Aiming for the Highest Steps

Step Code in New Westminster

ENERGY STEPCODE
BUILDING BEYOND THE STANDARD

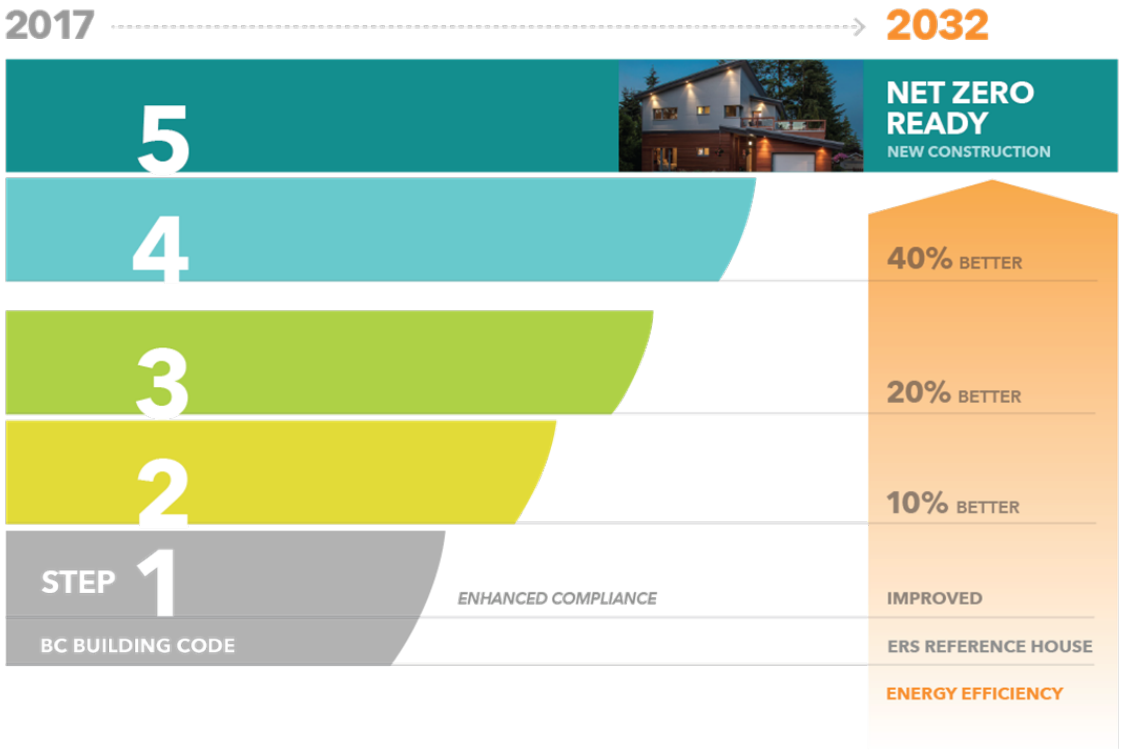
CACEA

TOTAL HOME SOLUTIONS INC.

Gilles Lesage

- Master Energy Advisor (MEA)
- Service Organization/Training/Education
- Step code committees local and provincial
- CHBA Net Zero registered
- Founding Member Canadian Association of Consulting Energy Advisors
- Technical Liaison Director CACEA
- Board Member MHABC

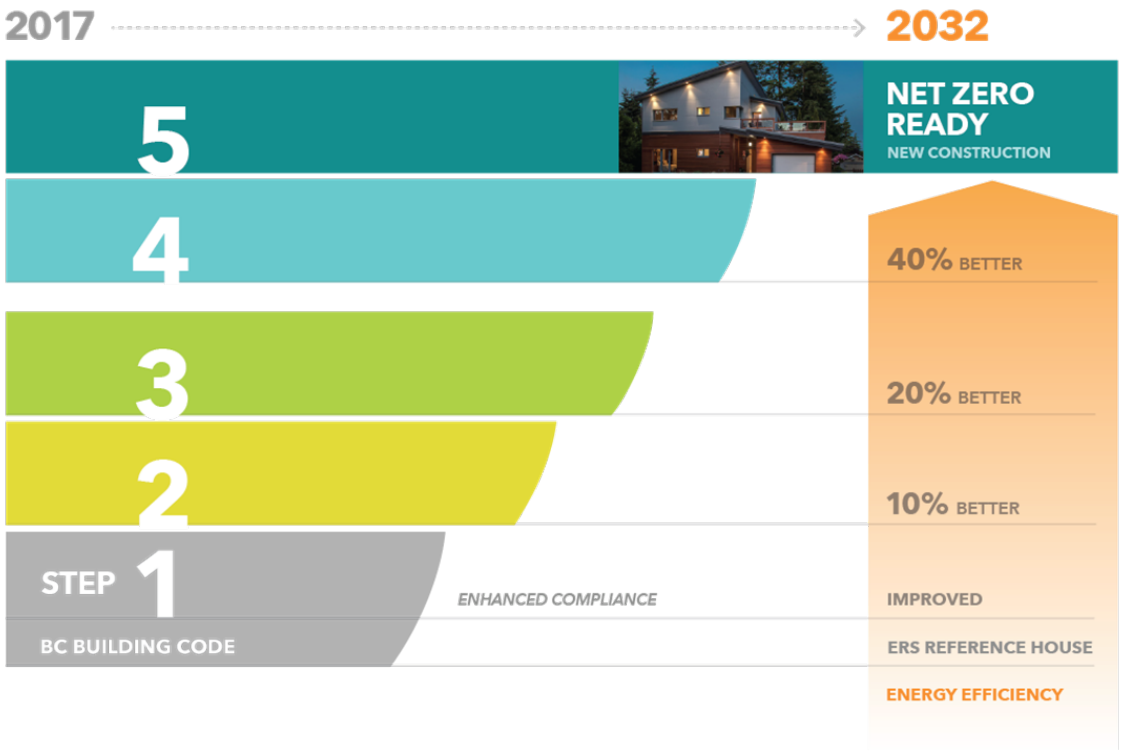
BC Energy Step Code – New Westminster



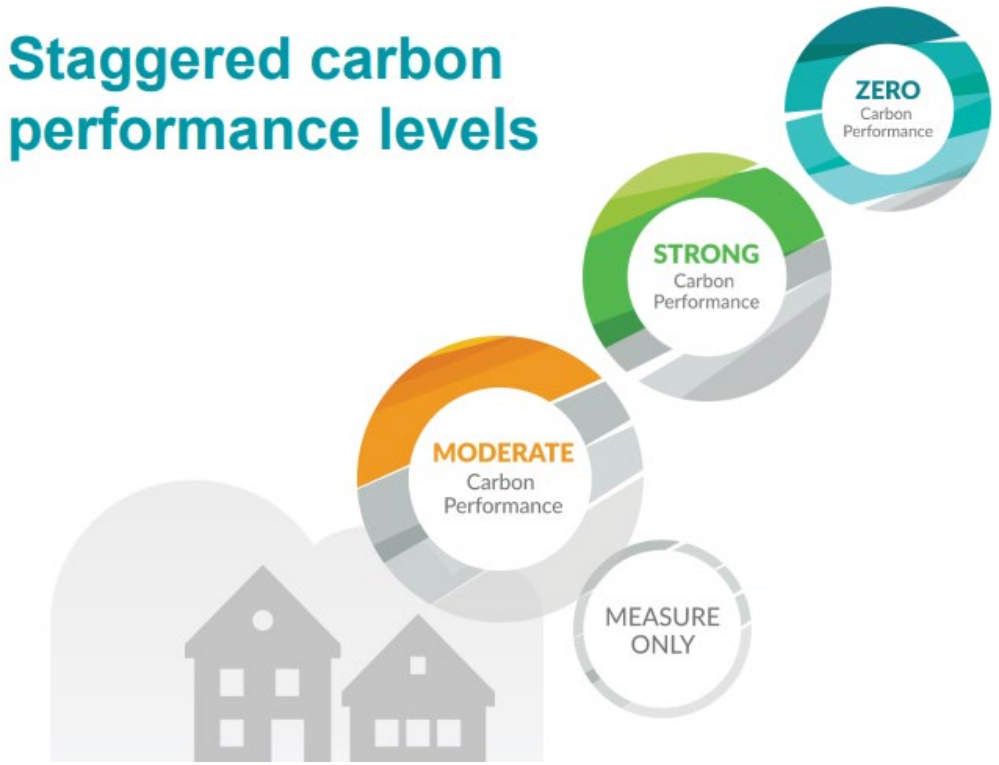
Introduction of Code Changes January 1 2025

1. 2 options available
    1. Step 5 – EL 2
    2. Step 4 – EL 4

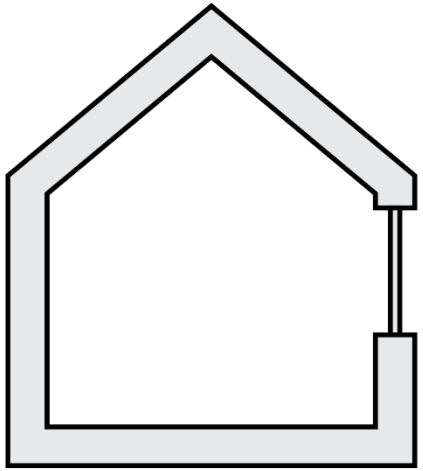
BC Energy Step Code – New Westminster



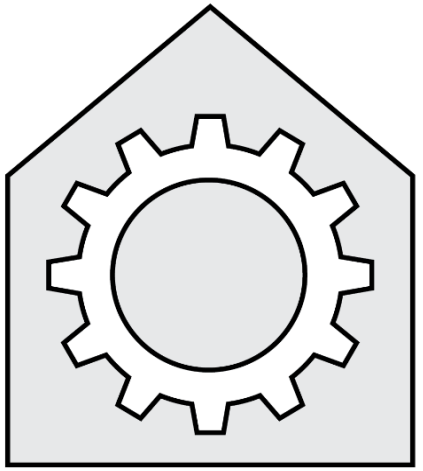
2030



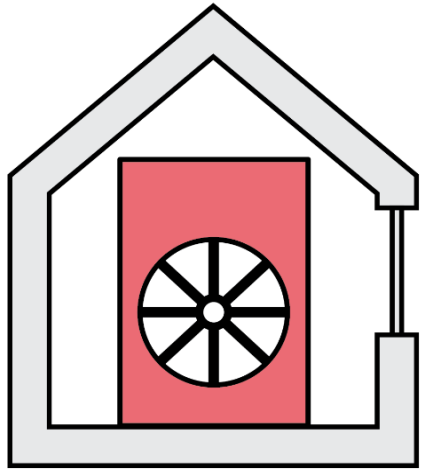
The Performance Based Metrics – Part 9



Envelope

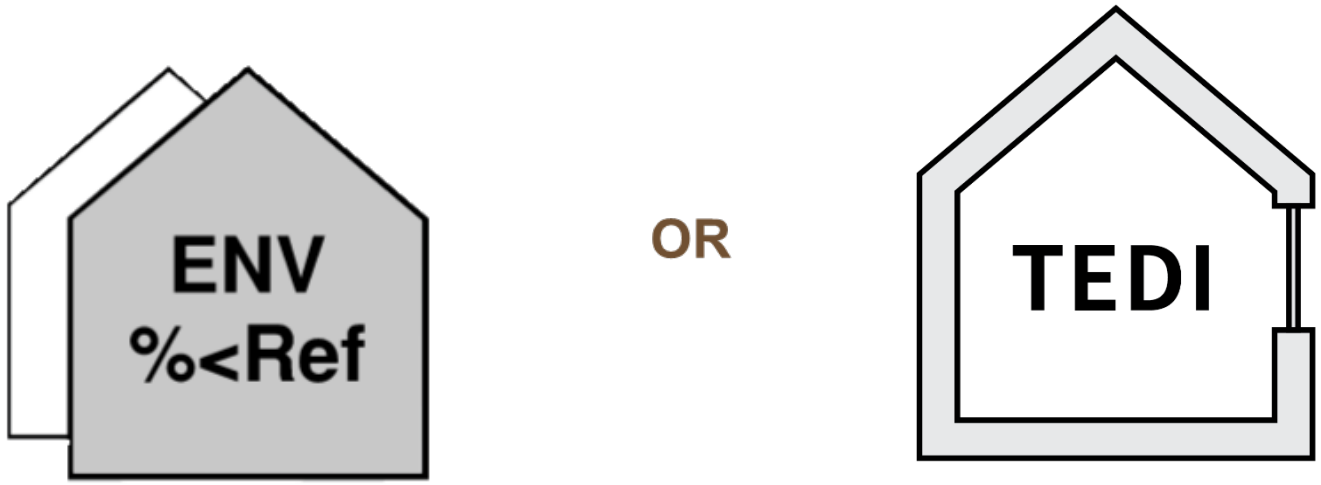


Equipment & Systems



Airtightness

The Performance Based Metrics – Part 9

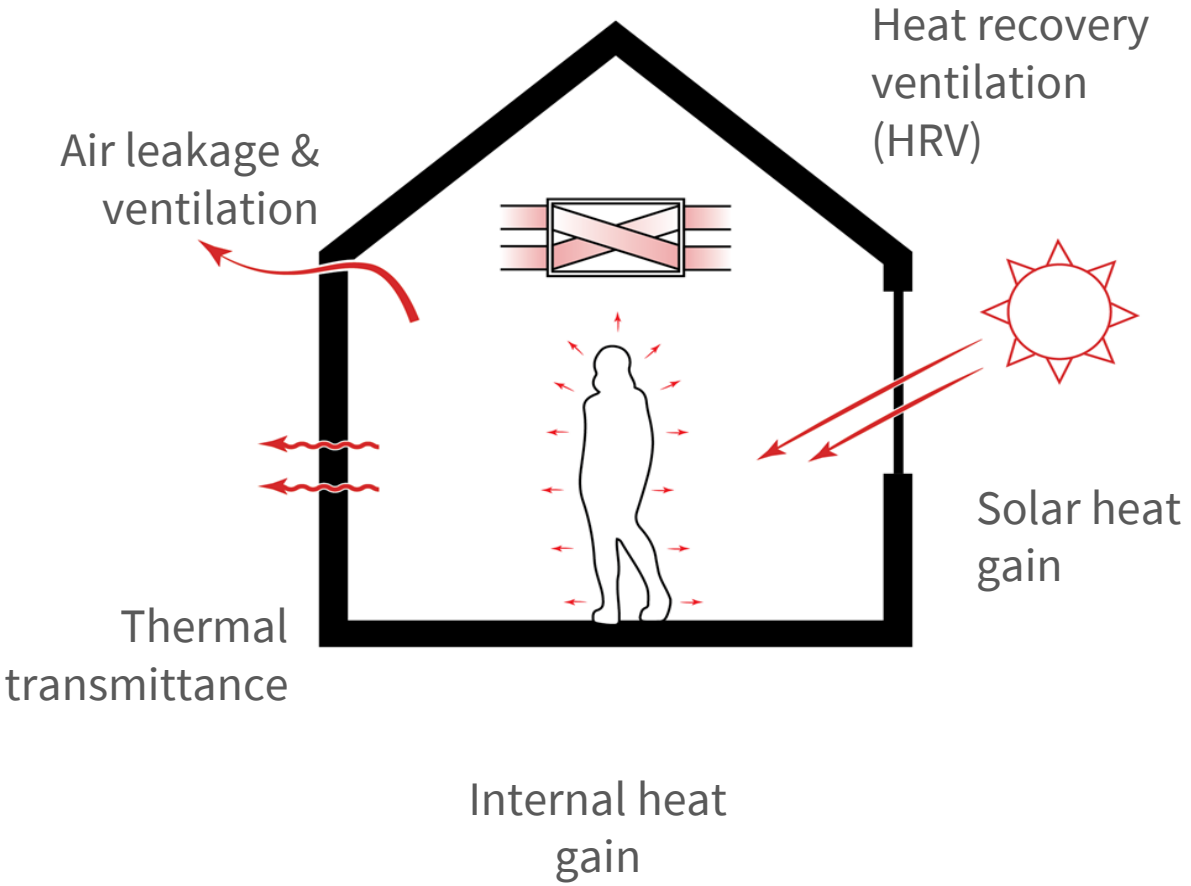


Building Envelope

TEDI Thermal Energy Demand Intensity

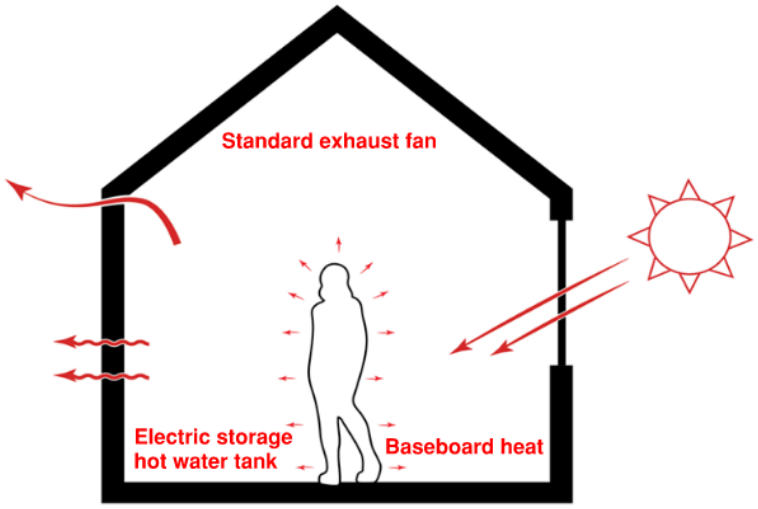
"Delivered Heat" - Is balance of losses and gains and ventilation

Determined by energy modeler as output from energy model.



Building Envelope % Better than Reference (Heat Loss Reduction)

Mechanical Systems are defaulted to basic electric in order to isolate the envelope performance with the Reference house.

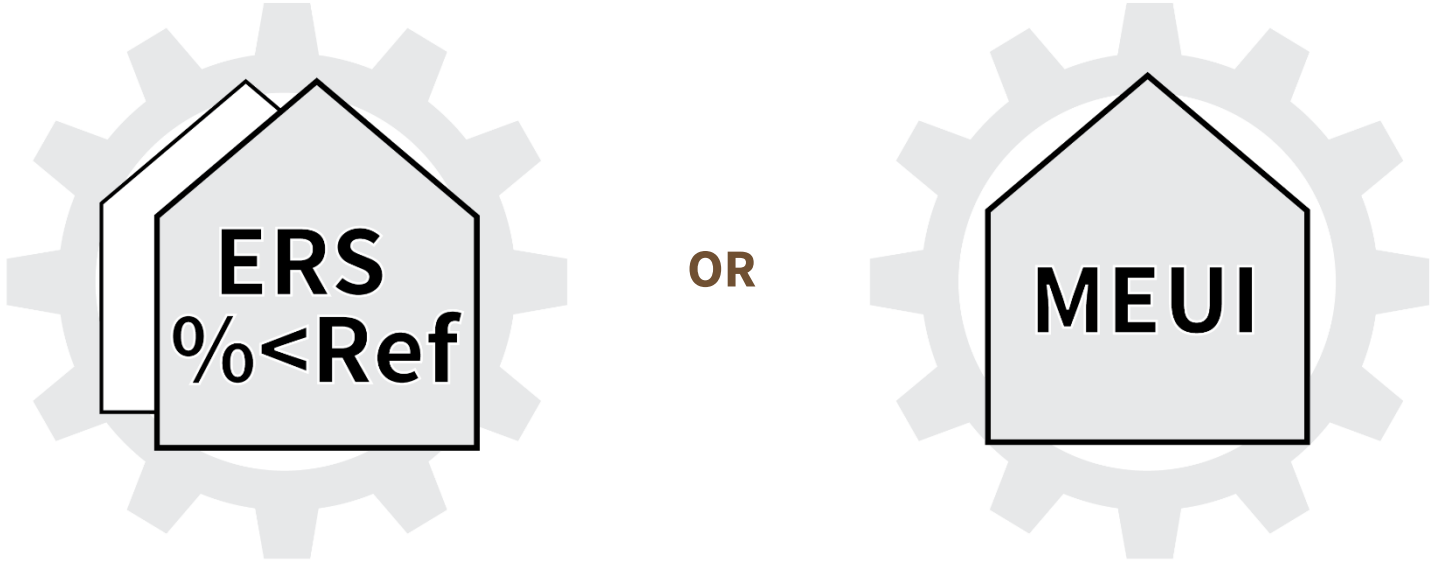


Most recent change: (May 1 2023):

Homes under 300 m3 (conditioned volume) have lowered % for compliance:

Step 3: 10% changed to 5%
Step 4: 20% changed to 15%
Step 5: 40% changed to 25%

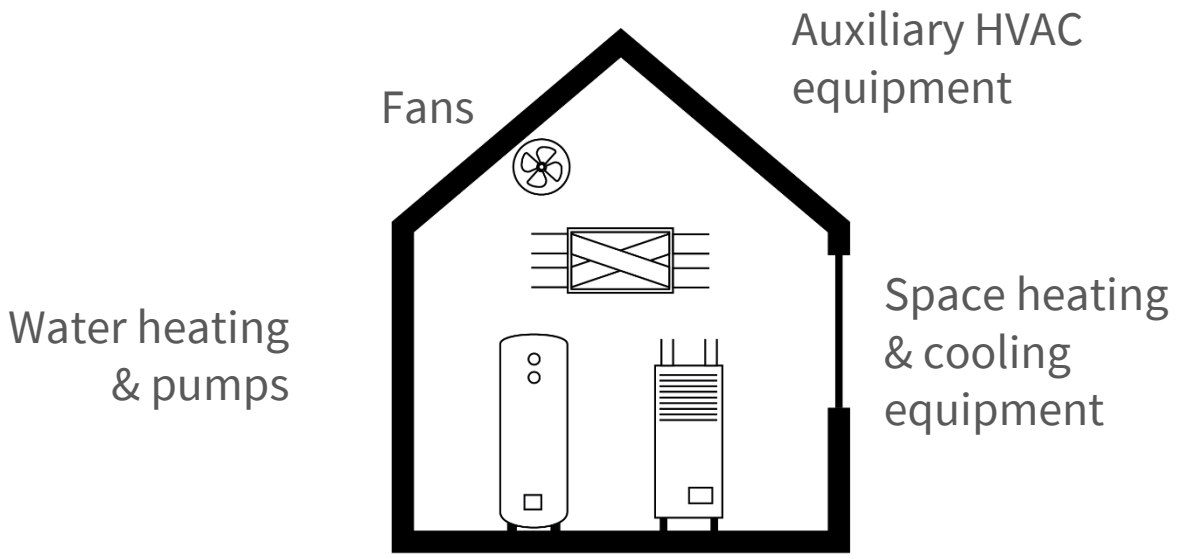
The Performance Based Metrics – Part 9



Equipment & Systems

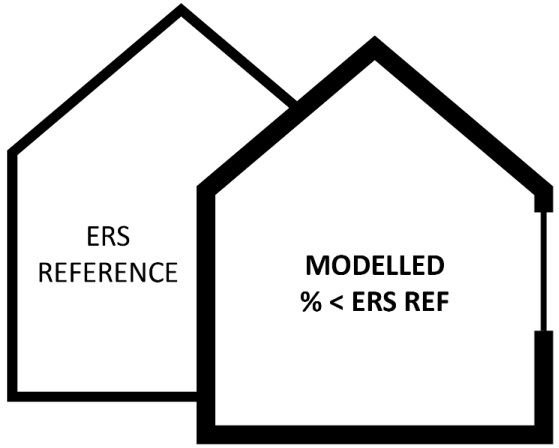
MEUI – Mechanical Energy Use Intensity

Determined by energy modeler as output from energy model.



ERS Rating % Lower Than Reference House

Determined by energy modeler as output from Hot2000 Model



Most recent change: (May 1 2023):

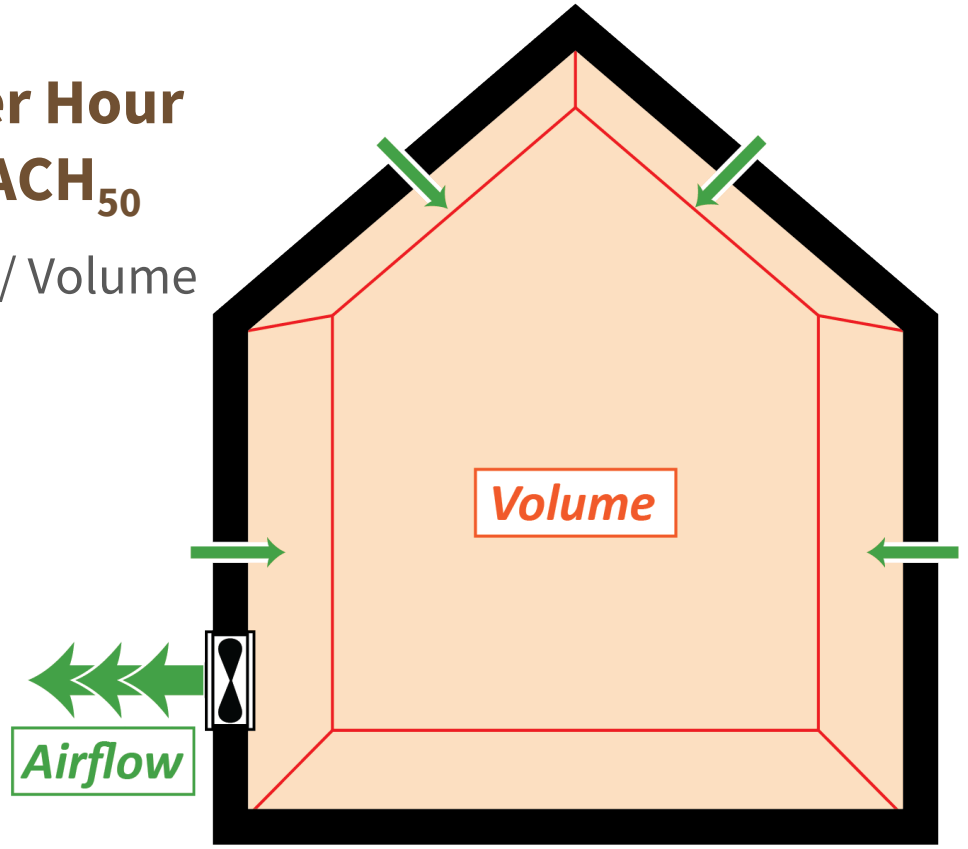
Homes under 300 m3 (conditioned volume) have lowered % for compliance:

Step 3: 20% changed to 10%
Step 4: 40% changed to 30%
Step 5: 70% changed to 60%

Airtightness: Air Changes Per Hour (ACH)

Air Changes per Hour at 50 Pascal – ACH_{50}

Airflow (per Hour) / Volume



Step 3 : 2.5 ACH

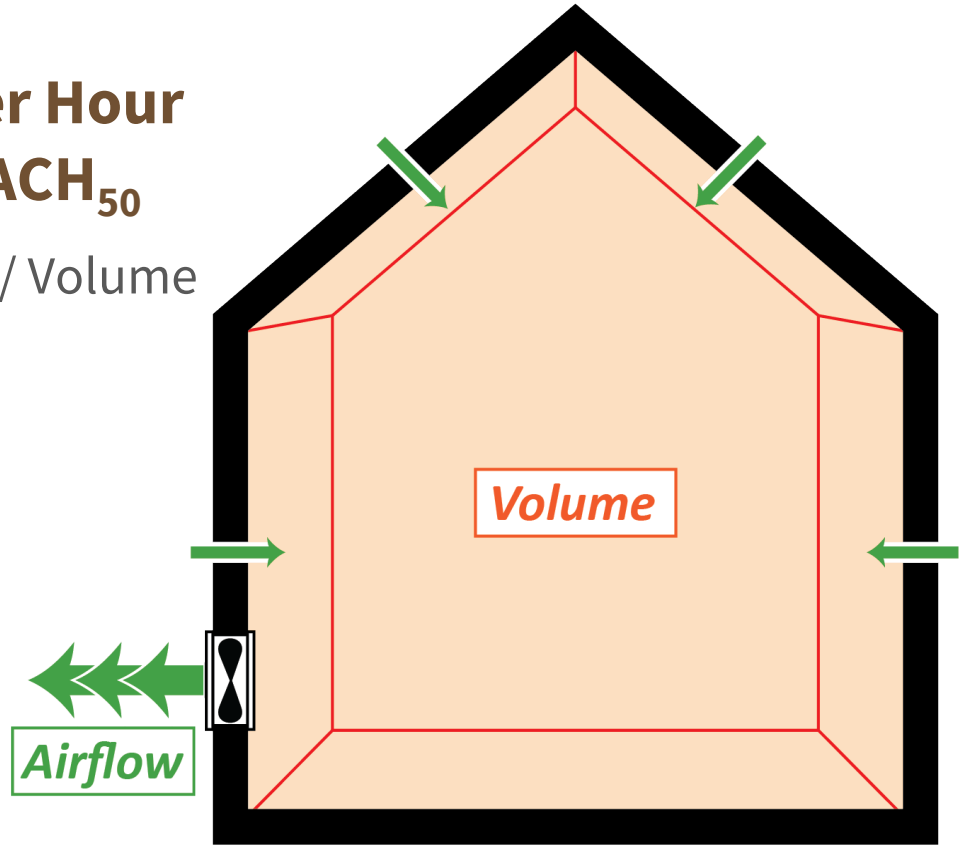
Step 4 : 1.5 ACH

Step 5 : 1.0 ACH

Airtightness: Recent changes (favors smaller homes)

Air Changes per Hour at 50 Pascal – ACH_{50}

Airflow (per Hour) / Volume



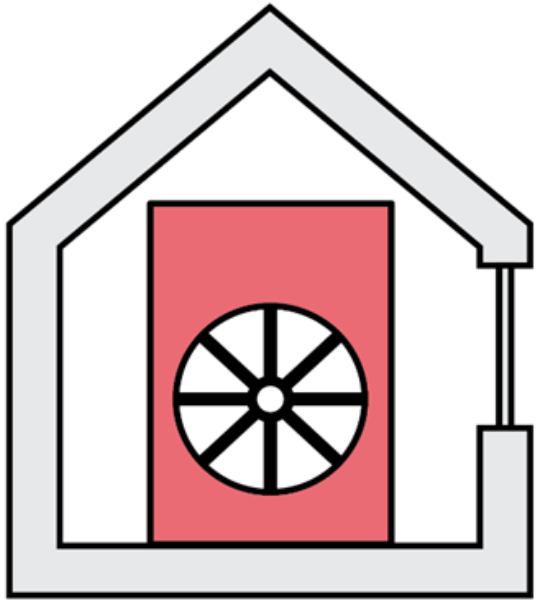
Step 3 : 2.5 ACH
Step 4 : 1.5 ACH
Step 5 : 1.0 ACH

As of May 1 2023:
Equivalency alternate air tightness metrics:

NLA (Normalized Leakage Area)

NLR (Normalized Leakage Rate)

Airtightness: Great news for smaller homes



Airtightness Levels
Forming Part of Sentence 9.36.7.4.(1)

Airtightness Levels	Airtightness Metrics		
	ACH_{50}	NLA_{10}, cm^2/m^2	NLR_{50}, L/sxm^2
	Maximum Airtightness Values		
AL-1	2.5	1.20	0.89
AL-3	1.5	0.72	0.53
AL-4	1.0	0.48	0.35

How big is the hole

How much air comes through that hole

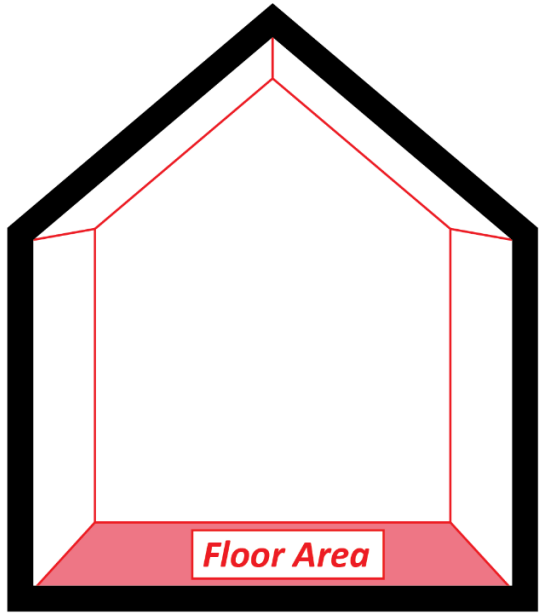
Getting to Step 4 and 5

- Design Considerations
- Assembly and Fenestration Performance
- Mechanical choices
- Air tightness

Design Considerations: 1. Heated Floor Area

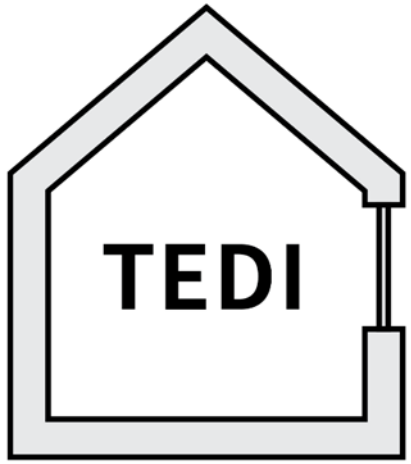
Conditioned Space – m^2

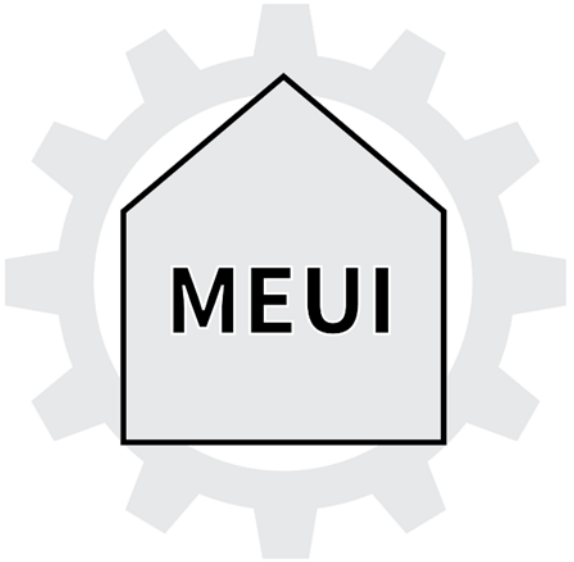
Any space within the building that is temperature controlled for substantial portions of the year.



1. Heated Floor Area

- How is it calculated?
  - **Above Grade floors**: Sum of all ***usable*** floor areas regardless of ceiling heights.
  - **Below Grade**: Floor areas that have a ceiling height of 4 feet or more (1.2 meters)
  - ***Used for:***



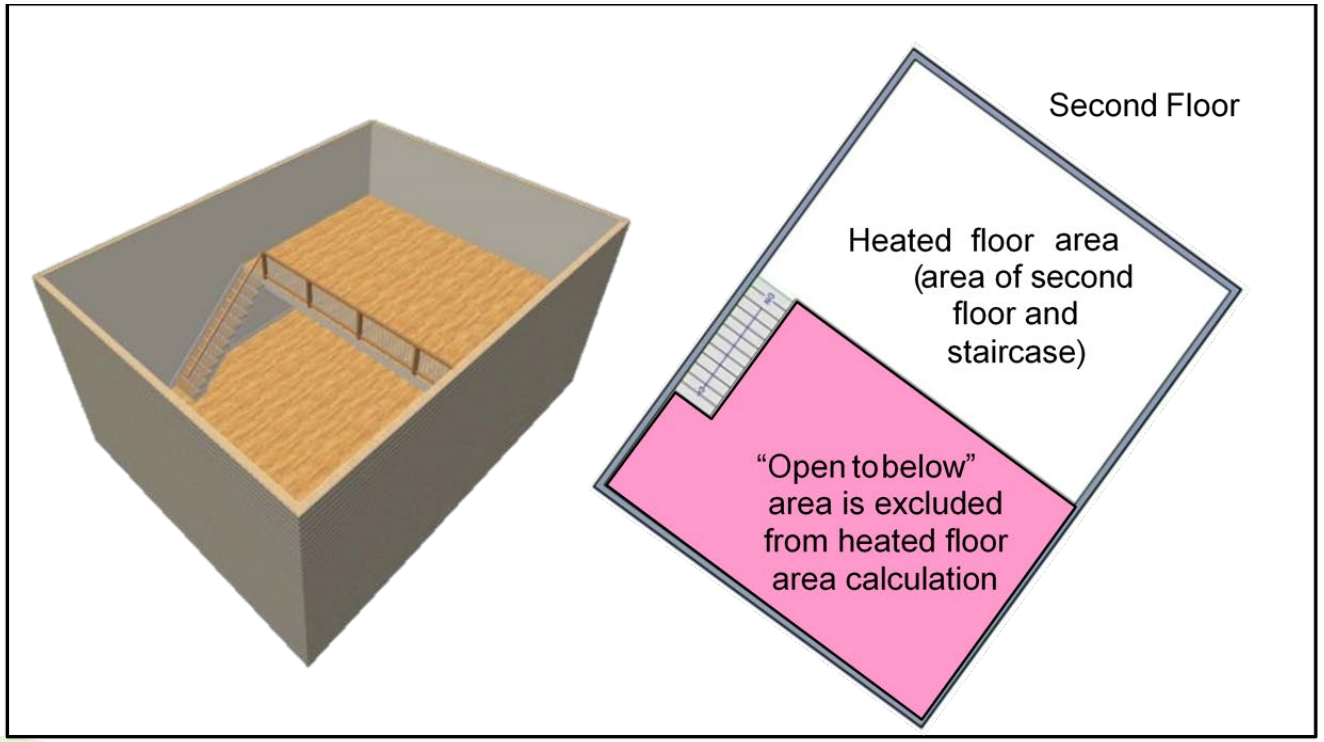


1. Heated Floor Area

- Crawlspaces:
  - 4-foot rule applies
    - Over 4 feet high can be included in the heated floor area

1. Heated Floor Area

- Areas open to below:



Design Considerations: 2. Window to Wall Ratio

- Lower window to wall ratio is of large benefit.
- Can lower the impact of relying on higher efficient windows needed.

2. Window to Wall Ratio

17%

22%

Reference House range

Other window performance impacts

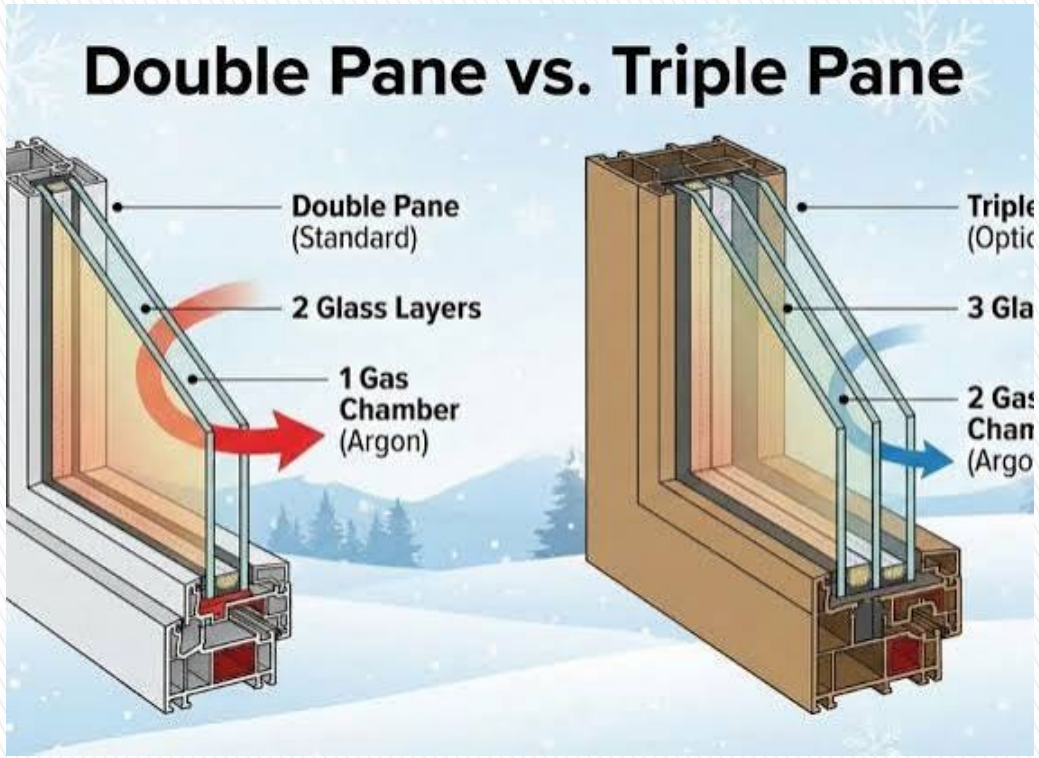
- Windows can get complicated!

- Solar Heat Gain Coefficients
- U values
- Triple Glaze vs Dual Glaze
- Orientation
- WWR – Where should I upgrade? Walls or Windows?
- Install and air tightness

Other window performance impacts

- U value Ranges 1.19 – 1.8

- Cost
- Workability
- Availability
- Options



- U value Ranges 0.75 – 1.30

- Modest added cost
- Workability
- Availability
- Options

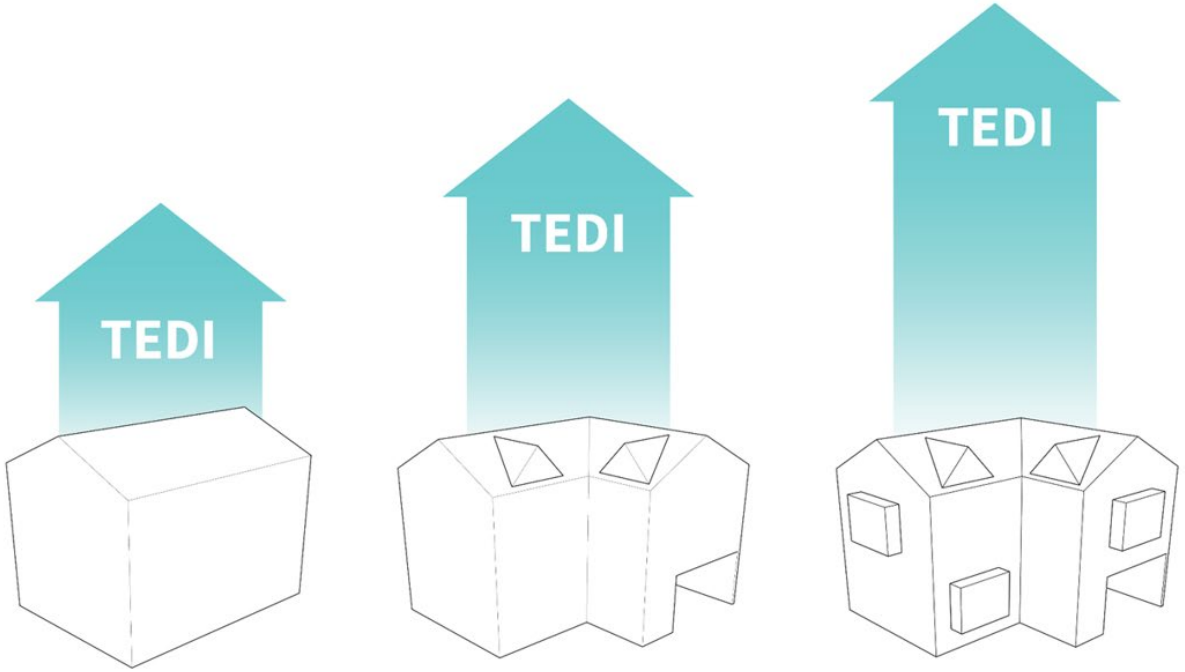
Dual Glaze Windows

Other Options are Krypton and Vacuum Glass Inserts (U 0.65 and U 0.45)

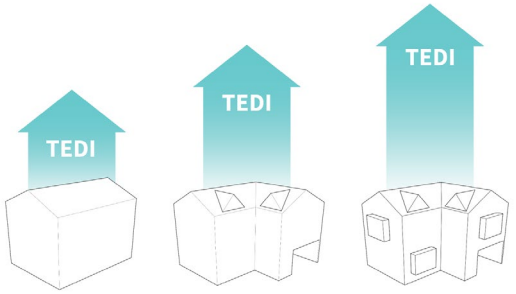
Triple Glaze Windows

Design Considerations: 3. Keep it simple!

Form Factor

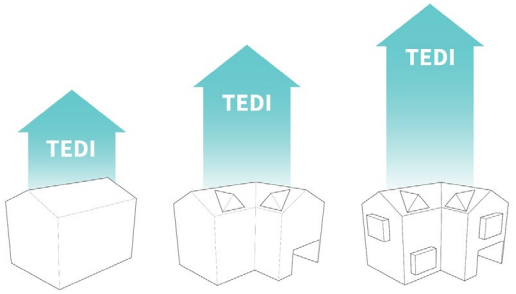


3. Form Factor



- Higher Surface area to volume = More exposed areas to the exterior
- More corners, framing losses
- Other side-effects:
  - Tougher to air seal
  - Time of construction
  - Complicated detail

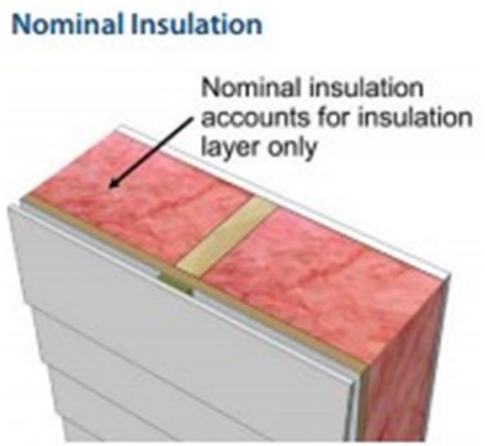
3. Form Factor – Size matters



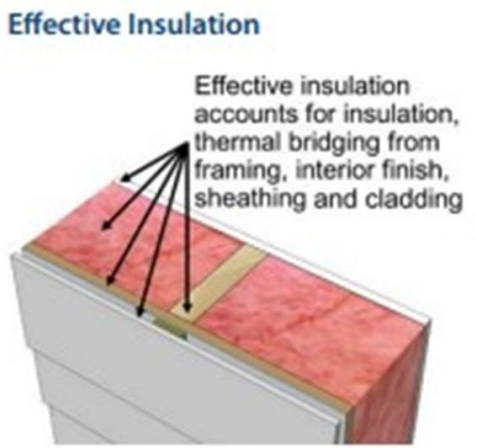
- Smaller spaces = Less to heat
- Internal Gains including 3 people, hot water storage tank
- Simpler form – air sealing details
- Typically, lower WWR

Design Considerations – 4. Effective R values

- Techniques that help
  - Whole house performance: effective R values = Every bit helps
  - Attics – Heel heights and eave lengths and insulation configurations
  - Split wall/advanced wall systems
  - Foundations below grade



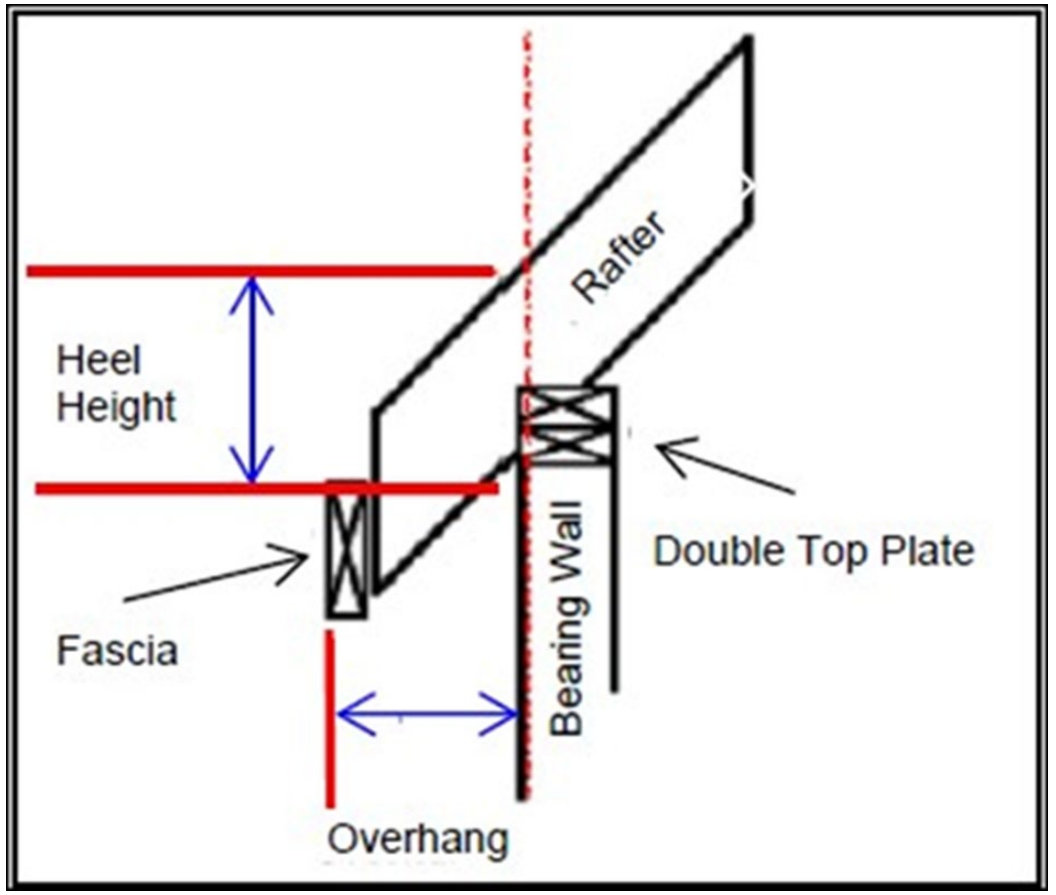
Nominal insulation accounts only for thermal resistance of the insulation.



Effective insulation takes into account all assembly components, including framing, sheathing, cladding etc.

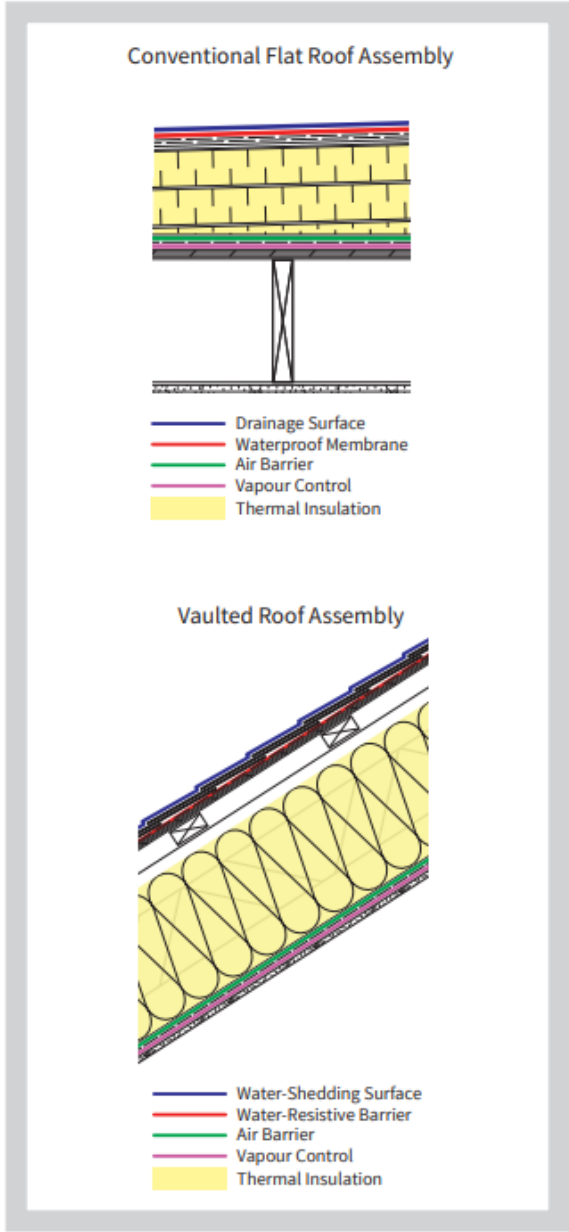
4. Effective R values

- **ATTICS**
  - Truss heel height over 12” relatively erases the effect of perimeter compression.
  - 1300 Sq ft attic R 50:
  - 12” Heel = R51.11
  - 10” Heel = R48.2
  - 7” Heel = R43.5
  - 3.5” Heel = R39.01



4. Effective R values

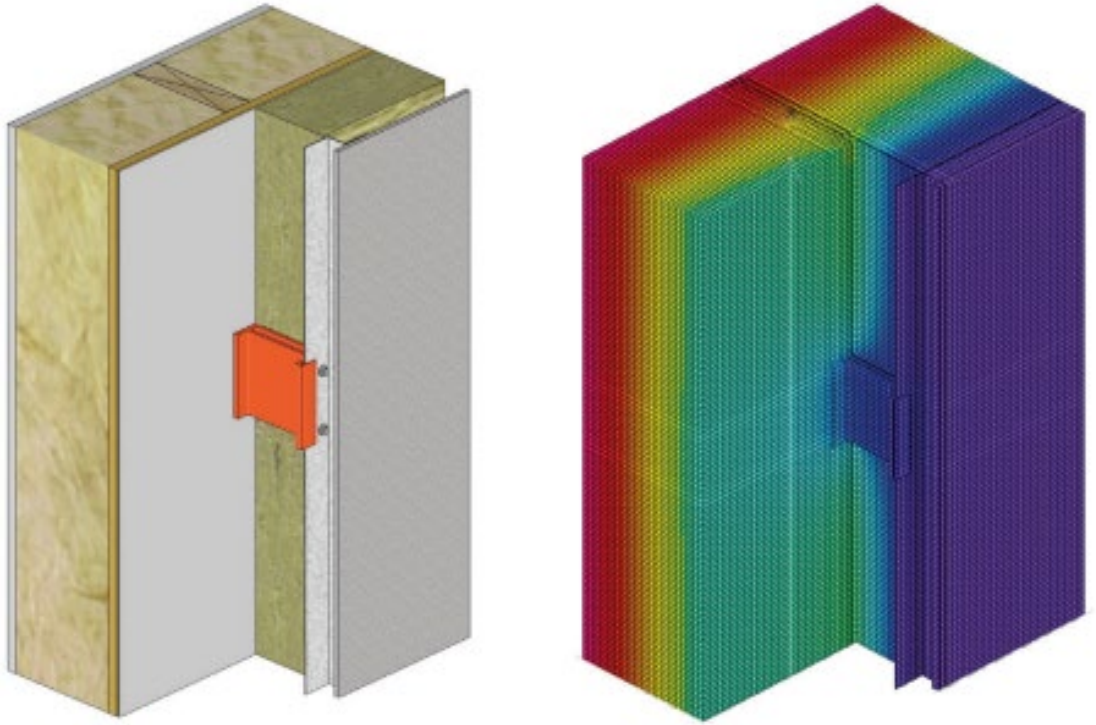
- **Flat Roofs/Decks**
  - Same concepts as wall insulation
  - Roof deck insulation
  - Split insulation
  - Slope Roof Package – EPS



*BC Housing illustrated Guide

4. Effective R values

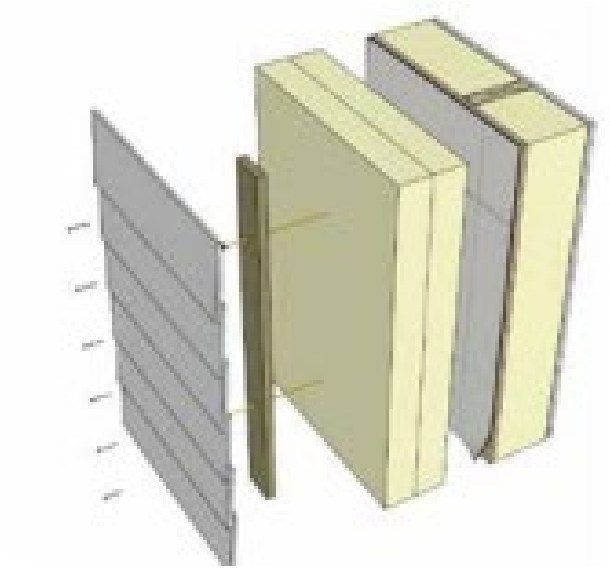
- **Exterior walls**
  - Insulation to the outside
  - Thermal Bridging
  - Drying Potential

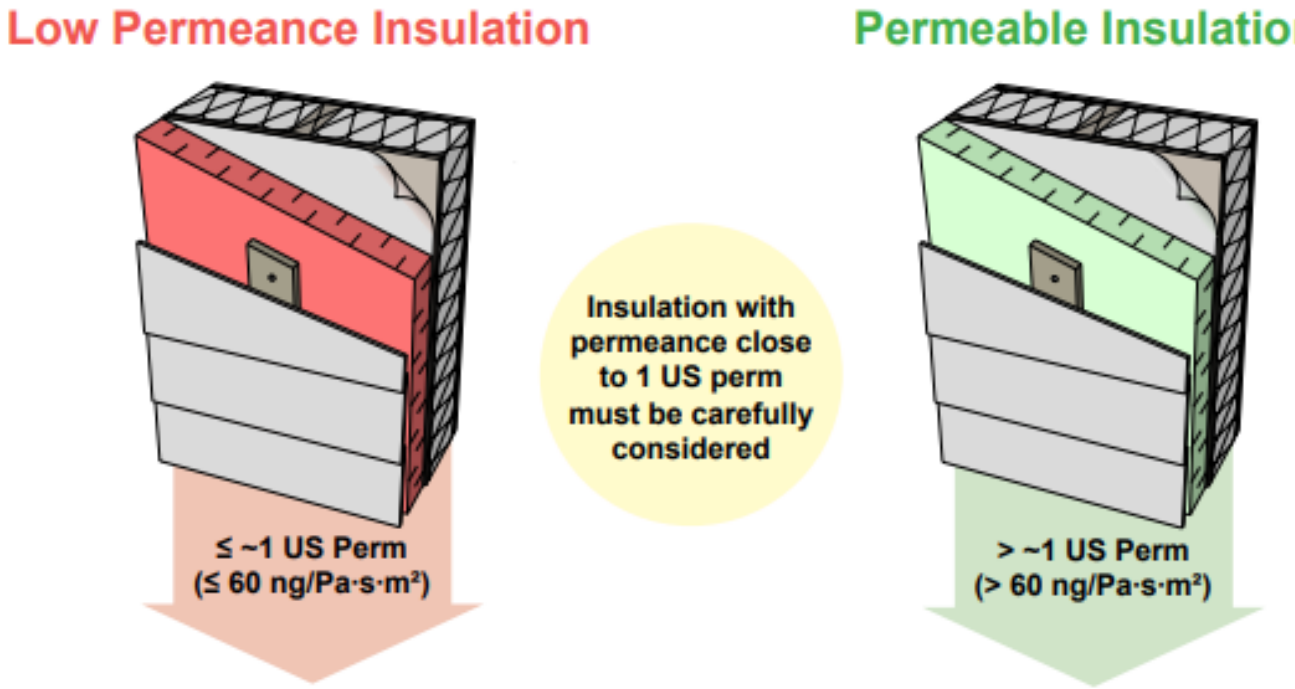


*BC Housing illustrated Guide

4. Effective R values

- Advanced wall systems





*BC Housing illustrated Guide

4. Effective R values

- **Advanced wall systems**

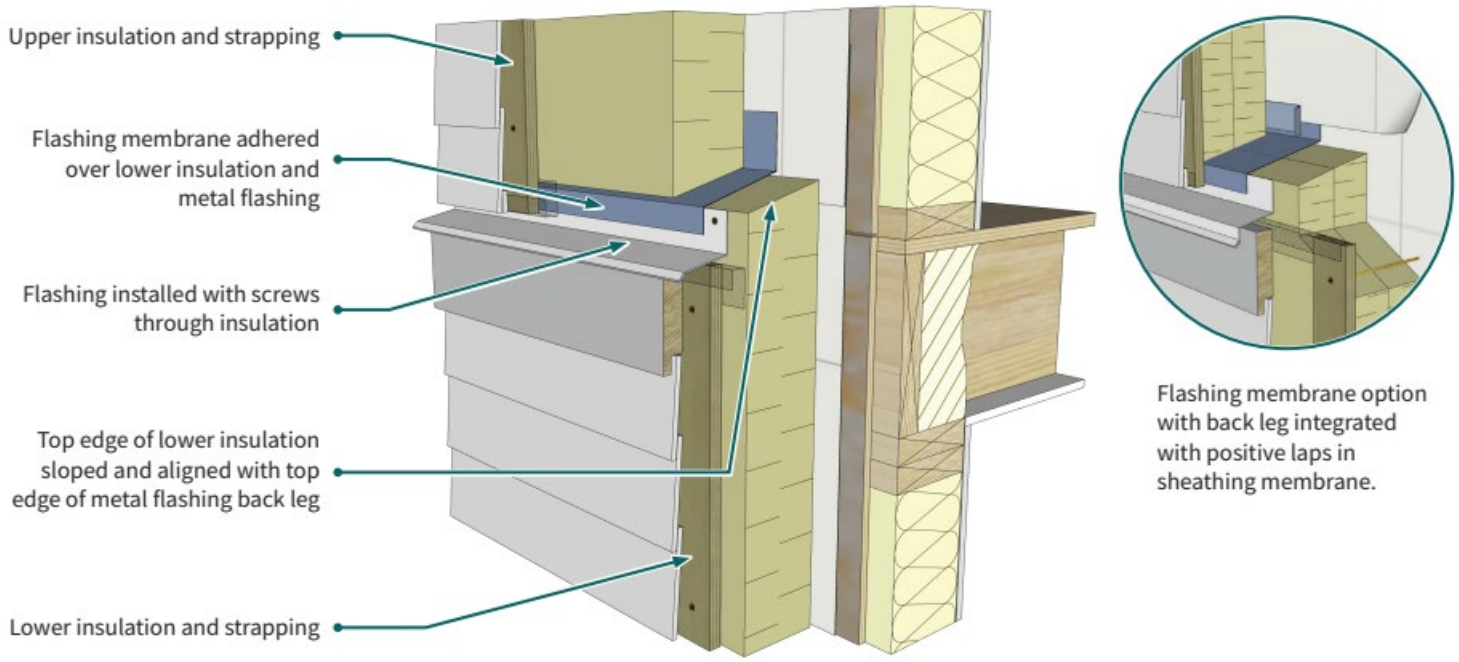


Figure 2-6 Through-wall flashing installation with membrane

*BC Housing illustrated Guide

4. Effective R values

- **Foundation Walls/Floors**
  - Many options available
  - Split type
  - Spray Foam
  - ICF

4. Effective R values

- **Foundation walls**
  - ICF R-values R22 – R28+
  - Spray foam – continuous and cavity
  - Framing spacing and gaps
  - Vapor Diffusion

4. Effective R values

- **Foundation Pony walls**
  - Opportunity for added R-Value with two layers of framing
- **Slabs**

Mechanical Choices

Mechanical Choices

HEATING/COOLING
TECHNOLOGY AVAILABLE

TOOLS FOR PROPER DESIGN
AND INSTALL

Mechanical Choices

- Heat pump technology
- Combination systems
- Ventilation efficiencies
- Cooling requirements

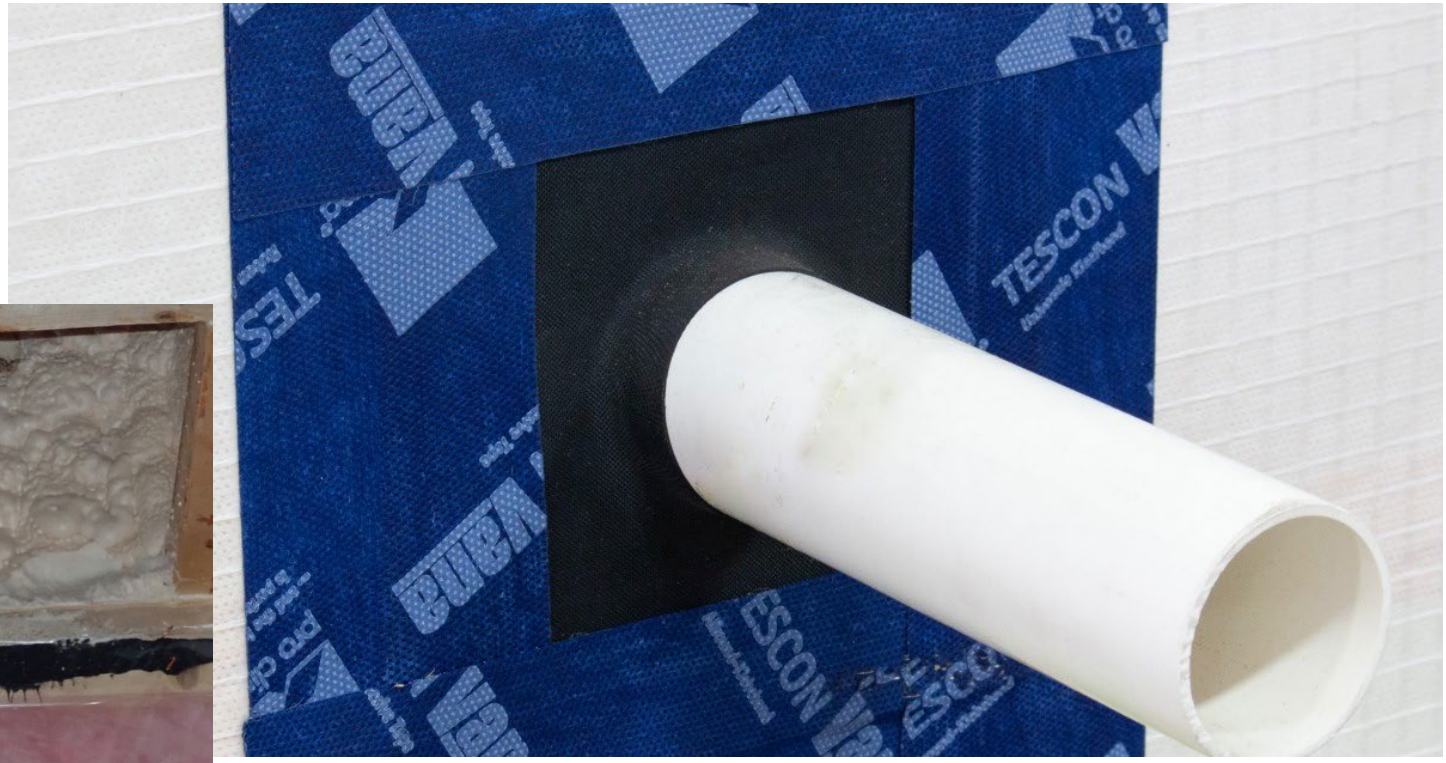
Mechanical Choices other considerations

- Equipment Selection
  - Full Electric Systems
  - Dual Fuel Systems
  - Combination systems/Radiant systems
  - Air to Air and Air to Water

Mechanical Choices other considerations

- Plan and do it right the first time
- Times have changed, why not mechanicals?
- Right sizing with proper F-280 Heat loss/Heat Gain
- Proper install and verification

Air tightness



Air sealing

Air sealing

Air sealing

Air sealing – Exterior Air Barrier

Air sealing


Rw1
ROOF TOP DECK
ROOF TOP DECK
ROOF TOP DECK
ROOF TOP DECK
Rw2
Rw2
Rw2
Rw2
BED
ENSUITE
CORRIDOR
ELEVATOR
ELEVATOR
CORRIDOR
BED
BED
ENSUITE
BED
ENSUITE
Fw1
Fw1
Fw1
KITCHEN
LIVING
DINING
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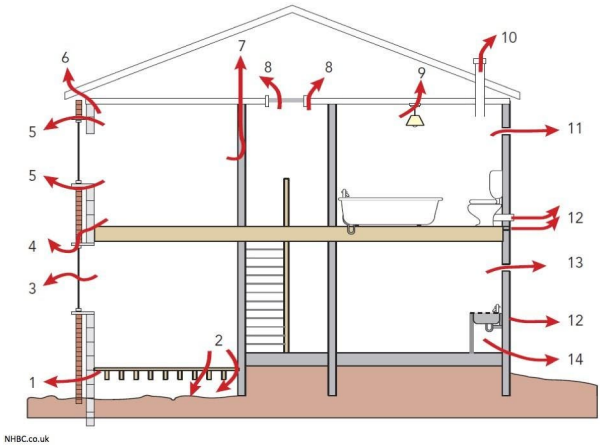
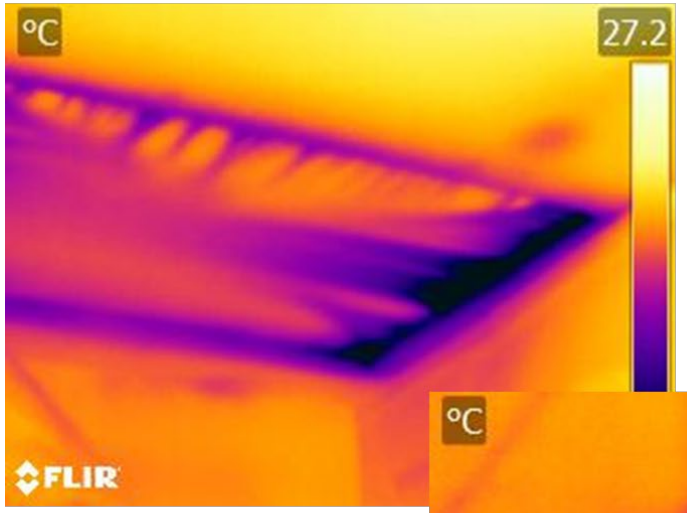
VESTIBULE
VESTIBULE
DEN
STORAGE
VESTIBULE
BED
STORAGE
VESTIBULE
DEN
Fc2
Fc2
Fc2
Fc2

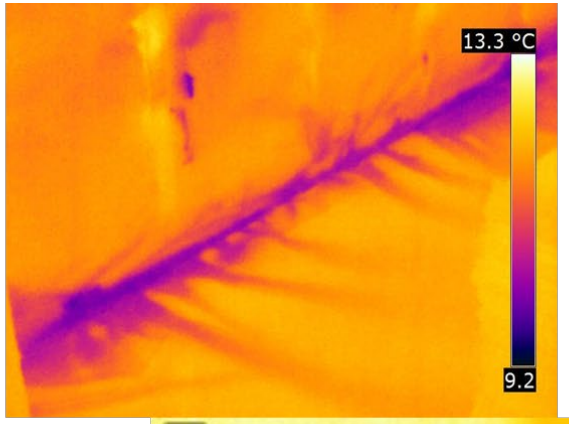
5. Air Sealing

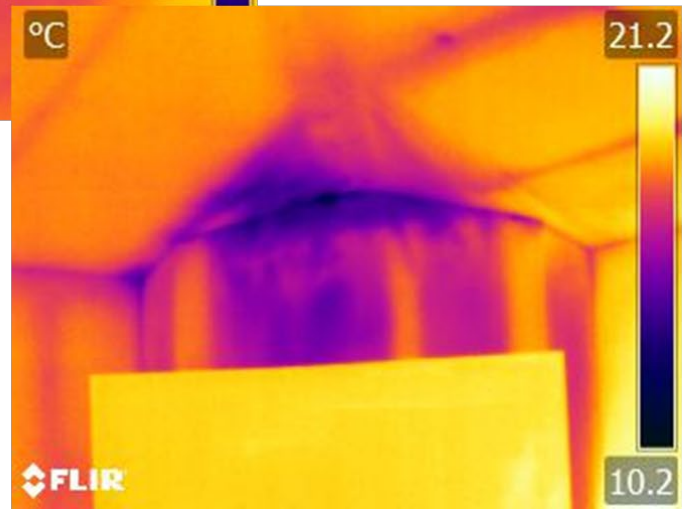
- Paying attention to the interruptions
- Working with your insulation/air barrier contractor
- Adopt “logical thinking” when looking at air sealing detail
- Air barrier is a system of many components

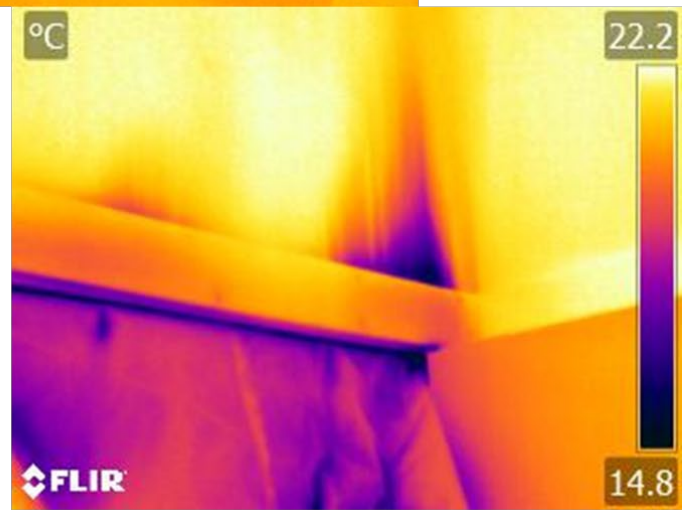


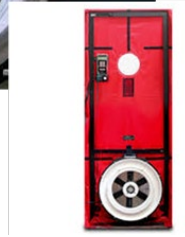
Pre Drywall/Mid Construction Stage





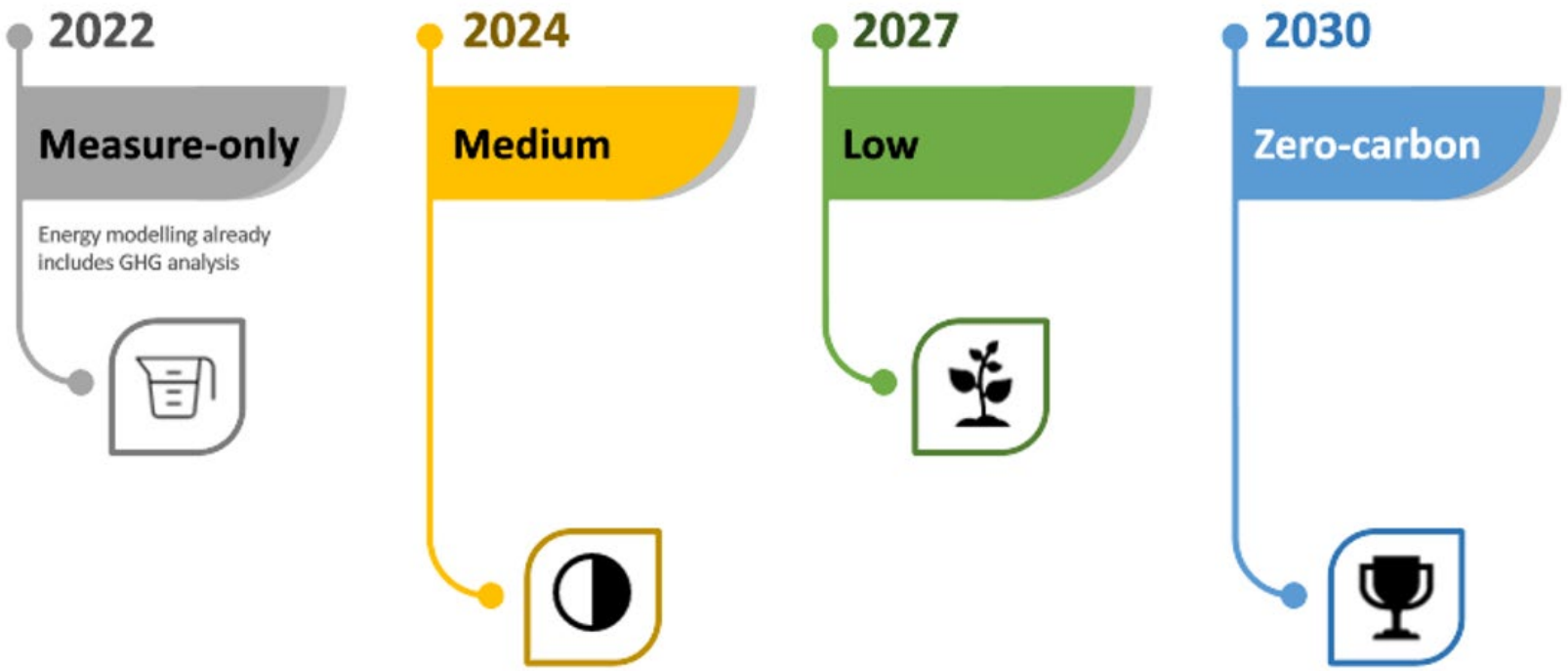






ZERO CARBON STEPCODE

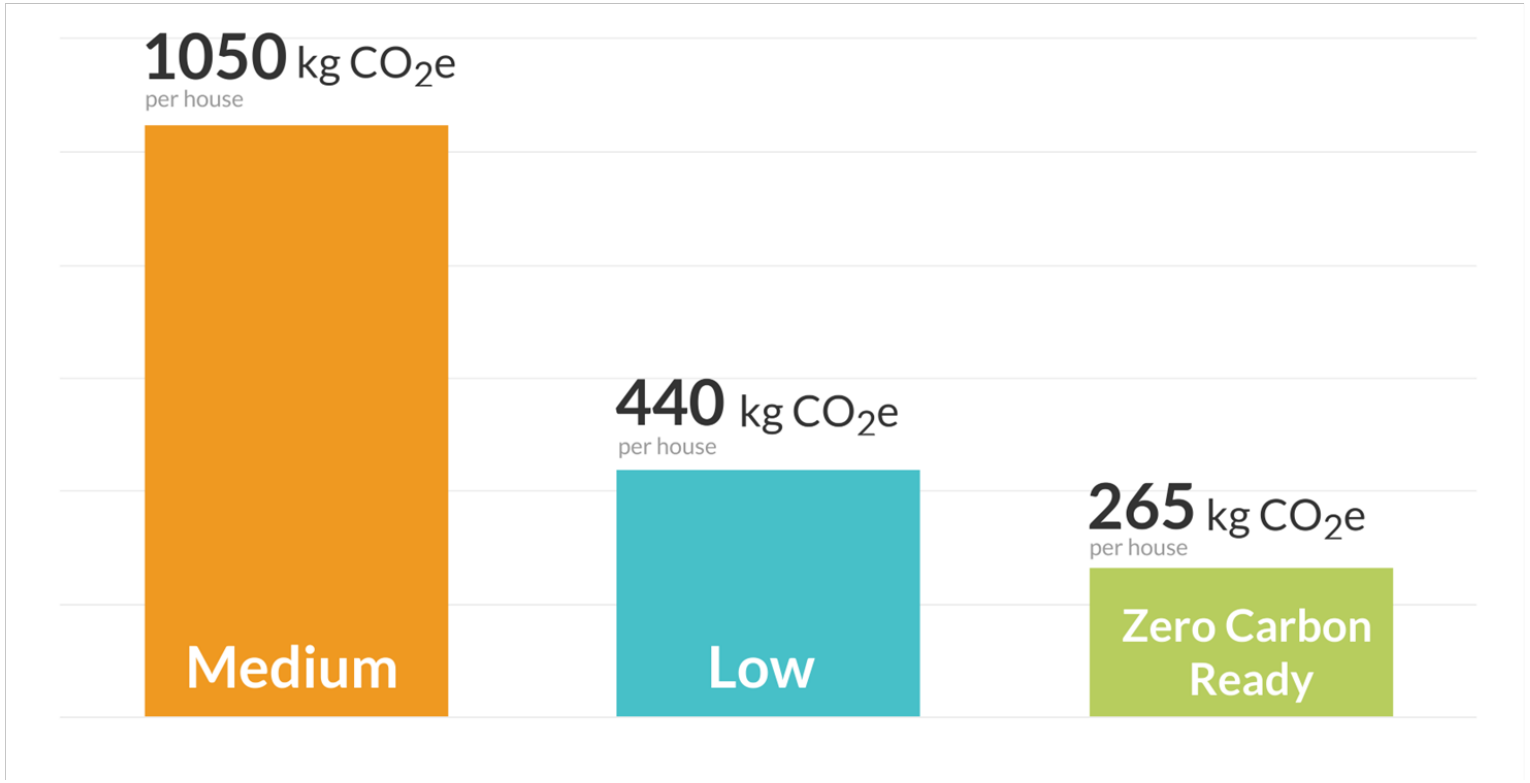
Proposed Provincial Timeline - Municipalities may choose to move faster



- March 10, 2025

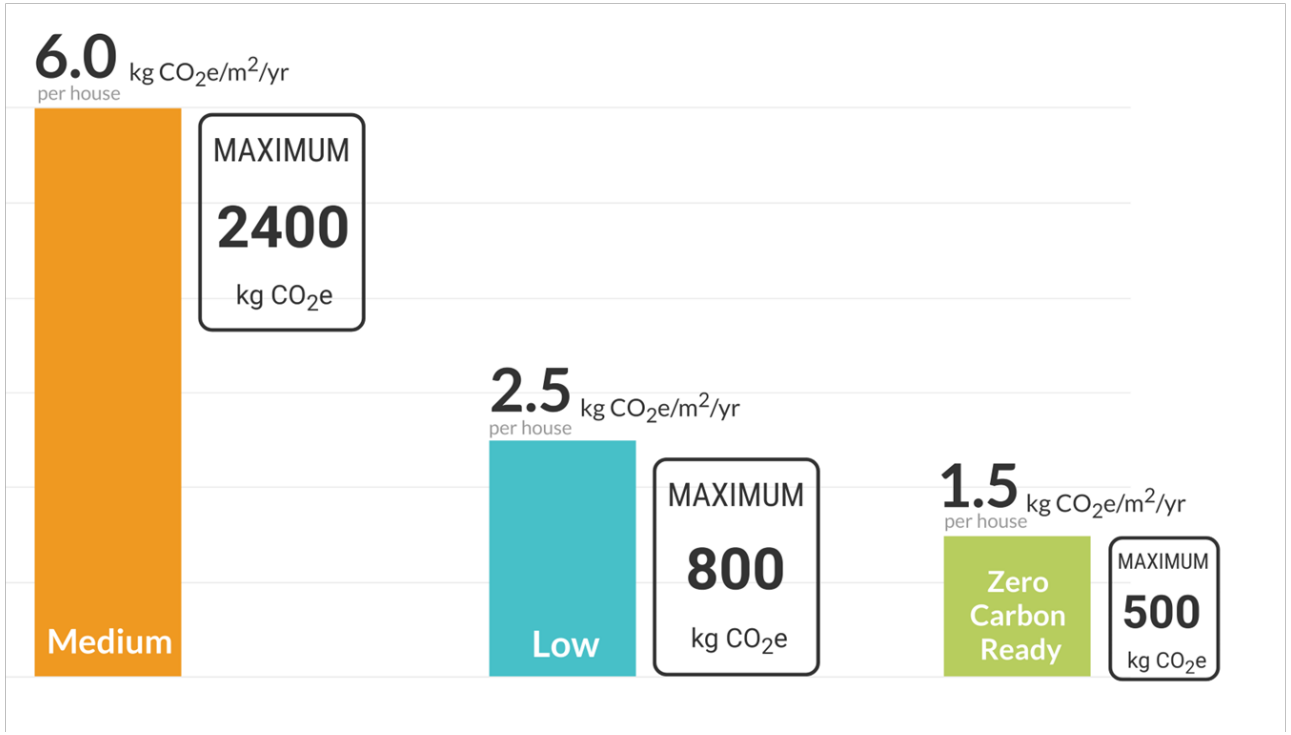
ZERO CARBON STEPCODE

Proposed GHG Targets – Part 9
Compliance Option 1: Ideal for smaller houses - Total Carbon



ZERO CARBON STEPCODE

Proposed GHG Targets – Part 9
Compliance Option 2 : Ideal for medium to large houses CO2 / Floor area



ZERO CARBON STEPCODE

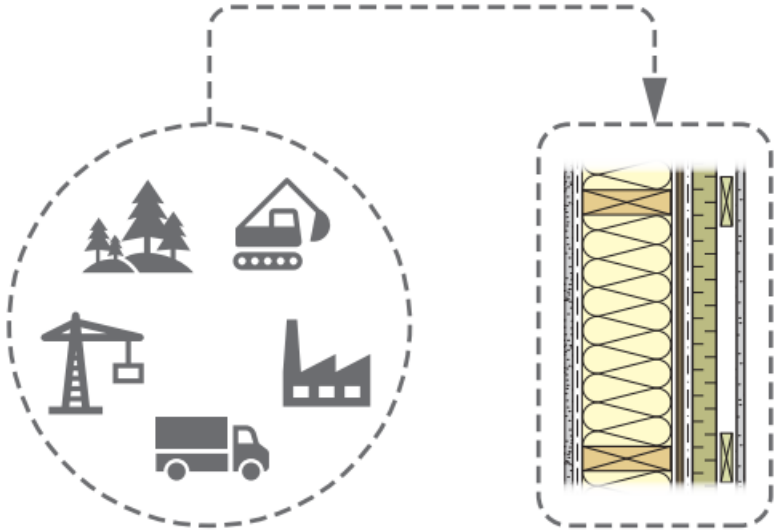
- Operational Carbon
- Primary heating systems (includes dual fuel systems)
- Appliances and fireplaces are not accounted for

Mechanical Choices

- Heat pump technology
- Electrical Hot Water Systems
- Dual Fuel systems if heat pumps sized properly

ZERO CARBON STEPCODE

- Embodied Carbon – Newer Concept



CASE STUDY EXAMPLES

3 Unit Townhome Climate Zone 4

3 Unit Townhome Climate Zone 4

- Step 4 EL-4

  - ACH 1.30 (Whole Building)
  - Cold Climate ASHP and Gas furnace Dual fuel system
  - Electric Storage Tank
  - Dedicated Bath Fans interconnected with Furnace Fan
  - R22 Walls
  - R60 Attic
  - R28 Exposed Floor
  - Skirting only at slab
  - Windows Triple Pane 1.19/Patio doors Dual pane U1.53

3 Unit Townhome Climate Zone 4

- Air tightness

3 Unit Townhome Climate Zone 4

- Step 5 EL-4

  - ACH 1.0 (Whole Building)
  - Cold Climate ASHP and Gas furnace Dual fuel system
  - Electric Heat Pump Tank
  - HRV System

  - R24 Walls + 1” Mineral wool
  - R60 Attic
  - R28 Exposed Floor
  - R12 Underslab
  - Windows Triple Pane 1.19/Patio doors Dual pane U1.19

Single Family w Suite Climate Zone 4

Single Family w Suite Climate Zone 4

- Step 4 EL-4

  - ACH 1.17
  - ASHP and Gas furnace Dual fuel system
  - Electric Storage Tank
  - Dedicated Bath Fans interconnected with Furnace Fan
  - R22 Walls
  - R50 Attic/R28 flat roof
  - R28 Exposed Floor
  - Perimeter under slab and Skirting
  - Windows Triple Pane 1.15-1.17
  - Basement R22 Batt

3 Unit Townhome Climate Zone 4

- Air tightness

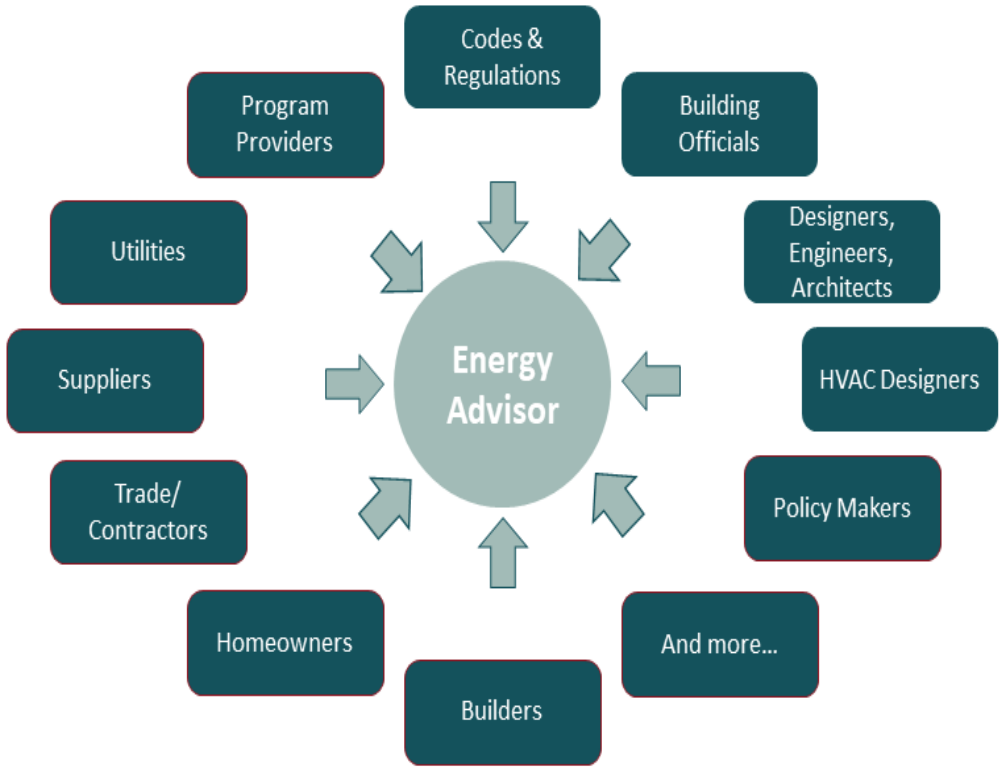
Single Family w Suite Climate Zone 4

- Step 5 EL-4

  - ACH 1.0
  - ASHP and Gas furnace Dual fuel system
  - Electric Storage Tank
  - HRV System

  - R24 Walls + 2" MW
  - R60 Attic/R40 flat roof
  - R28 Exposed Floor
  - Full under slab and Skirting
  - Windows Triple Pane 1.15-1.17
  - Basement R22 Batt

EAs are at the HUB of the Part 9 Sector

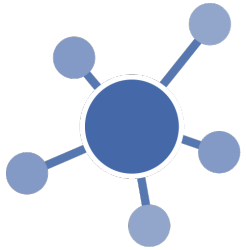


Energy Advisors/Builders/Developers/Plan Design:

WHEN?

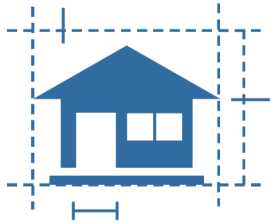
Planning/Design Stage

What is IDP?



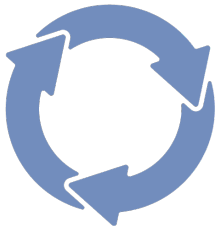
Integrated

- A **house** works “as a system” = many complex parts that all work together.
- The **design process** should also be conducted “as a system” = teamwork
- All the components, trades and suppliers must work together, e.g., site work, utilities, framing, HVAC, insulation, airtightness, solar, plumbing, electrical, etc.



Design

- Good design is much more than “a house plan”
- It must also include a ***plan*** to gather the right team, set goals and test the best solutions **before** construction starts
- Seeks synergies, working better together, understanding how building systems and components can be most effective, and when and how they are best incorporated



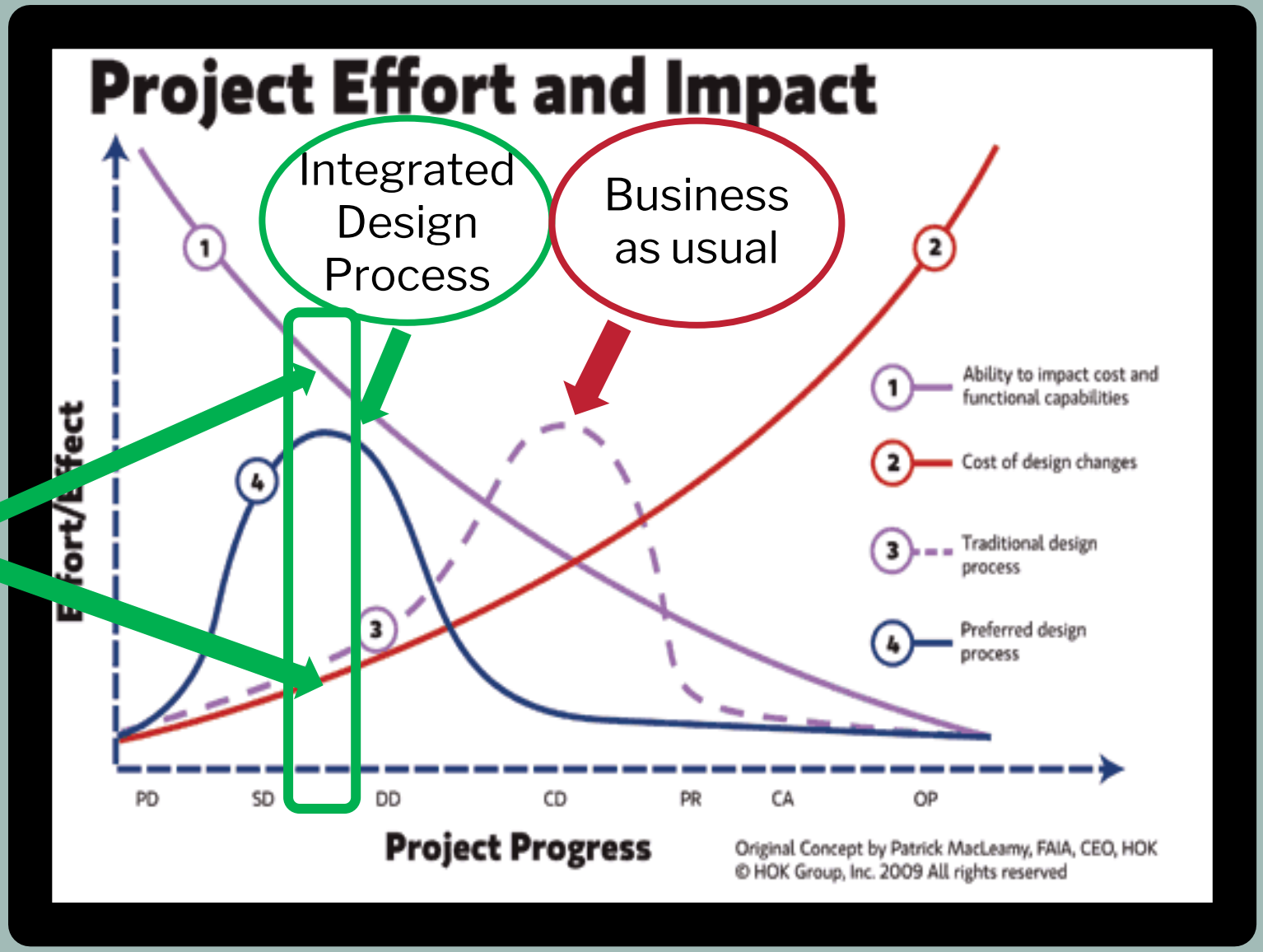
Process

- Structured, collaborative, measurable, documented, repeatable, efficient, effective

CACEA

The Value in IDP

IDP offers greater benefits at lower cost:



CACEA

The Value in IDP

Challenges?

- Time
- Trade Participation

CACEA

CACEA Canadian Association of Consulting Energy Advisors

Our Mission

To support a sustainable profession of successful and credible Canadian Energy Advisors (EA).

Our Mandate

Ensure credible, skilled members and be a valued, respected sector partner.

Our Members

Includes EAs, suppliers, stakeholders and allies, and those in the process of becoming registered EAs.

Members across Canada access to:

- knowledge and information;
- a supportive network;
- a unified voice to influence change; and
- discounts to equipment, training, and more.

Contact

Cindy Gareau, Executive Director
manager@cacea.ca • 888-315-2774 • www.cacea.ca

CACEA promotes sustainable building practices and contributes to the following Canadian Home Labeling Programs: R-2000 ENERGUIDE ENERGY STAR HIGH EFFICIENCY HAUTE EFFICACITÉ netzero home BuiltGreen

Questions?

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TOTAL HOME SOLUTIONS INC.

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