ENERGY STEPCODE

BUILDING BEYOND THE STANDARD

Sept. 27, 2017

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Director, Canadian Association of Consulting Energy Advisers

CAPITALHOMEENERGY INC

ADD CAPITAL TO YOUR HOME

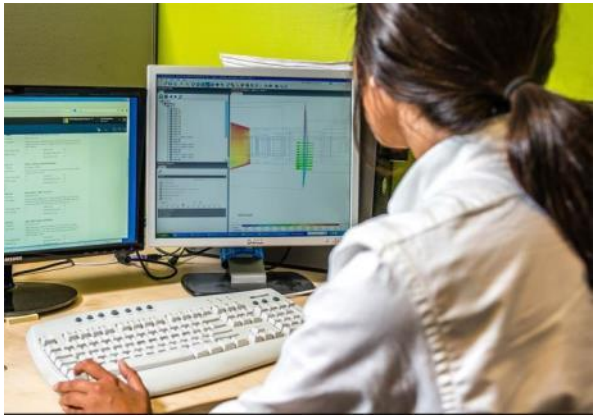
CACEA

Canadian Association of Consulting Energy Advisors

Energy Advisers

- Registered by Natural Resources Canada to deliver the ERS (EnerGuide Rating System)

- Services include:



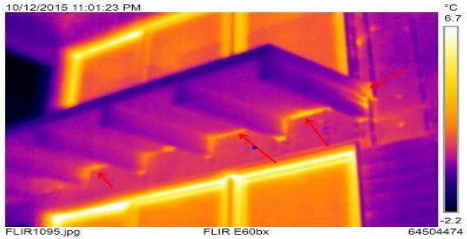
Energy modeling

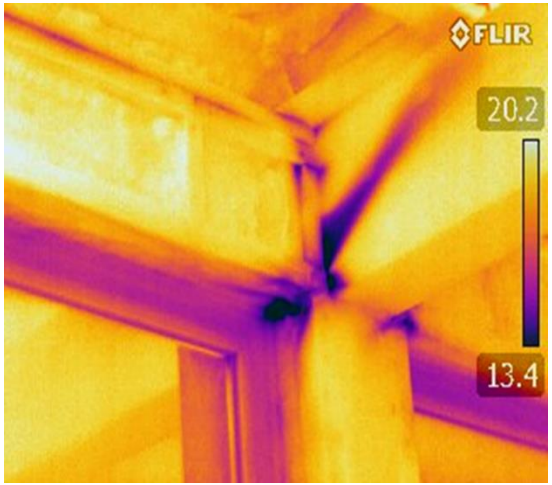
Air-Tightness Testing

Mechanical systems design

Energy Advisers

- We are Energy Design Consultants
- Third party neutral





Thermal Imaging

Value of Energy Adviser

- Optimize cost-effective strategies to improve energy performance
- Durability – reduce chances of moisture damage through air-sealing
- Healthy homes – advise on ventilation strategies & ensure good indoor air-quality

BC Energy Step Code

A Best Practices Guide for Local Governments

BRITISH COLUMBIA

Version: 1.2 September 15, 2017

A publication of the Energy Step Code Council and the Building and Safety Standards Branch.

2017 → 2032

5 — **NET ZERO READY**
NEW CONSTRUCTION

4 — **40%** BETTER

3 — **20%** BETTER

2 — **10%** BETTER

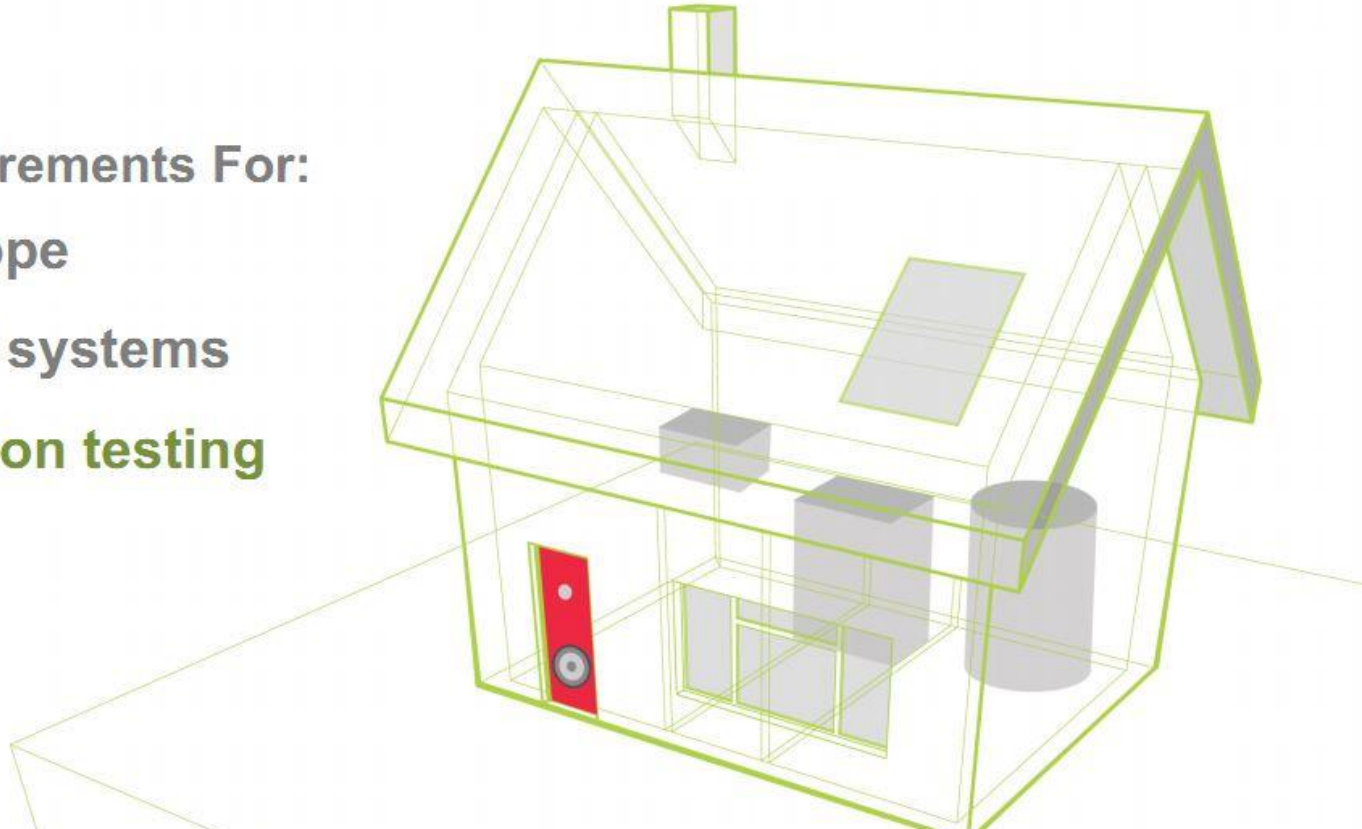
STEP 1 — *ENHANCED COMPLIANCE* — IMPROVED
BC BUILDING CODE — ERS REFERENCE HOUSE

ENERGY EFFICIENCY

What Does the BC Energy Step Code Measure?

Performance Requirements For:

- ✓ **Building envelope**
- ✓ **Equipment and systems**
- ✓ **Post-construction testing**
  - Airtightness



What do the Steps mean?

Who is going to help you?

What is the plan to get there?

What is the process?

Performance Compliance

Step Level	Energy Modelling	Airtightness	Equipment and Systems	Envelope
Step 1 Enhanced Compliance	Required	3.5 ACH_{50}	BCBC using 9.36.5. OR ERS v15 ref. house (MEUI of 80 kWh/m^2/year is likely, not required)	Report on TEDI and PTL (TEDI 50 kWh/m^2/year is likely, but not required)
Step 2 10% Beyond Code	Required	3.0 ACH_{50}	10% better than ERS v15 ref. house OR MEUI – 60 kWh/m^2/year	TEDI – 45 kWh/m^2/year OR PTL – 35 W/m^2
Step 3 20% Beyond Code	Required	2.5 ACH_{50}	20% better than ERS v15 ref. house OR MEUI – 45 kWh/m^2/year	TEDI – 40 kWh/m^2/year OR PTL – 30 W/m^2
Step 4 40% Beyond Code	Required	1.5 ACH_{50}	40% better than ERS v15 ref. house OR MEUI – 35 kWh/m^2/year	TEDI – 25 kWh/m^2/year OR PTL – 25 W/m^2
Step 5 50%+ Beyond Code	Required	1.0 ACH_{50}	MEUI – 25 kWh/m^2/year (no ERS option)	TEDI – 15 kWh/m^2/year OR PTL – 10 W/m^2

5.5 Metrics used in the BC Energy Step Code

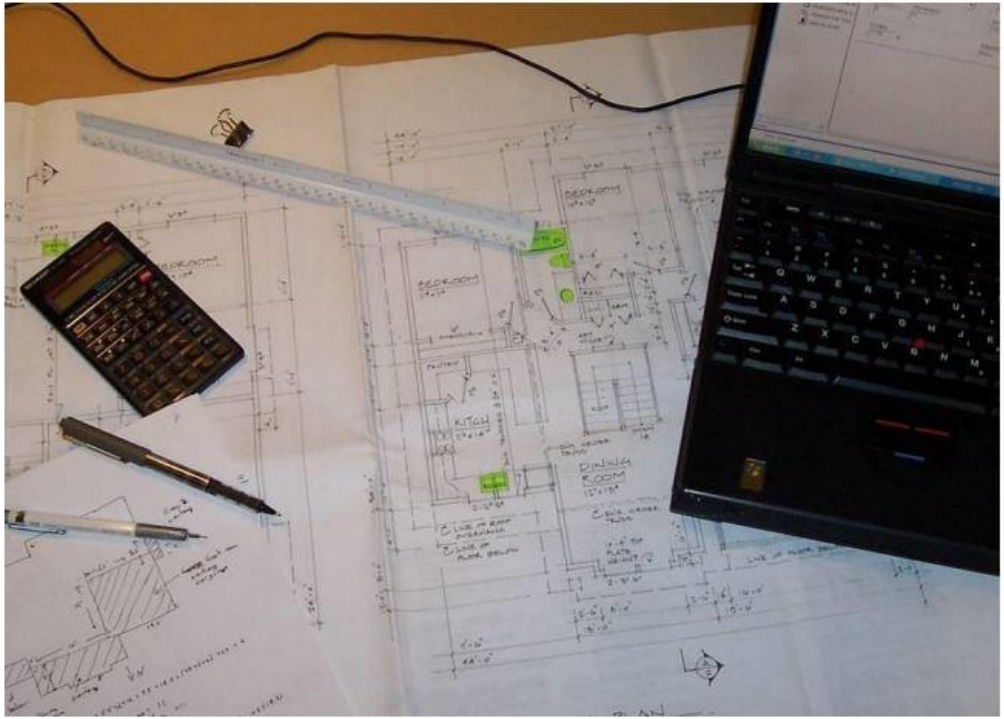
The following metrics are used in the *BC Energy Step Code* to assess which step a building achieves. The Building Envelope Metrics and the Equipment and Systems Metrics are demonstrated through a whole-building energy model of the design, while the Airtightness Metric is demonstrated through an on-site test of the building before occupancy. See *Appendix A* for a table of the required values by step for different climate zones and different building types.

	PART 9	PART 3
Building envelope metrics	***Thermal Energy Demand Intensity (TEDI):*** The amount of annual heating energy needed to maintain a stable interior temperature, taking into account heat loss through the envelope and passive gains (i.e., the amount of heat gained from solar energy passing through the envelope or from activities in the home like cooking, lights, and body heat). It is calculated per unit of area of the conditioned space over the course of a year, and expressed in kWh/(m²·year).	
	Peak Thermal Load (PTL): The maximum amount of energy needed to heat a building on the coldest day of the year, expressed in W/m² of conditioned space. Energy modellers also refer to this as "Design Heat Loss."	
Equipment and systems metrics	***Percent Lower than EnerGuide Reference House:*** An EnerGuide reference house establishes how much energy a home would use if it was built to base building code standards. This metric identifies how much less energy - stated as a percentage - the new home will require compared to the reference house. ***Mechanical Energy Use Intensity:*** The modelled amount of energy used by space heating and cooling, ventilation, and domestic hot water systems, per unit of area, over the course of a year, expressed in kWh/(m²·year).	***Total Energy Use Intensity:*** The modelled amount of total energy used by a building, per unit of area, over the course of a year, expressed in kWh/(m²·year). It includes plug loads - appliances, lighting, entertainment systems, and so on - and process loads, namely heating, cooling, fans, and other mechanical systems. Some exceptions for unique situations are permitted (for example, electric vehicle charging), as outlined in the modelling guidelines referenced in the *BC Energy Step Code* regulation. This metric may be challenging to achieve for specific buildings that have high process loads (for example, restaurants, hospitals, or large computer server farms).
Airtightness metrics	***Air Changes per Hour at a 50 Pa Pressure Differential (ACH_{50}):*** The number of times the full volume of air in the building exchanges in an hour when a building is at a specified pressure, different than the outdoor air pressure, as measured by a "blower door test". This measures the airtightness of the building (or how much air leaks through the building envelope).	***Air Leakage Rate:*** A measure of the rate that air leaks through the building envelope per unit area of the building envelope, as recorded in L/(s·m²) at a 75 Pa pressure differential.

So what do we do to get there?

What's the recipe?

2) Energy Advisor models the house



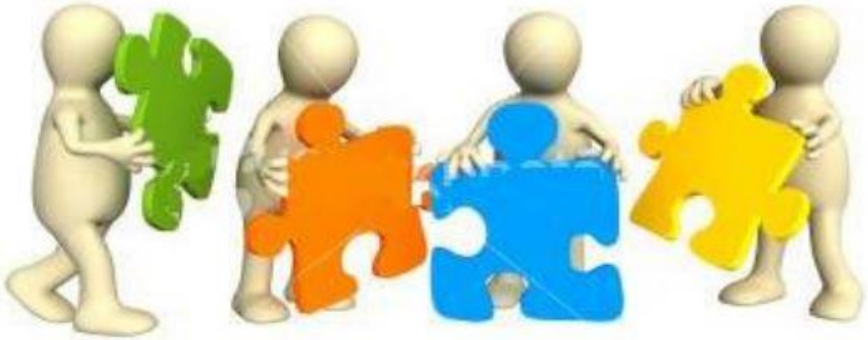
HOT2000

Natural Resources Canada · Ressources naturelles

HOT2000 outputs used to calculate Step Code Metrics:

- ✓ % lower energy than reference house
- ✓ MEUI
- ✓ TEDI
- ✓ PTL.

3) Energy Advisor and Builder develop a plan of action



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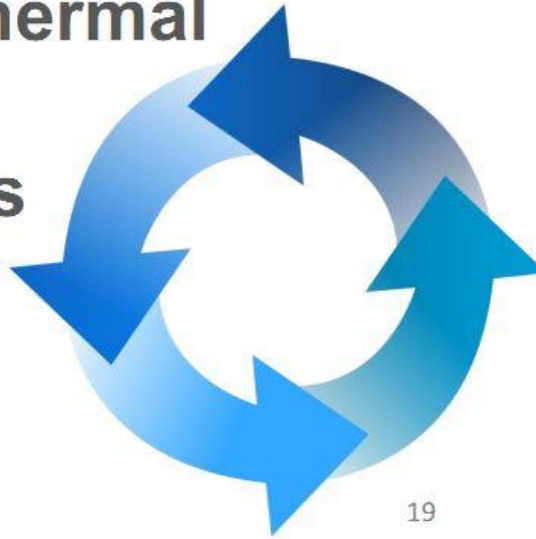
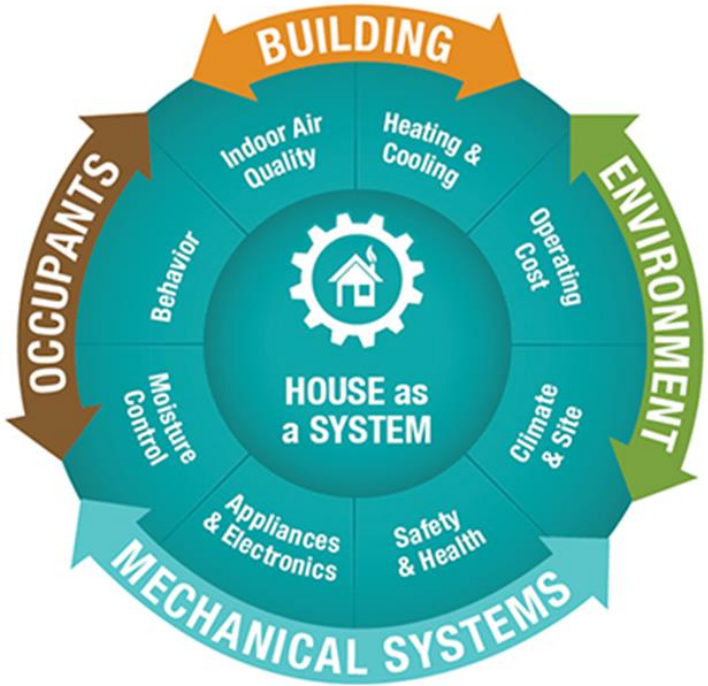
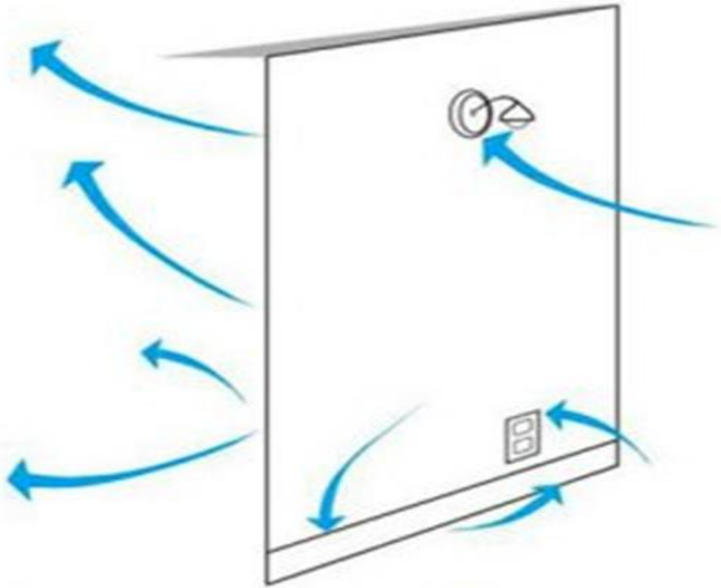
HOT2000 iterations evaluate potential upgrades:

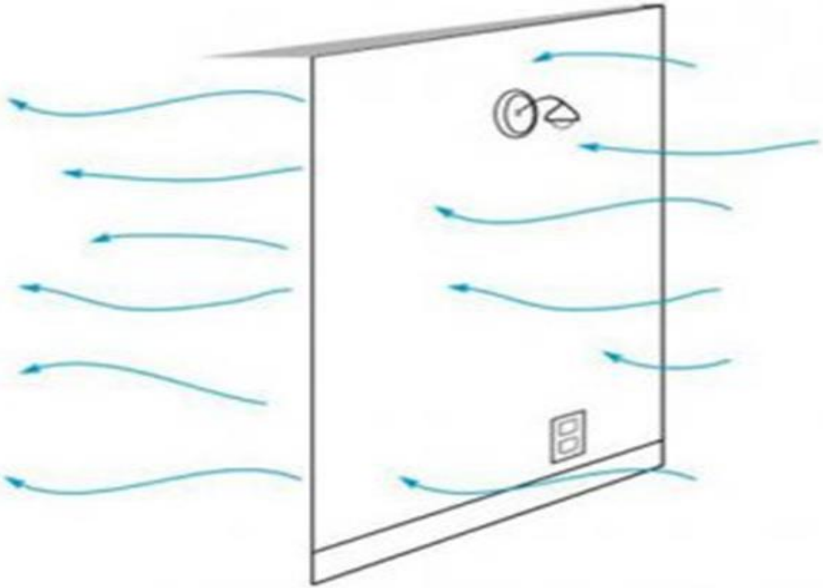
- ✓ Envelope upgrades (insulation, fenestration, air tightness, thermal bridging, etc)
- ✓ Mechanical system upgrades
- ✓ Heat recovery
- ✓ Lighting and appliances.



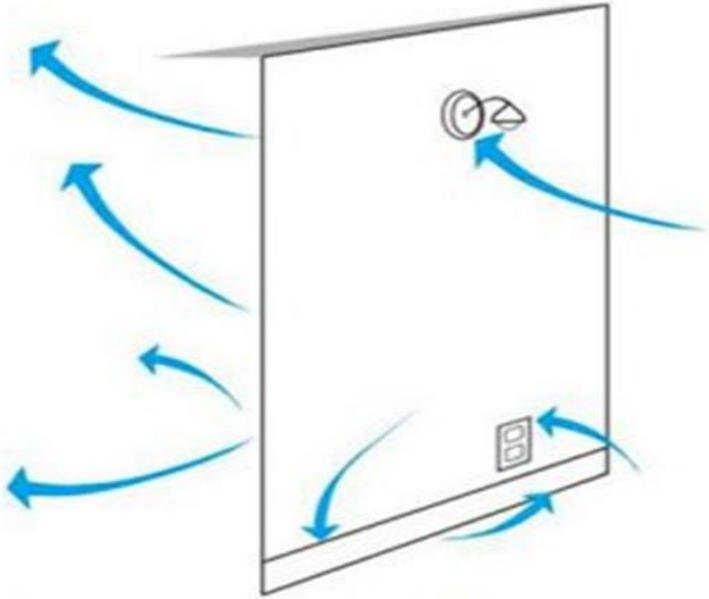

BUILDING
ENVIRONMENT
MECHANICAL SYSTEMS
OCCUPANTS
Indoor Air Quality
Heating & Cooling
Operating Cost
Climate & Site
Safety & Health
Appliances & Electronics
Moisture Control
Behavior
HOUSE as a SYSTEM



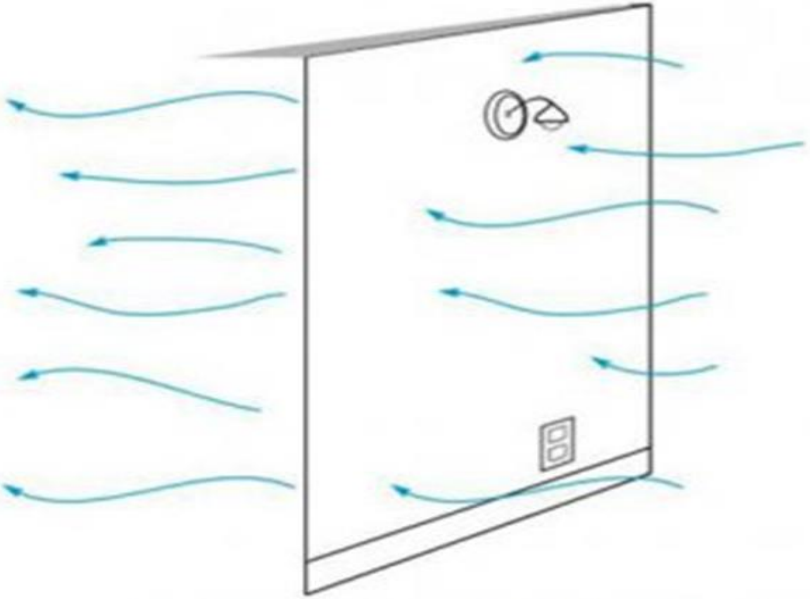
Air barriers stop air leakage through individual holes



Vapour barriers stop diffusion of moisture through solid material



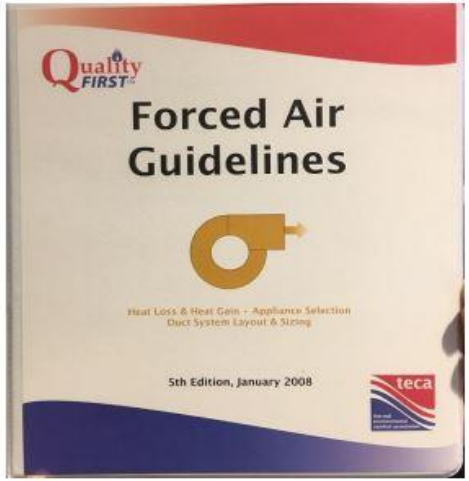
Air barriers stop air leakage through individual holes



Vapour barriers stop diffusion of moisture through solid material

Which upgrades make sense?

- ✓ Cost?
- ✓ Availability?
- ✓ Effect on Step Code metrics?
- ✓ Constructability?
- ✓ Synergies?
- ✓ Builder preference.



4) Builder completes house, Energy Advisor confirms construction details

Make sure you build what you agreed on!

- ✓ If changes, notify your Energy Advisor
- ✓ The energy model will need to be updated.

Energy Adviser Industry Ready for Energy Step Code

	2017	2018 (est.)	2019 (est.)
# Energy Advisors	60	85	100
Total new homes that Energy Advisors could serve	7200	10300	11760
Total new homes in BC	11,719	11,719	11,719
Proportion of Market Supplied	61%	87%	100%

Source: Modus Planning, Design & Engagement Inc. and Brantwood Consulting. April 2017. "Energy Step Code Training & Capacity Project: Summary Report".

BC’s Home-Building Industry is Ready

- Builders value Energy Step Code’s consistency

- Help eliminate confusion between local municipal codes for builders working in multiple jurisdictions

BC’s Home-Building Industry is Ready

- **“Steps 1-3”** cost-effective across BC
- **“Steps 4-5**” High Performance builders - already there
- As Technologies and systems progress, affordability increases

Projects Achieving Energy Step Code Performance Today

- [examples]

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- [examples]

Thank You!

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