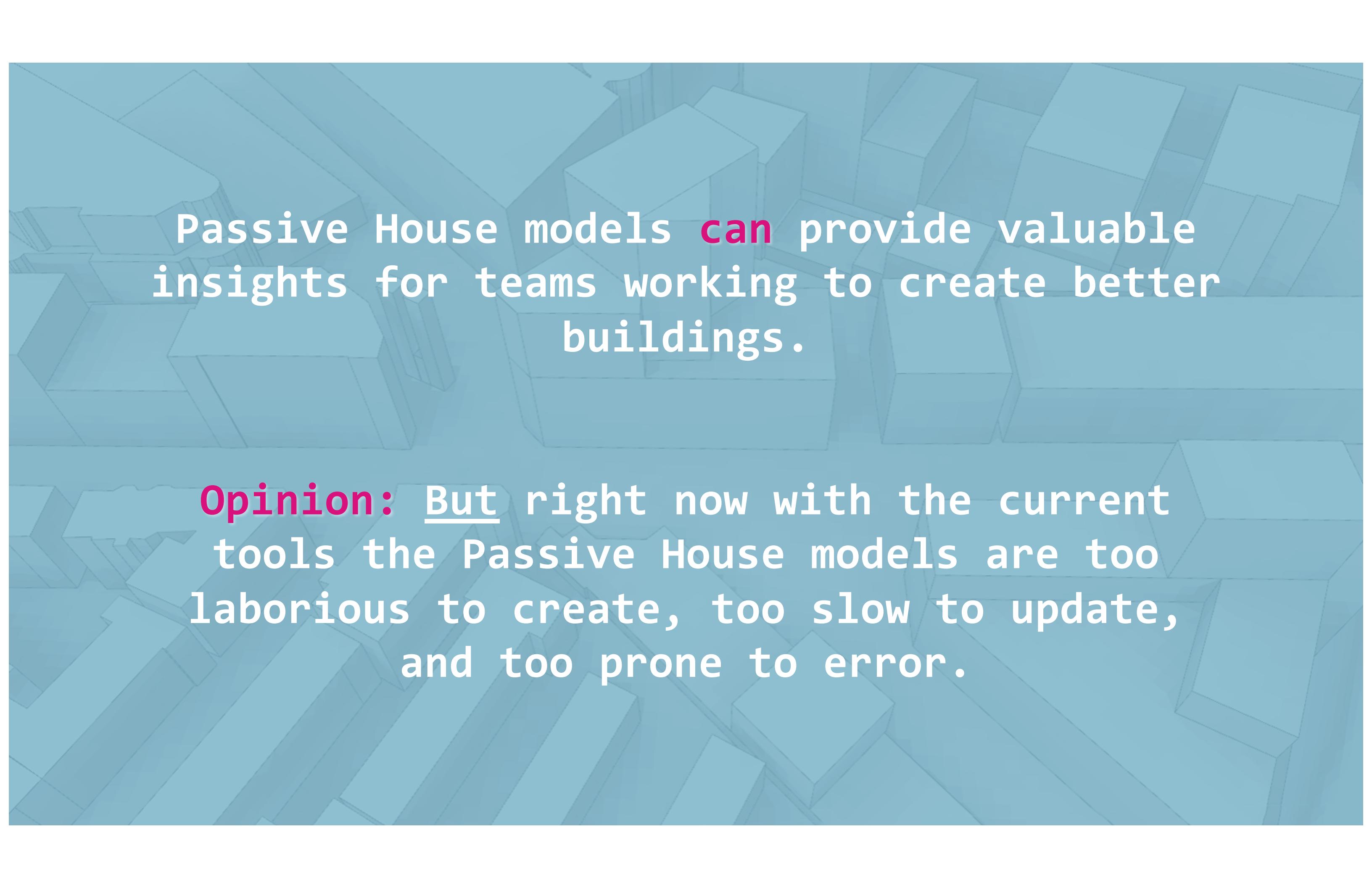




# A (brief) Introduction to Passive House Modeling with Honeybee-PH



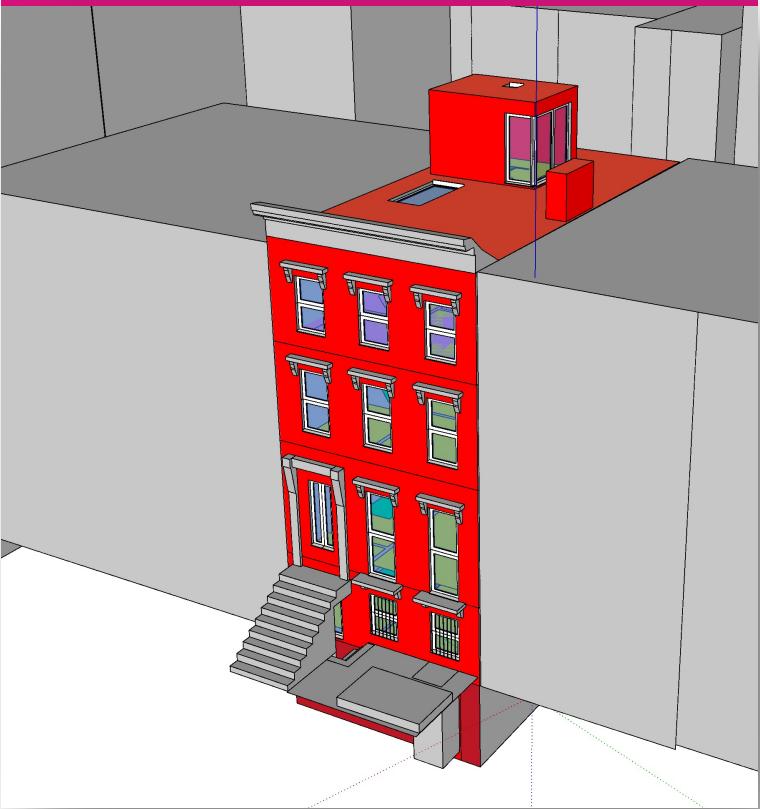
**Honeybee-PH?** A free and open-source toolkit  
for creating, managing, and documenting  
Passive House models.



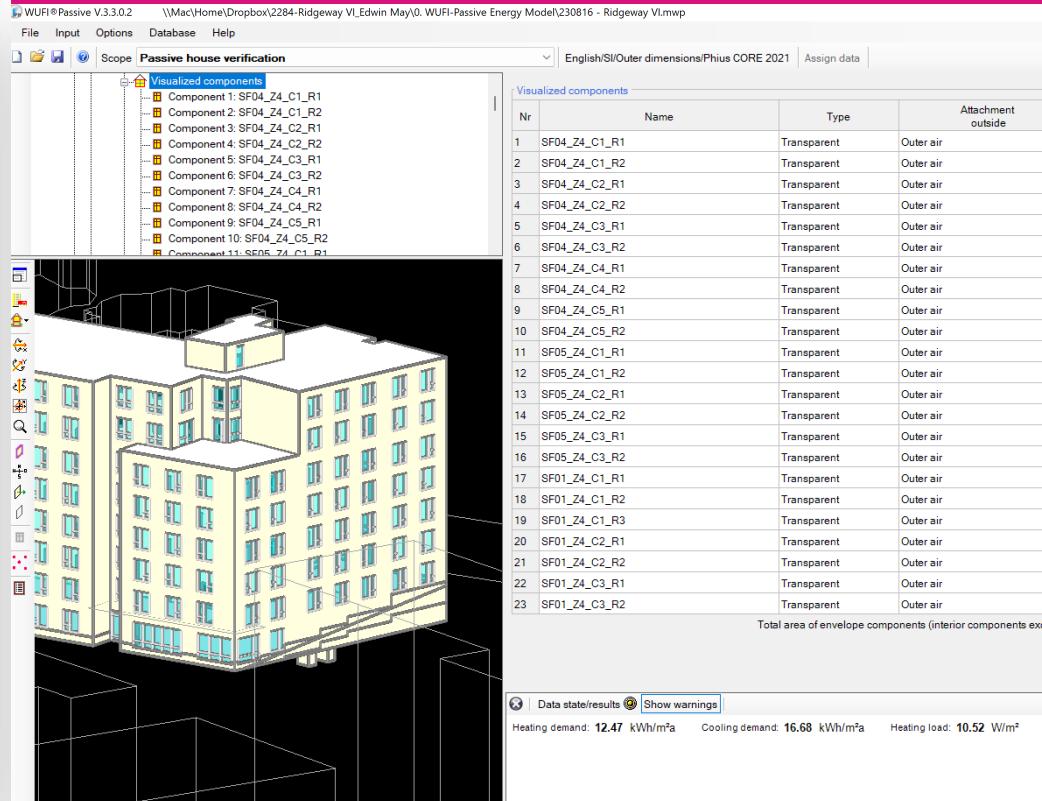
Passive House models **can** provide valuable insights for teams working to create better buildings.

**Opinion:** But right now with the current tools the Passive House models are too laborious to create, too slow to update, and too prone to error.

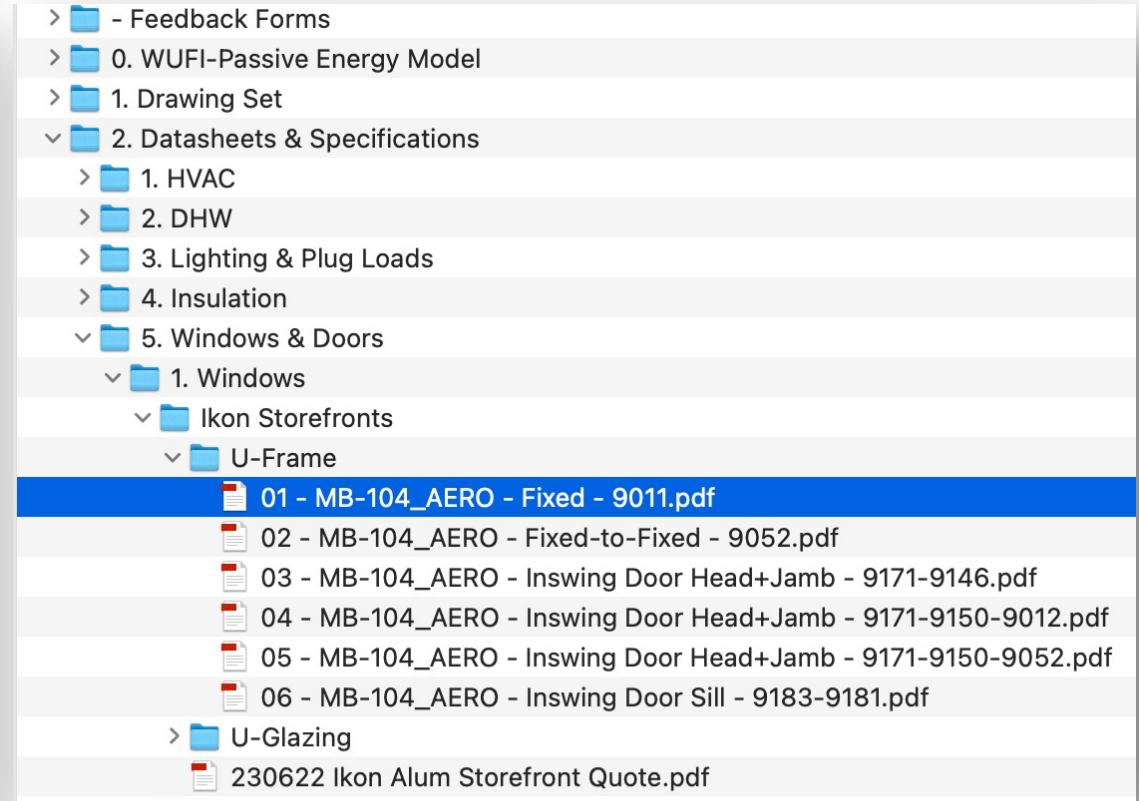
## MODEL 1 (3D)



## MODEL 2 (Energy)

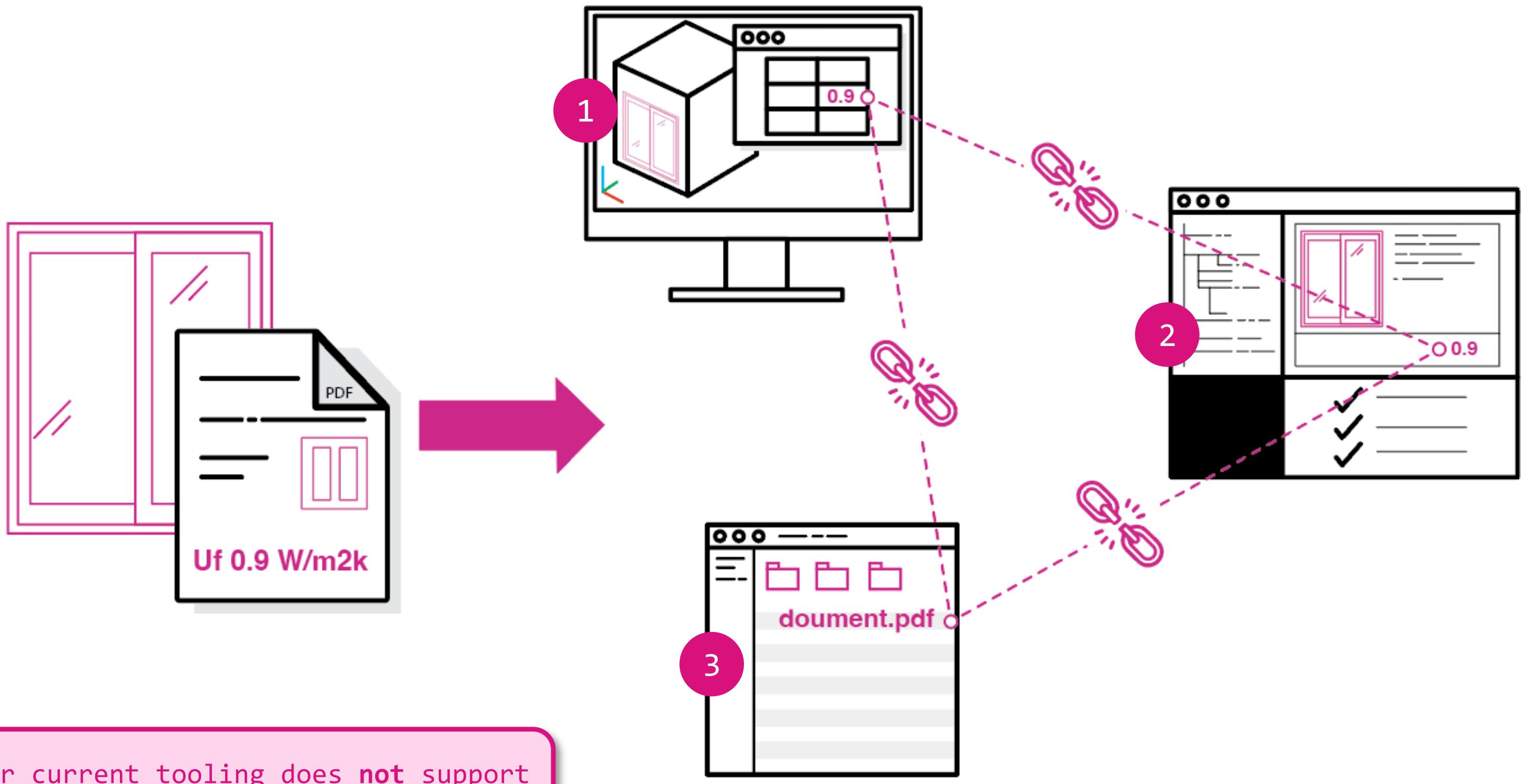


## MODEL 3 (Document)



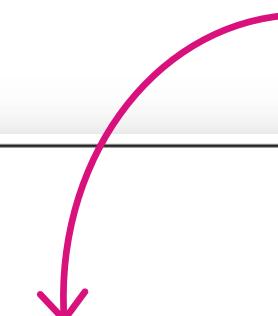
For PH-Certification, teams are required to produce 3 models:

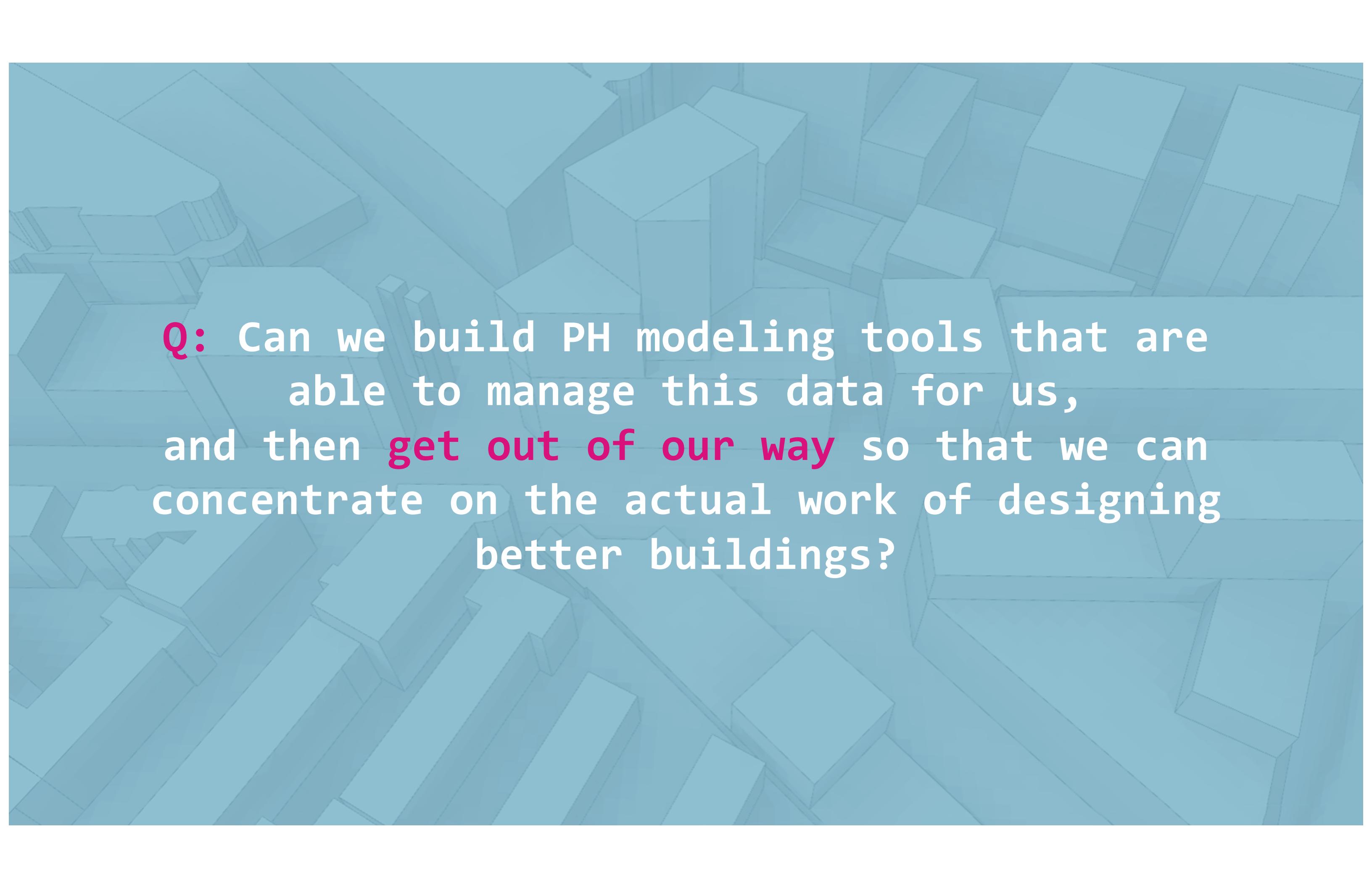
- (1) A 3D geometry model (WUFI-Sketchup / DesignPH)
- (2) The PH energy model itself (WUFI-Passive / PHPP)
- (3) A 'document' model which justifies and explains every input value.



Our current tooling does not support this requirement well.

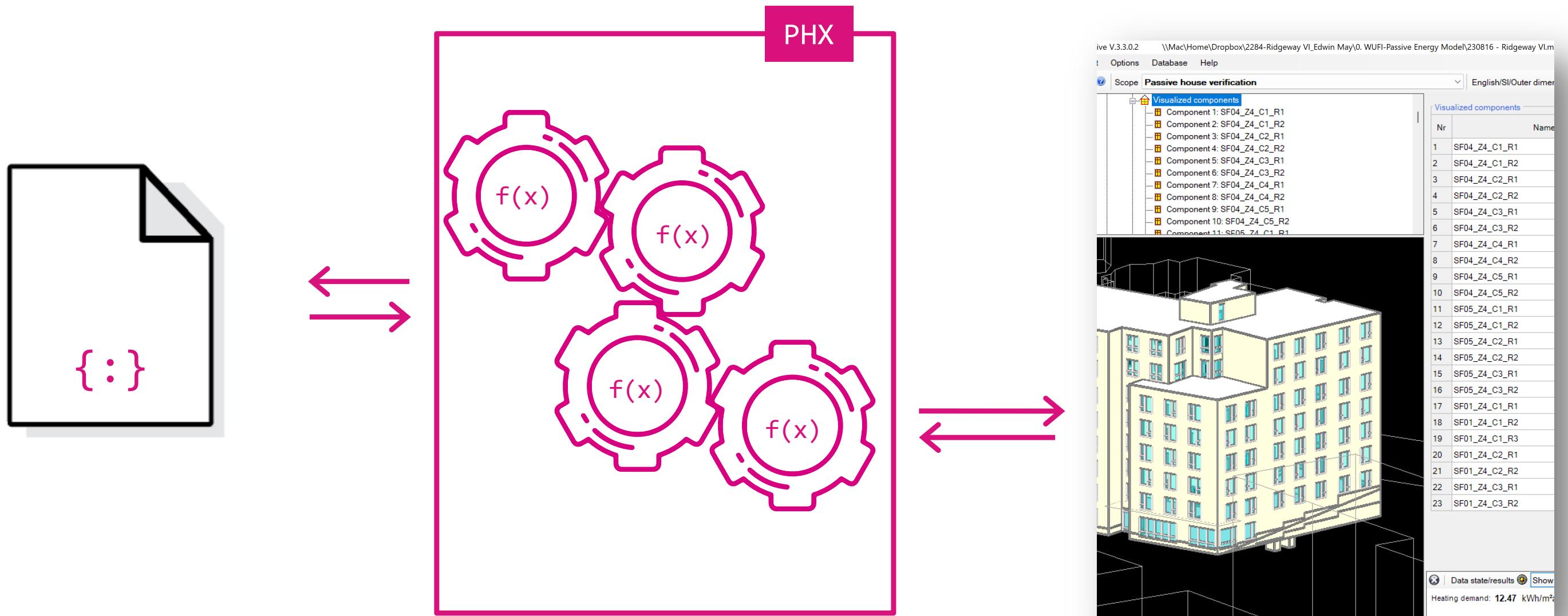
Ikon Storefront:	<b>Basic Parameters</b>	<b>General:</b>	Datasheets noted
		<b>U-glass:</b>	0.123 entered, Saint Gobain calls for 0.088, please confirm
		<b>SHGC:</b>	Does not match datasheet
		<b>Frame Width:</b>	Cannot confirm from documentation provided
	<b>Frame Parameters</b>	<b>U-frame:</b>	Does not match values on datasheet, lookd like Uf is on shop drawings
		<b>Glazing-to-frame psi-value (psi-spacer)</b>	Please confirm why this is not included
		<b>Frame-to-wall psi-value (psi-install)</b>	0.023, OK
		<b>Comfort Criteria:</b>	Please confirm assembly passes





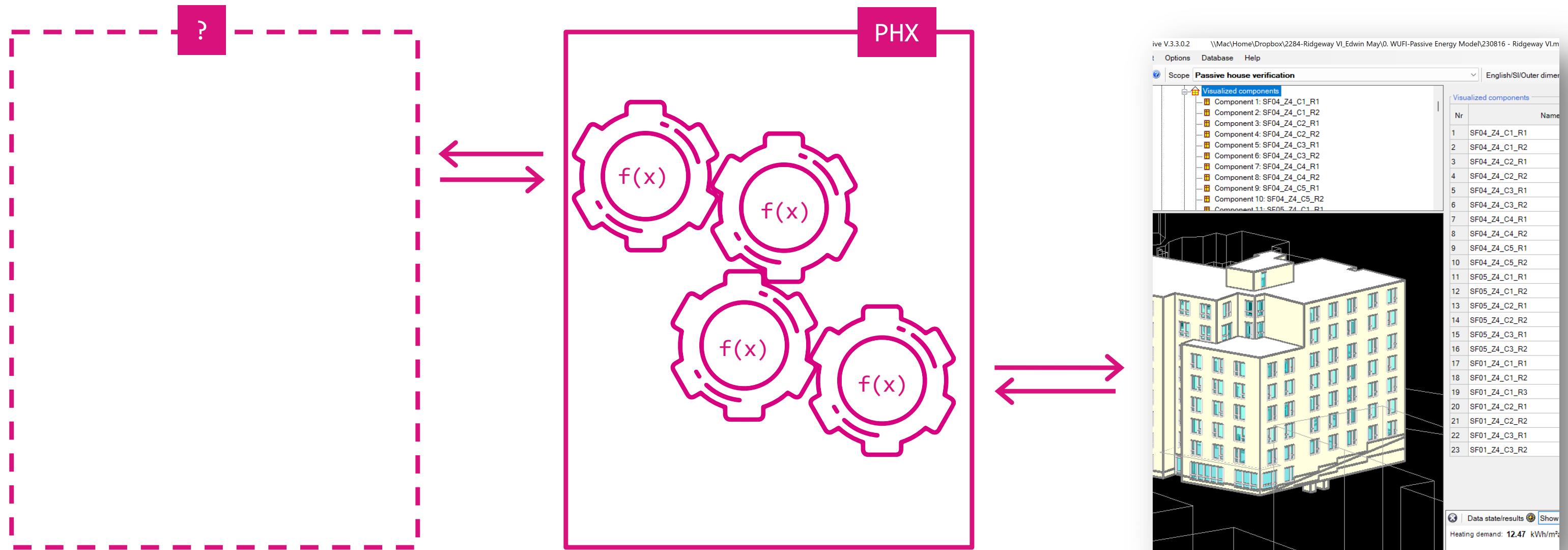
**Q:** Can we build PH modeling tools that are able to manage this data for us, and then **get out of our way** so that we can concentrate on the actual work of designing better buildings?

# Step 1: The PH-Model API [PH-Exchange]



<https://github.com/PH-Tools/PHX>

## Step 2: The PH-Model Interface?



The Honeybee-PH



Ladybug



Honeybee



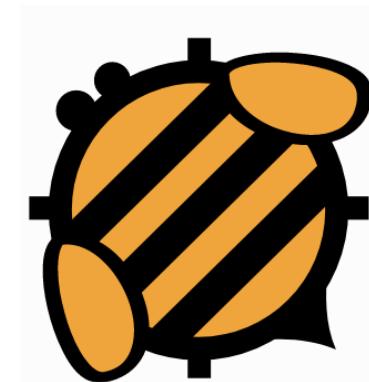
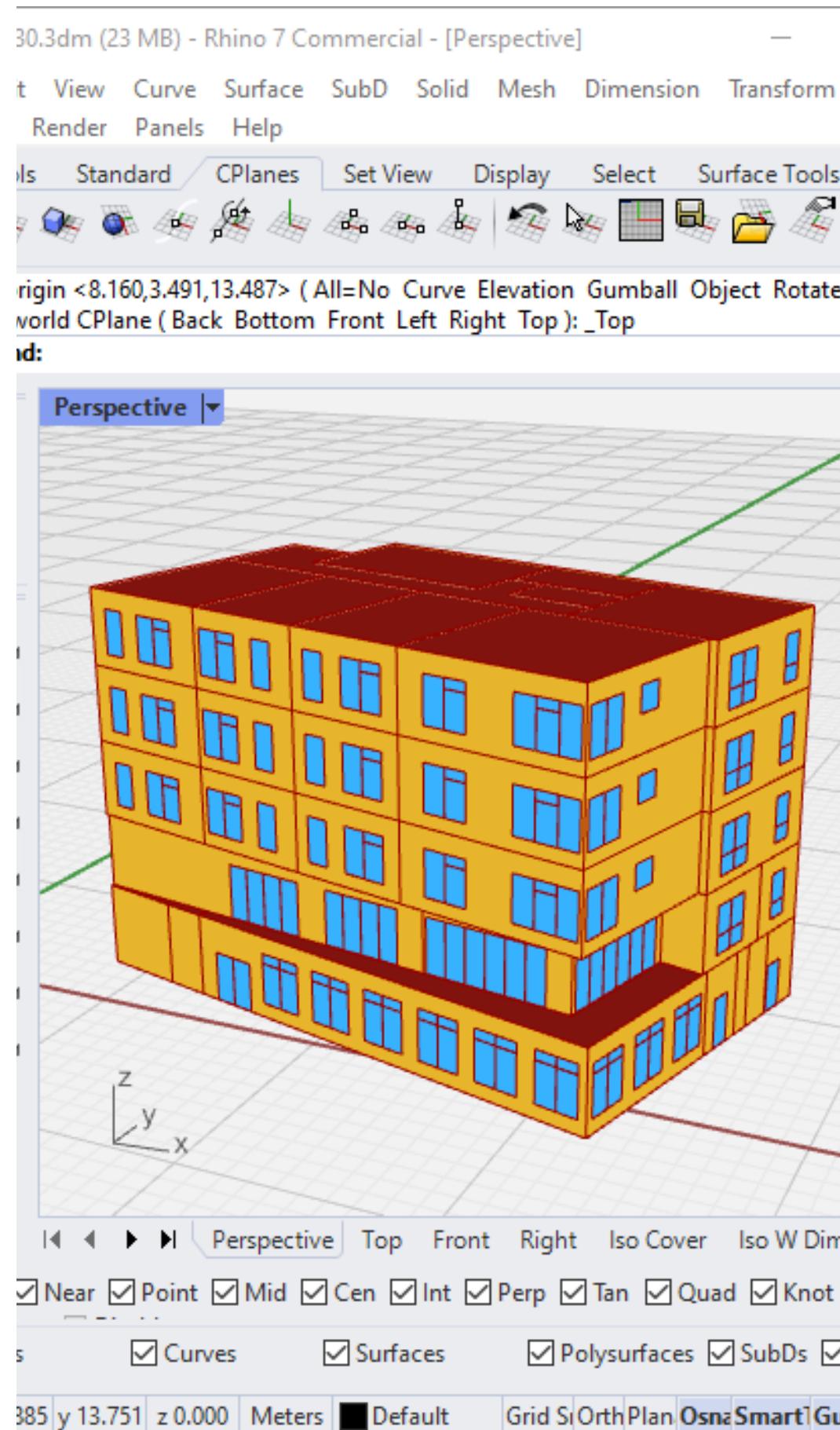
Dragonfly



Butterfly

“Ladybug and Honeybee ... have become a common language amongst architecture students, consultants and academics around the world, uniting communities that until recently operated in silos.”

-Alejandra Menchaca, Senior Associate, Thornton Tomasetti



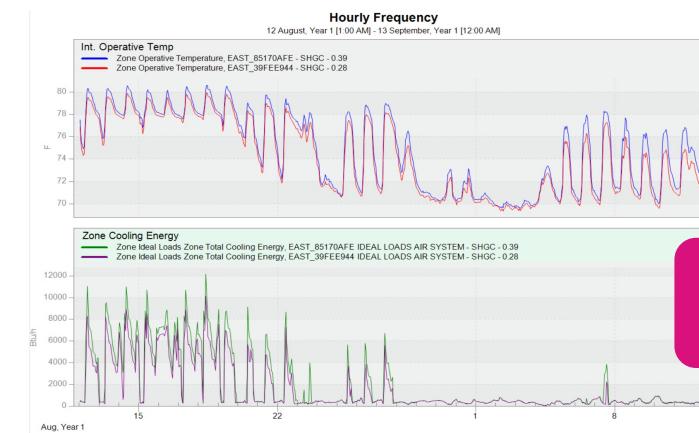
+



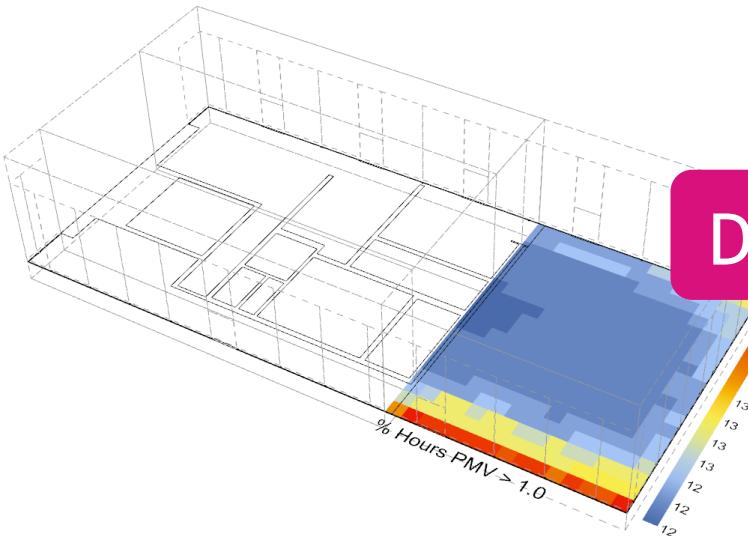
HONEYBEE-PH



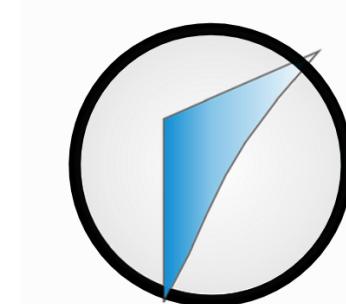
Hourly Energy



Thermal Comfort



Daylighting



WUFI-PASSIVE

PHPP



**Honeybee-Core**  
Geometry  
Visualizations



**Honeybee-Energy**  
Envelope  
HVAC  
Thermal Comfort  
EnergyPlus Simulations

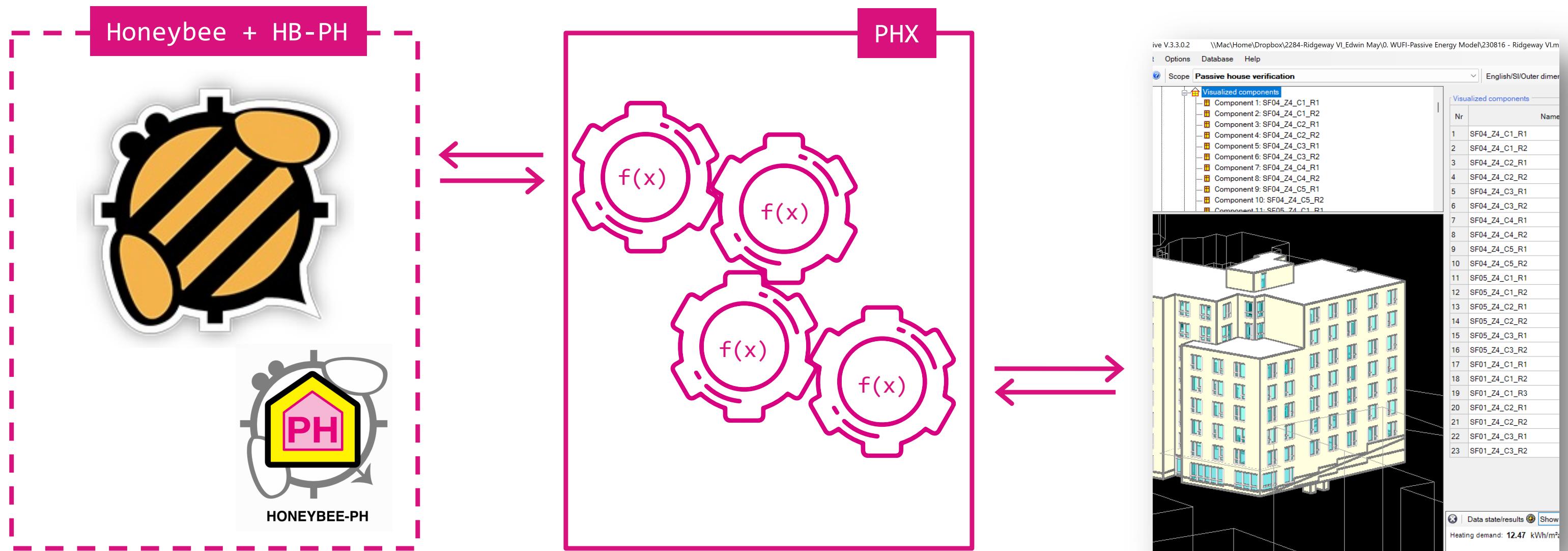


**Honeybee-Radiance**  
Daylighting



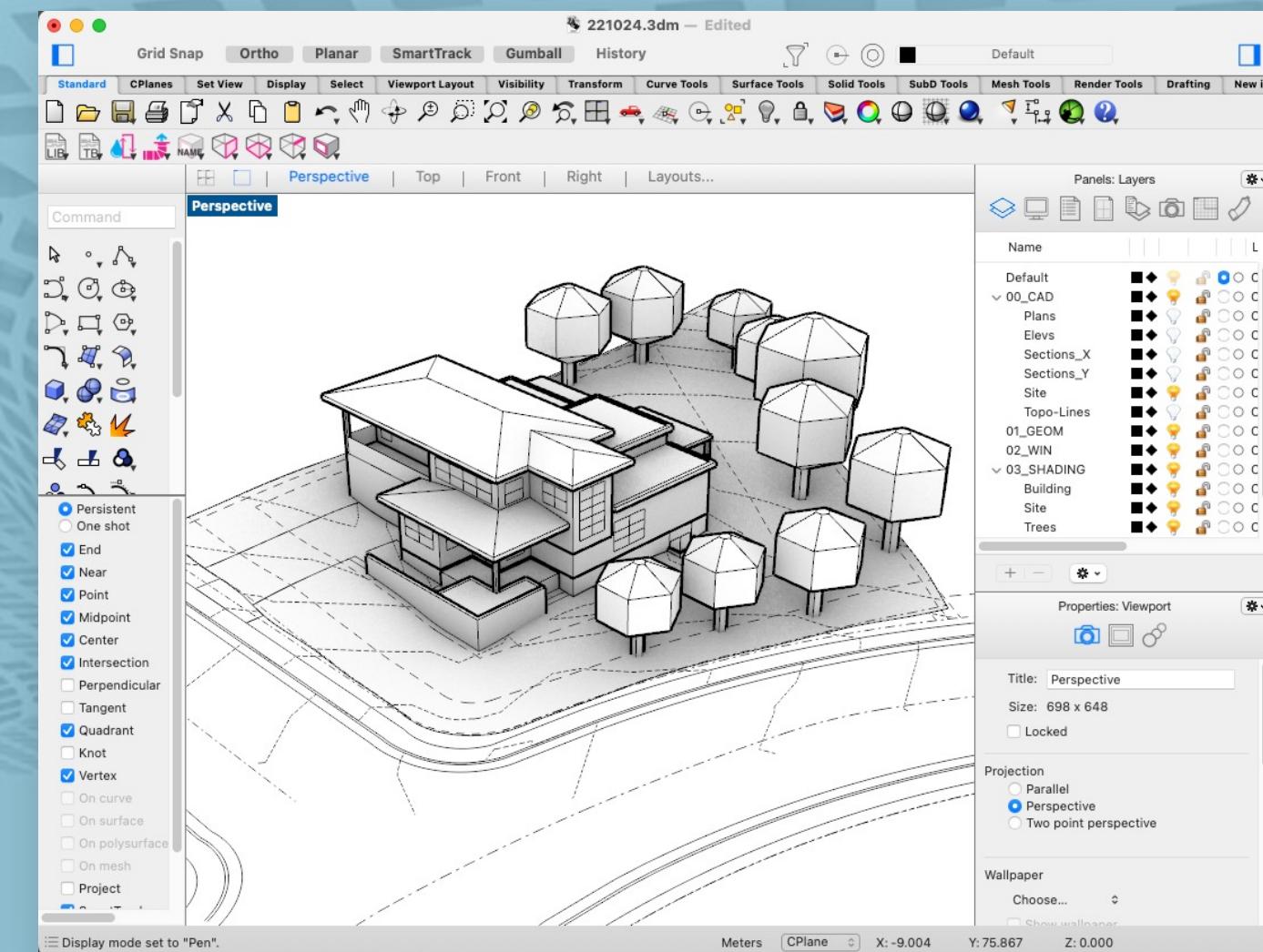
**Honeybee-PH**  
Passive House  
PHPP / WUFI-Passive

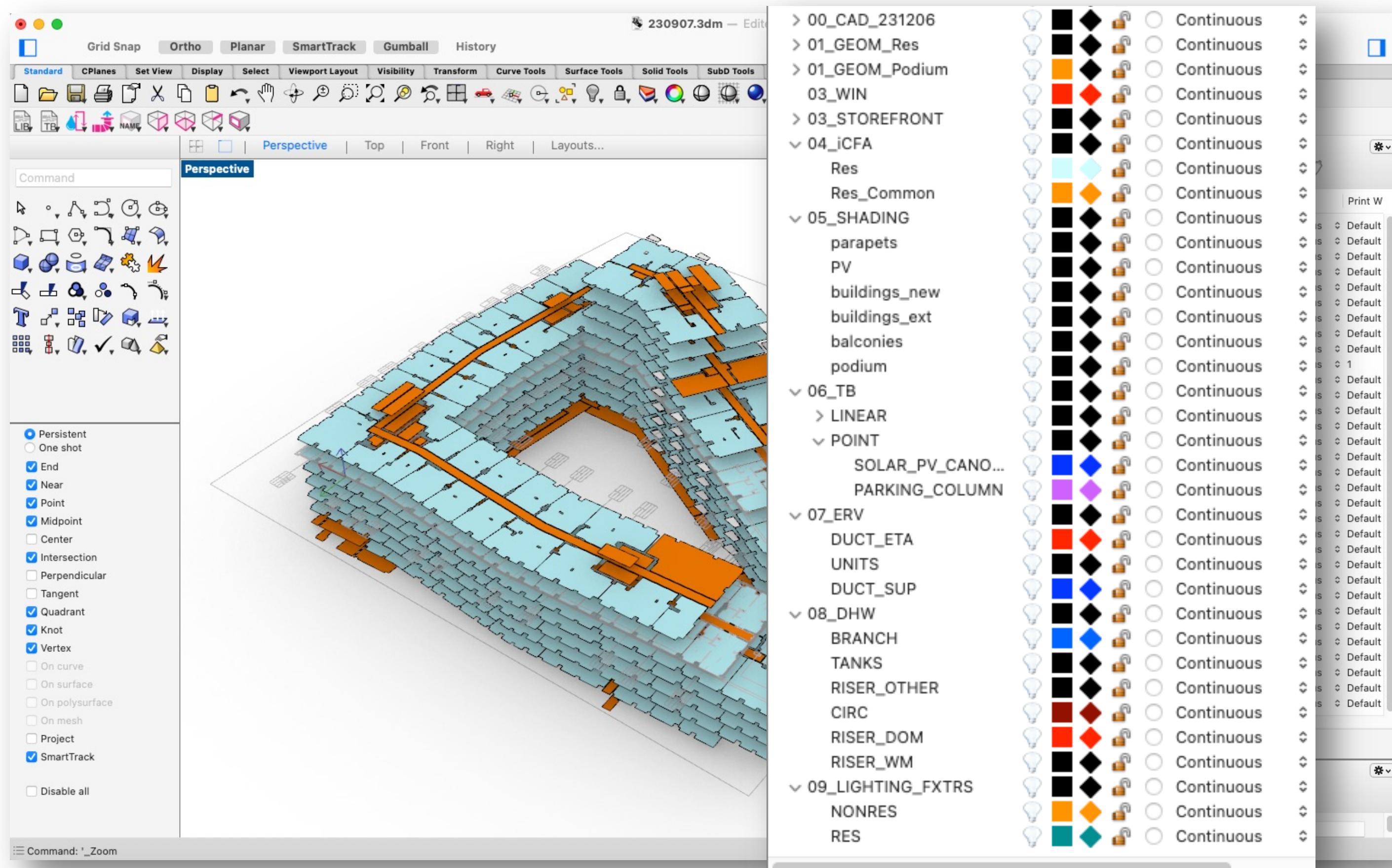
## Step 2: The PH-Model Interface

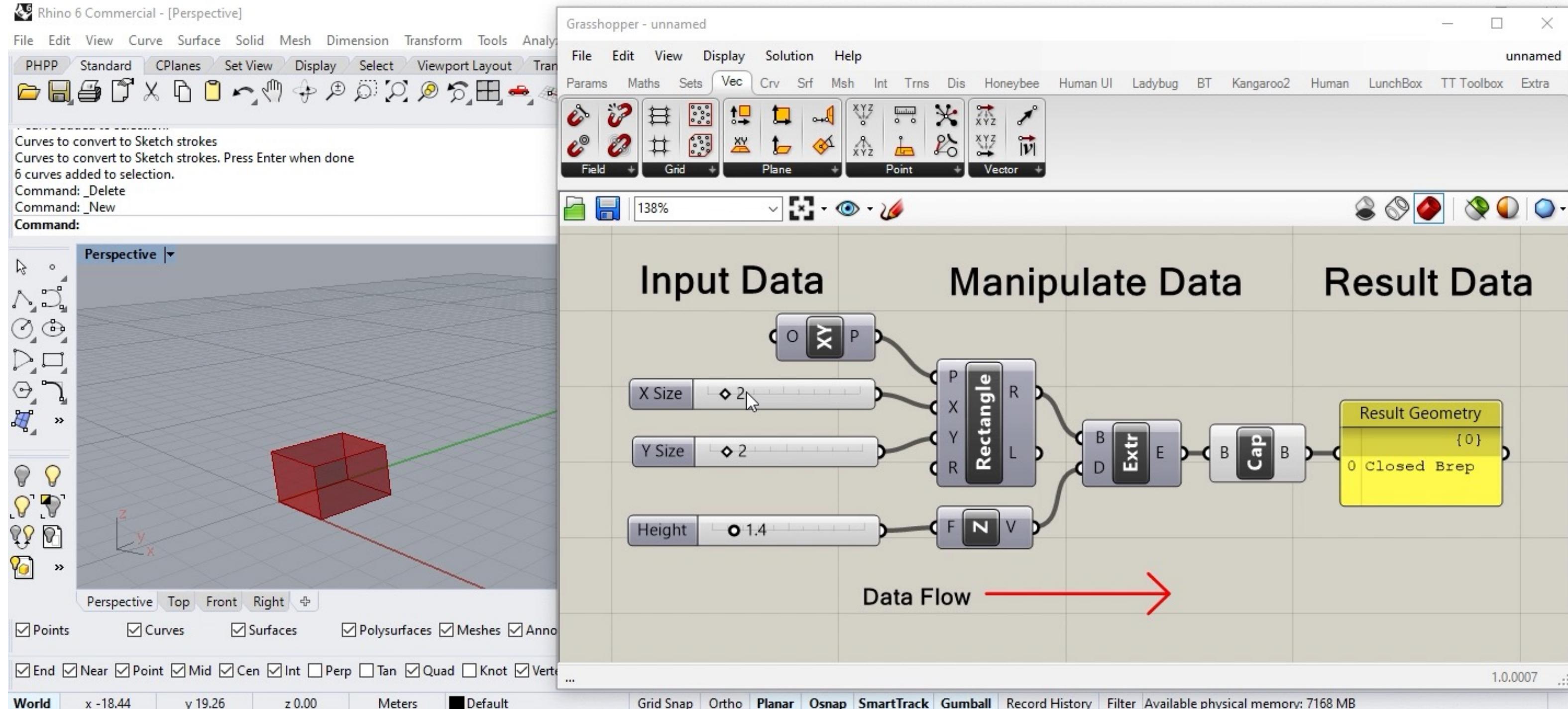


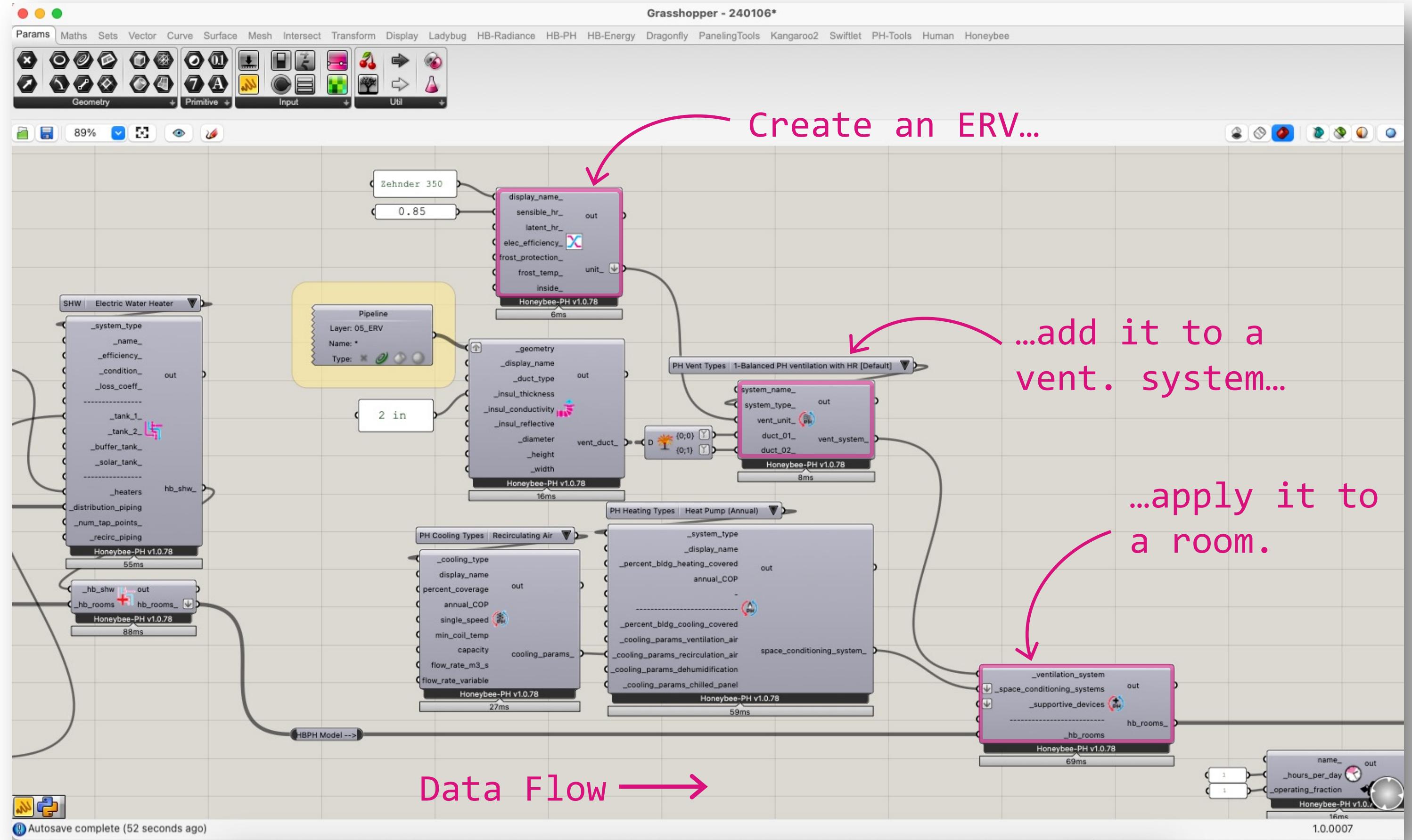


[www.rhino3d.com](http://www.rhino3d.com)









Grasshopper - unnamed

Params Maths Sets Vector Curve Surface Mesh Int Trns Dis HB-PH DF HB HB-R PH-Tools PanelingTools Kangaroo2 HB-E Swiftlet LB Human Extra PCamp

00 | ... 01 | Model 02 | Shading 03 | ... 04 | PDF

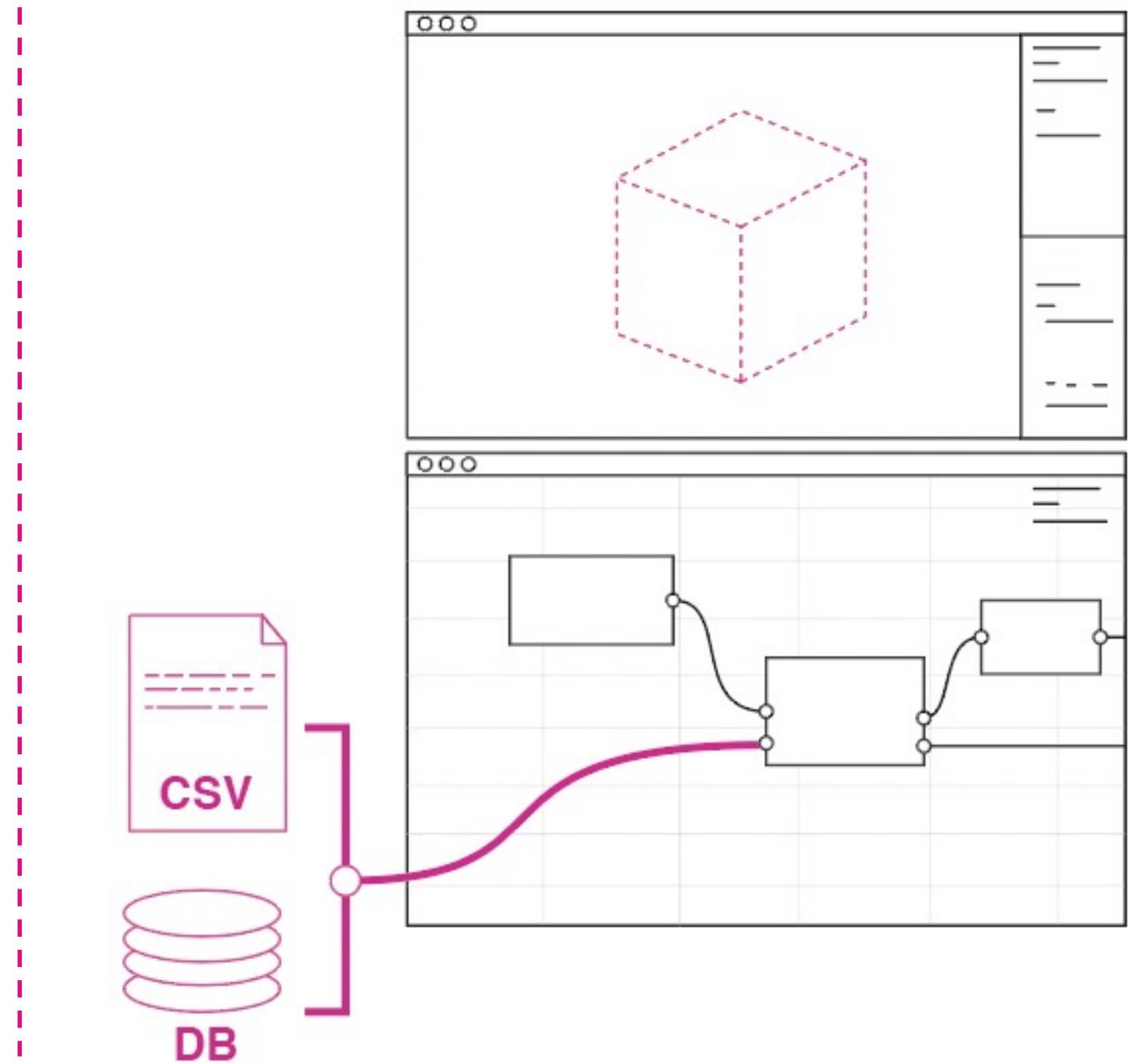
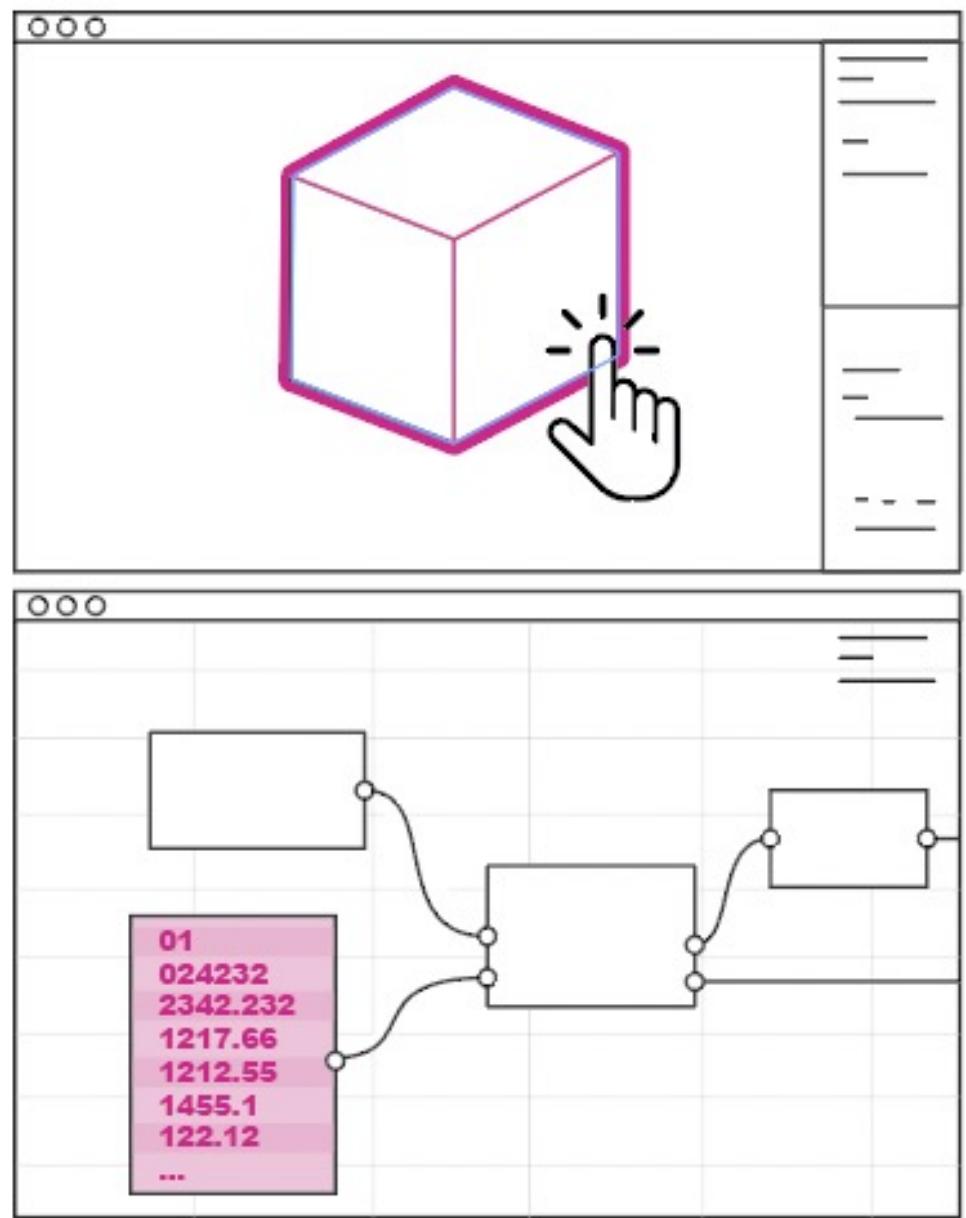
100% 100% ↕

Assemblies Components Thermal Bridges Shading Space TFA/iCFA

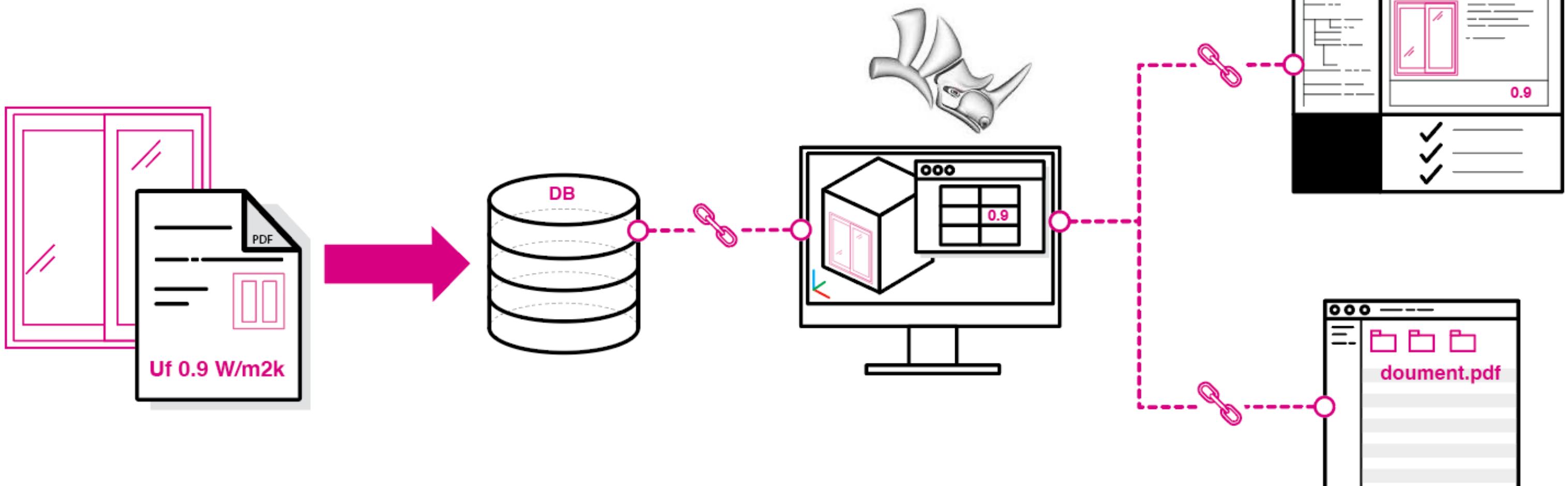
Hot-Water Mechanicals Appliances Programs Climate Certification Variants PDF Reports

1.0.0007

# HBPH Modeling



**Opinion:** The **data** should exist  
independently from the **application**.



 phius

Arverne Building D: Phius Certification

https://airtable.com/app2huKgwyKrnMRbp/tblQtcVgB6iYbyhis/viwo3CjtghqAtQgHf?block

Arverne Building D: Phius Certification Data Automations Interfaces Share Help

ERV UNITS | ERV: RISERS | FANS | PUMPS | LIGHTING\_FIXTURES | APPLIANCES | WINDOW: GLAZING TYPES | WIND | + | Extensions | Tools

Views Grid view 19 hidden fields Filter Group Sorted by 1 field Color Share and sync

Find a view Grid view Create... Grid Calendar Gallery Kanban Timeline

Grid view

DISPLAY\_NAME % HEAT RECOVERY [%] # WATTAGE [W] SPECIFICATI... DATA\_S... LINK

1 ERV-1-1 70.6% 410.0 QUESTION https://www.renewaire....

2 ERV-1-2 75.7% 825.0 QUESTION https://www.renewaire....

3 ERV-1-3 82.4% 1,066.1 COMPLETE

4 ERV-1-4 87.5% 190.0 COMPLETE https://www.renewaire....

5 ERV-1-5 75.5% 284.0 QUESTION https://www.renewaire....

6 ERV-1-6 77.5% 185.0 COMPLETE https://www.renewaire....

7 ERV-7-2 82.4% 1,088.0 COMPLETE

8 ERV-8-1 75.2% 191.0 COMPLETE https://www.renewaire....

9 ERV-9-2 75.0% 190.0 COMPLETE https://www.renewaire....

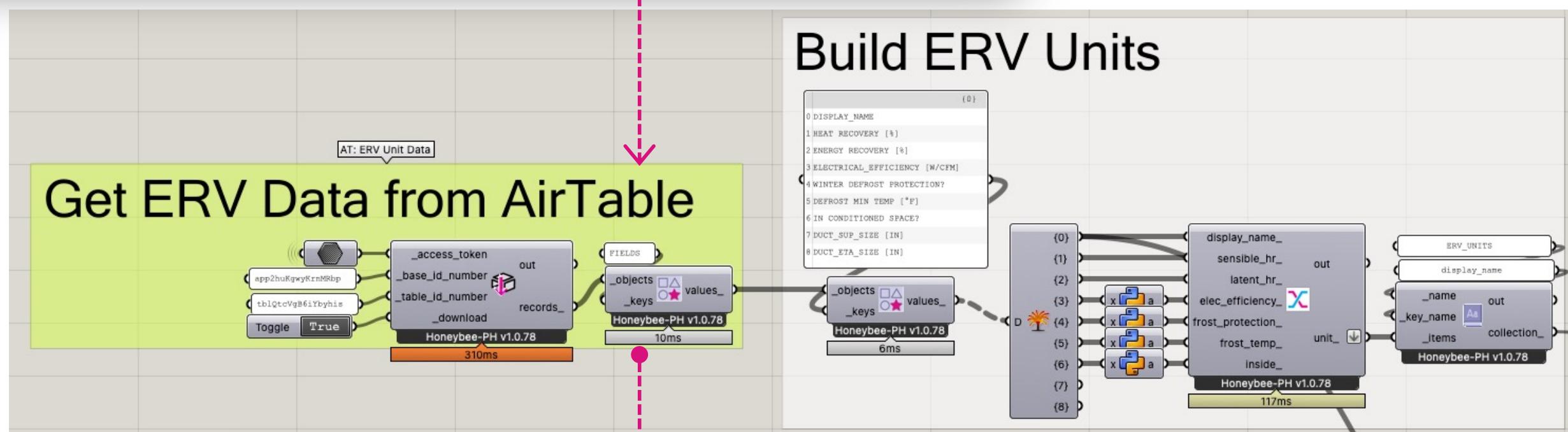
21 units Avg 75.0% Sum 22,006.0

Summary

Views | Grid view 19 hidden fields | Filter | Group | Sorted by 1 field | Color

Find a view Grid view

	A DISPLAY_NAME	% HEAT RECOVERY [%]	# WATTAGE [W]	
1	ERV-1-1	70.6%	410.0	
2	ERV-1-2	75.7%	825.0	
3	ERV-1-3	80.4%	1,000.0	



File Input Options Database Help

Scope Passive house verification

English/IP/Outer dimensions/Phius CORE 2021 Assign data

Thermal bridges  
Internal Loads/Occupancy  
Ventilation/Rooms  
Attached zones  
Remaining elements  
Component 1: Shade  
Systems  
System 1 (User defined): ideal Air System  
Device 1 (Heat pump: Heating, Cooling): Heating\_Cooling  
Device 2 (Mechanical ventilation: Ventilation): ERV-1-1  
Device 3 (Mechanical ventilation: Ventilation): ERV-1-2  
Device 4 (Mechanical ventilation: Ventilation): ERV-1-3  
Device 5 (Mechanical ventilation: Ventilation): ERV-1-4  
Device 6 (Mechanical ventilation: Ventilation): ERV-1-5  
Device 7 (Mechanical ventilation: Ventilation): ERV-1-6  
Device 8 (Mechanical ventilation: Ventilation): ERV-7-2  
Device 9 (Mechanical ventilation: Ventilation): ERV-8-1

Name: ERV-1-1

Database relevant data

Required data	Assign from database
Sensible recovery efficiency [-]	0.706
Humidity recovery efficiency [-]	0
Electric efficiency [W/cfm]	0.8577
Equipped with frost protection	<input checked="" type="checkbox"/>

Rooms ventilated by this unit

Z.1, R.1, User defined: L01_E123-NONRES	<input type="checkbox"/>
Z.1, R.2, User defined: L01_E124-NONRES	<input type="checkbox"/>
Z.1, R.3, User defined: L01_E1CRD.EAST-NONRES	<input type="checkbox"/>

Remaining parameters

Required data	
Quantity	1
HRV/ERV in conditioned space	<input type="checkbox"/>
No summer bypass feature (summer ventilation with HRV/ERV)	<input type="checkbox"/>
Defrost active	<input checked="" type="checkbox"/>
Temperature below which defrost must be used [°F]	26
Optional data (if not defined default value will be calculated)	
Subsoil heat exchanger efficiency [-]	0

Views

Thermal Bridges

Hide fields

Filter

Group

Sort

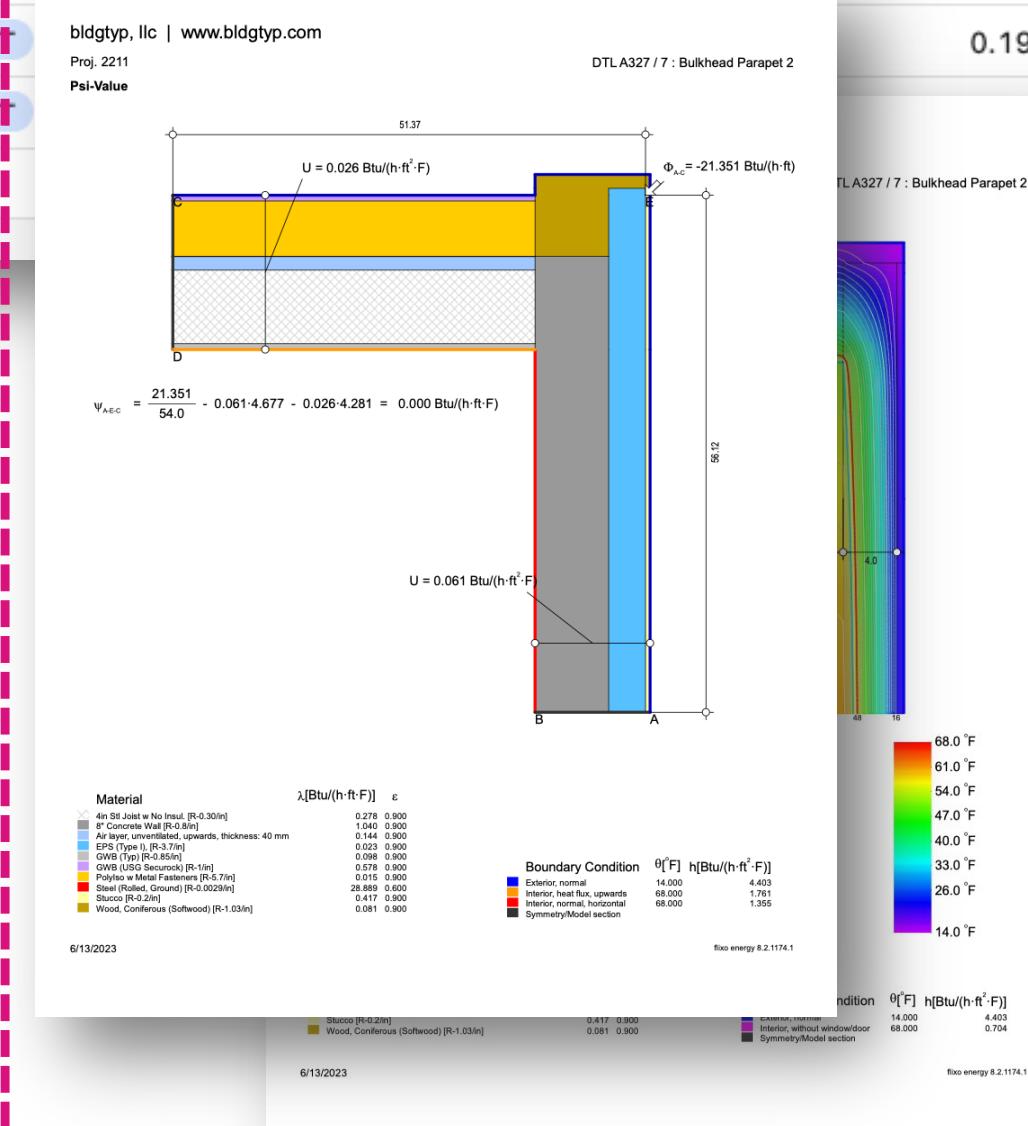
Color

Share and sync

Find a view

Thermal Brid...

	A DISPLAY_NAME	BRIDGE TYPE	# PSI-VALUE [BTU/H-FT-F]	PSI-VALUE [W/MK]	% F-RS VALUE	ISO 10211
1	Bulkhead_Parapet_2	15 - AMBIENT	0.000	0.000	83.1%	
2	Bulkhead_Parapet_1	15 - AMBIENT	0.166	0.287	70.9%	
3	Slab_Edge	15 - AMBIENT	0.072	0.125	83.3%	
4	Parapets	15 - AMBIENT		0.190	79.1%	
5	Canopy Steel Beam	15 - AMBIENT			62.6%	
+						



Rooms	ERV Units	Aux. Devices	Appliances	Material Data	Material Layers	Assemblies	Thermal Bridges	Window: Frame Elements	Window: Units	DHW: DOM Piping	DHW: Twig Piping				+
Views															
Window Unit Data															
14 hidden fields															
Filter															
Grouped by 2 fields															
Sorted by 3 fields															
Color															
Share and sync															
Find a view	DISPLAY_NAME	WIDTH [IN]	HEIGHT [IN]	INST_LEFT	INST_RIGHT	INST_TOP	INST_BO...	FRAME_LEFT	FRAME_RIGHT	FRAME_TOP	FRAME_BOTTOM				
Window Unit ...	MANUFACTURER IKON	Count 42	Sum 1831.0	Sum 2131.5	Sum 17	Sum 18	Sum 23	Sum 23							
	MANUFACTURER INTUS	Count 34	Sum 1188.0	Sum 1612.0	Sum 21	Sum 19	Sum 21	Sum 21							
	WINDOW_TYPENAME W1_L_Z4	3	Sum 100.0	Sum 160.0	Sum 2	Sum 1	Sum 2	Sum 2							

## Room Data

Ventilation Equipment, Pumps, Fans, Appliances

Heating, Cooling Equipment

Material Data

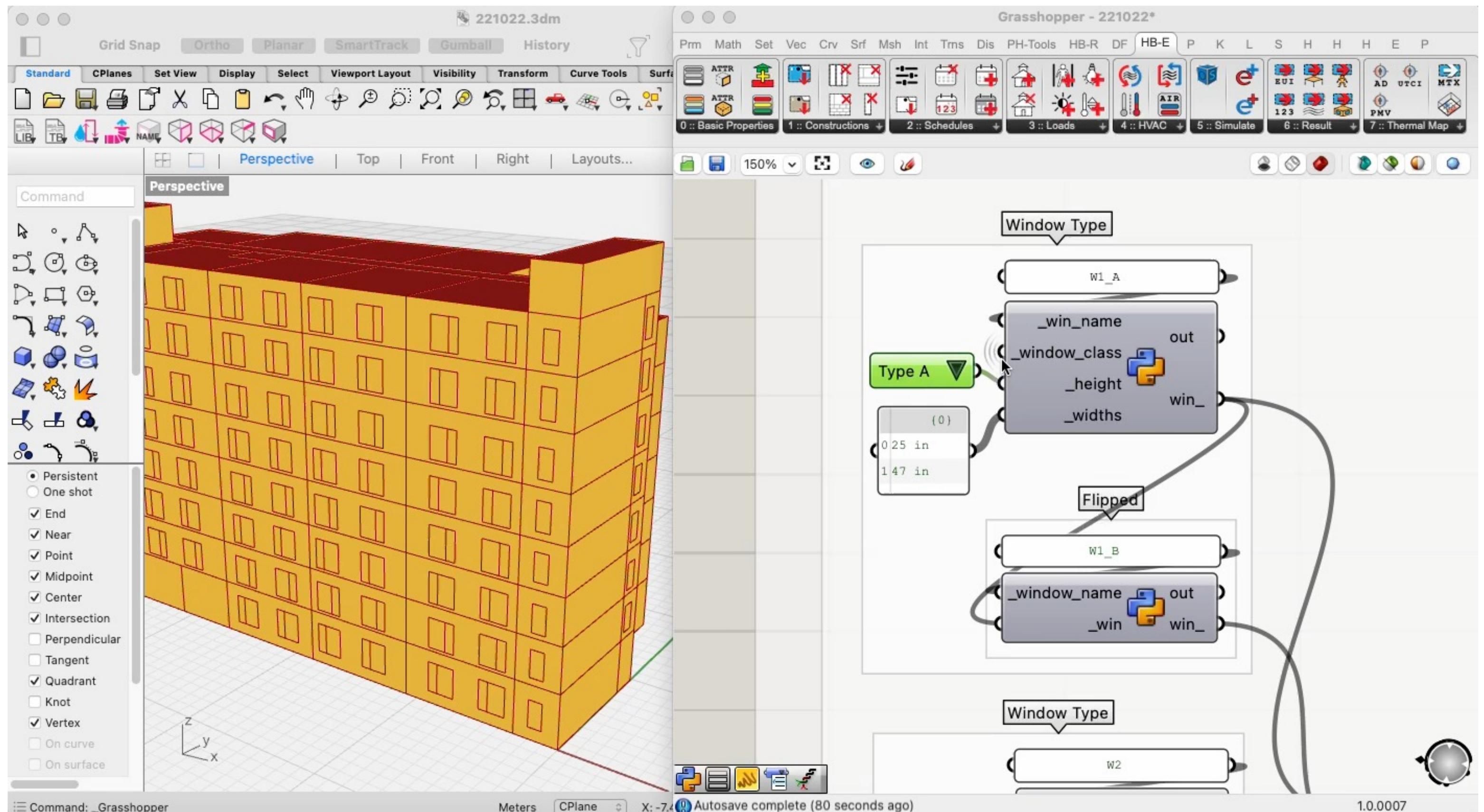
Assembly Layers, Constructions

Thermal Bridges

Window Frames, Glass, Sizes

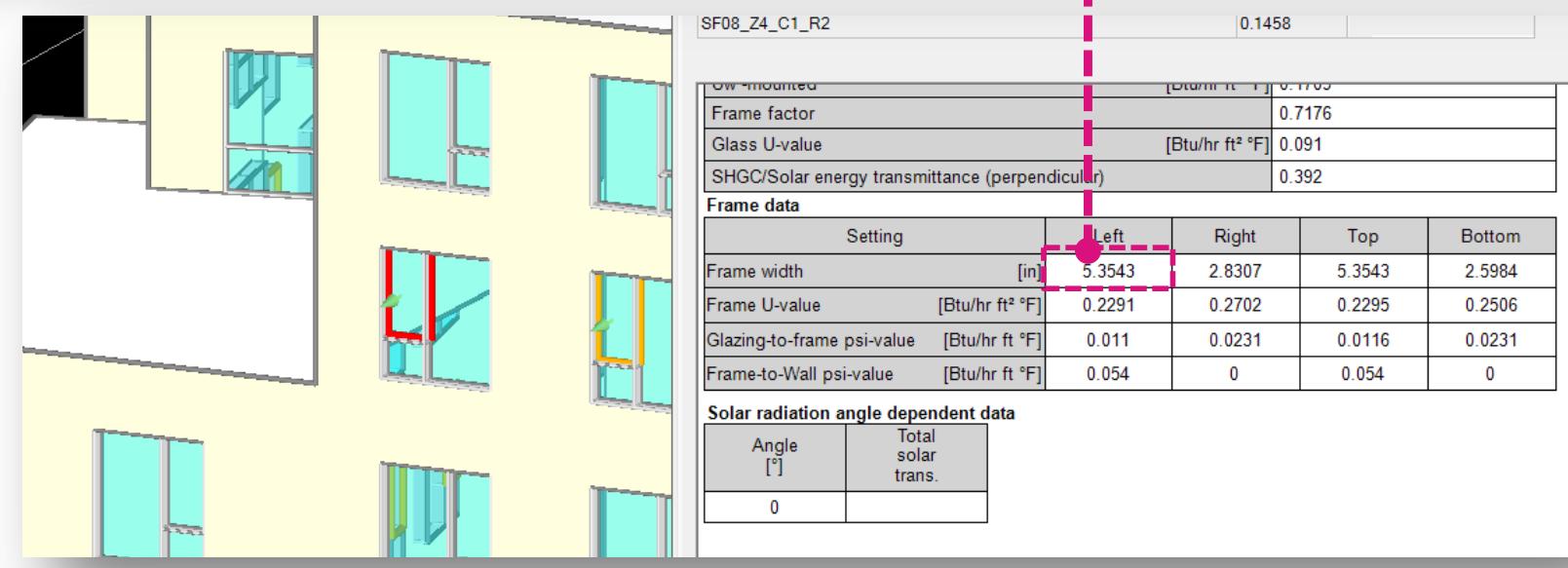
DHW Piping, Heaters, Tanks

...



	DISPLAY_NAME	ID NUMBER	MANUFACTURER	BRAND	POSITION	OPERATION	PART NUMBER	WIDTH [IN]	U-VALUE [BTU/HR-FT2-F]	PSI-GLAZING [BTU/HR-FT-F]	ISO-10077-2
>	IKON	Count 6	Sum 21					Sum 32.06	Sum 1.100	Sum 0.100	
<	INTUS	...	Sum 105					Sum 46.99	Sum 3.445	Sum 0.255	
7	INTUS_01 [3.39"]	1	INTUS	SUPERA	HEAD	Fixed	[8001]	3.39	0.213	0.012	
8	INTUS_02 [5.35"]	2	INTUS	SUPERA	HEAD	Operable	[8001 8095]	5.35	0.229	0.012	
9	INTUS_03 [3.39"]	3	INTUS	SUPERA	JAMB	Fixed	[8001]	3.39	0.213	0.012	
10	INTUS_04 [5.35"]	4	INTUS	SUPERA	JAMB	Operable	[8001 8095]	5.35	0.229	0.011	
11	INTUS_05 [4.88"]	5	INTUS	SUPERA	SILL	Fixed	[8001]	4.88	0.207	0.011	

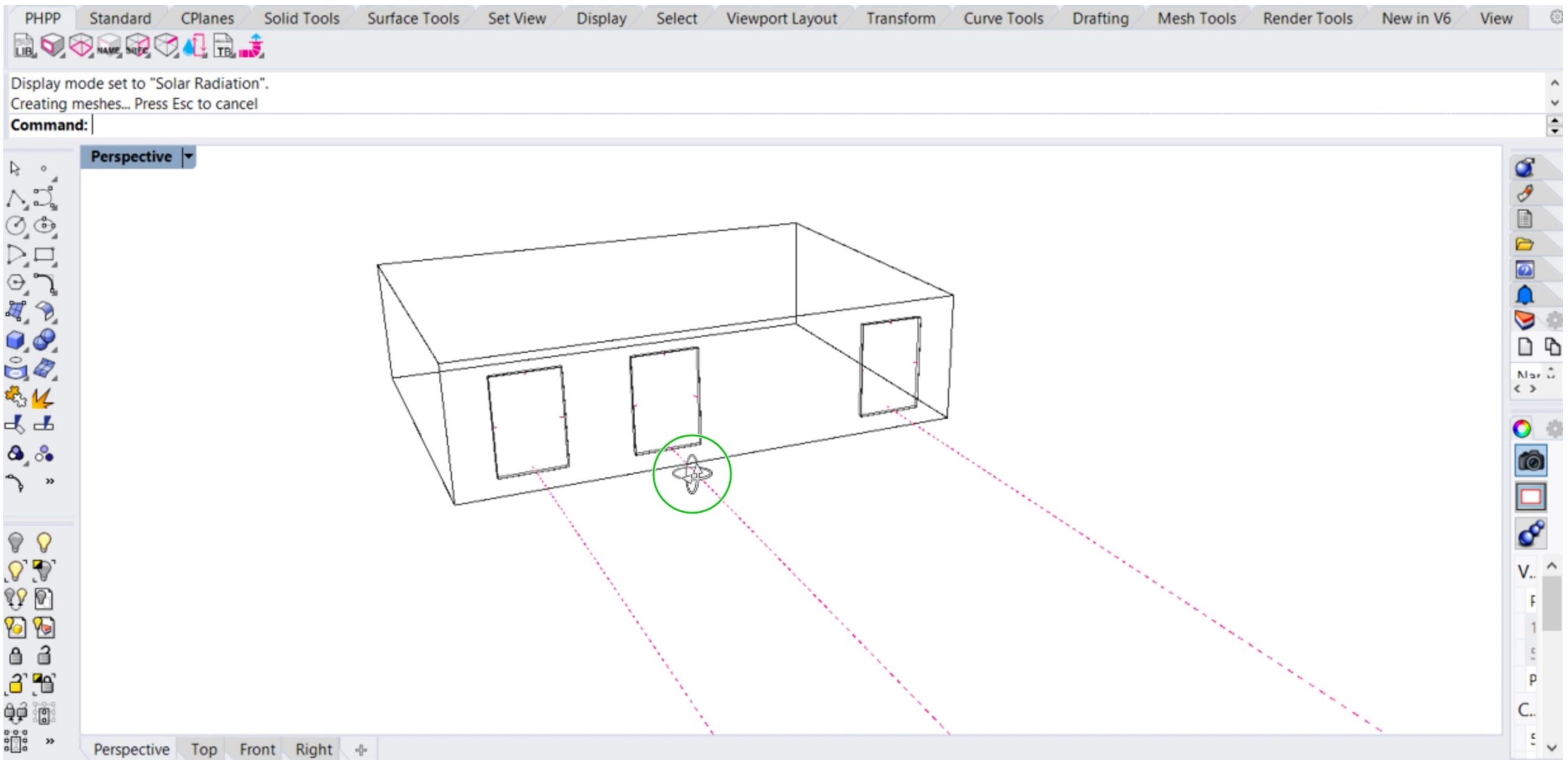
	DISPLAY_NAME	WIDTH [IN]	HEIGHT [IN]	INST_LEFT	INST_RIGHT	INST_TOP	INST_BOTTOM	FRAME_LEFT	FRAME_RIGHT	FRAME_TOP	FRAME_BOTTOM
>	IKON	Count 42	Sum 0.0	Sum 0.0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0
<	INTUS	Count 34	Sum 28.0	Sum 56.0	Sum 1	Sum 0	Sum 1	Sum 0	Sum 0	Sum 0	Sum 0
WINDOW_TYPENAME	W1_L_Z4	3	Sum 28.0	Sum 56.0	Sum 1	Sum 0	Sum 1	Sum 0	Sum 0	Sum 0	Sum 0
43	W1_L_Z4_C1_R1	28.0	24.0	1	0	0	1	INTUS_03 [3.39"]	INTUS_10 [1.85"]	INTUS_08 [2.6"]	INTUS_05 [4.88"]
44	W1_L_Z4_C1_R2	28.0	56.0	1	0	1	0	INTUS_04 [5.35"]	INTUS_13 [2.83"]	INTUS_02 [5.35"]	INTUS_08 [2.6"]
45	W1_L_Z4_C2_R1	44.0	80.0	0	1	1	1	INTUS_13 [2.83"]	INTUS_03 [3.39"]	INTUS_01 [3.39"]	INTUS_05 [4.88"]
WINDOW_TYPENAME	W1_L_Z5	3	Sum 0.0	Sum 0.0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0	Sum 0

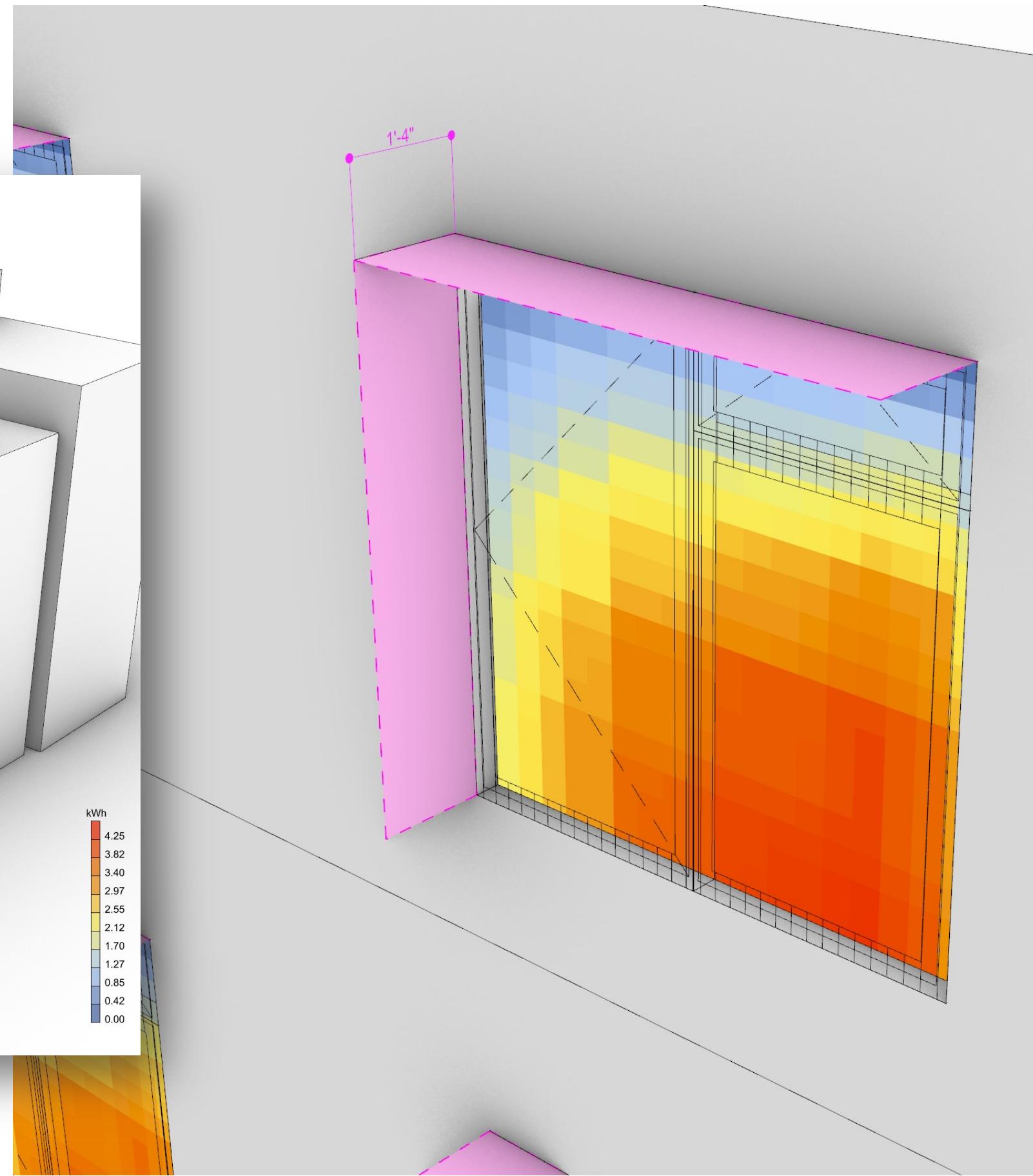
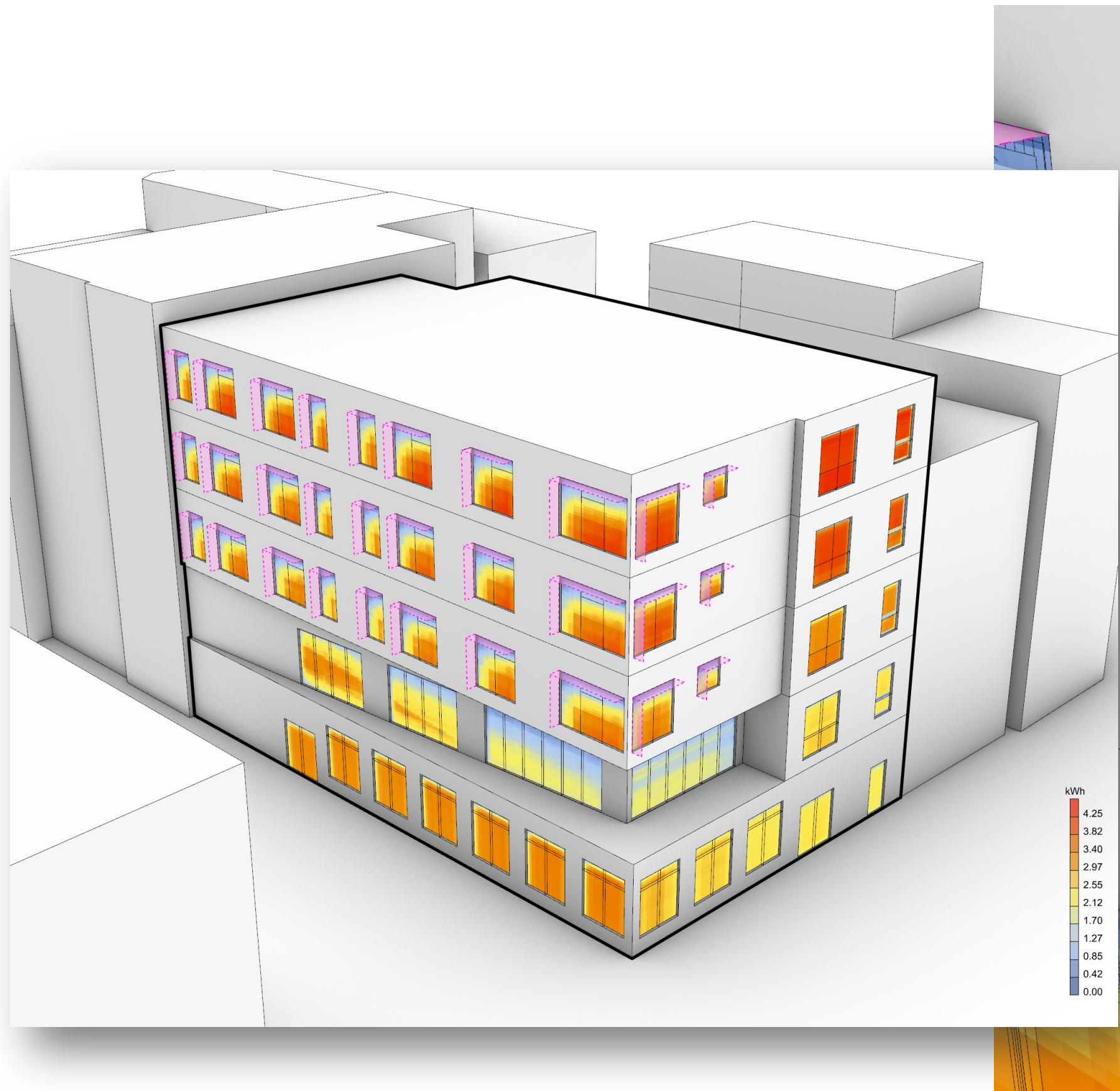


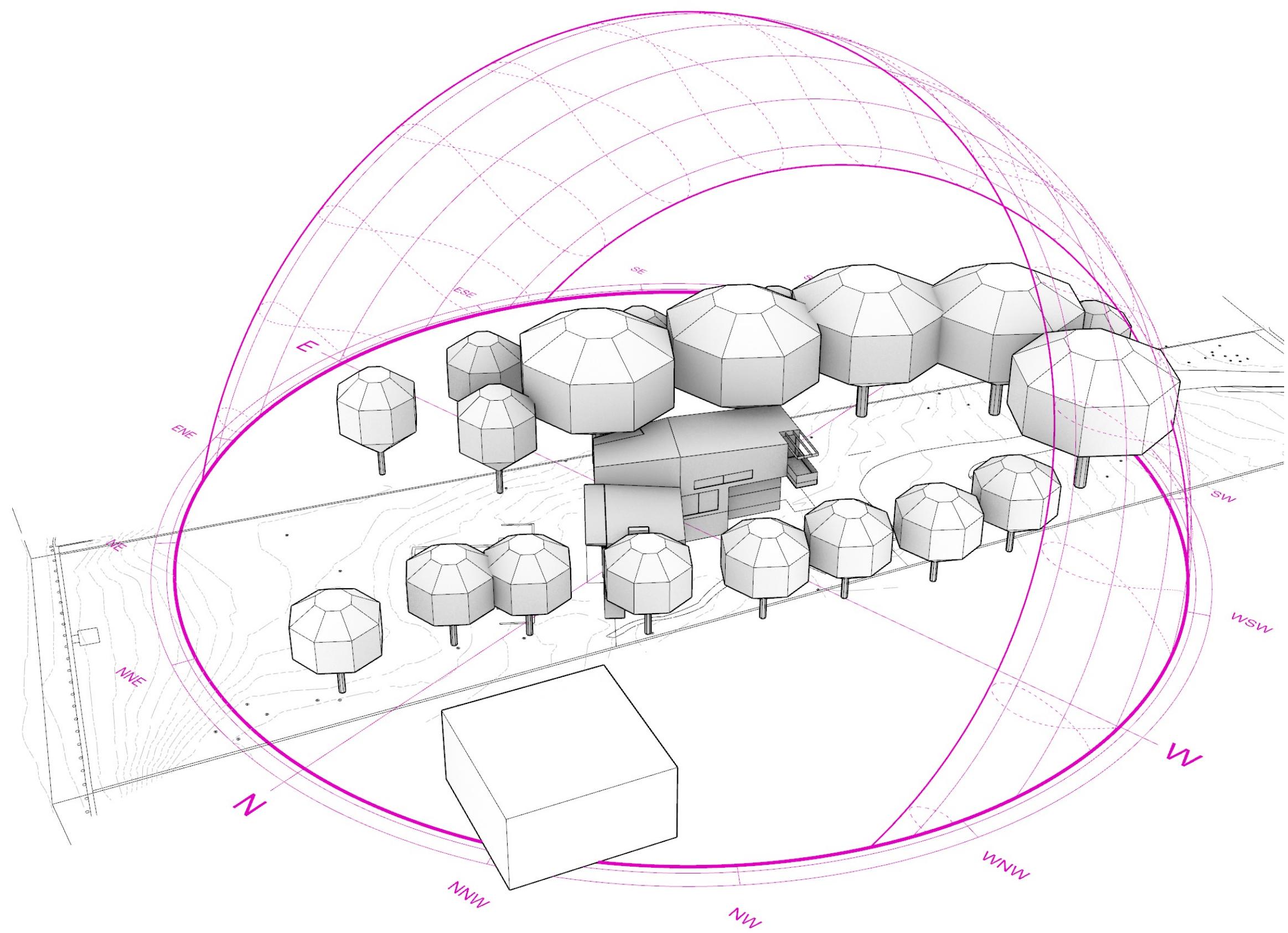
		<b>Risk of Condensation?</b>	OK	-
W1.2_X:	<b>Basic Parameters</b>	<b>General:</b>	OK per datasheets / Flixo /Airtable	-
		<b>U-glass:</b>	0.091, OK	-
	<b>Frame Parameters</b>	<b>SHGC:</b>	0.392, OK	-
		<b>Frame Width:</b>	OK	-
		<b>U-frame:</b>	OK	-
		<b>Glazing-to-frame psi-value (psi-spacer)</b>	OK	-
		<b>Frame-to-wall psi-value (psi-install)</b>	OK	-
		<b>Comfort Criteria:</b>	OK	-
		<b>Risk of Condensation?</b>	OK	-
		<b>General:</b>	OK per datasheets / Flixo /Airtable	-

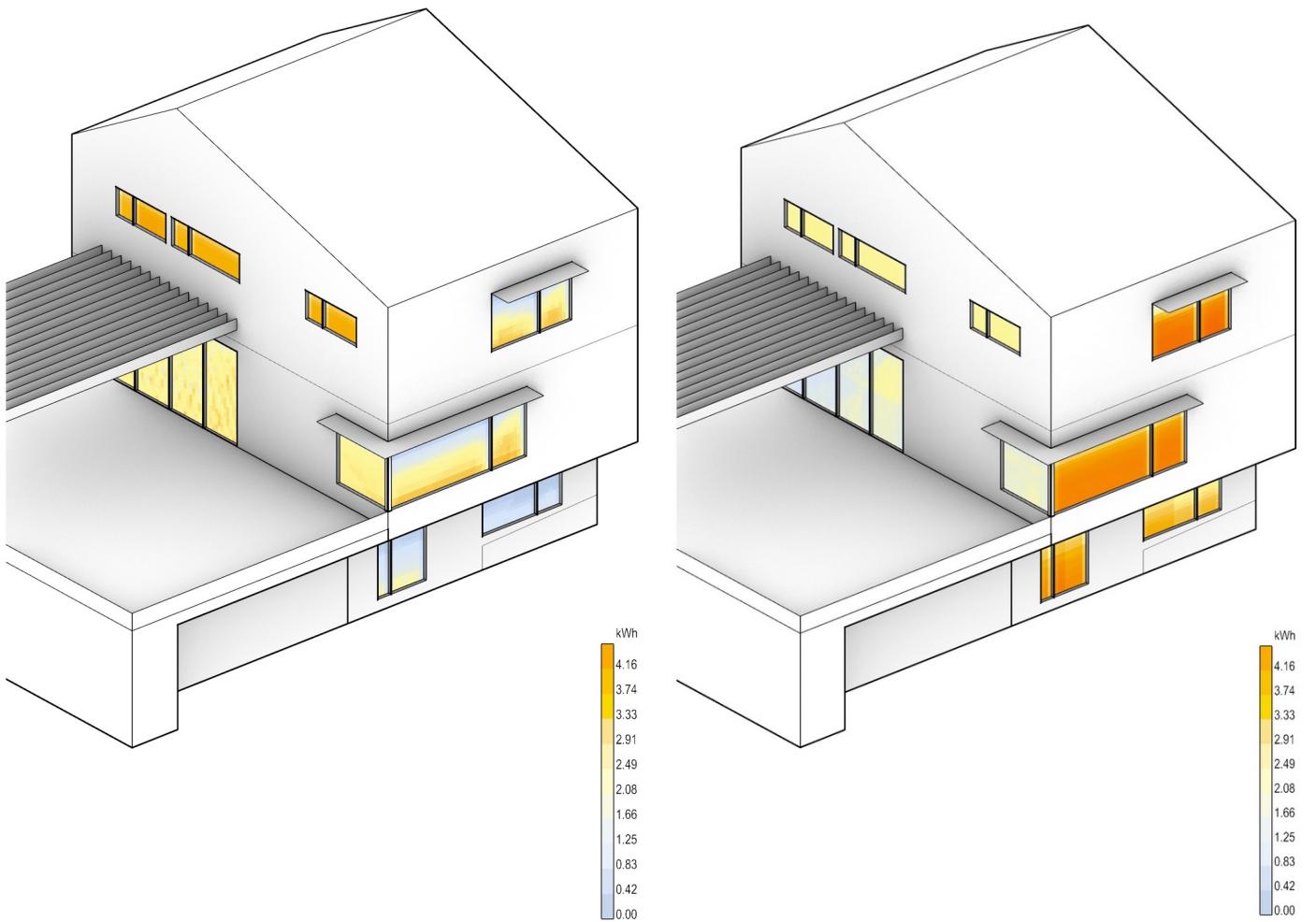


# HBPH Shading









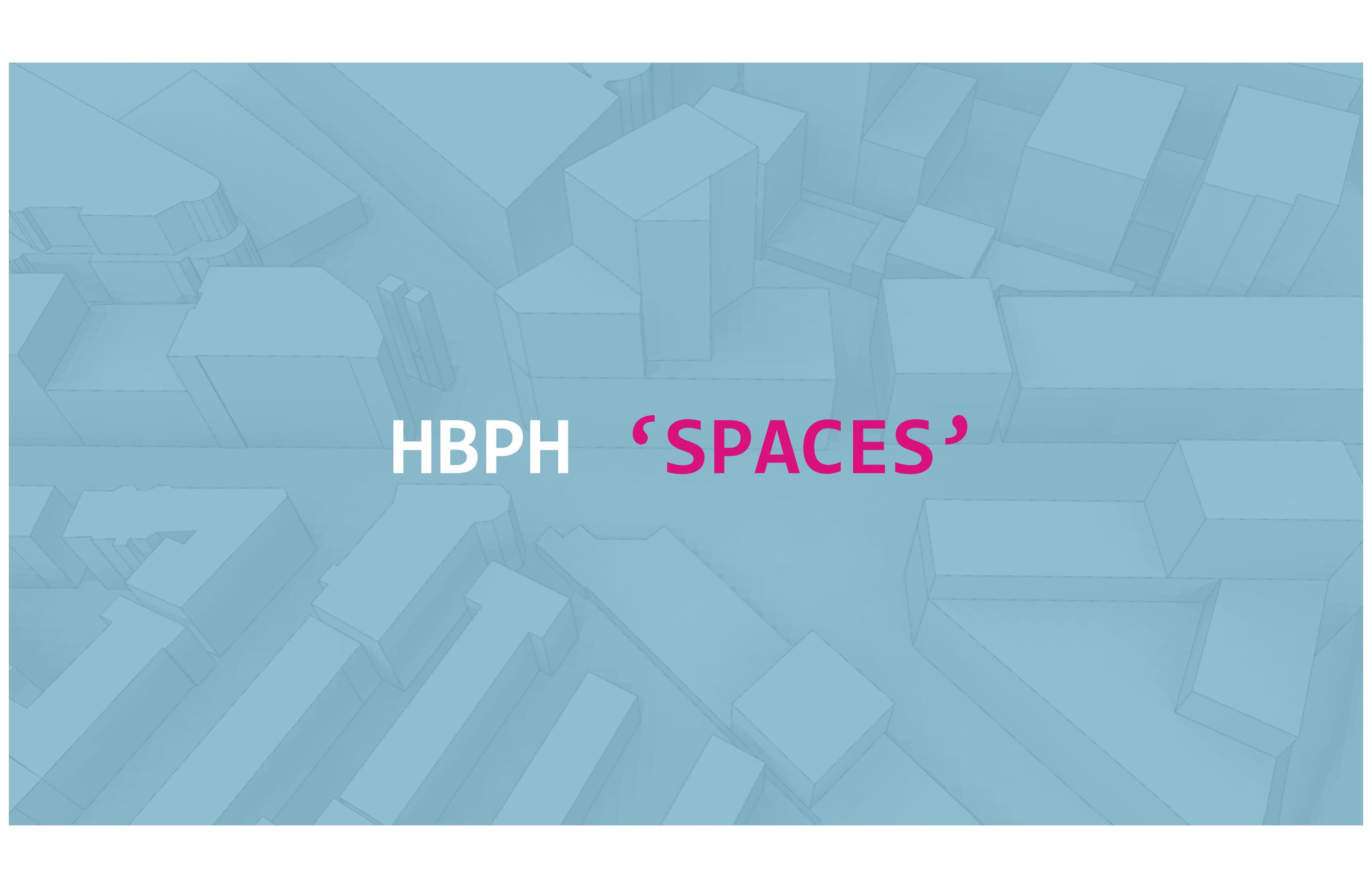
## **Calculation of shading coefficients**

8/13/2022 Building Data / Climate: Denver / TFA: 190 m<sup>2</sup> / Heating: 28.9 kWh/(m<sup>2</sup>a) / Cooling: 9 kWh/(m<sup>2</sup>a) / PER: 55 kWh/(m<sup>2</sup>a)

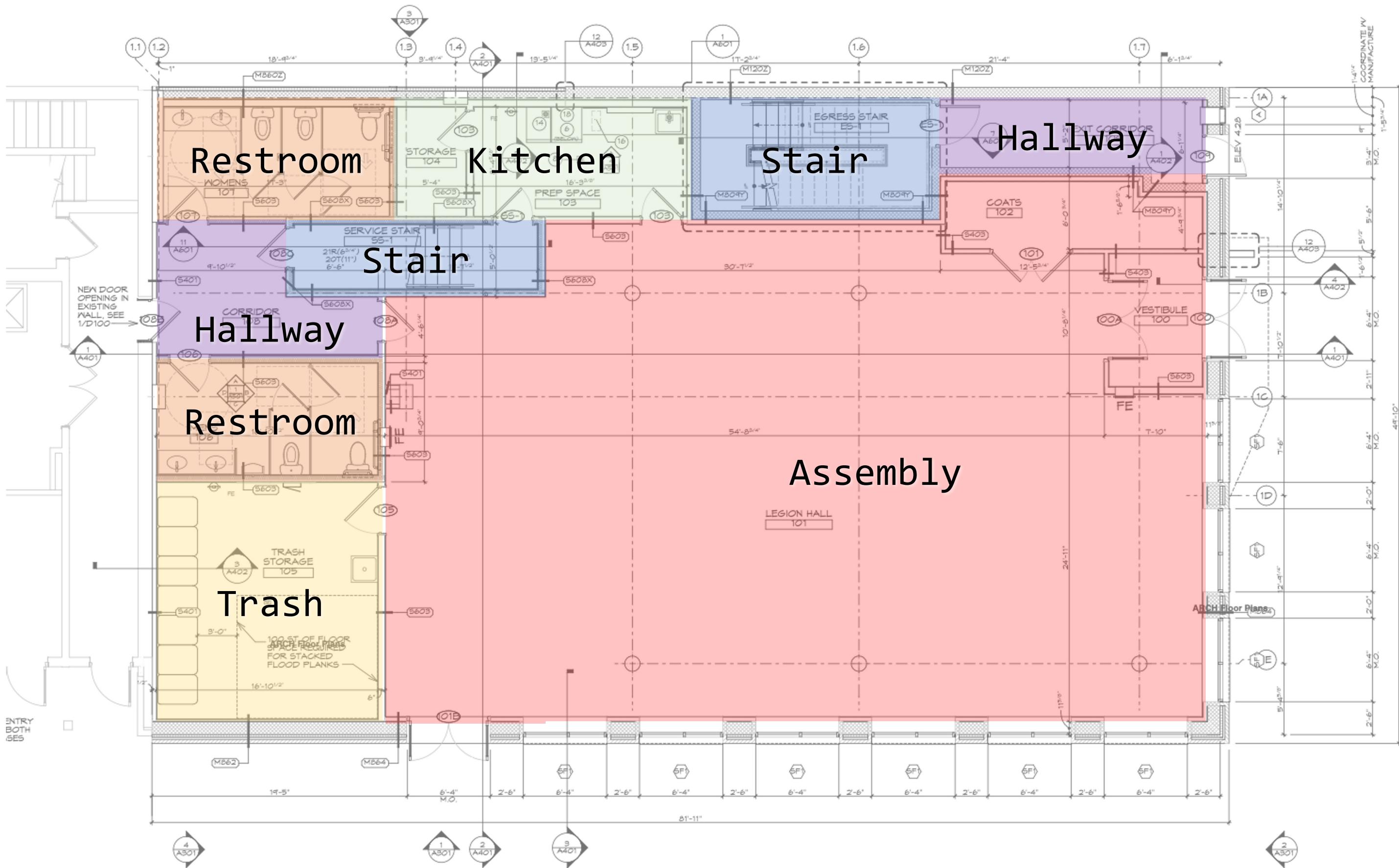
Latitude: 39.75

Solar load [kWh/(m <sup>2</sup> Glazing a)]
56
232
166
238
0

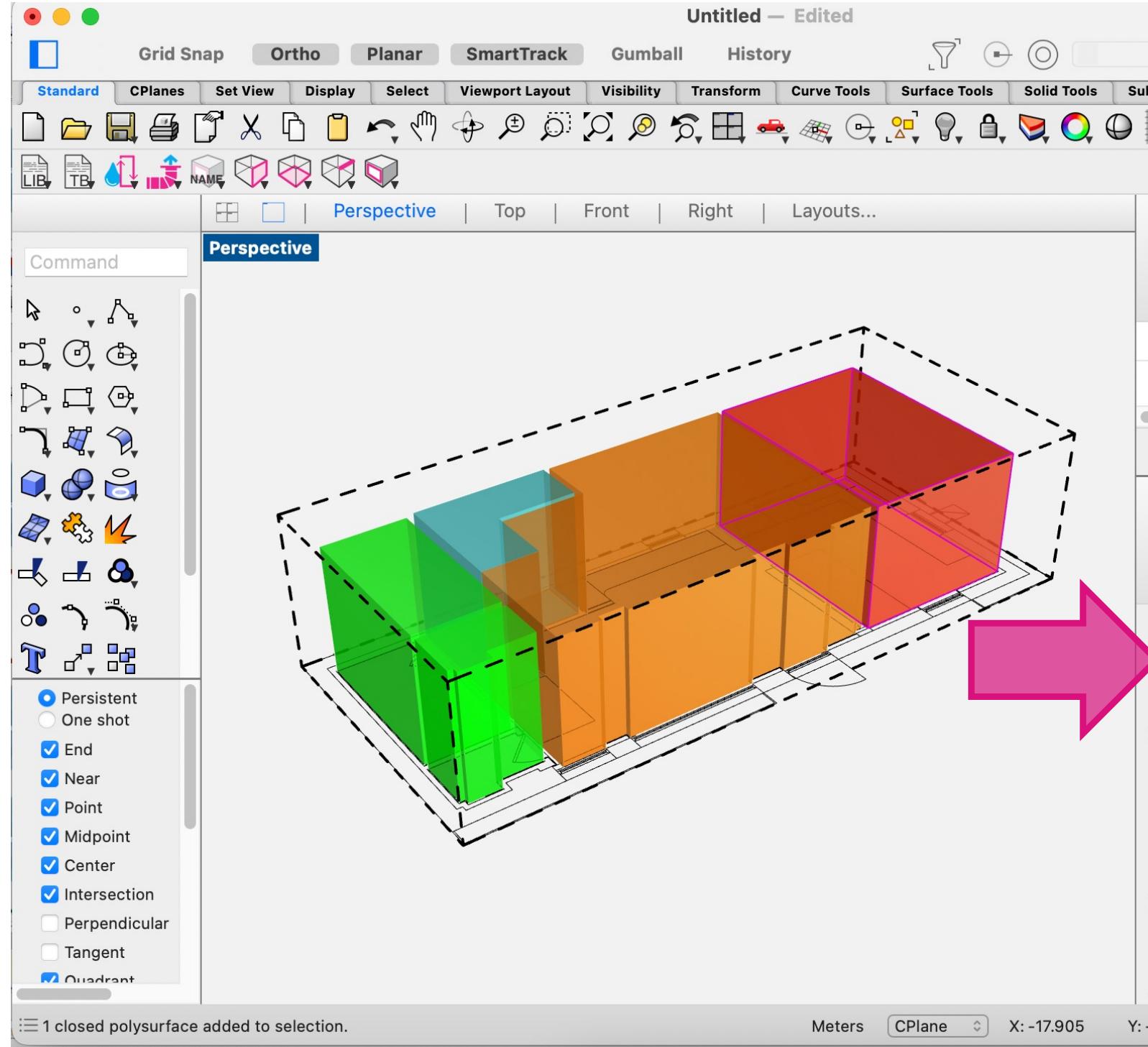
Quantity	Description	Deviation from North	Angle of inclination from the horizontal	Additional reduction factor winter shading	Additional reduction factor summer shading	Reduction factor z for temporary sun protection	Regulated /
		[Degree]	[Degree]	$r_{other,w} [\%]$	$r_{other,s} [\%]$	$z [\%]$	
1	Aperture_a5583c44	173	90	70%	39%		
1	Aperture_452c6cc5	173	90	67%	43%		
1	Aperture_08ba90b3	263	90	76%	79%		
1	Aperture_8a32a494	263	90	83%	83%		
1	Aperture_5bc03883	263	90	76%	78%		
1	Aperture_38e7f4c7	263	90	85%	83%		
1	Aperture_4a785b2e	263	90	75%	78%		
1	Aperture_d5a73ba5	263	90	83%	81%		
1	Aperture_0224f8bc	83	90	80%	83%		
1	Aperture_1b9c963e	83	90	72%	80%		
1	Aperture_9b535acc	83	90	72%	80%		
1	Aperture_4d11ae44	83	90	72%	80%		
1	Aperture_1cc49942	83	90	80%	83%		
1	Aperture_49148dc9	83	90	71%	79%		
1	Aperture_a9a76b2d	353	90	55%	49%		
1	Aperture_e8d8e5d0	353	90	60%	57%		
1	Aperture_613e376c	353	90	55%	48%		
1	Aperture_d6c05935	353	90	60%	57%		
1	Aperture_4185bc54	173	90	68%	46%		
1	Aperture_31651d90	173	90	70%	41%		
1	Aperture_ec134c3d	83	90	55%	76%		
1	Aperture_f5113426	83	90	54%	75%		
1	Aperture_4fb64b70	83	90	51%	60%		
1	Aperture_e1e6639f	83	90	...%	65%		



**HBPH 'SPACES'**



## Spaces



The screenshot shows an Excel spreadsheet titled "Results\_220119". The top menu bar includes Home, Insert, Draw, Page Layout, Formulas, Tell me, Comments, and Share. The formula bar shows "Q93". The main content area displays several tables and formulas related to energy performance.

Key formulas visible in the header include:

- Energy carrier for DHW: =
- Solar fraction of DHW: =
- Marginal performance ratio DHW: =

Below these formulas are two tables:

Room / Zone	Net ground area
Lighting / non-residential	m <sup>2</sup>

Room category	Power of nominal lighting	Deviation from North
	Lux	Degrees

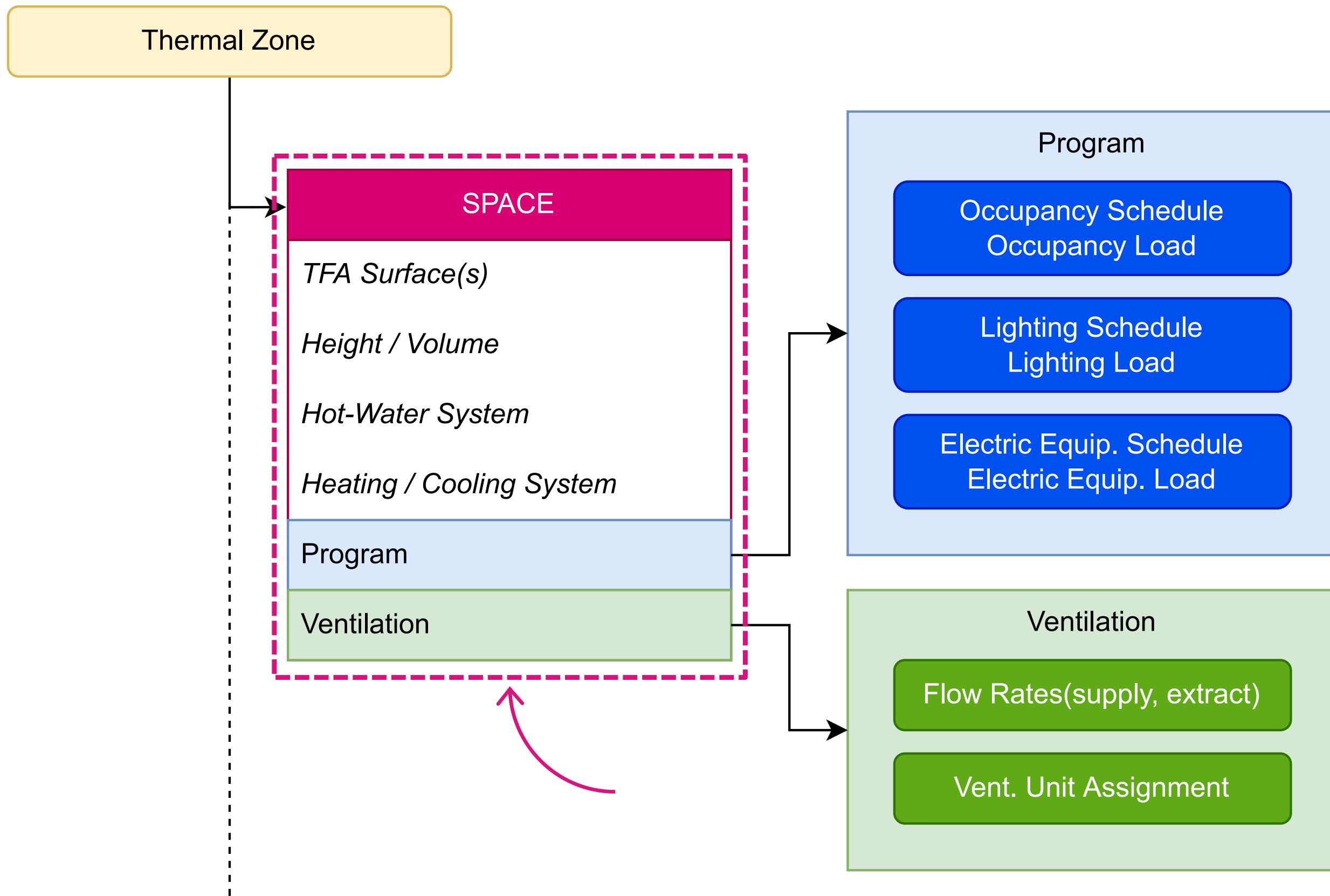
A pink oval highlights a list of room categories and their areas:

Room / Zone	Area (m <sup>2</sup> )
201-CAFE+MKT	35.0
202-KITCHEN	8.2
203-RESTROOM	5.3
101-KITCHEN	13.9
103-RESTROOM	4.9
103-CAFE+MKT	26.8
104-STORAGE	1.5

To the right of this highlighted list is another table listing room categories and their power requirements:

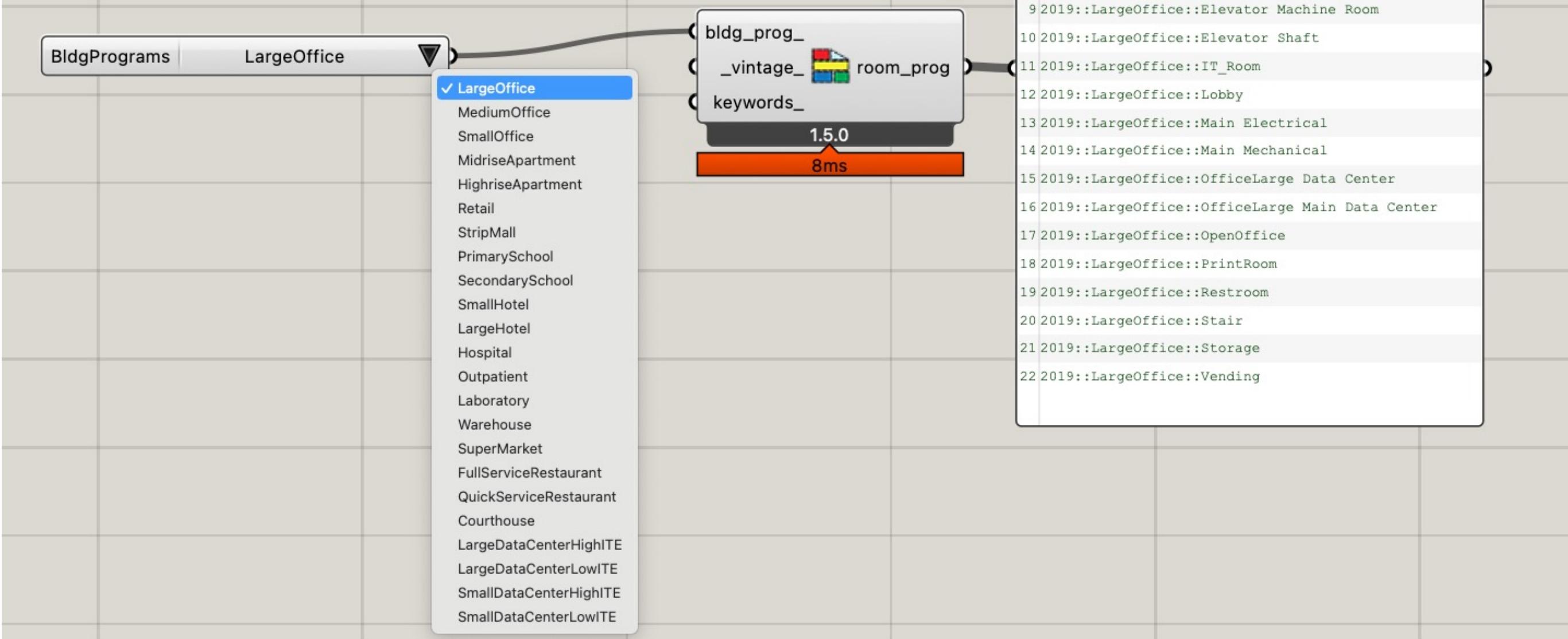
Room category	Power (Lux)	Deviation (Degrees)
1-12TH_ST_cafe_upper	300	0
2-12TH_ST_kitchen	300	0
3-12TH_ST_restroom	300	0
2-12TH_ST_kitchen	300	0
3-12TH_ST_restroom	300	0
4-12TH_ST_cafe_lower	300	0
5-12TH_ST_storage	300	0
	0	0
	0	0
	0	0

At the bottom of the screen, there are several green buttons labeled PV, Use non-res, Electricity non-res, Aux Electricity, IHG non-res, and a plus sign. The status bar at the bottom shows "Ready", "Accessibility: Investigate", "Adjust Settings", and a zoom level of 112%.

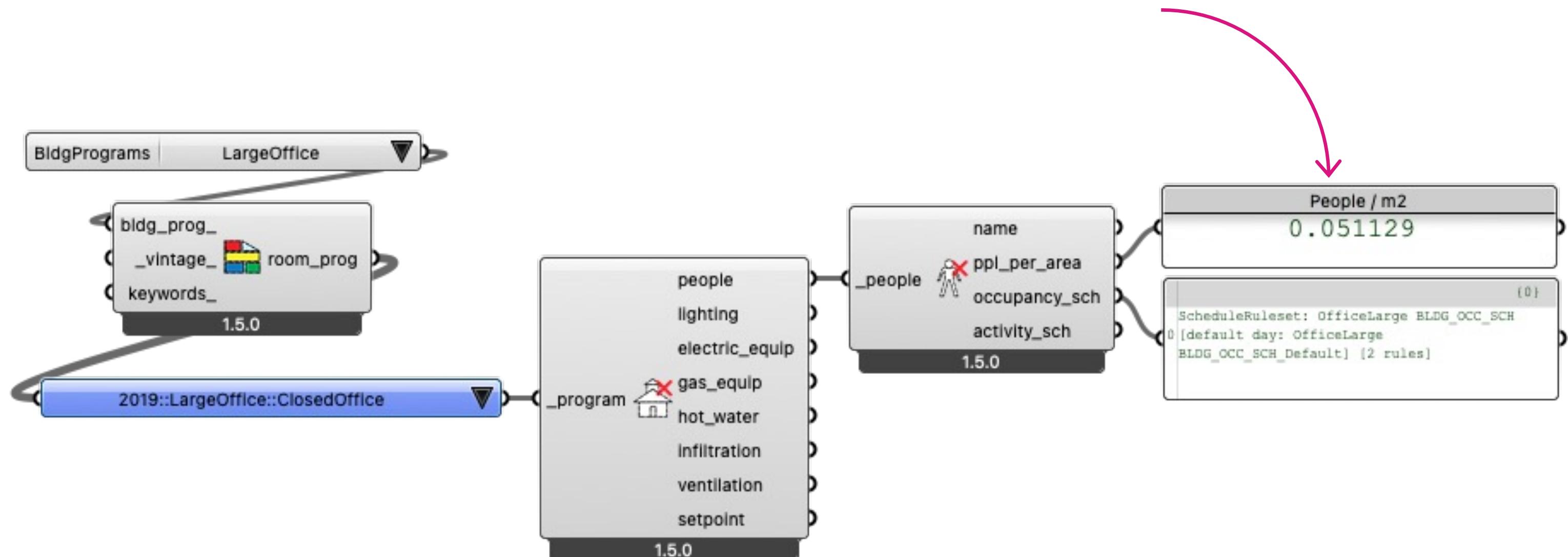


23 Typologies

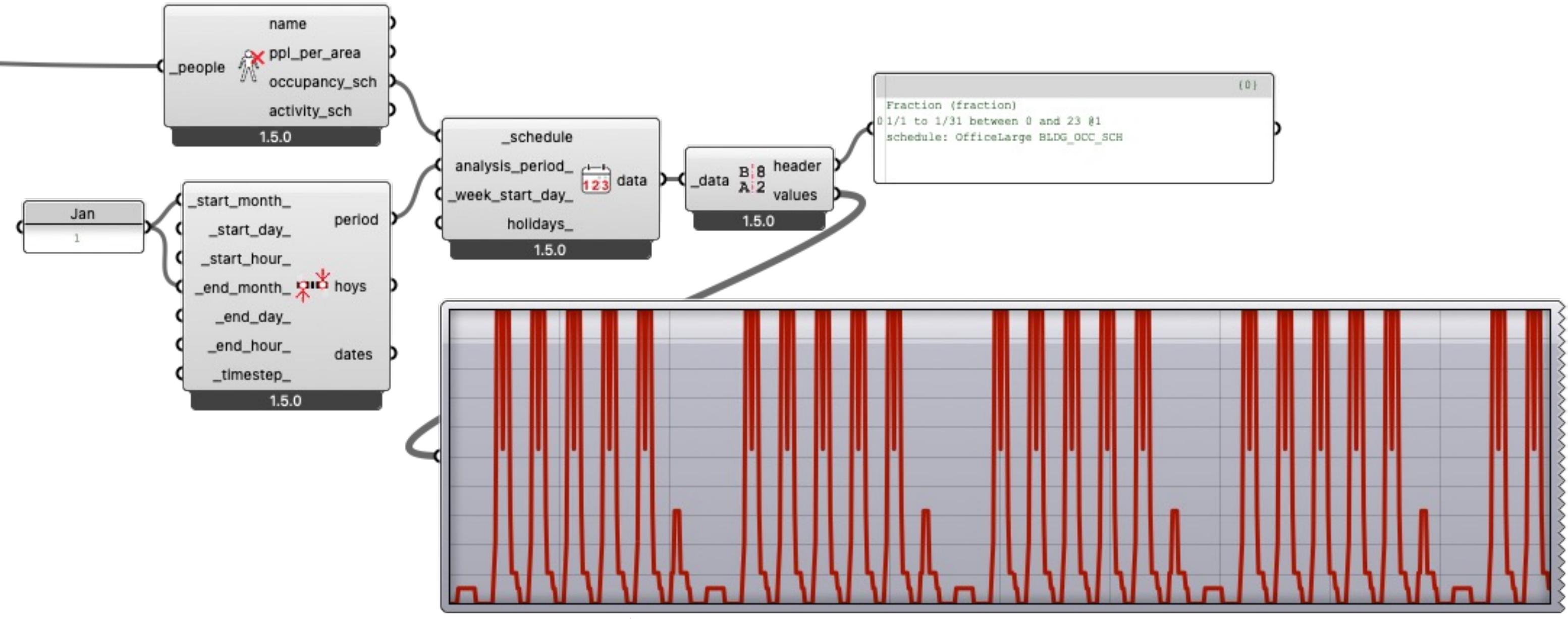
+1,700 Programs



# Program: Loads



# Program: Schedules



Hourly Occupancy: 0-100%

**PH** logo watermark

**Project** **Cases** **Case 1: Arverne Building D**

- Localization/Climate: NYC JFK
- Building
  - PH case: Passive house: Residential
    - Zone 1: Whole Building
      - Visualized components
      - Not visualized components
      - Thermal bridges
    - Internal Loads/Occupancy
    - Ventilation/Rooms
      - Attached zones
      - Remaining elements
      - Component 1: Shade
- Systems
  - System 1 (User defined): Ideal Air System
    - Device 1 (Heat pump: Heating/Cooling):
    - Device 2 (Mechanical ventilation: Ventila
    - Device 3 (Mechanical ventilation: Ventila
    - Device 4 (Mechanical ventilation: Ventila
    - Device 5 (Mechanical ventilation: Ventila
    - Device 6 (Mechanical ventilation: Ventila
    - Device 7 (Mechanical ventilation: Ventila

**Utilization pattern** **Rooms ventilation** **Summer ventilation** **Exhaust ventilation**

**Rooms**

Name	Room type	Quantity	Utilization pattern	Design volume flow rate [cfm]		Average volume flow rate [cfm]		Average air change rate [1/hr]
				Supply Air	Exhaust Air	Supply Air	Exhaust Air	
L01_W118-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.87
L01_W119-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.61
L01_W120-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.6
L01_W121-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.6
L01_W122-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.41
L01_W123-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.39
L01_W124-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.59
L01_W125-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.82
L01_W126-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.62
L01_W131-RES	User defined	1	Pattern 1: Constant	45.0027	45.0027	45	45	0.48
				$\Sigma$ 21676.84	21809.84	21676.84	21809.84	0.58

**Additional data: L01\_W118-RES**

Design volume flow rate interzonal [cfm]	380.5807	Standard dataset
Area [ft <sup>2</sup> ]	380.5807	
Clear room height [ft]	8.2021	

Needed only to evaluate the average room air change rate. Not for further calculations

**Data state/results** **Show warnings**

Heating demand: **4.99 kBtu/ft<sup>2</sup>yr**

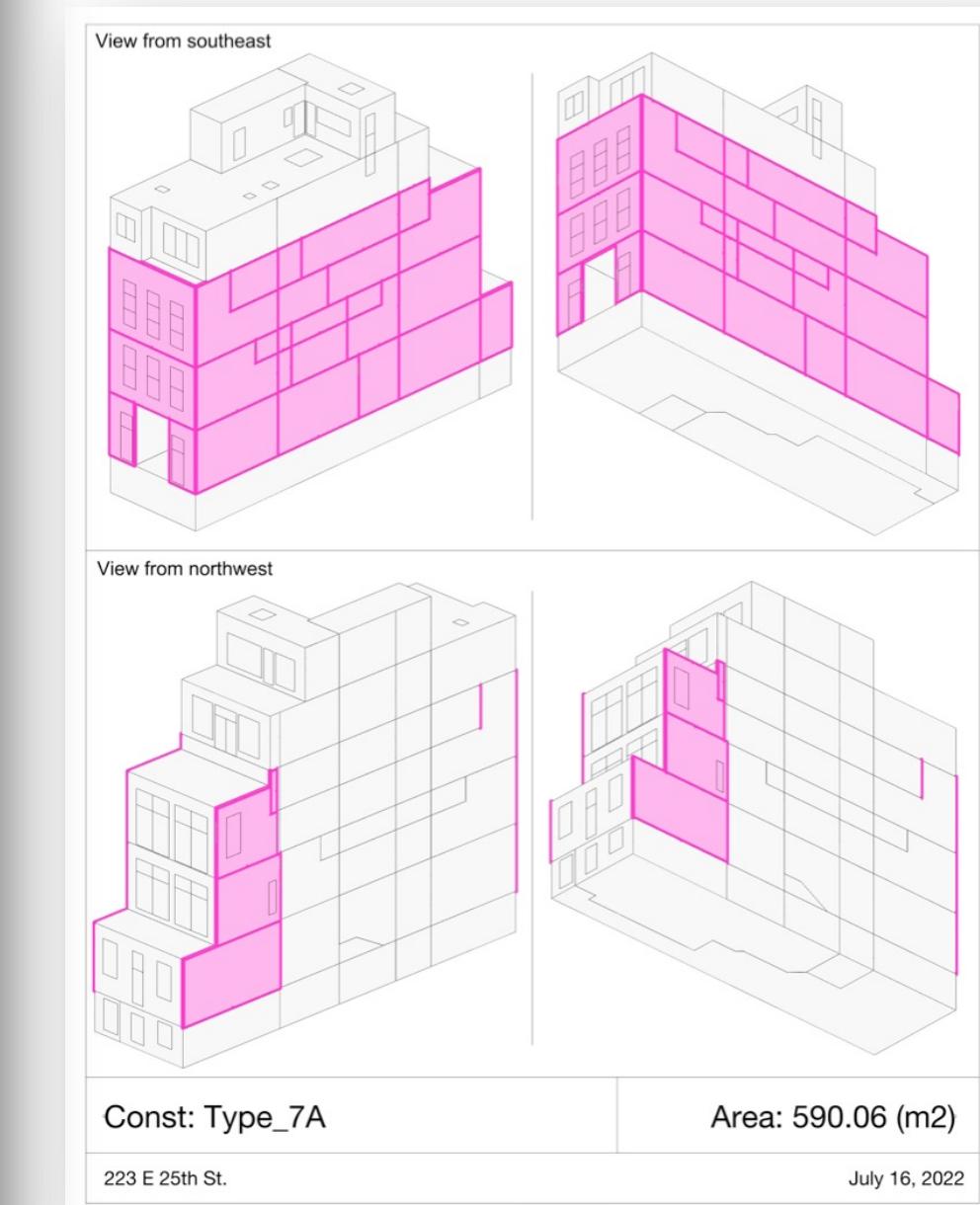
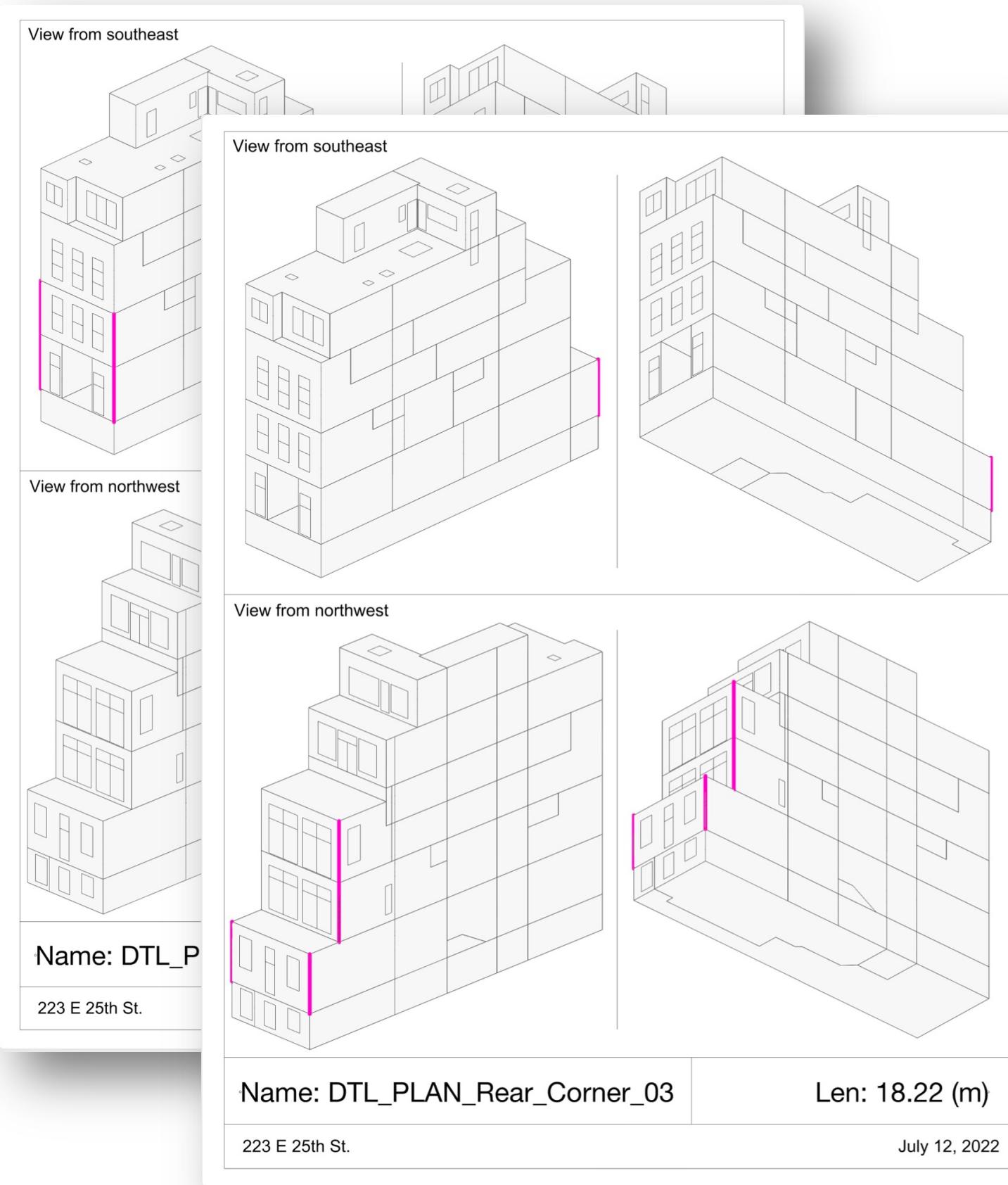
Cooling demand: **8.09 kBtu/ft<sup>2</sup>yr**

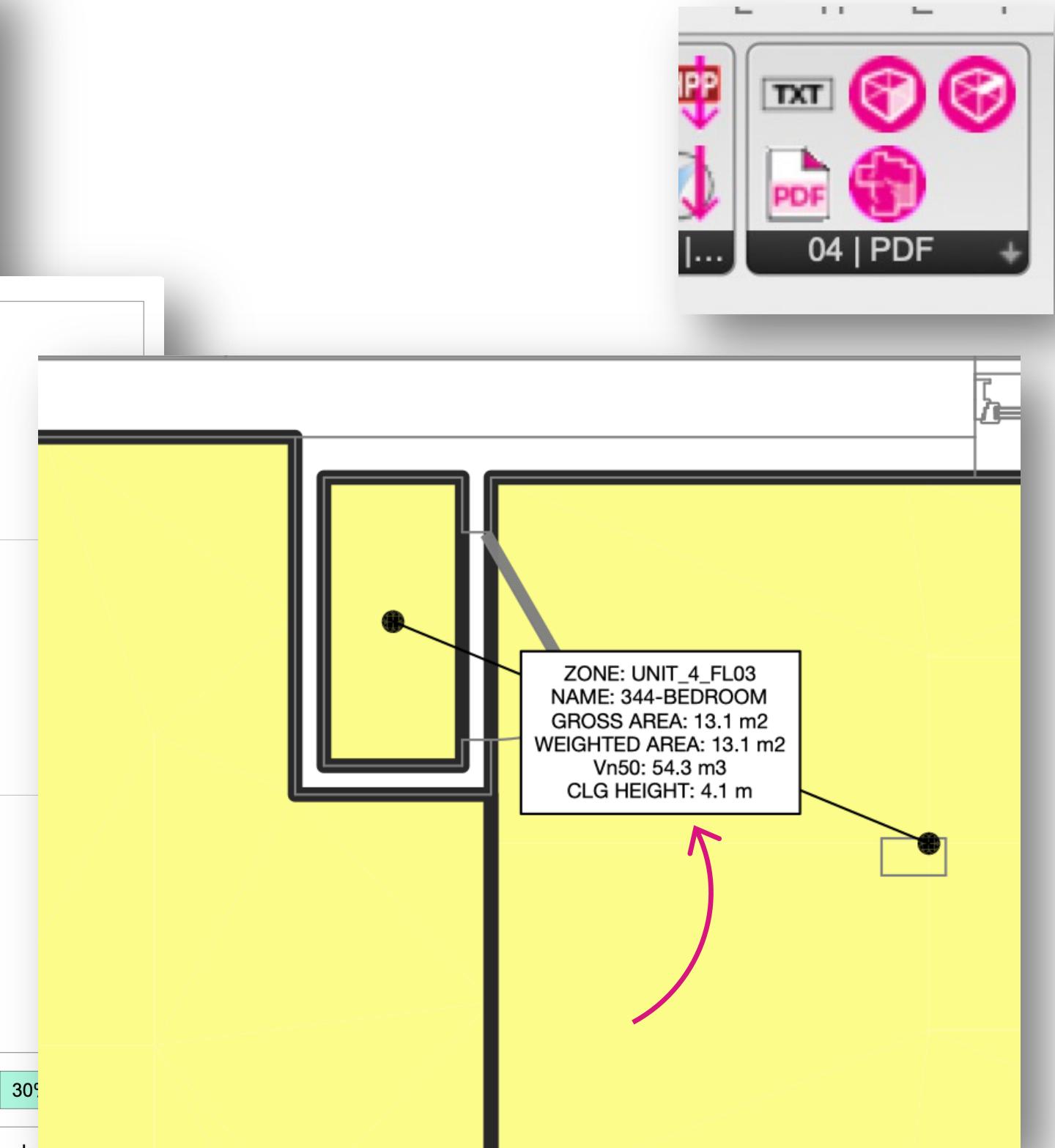
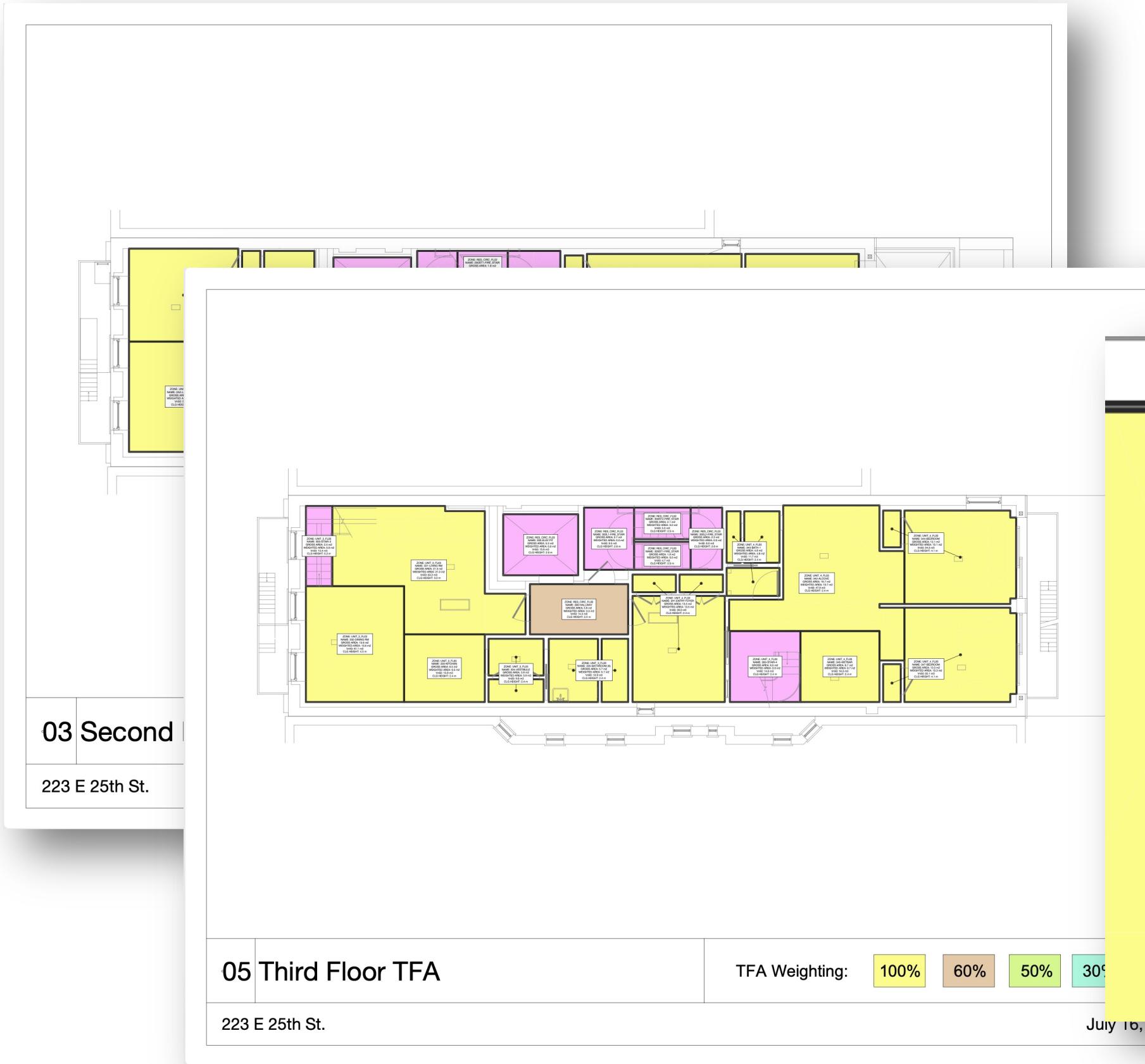
Heating load: **4.2 Btu/hr ft<sup>2</sup>**

Cooling load: **2.58 Btu/hr ft<sup>2</sup>**

Source energy: **3.165 kWh/Person yr**

# HBPH Reporting





\Mac\Home\Dropbox\2284-Ridgeway VI\_Edwin May\0. WUFI-Passive Energy Model\230

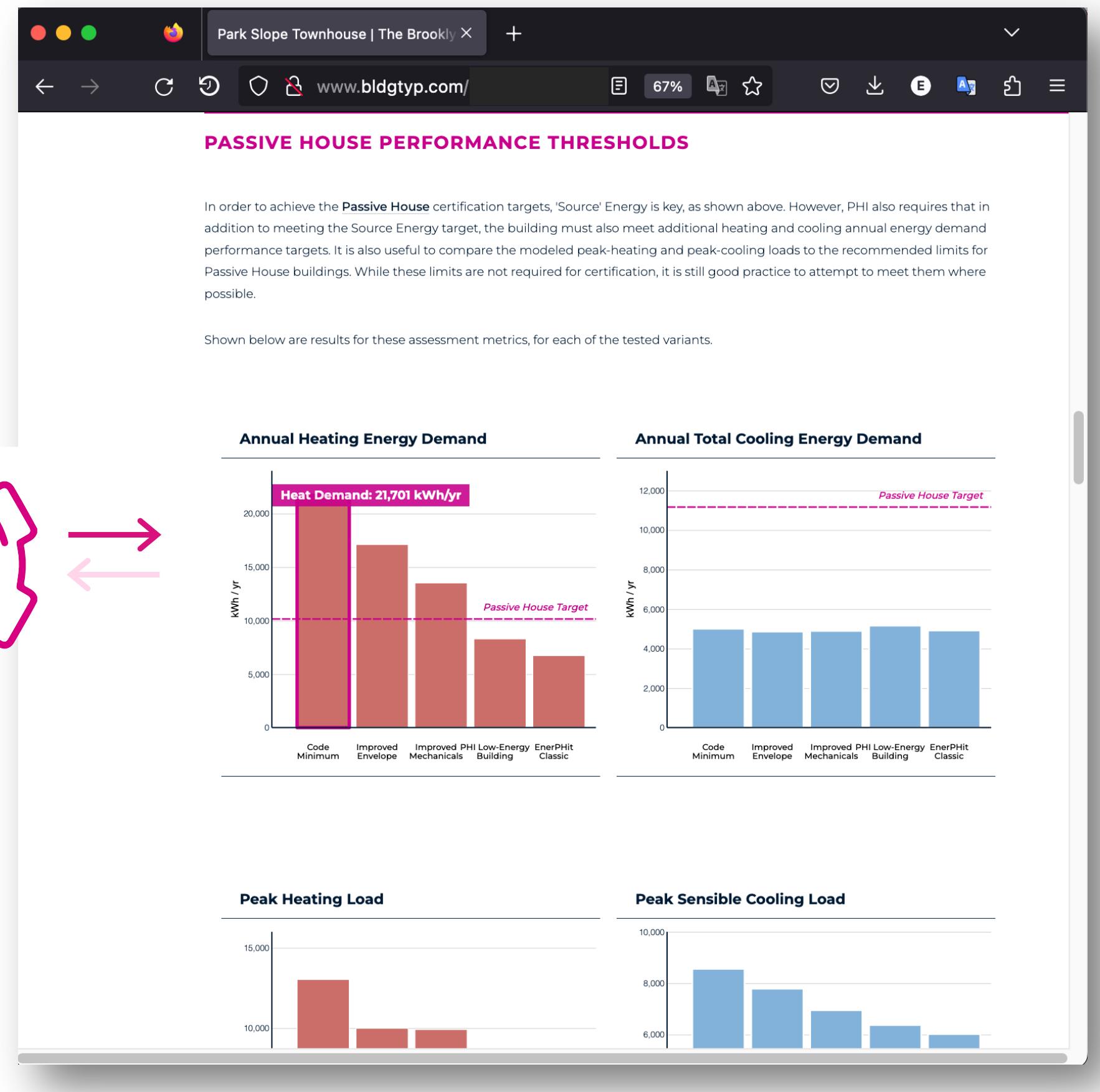
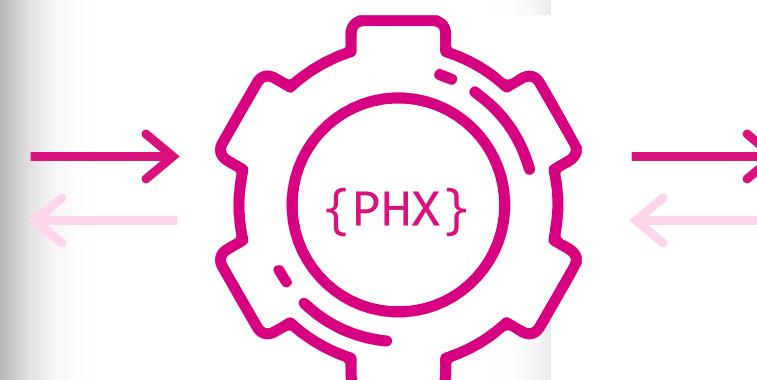
Database Help

**Passive house verification**

**Visualized components**

Nr	Component
1	SF04_Z4_C1_R1
2	SF04_Z4_C1_R2
3	SF04_Z4_C2_R1
4	SF04_Z4_C2_R2
5	SF04_Z4_C3_R1
6	SF04_Z4_C3_R2
7	SF04_Z4_C4_R1
8	SF04_Z4_C4_R2
9	SF04_Z4_C5_R1
10	SF04_Z4_C5_R2
11	SF05_Z4_C1_R1
12	SF05_Z4_C1_R2
13	SF05_Z4_C2_R1
14	SF05_Z4_C2_R2
15	SF05_Z4_C3_R1
16	SF05_Z4_C3_R2
17	SF01_Z4_C1_R1
18	SF01_Z4_C1_R2
19	SF01_Z4_C2_R1
20	SF01_Z4_C2_R2
21	SF01_Z4_C3_R1
22	SF01_Z4_C3_R2
23	SF01_Z4_C4_R1

Data store  
Heating demand



React App

localhost:3000/PH\_View\_React#/ventilation

**Apertures**

- Glazing Types
- Frame Types
- Unit Types

**Equipment**

- Ventilators
- Pumps
- Fans
- Lighting
- Appliances

**REQUIRED DOCUMENTATION:**

- Product DataSheet:** A PDF for the specified product which includes the required performance values.
- Design-Phase Specification:** A product specification included in the drawing-set which is used as the basis-of-design.
- Final Specification:** a product specification for the final as-built (purchased) unit.

**IN DEVELOPMENT: 'PH-VIEW'**

**ERV UNITS:**

<input type="checkbox"/>	ID ↑	Specification	Data Sheet	Manuf.	Model	HR [%]	ER [%]	Link
<input type="checkbox"/>	ERV-1-1	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	EV450	0.706	0	
<input type="checkbox"/>	ERV-1-2	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	HE-1XJINH-S1...	0.757	0	
<input type="checkbox"/>	ERV-1-3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PETRA	WPPH-5	0.824	0	-
<input type="checkbox"/>	ERV-1-4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	RENEWAIRE	EV PREMIU...	0.875	0	
<input type="checkbox"/>	ERV-1-5	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	EV450	0.755	0	

Unit is 'Retired'. Confirm spec.

<input type="checkbox"/>	ID ↑	Specification	Data Sheet	Manuf.	Model	HR [%]	ER [%]	Link
<input type="checkbox"/>	ERV-1-1	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	EV450	0.706	0	
<input type="checkbox"/>	ERV-1-2	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	HE-1XJINH-S1...	0.757	0	
<input type="checkbox"/>	ERV-1-3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	PETRA	WPPH-5	0.824	0	-
<input type="checkbox"/>	ERV-1-4	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	RENEWAIRE	EV PREMIU...	0.875	0	
<input type="checkbox"/>	ERV-1-5	<input type="checkbox"/>	<input type="checkbox"/>	RENEWAIRE	EV450	0.755	0	

The screenshot shows the [PH-Tools.honeybee\\_grasshopper\\_ph](https://ph-tools.github.io/honeybee_grasshopper_ph/) website. The main content area displays the Honeybee-PH interface, which includes a Grasshopper script editor at the top left, a 3D building model in the center, and a detailed energy analysis interface on the right. The right side features a tree view of building components like "Zone 1: Whole\_Building", "Visualized components", and "Not visualized components". A table on the far right lists "Merged\_Component" entries. Below the interface, a large yellow banner reads "Honeybee-PH" and describes the plugin as "The Passive House Plugin for Honeybee: Use the powerful Rhino+Grasshopper platform to streamline and simplify your Passive House energy modeling. Leverage the capabilities of your existing Ladybug/Honeybee workflows to produce Certification-ready Passive House models in a fraction of the time." At the bottom of the banner is a pink button labeled "Download Honeybee-PH Installer File ↓".

PH-Tools.honeybee\_grasshopper\_ph

Install Quick Start Learn More Contact

Honeybee-PH

The Passive House Plugin for Honeybee: Use the powerful Rhino+Grasshopper platform to streamline and simplify your Passive House energy modeling. Leverage the capabilities of your existing Ladybug/Honeybee workflows to produce Certification-ready Passive House models in a fraction of the time.

Download Honeybee-PH Installer File ↓

[github.com/PH-Tools](https://github.com/PH-Tools)

[www.passivehousetools.com](http://www.passivehousetools.com)