WEEK 6 YANG DICHENG

2019年11月12日 星期二　　下午9:12

Question 1

Considering the same example you solved in the previous assignment (radiative heat transfer between two paralle plates), how many shields with epsilon=0.1 should you add in order to have the new heat transfer rate to be 1% of the case without shields?

$$q_{net1-2} = \frac{\dot{Q}_{net1-2}}{a} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1} \div A = 5.67 * 10^{-8} * \frac{800^4 - 500^4}{\frac{1}{0.2} + \frac{1}{0.7} - 1}$$

$$= 3625.41\ W\ /m^2$$

The new heat transfer rate is 1% of q_{net1-2}

$$\dot{q}'_{net1-2} = \dot{q}'_{net1-2,shields} = \frac{1}{100} * \dot{q}_{net1-2}$$

$$= \frac{\sigma(T_2^4 - T_1^4)}{\left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right) + N * \left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right)} = \frac{1}{100} * \frac{\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}$$

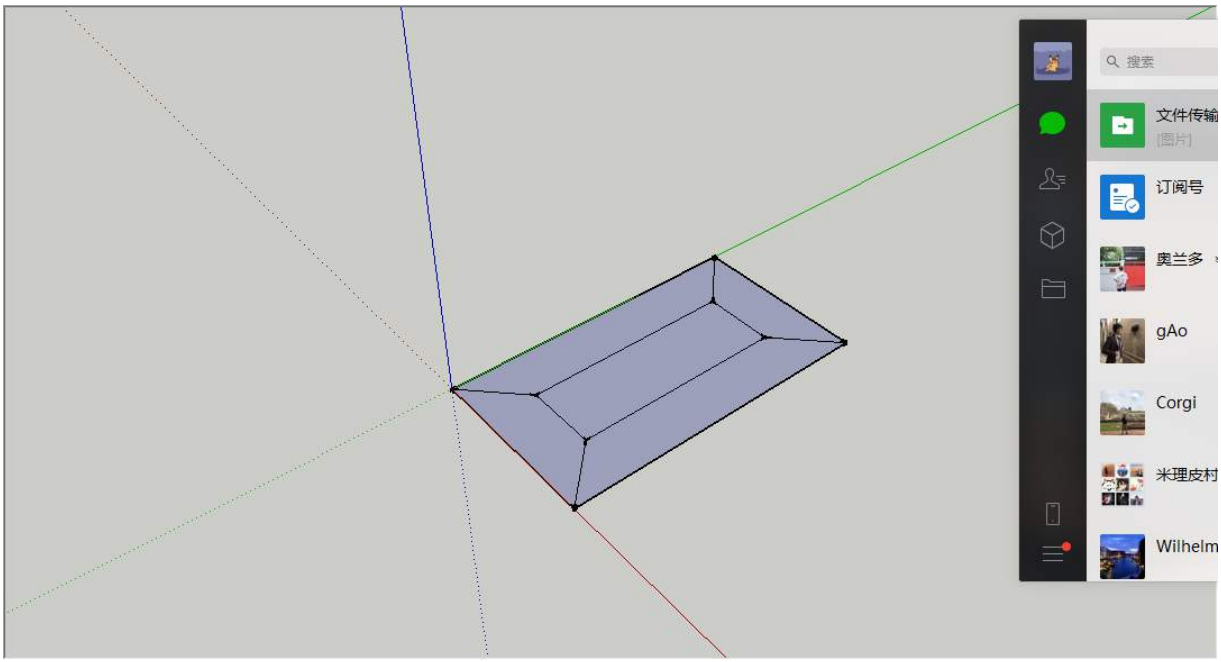
$$\rightarrow 99 * \left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right) = N * \left(\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1\right)$$

$$\rightarrow N = 28$$

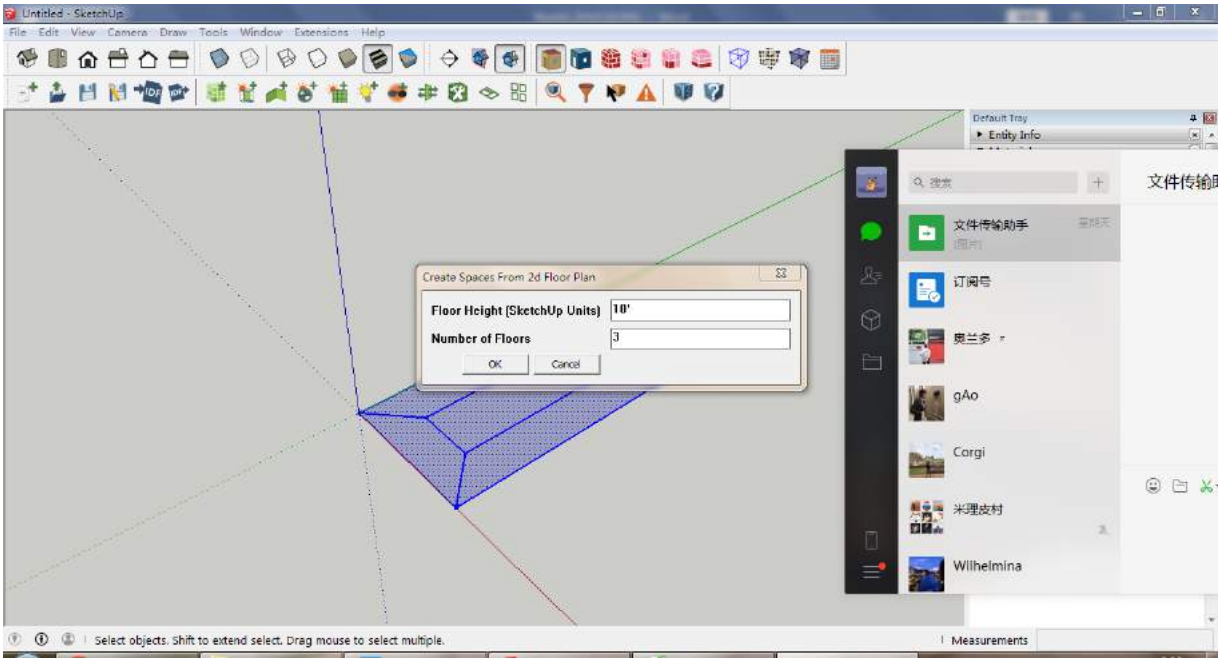
Task 2

You should create a pdf file with screenshots of all of the steps we went through and explain briefly the reason behind the use of each step.

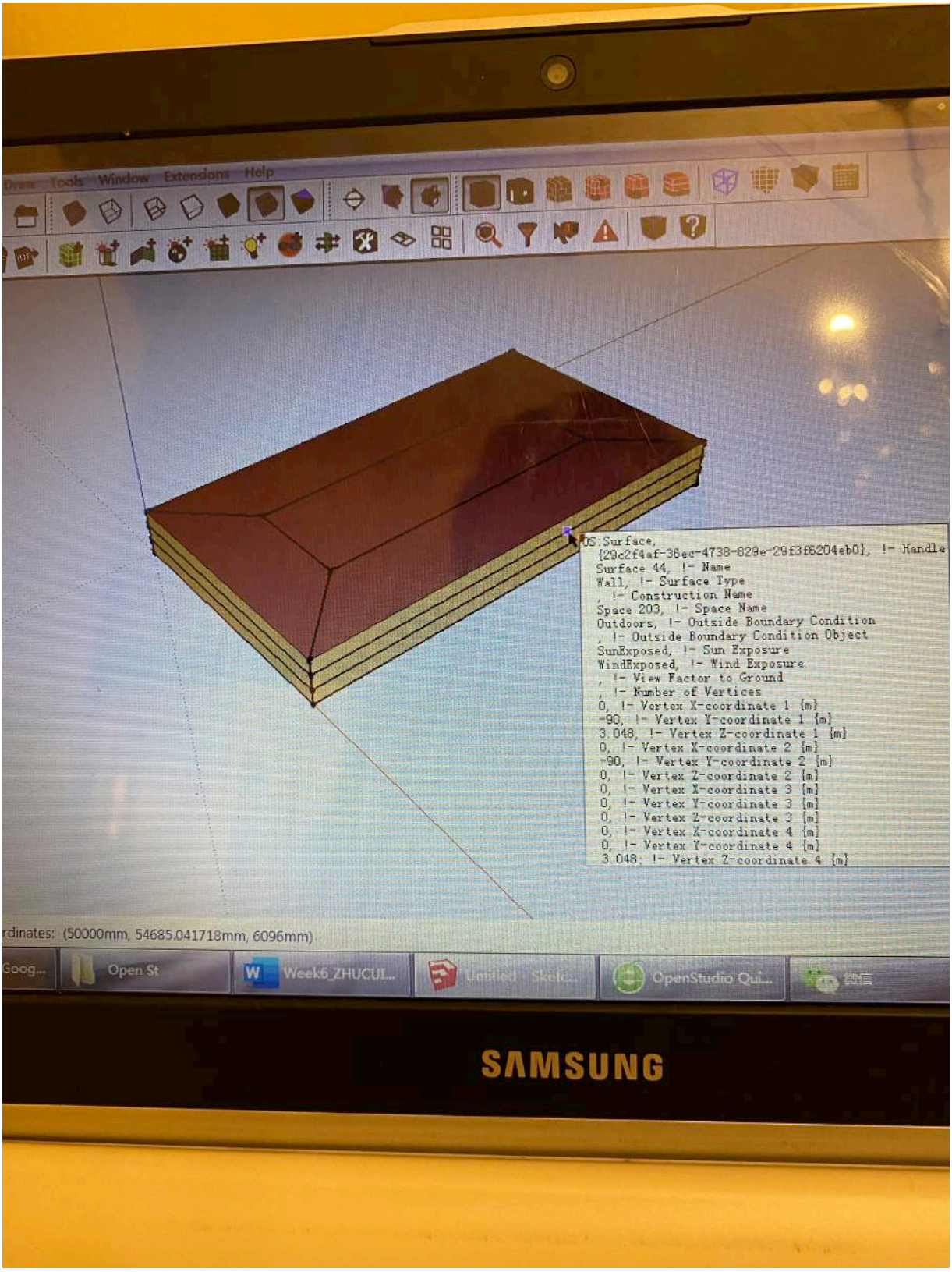
1. Draw the outline and shape of the building in Sketchup.



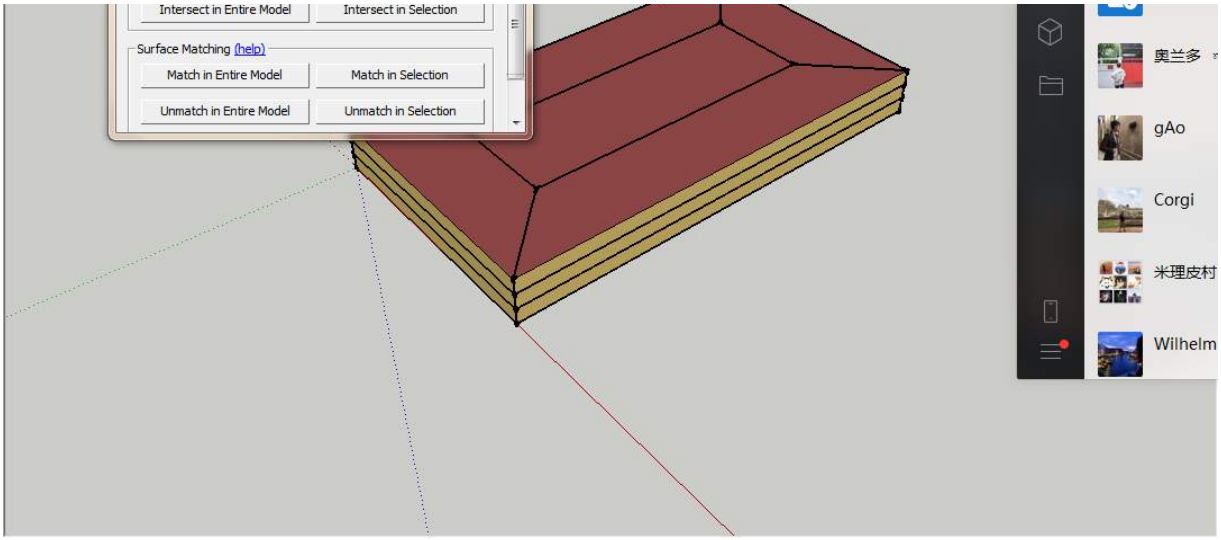
2. Use “Creat spaces from diagram”creat a 3 floor building.



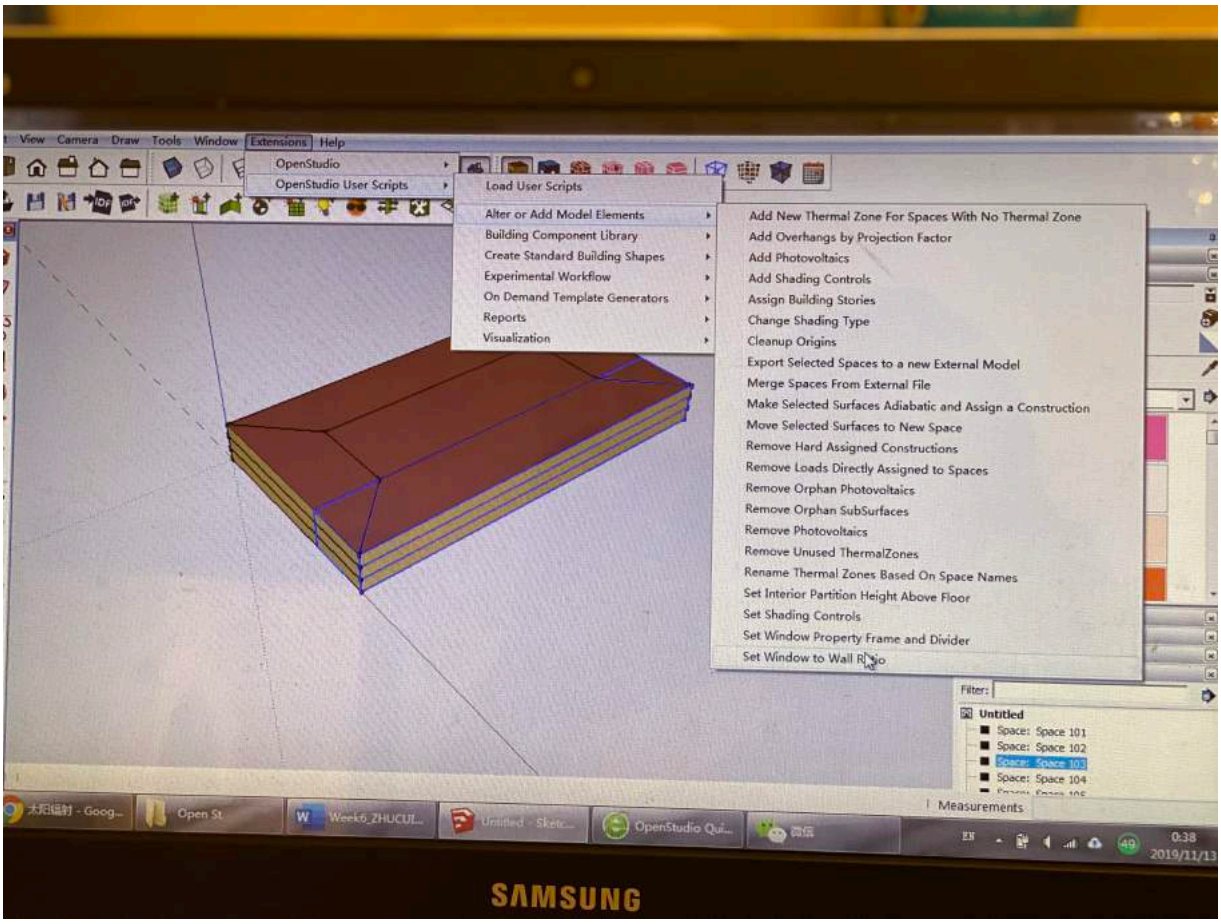
3. We can see the material information using the "Info tool".



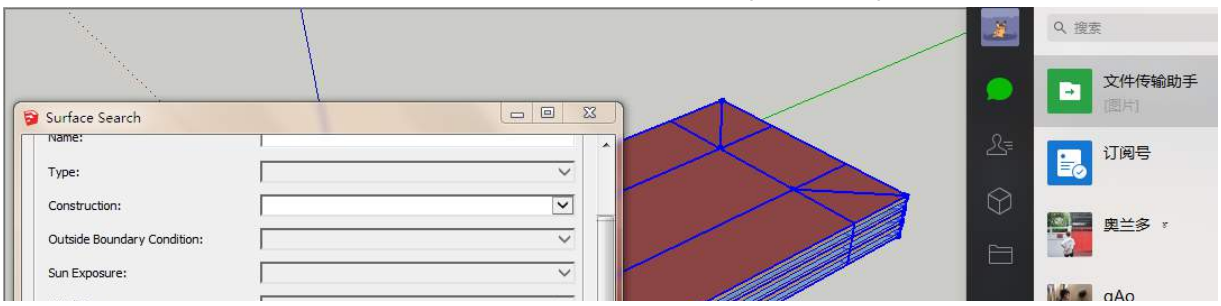
4. Click"Surface matching".

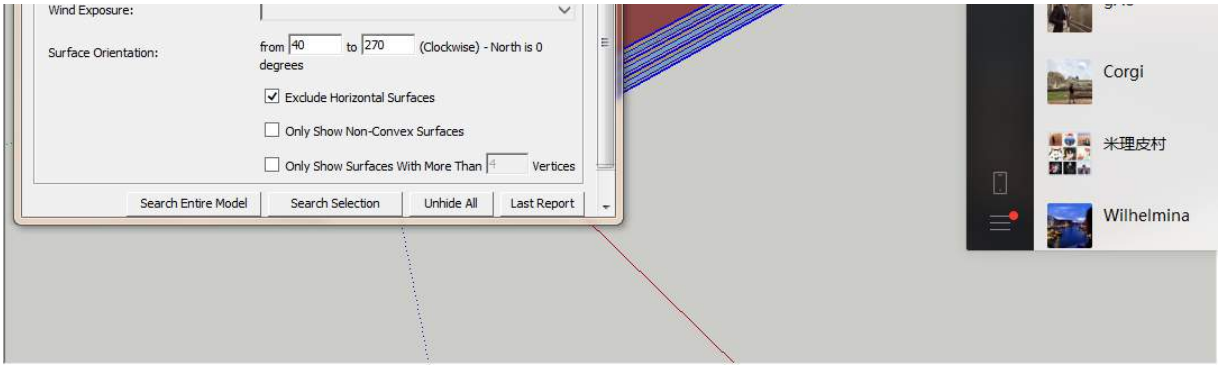


5. Click”Set Window to Wall Ratio”to built the windows.

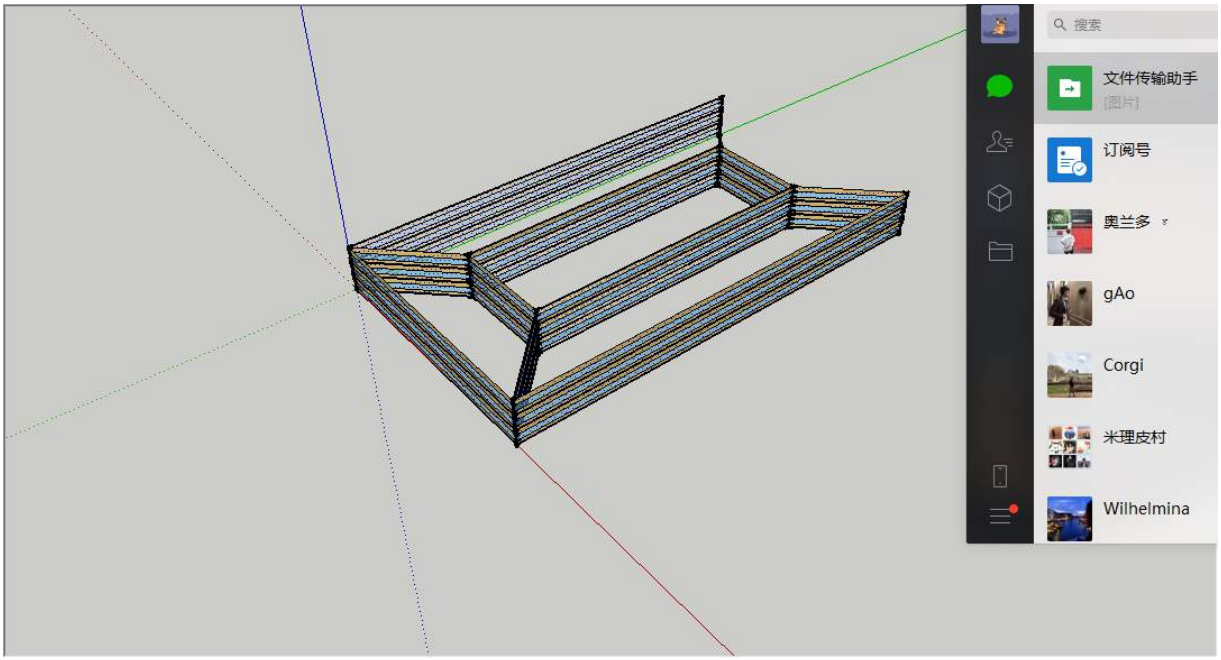


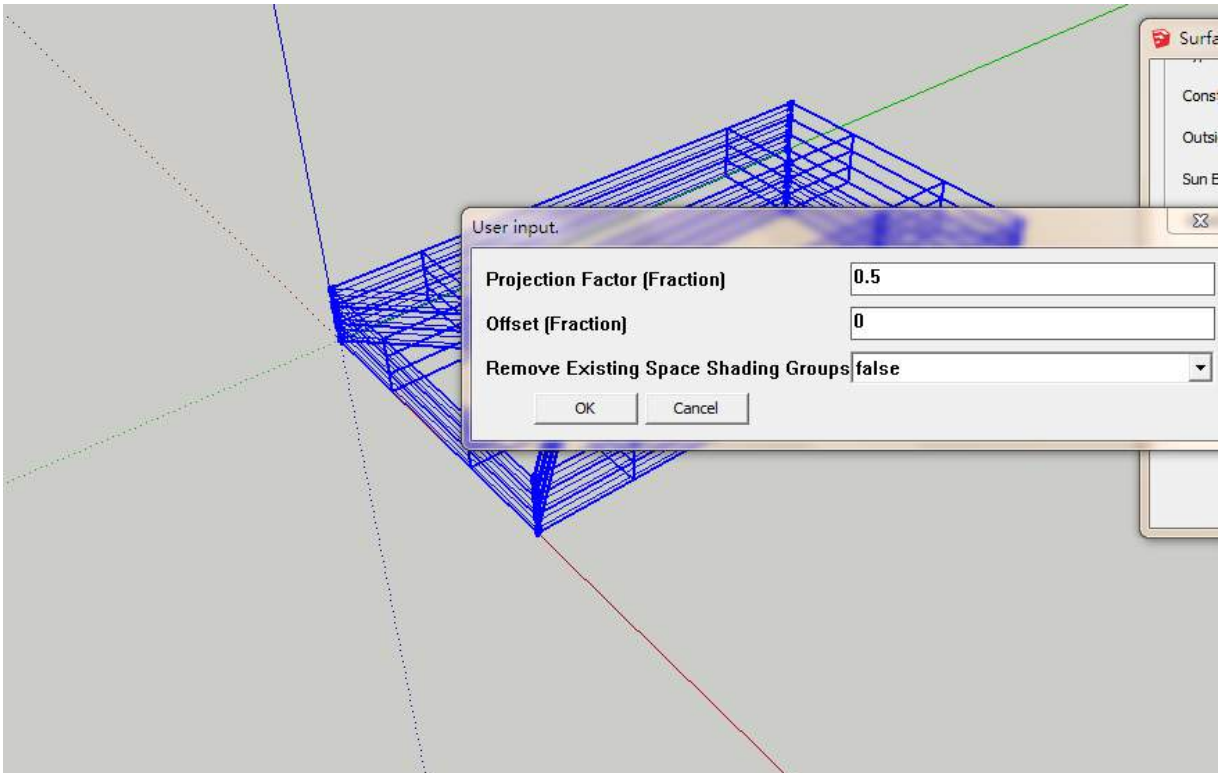
6. Check other directions besides the north. (40-270)

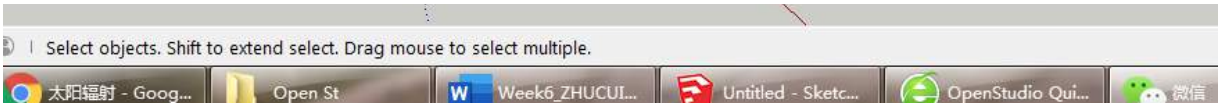




7. Click”Add Overhanges by Projection Factor”to built overhangs.

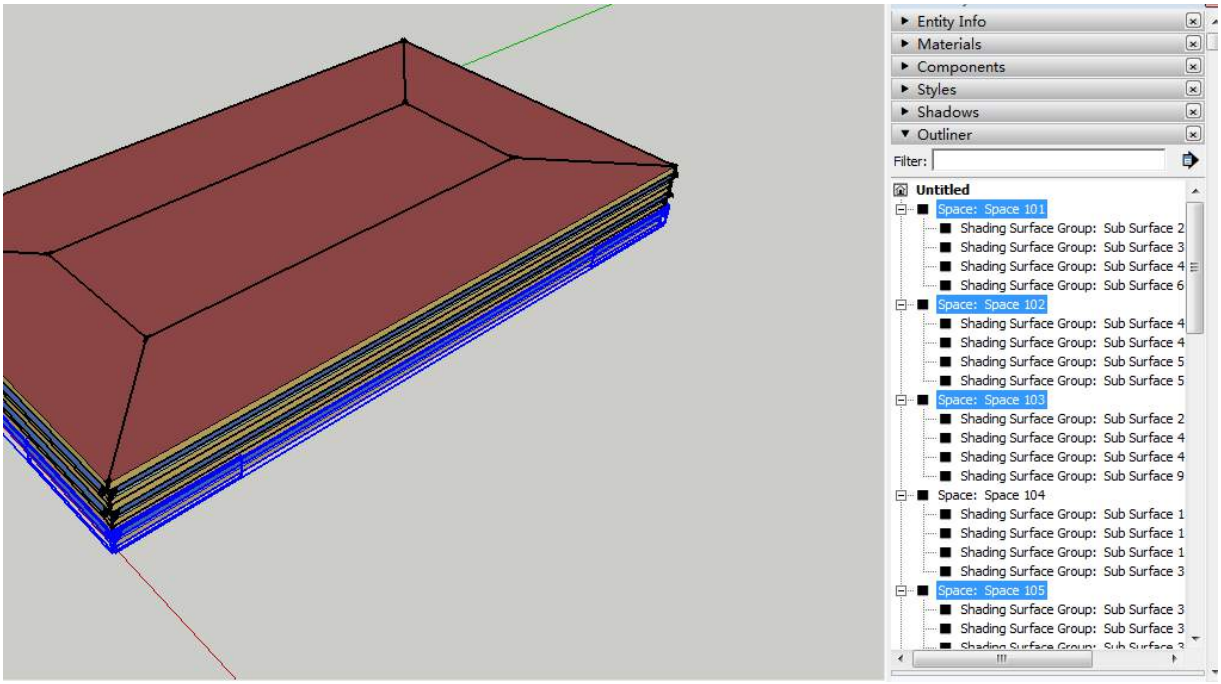




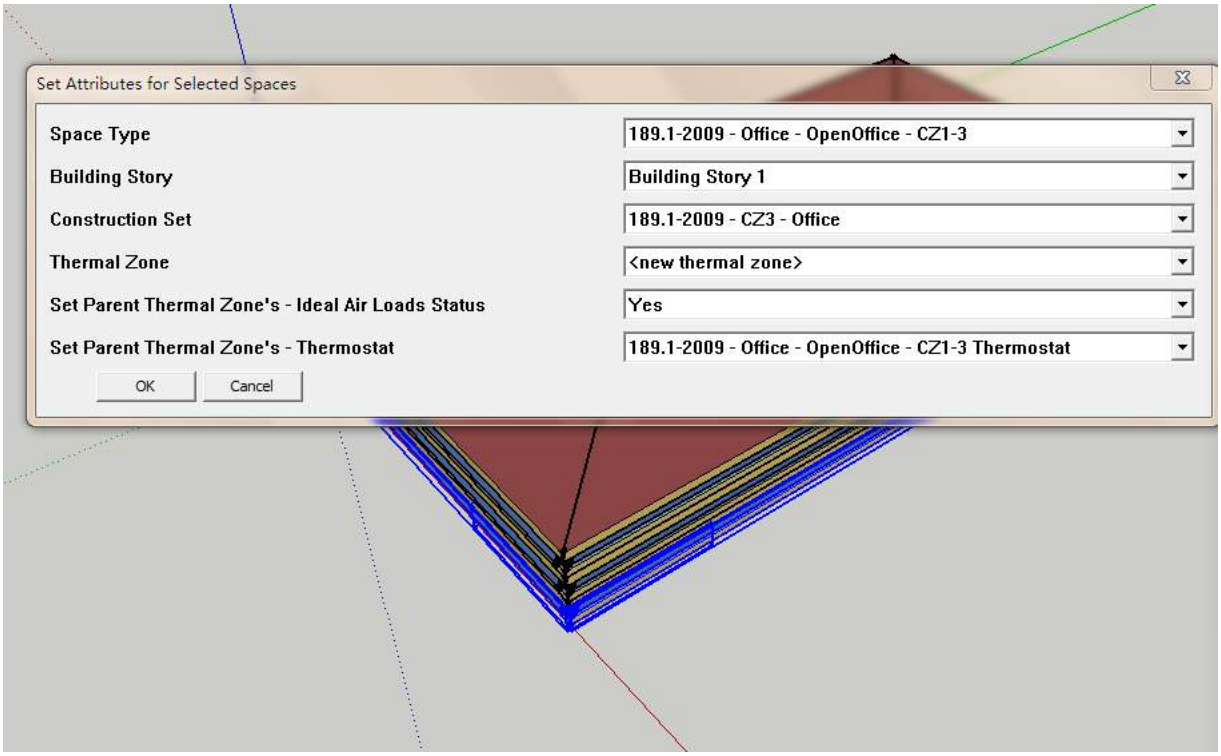


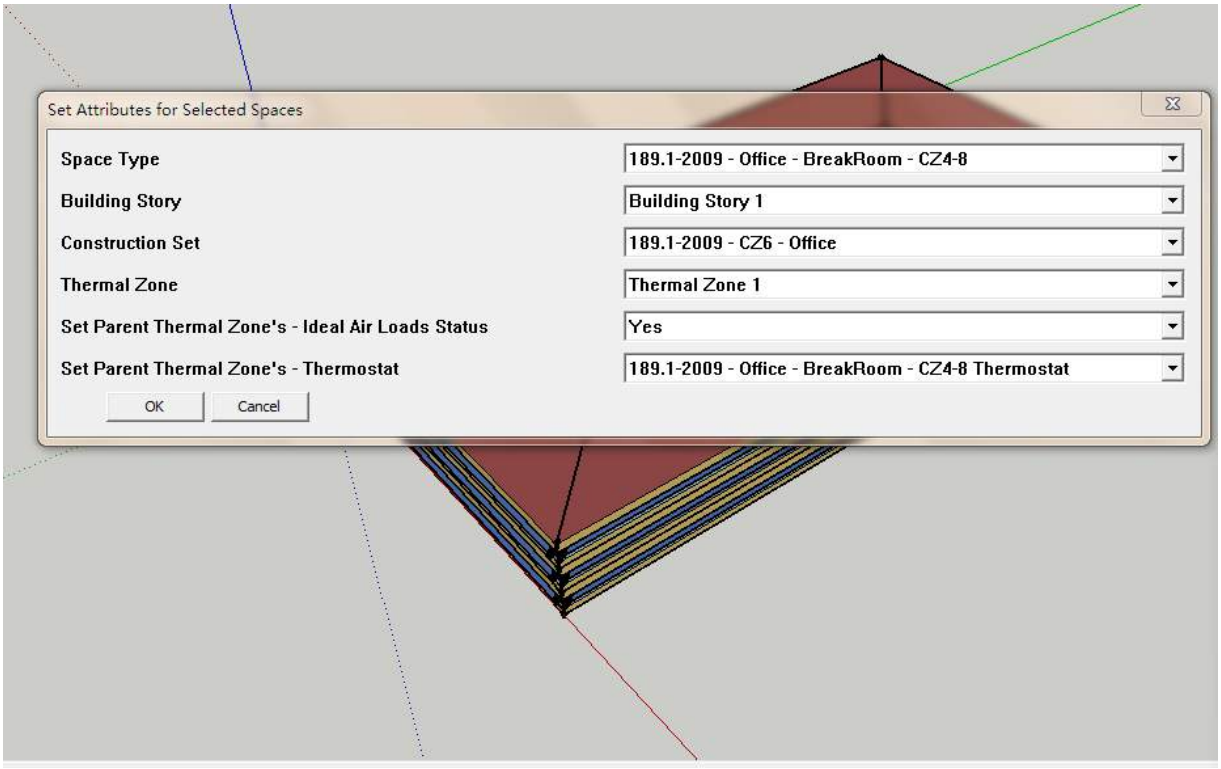
8. Open the"Outliner"

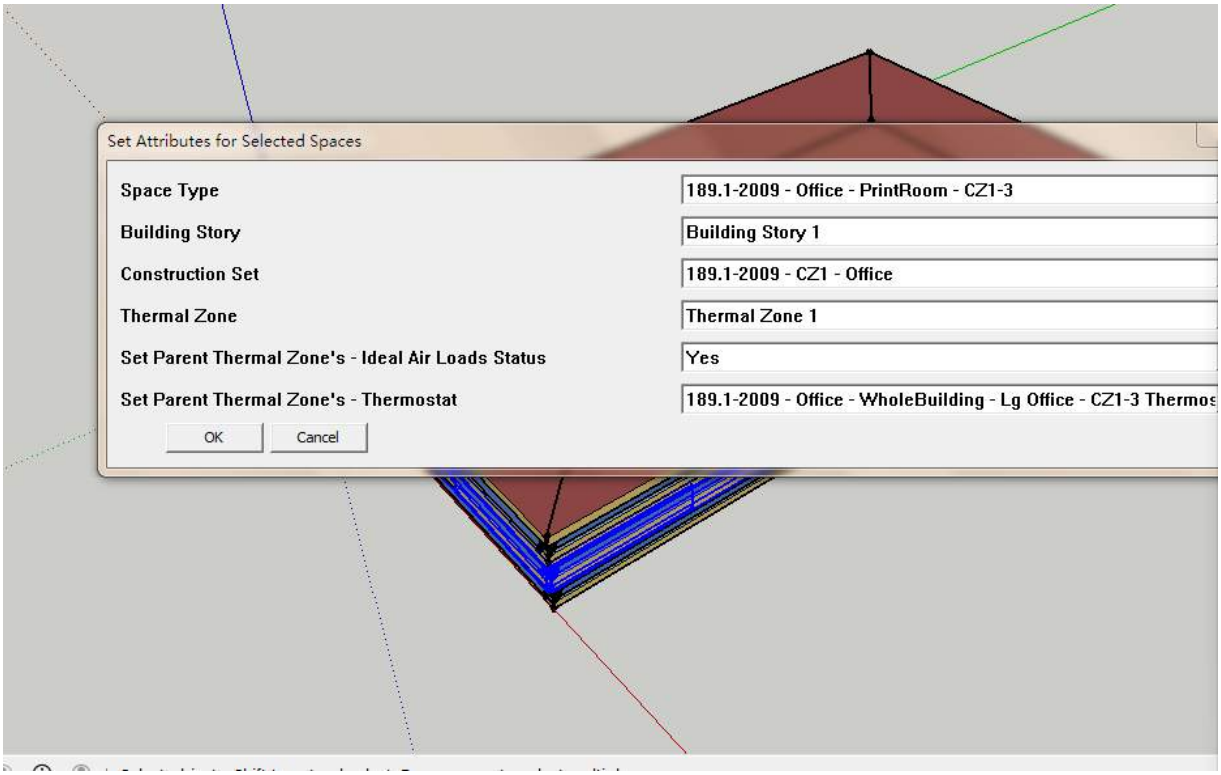
9. Choose the space of each thermal zone.



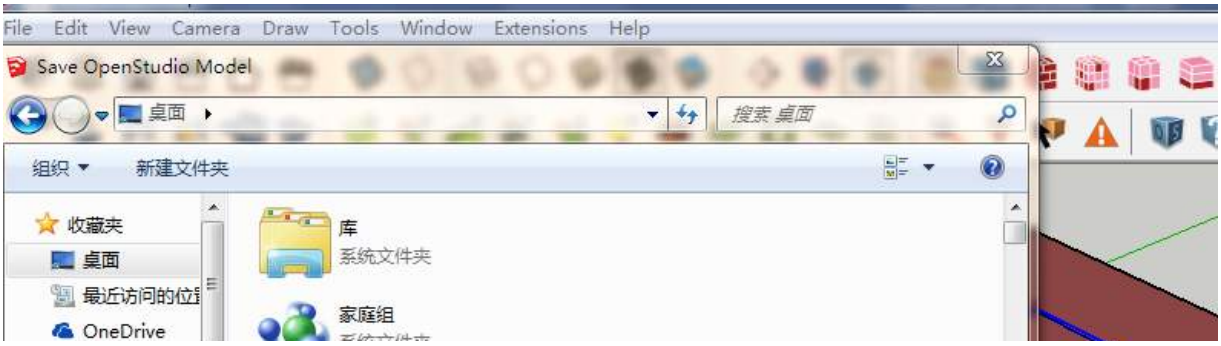
10. Click "Set Attributes for Selected Space"to set parameters.

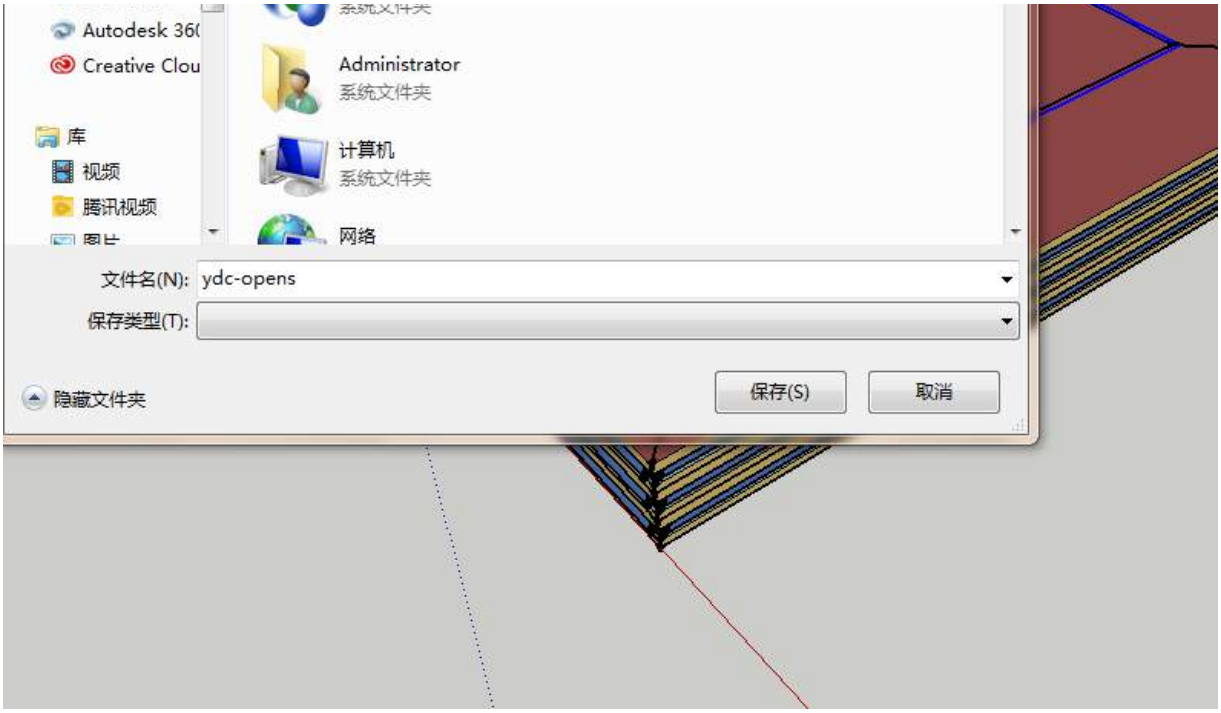




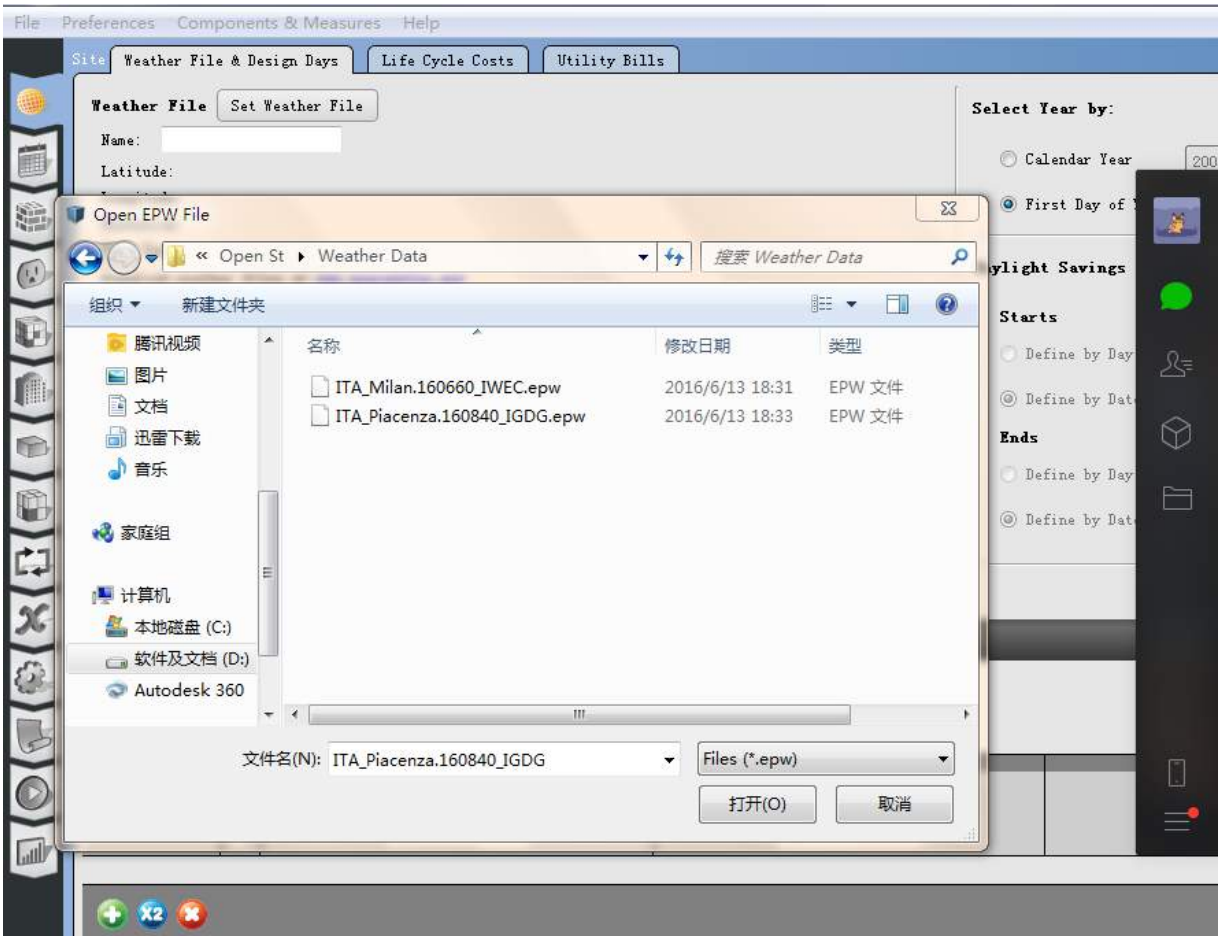


11. Save the model.

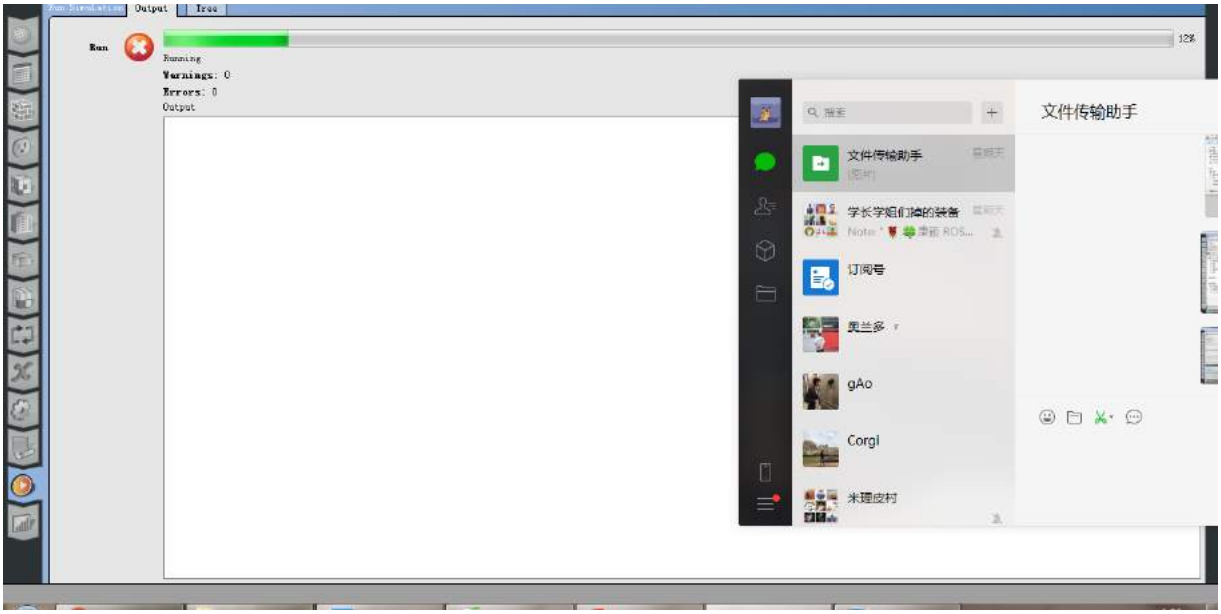




12. Run the Open studio.
13. Add the weather data.



14. Run the analysis.



15. Show the result.

Results Summary

Reports: EnergyPlus Results

Tabular Output Report in Format: HTML

Building: **Building 1**

Environment: **RUN PERIOD 1 ** Piacenza - ITA IGDG WMO#=160840**

Simulation Timestamp: **2019-11-13 00:59:27**

Report: **Annual Building Utility Performance Summary**

For: **Entire Facility**

Timestamp: **2019-11-13 00:59:27**

Values gathered over 8760.00 hours

Site and Source Energy

	Total Energy [GJ]	Energy Per Total Building Area [MJ/m2]	Energy Per Conditioned Building Area [MJ/m2]
Total Site Energy	6432.24	495.74	495.74
Net Site Energy	6432.24	495.74	495.74
Total Source Energy	19100.48	1472.10	1472.10
Net Source Energy	19100.48	1472.10	1472.10

Results Summary

Reports: EnergyPlus Results

Site to Source Energy Conversion Factors

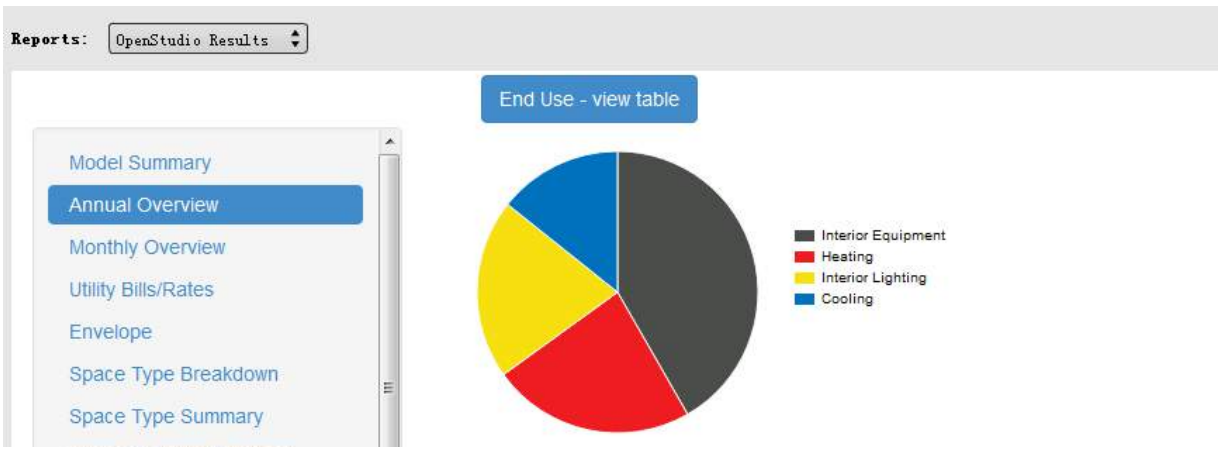
	Site=>Source Conversion Factor
Electricity	3.167
Natural Gas	1.084
District Cooling	1.056
District Heating	3.613
Steam	0.300
Gasoline	1.050
Diesel	1.050
Coal	1.050
Fuel Oil #1	1.050
Fuel Oil #2	1.050
Propane	1.050
Other Fuel 1	1.000
Other Fuel 2	1.000

Building Area

	Area [m2]
Total Building Area	12975.00
Net Conditioned Building Area	12975.00
Unconditioned Building Area	0.00

End Uses

	Electricity [GJ]	Natural Gas [GJ]	Additional Fuel [GJ]	District Cooling [GJ]	District Heating [GJ]	Water [m3]
Heating	0.00	0.00	0.00	0.00	1502.75	0.00
Cooling	0.00	0.00	0.00	919.40	0.00	0.00
Interior Lighting	1328.66	0.00	0.00	0.00	0.00	0.00
Exterior Lighting	0.00	0.00	0.00	0.00	0.00	0.00
Interior Equipment	2681.43	0.00	0.00	0.00	0.00	0.00
Exterior Equipment	0.00	0.00	0.00	0.00	0.00	0.00
Fans	0.00	0.00	0.00	0.00	0.00	0.00
Pumps	0.00	0.00	0.00	0.00	0.00	0.00



Energy Use - view table