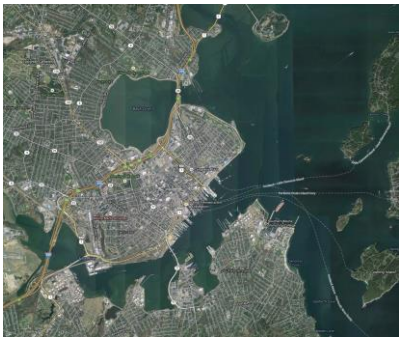
Stealth Passive House

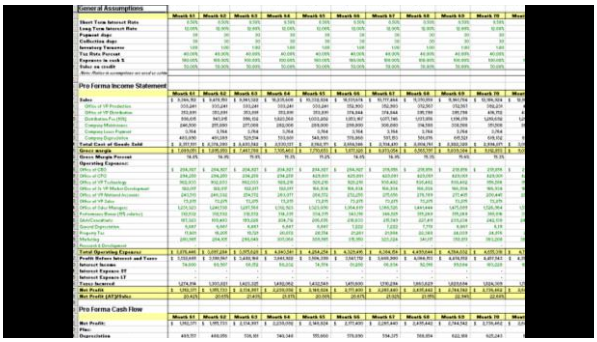
Boring, Invisible & Everywhere

Jesse Thompson
Kaplan Thompson Architects

IAQ & Energy 2019

Portland, ME





NET-ZERO LIFE

LOW ENERGY LIFE

REAL LIFE

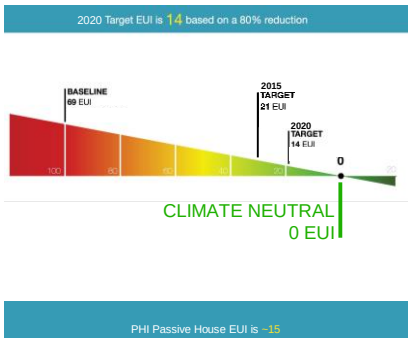
BrightBuilt Barn

2008

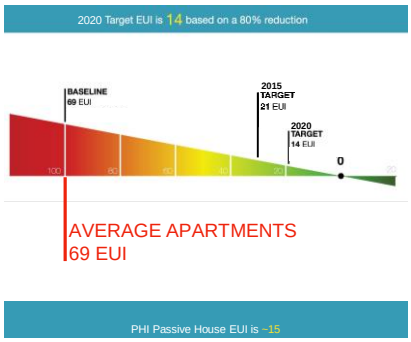
2013

BRIGHTBUILT HOME

AIA 2030™

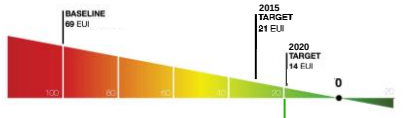


AIA 2030™



AIA 2030™

2020 Target EUI is 14 based on a 80% reduction



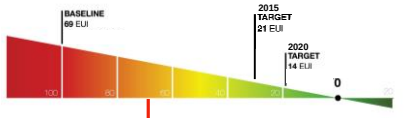
PASSIVE HOUSE
15 EUI

PHI Passive House EUI is ~15

Kaplan Thompson Architects

AIA 2030™

2020 Target EUI is 14 based on a 80% reduction



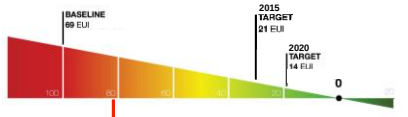
AVERAGE K-12 SCHOOL
48 EUI

PHI Passive House EUI is ~15

Kaplan Thompson Architects

AIA 2030™

2020 Target EUI is 14 based on a 80% reduction



AVERAGE MOVIE THEATER
56 EUI

PHI Passive House EUI is ~15

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AIA 2030™

SUPERMARKET
200 EUI

APARTMENTS
69 EUI

CLIMATE NEUTRAL
0 EUI

Kaplan Thompson Architects

AIA 2030™

HOSPITAL
235 EUI

APARTMENTS
69 EUI

CLIMATE NEUTRAL
0 EUI

Kaplan Thompson Architects

AIA 2030™

FAST FOOD RESTAURANT
405 EUI

APARTMENTS
69 EUI

CLIMATE NEUTRAL
0 EUI

Kaplan Thompson Architects

SOLAR PANEL

2010: $2,680

SOLAR PANEL

~~2010: $2,680~~
2014: $1,005

SOLAR PANEL

~~2010: $2,680~~
~~2014: $1,005~~
2019: $670

SOLAR PANEL

335 WATT

SOLAR PANEL

335 WATT

SOLAR PANEL

400 KILOWATT HOURS

ELECTRIC CAR

1,500 MILES

SOLAR PANEL

400 KILOWATT HOURS

SOLAR PANEL

400 KILOWATT HOURS
$0.18 / kWH

SOLAR PANEL

400 KILOWATT HOURS
$0.18 / kWH
$72 / YEAR

SOLAR PANEL

400 KILOWATT HOURS

SOLAR PANEL

400 KILOWATT HOURS
18 SQUARE FEET

SOLAR PANEL

400 KILOWATT HOURS
18 SQUARE FEET
22 kWH / SF

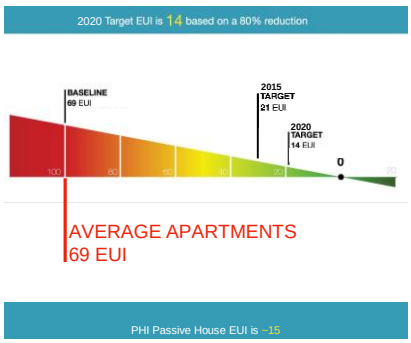
SOLAR PANEL

400 KILOWATT HOURS
18 SQUARE FEET
22 kWH / SF
75 KBTU / SF

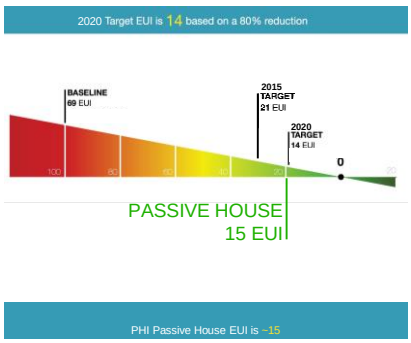
SOLAR PANEL

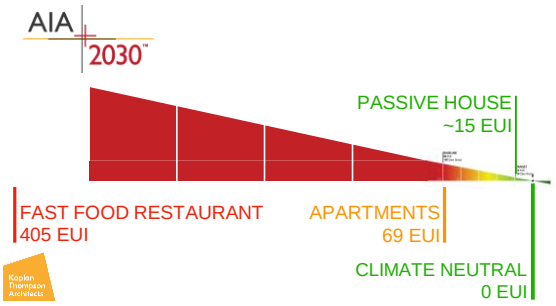
75 EUI

AIA 2030

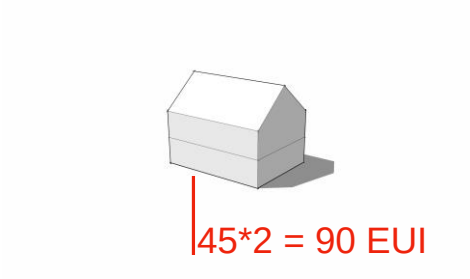


AIA 2030

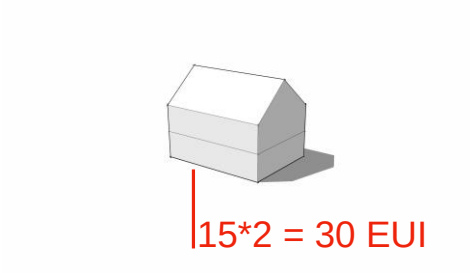




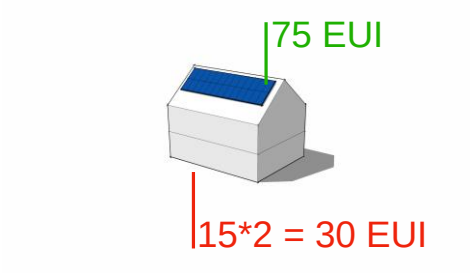
AVERAGE HOUSE



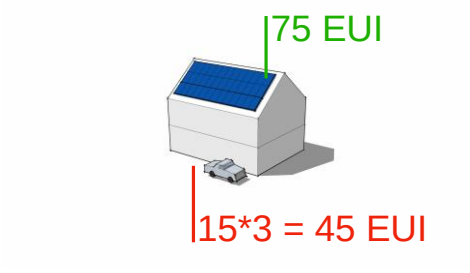
PASSIVE HOUSE



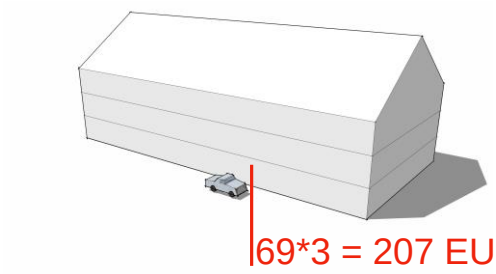
NET-ZERO PASSIVE HOUSE



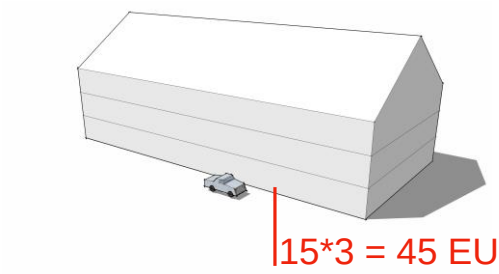
NET-ZERO PASSIVE HOUSE + E-CAR



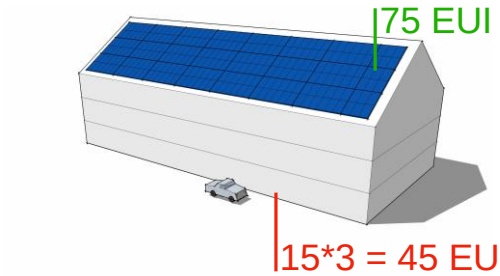
AVERAGE APARTMENTS



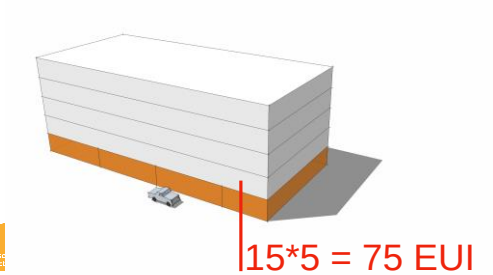
PASSIVE APARTMENTS



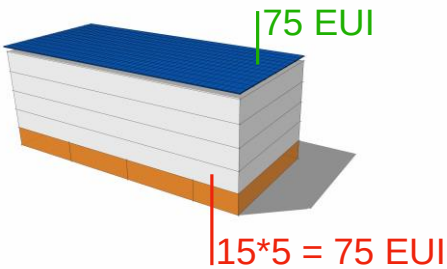
NET-ZERO PASSIVE APARTMENTS



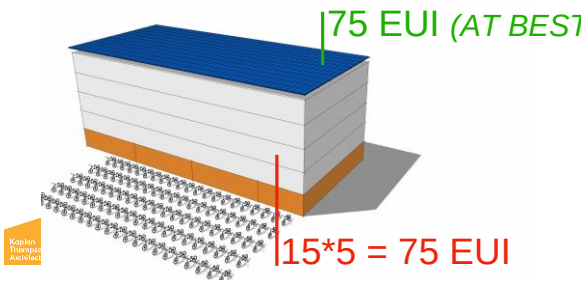
PASSIVE DOWNTOWN



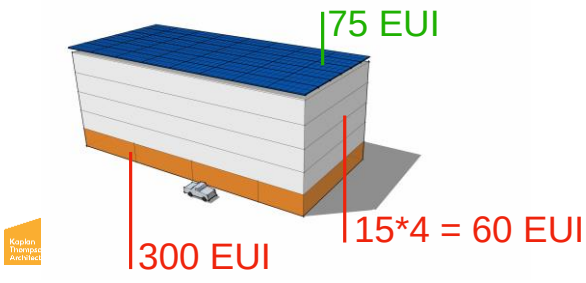
NET-ZERO PASSIVE DOWNTOWN



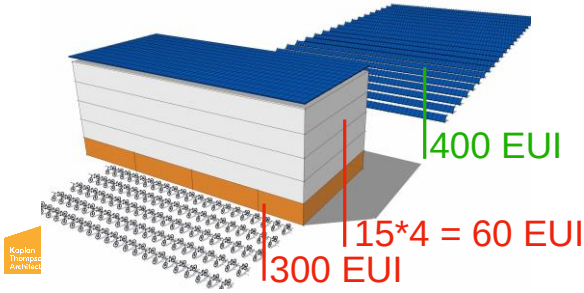
NET-ZERO PASSIVE DOWNTOWN + EBIKE



~~NET-ZERO~~ PASSIVE DOWNTOWN



NET-ZERO PASSIVE DOWNTOWN



Passive House Basics

100 SQUARE FEET

PEAK HEATING LOAD

1 WATT / SF

(3.41 BTU / HOUR / SF)

Bayside Anchor

2014

Bayside Anchor

LIHTC funding

Passive House as project goal

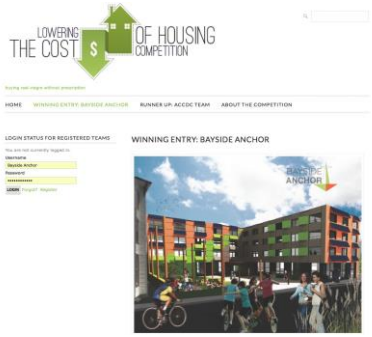
45 Units

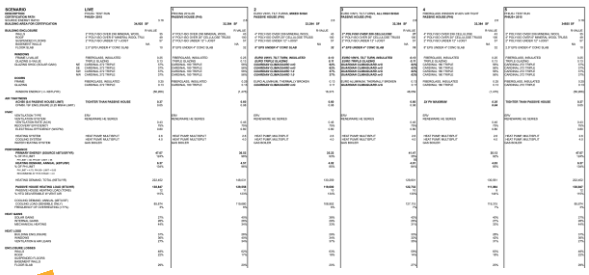
$142 / SF Construction Cost

$170,000 per Unit Total Development Cost

Lowering the Cost of Housing Competition

2013



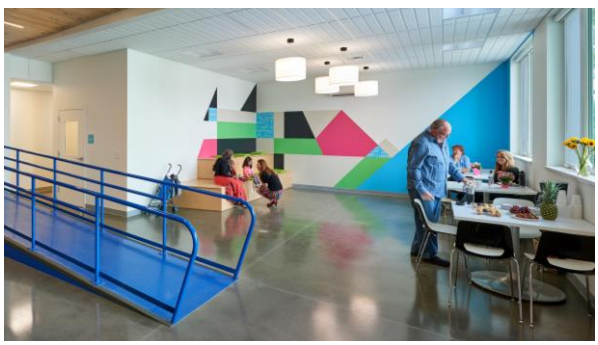


SCENARIOS ON SCENARIOS

U Frame 0.25
U COG 0.13
SHGC 45%

GUARDIAN triple Climaguard 8070

Kohltech
Windows & Entrance Systems



COST FOR EVERYTHING

$644 / APARTMENT / YEAR
$53.70 / APARTMENT / MONTH
~$0.82 / SF / YEAR

Blackstone Apartments

$165 / SF

Blackstone Apartments

LIHTC funding (Preservation Set-Aside)

19 new homes + 20 renovated townhouses
(17) 1 BR Apartments
(2) 2 BR Apartments

$180 / SF Construction Cost

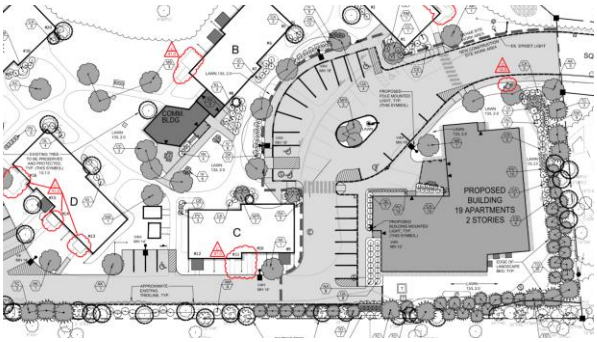
$188,000 per Unit Total Development Cost

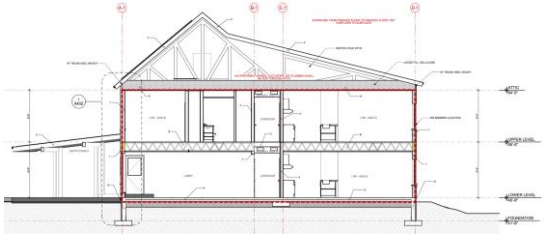
Blackstone Apartments

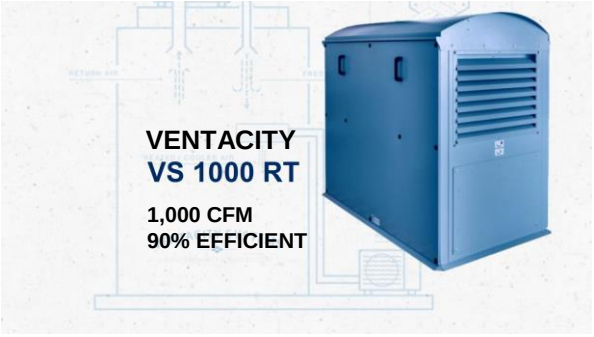
100% Affordable
Seniors 62+
Individuals with Disabilities

RENTS
1-BR unit: $845 - $1,013
2-BR unit: $1,054 - $1,269

Targeting 50% - 60% AMI local area

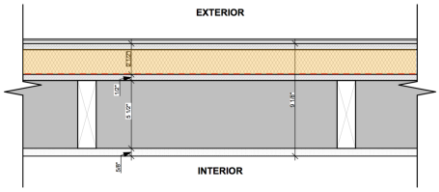






2” POLYISO OVER 2X6 CELLULOSE

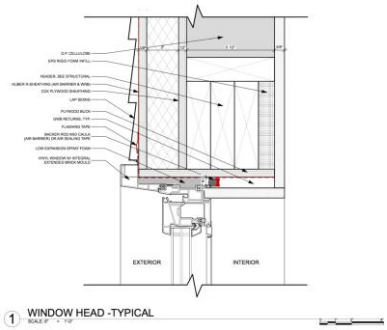
R - 32



paradigm
Window Solutions For Life.

U Frame 0.25
U COG 0.17
SHGC 37%

Cardinal triple
272 / clear / 180


EXTERIOR
INTERIOR
1 WINDOW HEAD -TYPICAL


BLACKSTONE SENIOR APARTMENTS
PROJECT INFORMATION


VOLVO


ATTIC AIR BARRIER

0.61 ACH50

or

0.058 CFM50 per SF of Enclosure

FREE energy MAINE

Commercial Airflow Assessment

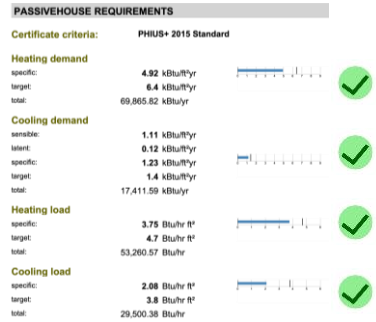
Customer: Karen James, Great Falls Construction
Address: Squidere Ln Falmouth, ME (New Building)
Date: November 17, 2017
Auditor: Andrew Greenlaw, MS, BPI (Cert# 5051532)

Karen,

As a recap, Friday's goal for the bulk air infiltration as measured via blower door was 1500 CFM50. After spending approximately two hours conducting blower door-directed air sealing, we were able to exceed that goal by approximately 134 CFM50 with a final result of 1366 CFM50.

Passive House?

1.1 W / SF

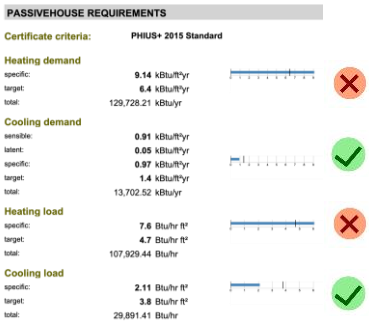


PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

Heating demand		
specific:	**4.92**	kBtu/ft²yr
target:	**6.4**	kBtu/ft²yr
total:	69,865.82	kBtu/yr
Cooling demand		
sensible:	**1.11**	kBtu/ft²yr
latent:	**0.12**	kBtu/ft²yr
specific:	**1.23**	kBtu/ft²yr
target:	**1.4**	kBtu/ft²yr
total:	17,411.59	kBtu/yr
Heating load		
specific:	**3.75**	Btu/hr ft²
target:	**4.7**	Btu/hr ft²
total:	53,260.57	Btu/hr
Cooling load		
specific:	**2.08**	Btu/hr ft²
target:	**3.8**	Btu/hr ft²
total:	29,500.38	Btu/hr

0.25 CFM50 per SF of Enclosure

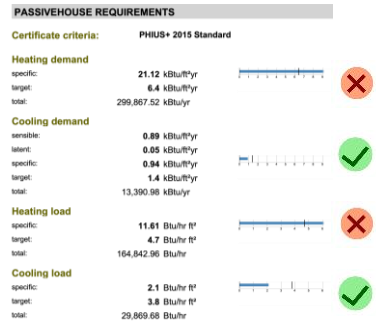


PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

Heating demand		
specific:	**9.14**	kBtu/ft²yr
target:	**6.4**	kBtu/ft²yr
total:	129,728.21	kBtu/yr
Cooling demand		
sensible:	**0.91**	kBtu/ft²yr
latent:	**0.05**	kBtu/ft²yr
specific:	**0.97**	kBtu/ft²yr
target:	**1.4**	kBtu/ft²yr
total:	13,702.52	kBtu/yr
Heating load		
specific:	**7.6**	Btu/hr ft²
target:	**4.7**	Btu/hr ft²
total:	107,929.44	Btu/hr
Cooling load		
specific:	**2.11**	Btu/hr ft²
target:	**3.8**	Btu/hr ft²
total:	29,891.41	Btu/hr

No Heat Recovery



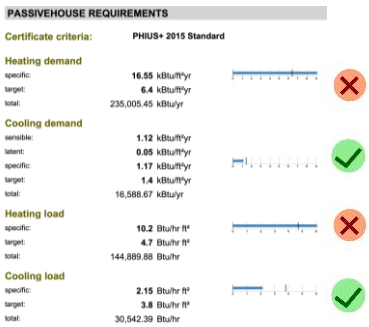
PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

Heating demand		
specific:	**21.12**	kBtu/ft²yr
target:	**6.4**	kBtu/ft²yr
total:	299,867.52	kBtu/yr
Cooling demand		
sensible:	**0.89**	kBtu/ft²yr
latent:	**0.05**	kBtu/ft²yr
specific:	**0.94**	kBtu/ft²yr
target:	**1.4**	kBtu/ft²yr
total:	13,390.98	kBtu/yr
Heating load		
specific:	**11.61**	Btu/hr ft²
target:	**4.7**	Btu/hr ft²
total:	164,842.96	Btu/hr
Cooling load		
specific:	**2.1**	Btu/hr ft²
target:	**3.8**	Btu/hr ft²
total:	29,869.68	Btu/hr

All the Insulation:

R-54 Walls
R-44 Slab
R-145 Attic

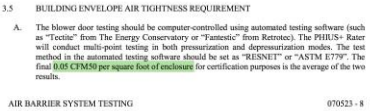


PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

Heating demand		
specific:	**16.55**	kBtu/ft²yr
target:	**6.4**	kBtu/ft²yr
total:	235,005.45	kBtu/yr
Cooling demand		
sensible:	**1.12**	kBtu/ft²yr
latent:	**0.05**	kBtu/ft²yr
specific:	**1.17**	kBtu/ft²yr
target:	**1.4**	kBtu/ft²yr
total:	16,588.67	kBtu/yr
Heating load		
specific:	**10.2**	Btu/hr ft²
target:	**4.7**	Btu/hr ft²
total:	144,889.88	Btu/hr
Cooling load		
specific:	**2.15**	Btu/hr ft²
target:	**3.8**	Btu/hr ft²
total:	30,542.39	Btu/hr

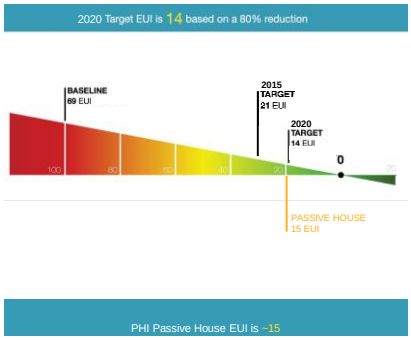
Specification

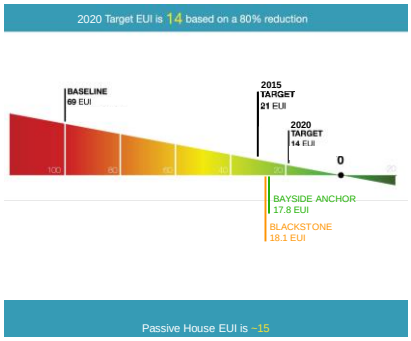


3.5 BUILDING ENVELOPE AIR TIGHTNESS REQUIREMENT

A. The blower door testing should be computer-controlled using automated testing software (such as "Tectite" from The Energy Conservatory or "Fantastic" from Retrotec). The PHIUS+ Rater will conduct multi-point testing in both pressurization and depressurization modes. The test method in the automated testing software should be set as "RESNET" or "ASTM E779". The final 0.05 CFM50 per square foot of enclosure for certification purposes is the average of the two results.

AIR BARRIER SYSTEM TESTING 070523 - 8

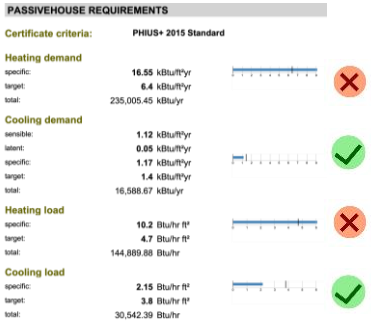




The Distraction of Insulation

All the Insulation:

R-54 Walls
R-44 Slab
R-145 Attic



PASSIVEHOUSE REQUIREMENTS

Certificate criteria: PHIUS+ 2015 Standard

Heating demand

specific:	16.55	kBtu/ft²yr
target:	6.4	kBtu/ft²yr
total:	235,005.45	kBtu/yr

Cooling demand

sensible:	1.12	kBtu/ft²yr
latent:	0.05	kBtu/ft²yr
specific:	1.17	kBtu/ft²yr
target:	1.4	kBtu/ft²yr
total:	16,588.67	kBtu/yr

Heating load

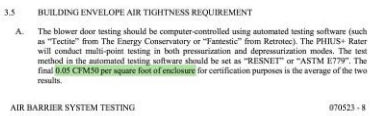
specific:	10.2	Btu/hr ft²
target:	4.7	Btu/hr ft²
total:	144,889.88	Btu/hr

Cooling load

specific:	2.15	Btu/hr ft²
target:	3.8	Btu/hr ft²
total:	30,542.39	Btu/hr

Air Tightness is Underpriced

Specification



3.5 BUILDING ENVELOPE AIR TIGHTNESS REQUIREMENT

A. The blower door testing should be computer-controlled using automated testing software (such as "Tectite" from The Energy Conservatory or "Fantestic" from Retrotec). The PHIUS+ Rater will conduct multi-point testing in both pressurization and depressurization modes. The test method in the automated testing software should be set as "RESNET" or "ASTM E779". The final 0.05 CFM50 per square foot of enclosure for certification purposes is the average of the two results.

AIR BARRIER SYSTEM TESTING 070523 - 8

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Disclaimer

- This presentation is not intended to be a comprehensive program covering all aspects of this topic.
- All are participants are encouraged to read and follow applicable standards, codes and regulations related to this topic.
- The views and opinions following are the presenter's opinions and not necessarily the official position of the Maine IAQ Council, IAQnet LLC, or Healthy Indoors.

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