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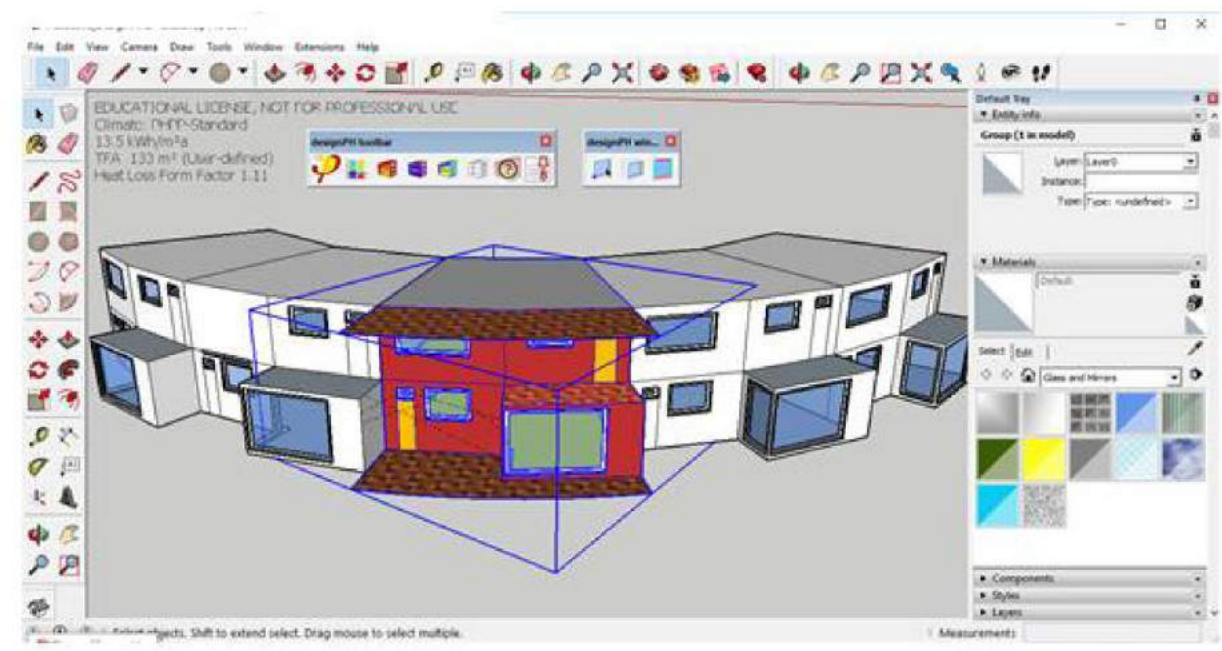
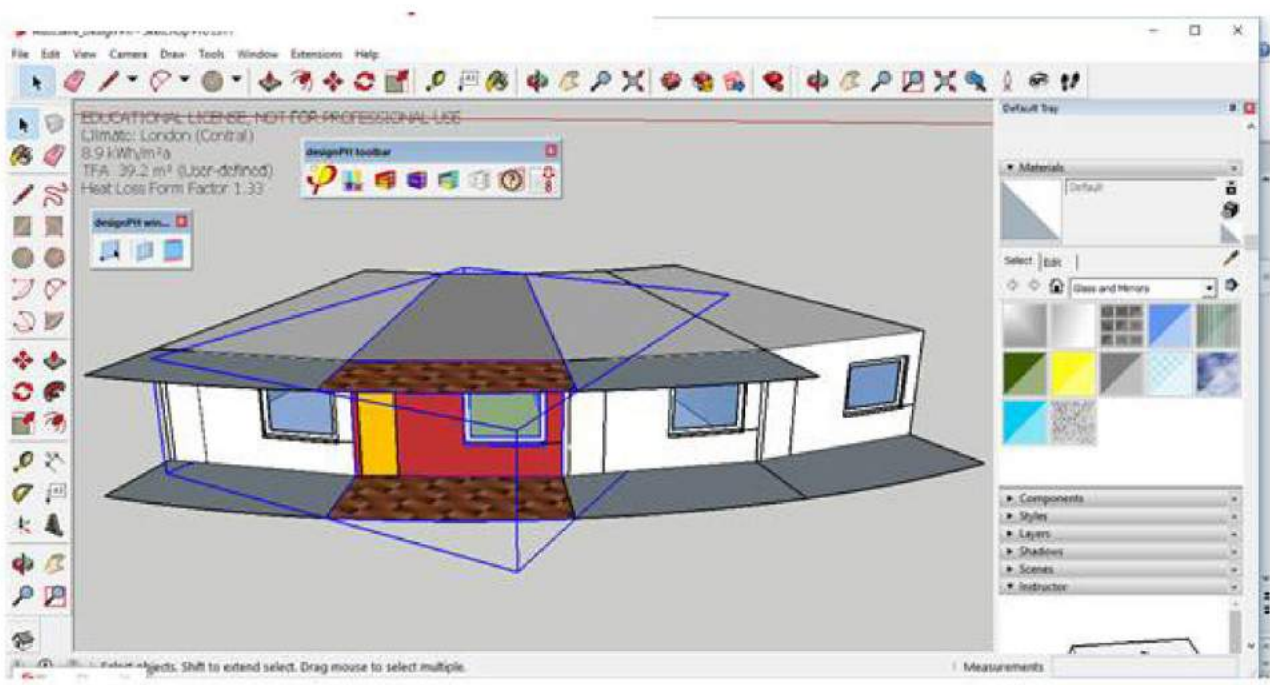
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Time Machine Tower

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Design & development:

- In the first case, the heating demand is 8.9 kWh/m²a. Solar gains should be increased in order to reduce the heating demand. However, it may lead to overheating and we should try to reduce heat loss by reducing the window. As it showed, this case meets the requirement of Passivhaus.
- In the Second case, it meets the requirement of Passivhaus as well. Heating demand as it showed is 11.5 kWh/m²a. The big windows on the southwest and east are carry the rise of overheating: the project has voice-activated dynamic shading and energy façade, so it enables residents to manage solar gain.



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Update window options | Redraw windows

Overview | Heat balance | Areas | U-value editor | Assemblies | Components | Climate

▼ Heat balance

▼ Project overview

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Climate	PHPP-Standard	change
Annual heat demand (Q _a)	9.8 kWh/m ² a	details
Treated Floor Area (TFA)	39.2 m ² (User-defined)	details
Thermal envelope area	32.4 m ²	details
Heat Loss Form Factor	0.83	
Projected building footprint	~ m ²	
Number of windows	1	details
Number of thermal surfaces	12	details
Number of thermal bridges	None defined	details

Thermal envelope checks
The thermal envelope appears to be incomplete!
This may be caused by incorrectly assigned non-thermal surfaces, reversed faces, a hole, glued components, or unintersected faces in the envelope!

Projection along Blue axis: 22.3% variance
Projection along Red axis: 0.1% variance
Projection along Green axis: 0.9% variance

Render mode: Render by Area Group

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Update window options | Redraw windows

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▼ Heat balance

▼ Project overview

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Climate	London (Central)	change
Annual heat demand (Q _a)	11.5 kWh/m ² a	details
Treated Floor Area (TFA)	133 m ² (User-defined)	details
Thermal envelope area	235 m ²	details
Heat Loss Form Factor	1.77	
Projected building footprint	~ m ²	
Number of windows	9	details
Number of thermal surfaces	22	details
Number of thermal bridges	None defined	details

Thermal envelope checks
The thermal envelope appears to be incomplete!
This may be caused by incorrectly assigned non-thermal surfaces, reversed faces, a hole, glued components, or unintersected faces in the envelope!

Projection along Blue axis: 49.4% variance
Projection along Red axis: 71.0% variance
Projection along Green axis: 19.4% variance

Render mode: Render by Area Group

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Select	Area ID	Building element desc.	Assigned to group	Orientation	Total area (m ²)	Window areas (m ²)	Qty. windows	Net area (m ²)	Assem. no.	Assem. desc.	U-value	Transmission heat losses (kWh/a)
1	External Door_778_N	External Door	External Door	N	1.98	0.00	0	1.98	05ud	PH External Door	0.50	81.18
2	Wall_317755_S	External Wall - Ambient	E	1.98	0.00	0	1.98	05ud	PH External wall	0.15	24.35	
3	Wall_649992_E	External Wall - Ambient	E	0.02	0.00	0	0.02	05ud	PH External wall	0.15	0.27	
4	Wall_900_N	External Wall - Ground	N	15.44	2.96	1	12.48	06ud	PH Basement wall	0.25	153.51	
5	Floor_915_D	Floor slab / Basement ceiling	D	12.96	0.00	0	12.96	05ud	PH Floor	0.25	159.38	
6	Floor_317776_D	Floor slab / Basement ceiling	D	0.00	0.00	0	0.00	05ud	PH Floor	0.25	0.04	
7	Floor_317787_D	Floor slab / Basement ceiling	D	0.01	0.00	0	0.01	05ud	PH Floor	0.25	0.07	
8	Wall_681_E	Partition Wall to Neighbour	E	33.47	0.00	0	33.47	07ud	Partition wall to neighbour	0.25		
9	Floor_915_D	Partition Wall to Neighbour	D	45.08	0.00	0	45.08	07ud	Partition wall to neighbour	0.25		
10	Wall_937_E	Partition Wall to Neighbour	E	0.91	0.00	0	0.91	07ud	Partition wall to neighbour	0.25		
show more... (2 rows hidden)												
					198.44	2.96	1.00	195.48				418.00

▼ Windows

Select	Win ID	Window name	Assigned to group	Width	Height	Installed in	Glazing type ID	Glazing type	Frame type ID	Frame type	g-value	Window area (S/O)(m ²)	U-value installed	Transmission heat losses (kWh/a)	Solar heat gains (kWh/a)	
1	Win_946_N	North Windows	North Windows	2.00	1.48	Wall_900_N	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	2.96	0.96	139.49	105.57	
														2.96	139.49	105.57

▼ Shading

Select	Win ID	Window name	Assigned to group	Width	Height	Installed in	Horiz. obj. height	Horiz. obj. dist.	Reveal depth (av.)	Reveal dist. (av.)	Overhang depth	Overhang height	Horizontal shading reduction factor	Reveal shading reduction factor	Overhang shading reduction factor	Total shading reduction factor (winter)
1	Win_946_N	North Windows	North Windows	2.00	1.48	Wall_900_N	0.12	0.14	0.12	0.16	1	0.96	0.95	0.95	0.95	0.91

▼ Thermal bridges (export only)

No thermal bridges found in the model - run analysis to update the results.

▼ Non-thermal surfaces

Select	Area ID	Building element desc.	Group no.	Assigned to group	TempZone name	Shape	Dim. A	Dim. B	Area check	Total area (m ²)	Dev. north	Inc. horiz.	Orientation
1	Surface_649963_E	Un-assigned		Un-assigned	Internal	rectangle	0.90	0.01	0.01	0.01	90	0	H
2	Surface_317797_W	Un-assigned		Un-assigned	Internal	rectangle	2.20	0.01	0.02	0.02	241.19	90.00	W
										0.03			

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▼ Windows

Select	Win ID	Window name	Assigned to group	Width	Height	Installed in	Glazing type ID	Glazing type	Frame type ID	Frame type	g-value	Window area (S/O)(m ²)	U-value installed	Transmission heat losses (kWh/a)	Solar heat gains (kWh/a)
1	Win_1312087_N	North Windows	North Windows	2.03	1.55	Wall_1312439_N	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	3.15	0.95	164.45	39.07
2	Win_1312087_N	North Windows	North Windows	3.44	2.62	Wall_1312068_N	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	9.00	0.89	278.94	297.25
3	Win_1312082_N	North Windows	North Windows	2.92	1.86	Wall_1312719_N	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	5.45	0.92	174.62	68.56
4	Win_1312092_N	North Windows	North Windows	1.84	1.64	Wall_1312748_N	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	3.02	0.95	100.34	45.61
5	Win_1312902_E	East Windows	Un-assigned	1.55	2.62		01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	4.07	0.94		
6	Win_1312917_S	South Windows	South Windows	2.13	1.29	Wall_1312845_S	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	2.74	0.97	92.19	165.23
7	Win_1312912_S	South Windows	South Windows	2.29	1.38	Wall_1312568_S	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	3.15	0.96	164.81	149.27
8	Win_1312877_S	South Windows	South Windows	1.03	1.45	Wall_1312845_S	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	2.70	0.96	90.66	161.03
9	Win_1312907_S	South Windows	South Windows	2.30	1.33	Wall_1312568_S	01ud	PH glazing	01ud	PH-FRAMES: average thermal quality	0.50	3.05	0.96	101.95	123.30
												36.33	1048.95	1010.40	

▼ Shading

Select	Win ID	Window name	Assigned to group	Width	Height	Installed in	Horiz. obj. height	Horiz. obj. dist.	Reveal depth (av.)	Reveal dist. (av.)	Overhang depth	Overhang height	Horizontal shading reduction factor	Reveal shading reduction factor	Overhang shading reduction factor	Total shading reduction factor (winter)
1	Win_1312867_N	North Windows	North Windows	2.03	1.55	Wall_1312439_N	0.12	0.14	0.12	0.14	3.69	0.49	1	0.95	0.44	0.42
2	Win_1312867_N	North Windows	North Windows	3.44	2.62	Wall_1312668_N	0.12	0.14	0.14	1.78	3.32	1	0.97	0.89	0.89	0.87
3	Win_1312862_N	North Windows	North Windows	2.92	1.86	Wall_1312719_N	0.12	0.14	0.14	4.85	0.55	1	0.97	0.44	0.43	
4	Win_1312882_N	North Windows	North Windows	1.84	1.64	Wall_1312748_N	2.24	1.07	4.54	3.41	1	0.77	0.77	0.74		
5	Win_1312902_E	Un-assigned	Un-assigned	1.55	2.62		2.95	5.32	50.06	0.64	5.31	3.31			1	
6	Win_1312917_S	South Windows	South Windows	2.13	1.29	Wall_1312845_S	2.51	0.83	4.16	3.87	1	0.93	0.93	0.85	0.79	
7	Win_1312912_S	South Windows	South Windows	2.29	1.38	Wall_1312568_S	2.51	0.85	4.18	0.79	1	0.93	0.93	0.61	0.57	
8	Win_1312877_S	South Windows	South Windows	1.03	1.45	Wall_1312845_S	2.51	0.48	4.00	3.80	1	0.93	0.93	0.83	0.77	
9	Win_1312907_S	South Windows	South Windows	2.30	1.33	Wall_1312568_S	2.51	0.24	4.76	0.75	1	0.93	0.93	0.56	0.52	

▼ Thermal bridges (export only)

No thermal bridges found in the model - run analysis to update the results.