Week 6

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Task 1 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?

$$Q_{12,noshield} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon 1} + \frac{1}{\varepsilon 2} - 1}$$

$$Q_{12,N\ shield} = \frac{A\sigma(T_1^4 - T_2^4)}{(N+1)(\frac{1}{\varepsilon 1} + \frac{1}{\varepsilon 2} - 1)} = \frac{1}{N+1} Q_{12,noshield}$$

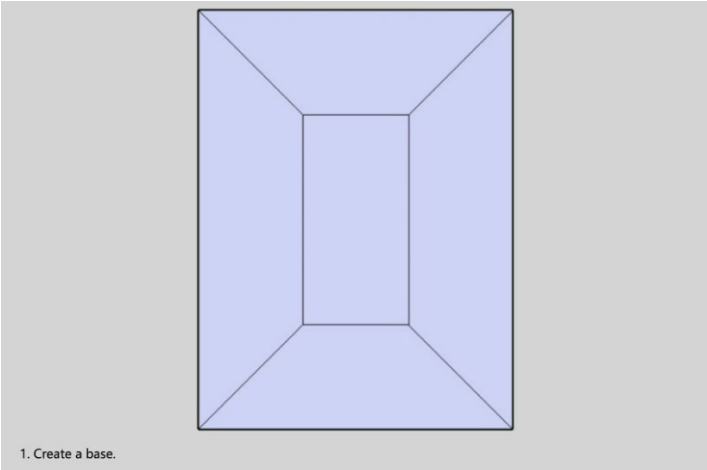
So if want heat transfer rate to be 1% of the case without shields

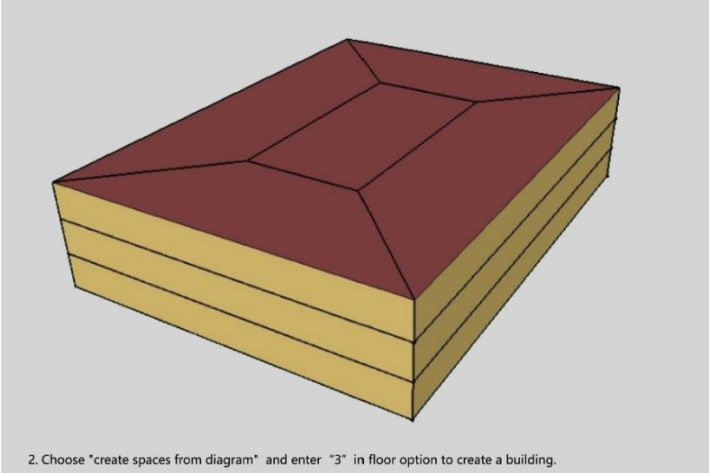
Then we have $\frac{1}{N+1} = 1\%$

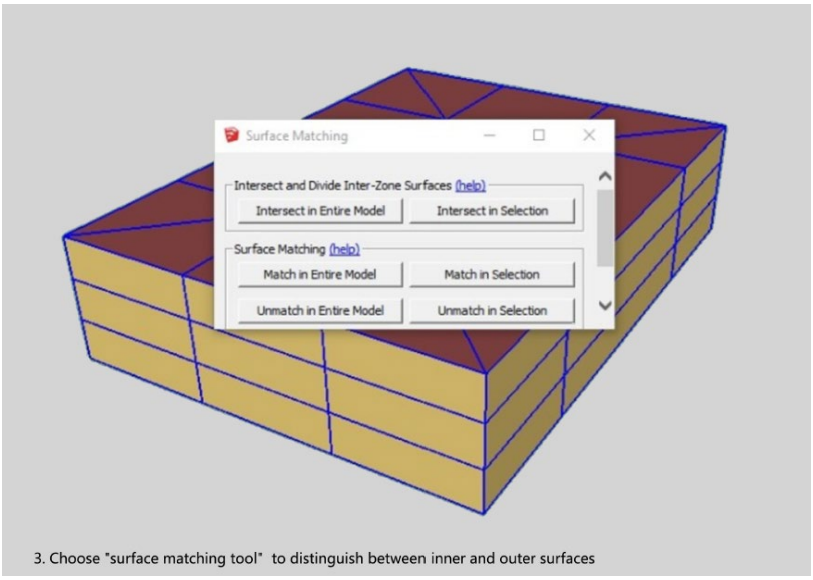
So N=99

We should add 99 shields

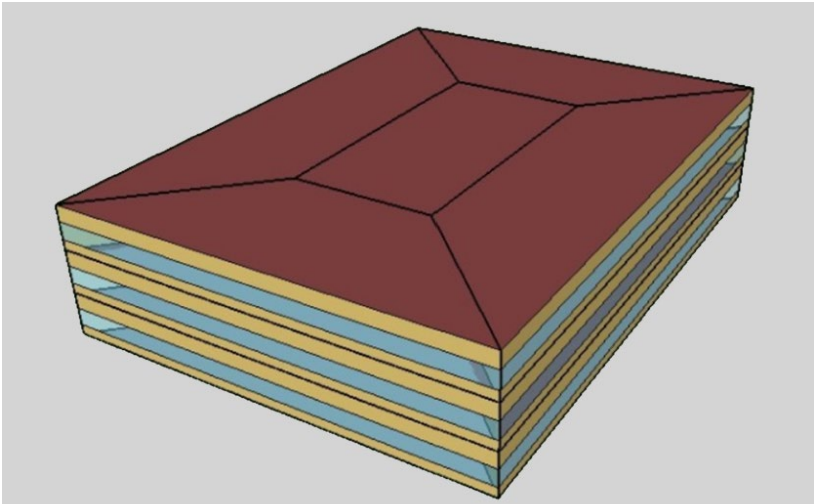
Task 2 Screenshots of all the steps



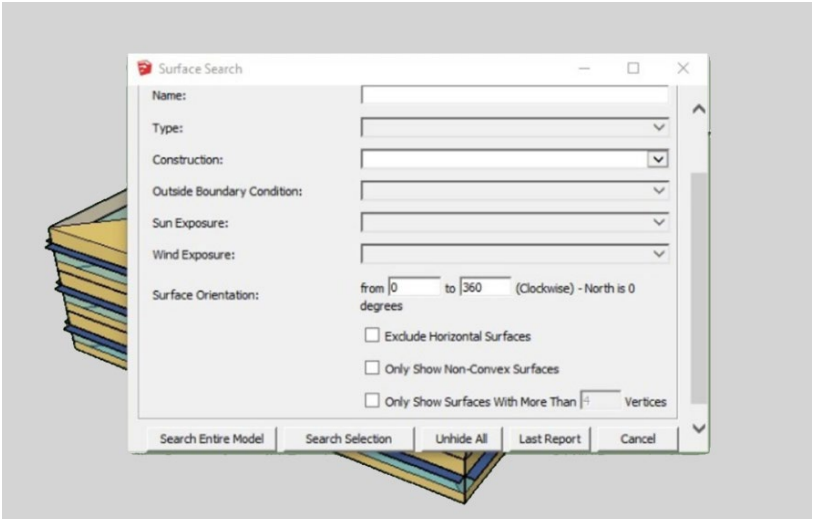


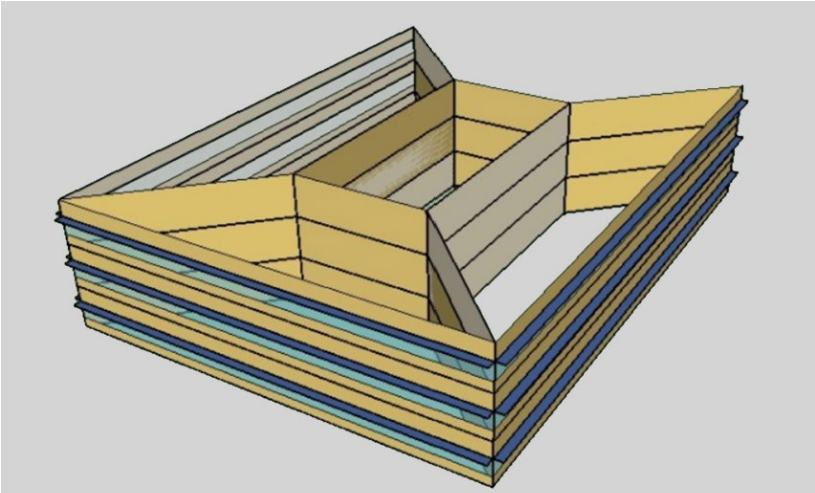


3. Choose "surface matching tool" to distinguish between inner and outer surfaces

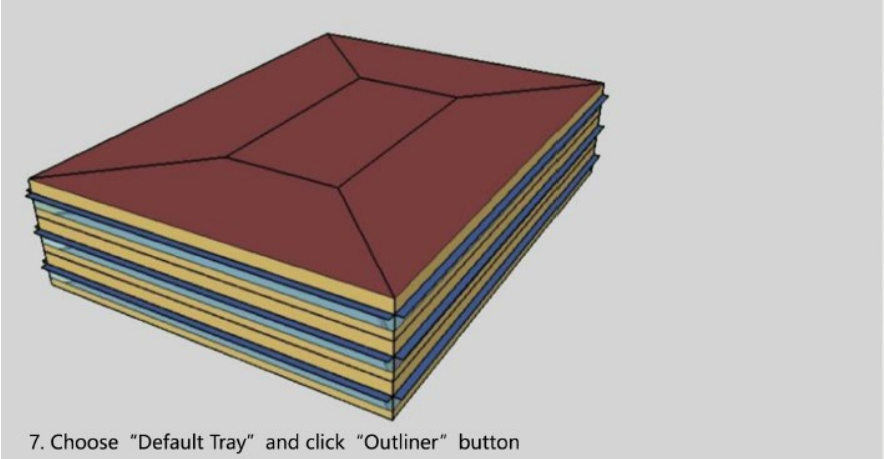


4. Choose "set window to wall ratio" to create windows and select all the surfaces except north.

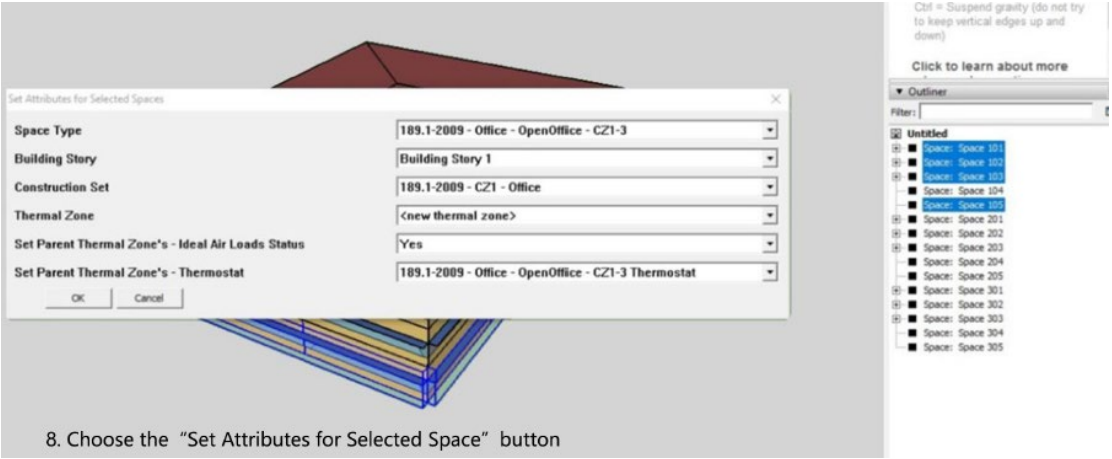




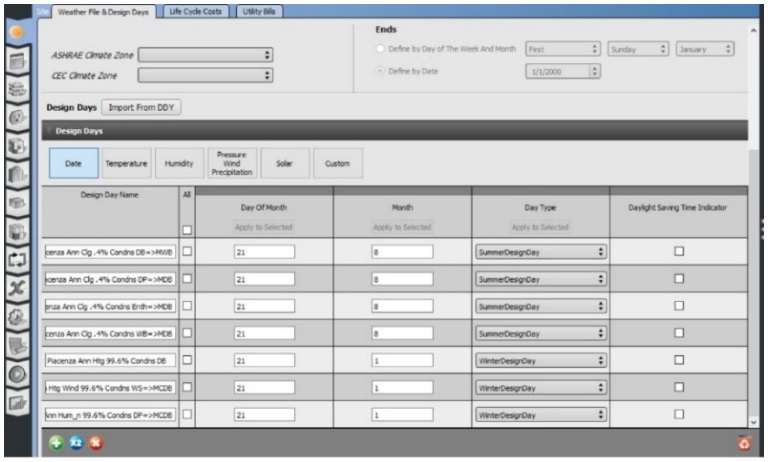
5. Choose "add overhang by projection factor" to create external shading.



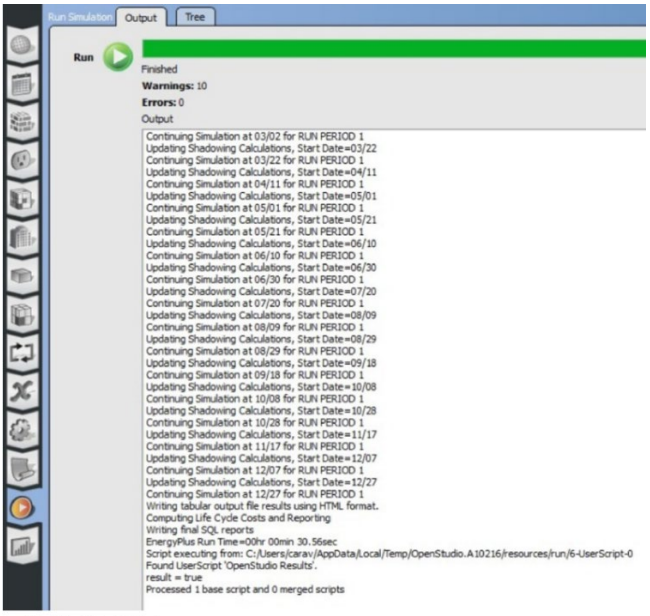
7. Choose "Default Tray" and click "Outliner" button



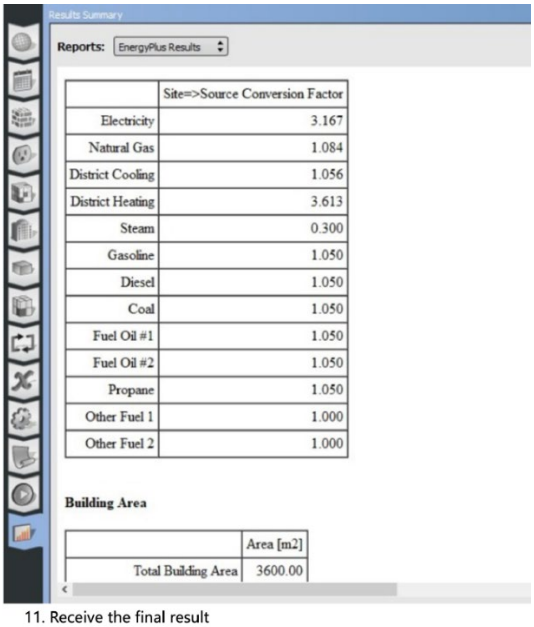
8. Choose the "Set Attributes for Selected Space" button



9. Add the weather data



10. Run the model



	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	3600.00

11. Receive the final result