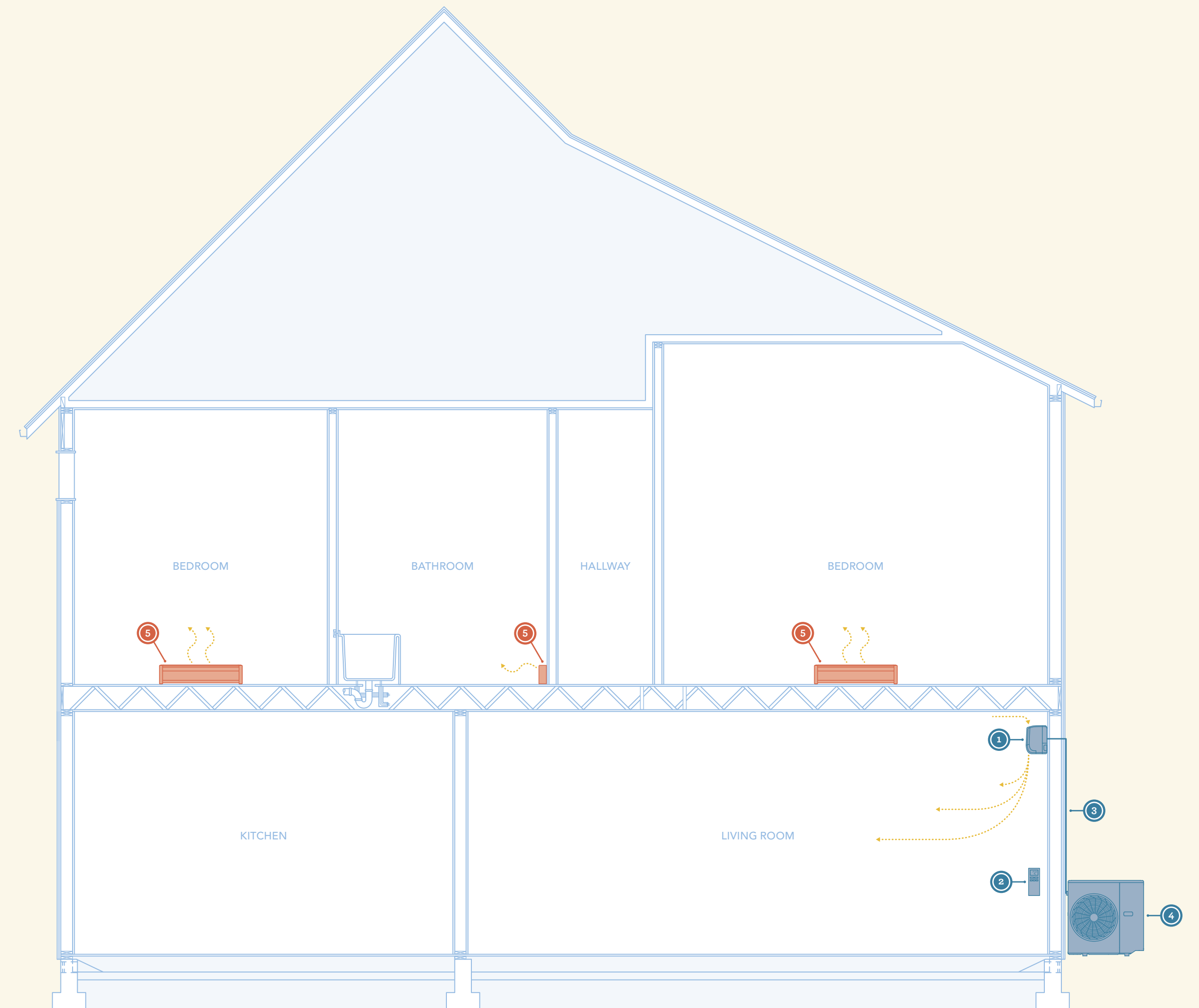
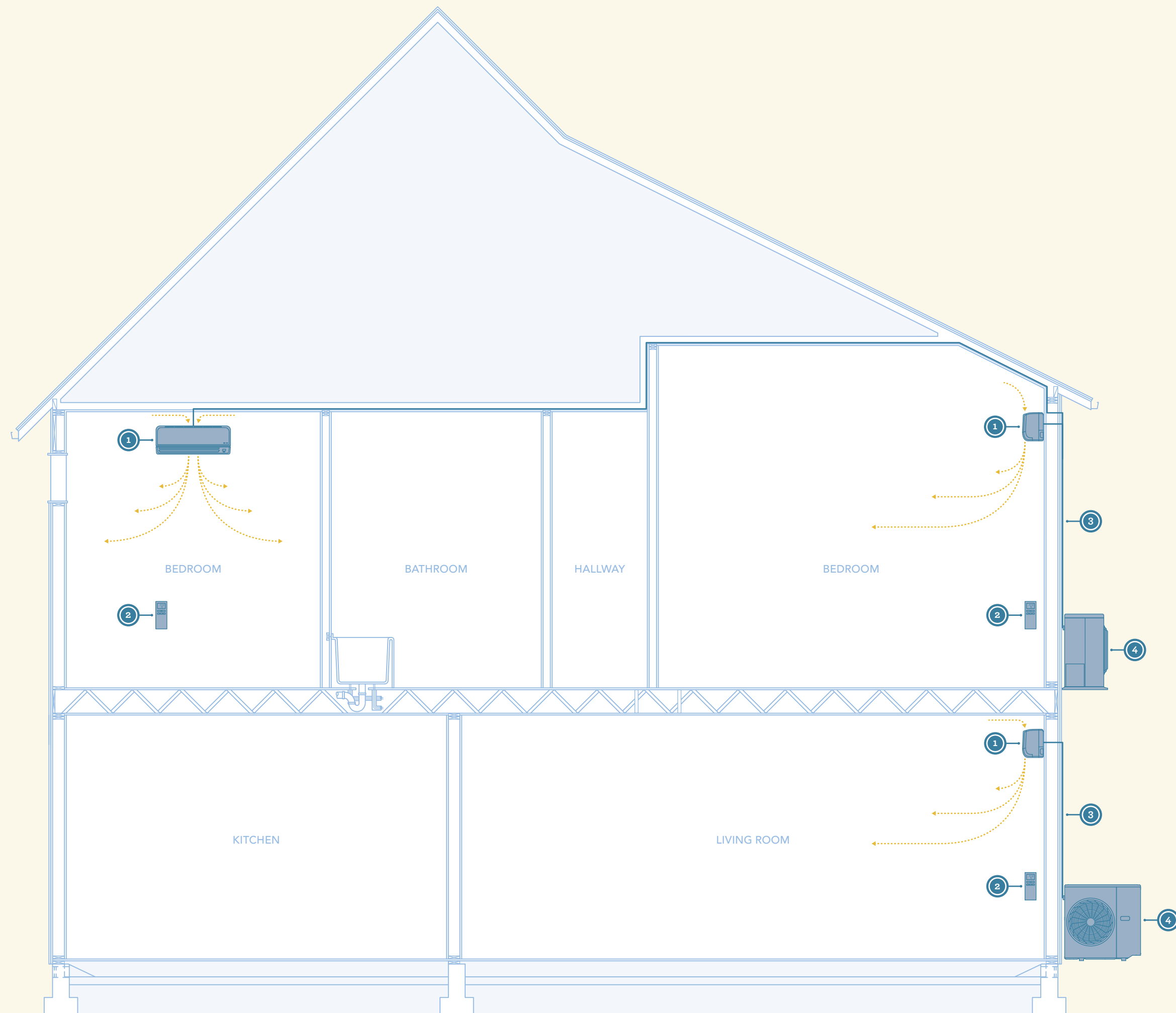


MINI-SPLIT TECHNOLOGY IN NEW CONSTRUCTION

Mini-split technology offers a new range of efficiency and comfort—benefits that previously required higher cost or added complexity. To help you determine which mini-split system is most appropriate for your efficient-home construction project, this guide presents four system options and their respective benefits and challenges.



All Ductless

BENEFITS

- Heating and cooling available in every room
- Conceptually straightforward for contractors
- Industry-leading technology "cool factor"

CHALLENGES

- Multiple outdoor units may be necessary
- Multi-head system can be expensive*
- Choosing the right-sized system for the home can be challenging¹
- Operates more effectively in homes with an open floor plan and scenarios where bedroom doors are kept open

*More than four heads would necessitate an additional outdoor unit. See manufacturer recommendations for number of heads per compressor. ¹Size all systems to 90–150 percent of the home's heating and cooling load.

Ductless and Backup Resistance Heat (Baseboards or Infrared Panels)

BENEFITS

- Most effective strategy for reducing overall energy use by heating the core of the home with efficient technology and using backup resistance heat in satellite rooms as needed
- Fewer issues with oversized ductless heads in bedrooms
- Avoid perceived aesthetic concerns with fewer wall-mounted ductless heads

CHALLENGES

- No direct cooling in bedrooms
- Can lead to incorrect home efficiency claims from electric-resistance and infrared-heating system manufacturers
- Some homeowners have a negative perception of electric-resistance heating

Ductless Heating and Cooling

- 1 Ductless head unit 2 Wireless remote 3 Refrigerant line 4 Outdoor unit

Backup Resistance Heat

- 5 Electric radiant heater (baseboard or infrared panel)

Ducted Mini-Split

- 6 Register 7 Duct 8 Ducted mini-split unit 9 Return grill 10 Thermostat 11 Refrigerant line 12 Outdoor unit

Unconditioned space =

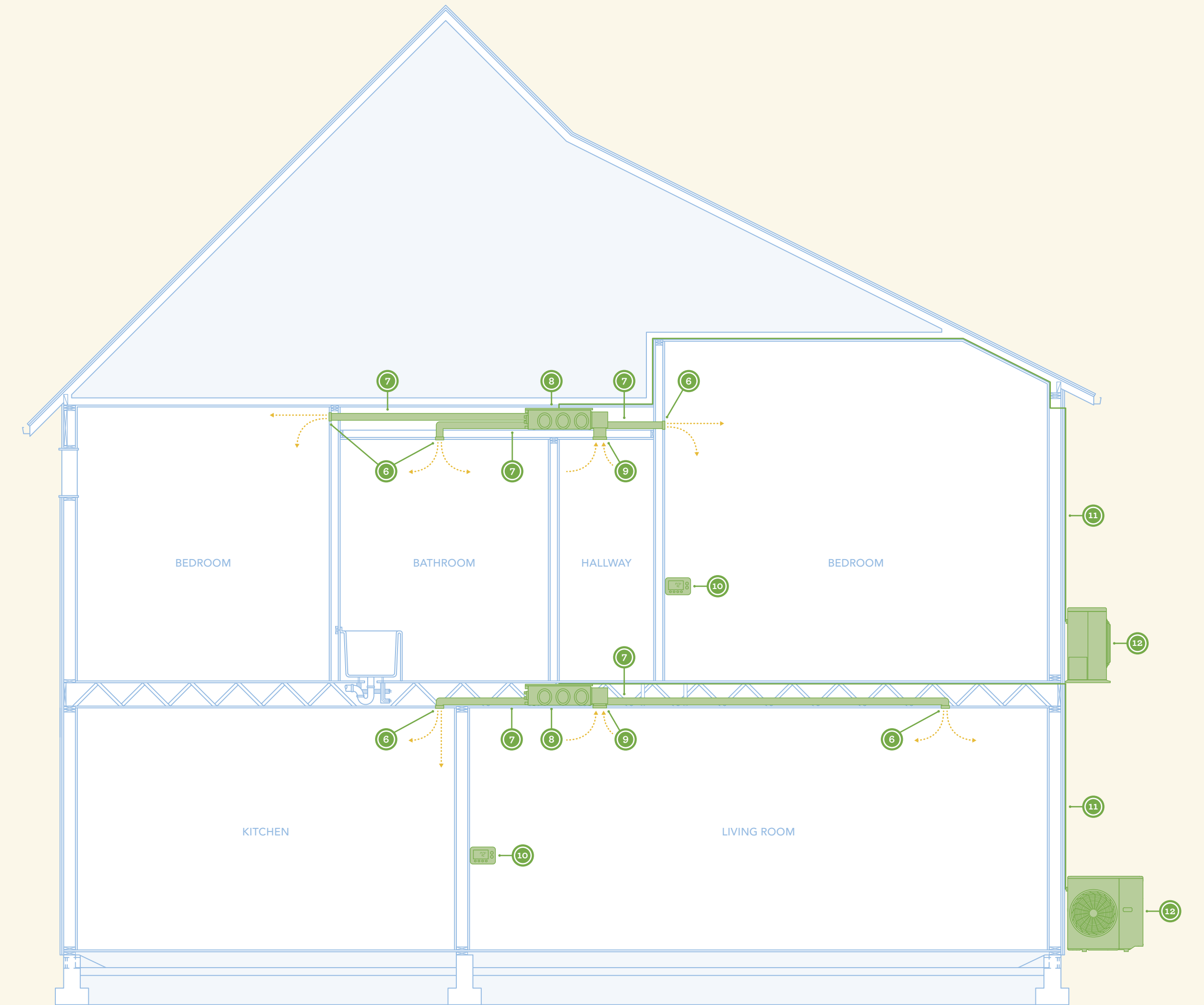
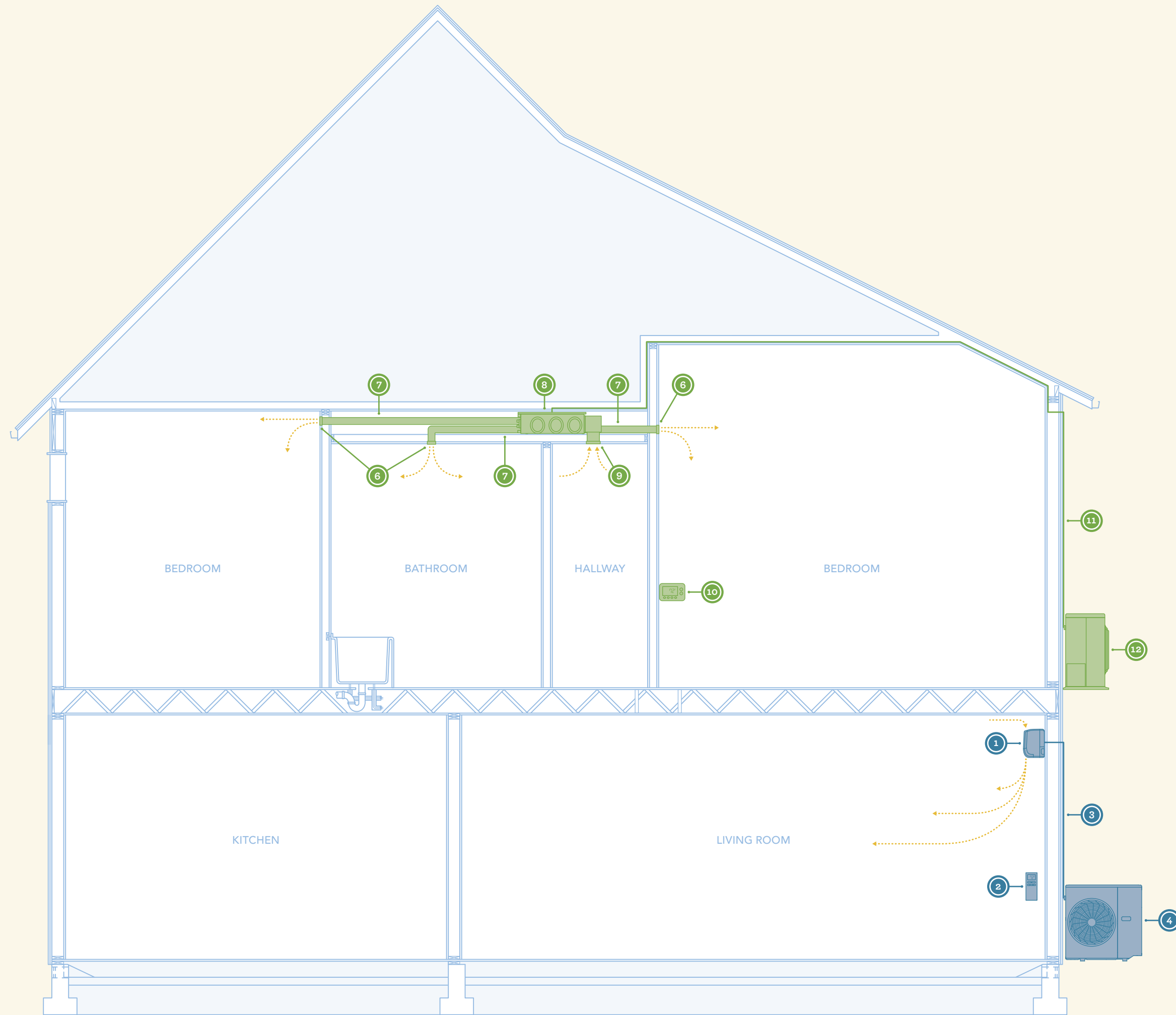
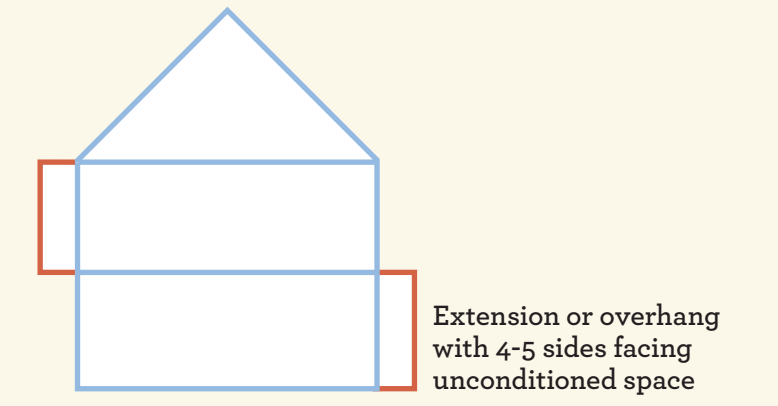
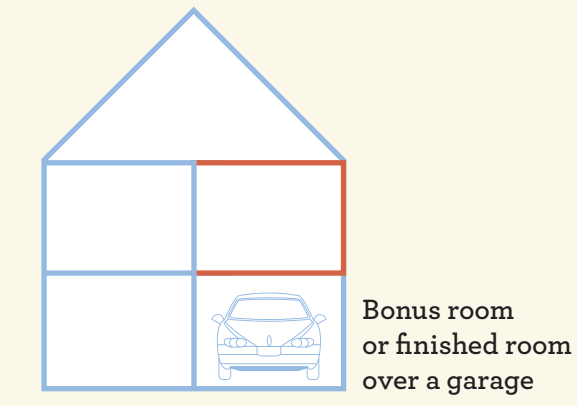
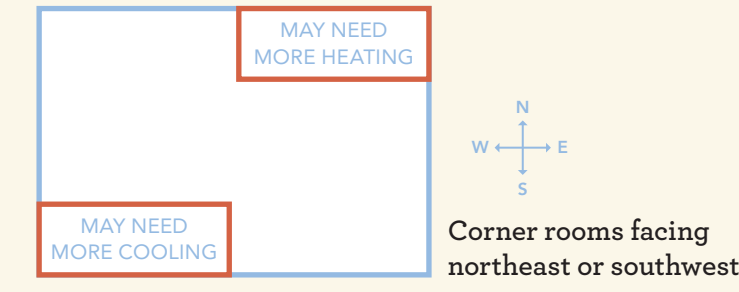
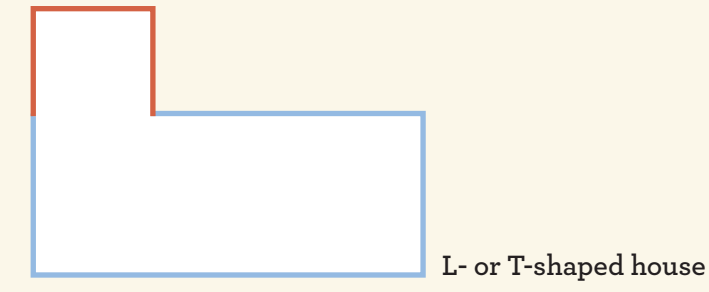
Airflow = ----->

Thermal Peninsulas

Requiring special consideration when selecting the right heating and cooling system, a thermal peninsula is any room or section of the home that has at least five sides facing the exterior. A thermal peninsula may require more heating or more cooling depending on which direction it faces.

To ensure thermal comfort, your system decisions must address special cases. For instance, rooms facing southwest may need increased cooling capacity, while rooms facing northeast will likely have greater heating-capacity needs. Bonus rooms may require an additional ductless head or greater ducted capacity, depending on the system choices made.

Thermal peninsulas may include:



● Ductless and Ducted Mini-Split Hybrid

- BENEFITS**
- Heating and cooling available in every room
 - More energy efficient than most standard central heat pumps
 - For more precise control, systems may run on separate outdoor units; for more simplicity, systems may run on the same outdoor unit
 - Industry-leading technology “cool factor”
 - Unlike central-heating systems, ducted mini-splits can run easily in conditioned spaces (including between floors, soffits and chases)

- CHALLENGES**
- Higher installation cost
 - New (less well-known) ducted technology
 - Multiple systems on each floor may create a larger-than-necessary overall system and add complexity to controls
 - Space needs and duct design for interior units and ducts in conditioned space require very thorough planning during the design phase

● Ducted Mini-Split Only

- BENEFITS**
- Heating and cooling available in every room
 - More energy efficient than most standard central heat pumps
 - No visible units or heads
 - Operates effectively in homes with complex, segmented and closed floor plans
 - Unlike central-heating systems, ducted mini-splits can run easily in conditioned spaces (including between floors, soffits and chases)

- CHALLENGES**
- Higher installation cost
 - New (less well-known) ducted technology
 - Air leakage and heat loss can result if ducts are located in unconditioned space
 - Multiple systems on each floor may create a larger-than-necessary overall system and add complexity to controls
 - Space needs and duct design for interior units and ducts in conditioned space require very thorough planning during the design phase

● Ductless Heating and Cooling

- 1 Ductless head unit 2 Wireless remote 3 Refrigerant line 4 Outdoor unit

● Backup Resistance Heat

- 5 Electric radiant heater (baseboard or infrared panel)

● Ducted Mini-Split

- 6 Register 7 Duct 8 Ducted mini-split unit 9 Return grill 10 Thermostat 11 Refrigerant line 12 Outdoor unit

Unconditioned space = Airflow =