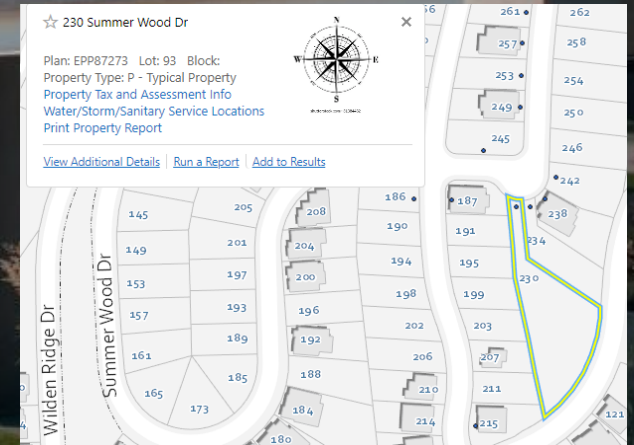
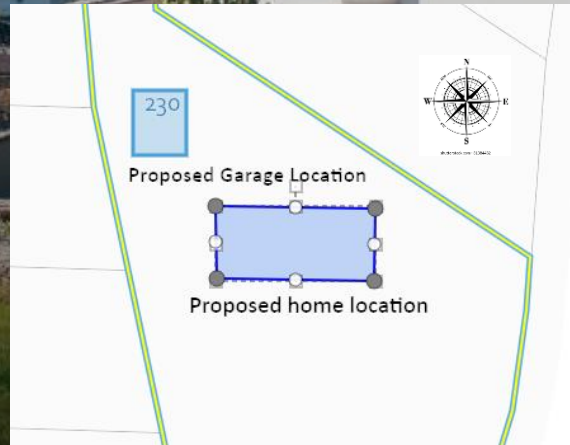
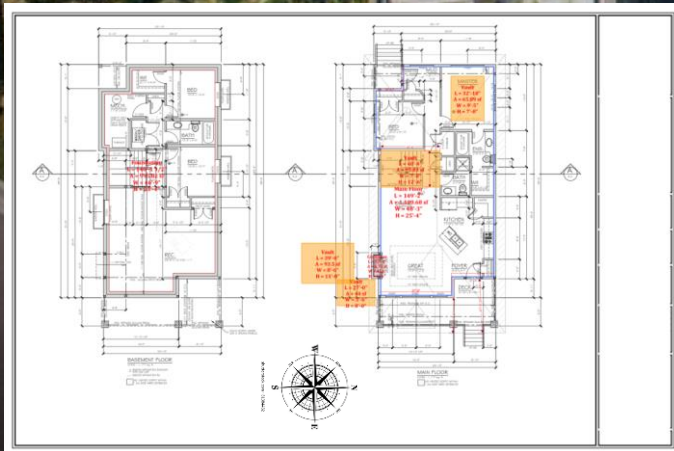




Lot 93 – 230 Summer Wood Dr.

Home 1 selected

Orientated East-West



HOUSE ORIENTATION



Safety is Paramount

Healthy Human Biome

Investing in the Future

Redundancy

Environmentally-Conscious

BUILDING ENVELOPE

The image shows the interior of a building under construction. The walls and ceiling are covered in green insulation, with wooden studs visible. A window is on the left, and a wooden floor is at the bottom. The text is overlaid on the image in white boxes.

Environmental & Thermal Protection

Presence of Inherent Contaminants

Embodied CO₂ Equivalent

Ease of Acquisition & Installation

Material Cost

BUILDING ENVELOPE

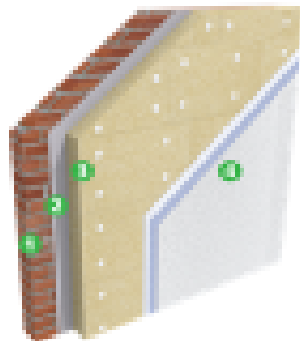
Building Envelope



Building Envelope

Main Attic and Scissor
Area: R80 Attic
Fiberglass Loose Fill
R Min: 66.87
R Max: 72.96

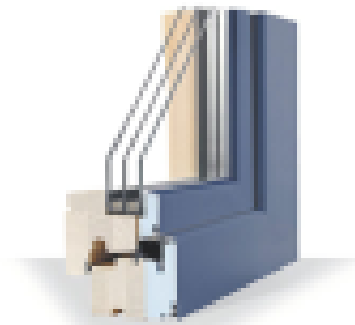
Walls: 2x8 24" R28 Batt
4" ROX
R Min: 33.32
R Max: 36.70



Windows

Triple glazed windows

- R value = 6.67
- U value = 0.15
- SHGC = 0.2743



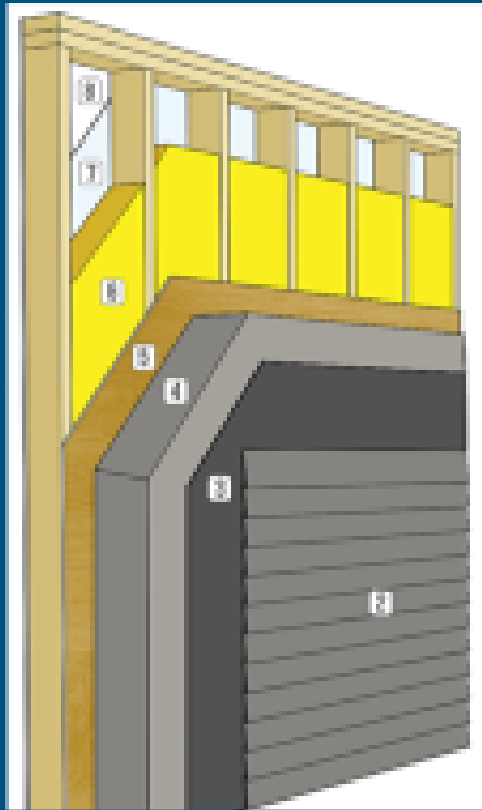
Doors

Steel medium spray foam core door

- R value = 6.47



Building Envelope - Above Ground Wall Assembly



- Implementing advanced framing for lower lumber wastes and costs, increase in insulated area, reduce thermal bridging.
- Our wall assembly features exterior rigid board insulation and R22 cavity insulation.

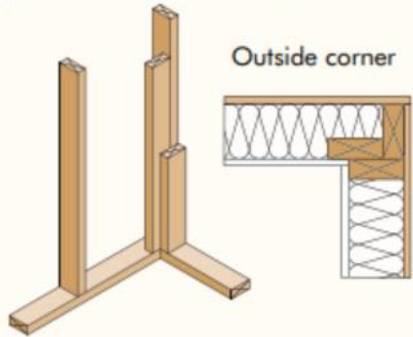
Wall ASSEMBLY COMPONENTS		RSI	R
1	Exterior air film	0.03	0.17
2	Vinyl siding (no air space)	0.11	0.62
3	Tyvek House Wrap	0	0
4	4" XPS Rigid Foam board	3.56	20.19
5	7/16" (11.1mm) OSB Sheathing	0.11	0.62
6	2x6 framing filled with R22 Batt @ 24" o.c.	2.67	15.16
7	Vapour barrier	0.25	1.4
8	5/8" (12.7mm) gypsum board	0.08	0.45
9	Finish: 1 coat latex primer and 2 coat latex paint	0	0
10	Interior air film	0.12	0.68
Effective RSI/ R Value of Entire Assembly		6.93	39.73

Net Zero: R effective = 39.73
Conventional: R effective = 17.5

Advanced Framing for Smarter Insulation Installation

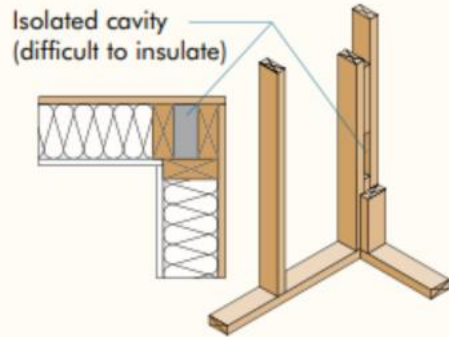
THREE-STUD CORNERS

INSULATED THREE-STUD CORNER (CALIFORNIA CORNER)



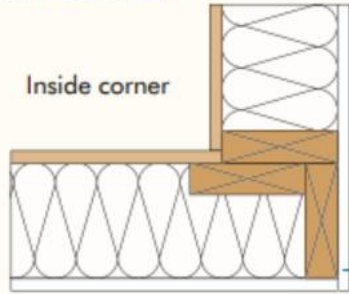
Outside corner

CONVENTIONAL CORNER



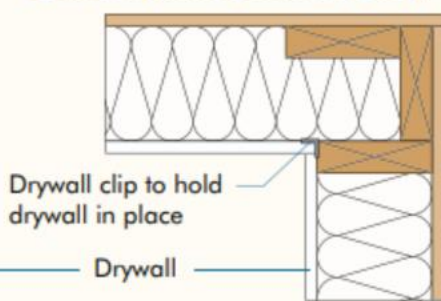
Isolated cavity (difficult to insulate)

INSULATED THREE-STUD CORNER (INSIDE CORNER)



Inside corner

ALTERNATE INSULATED THREE-STUD CORNER (WITH DRYWALL CLIPS)



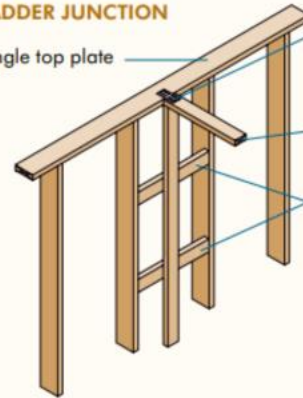
Drywall clip to hold drywall in place

Drywall

INTERIOR WALL INTERSECTION OPTIONS

LADDER JUNCTION

Single top plate

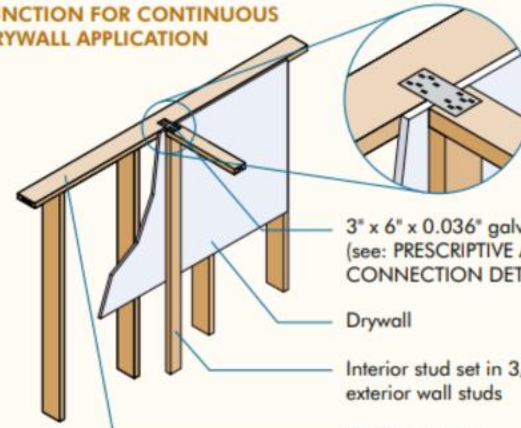


3" x 6" x 0.036" galvanized steel plate (see: PRESCRIPTIVE AND ALTERNATE CONNECTION DETAILS, Figure 6)

Interior wall plate tight to exterior wall plate

2x ladder blocking at 24" o.c. Install blocking with wide face vertical for maximum backing to wall finish materials and for maximum insulation to exterior walls.

JUNCTION FOR CONTINUOUS DRYWALL APPLICATION



3" x 6" x 0.036" galvanized steel plate (see: PRESCRIPTIVE AND ALTERNATE CONNECTION DETAILS, Figure 6)

Drywall

Interior stud set in 3/4" to 1" from exterior wall studs

Single top plate

Detail courtesy of Home Innovation Research Labs.

24in O/C instead of 16in O/C

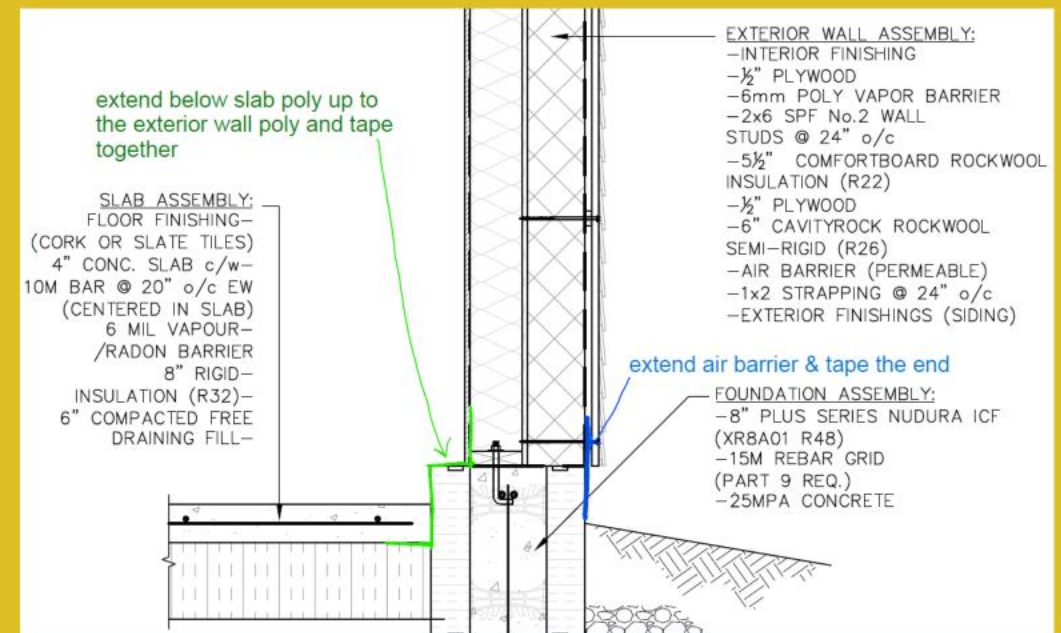
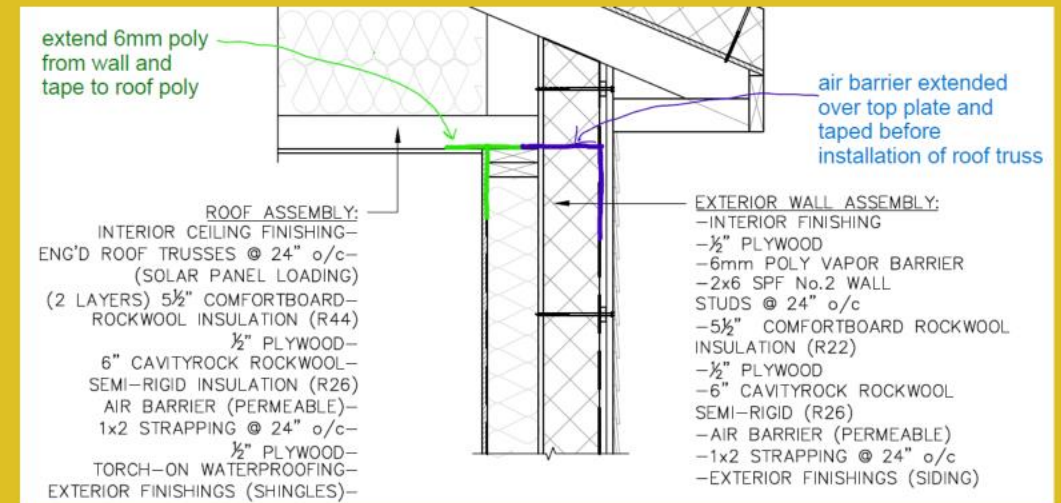






Air Tightness

- Delta Vent SA peel and stick membrane air barrier with Delta flex band and Delta multi use tape
- Ensure continuity at transition locations to minimize air leakage
- Blower test to be performed ensure ACH50 of 1.0 or less.



Mineral Wool Insulation

- Significantly contributes to indoor air quality
- Reduction in off-gassing (i.e., elimination of Volatile Organic Compounds such as formaldehyde, Phenols, Styrene, etc.)
- This is important since off-gassing increases with high temps (commonly experienced in the Southern Interior)
- Fibreglass, overtime, can cause serious health degredation due to the VOC off-gassing
- Make the investment for long term health

Advanced
Framing



Nadura ICF Foundation

- Consists of two panels of Expanded Polystyrene (EPS) foam, connected together with web system made of 100% recycled material
- Durability against severe weather
- High strength
- Air infiltration
- Sound reduction
- Fire resistance
- R-value 48
- 60% energy saving



Windows

Triple glazed windows

provides better insulation compared to single or double glazed windows.

- **Increased Energy Efficiency**
 - Reduces heat transfer and prevents heat loss
- **Better Sound Insulation**
 - Reducing noise transmission from outside
- **Enhanced Security**
 - The extra pane of glass in triple glazed windows makes them more difficult to break
- **Reduced Condensation**
 - The extra layer of glass in triple glazing reduces the risk of condensation forming on the interior of the windows





Geothermal horizontal Closed Loop Heat Pump

Heat Recovery Ventilator

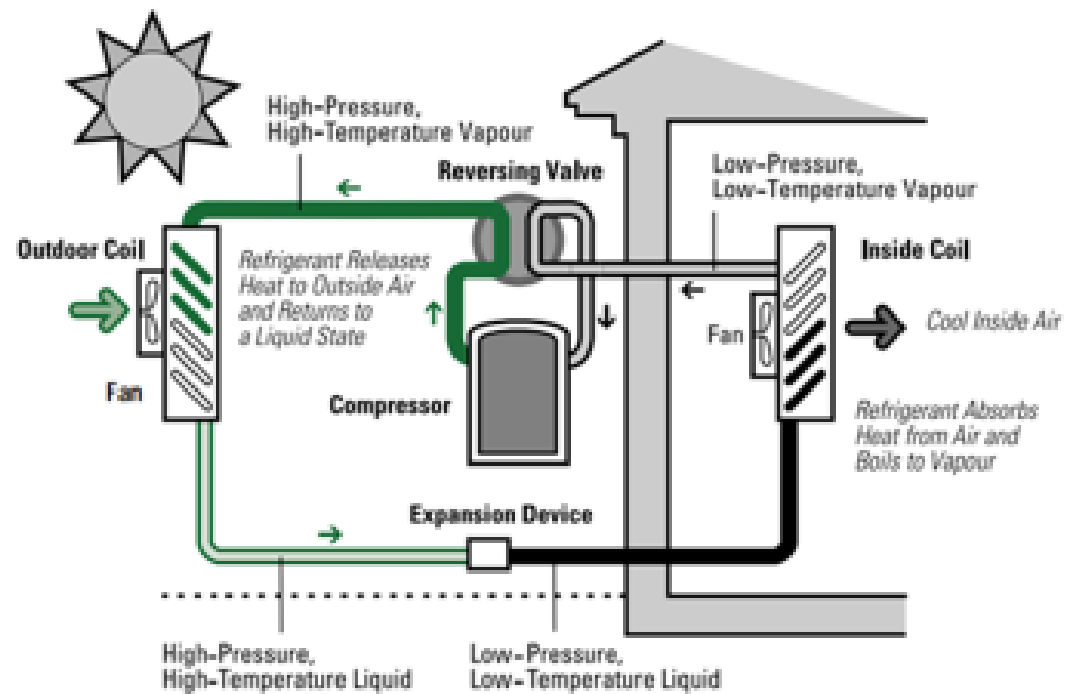
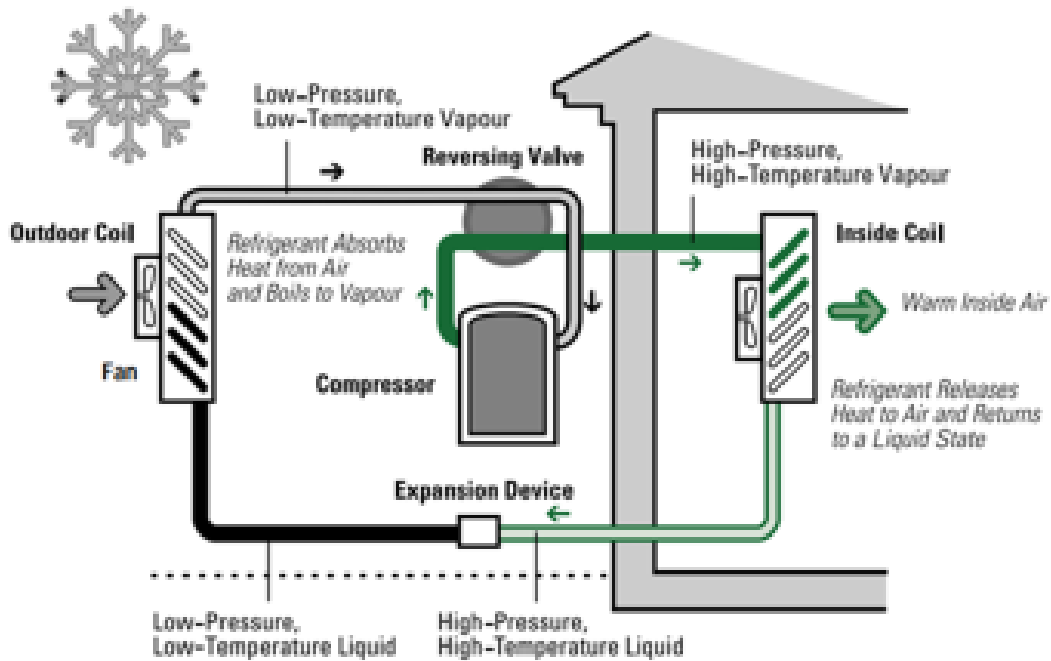
Humidifier Bypass

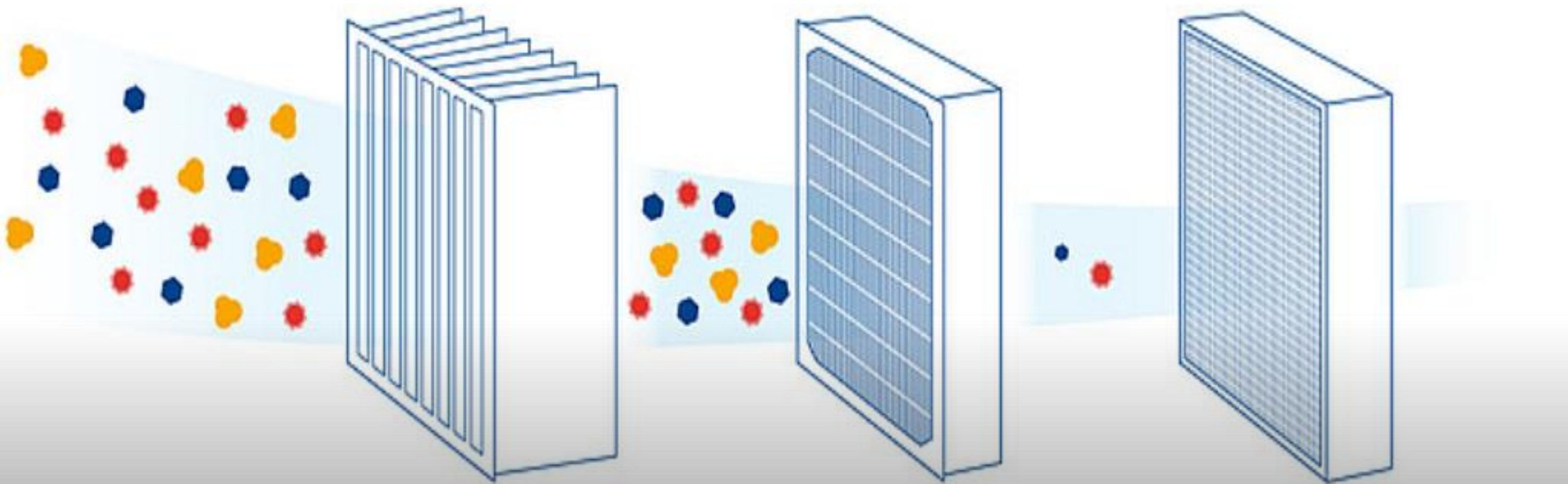
HVAC

Air source heat pump system

- Heating process

- Cooling process





Pre-filter

MERV 14 Filter

Carbon Filter

HVAC

Particle Size Chart

Common types of particulate matter

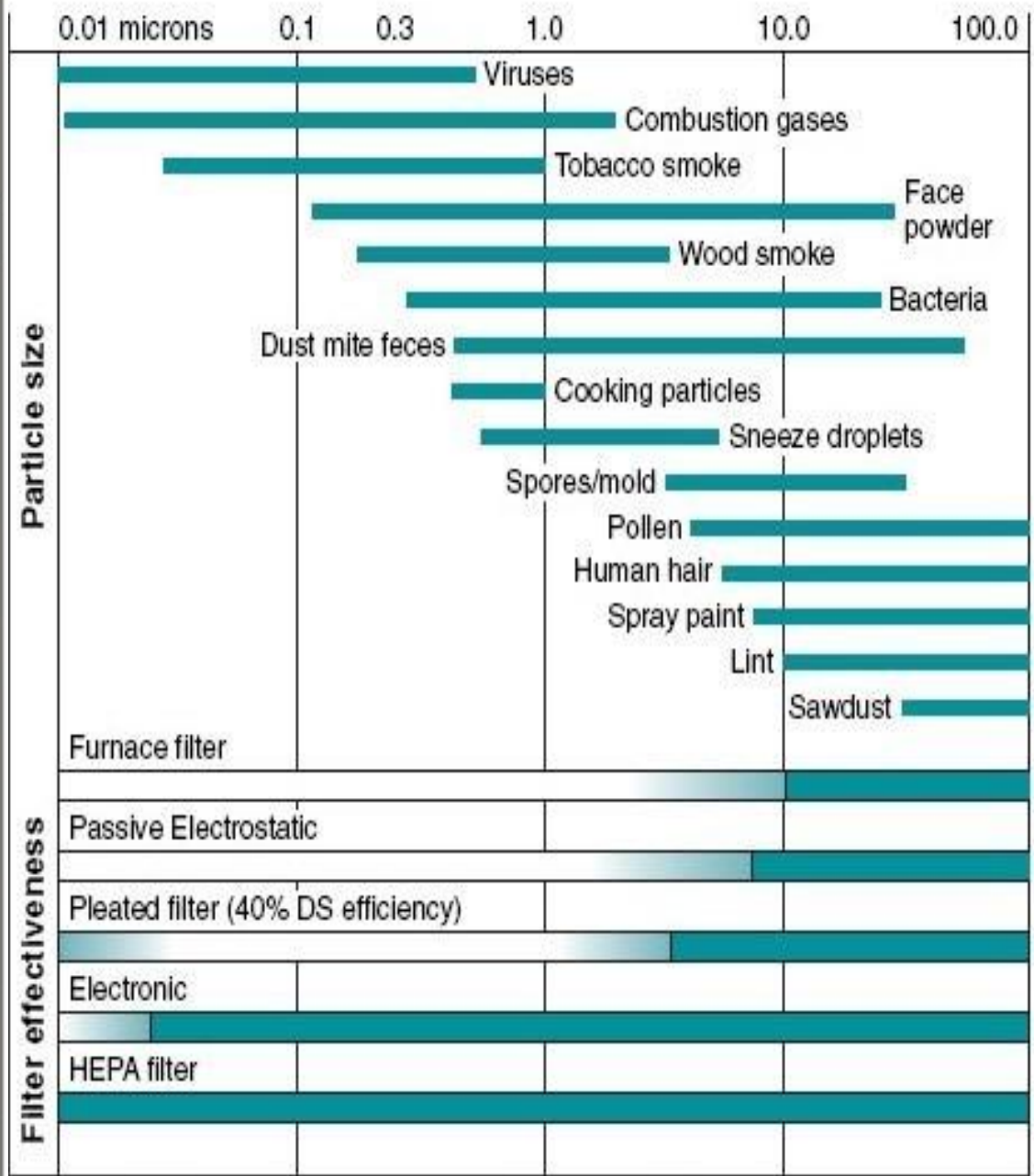
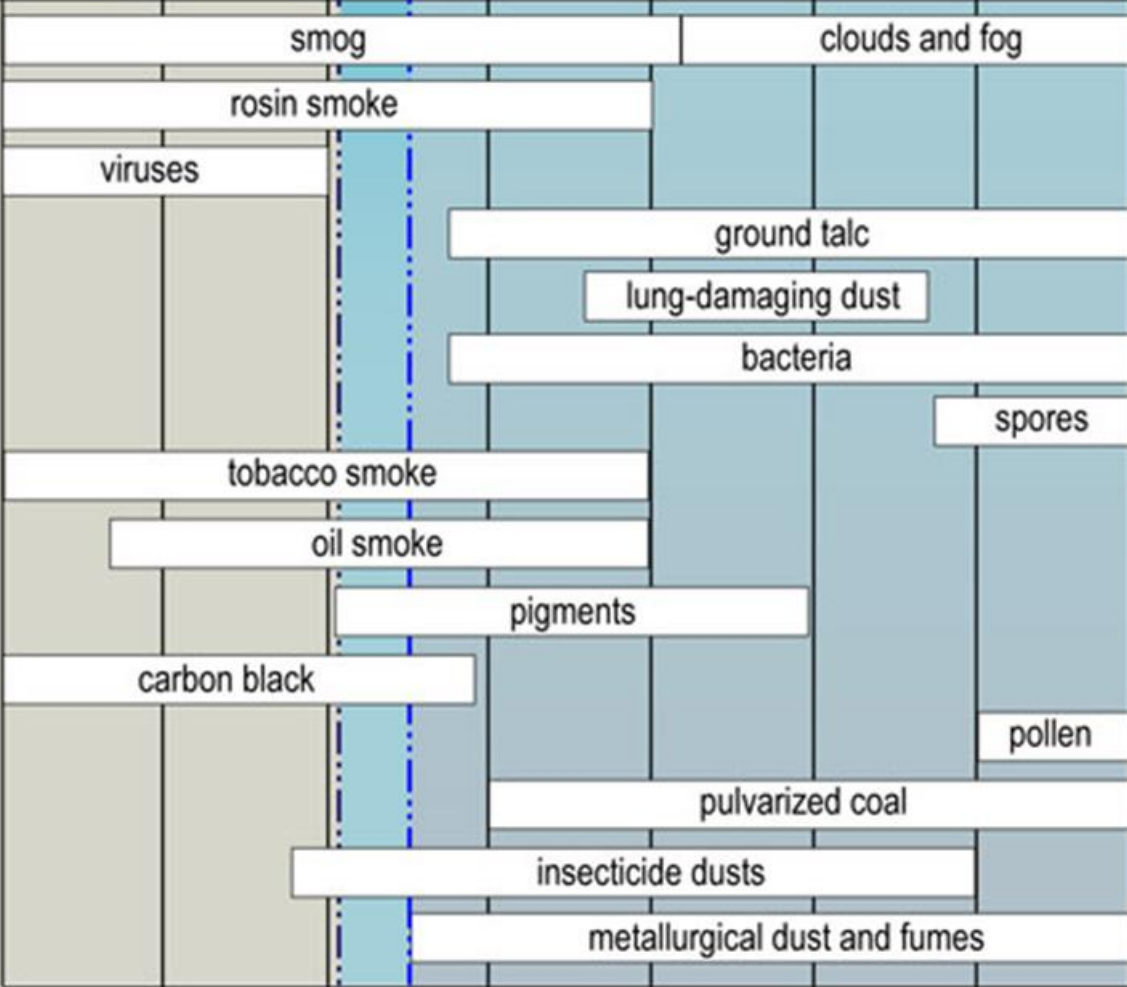
ULPA
up to 99.9995% efficient to 0.12 microns

HEPA
up to 99.97% efficient to 0.3 microns

FILTER TYPE

Particle size in microns: 0.01, 0.05, 0.1, 0.5, 1, 5, 10, 15

common air filters



Sentry Air Systems

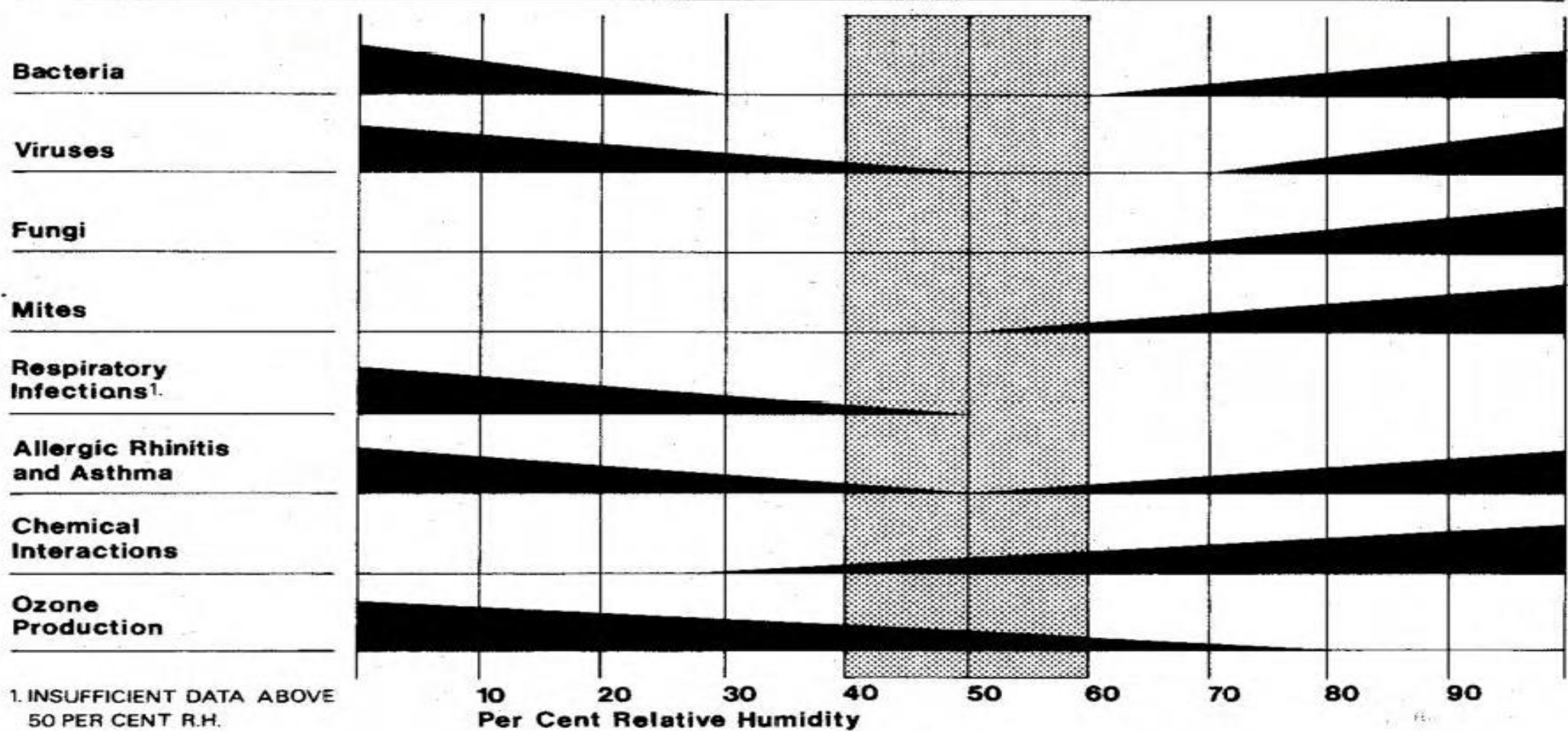
Removes less than 95% of these particles (light blue bar)
Removes more than 95% of these particles (dark blue bar)



Optimum Relative Humidity

Decrease in Bar Width
Indicates Decrease in Effect

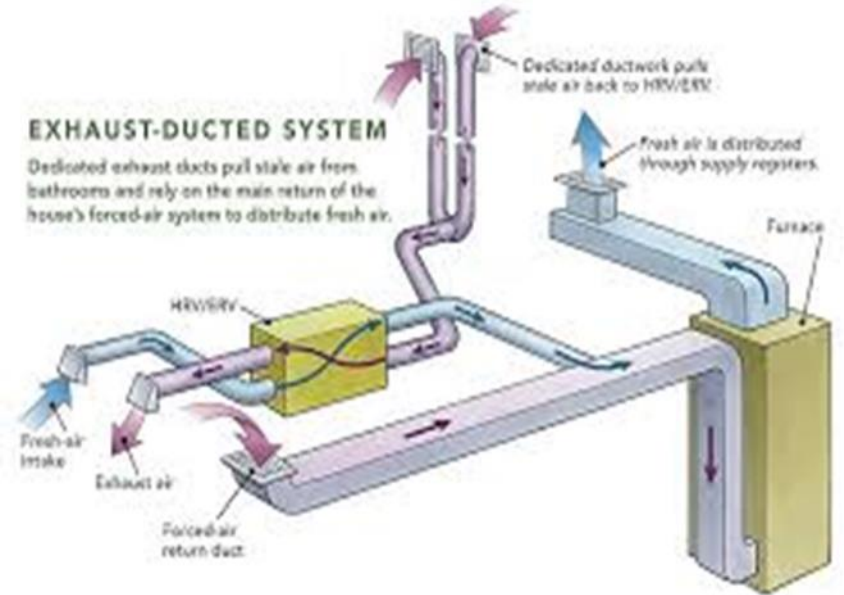
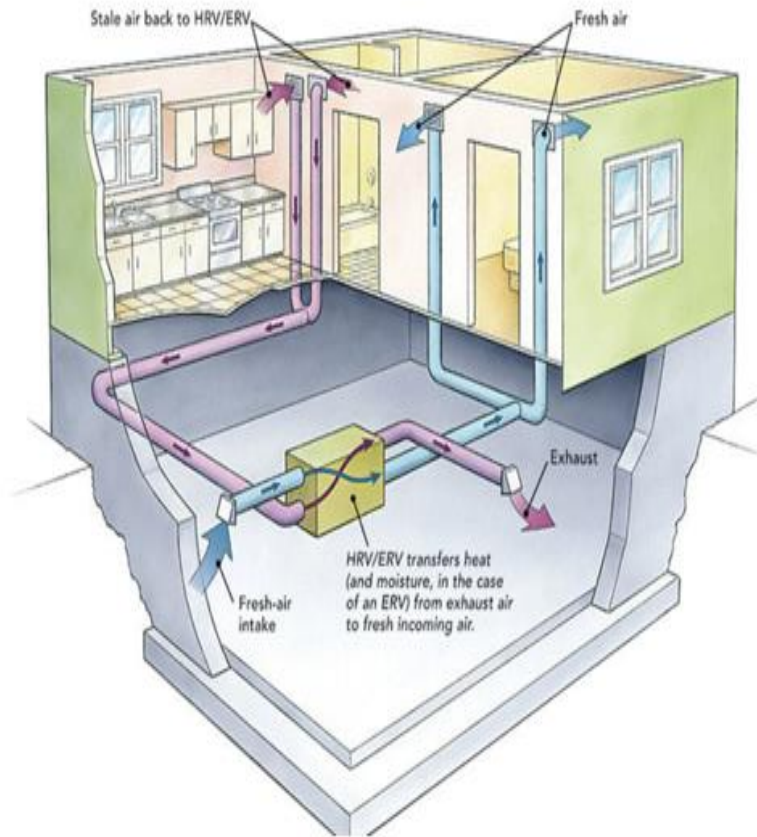
Optimum
Zone



¹ INSUFFICIENT DATA ABOVE
50 PER CENT R.H.

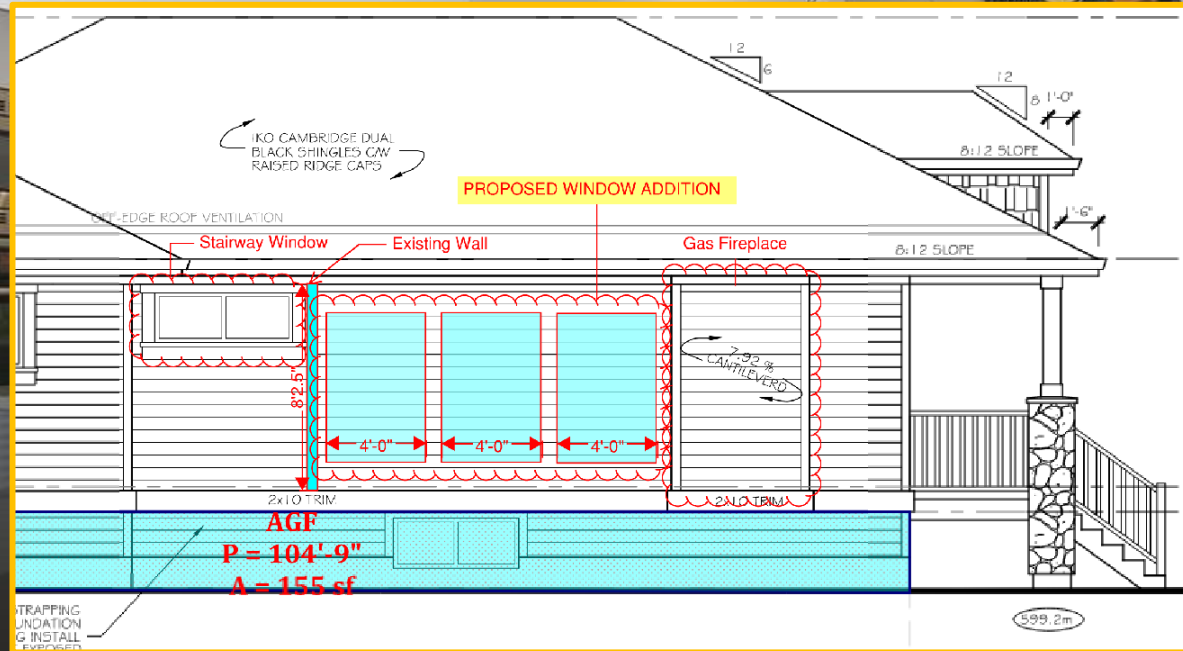
Fully Ducted systems are the most efficient as dedicated supply ducts are excellent in pulling the stale air from some parts of the house to other areas where its mostly needed.

Dedicated supply ducts deliver fresh air to the living room and bedrooms, while exhaust ducts pull stale air from bathrooms and the kitchen.



Sunlight is Paramount to Health

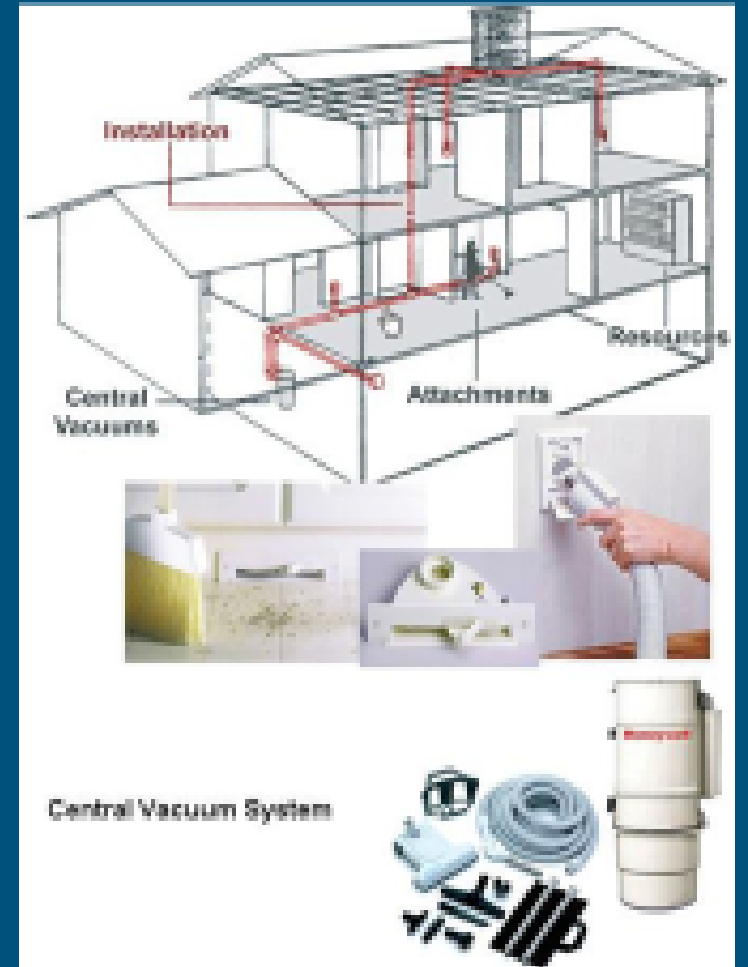
+64.9sqft of Additional Window Area



INDOOR ENVIRONMENTAL QUALITY

Design for Quality Indoor Environment

- Lighting
 - Windows orientated to maximize amount of natural lighting
 - Bulbs were appropriately chosen based on K values
- Sound
 - Acoustic insulation in wall
- Air quality
 - Central vacuum system, correct filters
- Radon Removal
 - Ventilation piping



GHG, IEQ materials, & Systems



Biological Contaminants

- Proper ventilation
- Humidity control
- Regular disinfection
- Pest control
- HVAC maintenance

Combustion

- Installing carbon monoxide detectors
- Air cleaners, air filter maintenance
- Intake of vents are clear

VOC

- Usage of low-VOCs construction materials:
 - low-VOC: paints, adhesive, and sealants
 - cork flooring

Radon

- Adequate sub-floor ventilation
- Sealing cracks in floors, walls, drains, and pipes

GHG

- Electric components:
 - Heater
 - Stove
 - Other energy efficient appliances

Central Vacuum



INNOVATION

Maintain comfortable and healthy indoor environment through smart finishes

- Reduce Toxins and VOCs
- Optimize Airflow
- Smart Security
- Complementary Lighting



Color Temperature Spectrum

2,000K



Very warm, amber hues similar to candlelight.

2,700K



Soft, cozy warm tinge that's very flattering.

3,500K



A hint of warmth for a bright tone.

4,100K



A clean neutral white for a fresh look.

4,500K



Bright tone that skews cool to match daylight.

6,500K



Ultra bright light that casts cool shadows.

A green plant with heart-shaped leaves is growing in a white container. The background is a red brick wall. The image is overlaid with several text boxes.

Plants Promote Mental Wellbeing

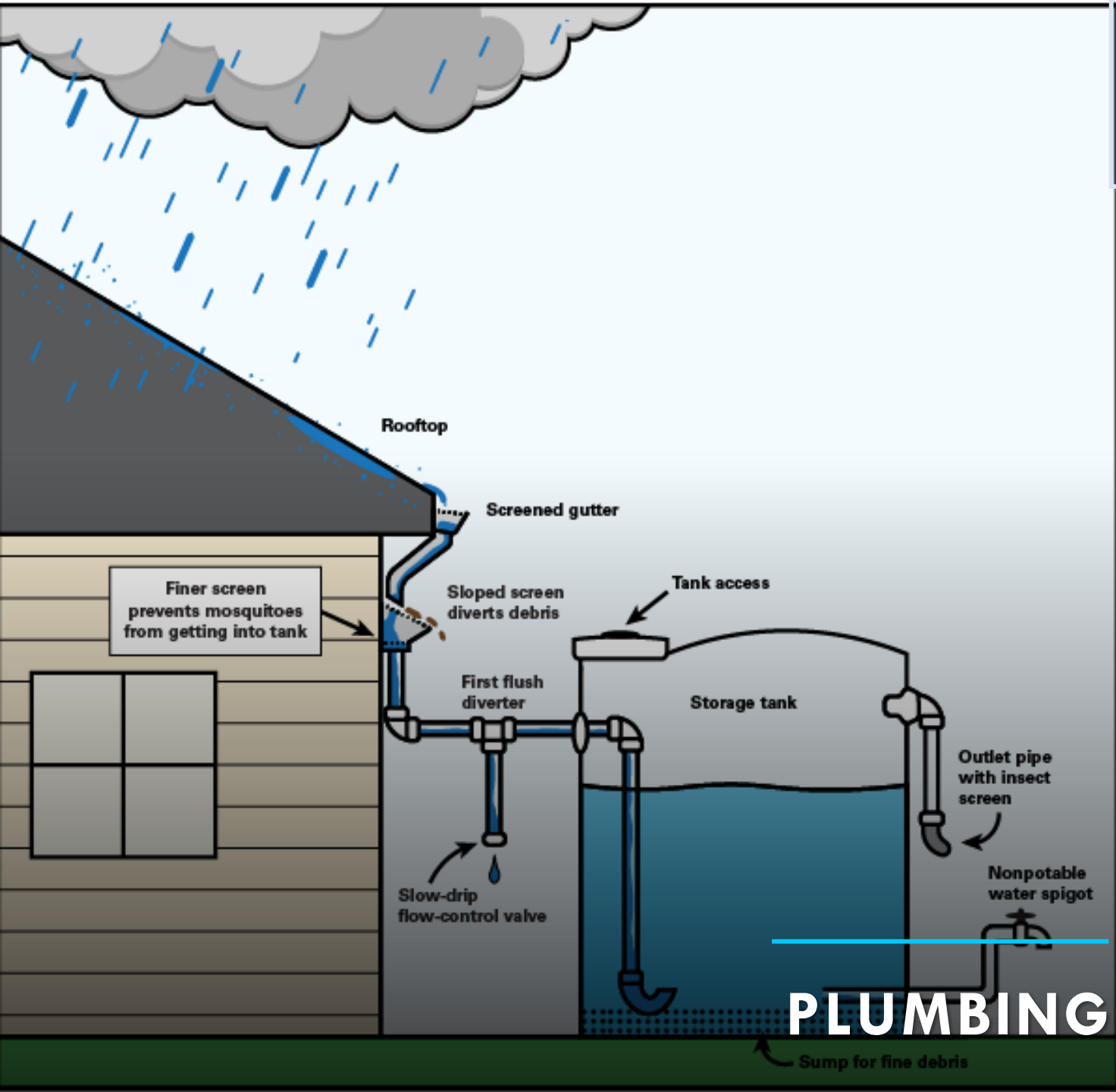
75% Reduction in VOCs

Significant Reduction in PM10

Humidity Increase of 13%

Florafelt Compact Kit

INDOOR ENVIRONMENTAL QUALITY

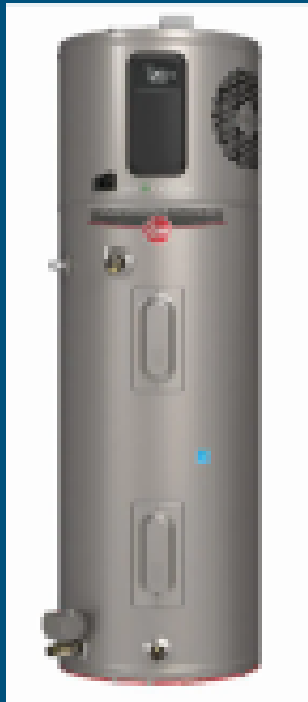


Reducing Water Demand

Producing Alternative Water Sources

Treating Water Onsite

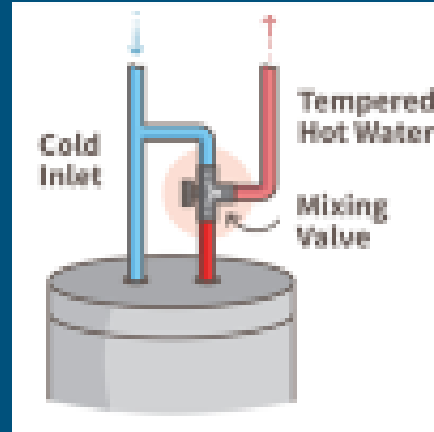
Plumbing System



Rheem Proterra 50 gallon (189L) Hybrid Electric Heat Pump Water Heater

Features

- UEF: 3.0
- FHD: 55 gallons
- EcoNet Smart Technology

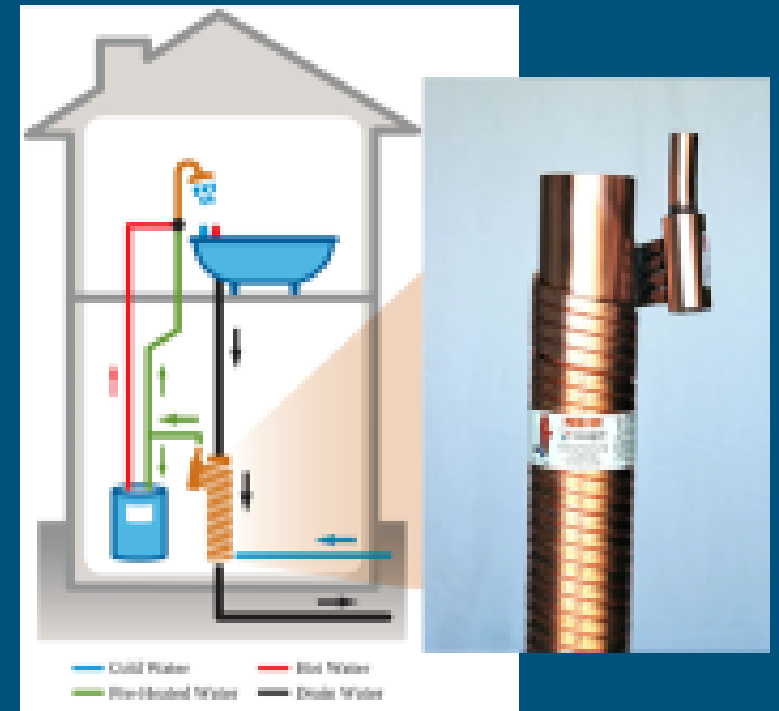


Mixing Valve



Tundra Foam Pipe Insulation

System Improvements



Drain Water Heat Recovery

Energy consumption of using hot water

Performance of each alternative through the HOT-2000 report

Water Heating System:	Natural gas	Electric Hot Water Tank	Integrated heat pump
Daily Hot Water Consumption:	187.7 Litres	187.7 Litres	187.7 Litres
Cold Water Temperature (Input):	15.0 °C	15.0 °C	15.0 °C
Hot Water Temperature (Output):	55.0 °C	55.0 °C	55 °C
Domestic Water Heating Load (How much energy is required to heat the water): Note: This is dependent of volume of water that requires heating and the heat capacity of water	12837 MJ	12837 MJ	12837 MJ
Domestic Water Heating Energy Consumption (What is required to power the tank to heat the water):	19053 MJ	14549 MJ	3922 MJ
Primary System Seasonal Efficiency:	67.4%	88.2%	327.3%



Optimal Tilt Angle – 49.925°

13 - BiHiKu6 CS6W-MB-AG 520 W

Enphase IQ8H Microinverters

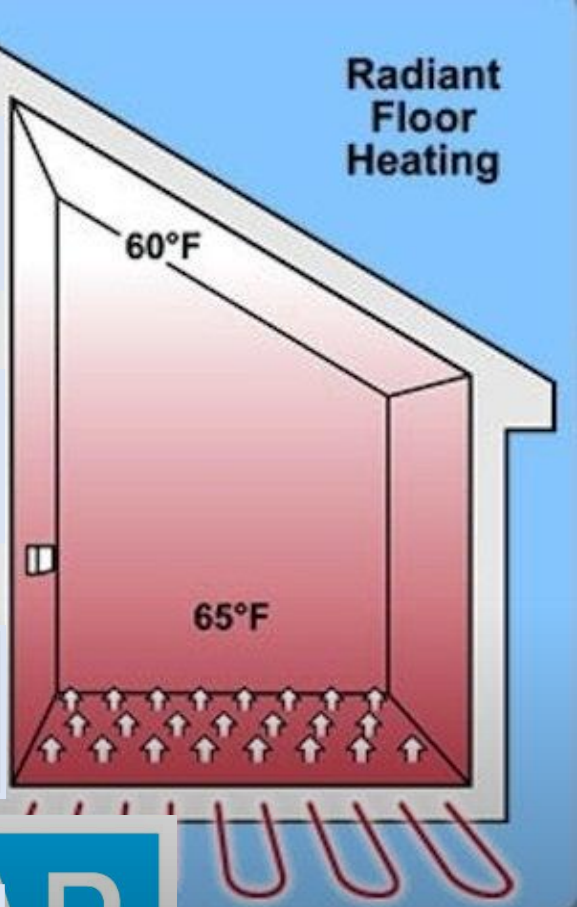
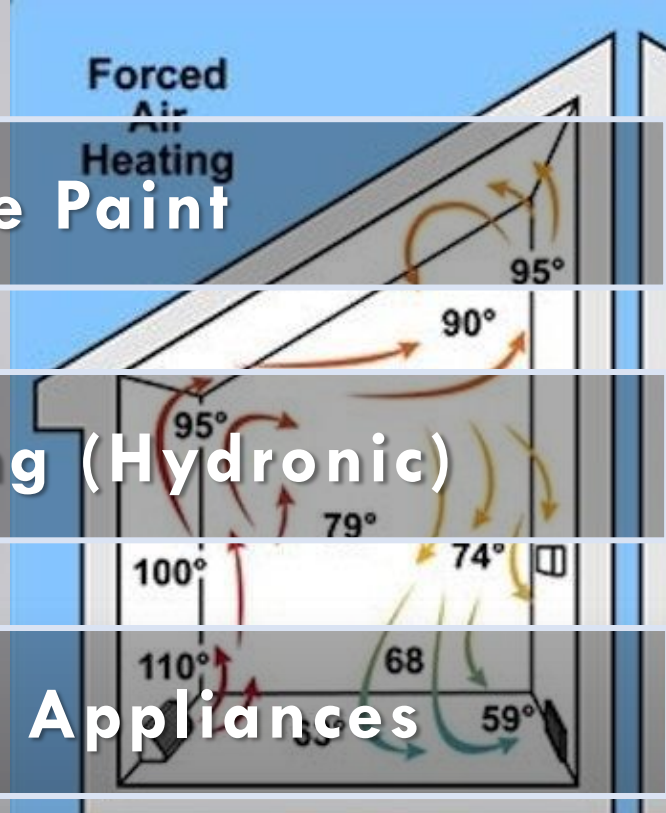
SOLAR



VOC Free Paint

In-Floor Heating (Hydronic)

ENERGY STAR Appliances



Oven and Stove Selection

ENERGY STAR

HIGH EFFICIENCY

ADDITIONAL CONSIDERATIONS

Photos: homedepot.com - bobvila.com - natural-resources.canada.ca

Appliances

Appliance	Canadian Federal Energy Efficiency Standard	Chosen Product Energy Efficiency	% Better Than Federal Standard
Dryer	3.73 lb/kWh/cycle	11.0 lb/kWh/cycle	194%
Clothes Washer	52.1 L/kWh/cycle	59.5 L/kWh/cycle	14%
Fridge	536.4 kWh/yr.	385 kWh/yr.	28.2%
Range	627.9 kWh/yr.	449 kWh/yr.	28.5%
Dishwasher	307 kWh/yr.	199 kWh/yr.	35.2%

Standard Annual Appliance Energy Cost: \$313.77

Chosen Appliance Annual Energy Cost: \$180.38

FortisBC rebates: \$350

Additional cost of high efficiency appliances: \$9404

Annual Savings: \$133.38

EnerGuide Rating System Results

Rating	70 GJ/a	Reference House	78 GJ/a	Nat. ACH	0.13
Energy Use Intensity	0.36 GJ/m ² /a	% Lower Than Ref Hse	10.5 %	Q _{Tot}	32.5 L/s
Greenhouse Gases	2.1 t/a			Q _{Warm}	24.25 L/s

Rated Annual Energy Consumption (AEC)		Rated Annual Energy Production (AEP)	
Space Heating	24.57 GJ	Electricity Generation	0.0 GJ
Space Cooling	4.25 GJ	Solar DHW	0.0 GJ
DHW	14.76 GJ		
Ventilation, Electric	0.57 GJ		
Baseloads	25.62 GJ		
Total AEC	69.77 GJ	Total AEP	0.0 GJ
		Net AEC - AEP	69.77 GJ

House Name	AEC (GJ/a)	AEP (GJ/a)	Net (GJ/a)
ERS reference house			77.93
General mode			82.32
House with standard operating conditions			69.78

	Gross		Net	
	Value	GJ	Value	GJ
Electricity	8583 kWh	30.9 GJ	8583 kWh	30.9 GJ
Natural Gas	1043 m ³	29.9 GJ	1043 m ³	29.9 GJ
Oil	0 L	0.0 GJ	0 L	0.0 GJ
Wood	0 kg	0.0 GJ	0 kg	0.0 GJ
Propane	0 L	0.0 GJ	0 L	0.0 GJ

EnerGuide Rating System Results - Reduced Operating Conditions are applied.

Rating	0 GJ/a	Reference House	77 GJ/a	Nat. ACH	0.01
Energy Use Intensity	0.17 GJ/m ² /a	% Lower Than Ref Hse	100 %	Q _{Tot}	19.7 L/s
Greenhouse Gases	0.0 t/a			Q _{Warm}	24.25 L/s

Rated Annual Energy Consumption (AEC)		Rated Annual Energy Production (AEP)	
Space Heating	3.18 GJ	Electricity Generation	36.14 GJ
Space Cooling	3.74 GJ	Solar DHW	0.0 GJ
DHW	4.67 GJ		
Ventilation, Electric	0.32 GJ		
Baseloads	22.05 GJ		
Total AEC	24.06 GJ	Total AEP	36.14 GJ
		Net AEC - AEP	0.0 GJ

House Name	AEC (GJ/a)	AEP (GJ/a)	Net (GJ/a)
House with household operating conditions			0
House with reduced operating conditions			0
ERS reference house			76.86
General mode			5.15
House with standard operating conditions			2.08

	Gross		Net	
	Value	GJ	Value	GJ
Electricity	9429 kWh	33.9 GJ	0 kWh	0.0 GJ
Natural Gas	0 m ³	0.0 GJ	0 m ³	0.0 GJ
Oil	0 L	0.0 GJ	0 L	0.0 GJ
Wood	0 kg	0.0 GJ	0 kg	0.0 GJ
Propane	0 L	0.0 GJ	0 L	0.0 GJ

51.3% Less Energy Used

100% Decrease in GHG emissions

87% Decrease in Energy for Heating

29% Increase in Window/Door Area

Improvements Made

National Building Code 2020

Proposed House Reference House

Within Scope
 Annual Energy Consumption (GJ)
 Gross Space Heat Loss (GJ)
 Peak Cooling Load (W)
 Airtightness (ACH @ 50pa)

Proposed House	Reference House
Yes	
44.15	52.30
56.53	62.31
3388	3579
3.2	2.5

62.4% Decrease in the TEDI

Overall Energy Performance Improvement (%)
 Envelope Performance Improvement (%)
 Peak Cooling Validation
 Airtightness Level
 Energy Performance Tier

15.59
9.28
Pass
0
I

71.5% Decrease in the MEUI

Other Compliance Metrics

Thermal Energy Demand Intensity (kWh/(m2.year))
 Mechanical Energy Use Intensity (kWh/(m2.year))

33.88
62.70

National Building Code 2020

Proposed House Reference House

Within Scope
 Annual Energy Consumption (GJ)
 Gross Space Heat Loss (GJ)
 Peak Cooling Load (W)
 Airtightness (ACH @ 50pa)

Proposed House	Reference House
Yes	
12.59	51.23
29.08	57.06
2695	4168
0.5	2.5

Overall Energy Performance Improvement (%)
 Envelope Performance Improvement (%)
 Peak Cooling Validation
 Airtightness Level
 Energy Performance Tier

75.42
49.04
Pass
5
4

Other Compliance Metrics

Thermal Energy Demand Intensity (kWh/(m2.year))
 Mechanical Energy Use Intensity (kWh/(m2.year))

12.75
17.89

Improvements Made

Overall

NET ZERO HOME



House orientation ✓
Solar ✓
Building envelope ✓
HVAC ✓
Combo Heating/DHW ✓
Ground source heat pump ✓
Whole house ventilation ✓
Heat recovery ✓
Plumbing system ✓
GHG ✓
IEQ materials & system ✓



Net Zero Has Been Reached!

Have a Great Day