from on-site renewable energy sources) as it consumes on an annual basis.

- A Net Zero Ready home is a Net Zero Home that has a renewable energy system designed for it that will allow it to achieve Net Zero Home performance, but the renewable energy system is not yet installed.

-Canadian Home Builders Association

Some Key Technical Requirements

- Modelled (not as operated) net energy consumption of **0 GJ/year** -using assumptions for occupant consumption
- Minimum 33% more efficient envelope than the reference house*
- Improved airtightness-field validated by testing (max. 1.5 ACH for detached, 2.0 ACH for attached)
- Cooling load threshold is calculated and included in modelling
- The energy produced is a) generated on-site and b) renewable
- Net Zero/Ready Homes are fuel agnostic (any combination of fuels)

Who Builds Net Zero Homes

- To be a Net Zero builder or renovator, a business must be a member of a local HBA chapter. This requires that they:
  - Be a Certified Professional Home Builder and take required safety courses.
  - Be a member in good standing with an approved New Home Warranty Program and enroll eligible homes in that program.

  - Renovators must be RenoMark certified
    - Return client messages within 2 days
    - Carry $2 million in liability insurance
    - Provide a detailed contract for each project
    - Offer one-year warranty on all work

Who Builds Net Zero Homes

- Builders and renovators who are net zero certified must take an advanced building science course, a NZ builder/renovator course and pass exams showing understanding
- Sign attestation that their homes meet all technical requirements that are not visually verified by an EA
- A list of NZ renovators and builders can be found here

Net Zero Process and Requirements

Integrated Design Process

- The Integrated Design Process (IDP)
  - Collaborative planning between all parties involved in the design and construction
  - IDP encourages communication between all trades and professions,
  - Helps resolve issues in the early stages

Integrated Design Process

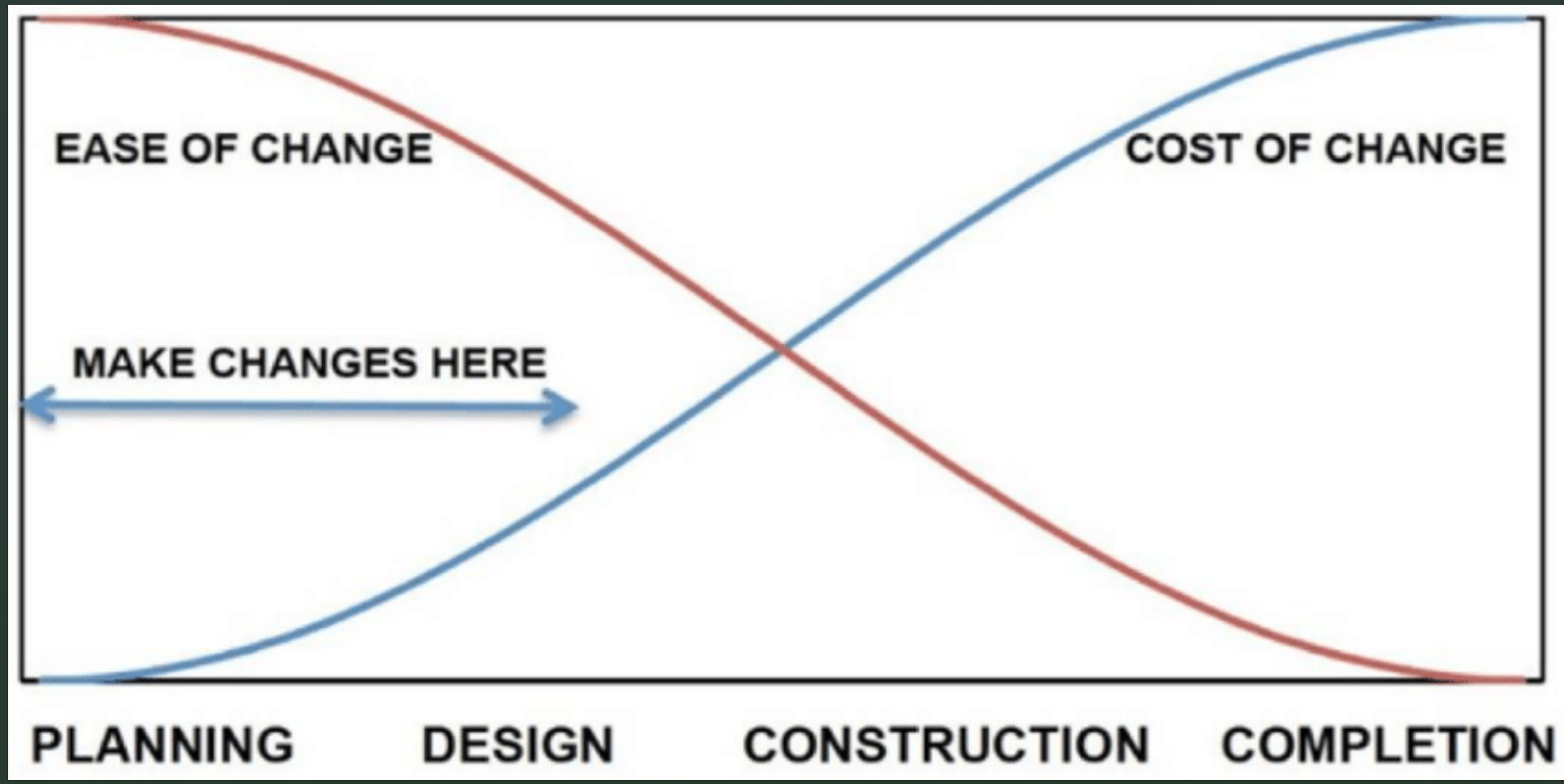


Image: Construction Productivity - Robert Prieto Strategic Program Management LLC

IDP


INTEGRATED DESIGN PROCESS (IDP)
PLANNING STAGE (BEFORE PROJECT STARTS)
EXECUTION STAGE
IDEA
DISCOVERY
BENCHMARKING & OPTIMIZATION
CHARRETTE
DECISIONS MADE
Purpose:
Identify project vision and next steps.
Identify current state.
Target project information.
Identify the Benchmark and Optimization tasks.
Design the Charrette agenda, topics, participants.
Iterative energy modelling.
Application of other diagnostic tools e.g. costing, embodied carbon.
Renewable energy assessment.
Identify potential synergies.
Explore how construction practices might change.
An established process that is efficient, repeatable, effective and trackable.
Engages new conversations and information related to equipment, building approaches, innovative, collaborative and pro-active thinking and approaches.
Broader understanding of the building/renovation process and plan.
Shared expertise, project understanding and buy-in.
Take advantage of IDP process to ensure a more efficient, cost-effective and satisfying end product.
Additional modelling, benchmarking and optimization may occur.
Who:
IDP facilitator, client, contractor/builder
Energy Advisor (EA) (may not be IDP facilitator)
IDP facilitator; homeowner; contractor/builder; architect/designer; EA; HVAC; windows; insulation; PV; others identified in the Discovery Phase
Some may NOT be contracted for the project. Their attendance is to provide education/ information only.
Final report produced by the IDP facilitator
Natural Resources Canada
Ressources naturelles Canada
Canada

CSA F280-12 Residential Heat Loss Heat Gain

- Room by room heat loss/heat gain calculation
- Provides an estimate of how much heating/cooling each room needs
- Mandatory in BC, used to show that a house has a refuge room

Indoor Air Quality

- Need to satisfy:
- Mandatory requirements such as no unvented fuel fired equipment, low outside air infiltration, minimum MERV 8 air filtration, low to no VOC emitting paint
- Six additional points from a list of such measures as:
  - No carpet or certified Green Label carpet
  - Low-VOC gypsum and hard flooring
  - No gas ranges
  - Taping registers during construction or cleaning ducts
  - Constant IAQ monitoring for VOC, PM, formaldehyde connected to smart ventilation controls

Minimum Requirements for Opaque Assemblies

- Overall, similar to current energy codes
  - Modelling must show 33% better envelope than a house built to code
- Requirement for at least R-5 below basement slab, not required by code here

Measuring Embodied Carbon

- Calculator from NRCan called MCE2 (Material Carbon Emissions Estimator)
- Allows for some helpful comparisons

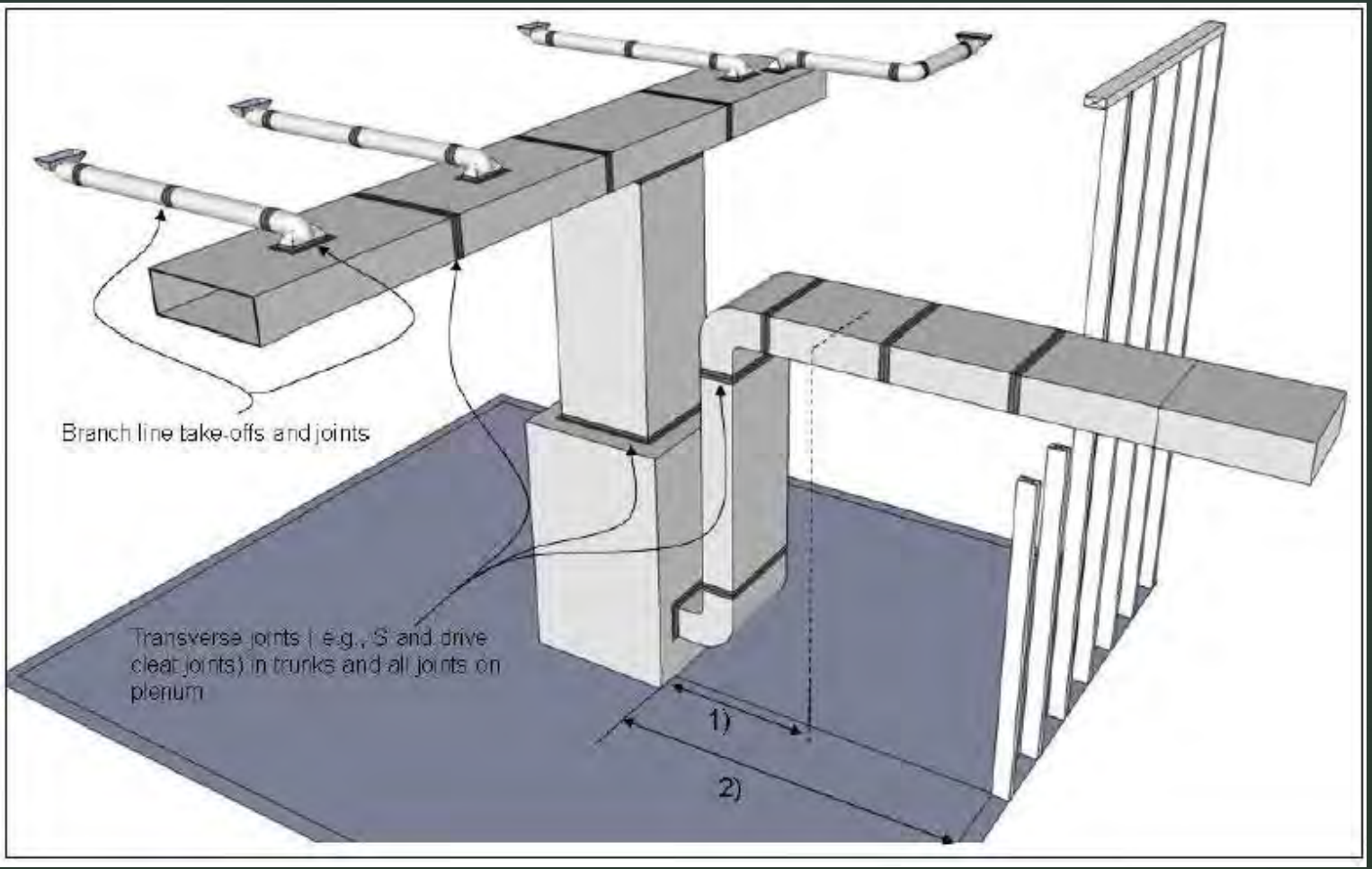
CATEGORY	MATERIAL	QUANTITY	%	SELECT	NET $kgCO_2e$ EMISSIONS	MATERIAL $kgCO_2e$ CONTENT
XPS FOAM BOARD		R-VALUE: 5				
	XPS foam board - AVERAGE	115.1 m2	100%	1	497	497
POLYISOCYANURATE FOAM BOARD		R-VALUE: 5				
	Polyisocyanurate - AVERAGE	115.1 m2	100%	1	374	374
EPS FOAM BOARD		R-VALUE: 5				
	EPS foam board - AVERAGE	115.1 m2	100%	1	331	331
FIBERGLASS BATT		R-VALUE: 5				
	Fiberglass batt - AVERAGE	115.1 m2	100%	1	68	68
CELLULOSE INSULATION		R-VALUE: 5				
	Cellulose - AVERAGE	115.1 m2	100%	1	-203	-203

Duct Sealing

	Factory-designed efficiency	Actual efficiency with unsealed ducts			
		2% or less (SEALED)	10% leakage	20% leakage	30% leakage
A/C and Heat Pumps	24 SEER	23.3	20.3	16.6	12.9
	22 SEER	21.3	18.6	15.2	11.9
	20 SEER	19.4	16.9	13.9	10.8
	18 SEER	17.5	15.2	12.5	9.7
	16 SEER	15.5	13.5	11.1	8.6
	14 SEER	13.6	11.9	9.7	7.6
Furnaces	95% AFUE	93	85	76	67
	90% AFUE	88	81	72	63
	80% AFUE	78	72	64	56

Source: Comfort Institute. Based on Department of Energy Research and FL Energy Office Research Report: FSEC-CR-397-91 Degradation above is typical. Impact is up to 50% greater on AC performance if return air leakage is from a hot attic or attached garage. Impact is typically 50% to 100% greater on winter heating performance of a heat pump with electric resistance auxiliary heat.

Duct Sealing



For NZ Renovations, only ducts that are visible are required to be sealed

Source: Energy Star for New Homes Standard

Energy Monitoring

- Homeowner is still the number one determinate of energy use
- Real-time energy monitors can help occupants better understand where their electricity is being used in order to reduce it

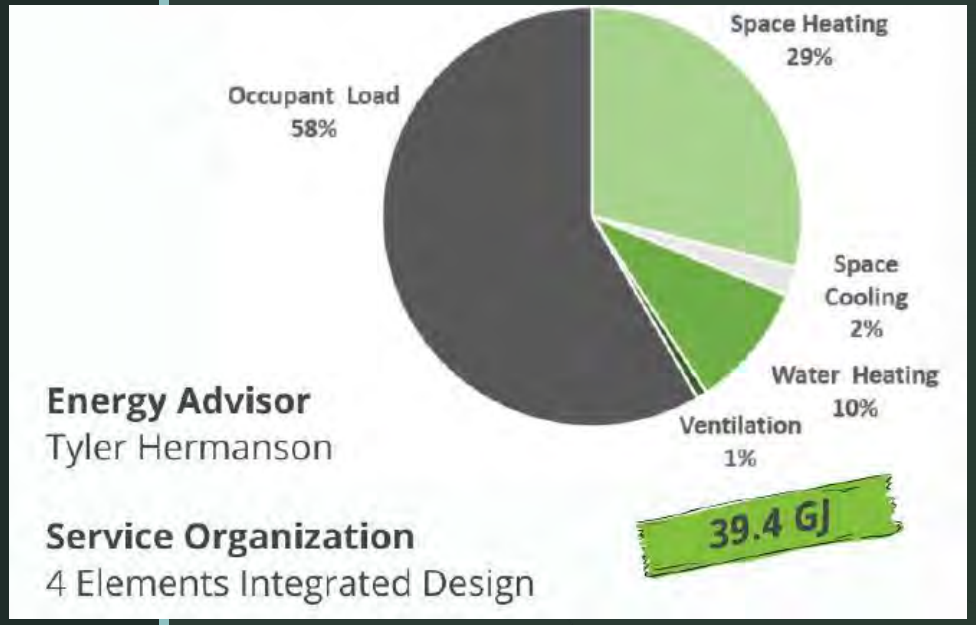
Net Zero So Far

Net Zero in Saskatoon

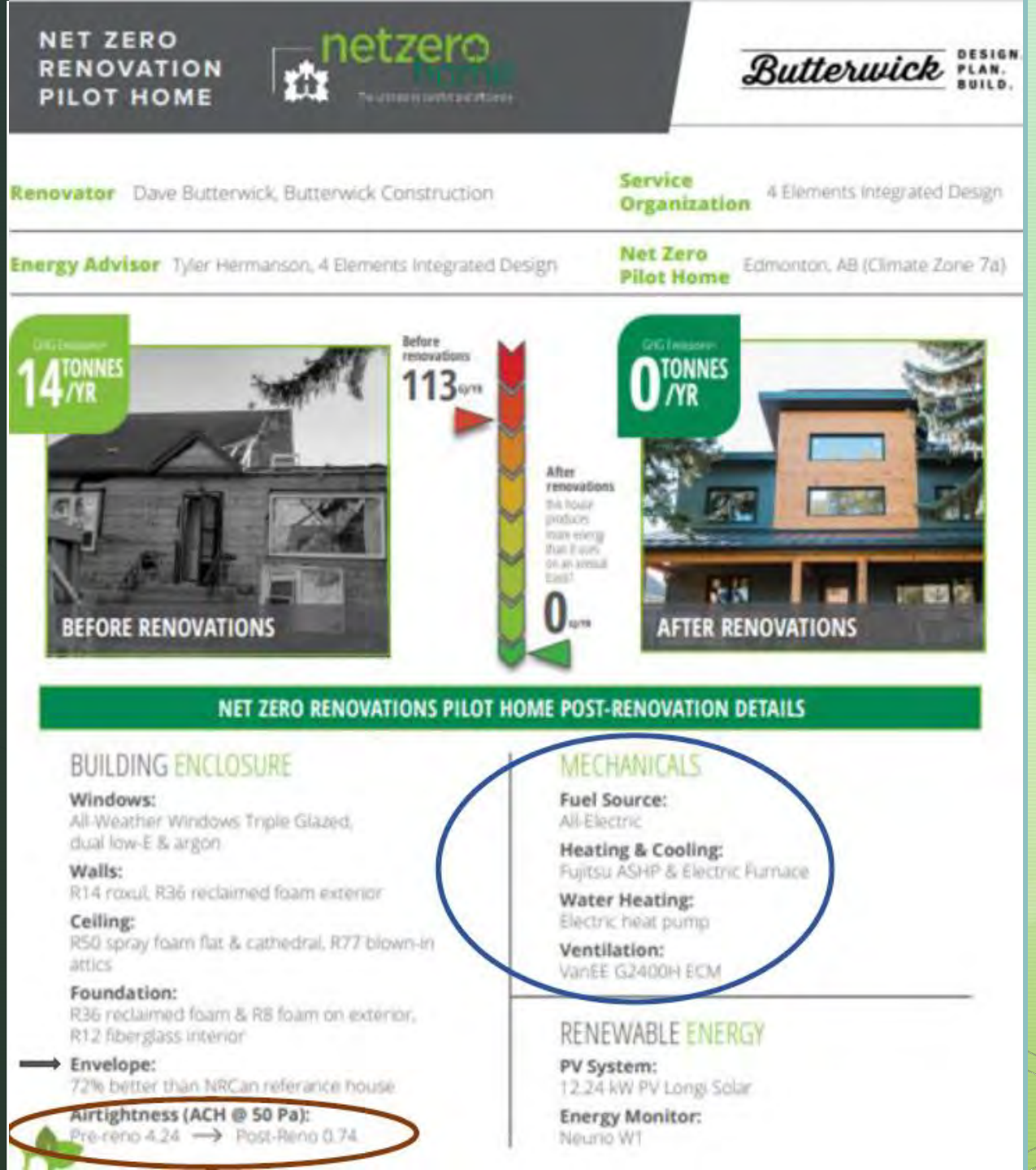
- First multi unit residential building in Canada to receive a Net Zero Ready label

Net Zero in Saskatoon

- Hospital home lottery 2025 Net Zero Ready home



Net Zero Renovation Pilot Home



Net Zero So Far

CHBA NET ZERO HOME LABELLING PROGRAM

HOMES LABELLED ACROSS CANADA: 2,318

Last Updated: December 6, 2024

Detached:	Attached:	MURB Units: (within 10 buildings)	Renovation:
			
1,454	745	108	11

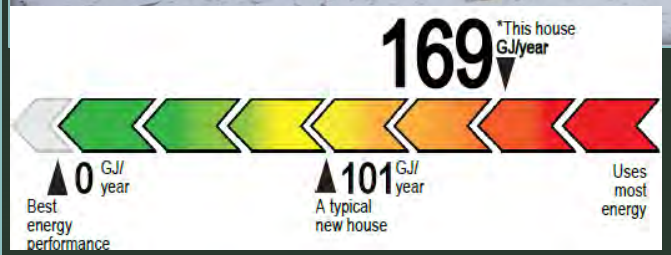
https://www.chba.ca/about-the-net-zero-home-labelling-program/

Towards Net Zero Renovations

- Initiative to encourage more NZ Renovations by starting with a Deep Energy Retrofit
- Fees for advising from professionals for design and analysis is funded by the CHBA and NRC
- List of minimum requirements option without a label

City of Saskatoon

- The City of Saskatoon has a Net Zero program through their Home Energy Loan Program (HELP)
  - Provides a maximum loan of up to $60,000, and a $10,000 rebate to approved HELP participants who perform a Net Zero home renovation that meets the CHBA requirements
  - Recently opened to Towards Net Zero qualifying homes



Holliston Renovation

- Plan to:
  - Add R20 to exterior with continuous air barrier
  - Add 2” spray foam + R60 cellulose in attic
  - Replace mid efficient furnace with 97% efficient with cold climate air source heat pump
  - Replace naturally aspirating DHW with on demand
  - Mechanically ventilate through ERV

Holliston Renovation

- Modelled 53% energy reduction
- Limited by a newly renovated basement and budget
- Driven by homeowners unhappy with the uneven temperatures in their home and expensive heating and cooling bills

Deep Energy Retrofits

- Net Zero requirements are stringent but need only be a goal to strive for
- Net Zero housing in the masses starts with deep energy retrofits
- The NZ program is working to remove roadblocks for more of these to happen
- To reach climate change mitigation goals, we must do a lot but not everything perfect

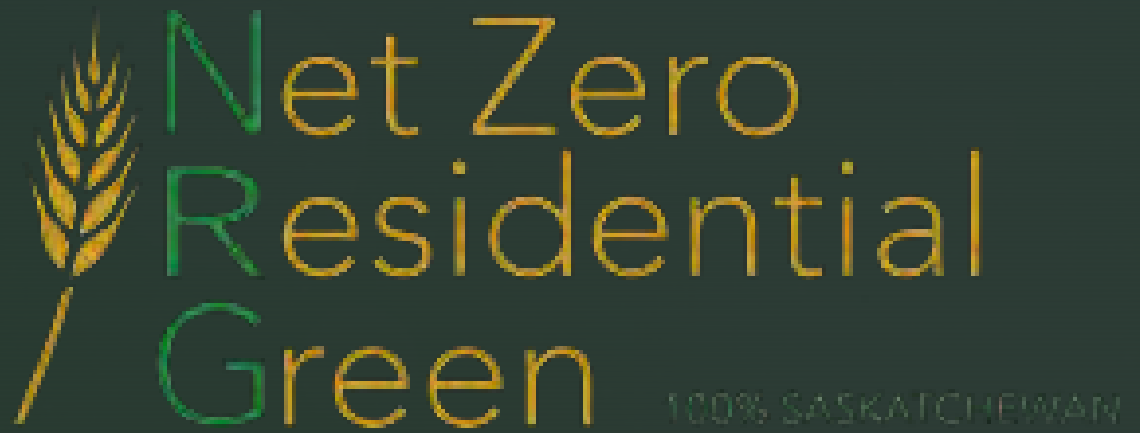
Doing Retrofits Right

- Building science needs to be at the forefront
- When houses are made more airtight, mechanical ventilation needs to be considered
- Care needs to be taken not to create moisture problems

Conclusion

- The sooner we get cost effective at building Net Zero homes the better
- Net Zero Renovations are beneficial to occupant health, the environment, and can significantly increase property value
- Any deep energy retrofit need to be planned

- Consider encouraging anyone you know building or renovating a home to consider Net Zero
- Incorporate some of these aspects into your own home!



- Thank you for the invitation to speak today