

ZERO SIX:

URBAN PASSIVE HOUSE IN THE NEW AGE OF ADAPTATION

PHILADELPHIA'S CARBON FOOTPRINT

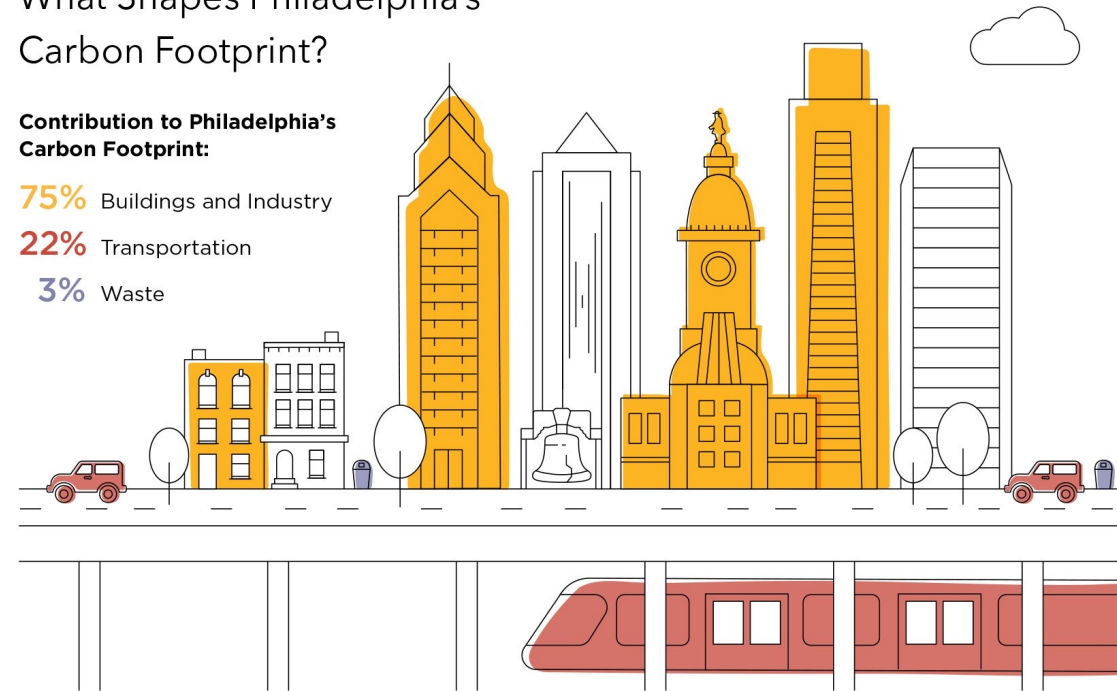
Sources of Emissions

OOS measures and tracks Philadelphia's carbon footprint. According to the most recent inventory, Philadelphia's emissions come from three major sources: Buildings and Industry, Transportation, and Waste.

What Shapes Philadelphia's Carbon Footprint?

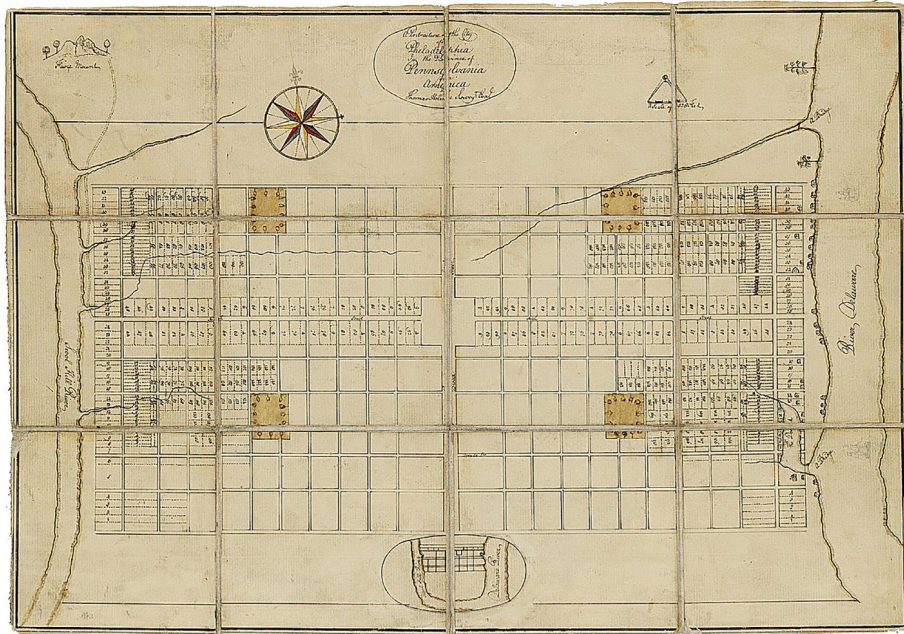
Contribution to Philadelphia's Carbon Footprint:

- 75% Buildings and Industry
- 22% Transportation
- 3% Waste

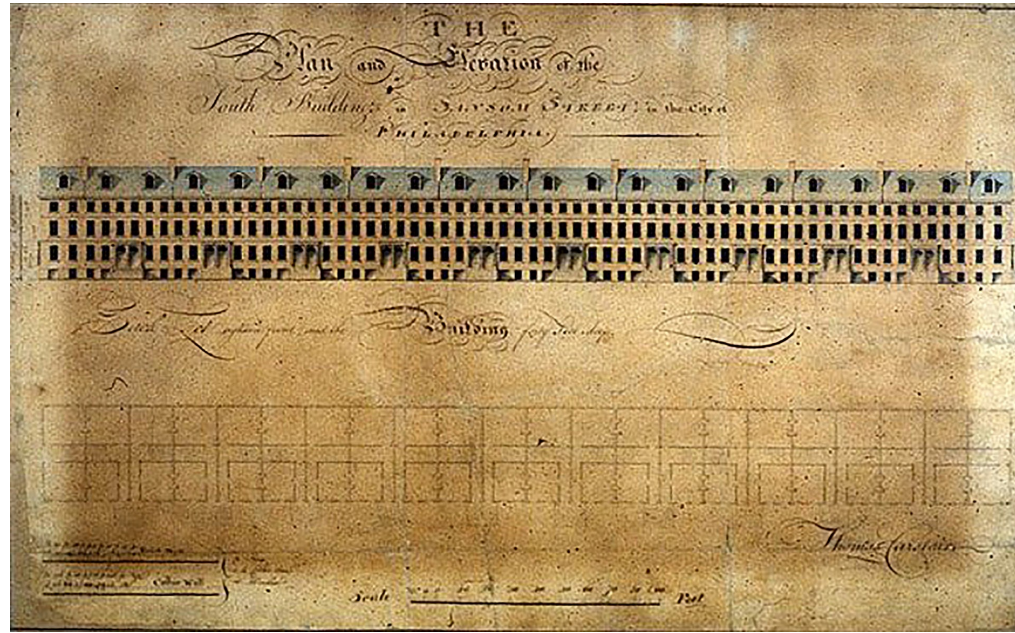




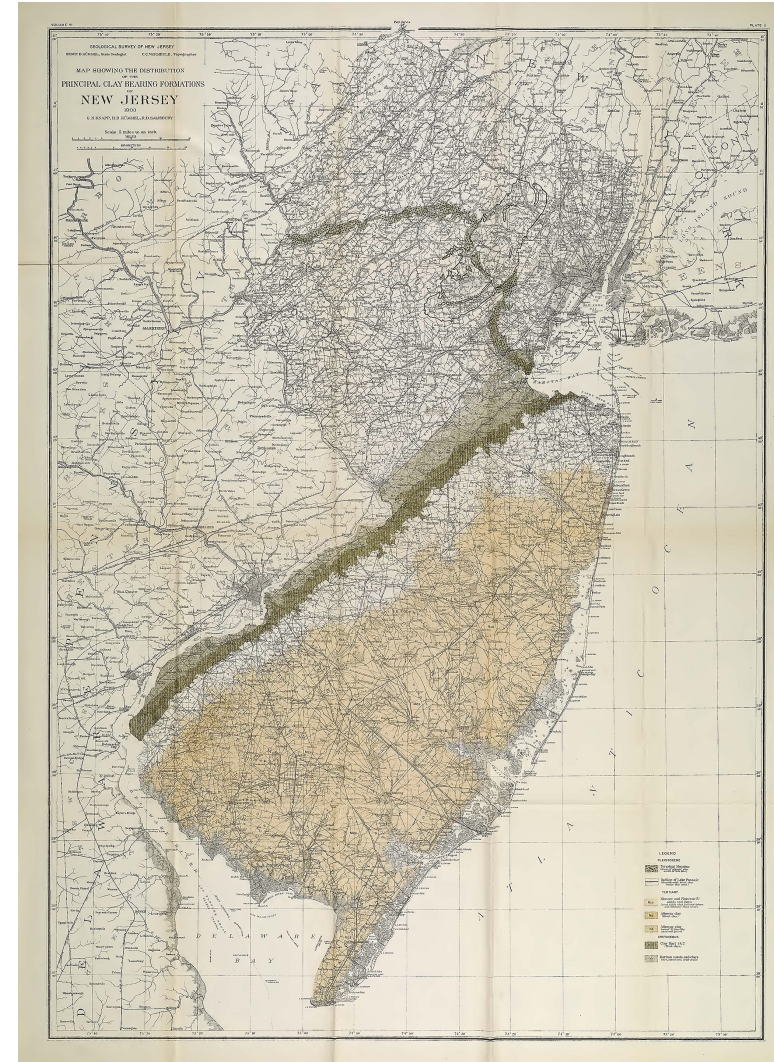
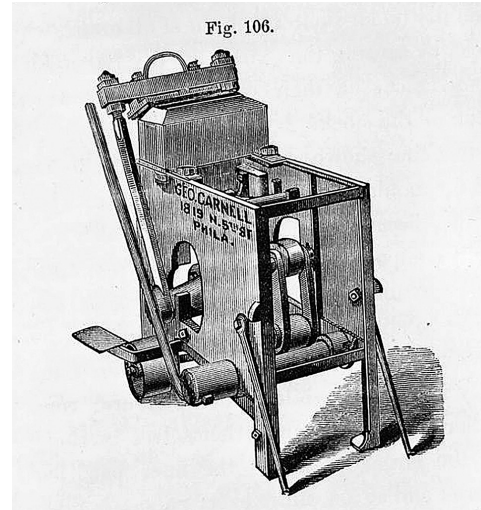
ZERO SIX Site + Context: Paradise, Philadelphia, Pennsylvania



The Philly Rowhouse: A Brief History (in 3 minutes)



The Philly Rowhouse: 1803 - Carstairs Row



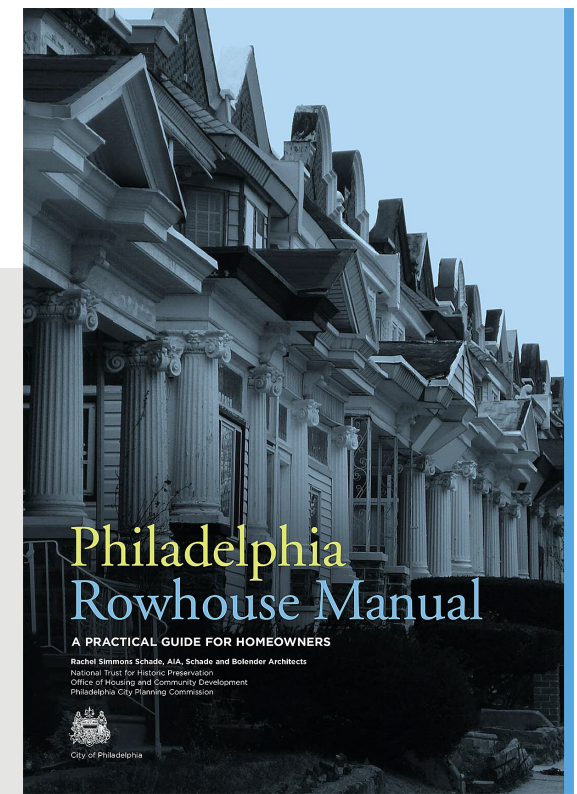
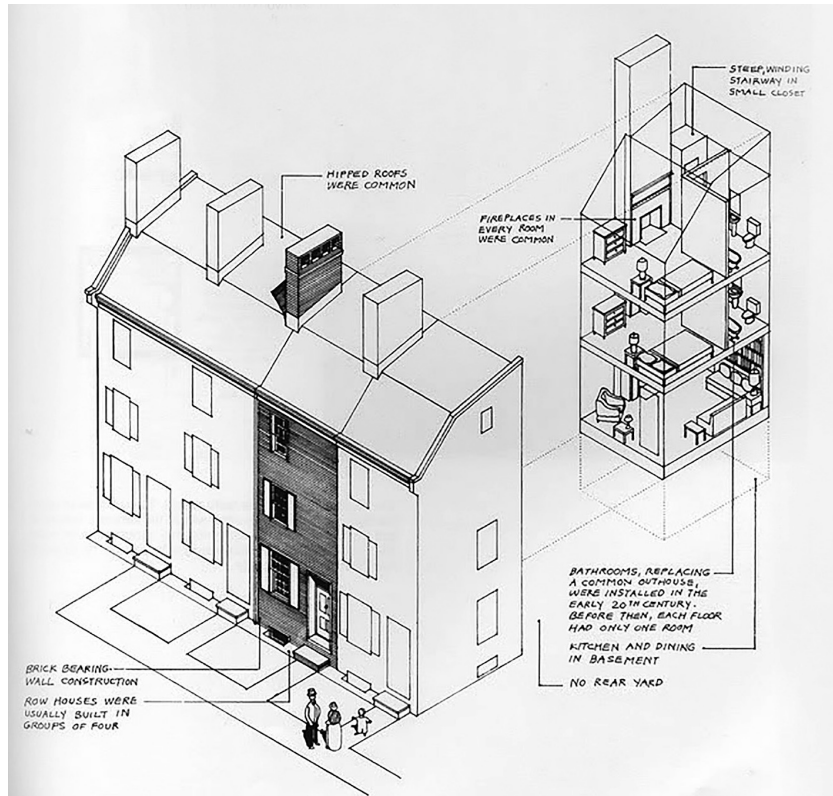


Image Credit: Alex Bruce

The Philly Rowhouse: What Is A Rowhouse?



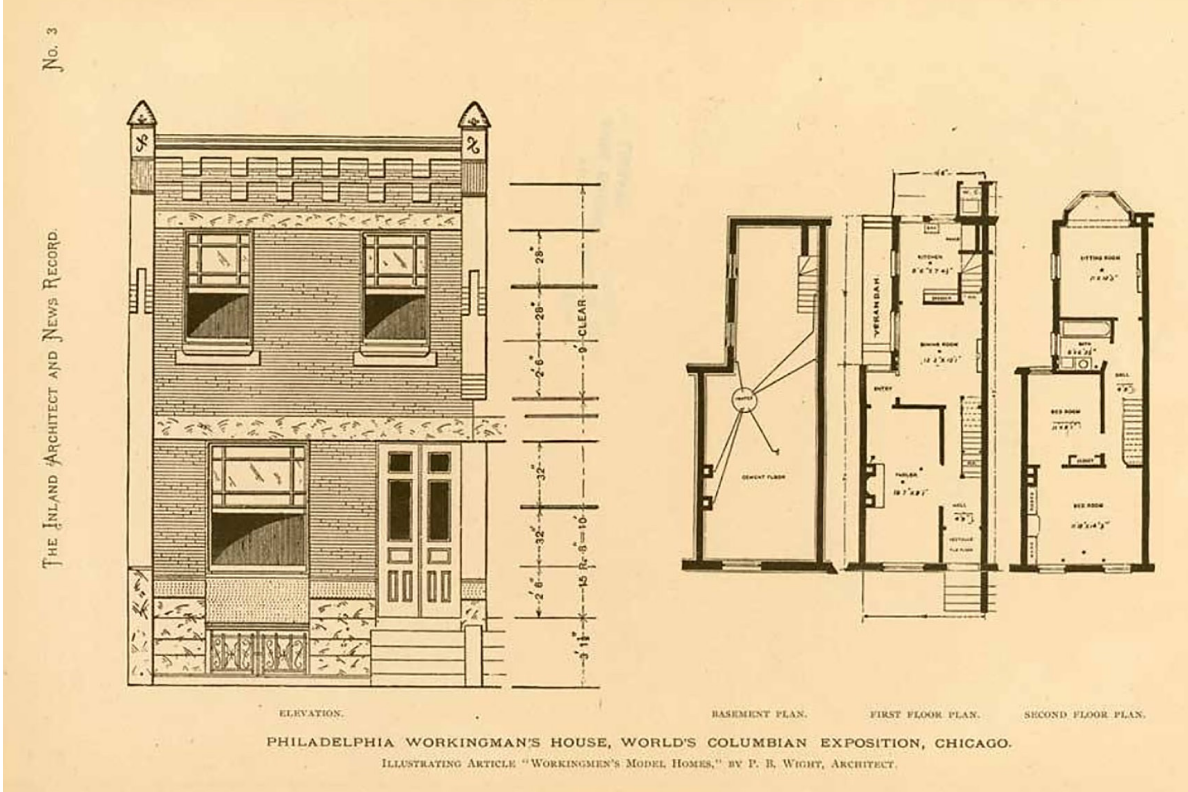
The Philly Rowhouse: Some Rowhouse Types



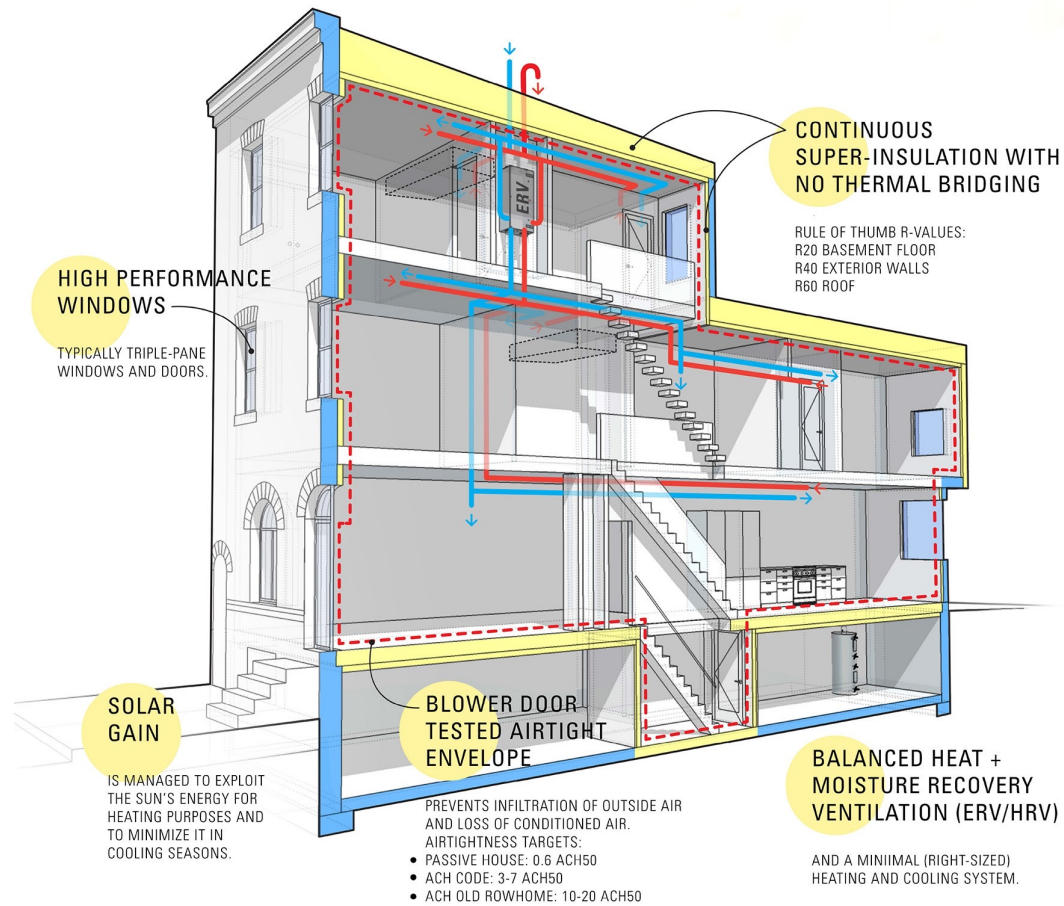
PUBLIC LEDGER PHOTO

A VIEW IN THE KENSINGTON MILL DISTRICT

Most of the mills shown in this picture manufacture textile goods. Two wards, in the northern section of the city, produce more carpets than the whole of Great Britain and Ireland. Philadelphia is primarily a manufacturing city, the greatest manufacturing city on earth—the "World's Greatest Workshop," but she lays a special emphasis upon her prestige as the world's largest manufacturer of textiles.



The Philly Rowhouse: The Workingmen's House



PASSIVE ROWHOUSE MANUAL

GREEN BUILDING UNITED

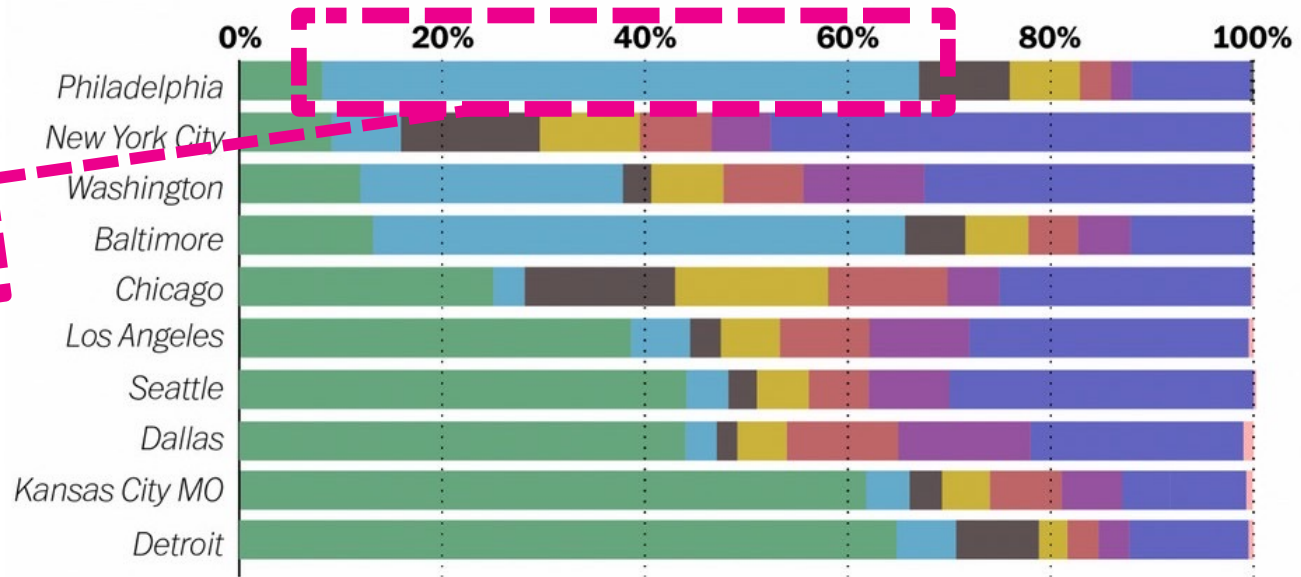
greenbuildingunited.org

The way we live, city by city

Occupied housing units, by building type



PHILADELPHIA'S
UNIQUE
CHALLENGE



WAPO.ST/**WONKBLOG**

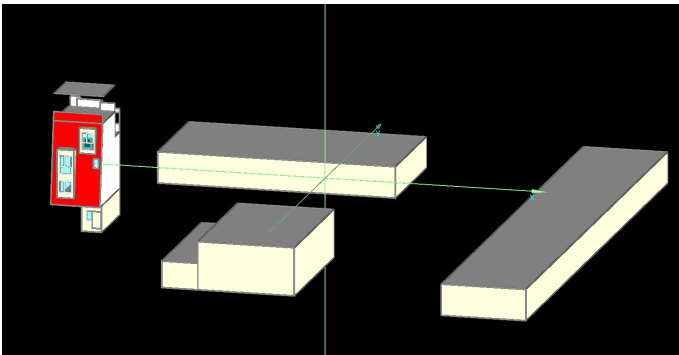
Source: U.S. Census Bureau, American Community Survey

Icons by Martin Lebreton and Arthur Shlain, The Noun Project



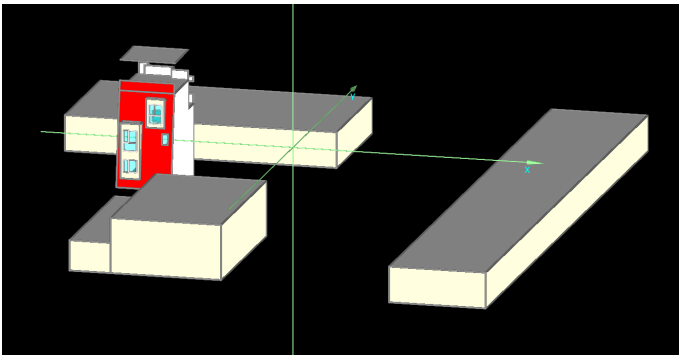
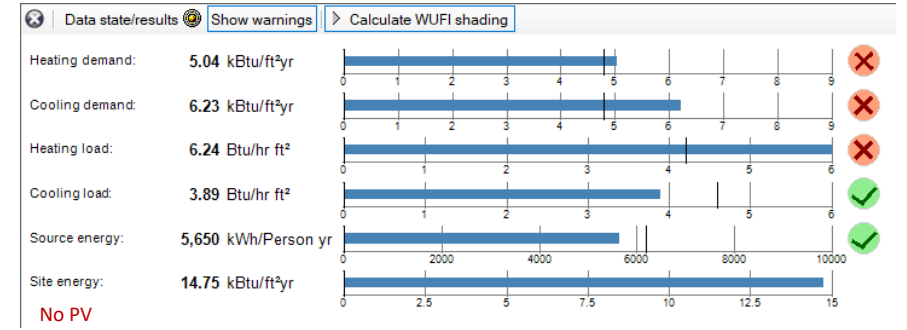
ZERO SIX: A New Kind of (Passive) Rowhouse

PHIUS+ 2015 Targets



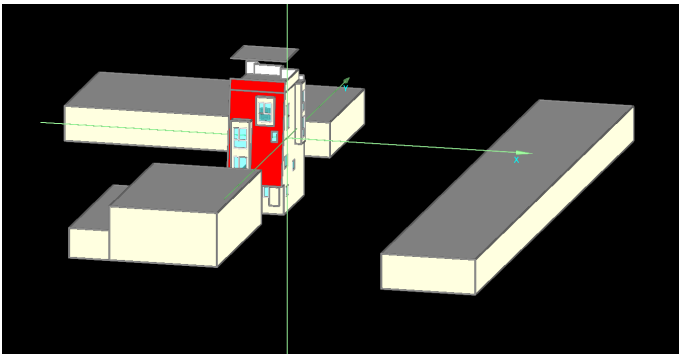
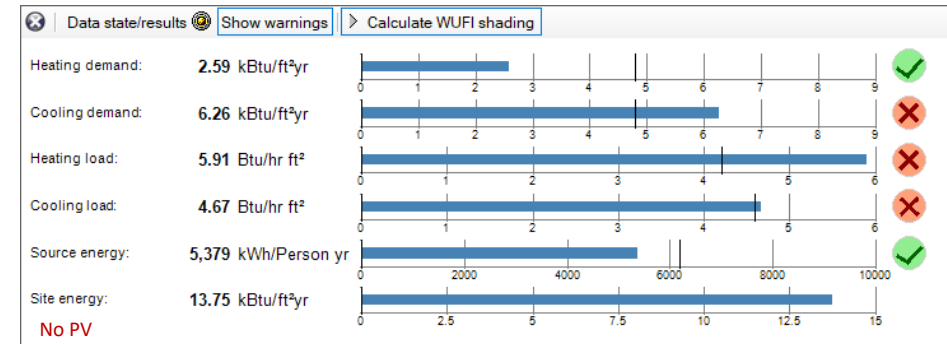
Townhome Unit A - West

Space conditioning target data	
Annual heating demand [kBtu/ft ² yr]	4.8
Annual cooling demand [kBtu/ft ² yr]	4.8
Peak heating load [Btu/hr ft ²]	4.2
Peak cooling load [Btu/hr ft ²]	4.6



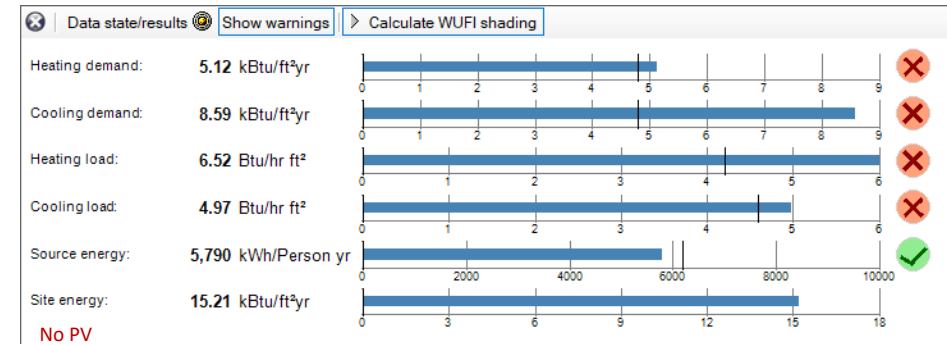
Townhome Unit B - Middle

Space conditioning target data	
Annual heating demand [kBtu/ft ² yr]	4.8
Annual cooling demand [kBtu/ft ² yr]	4.8
Peak heating load [Btu/hr ft ²]	4.2
Peak cooling load [Btu/hr ft ²]	4.6

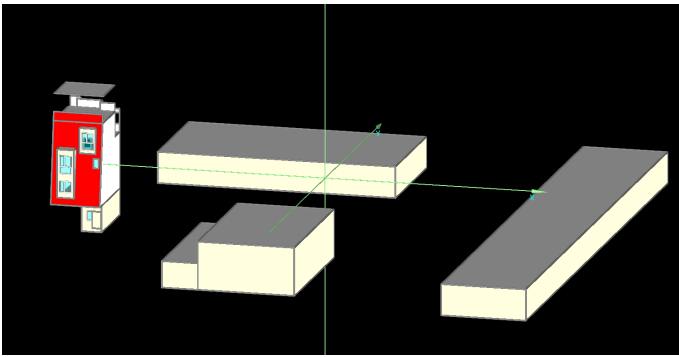


Townhome Unit C - East

Space conditioning target data	
Annual heating demand [kBtu/ft ² yr]	4.8
Annual cooling demand [kBtu/ft ² yr]	4.8
Peak heating load [Btu/hr ft ²]	4.2
Peak cooling load [Btu/hr ft ²]	4.6

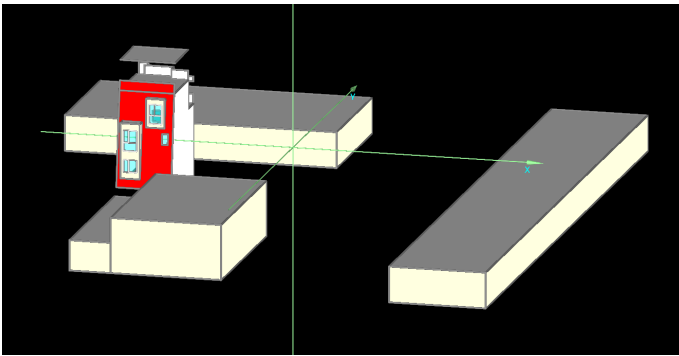


PHIUS+ 2018 Targets



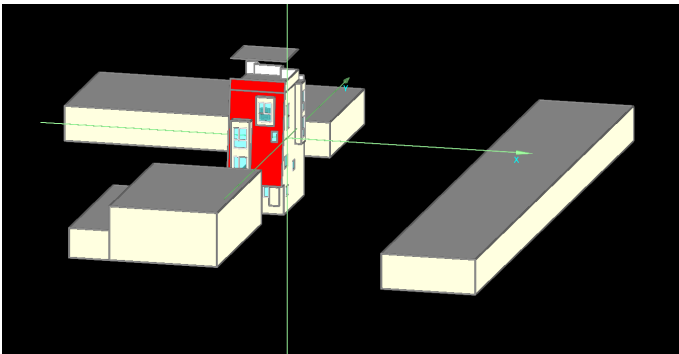
Townhome Unit A - West

Space conditioning target data		User defined
Annual heating demand [kBtu/ft ² yr]	7.2	
Annual cooling demand [kBtu/ft ² yr]	7.5	
Peak heating load [Btu/hr ft ²]	5.8	
Peak cooling load [Btu/hr ft ²]	4.5	
Building Geometry:		
Envelope area/iCFA:	2.73	
Occupant density:	413.6 ft ² /Person	



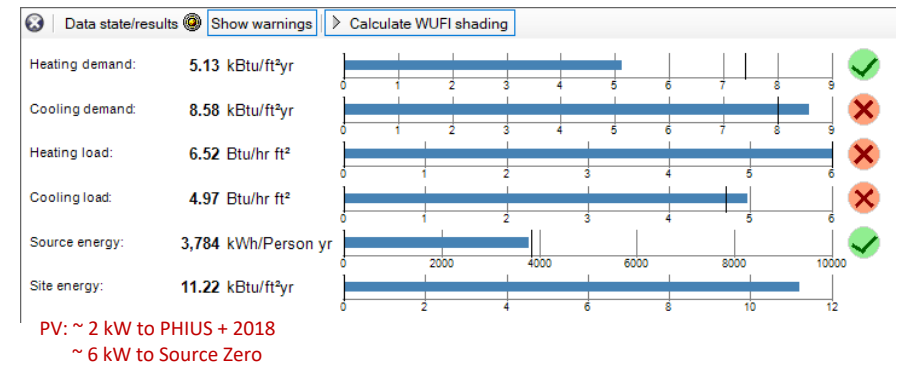
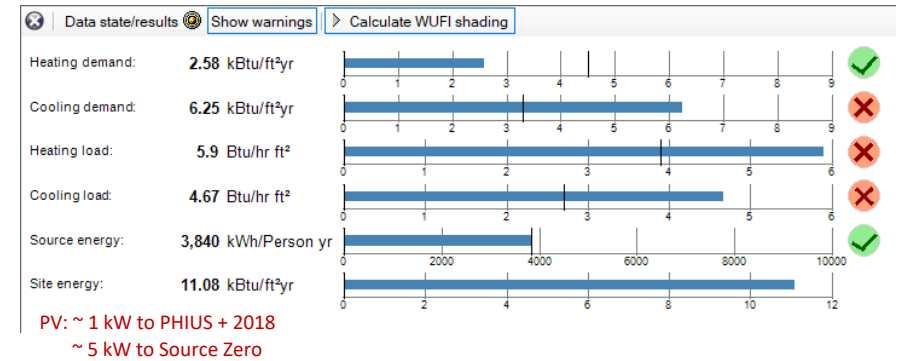
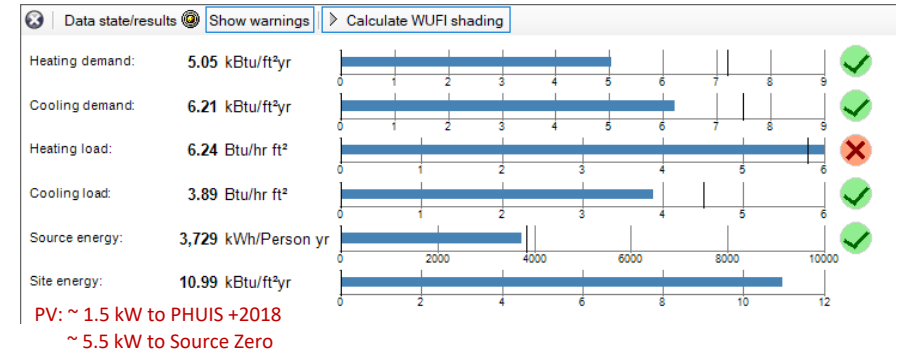
Townhome Unit B - Middle

Space conditioning target data		User defined
Annual heating demand [kBtu/ft ² yr]	4.5	
Annual cooling demand [kBtu/ft ² yr]	3.3	
Peak heating load [Btu/hr ft ²]	3.9	
Peak cooling load [Btu/hr ft ²]	2.7	
Building Geometry:		
Envelope area/iCFA:	1.86	
Occupant density:	422.3 ft ² /Person	

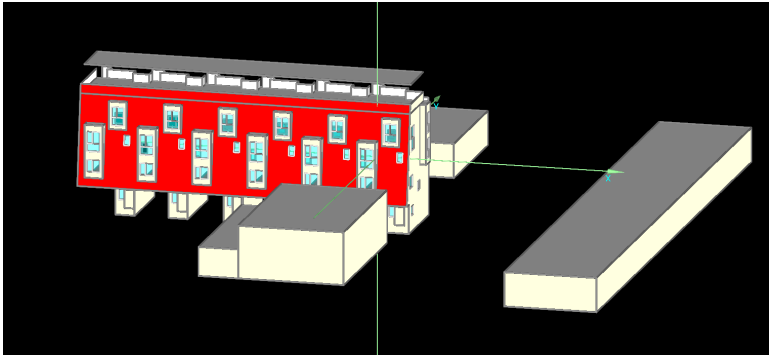


Townhome Unit C - East

Space conditioning target data		User defined
Annual heating demand [kBtu/ft ² yr]	7.4	
Annual cooling demand [kBtu/ft ² yr]	8	
Peak heating load [Btu/hr ft ²]	6	
Peak cooling load [Btu/hr ft ²]	4.7	
Building Geometry:		
Envelope area/iCFA:	2.81	
Occupant density:	411.1 ft ² /Person	



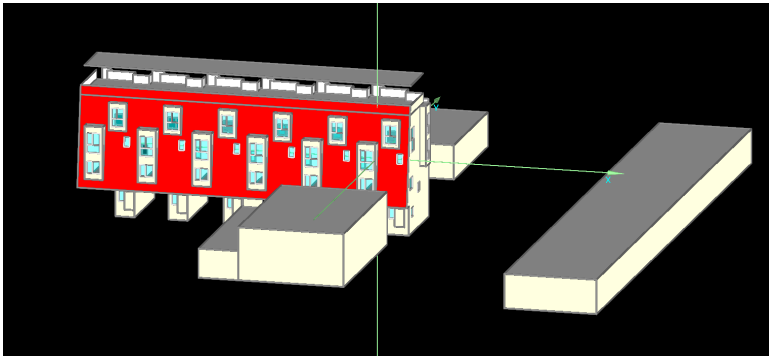
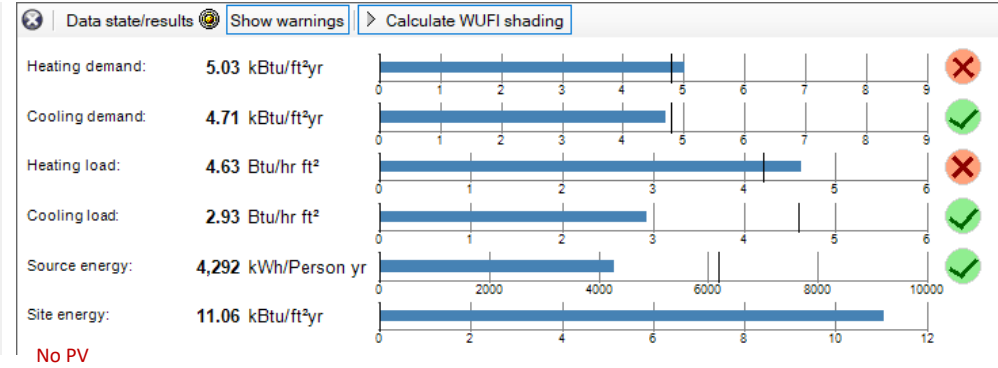
Multifamily PHIUS+ 2015 vs. PHIUS+ 2018 Source Zero Targets



Six Unit Multifamily Building

Space conditioning target data User defined

Annual heating demand [kBtu/ft²yr]	4.8
Annual cooling demand [kBtu/ft²yr]	4.8
Peak heating load [Btu/hr ft²]	4.2
Peak cooling load [Btu/hr ft²]	4.6

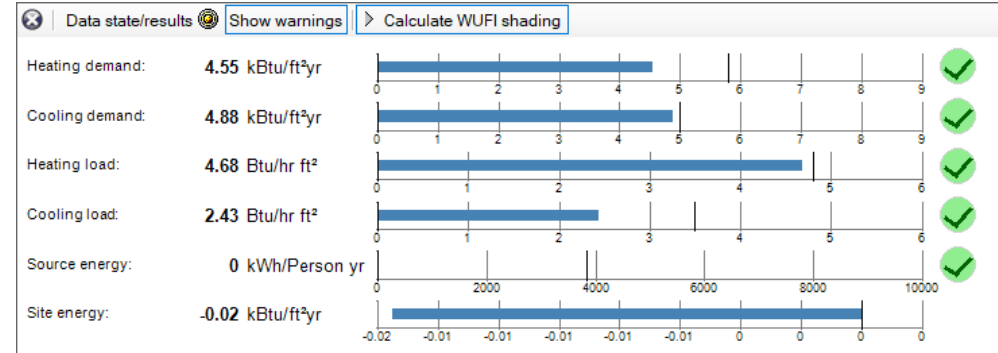


Six Unit Multifamily Building

Space conditioning target data User defined

Annual heating demand [kBtu/ft²yr]	5.8
Annual cooling demand [kBtu/ft²yr]	5.0
Peak heating load [Btu/hr ft²]	4.8
Peak cooling load [Btu/hr ft²]	3.5

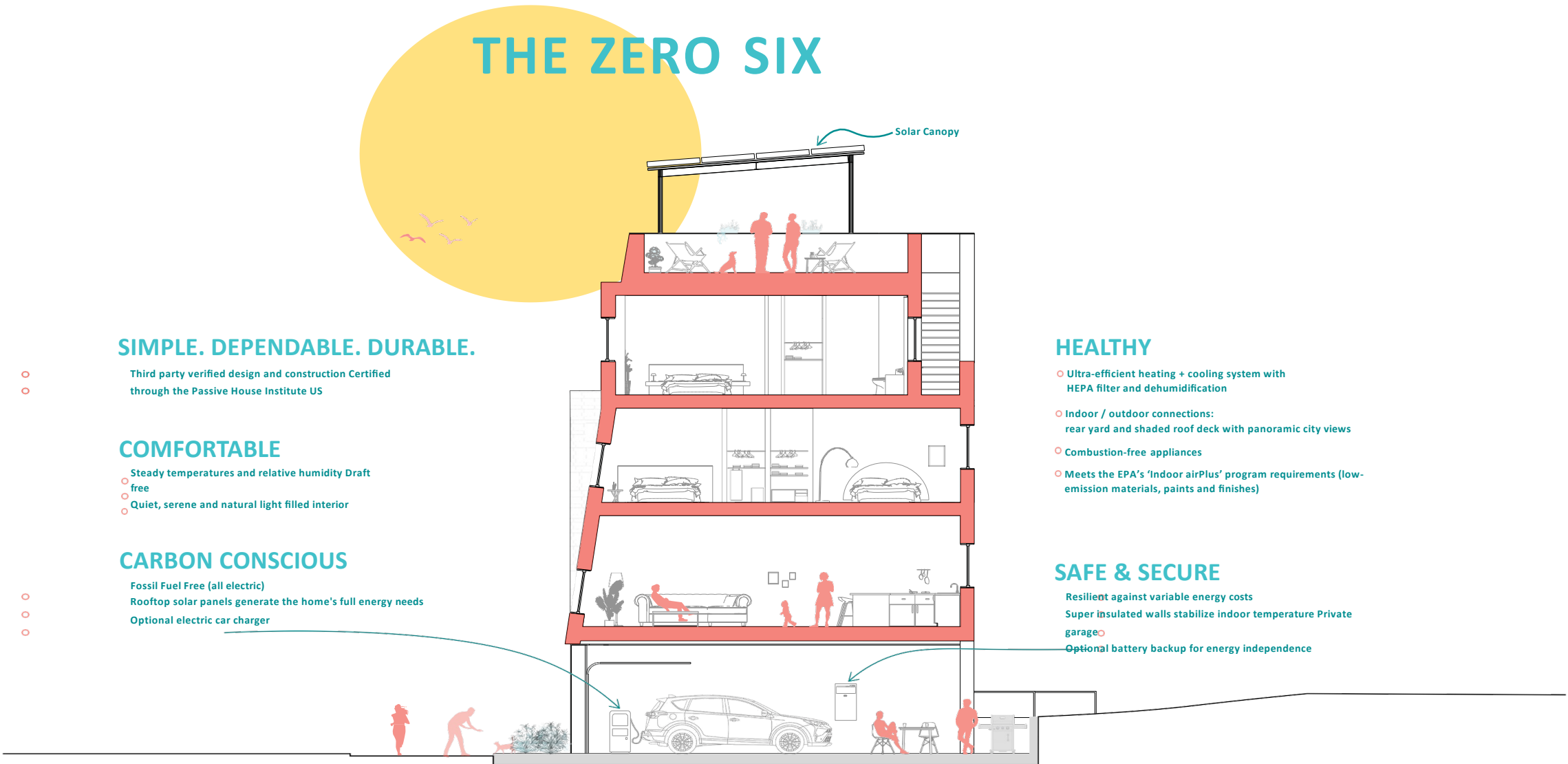
Building Geometry:
Envelope area/iCFA: 2.3
Occupant density: 419 ft²/Person



PV: ~ 4 kW to PHIUS + 2018
~ 28 kW to Source Zero



THE ZERO SIX



SIMPLE. DEPENDABLE. DURABLE.

- Third party verified design and construction Certified through the Passive House Institute US

COMFORTABLE

- Steady temperatures and relative humidity Draft free
- Quiet, serene and natural light filled interior

CARBON CONSCIOUS

- Fossil Fuel Free (all electric)
- Rooftop solar panels generate the home's full energy needs
- Optional electric car charger

Solar Canopy

HEALTHY

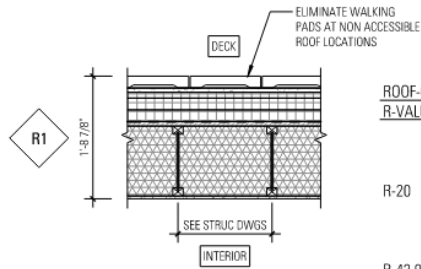
- Ultra-efficient heating + cooling system with HEPA filter and dehumidification
- Indoor / outdoor connections: rear yard and shaded roof deck with panoramic city views
- Combustion-free appliances
- Meets the EPA's 'Indoor airPlus' program requirements (low-emission materials, paints and finishes)

SAFE & SECURE

- Resilient against variable energy costs
- Super insulated walls stabilize indoor temperature
- Private garage
- Optional battery backup for energy independence

ZERO SIX: Simple, Dependable, Durable, Comfortable, Healthy.....

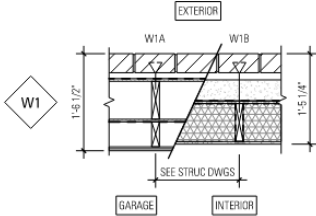
ROOF-CEILING ASSEMBLIES - REFERENCE BUILDING SECTIONS



ROOF-CEILING ASSEMBLY 1: AT ROOF DECKS

R-VALUE	DEPTH	MATERIAL
	2"	EXTERIOR FINISH: RECYCLED RUBBER PAVERS (XYZYXZYX)
	---	TPO SINGLE PLY MEMBRANE ROOFING (XYZYXZYX), INITIAL SOLAR REFLECTANCE: .XXX
	3/4"	COVERBOARD
R-20	5"	(2) LAYERS EPS FOAM BOARD INSULATION W/ STAGGERED SEAMS (XYZYXZYX)
	---	FLUID APPLIED AIR BARRIER (XYZYXZYX)
	3/4"	ROOF SHEATHING: PLYWOOD SHEATHING
	11 7/8"	TJI ROOF RAFTERS (SEE STRUCTURAL DWGS FOR SIZING & SPACING)
R-43.9	11 7/8"	DENSE-PACKED CELLULOSE INSULATION
	1/2"	(1) LAYER PTD GWB
R-63.9		R-VALUE
R-59		WUFI MODELED EFFECTIVE R-VALUE

WALL ASSEMBLIES - REFERENCE OVERALL FLOOR PLANS

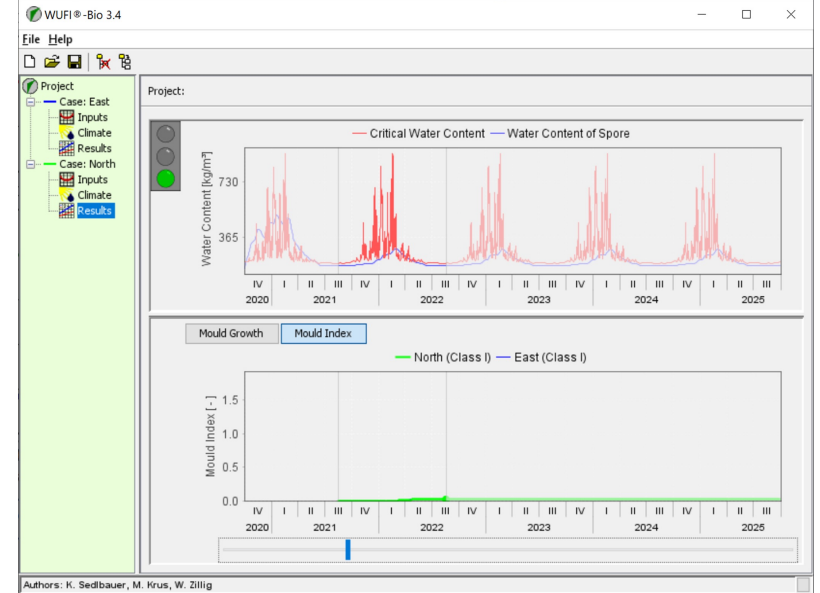
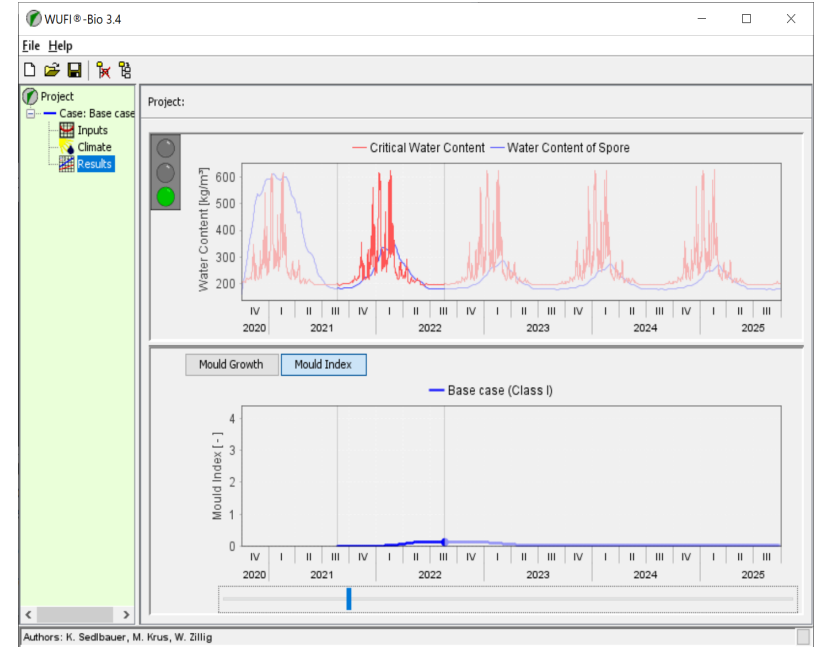


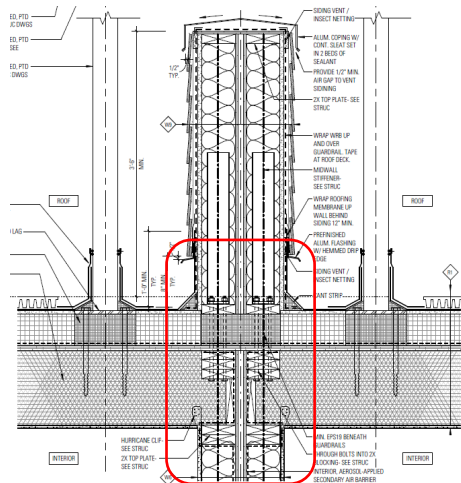
WALL ASSEMBLY 1: EXTERIOR WD-FRAMED WALL W/ BRICK

R-VALUE	DEPTH	MATERIAL
	3 5/8"	EXTERIOR CLADDING: SINGLE WYTHE BRICK
	1 1/8"	AIR GAP
	---	WEATHER RESISTIVE BARRIER: WEATHERLAP COMPONENTS (HENRY BLUESKIN VP 160)
	1/2"	EXTERIOR SHEATHING: WD STRUCTURAL PANELS
	7 1/4"	2X8 WD STUD FRAMING
	1/2"	EXTERIOR SHEATHING: WD STRUCTURAL PANELS
	---	WEATHER RESISTIVE BARRIER: WEATHERLAP COMPONENTS (HENRY BLUESKIN VP 160)
	4 3/4"	2X PT WD FURRING
	3/8"	EXTERIOR CLADDING: ENGINEERED WOOD SIDING
	(+/- 3/4" LAP)	

W1B:

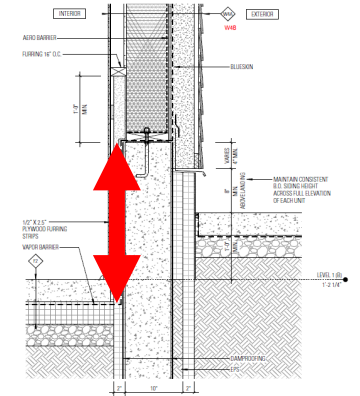
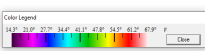
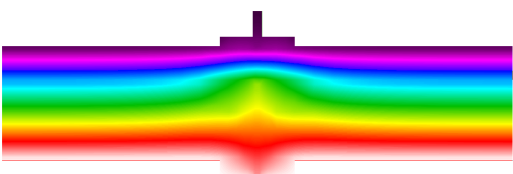
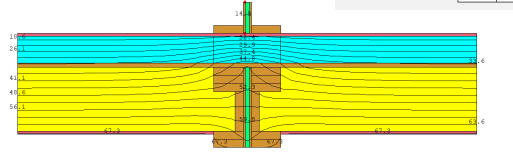
	3 5/8"	EXTERIOR CLADDING: SINGLE WYTHE BRICK
	1 3/8"	AIR GAP
R-14.6	4"	WOOD FIBER BOARD INSULATION (GUTEX MULTITHERM 120)
	---	WEATHER RESISTIVE BARRIER/EXTERIOR AIR BARRIER: WEATHERLAP COMPONENTS (HENRY BLUESKIN VP 160)
	1/2"	EXTERIOR SHEATHING: WD STRUCTURAL PANELS
	7 1/4"	2X8 WD STUD FRAMING
	---	INTERIOR AIR BARRIER (AEROBARRIER)
R-26.8	7 1/4"	DENSE-PACKED CELLULOSE INSULATION
	1/2"	(1) LAYER PTD GWB
R-41.4		R-VALUE
R-37		WUFI MODELED EFFECTIVE R-VALUE





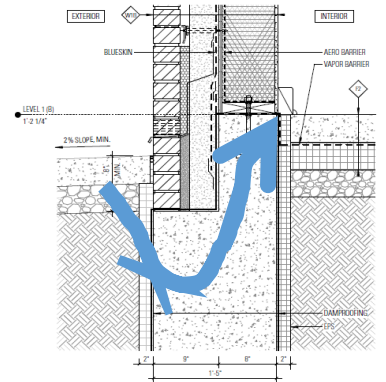
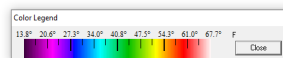
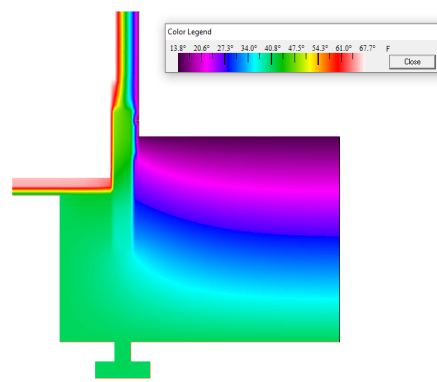
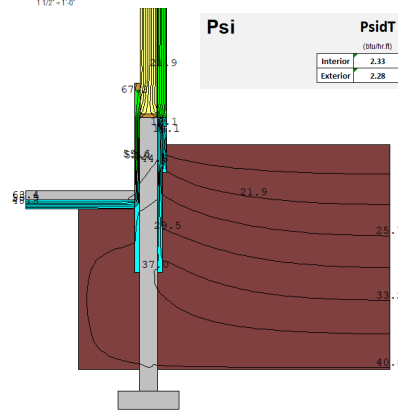
SECTION DETAIL - T.O. ROOF @ SOLAR CANOPY

Psi	PsidT	dT	Psi	Psi for WUFI
	(btu/hr ft)	(F)	(btu/hr ft F)	(btu/hr ft F)
Interior	0.85	54.00	0.016	0.016
Exterior	0.84	54.00	0.016	0.016



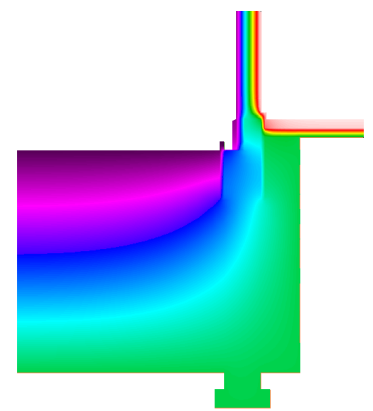
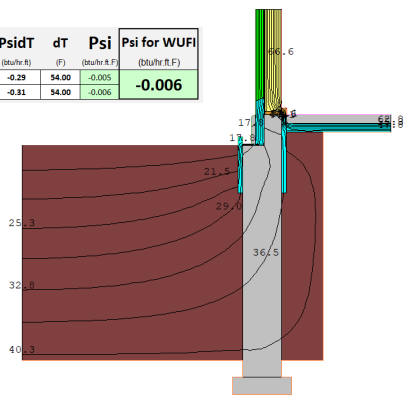
5 SECTION DETAIL - T.O. FOUNDATION @ YARD

Psi	PsidT	dT	Psi	Psi for WUFI
	(btu/hr ft)	(F)	(btu/hr ft F)	(btu/hr ft F)
Interior	2.33	54.00	0.043	0.043
Exterior	2.28	54.00	0.042	0.042



1 SECTION DETAIL - T.O. FOUNDATION @ STOOP 3

Psi	PsidT	dT	Psi	Psi for WUFI
	(btu/hr ft)	(F)	(btu/hr ft F)	(btu/hr ft F)
Interior	-0.29	54.00	-0.005	-0.006
Exterior	-0.31	54.00	-0.006	-0.006





July 20, 2020

Ilka Cassidy,

I'm pleased to inform you that project #1651: 3120 N 34th Street is now a pre-certified *PHIUS+ 2018 and PHIUS+ Source Zero* project. Congratulations to you and your team.

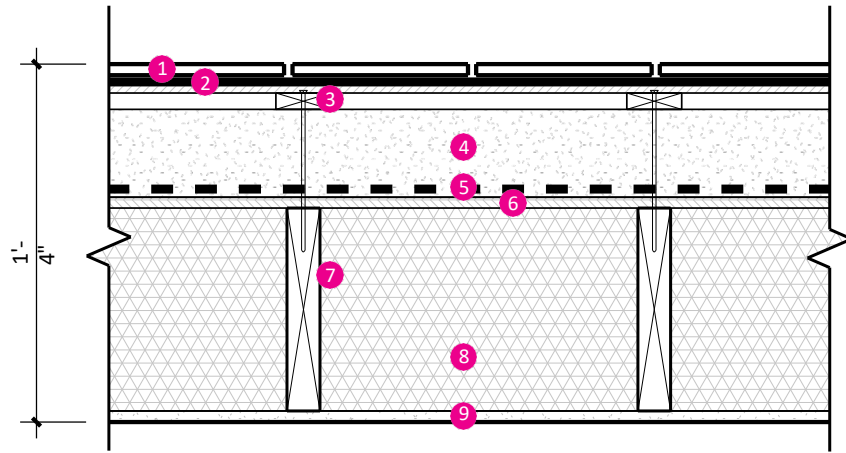
In the next few days, please review the Project Details listed in the database and update them as necessary, as the project is now publicly visible. (We have set the iCFA, AHD, PE, and Heat Load to match the energy model.) Also, if you have any new photos for marketing or publicity purposes, please upload these to the Photos tab.

Thank you for choosing PHIUS+ 2018, and best wishes to your team on achieving final certification. Please contact us when commissioning is complete and you are ready for final certification review, or earlier if you have any other issues to discuss.

Regards,

James Ortega
Lisa White
Graham S. Wright
Isaac Elnecave
Andres Pinzon

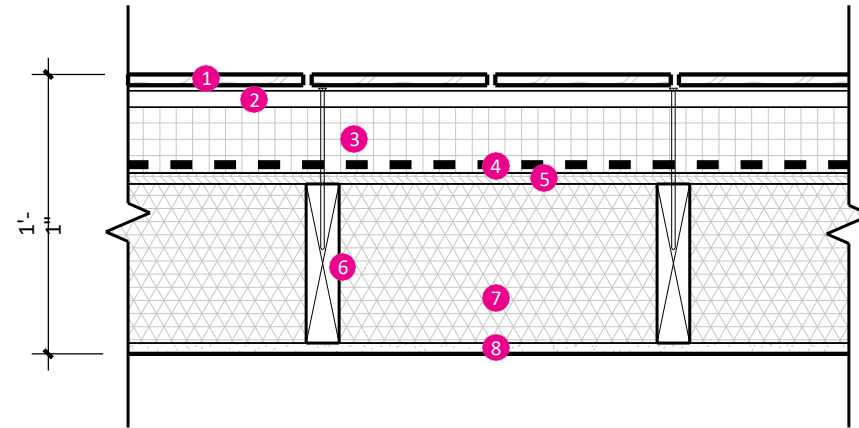
PHIUS
116 W Illinois St. Ste. 5E Chicago Illinois 60654
312.561.4588 www.phius.org



SCHEME 1.0

- 1 Composite Slate Cladding
- 2 Plywood
- 3 Wood Strapping
- 4 Insulation: Wood Fiber
- 5 Air & Weather Resistive Barrier
- 6 Plywood
- 7 2x10 Wood Studs
- 8 Insulation: Cellulose
- 9 Drywall

R-48.8



SCHEME 2.0

- 1 Natural Slate Cladding
- 2 Wood Strapping
- 3 Insulation: EPS Foam
- 4 Air & Weather Resistive Barrier
- 5 Plywood
- 6 2x8 Wood Studs
- 7 Insulation: Cellulose
- 8 Drywall

R-38.8

	SCHEME 1.0 PLANT-BASED CARBON SINK PASSIVE HOUSE EXTERIOR CLADDING: COMPOSITE EXTERIOR INSULATION: 4" WOOD FIBER 2x10 WALL FRAMING CAVITY INSULATION: CELLULOSE RENEWABLE ENERGY: ROOFTOP SOLAR PV	SCHEME 2.0 SOME-FOAM CARBON SINK PASSIVE HOUSE EXTERIOR CLADDING: NATURAL SLATE EXTERIOR INSULATION: 3" EPS FOAM 2x8 WALL FRAMING CAVITY INSULATION: CELLULOSE RENEWABLE ENERGY: NONE	REFERENCE 1 LOTS-O-FOAM PASSIVE HOUSE EXTERIOR CLADDING: COMPOSITE EXTERIOR INSULATION: 3" XPS FOAM 2x8 WALL FRAMING CAVITY INSULATION: SPRAY FOAM RENEWABLE ENERGY: ROOFTOP SOLAR PV	REFERENCE 2 PHILADELPHIA IECC 2018 CODE HOUSE EXTERIOR CLADDING: COMPOSITE EXTERIOR INSULATION (WALL): NONE 2x6 WALL FRAMING CAVITY INSULATION: FIBERGLASS BATT RENEWABLE ENERGY: NONE
EMBODIED CARBON (lbs eCO ₂ e):*	-1.8 million	-800,000	+83,000	-700,000
ENERGY USE INTENSITY (pEUI) (kBtu/sf/yr):**	-2	18	-2	40 to 50
BUILDING COMPACTNESS:***	2.3	2.3	2.3	2.3

GENERAL NOTES:
METRICS ABOVE ARE PROVIDED FOR GENERAL REFERENCE ONLY.

*PROJECTED EMBODIED CARBON IS BASED ON STAGES A1 - A3 OF CONSTRUCTION. MODELED EMBODIED CARBON DOES NOT INCLUDE INTERIOR PARTITIONS AND INTERIOR FINISHES.

**NATIONAL MEDIAN EUI FOR MULTI-FAMILY PROJECTS (WITH 5+ UNITS) = 59.6.
THIS METRIC IS BASED ON NATIONAL AVERAGES OF SUBMITTED DATA FOR MULTIFAMILY PROJECTS AS PROVIDED BY THE AMERICAN INSTITUTE OF ARCHITECTS' 2020 COMMITMENT CHALLENGE AND THE ENERGY STAR PORTFOLIO MANAGER.

***BUILDING COMPACTNESS MEASURED AS "HEAT LOSS FORM FACTOR" (HLFF).
HLFF IS TYPICALLY BETWEEN 0.5 - 5, WITH A LOWER NUMBER INDICATING A MORE COMPACT, EFFICIENT BUILDING SHAPE. AN HLFF OF 3.0 OR LESS IS TYPICALLY THE TARGET SET FOR HIGH PERFORMANCE CONSTRUCTION.

WUFI® Passive V.3.2.0.1 C:\Users\IlkaCassidy\Dropbox\1651 - 3120 N 34th Street - Ilka Cassidy\0. Energy Model\1651_ZeroSix_PRE-CERT_2021.11.30 - core 2021.mwp

File Input Options Database Help

Scope **Passive house verification** English/IP/Outer dimensions/PHIUS+ 2018 Assign data **Project/Cases/Case 1: PHIUS+ 2018**

Project Cases

- Case 1: PHIUS+ 2018
 - Localization/Climate: PA - PHILADELPHIA NE PHILADELPHIA (4) (Monthly)
 - Building
 - PH case: Passive house: Residential
 - Zone 1
 - Visualized components
 - Component 1: roof
 - Component 2: roof/wall_sloped
 - Component 3: floor ext.
 - Component 4: slab
 - Component 5: windows_north_tt
 - Component 6: windows_east_fixed
 - Component 7: ext. wall - no side lights
 - Component 8: windows-sloped_tt
 - Component 9
 - Component 10: windows_north_tt_mulled
 - Component 11: windows_north_fixed_mulled
 - Component 12: windows_east_fixed_mulled
 - Component 13: windows_east_fixed_mulled
 - Component 14: windows_east_tt_mulled
 - Component 15: windows-south_fixed_mulled
 - Component 16: windows-south_tt_mulled-double
 - Component 17: windows-south_tt_mulled
 - Component 18: windows-south_fixed_mulled-double
 - Component 19: windows-south_fixed_mulled
 - Component 20: exterior walls_mansard
 - Component 21: exterior walls
 - Component 22: doors_solid
 - Component 23: doors_solid_north
 - Component 24: skylights_fixed
 - Component 25: windows_east_fixed
 - Not visualized components

General Report: data & results

Name: PHIUS+ 2018

Remarks:

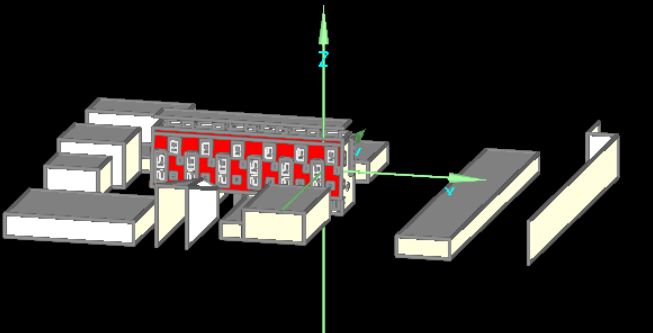
Calculation

Certificate criteria: PHIUS+ 2018

Use WUFI month mean shading factors

Data state/results Show warnings Calculate WUFI shading

Heating demand:	5.17 kBtu/ft²yr	
Cooling demand:	5.91 kBtu/ft²yr	
Heating load:	5.33 Btu/hr ft²	
Cooling load:	2.78 Btu/hr ft²	
Source energy:	3,789 kWh/Person yr	
Site energy:	10.75 kBtu/ft²yr	



PHIUS+ 2018 Space Conditioning Criteria Calculator v2

METHOD: CALCULATOR

UNITS: IMPERIAL (IP)

STATE / PROVINCE: PENNSYLVANIA

CITY: PHILADELPHIA NE PHILADEL

Envelope Area (ft²) / iCFA (ft²) **2.31** or enter here:

iCFA (ft²) / person **430** or enter here:

**Calculator method is used for official certification targets.*

Space Conditioning Criteria

Annual Heating Demand	5.6	kBTU/ft²yr
Annual Cooling Demand	7.5	kBTU/ft²yr
Peak Heating Load	5.4	BTU/ft²hr
Peak Cooling Load	3.9	BTU/ft²hr



November 30, 2021

Ilka Cassidy,

I am pleased to inform you that project **#1651: 3120 N 34th Street** is now a Pre-Certified **PHIUS+ 2018** project. Congratulations to you and your team.

In the next few days, please review the Project Details listed in the database and update them as necessary, as the project is now publicly visible. If you have any new photos for marketing or publicity purposes, please upload these to the Photos tab.

Thank you for choosing Phius Certification, and best wishes to your team on achieving Final Certification. Please contact us when commissioning is complete and you are ready for Final Certification review, or earlier if you have any other issues to discuss.

Regards,

James Ortega

Lisa White

Graham S. Wright, PhD

Andres Pinzon, PhD

Isaac Elnecave

Al Mitchell

John Loercher

Phius | Passive House Institute US
53W. Jackson Blvd. Suite 1462, Chicago, Illinois 60604 | 312.561.4588 | www.phius.org

WUFI® Passive V.3.2.0.1 C:\Users\IlkaCassidy\Dropbox\1651 - 3120 N 34th Street - Ilka Cassidy\0_Energy Model\1651_ZeroSix_PRE-CERT_2021.11.30 - core 2021.mwp

File Input Options Database Help

Scope **Passive house verification** English/IP/Outer dimensions/PHIUS+ 2018 Assign data **Project/Cases/Case 2: PHIUS Core 2021**

Project

- Cases
 - Case 1: PHIUS +2018
 - Case 2: PHIUS Core 2021**
 - Localization/Climate: PA - PHILADELPHIA NE PHILADELPHIA (4) (Monthly)
 - Building
 - PH case: Passive house: Residential
 - Zone 1
 - Visualized components
 - Component 1: roof
 - Component 2: roof/wall_sloped
 - Component 3: floor ext.
 - Component 4: slab
 - Component 5: windows_north_t
 - Component 6: windows_east_fixed
 - Component 7: ext. wall - no side lights
 - Component 8: windows-sloped_t
 - Component 9
 - Component 10: windows_north_t_mulled
 - Component 11: windows_north_fixed_mulled
 - Component 12: windows_east_fixed_mulled
 - Component 13: windows_east_fixed_mulled
 - Component 14: windows_east_t_mulled
 - Component 15: windows-south_fixed_mulled
 - Component 16: windows-south_t_mulled-double
 - Component 17: windows-south_t_mulled
 - Component 18: windows-south_fixed_mulled-double
 - Component 19: windows-south_fixed_mulled
 - Component 20: exterior walls_mansard
 - Component 21: exterior walls
 - Component 22: doors_solid
 - Component 23: doors_solid_north
 - Component 24: skylights_fixed
 - Component 25: windows_east_fixed

General Report data & results

Name: PHIUS Core 2021

Remarks:

Calculation

Certificate criteria: PHIUS+ 2018

Use WUFI month mean shading factors

Data state/results Show warnings Calculate WUFI shading

Heating demand:	5.17 kBtu/ft²yr		✓
Cooling demand:	5.91 kBtu/ft²yr		✓
Heating load:	5.33 Btu/hr ft²		✓
Cooling load:	2.78 Btu/hr ft²		✓
Source energy:	4,086 kWh/Person yr		✗
Site energy:	18.03 kBtu/ft²yr		

Phius 2021 Performance Criteria Calculator v3.1

UNITS: IMPERIAL (IP) ▾

BUILDING FUNCTION: RESIDENTIAL ▾

PROJECT TYPE: NEW CONSTRUCTION ▾

STATE/ PROVINCE: PENNSYLVANIA ▾

CITY: PHILADELPHIA NE PHILAI ▾

Envelope Area (ft²)	23,850.4
iCFA (ft²)	10,311.0
Dwelling Units (Count)	6
Total Bedrooms (Count)	18

Space Conditioning Criteria

Annual Heating Demand	6.1	kBtu/ft²yr
Annual Cooling Demand	6.9	kBtu/ft²yr
Peak Heating Load	5.7	Btu/ft²hr
Peak Cooling Load	2.9	Btu/ft²hr

Source Energy Criteria

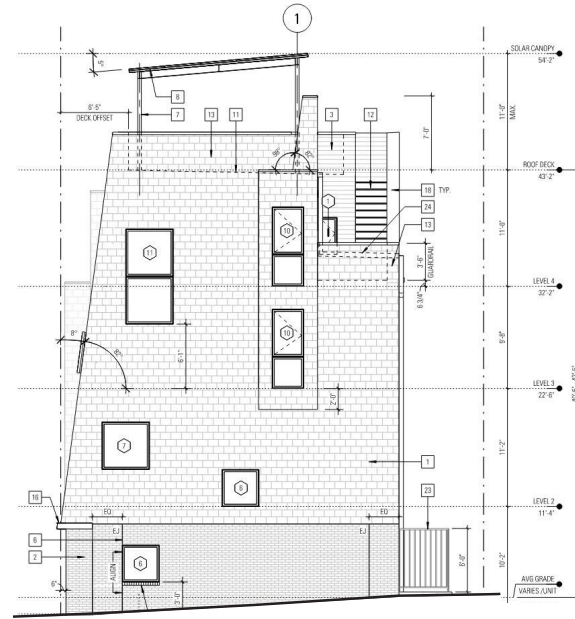
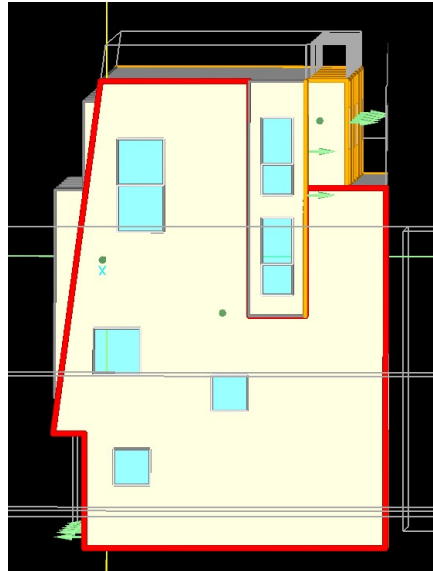
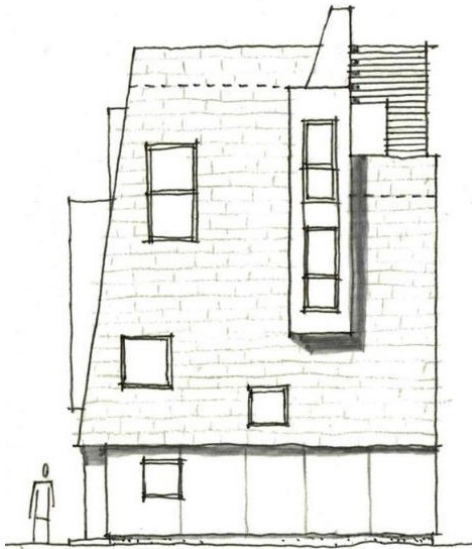
Phius CORE	4075	kWh/person.yr
Phius ZERO	0	kWh/person.yr



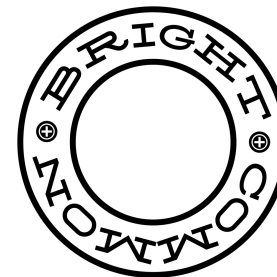
ZERO SIX: Under Construction



ZERO SIX: Under Construction



Ilka Cassidy, Dipl.-Ing. Architecture, CPHC
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Thank You!

