

Energy Performance Excellence:

Four East Kootenay residential
builds that cost-effectively
meet Steps 3, 4 and 5, of the
BC Energy Step Code

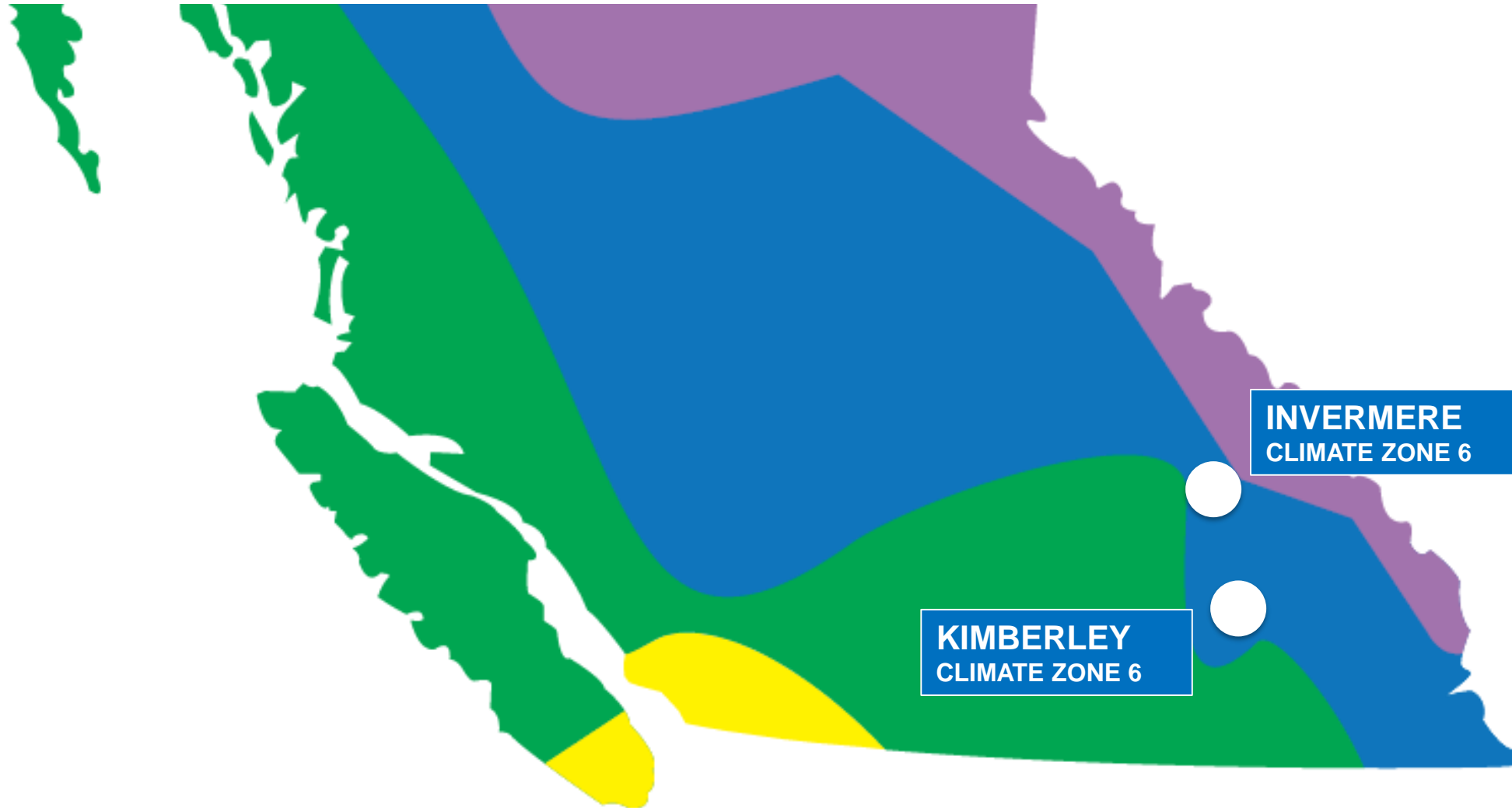
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Community Energy Manager,
Community Energy Association
October 2020

ENERGY
STEPCODE
BUILDING BEYOND THE STANDARD



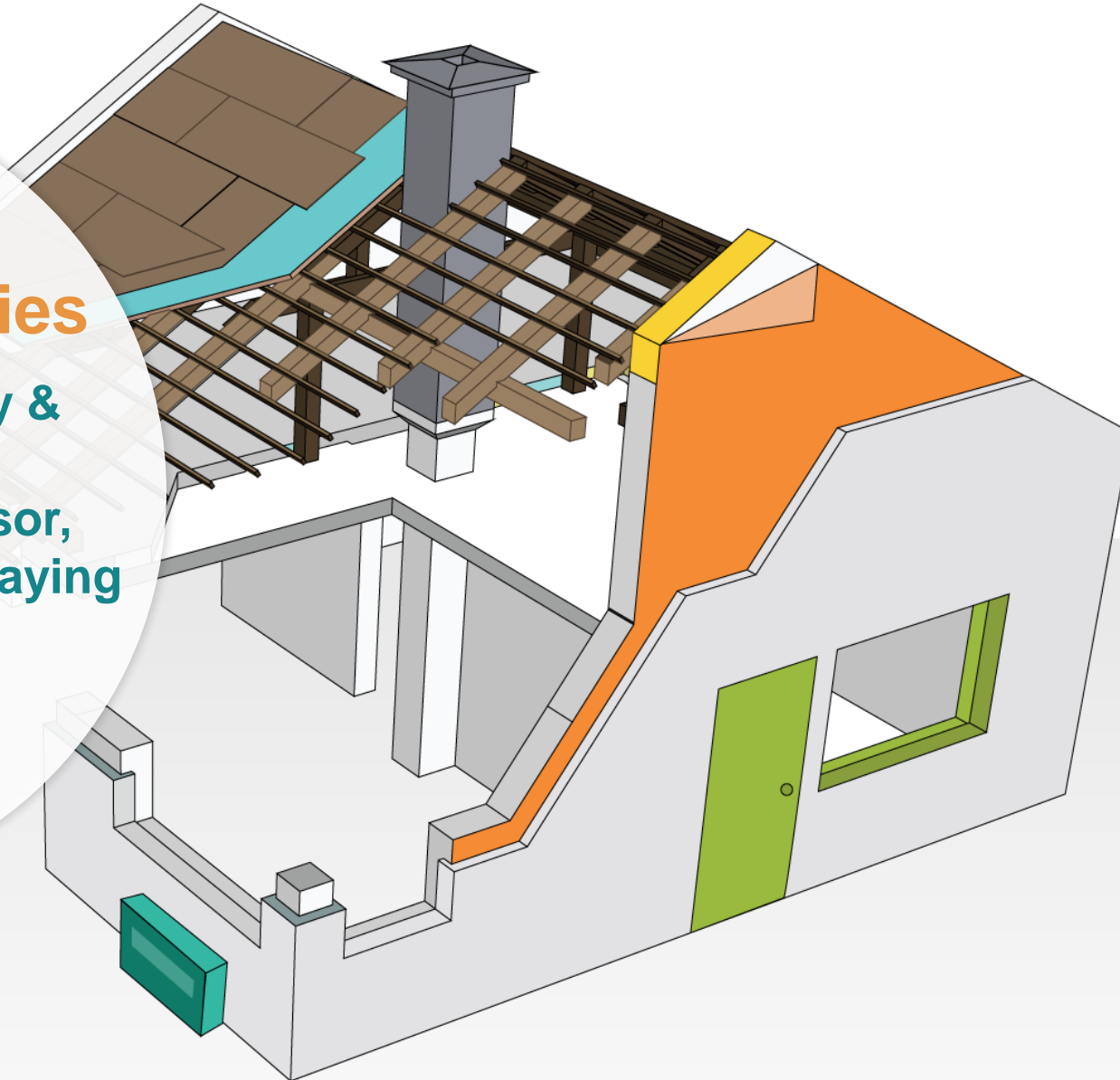
Embracing the Energy Step Code: 4 East Kootenay Case Studies



A look inside an energy efficient home

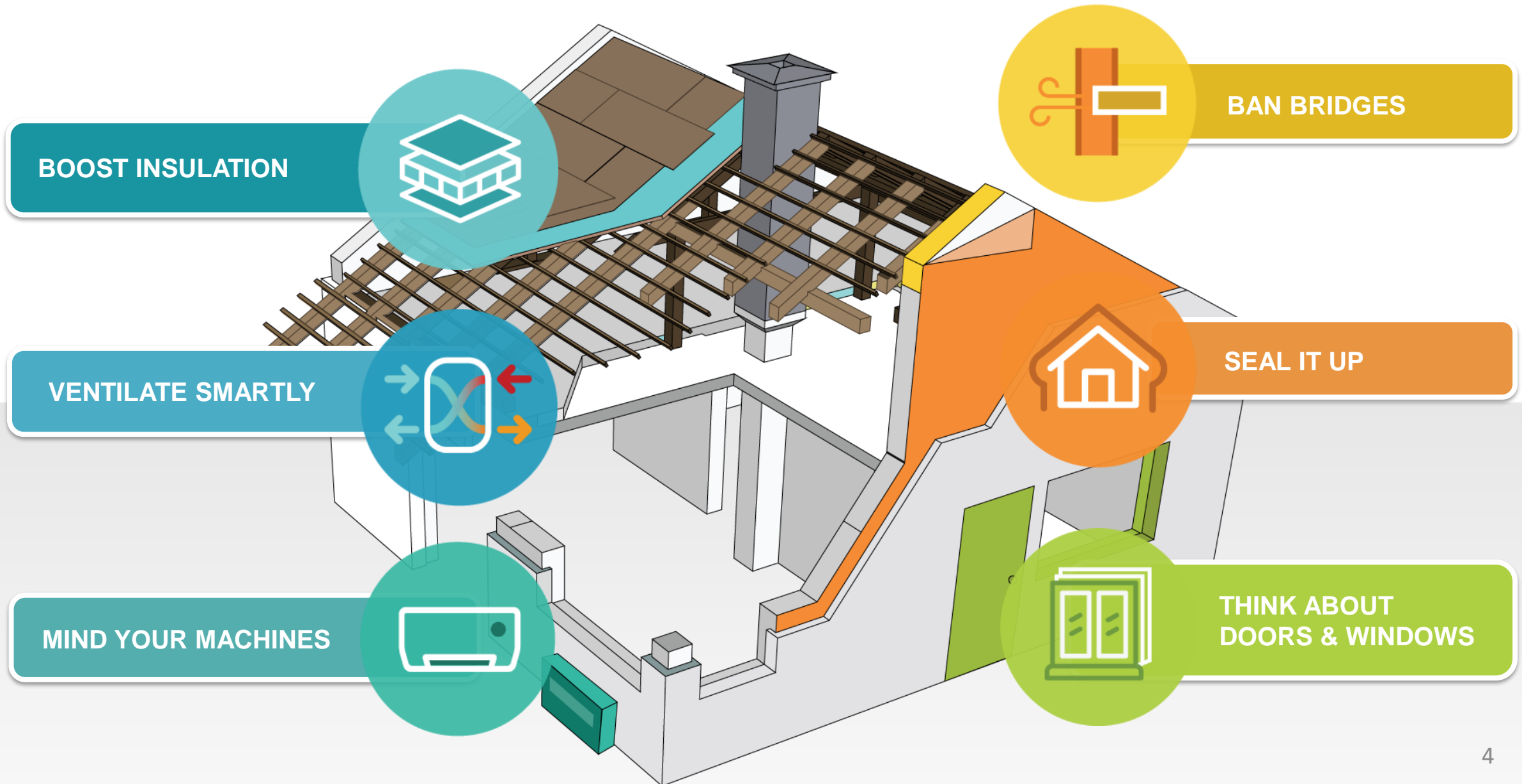
10 Proven Strategies

Achieve energy efficiency & prepare for the future by engaging an energy advisor, designing to context, & paying attention to detail.



Six Basic Strategies

that cost-effectively boost performance



Six Basic Strategies

that cost-effectively boost performance

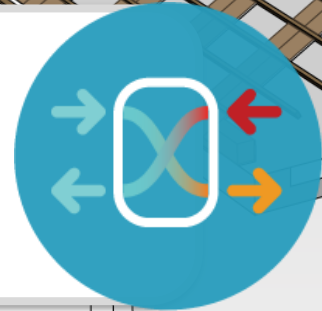
BOOST INSULATION

To reduce heat loss, increase insulation in walls, floors, roof, and foundation.



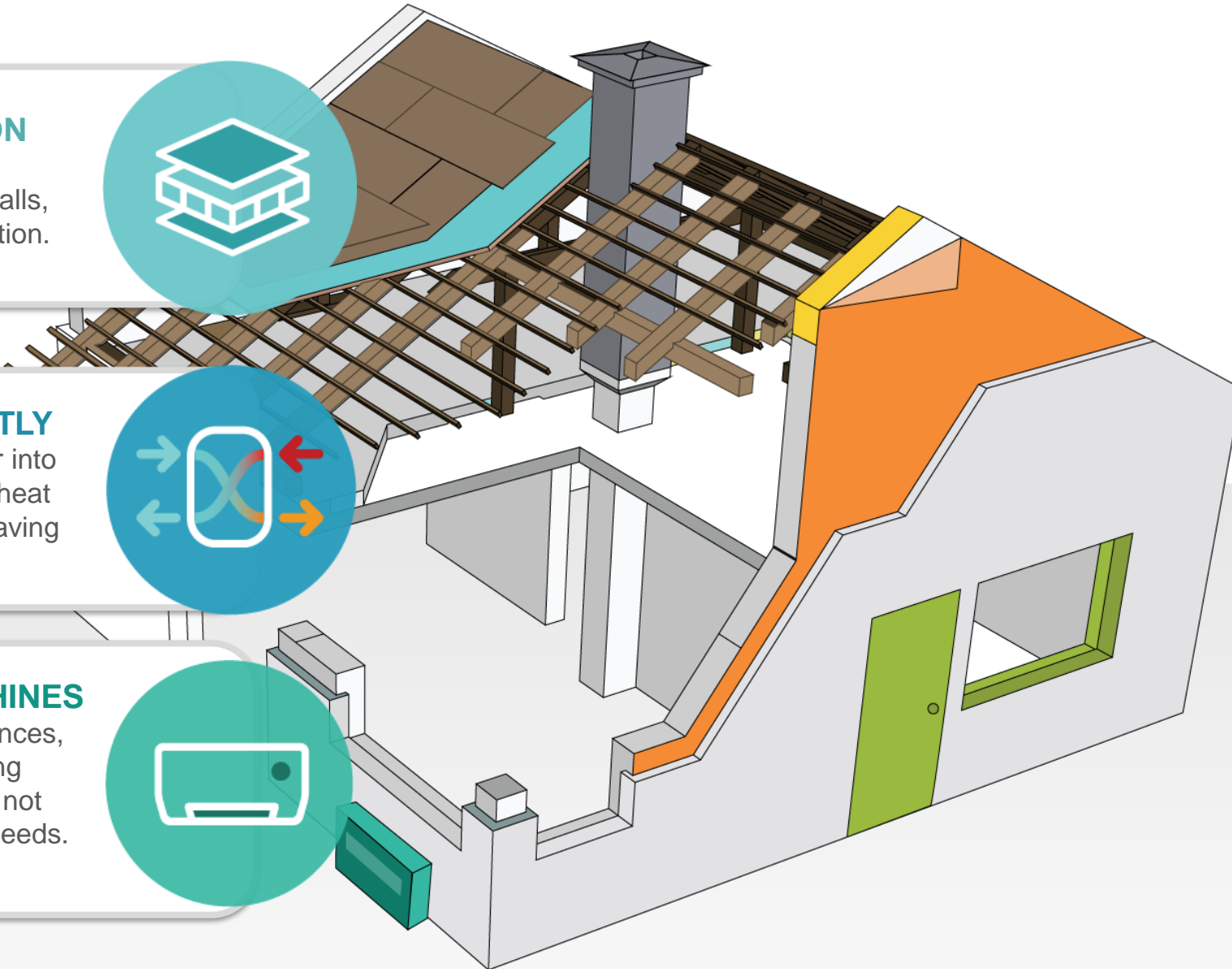
VENTILATE SMARTLY

Bring plenty of fresh air into the home and recover heat from the exhaust air leaving the building.



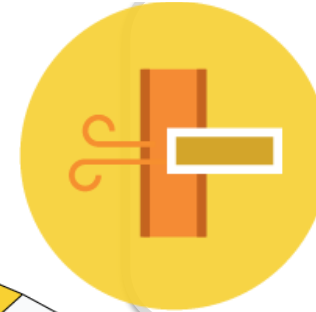
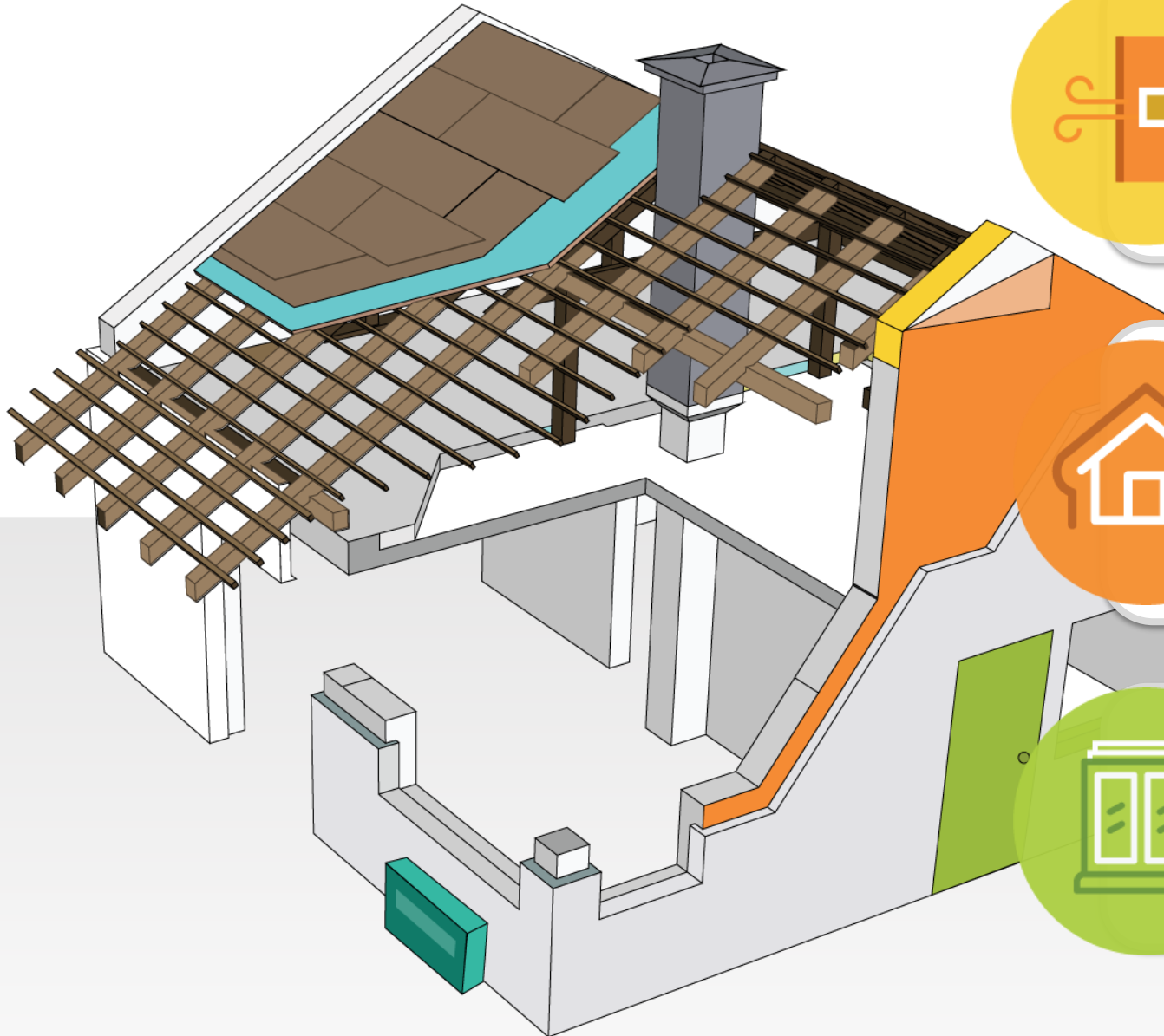
MIND YOUR MACHINES

Specify efficient appliances, and ensure your heating system will meet – but not exceed – the home's needs.



Six Basic Strategies

that cost-effectively boost performance



BAN BRIDGES

A break in your insulation acts like a bridge that carries heat straight out of the house. Take care with corners, junctions, gaps and studs!



SEAL IT UP

Air leaks are heat leaks. Wrap the home tightly, taking care to seal around ducts, pipes, fixtures, and wires that pass through walls, ceilings, and roof.



THINK ABOUT DOORS & WINDOWS

Carefully consider their energy performance, size, and location.

Four Next Level Strategies

to maximize energy performance & optimize design

ENERGY MODEL FIRST



OPTIMIZE SOLAR EXPOSURE



FUTURE PROOF DESIGN



DESIGN TO YOUR CONTEXT



Four Next Level Strategies

to maximize energy performance & optimize design

ENERGY MODEL FIRST

Involve an energy advisor early on to identify a combination of design elements optimally suited to your specific climate, location, budget & preferences.



OPTIMIZE SOLAR EXPOSURE

Use the sun to best advantage, thoughtfully orienting the building, to gain heat in winter and stay cool in summer.



FUTURE PROOF DESIGN

Consider and plan for future adaptation such as electric vehicle charging infrastructure, solar panels, or rainwater collection.



DESIGN TO YOUR CONTEXT

Choose a lot before choosing a building plan. Thoughtfully design to harmonize with the precise location of the lot.



CASE STUDY: Hideaways Development, Invermere



CASE STUDY: Hideaways Development, Invermere

Climate zone	6
Project size	1664 SQ FT
Build cost compared to code-built house	+5%
Energy efficiency over code-built house	+33%
Energy savings equivalent of BC Energy Step Code	Step 3

5% above
cost to build to the
energy efficiency
requirements of the
BC Building Code

“Attention to detail in the air sealing process is very important and makes a real difference.”

~Kipp Lester,
Chisel Peak Mountain Homes

MIND YOUR MACHINES

Installing a heat pump brought this house from 23% to 33% more energy efficient than a Code Built house.



CASE STUDY: Hideaways Development, Invermere

Project size	1664 SQ FT
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2019 estimated annual energy cost

Comparable code-built house	\$ 2,900
This home without heat pump	\$ 2,229
This home with heat pump	\$ 1,955
Potential yearly energy savings	\$ 981
	(33%)

CASE STUDY: Hideaways Development, Invermere

VENTILATE SMARTLY

An energy advisor helped right-size the **heat recovery ventilator** and balance the inflow and outflow of air.



SEAL IT UP

With **improved air sealing**, the team went from 33% to 49% more efficient than Code Built, in the same model, using otherwise identical building practices.



CASE STUDY: Hideaways Development, Invermere



THINK ABOUT DOORS & WINDOWS

The team specified **triple-pane windows** wherever possible.

BAN BRIDGES

2x8 construction reduces thermal bridging and prevents heat loss to the outdoors.



CASE STUDY: Hideaways Development, Invermere



BOOST INSULATION
2x8 walls with R28,
and **R40** in vaulted
ceilings.

FUTURE-PROOF DESIGN

The design intentionally incorporates provisions for heat-pump, electric vehicle charging and solar panel installation.



CASE STUDY: Fort Point Residence, Invermere





CASE STUDY: Fort Point Residence, Invermere

Climate zone	6
Project size	5325 SQ FT
Build cost compared to code-built house	+5%
Energy efficiency over code-built house	+54%
Energy savings equivalent of BC Energy Step Code	Step 4

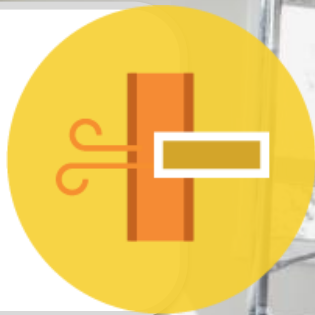
5% above
costs to build to the
energy efficiency
requirements of the
BC Building Code

“ We used the exact same building practices on this much higher end home and achieved fantastic ratings with relatively little additional work.

~Kipp Lester, Chisel Peak Construction

BAN BRIDGES

Standard 2x8 construction reduces thermal bridging and discourages heat loss to the outdoors.



MIND YOUR MACHINES

Right-sized, coordinated, high-efficiency mechanical components included in-floor heating, furnace, heat recovery ventilator and smart thermostats.

CASE STUDY: Fort Point Residence, Invermere

Project size 5325 SQ FT

2019 estimated annual energy cost

Comparable code-built home \$ 6, 930

This home \$ 3,173

Potential energy savings \$ 3,757

(54%)

CASE STUDY: Fort Point Residence, Invermere

SEAL IT UP

The team ensured a **good seal at the plate line** between floors. **Mid-construction air tightness** testing identified leaks in time to fix them.



THINK ABOUT DOORS & WINDOWS

The design specified **triple-pane windows**. Sourcing them is becoming easier.



CASE STUDY: Residential Four-Plex, Kimberley



CASE STUDY: Residential Four-Plex, Kimberley

Climate zone	6
Project size	7868 SQ FT
Build cost compared to code-built building	+4%
Energy efficiency over code-built building	+45%
BC Energy Step Code level	Step 4

4% above
cost to build to the
energy efficiency
requirements of the
2018 BC Building
Code

“The energy efficiency we achieve is not exceptional or hard to do. We pay a little extra attention to detail and there is a bit of cost to it, but any builder could do this.”

~Carl Lauren, Owner,
Tyee Homes

CASE STUDY: Residential Four-Plex, Kimberley



ENERGY MODEL FIRST

An energy advisor helped balance design features and materials selection to optimize energy efficiency.



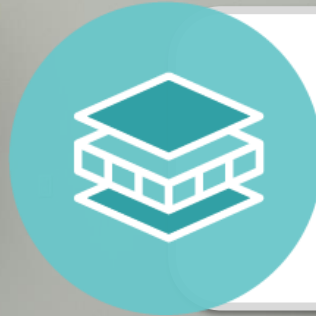


MIND YOUR MACHINES

Right-sized, coordinated, high-efficiency mechanical components included furnace, heat recovery ventilator and smart thermostats.



CASE STUDY: Residential Four-Plex, Kimberley



BOOST INSULATION

Attention to detail from the insulation trade is a critical part of reaching the efficiency target.



SEAL IT UP

Trades understand the efficiency targets of the project from the start. Achieving and protecting a continuous air barrier key.

CASE STUDY: Forest Crowne Residence, Kimberley



CASE STUDY: Forest Crowne Residence, Kimberley

Climate zone	6
Project size	3000 SQ FT
Build cost compared to code-built house	+5%
Energy efficiency over code-built house	+61%
BC Energy Step Code level	Step 5

5% above
*cost to build to the
energy efficiency
requirements of the
BC Building Code*

*A house needs to be designed
for its lot. We chose a lot that
gets a lot of sun and then
optimized window and solar
panel placement.*

~Sanford Brown, owner/builder

CASE STUDY: Forest Crowne Residence, Kimberley

DESIGN PRIORITIES

Compact & comfortable
Ample natural light
Familiar construction techniques
Low operating costs
Solar-ready



DESIGN TO YOUR CONTEXT

The builder chose a lot before choosing a building plan & worked with an energy advisor to design for the precise conditions of the site.

CASE STUDY: Forest Crowne Residence, Kimberley

BAN BRIDGES

Double 2x4 wall & underslab insulation sit on top of the footings preventing heat loss via thermal bridging.



BOOST INSULATION

Extra insulation was added where ever possible, from footings to double 2x4 walls to roof spaces.



CASE STUDY: Forest Crowne Residence, Kimberley



SEAL IT UP

Exterior air-barrier minimized envelope penetrations & a **mid-construction air tightness test** caught leaks in time to fix them.

CASE STUDY: Forest Crowne Residence, Kimberley



OPTIMIZE SOLAR EXPOSURE

A **south-oriented, 45° roof** captures the greatest amount of sun for this solar-powered home. **Careful window placement** & selection prevents overheating while providing plentiful natural light.



FUTURE PROOF DESIGN

Roof utility & ventilation penetrations locations did not interfere with solar panel installation.

Further Resources

Accompanying case study videos, and additional Energy Step Code resources, may be found on CEA's ***Building A Legacy*** [webpage](#) and YouTube [channel](#).



For More Information



www.EnergyStepCode.ca

Questions?

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Community Energy
Association