

WEEK 6

Tuesday, November 12, 2019 10:16 PM

Politecnico di Milano
MSc. Sustainable Architecture and Landscape Design
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Task 1. Considering the same example you solved in the previous assignment (radiative heat transfer between two parallel 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 ?

From last exercise

$$\dot{Q}_{1 \rightarrow 2} = 1035.81 \frac{W}{m^2}$$

$$\dot{Q}_{1 \rightarrow 2 \text{ no shield}} = 10.3581 \frac{W}{m^2}$$

We need to calculate N

$$\dot{Q}_{1 \rightarrow 2 \text{ no shield}} = \frac{1}{(N + 1)Q_{12}}$$

$$10.3581 = \frac{1}{(N + 1)1035.81}$$

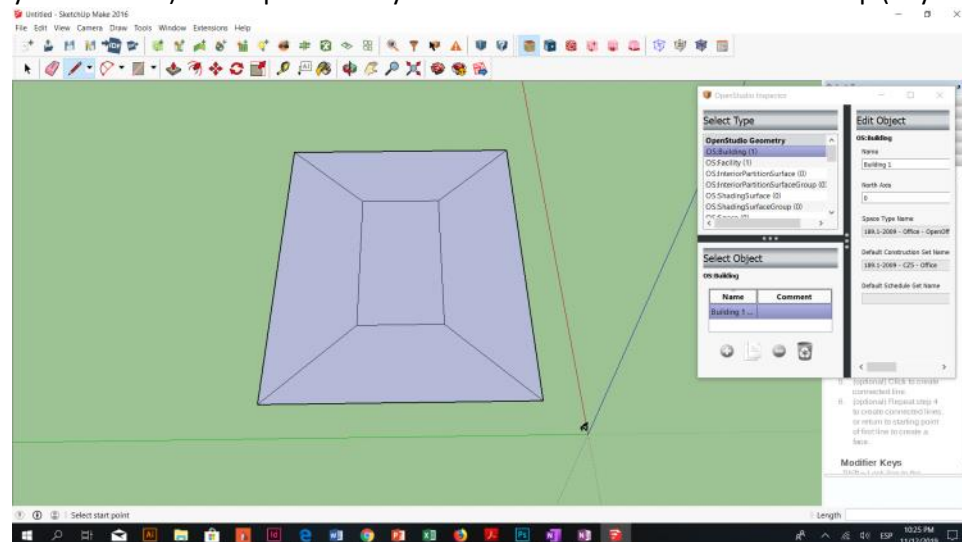
$$0.01 = \frac{1}{(N + 1)}$$

$$100 = (N + 1)$$

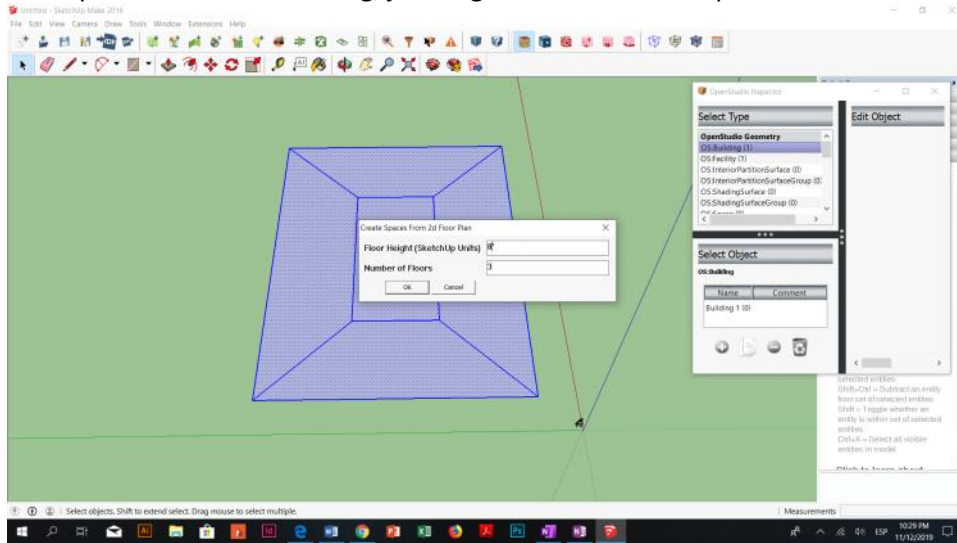
$$N = 99$$

So, we need 99 shields to have the new heat transfer to be 1% of the case without shields

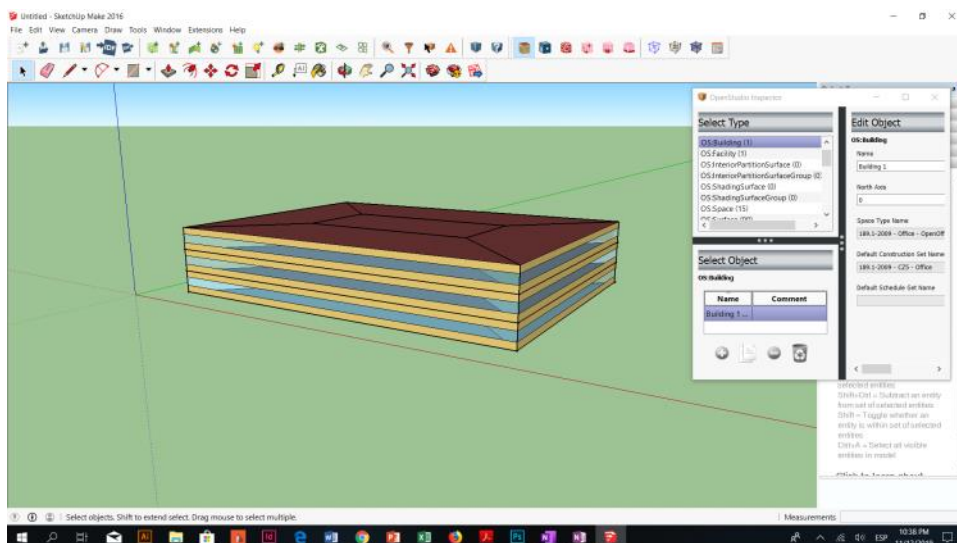
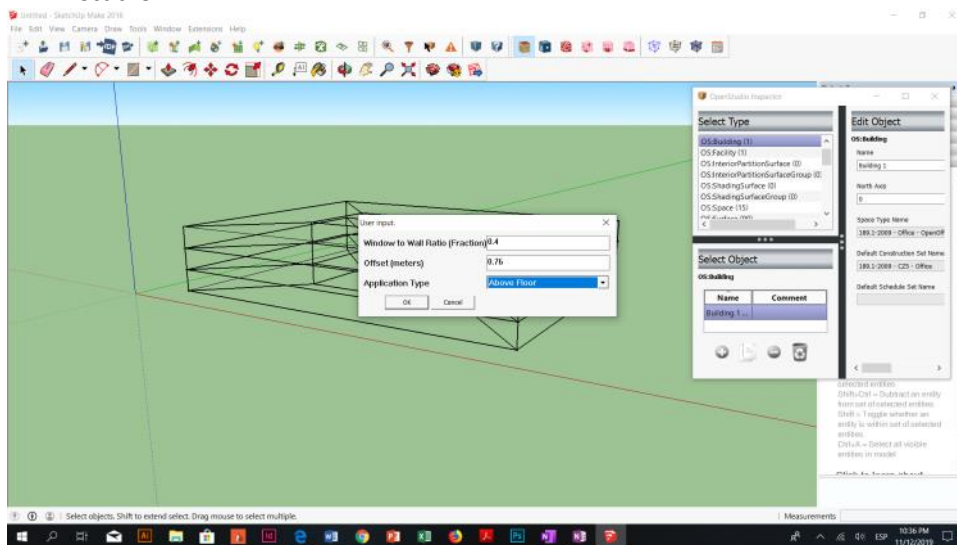
Task 2. You should create a pdf file with screenshots of all of the steps we went through (clearly from your own file) and explain briefly the reason behind the use of each step (in your own words)



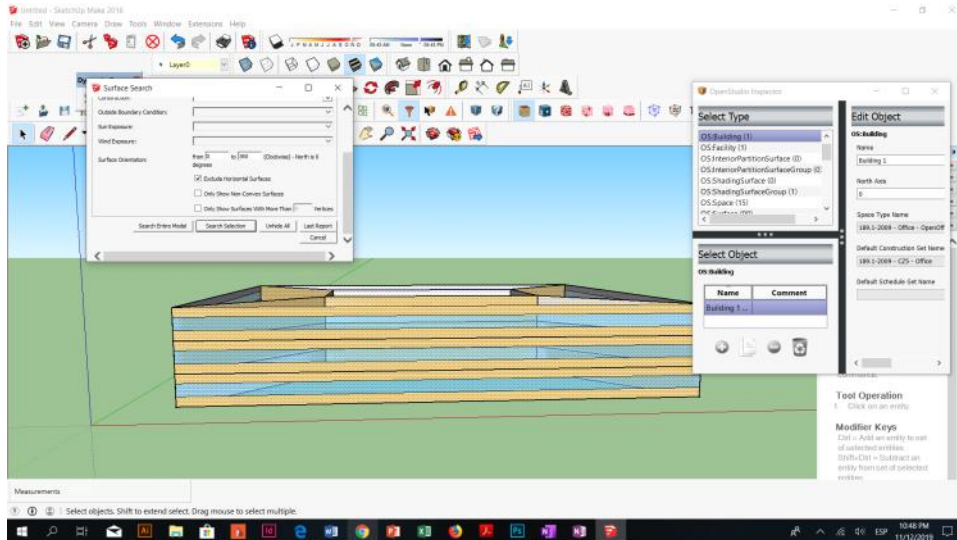
1. I draw a rectangle that is the base for the building and the interior lines will be the interior partitions of the building, just to give the model a shape.



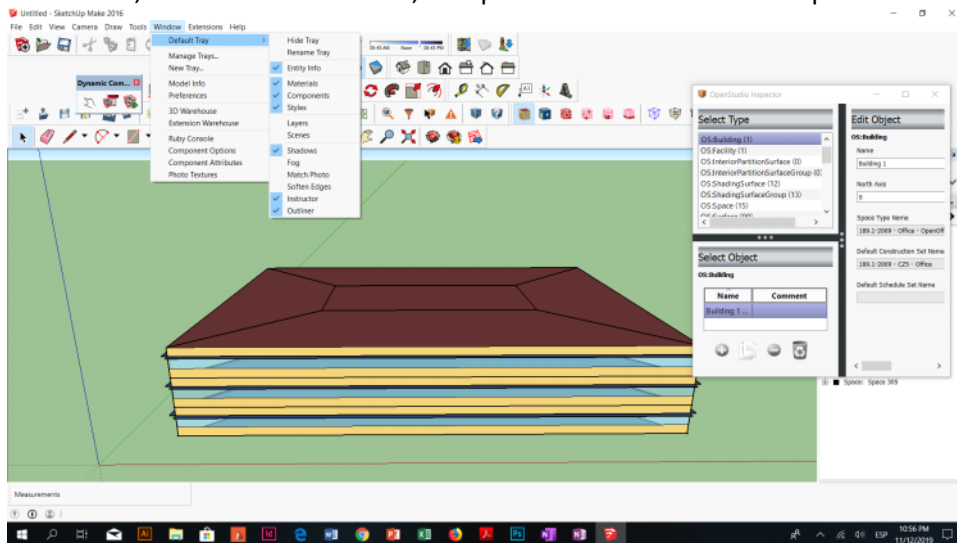
2. I create spaces from diagram, then choose the number of floors and the height of each floor to form the building in open studio software, and have a 3D model that can be analyzed by open studio.



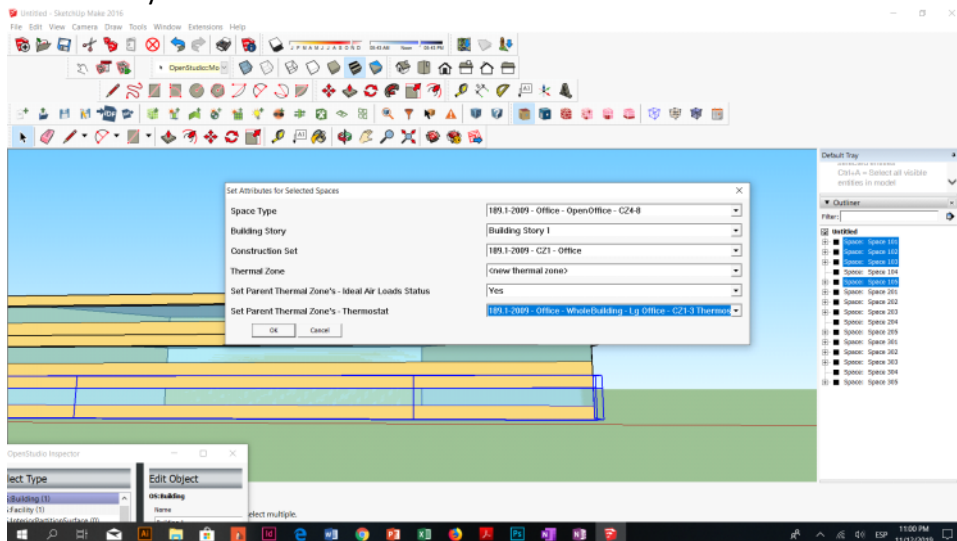
- Then I create the glass wall around the building with the extension of Open Studio, since always we are going to use glass in our designs, so the program can analyze the entrance of light and solar radiation.



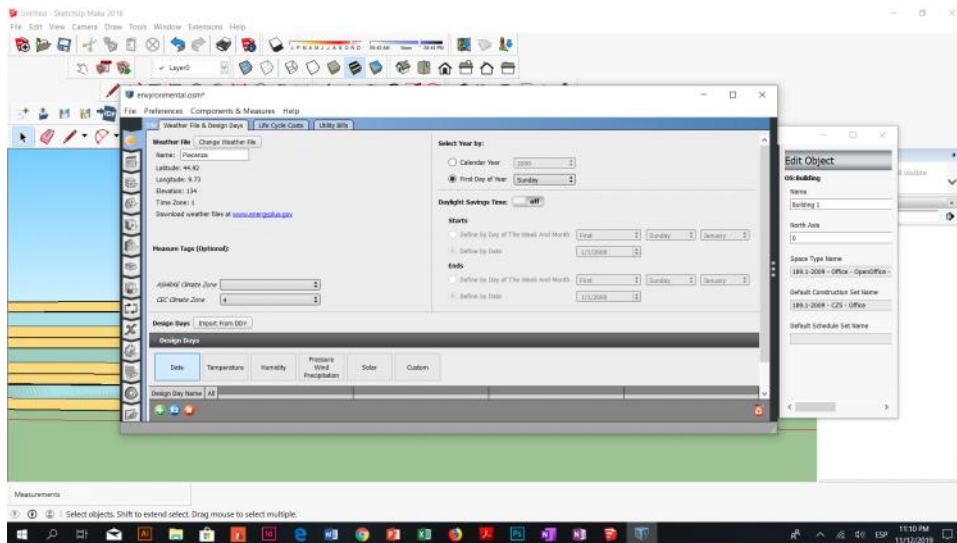
- Now, we select the surfaces, except the horizontal surface to put shade!



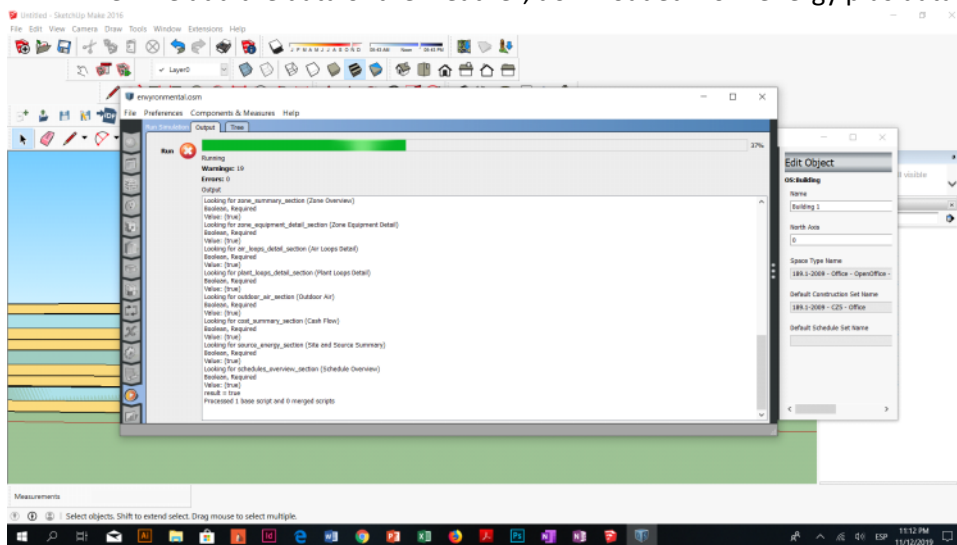
- Then you activate the outliner



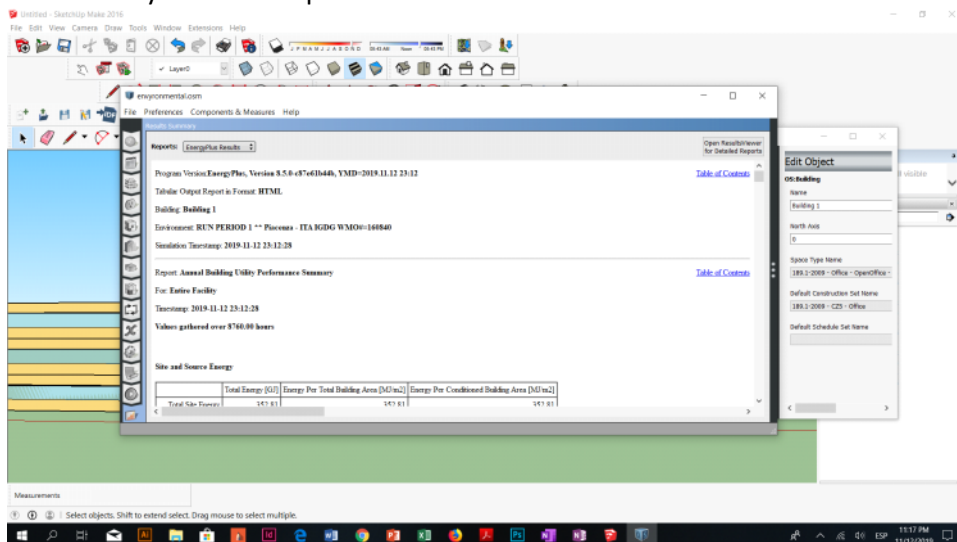
- Then we set the attributes to each floor, to give them a use and function inside the software, for this example I only gave function to the first floor of offices.



7. Then we add the data of the weather, downloaded from energy plus data.



8. Then you run the open studio file!



9. Then we can check the table of results of energy plus and open studio and analyze utility uses per floor and how many energy it will demand. Also, all the parameters that we have to take care of as the demands of cooling and heating, water, energy.