

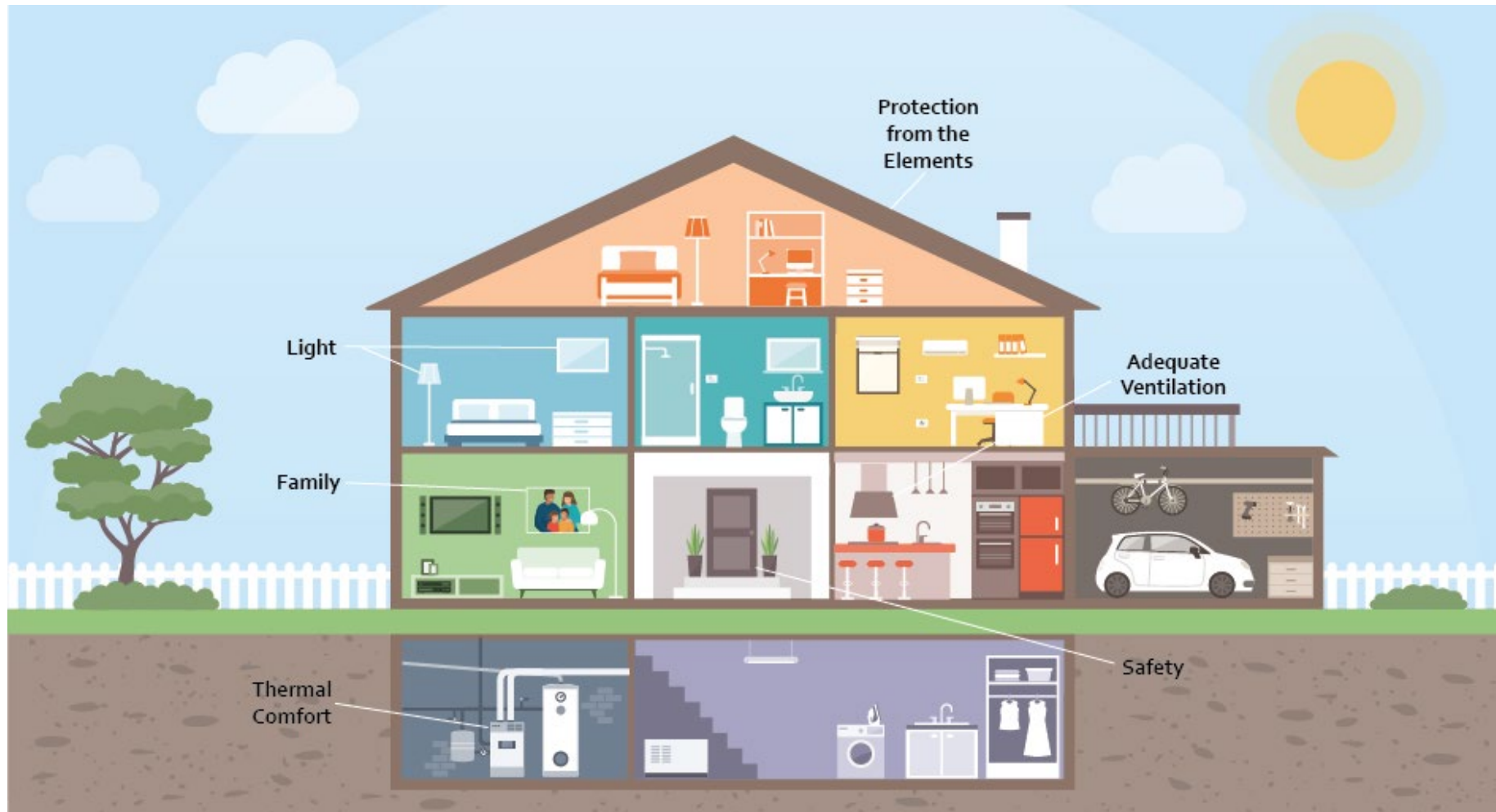


FIRST NATIONS HOME ENERGYSAVE

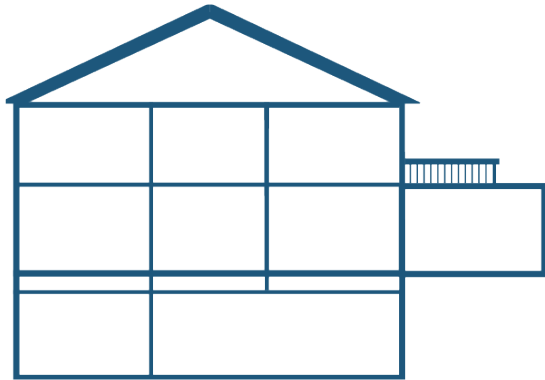


UNDERSTANDING BUILDING SYSTEMS

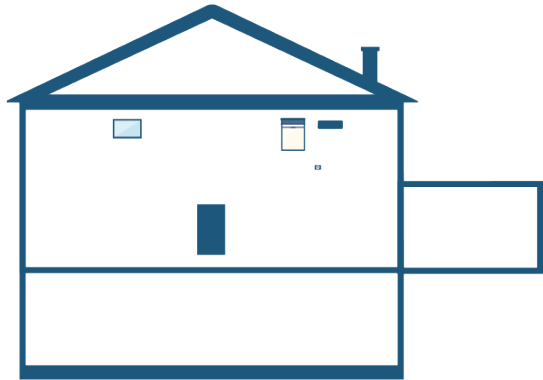
IMPORTANCE OF HOUSING



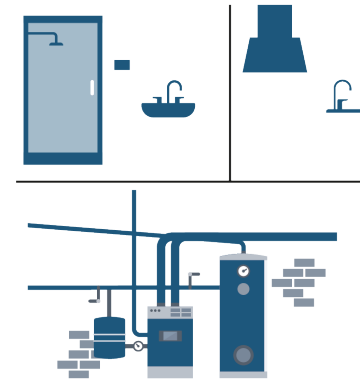
MAIN SYSTEMS IN A HOME



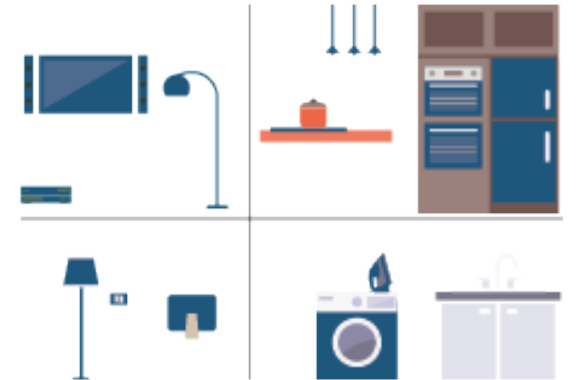
2. Structural



3. Envelope



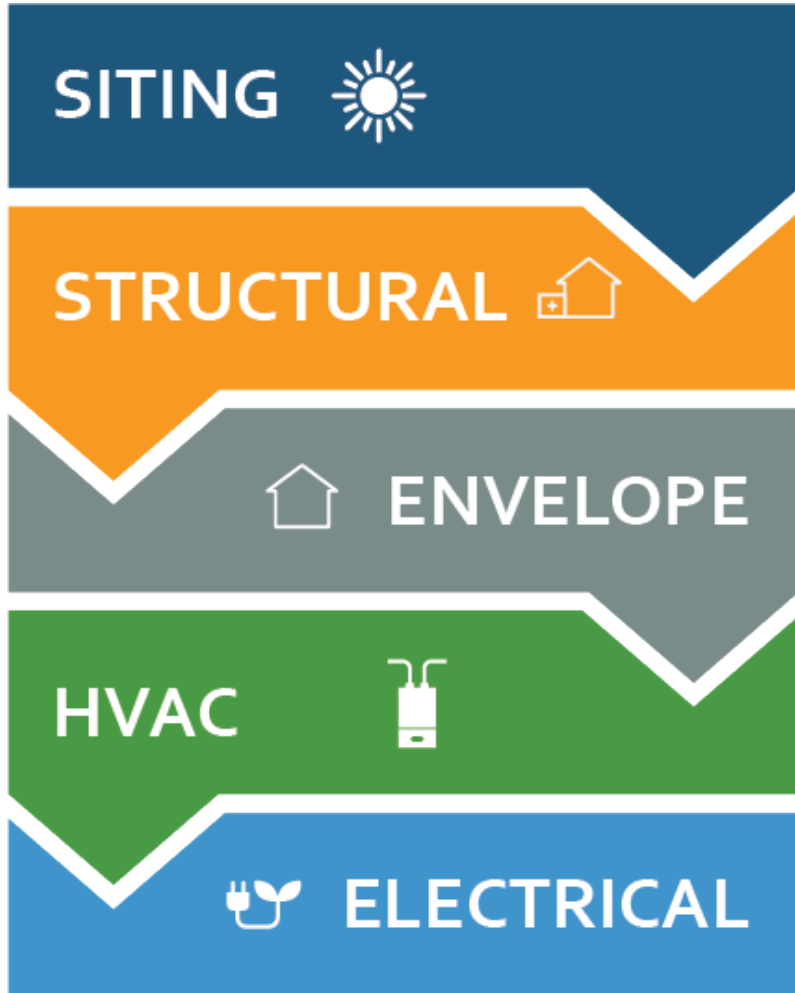
4. Heating, Ventilation & Air Conditioning (HVAC)



5. Electrical

1. Location / Siting

BUILDING SYSTEMS AND PERFORMANCE



Building systems can be looked at as a hierarchy. Siting (location) will influence your structural considerations, which will influence envelope, etc. The higher on the list, the harder (and more expensive) it is to change once the home is built.



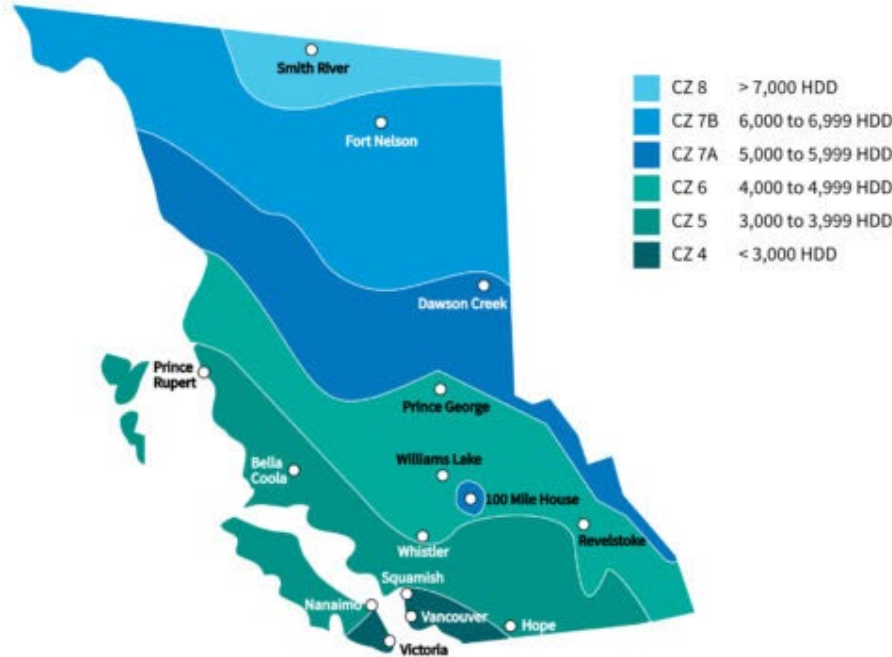
LOCATION / SITING



You can't change the location you're building in, but understanding the site conditions can help you determine your design requirements.

Climate Zones

The BC Building Code defines the energy performance targets of the Step Code based on the building's climate zone (CZ). The BC climate zones are defined by the average heating degree-days below 18° C (HDD). The BC Building Code states that the authority having jurisdiction (AHJ) can establish climatic values to define climate zones, typically based on information from Environment Canada, and building designers must consult the AHJ before making any assumptions about a building's climate zone. Note that in some locations, there may be several climate zones due to variations in elevation.



BC Climate Zone Per BCBC (* denotes locations with multiple climate zones)

CZ 4 < 3,000 HDD

Abbotsford	Duncan	Langley	Richmond	Surrey
Agassiz	Delta	Mission	Sechelt	Vancouver
Burnaby*	Maple Ridge	New Westminster	Sidney	Victoria
Chilliwack	Jordan River	North Vancouver*	Sooke	West Vancouver
Crofton	Langford	Port Renfrew	Squamish	White Rock

CZ 5 3,000 to 3,999 HDD

Alberni	Courtenay	Ladysmith	Osoyoos	Queen Charlotte City
Ashcroft	Crescent Valley	Lillooet	Parksville	Salmon Arm
Bamfield	Gold River	Lytton	Penticton	Sandspit
Bella Bella	Grand Forks	Masset	Port Alberni	Tahsis
Bella Coola	Hope	Merritt	Port Alice	Tofino
Burnaby (SFU)	Kamloops	Montrose	Port Hardy	Trail
Cache Creek	Kaslo	Nakusp	Port McNeill	Ucluelet
Campbell River	Kelowna	Nanaimo	Powell River	Vernon
Castlegar	Kitimat Plant	Nelson	Prince Rupert	Youbou
Comox	Kitimat Townsite	Ocean Falls	Qualicum Beach	

CZ 6 4,000 to 4,999 HDD

Carmi	Fernie	McBride	Revelstoke	Williams Lake
Cranbrook	Golden	Prince George	Stewart	
Dog Creek	Greenwood	Princeton	Terrace	
Elko	Kimberley	Quesnel	Whistler	

CZ 7A 5,000 to 5,999 HDD

100 Mile House	Glacier
Burns Lake	Mackenzie
Chetwynd	McLeod Lake
Dawson Creek	Smithers
Fort St. John	Taylor

CZ 7B 6,000 to 6,999 HDD

Beaton River
Dease Lake
Fort Nelson

CZ 8 > 7,000 HDD

Smith River

STRUCTURAL

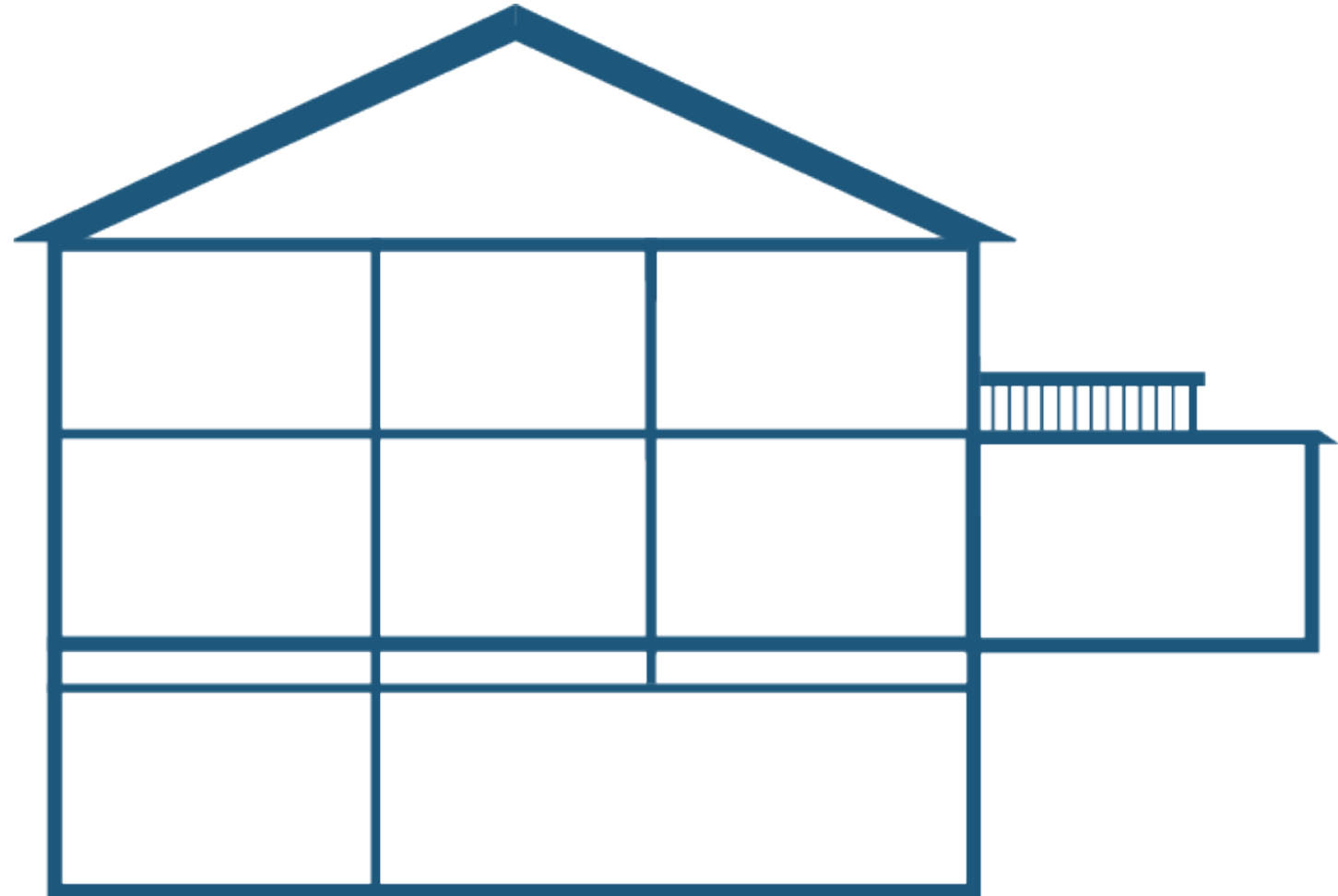


Structural influences are mostly determined at the design stage.

Some of the decisions that influence energy efficiency include:

- Size of the home
- If it has shared walls
- Density (how many people live there)
- Size and position of windows
- Materials used

Passive House Design is one example of focusing on design to minimize energy footprint.



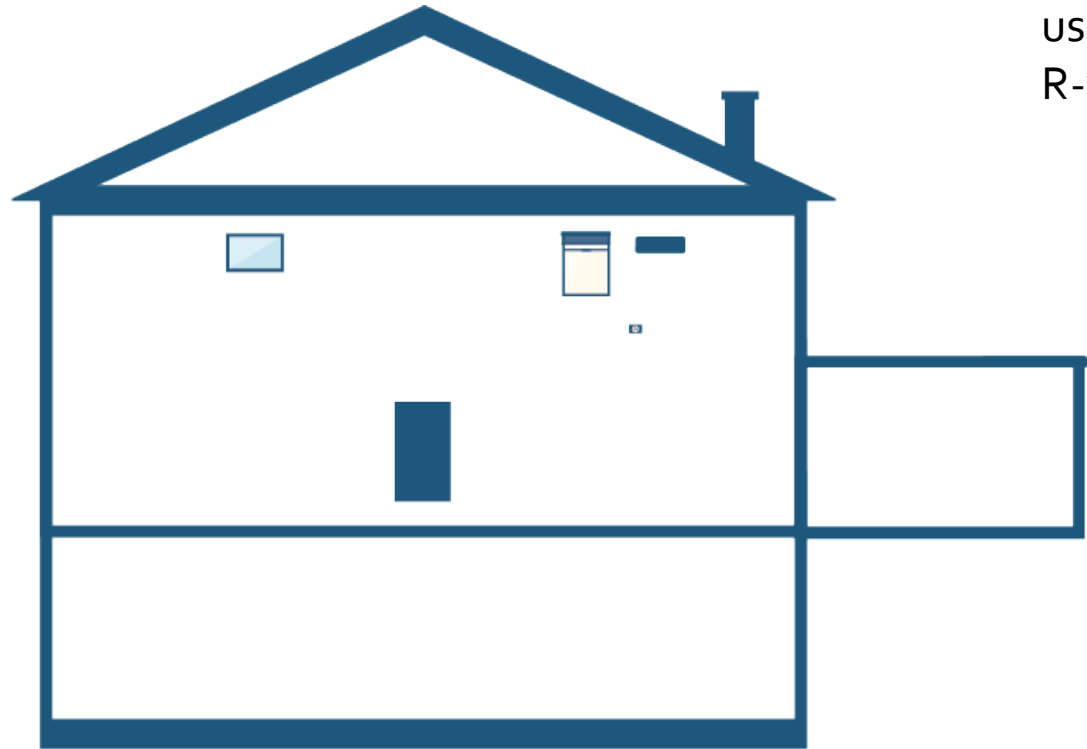
ENVELOPE



Envelope is the barrier between the heated and unheated spaces.

This includes:

- Roof
- Above-grade walls
- Below-grade walls
- Under slab insulation
- Windows and doors



R-VALUE or the insulative value of materials is a big idea in building envelope energy efficiency. U-Value is used for windows and is the opposite of R-value.

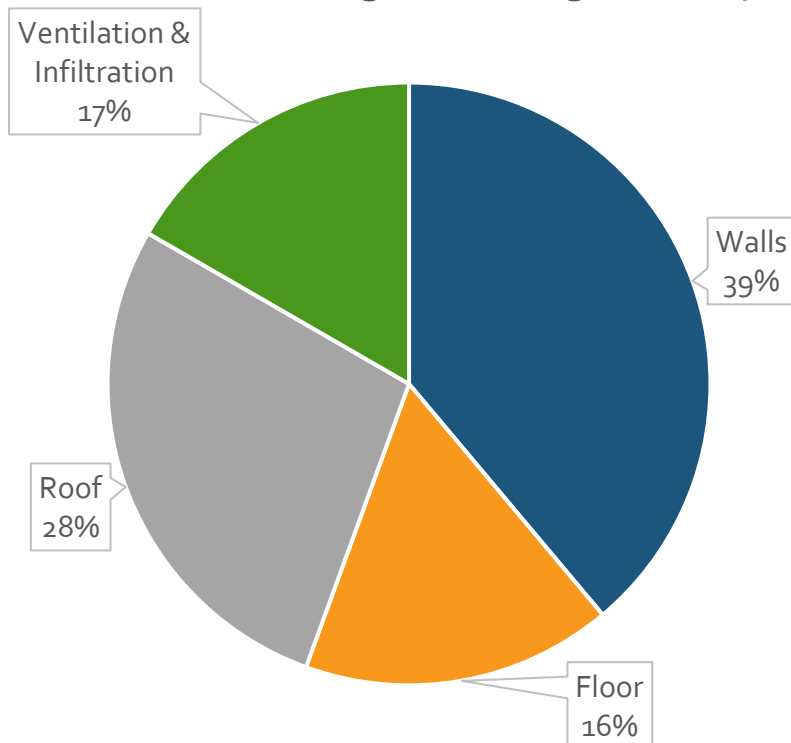
R-Value
Higher = Better

U-Value
Lower = Better

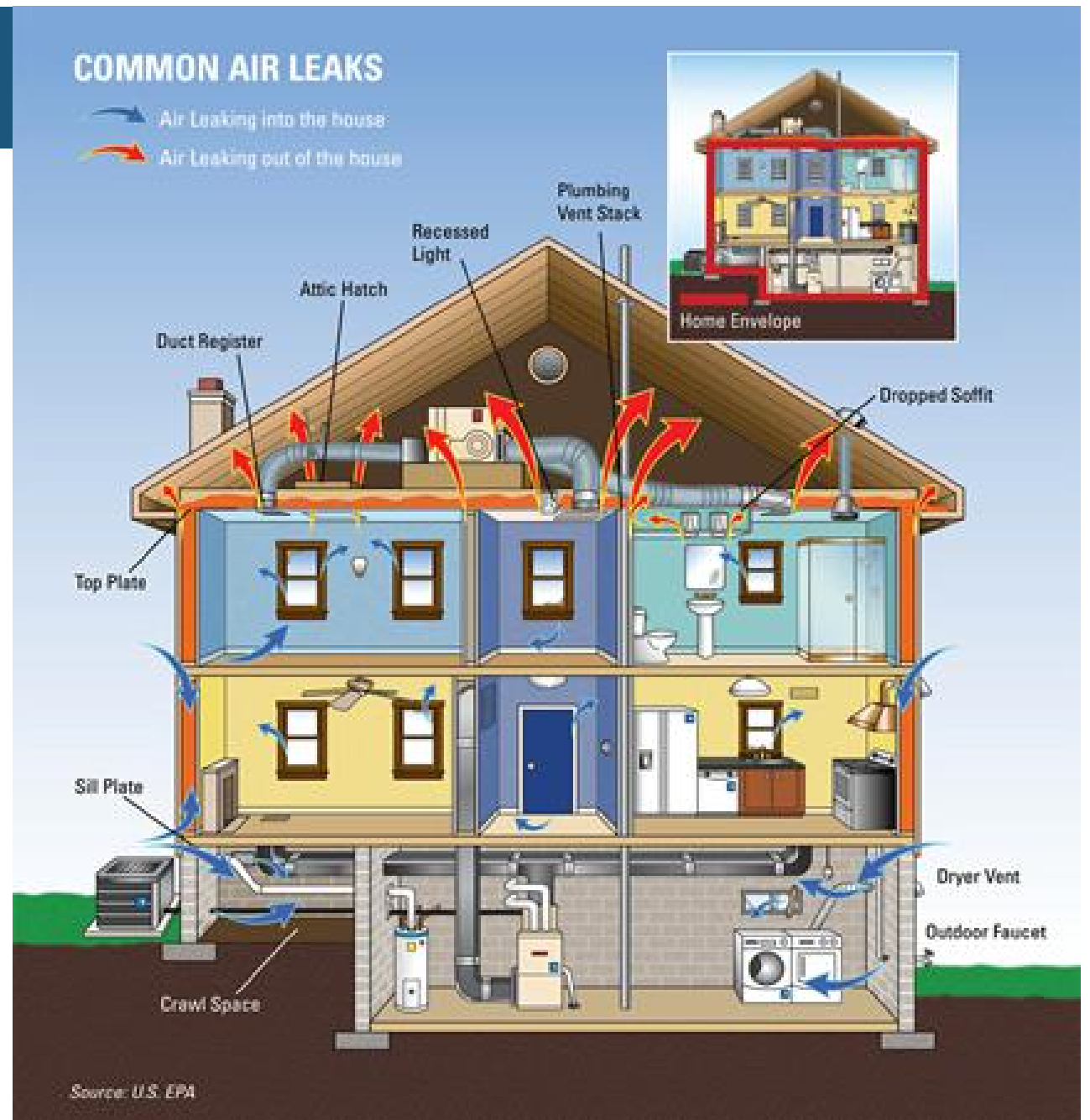
AIR TIGHTNESS

AIR TIGHTNESS is one big idea in envelope construction. It's a measure of how well sealed the house is from outside air. It also influences moisture management through ventilation.

Heat Loss Through Building Envelope



Source: US EPA, National Renewable Energy Laboratory

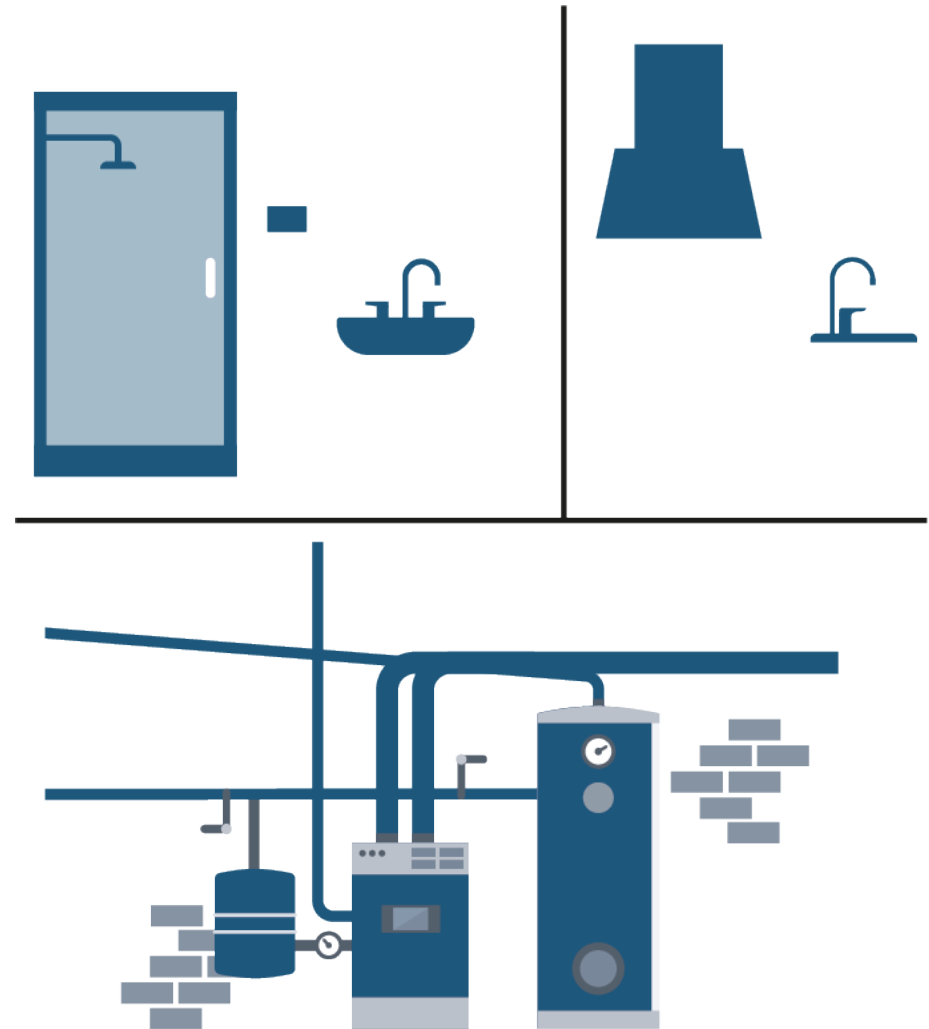


HVAC



HVAC stands for heating, ventilation and air conditioning. This system grouping includes domestic hot water (DHW) as well.

There are many ways to design a houses HVAC and DHW system, which can make renovating these systems a bit confusing.



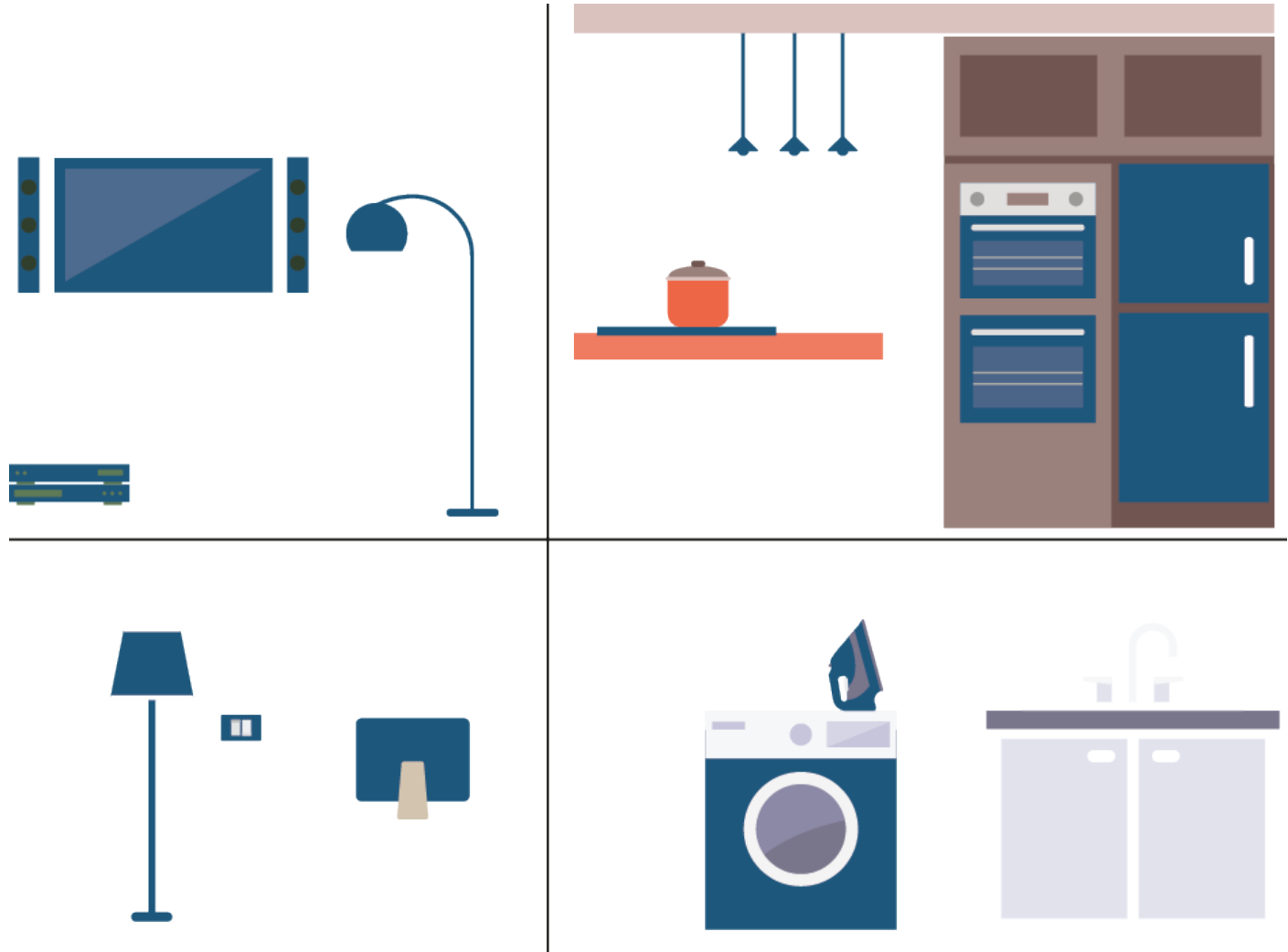
ELECTRICAL



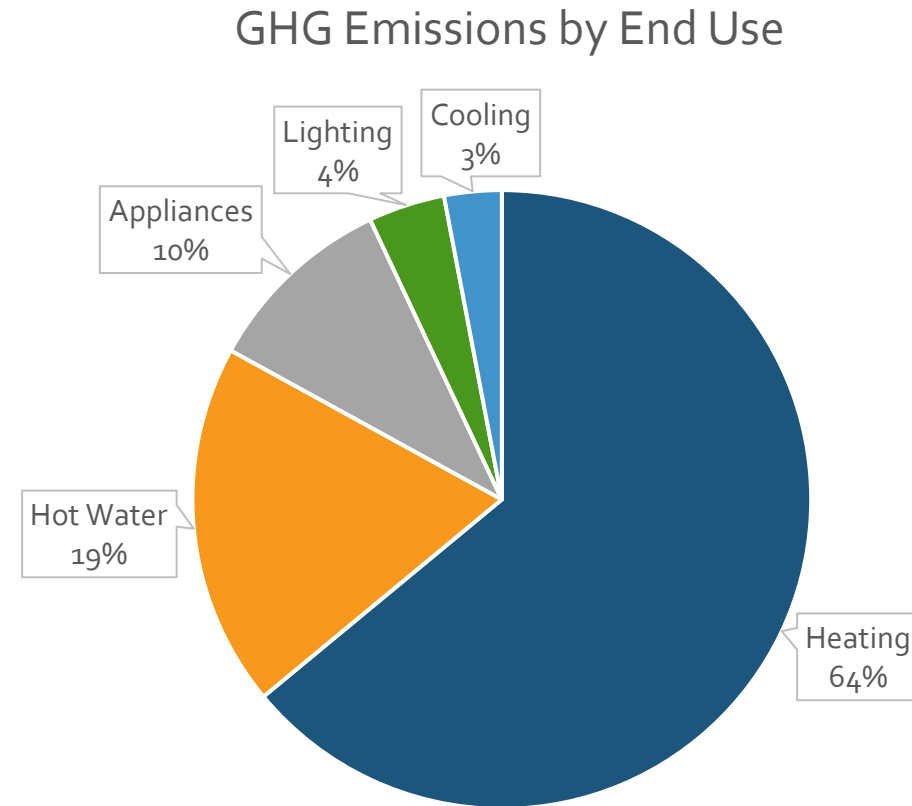
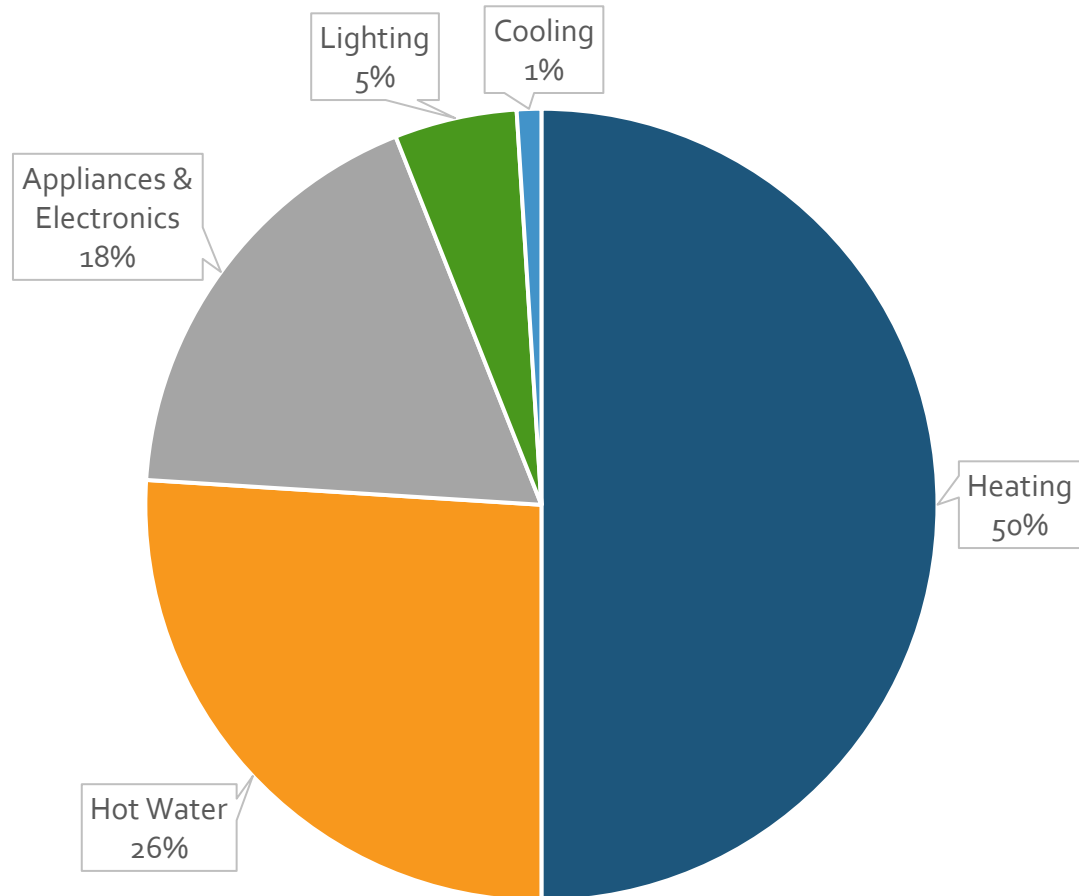
Electrical includes all the major appliances and plug in devices in a home. Some of this may be controlled by a housing manager (owner) and some by the resident.

While it's the smallest component of home energy use, it has been growing. It is also the most easily influenced and at the lowest cost.

Electric vehicle charging is a new component of home electricity use and something to keep in mind as well.

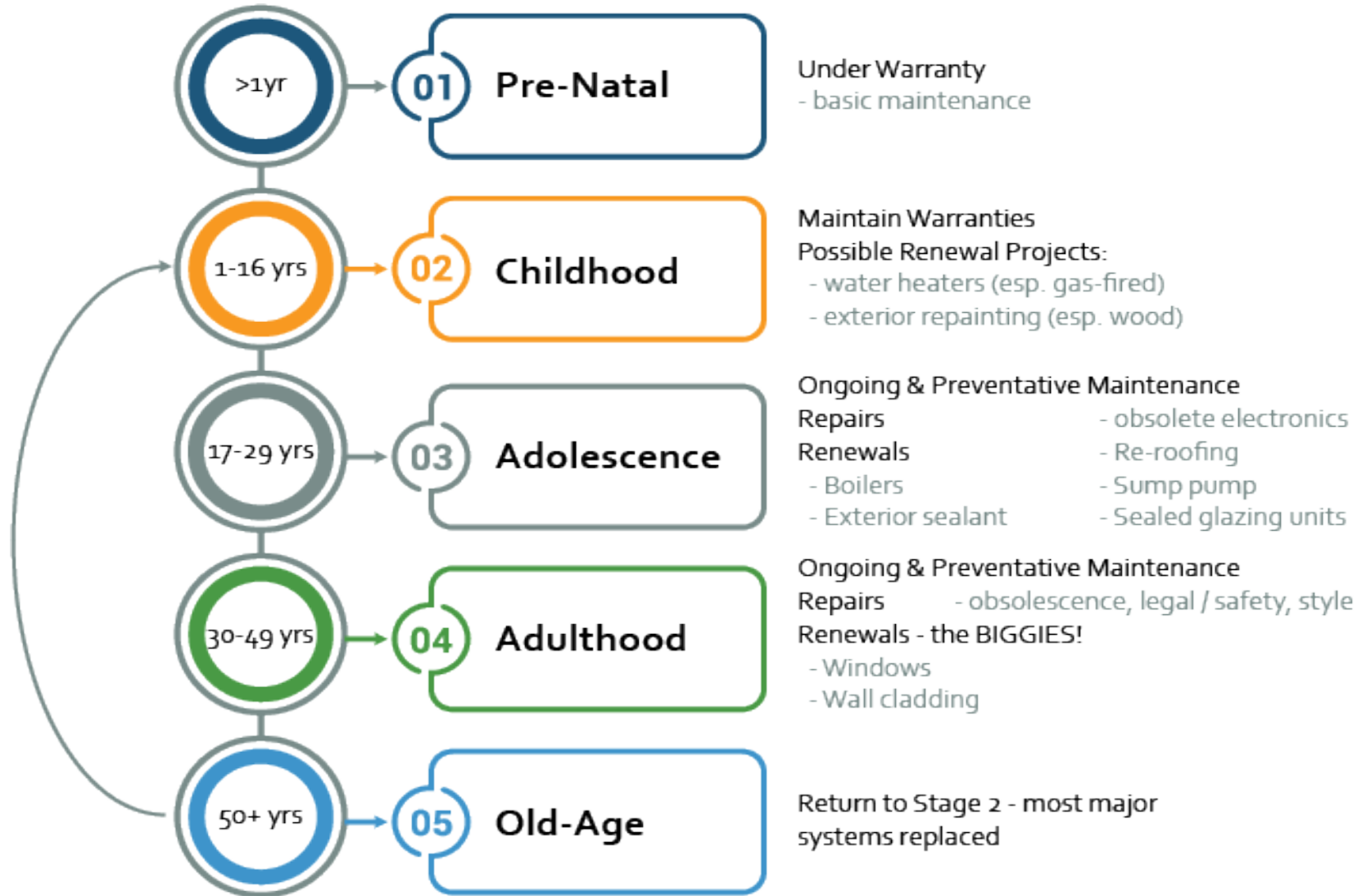


HOME ENERGY USE



Source: Natural Resources Canada, Office of Energy Efficiency, Comprehensive Energy Use Database, residential sector, BC, Table 2: Secondary Energy Use, 2016.

PERFORMANCE AND AGE



REDUCING GHG EMISSIONS



Buildings have a 50-year lifespan before all the systems are effectively replaced – so what we're building now will exist into 2070.

The Province of British Columbia has committed to reducing carbon emissions relative to 2007 levels. Many of the incentive programs currently available are to support GHG reductions.



2007



2030



2040



2050



Developed by



For the Fraser Basin Council's First Nations Home EnergySave program

With financial support from

