

BUILDINGENERGY BOSTON

Pretty Good House: A Guide to Creating Better Homes

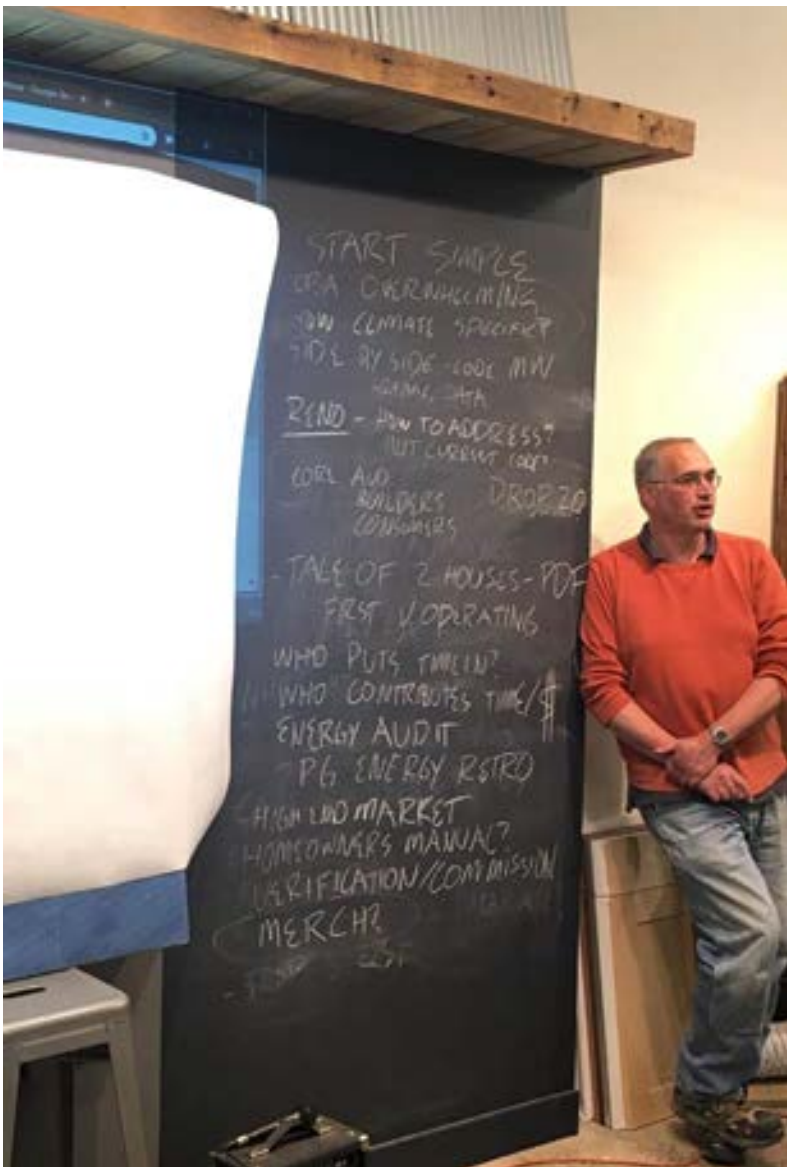
**Emily Mottram (Mottram Architecture)
Chris Briley (BRIBURN)**

Curated by Danny Veerkamp and Frank Nitti

**Northeast Sustainable Energy Association (NESEA)
March 28, 2023**



the
Pretty
Good
House



How it Started

In southern Maine, there's a small group of building professionals that get together monthly to discuss building science. It sounds boring, we know, but truly it isn't.

Food is brought in, beer is consumed, a blackboard is present and a topic is brought up for discussion. (topics like, high performance windows, venting cathedral ceilings, moisture migration in wall assemblies, slab on grade details, etc.)

Since we are all peers, and colleagues (with egos, attitude, and a good sense of humor) the conversation is usually lively, informal and frankly all over the place. Builder Dan Kolbert (pictured left) is the moderator and at one meeting, on a rant he, expressed frustration with the status quo, and even more frustration with the various rating systems that had him jumping through many hoops to prove that his work was in fact "green" and energy efficient. As many can attest, these systems can be very costly in time and money, and in the case of many green projects, they aren't doing anything to advance the project. Rather they are simply certifying them.

So Dan simply stated, "I just want to build a pretty good house."

Other Programs That Have Helped Shape Building Better Homes

A big thank you to the other programs that have inspired us to build better things – working through these programs has helped bring PGH to life. While we value these programs immensely - PGH is not a standard

To mention a few

- LEED For Homes
- Energy Star
- Passive House
- Living Building Challenge
- Well Building
- DOE ZEH



Pretty Good House provides a framework and guidelines to focus on the core issues that should be front and center when designing and building a high quality home or renovation.

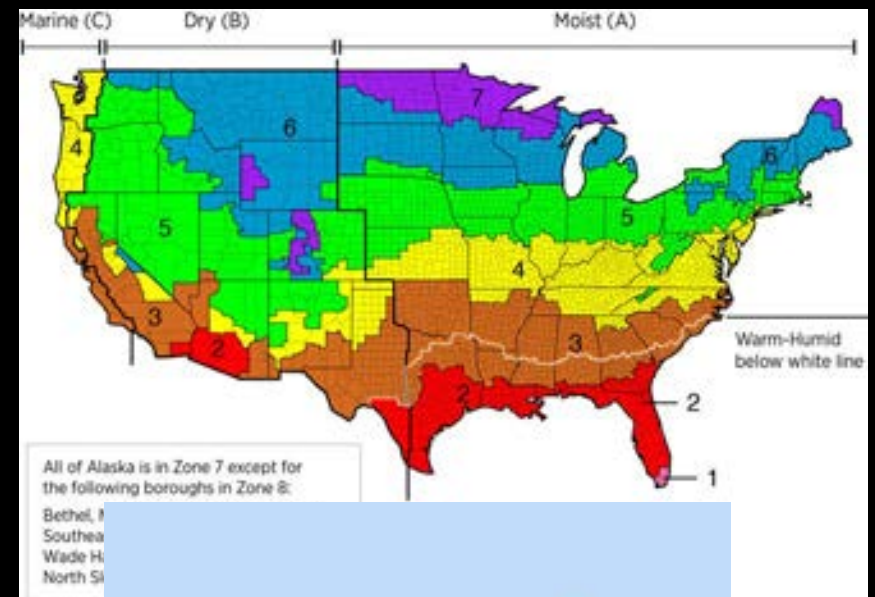
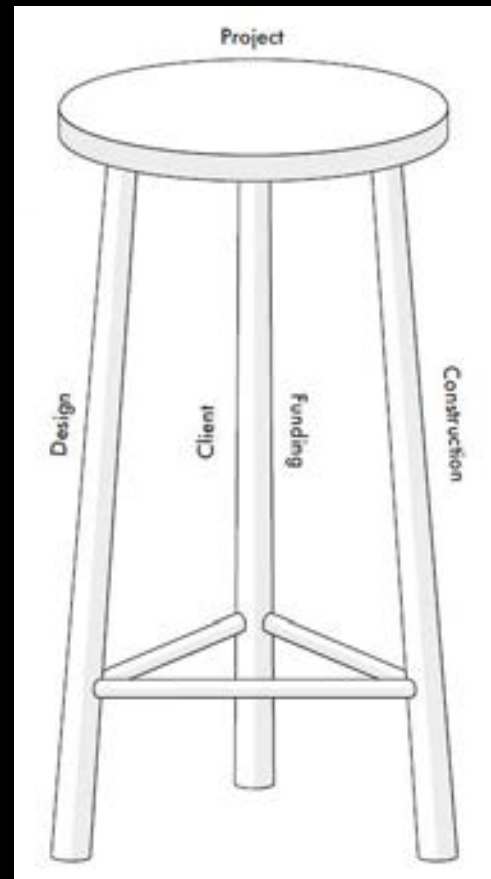
PGH Principles

1. Consider the house as a system.
2. Build no larger than necessary.
3. Build simply.
4. Make energy improvements until they stop making sense.
5. Prioritize good indoor air quality.
6. Support your local economy.
7. Support local and global ecosystems.
8. Build durable, resilient homes.
9. Design homes with aesthetic appeal.



Climate - Team - Regulations

- Climate
- Team
- Constraints
 - Regulations
 - Infrastructure
 - Resiliency



PGH RECOMMENDED SIZES



1-person
600-1000 ft²



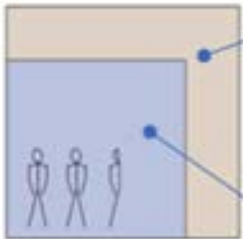
2-person
800-1500 ft²



3-person
1200-1750 ft²



4+person
1600-1875 ft²



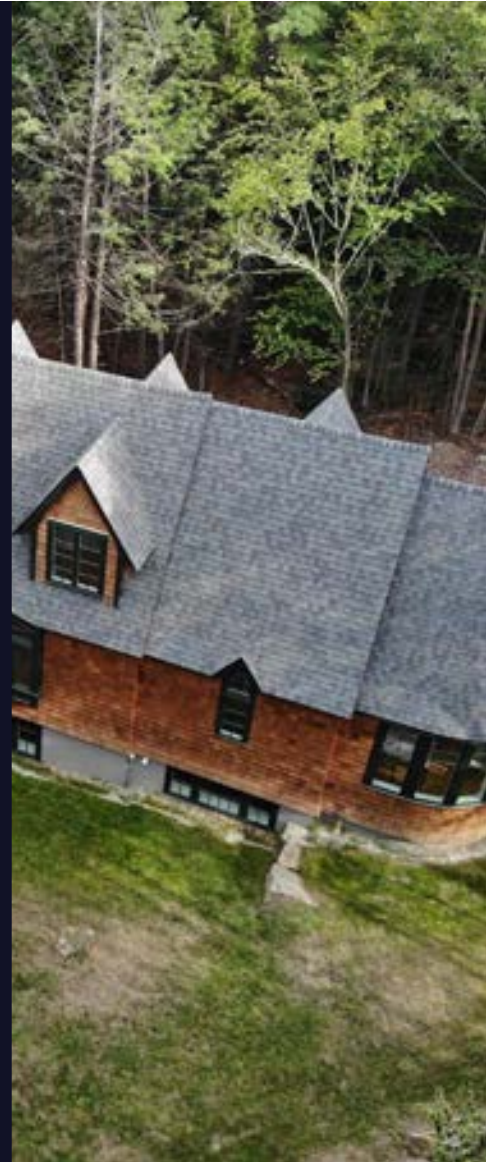
US NATIONAL
AVERAGE: 2.5
OCCUPANTS, 2687 FT²

PGH FOR 2.5
OCCUPANTS: 1600 FT²

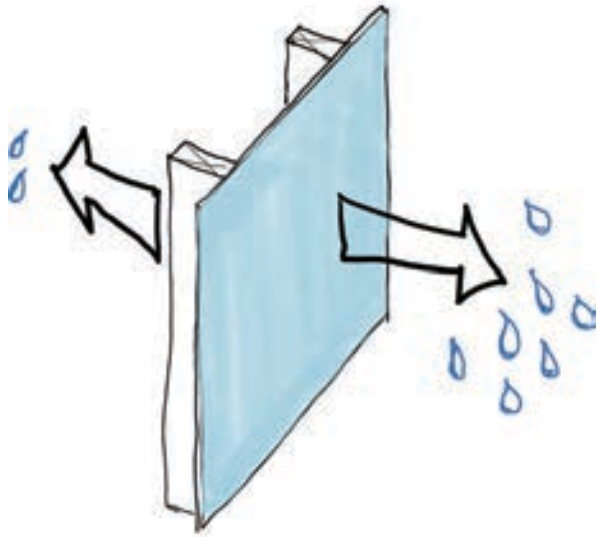
Economics

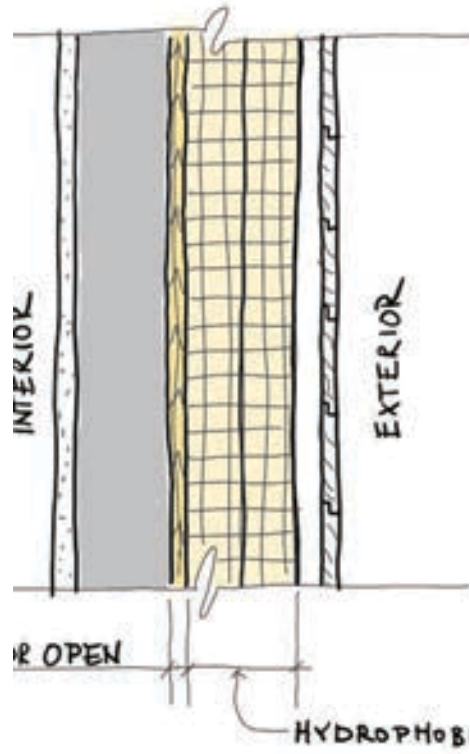


Design

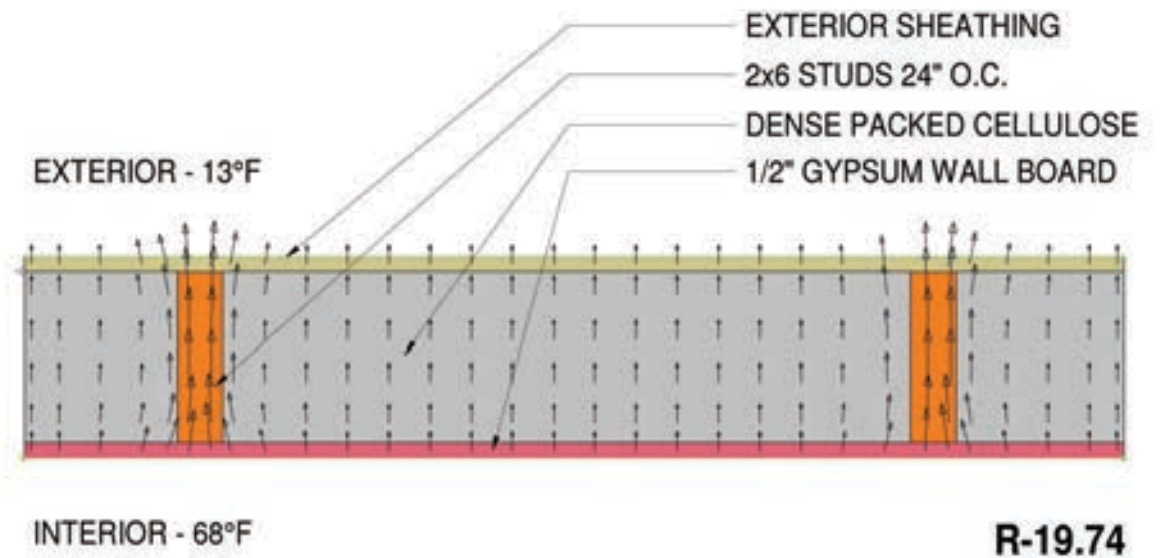
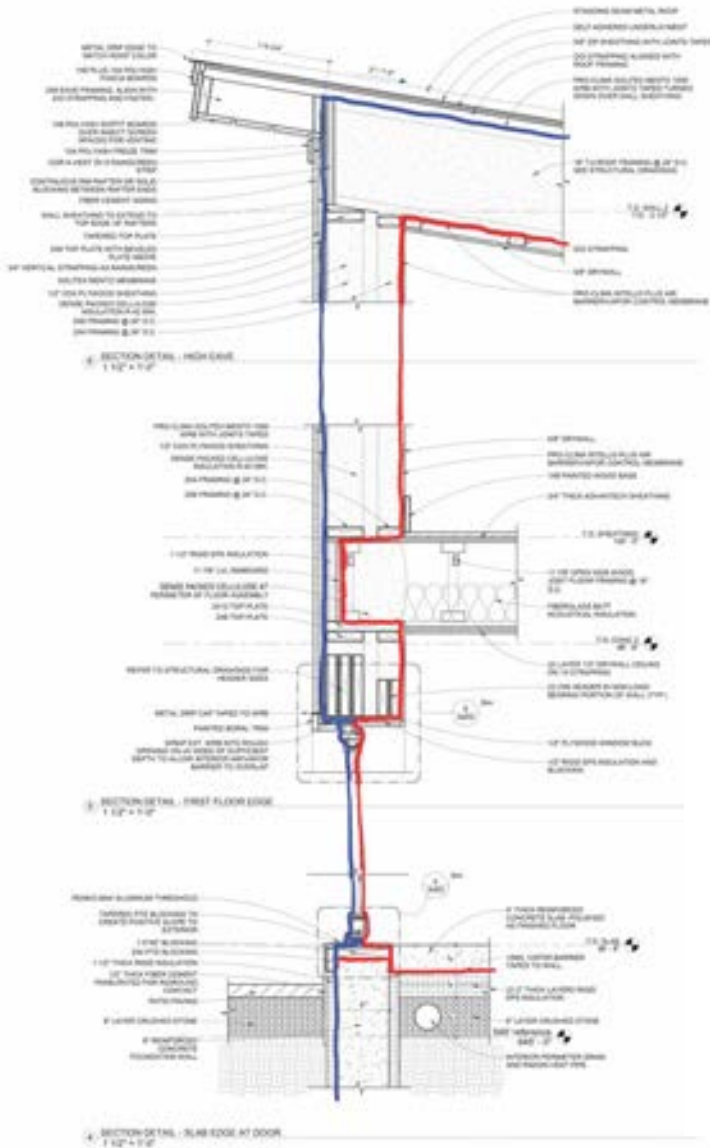


Water & Moisture Management





Building Envelope Basics





Windows & Exterior Doors

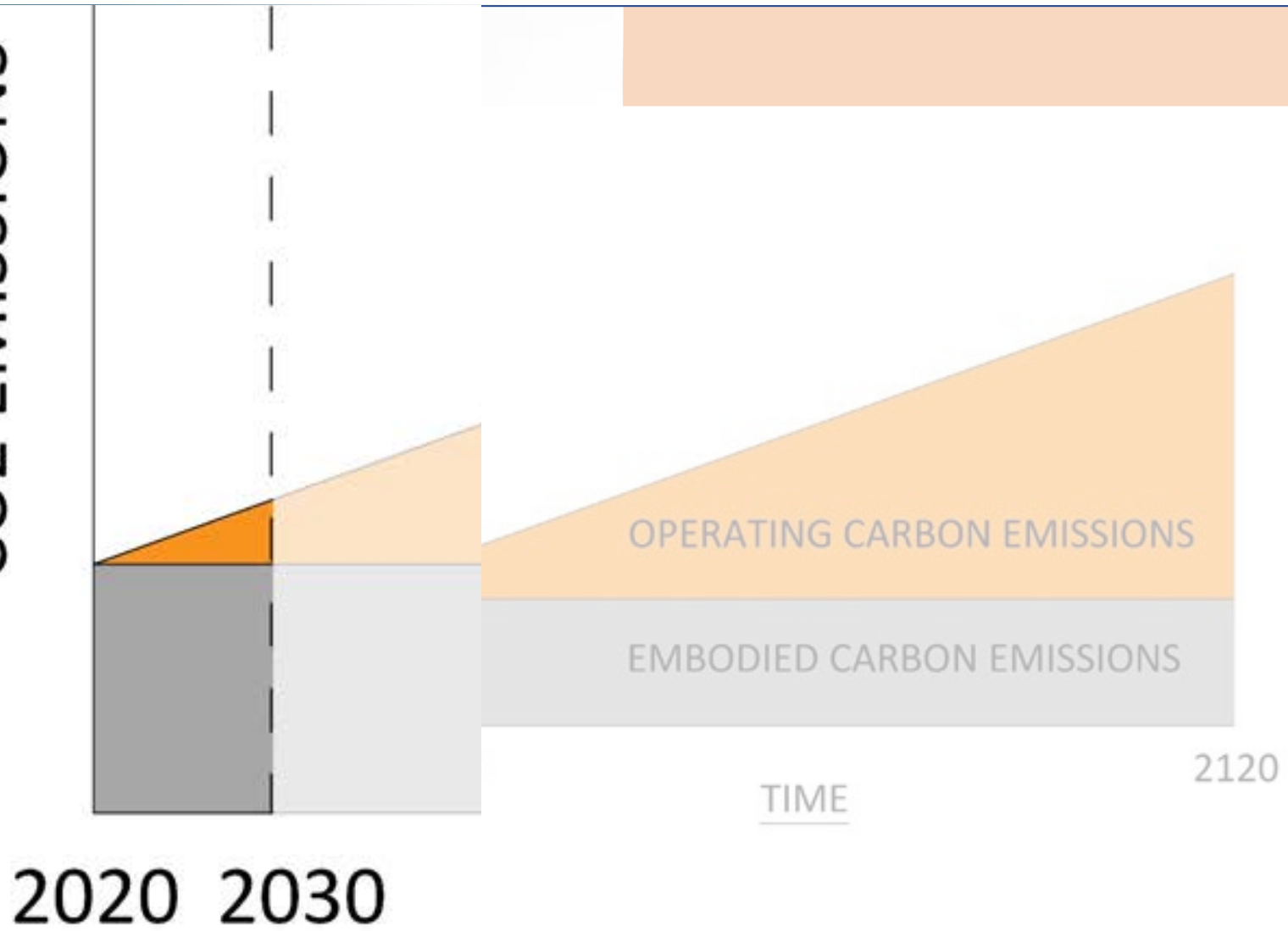




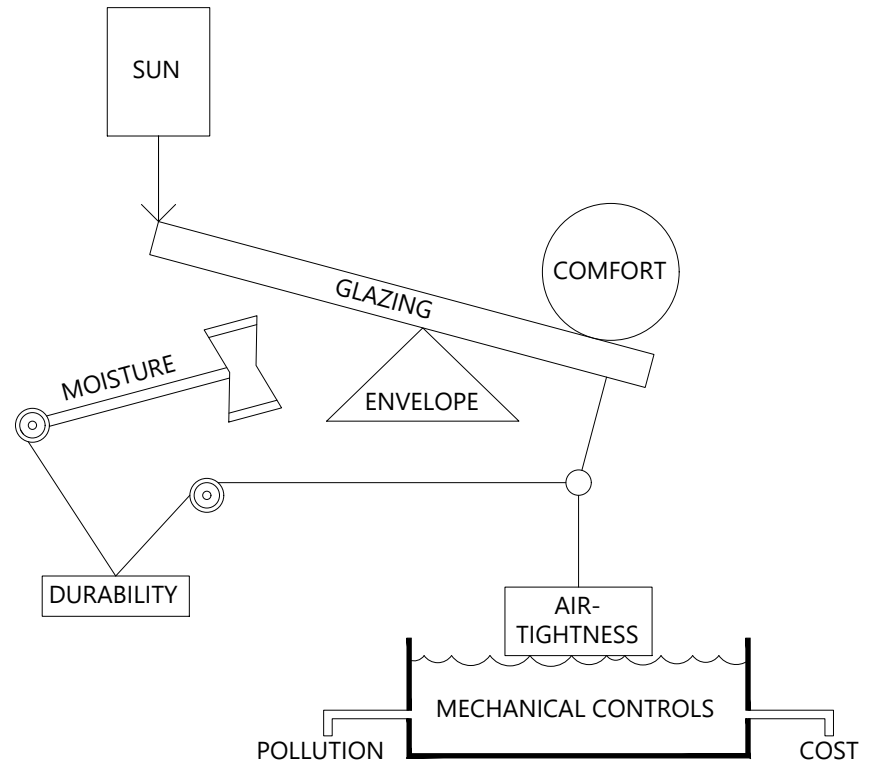
Materials

- Embodied Carbon – or Upfront Carbon Emissions
- Resource Efficiency
- Recycled Content
- Toxins & Indoor Air Quality

CO2 EMISSIONS



Mechanical Systems





Heating demand

specific: **15.33** kBtu/ft²yr
 target: **6.4** kBtu/ft²yr
 total: **50,107.63** kBtu/yr



Cooling demand

sensible: **0.84** kBtu/ft²yr
 latent: **0.01** kBtu/ft²yr
 specific: **0.85** kBtu/ft²yr
 target: **4.1** kBtu/ft²yr
 total: **2,776.16** kBtu/yr



Heating load

specific: **8.11** Btu/hr ft²
 target: **5.2** Btu/hr ft²
 total: **26,498.77** Btu/hr



Cooling load

specific: **1.67** Btu/hr ft²
 target: **2.4** Btu/hr ft²
 total: **5,461.04** Btu/hr



Electricity and Lighting

- Reduce First
- Produce your own Energy



- Will you include daylighting in your design?

- Reduce First

- Produce your own Energy

- Do your local regulations and site conditions support solar?

- Is there a community solar option if not?

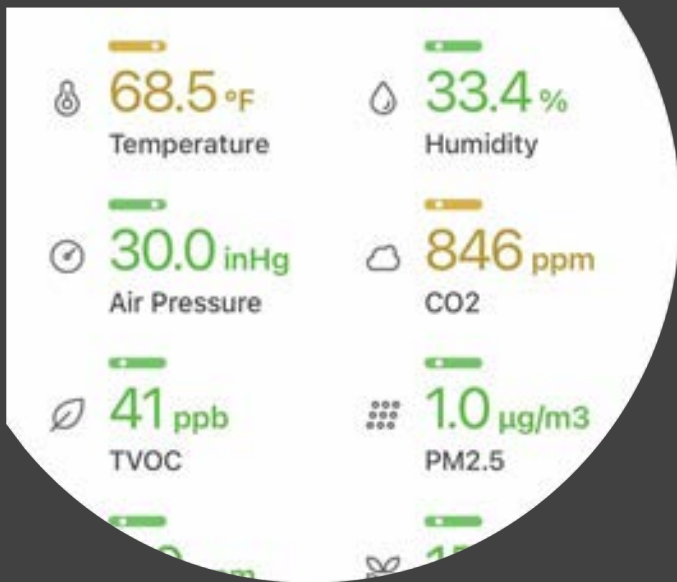
Will we use our cars as back up systems for our home to improve their resiliency during power outages?

Have you reduced your energy demand to the greatest extent possible?

Electricity and Lighting



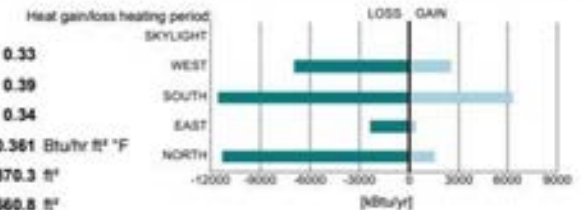
Verification & Client Education



BUILDING ELEMENTS

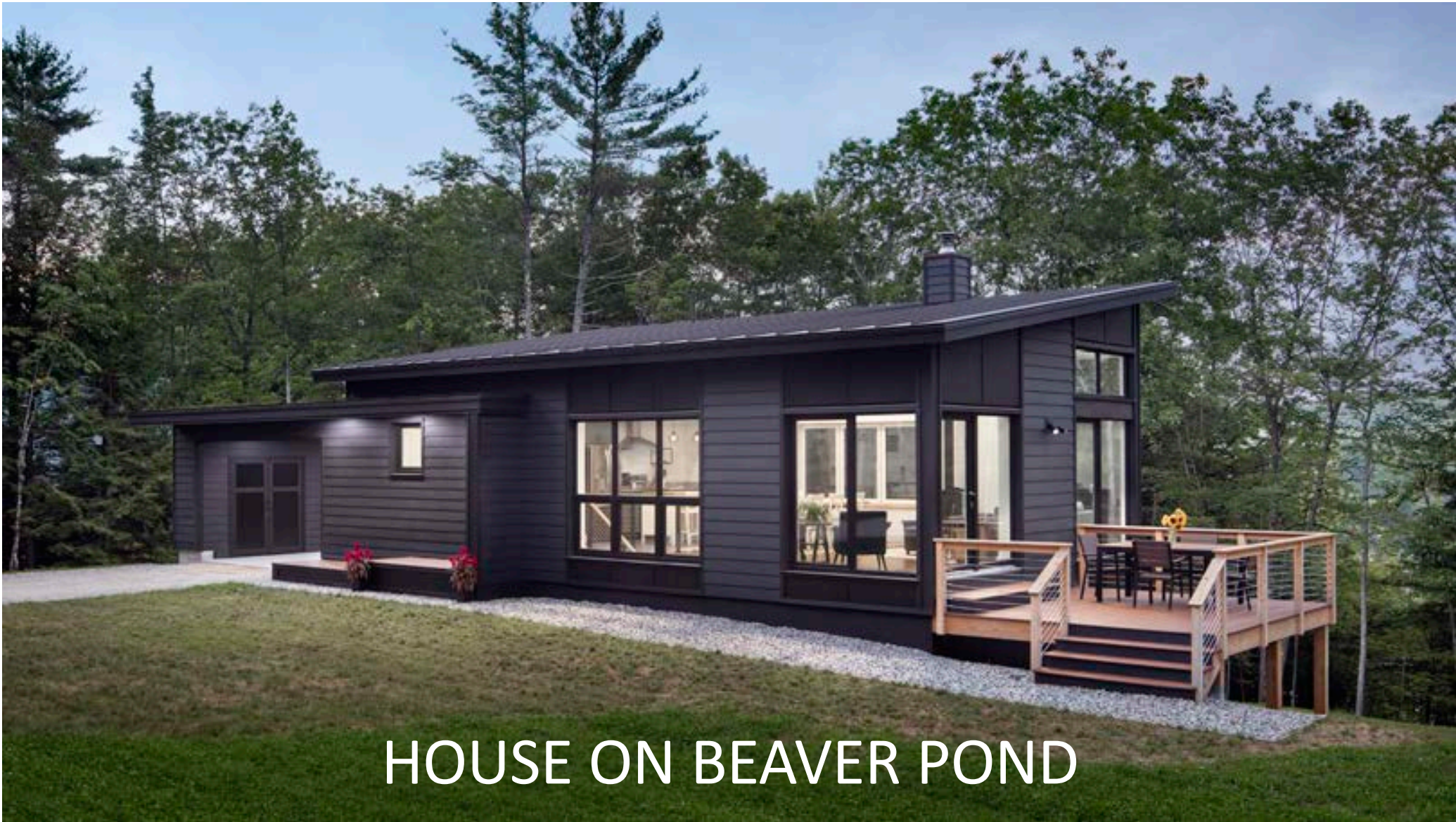
Windows

Average SHGC:	0.33
Average solar reduction factor heating:	0.39
Average solar reduction factor cooling:	0.34
Average U-value:	0.361 Btu/hr ft ² °F
Total glazing area:	370.3 ft ²
Total window area:	560.8 ft ²



- And if you think you designed or built a PGH – download your certificate and proudly show off your commitment to doing better things.





HOUSE ON BEAVER POND

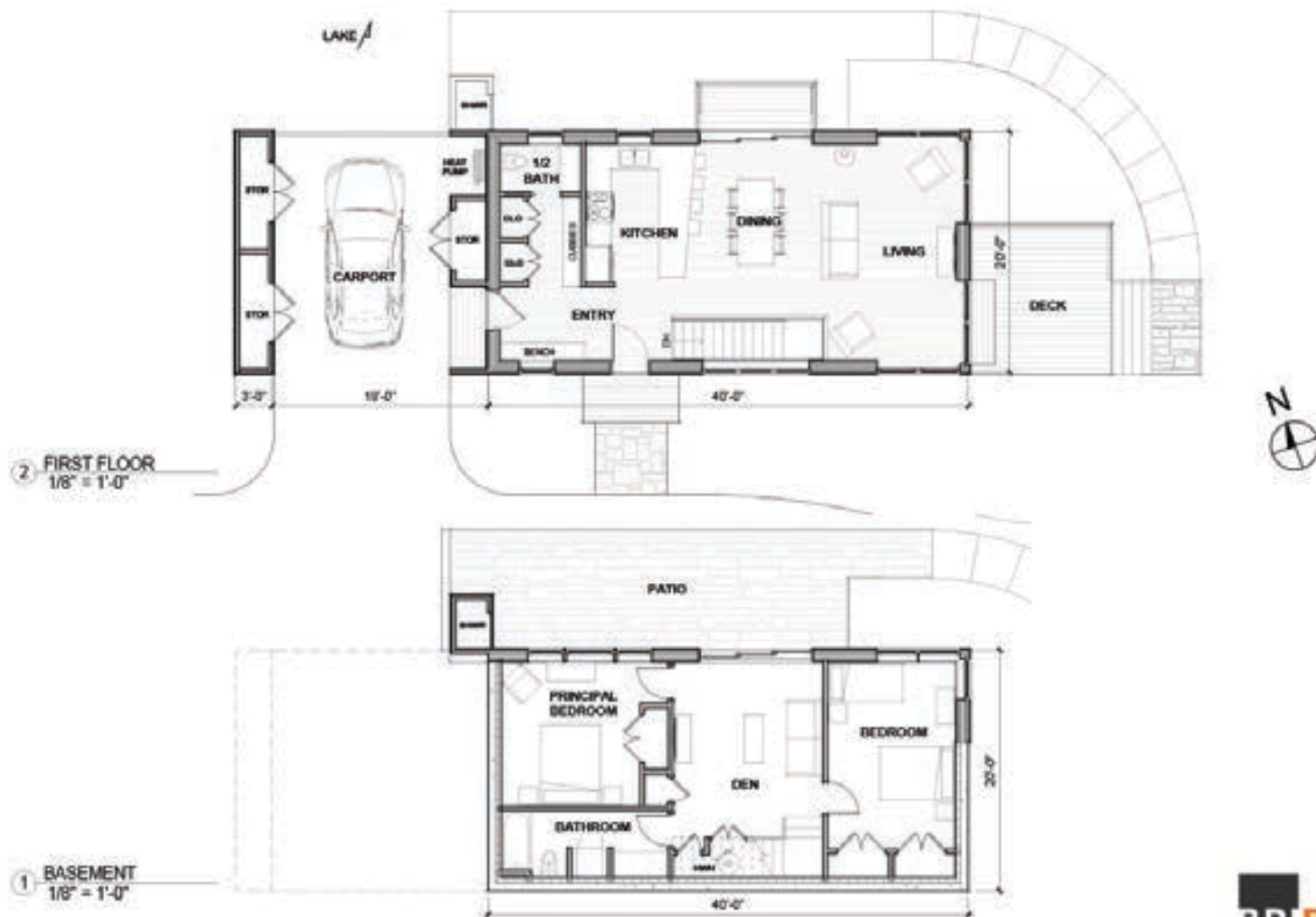
THE TEAM



HOUSE ON BEAVER POND







OPTION 4 PLANS

1/8" = 1'-0"



ECONOMICS

2 Bedrooms

1.5 Baths

1600 SF

Strapped I-Joist Roof - R-61

Double Stud Walls – R-42

Insulated Foundation wall – R-28

Insulated Slab – R-20

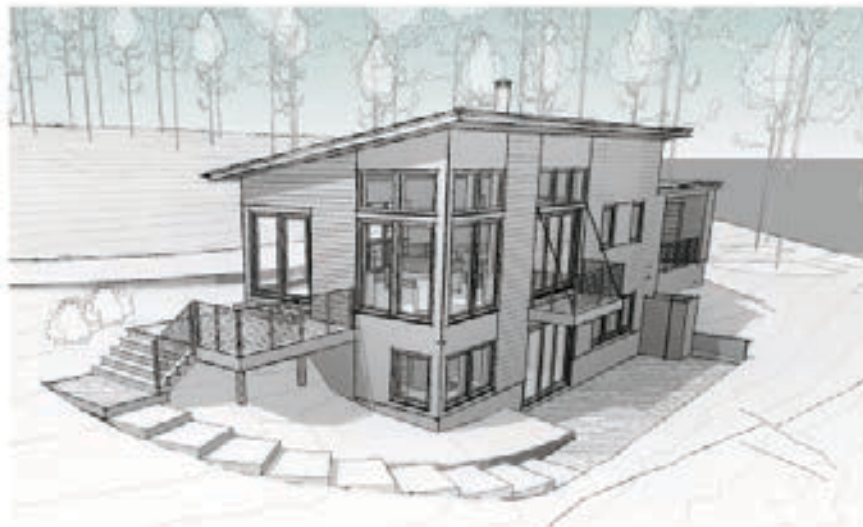
Air source Mini split heat pump first floor

Electric ENVI heaters second floor

Morso Wood Stove

Triple pane Logic windows

\$379/SF (excludes site work)

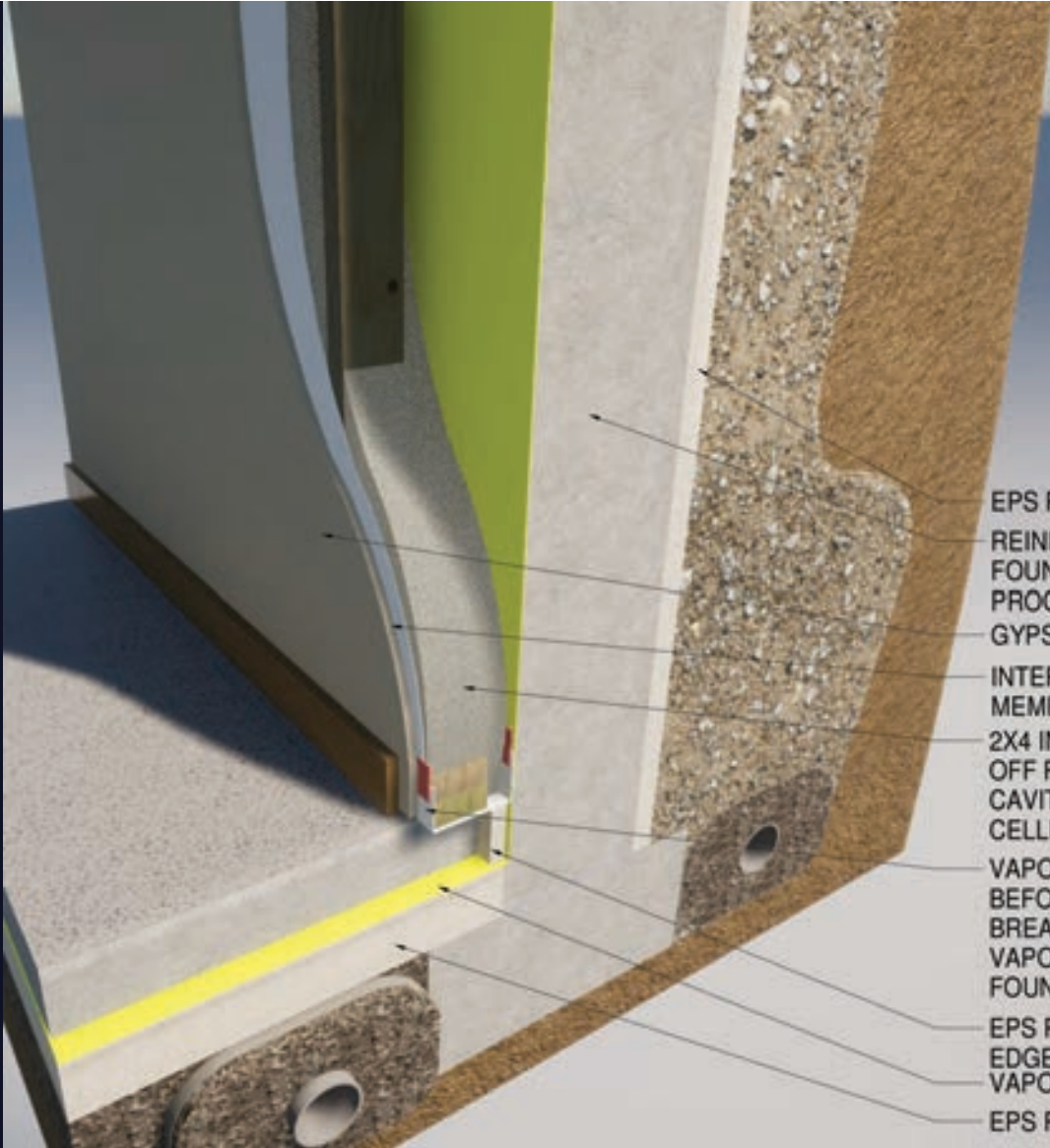


DOUBLE STUD ON BASEMENT WALL



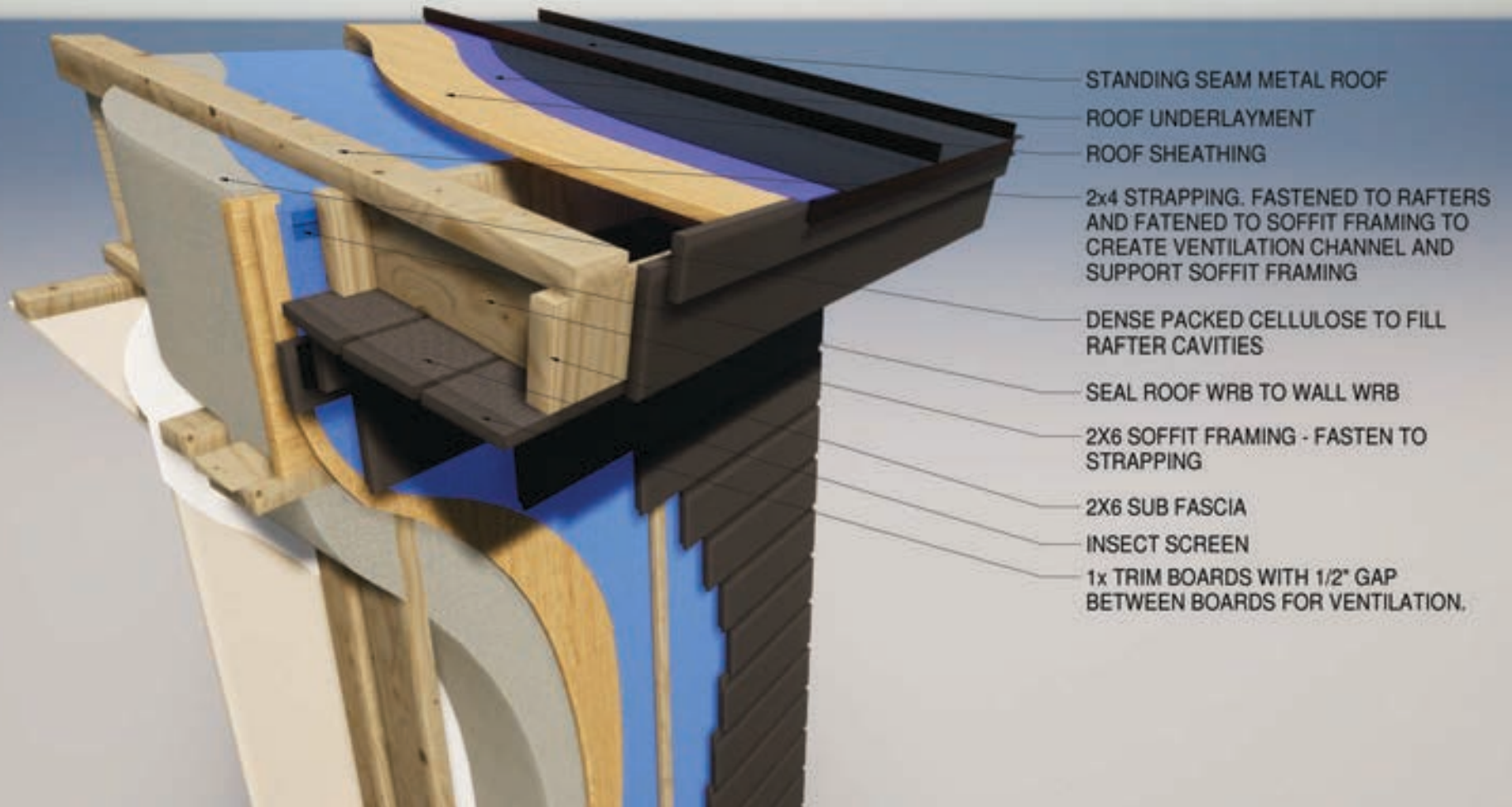
- SIDING AS SCHEDULED
- VERTICAL STRAPPING AS RAINSCREEN
- JOIST CAVITY PACKED WITH FORMALDEHYDE FREE FIBERGLASS OR DENSE PACKED CELLULOSE
- RIM JOIST IS RECESSED TO ALLOW 2" EPS RIGID INSULATION
- SHEATHING SEALED AS PRIMARY AIR BARRIER
- WEATHER RESISTANT BARRIER
- RIGID INSECT SCREEN VENT STRIP
- TURN UP VAPOR BARRIER AND SEAL TO SHEATHING
- VAPOR VARIABLE MEMBRANE SEAL TO VAPOR BARRIER AT SILL
- INTERIOR 2X4 STUD WALL HELD OFF OF FOUNDATION WALL. CAVITY FILLED WITH DENSE PACKED CELLULOSE
- VAPOR BARRIER -SEALED TO SLAB VAPOR BARRIER AND LAPPED OVER TOP OF FOUNDATION WALL
- REINFORCED CONCRETE WALL WITH STEM WALL
- WATERPROFFING MEMBRANE
- 2" EPS RIGID INSULATION
- CEMENT BOARD RATED FOR IN-GROUND CONTACT
- GRANULAR BACKFILL FOR DRAINAGE

BASEMENT WALL



- EPS RIGID INSULATION
- REINFORCED CONCRETE FOUNDATION WALL WITH WATER PROOFING ON EXTERIOR
- GYPSUM WALL BOARD
- INTERIOR VAPOR VARIABLE MEMBRANE
- 2X4 INTERIOR STUD WALL HELD OFF FROM FOUNDATION WALL. FILL CAVITIES WITH DENSE PACKED CELLULOSE
- VAPOR BARRIER APPLIED BEFORE WOOD SILL AS CAPILARY BREAK. TAPE SEAL TO INTERIOR VAPOR BARRIER AND FOUNDATION VAPOR BARRIER
- EPS RIGID INSULATION AT SLAB EDGE
- VAPOR BARRIER. TURN UP WALL.
- EPS RIGID INSULATION UNDER SLAB

VENTED SUSPENDED SOFFIT





























MATERIALS



SYSTEMS



BUILDING INFORMATION

Category: Residential
 Status: In planning
 Building type: New construction
 Year of construction:
 Units: 1
 Number of occupants: 5 (Design)
 Occupant density: 279.6 ft²/Person



Boundary conditions

Climate: PORTLAND INTL JETPORT ME
 Internal heat gains: 0.4 Btu/hr ft²
 Interior temperature: 68 °F
 Overall temperature: 77 °F

Building geometry

Enclosed volume: 19,209.9 ft³
 Net volume: 12,842.5 ft³
 Total area envelope: 4,309.6 ft²
 Area/Volume Ratio: 0.2 1/ft
 Floor area: 1,398 ft²
 Envelope area/CFM: 3.883

PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2018

Heating demand

specific: 10.6 kBtu/ft²yr
 target: 11.7 kBtu/ft²yr
 total: 14,814.42 kBtu/yr



Cooling demand

sens: 3.33 kBtu/ft²yr
 latent: 0.82 kBtu/ft²yr
 specific: 3.35 kBtu/ft²yr
 target: 10.4 kBtu/ft²yr
 total: 7,484.32 kBtu/yr



Heating load

specific: 6.49 Btu/hr ft²
 target: 8.6 Btu/hr ft²
 total: 9,077.71 Btu/hr



Cooling load

specific: 6.39 Btu/hr ft²
 target: 5 Btu/hr ft²
 total: 8,937.53 Btu/hr



Source energy

total: 32,083.54 kWh/yr
 specific: 4,417 kWh/Person yr
 target: 3,840 kWh/Person yr
 total: 75,351.57 kBtu/yr
 specific: 53.9 kBtu/ft²yr



Site energy

total: 27,268.59 kBtu/yr
 specific: 19.51 kBtu/ft²yr
 total: 7,992.42 kWh/yr
 specific: 5.72 kWh/ft²yr



Air tightness

ACH50: 1.01 1/hr
 CFM50 per envelope area: 0.03 cfm/ft²
 target: 1.21 1/hr
 target CFM50: 0.06 cfm/ft²



PASSIVEHOUSE RECOMMENDATIONS

Sensible recovery efficiency: 73.2 %



Frequency of overheating: 29.2 %

Frequency of overheating only applies if there is not a properly sized cooling system installed.



EUI= 17 kBtu/SF/yr

0.6 ACH50



VERIFICATION















We wrote a book
A "Pretty Good" Offer

www.TauntonStore.com

code:

PGHEVENT



PRETTYGOODHOUSE

A GUIDE TO CREATING BETTER HOMES



DAN KOLBERT

EMILY MOTTRAM

MICHAEL MAINES

CHRISTOPHER BRILEY

We have a
website

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About the name...

In southern Maine, there's a small group of building professionals that get together monthly to discuss building science. It sounds boring, I know, but truly it isn't. Food is brought in, beer is consumed, a blackboard is present and a topic is brought up for discussion, topics like, high performance windows, varying cathedral ceilings, moisture migration in wall assemblies, nails on grade details, etc.) Since we are all peers, and colleagues both ego, attitude, and a good sense of humor the conversation is usually lively, informal and fairly all over the place. There's usually a moderator to keep everyone reined in and on topic. Every once in a while I have the pleasure of being that moderator, but that is only when Dan Kubert can't attend. Dan while not a rare once, expressed frustration with the status quo, and even more frustration with the various rating systems that had him jumping through many hoops to prove that his work was in fact "green" and energy efficient. As many can attest, these systems can be very costly in time and money, and in the case of many green projects, they aren't doing anything to advance the project. Rather they are simply certifying them. So Dan simply stated, "I just want to build a pretty good house."

-Chris Wiley

We like discussion

List of BS+Beer and other
building science groups + The
BS+Beer Show

