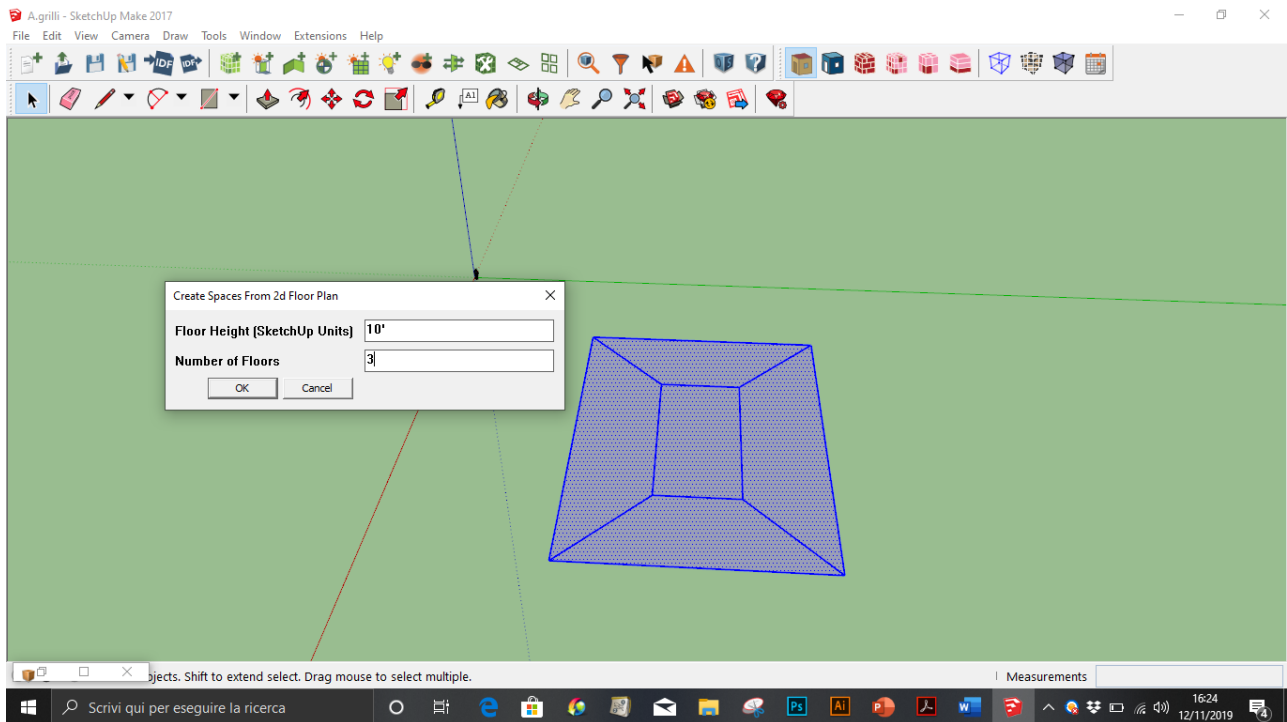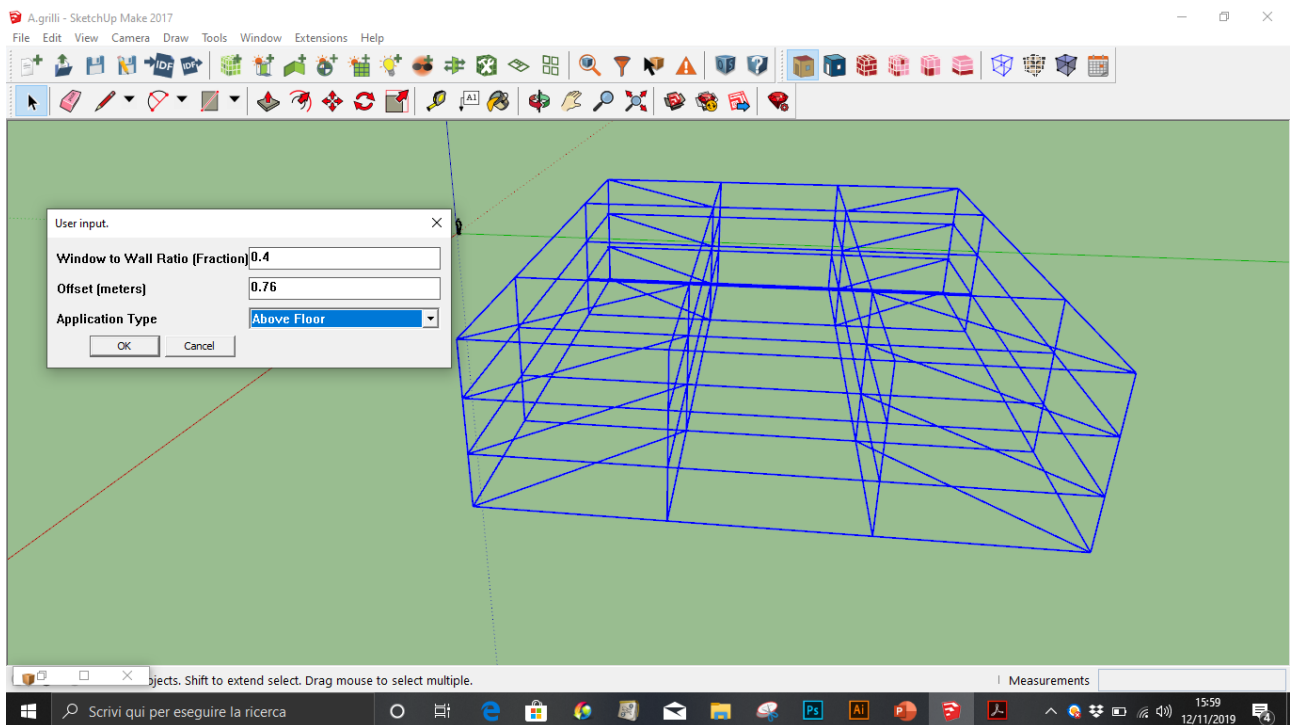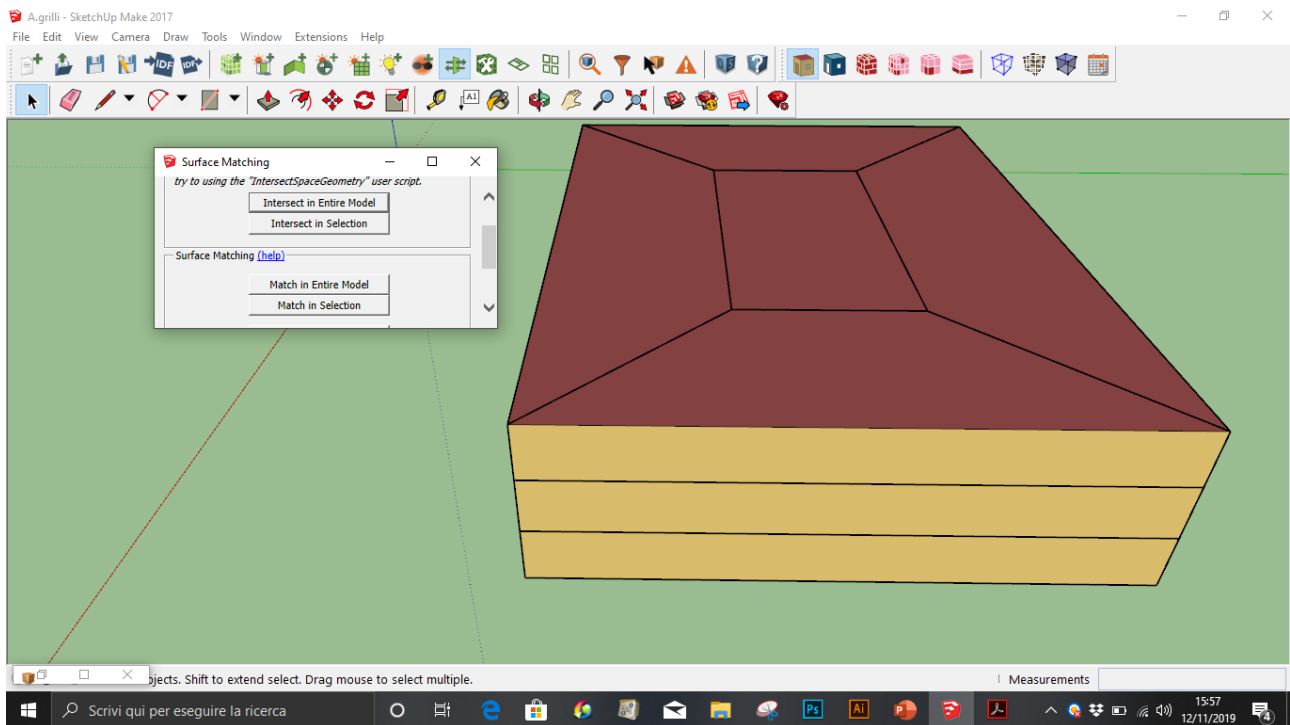# Open Studio exercise

After the diagram is ready, let's make it a building by adding a number of floor of the same height
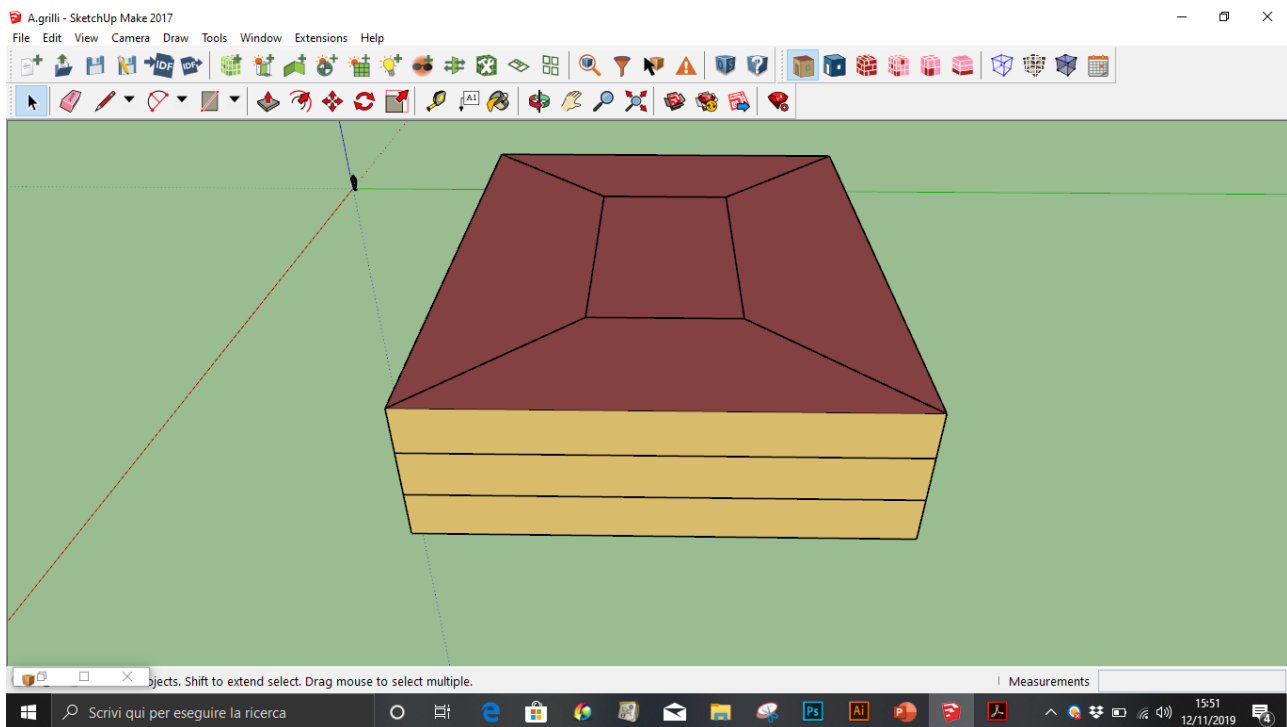
2) Before creating windows, we have to match the surfaces in order to have separate units with only the windows in the outside surfaces
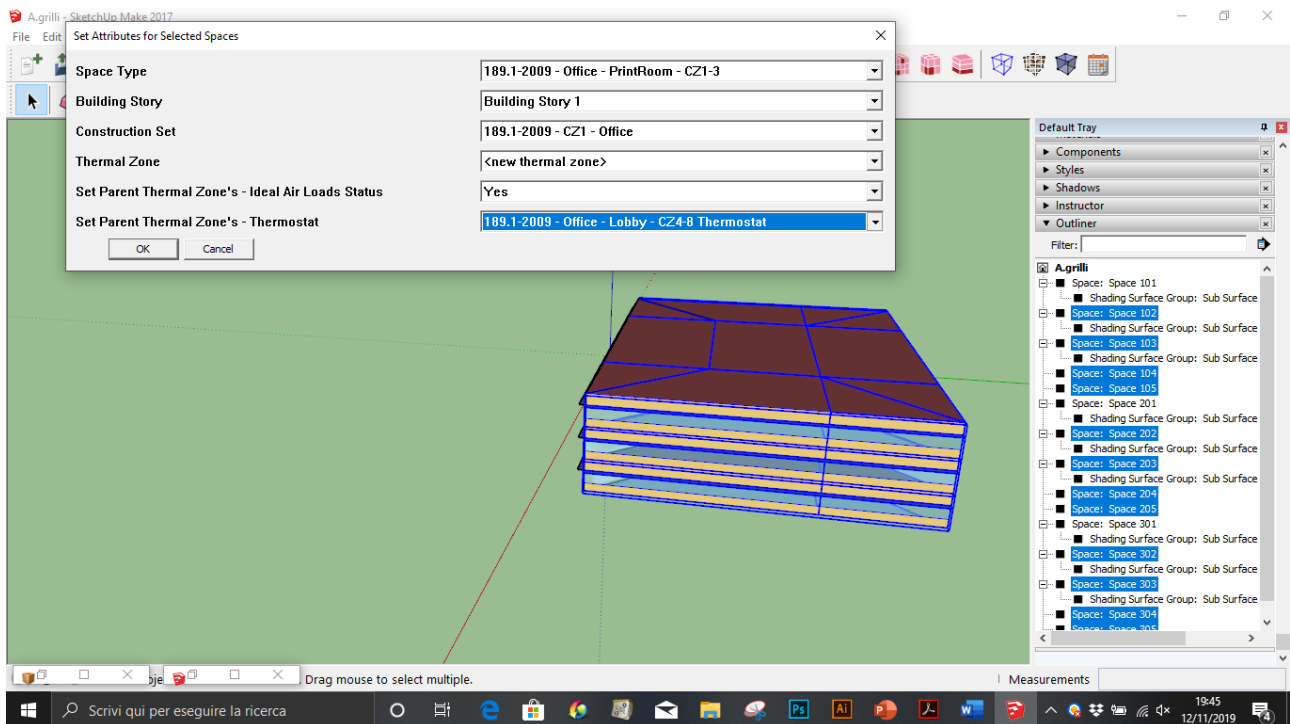
3)For adding the overhangs, we need to select all the surfaces except the one facing North (between 45 and 270 degrees)
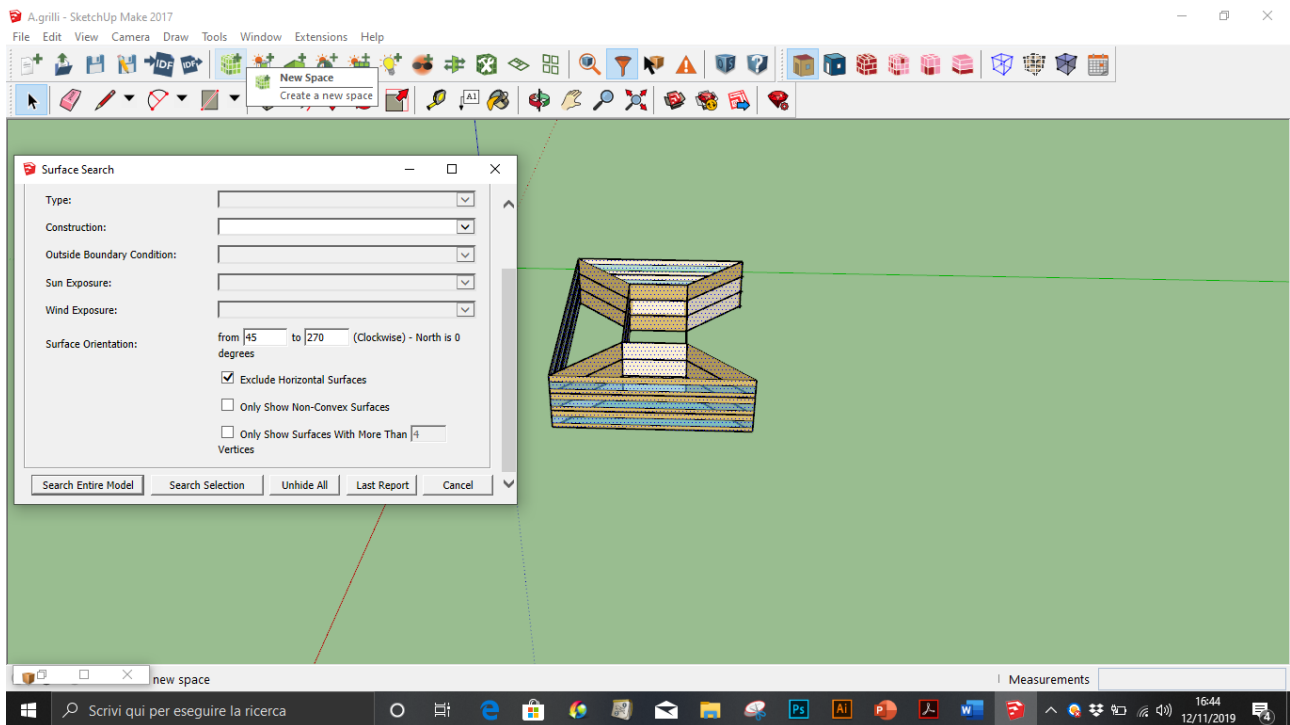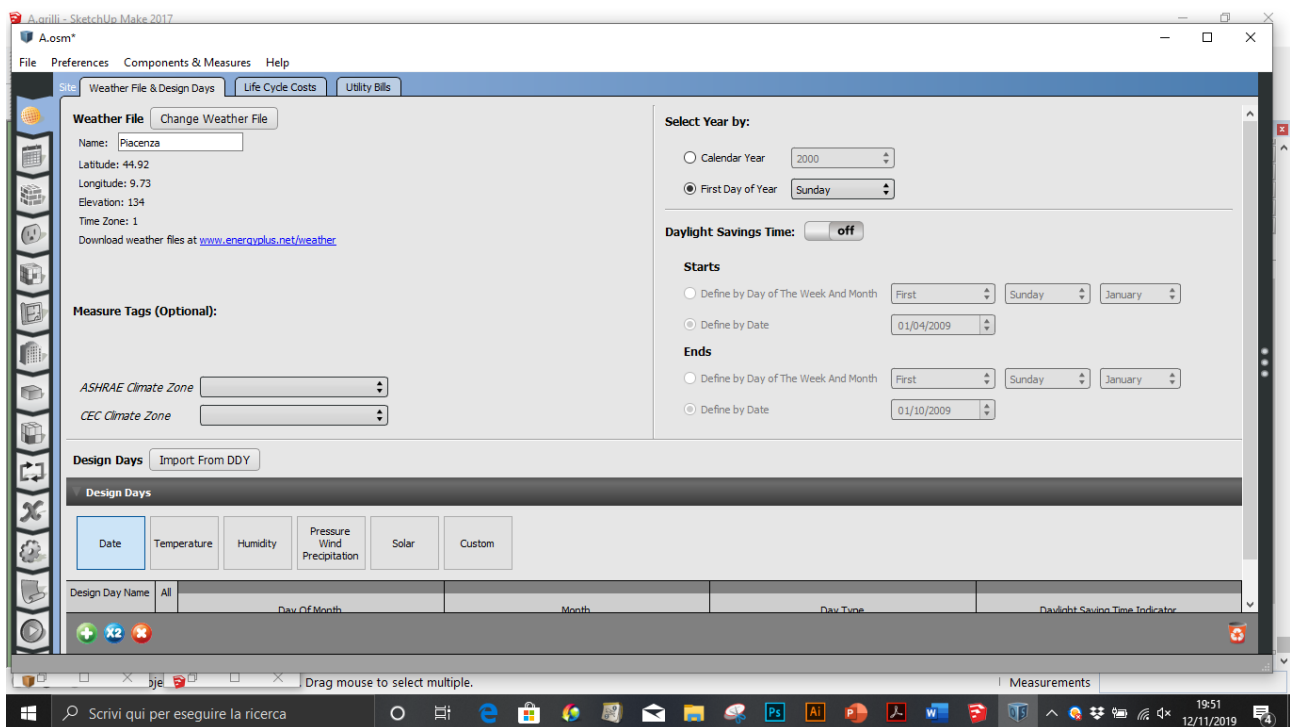

Then adding overhands on the remaining surfaces and reselect all the surfaces again to see the entire model
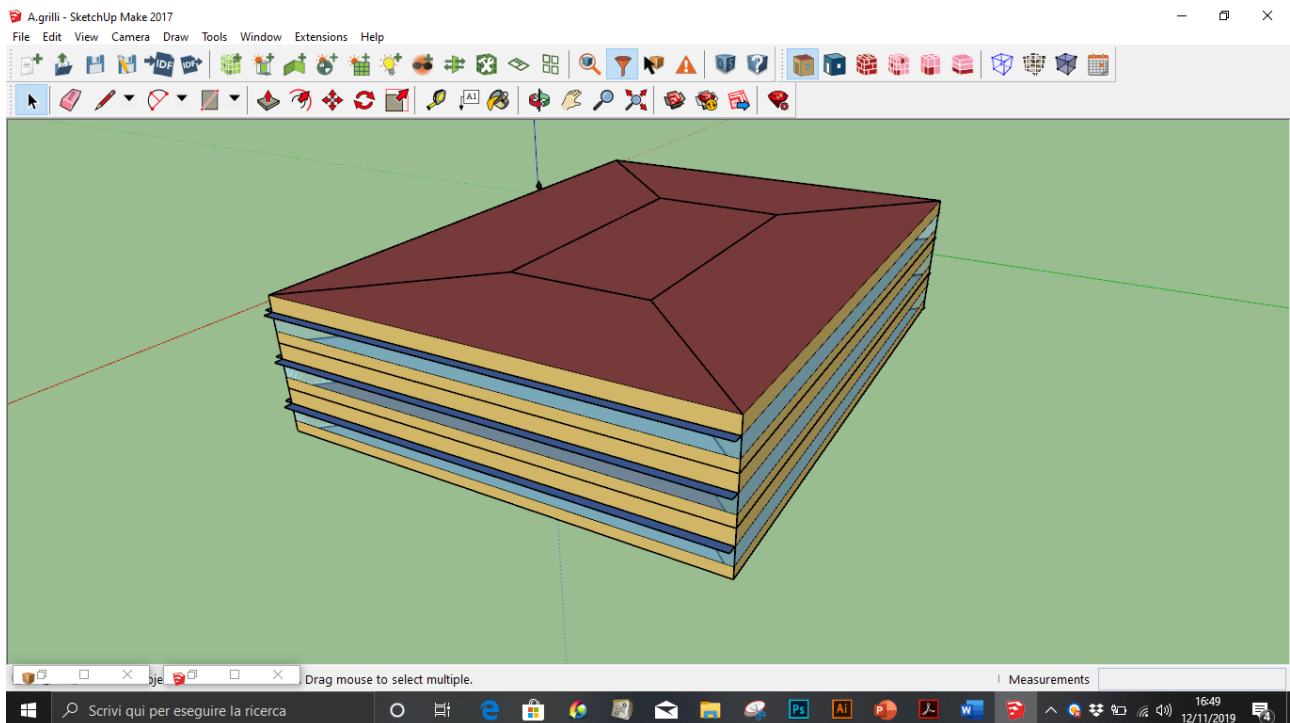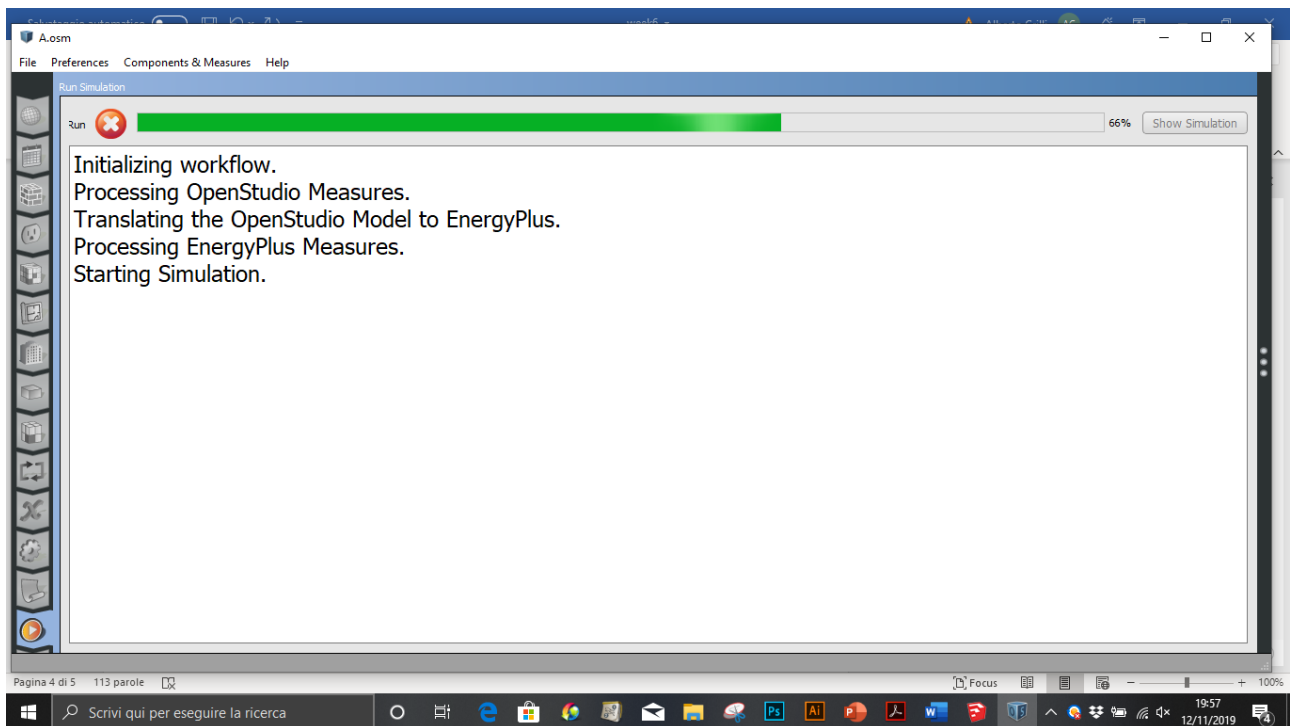
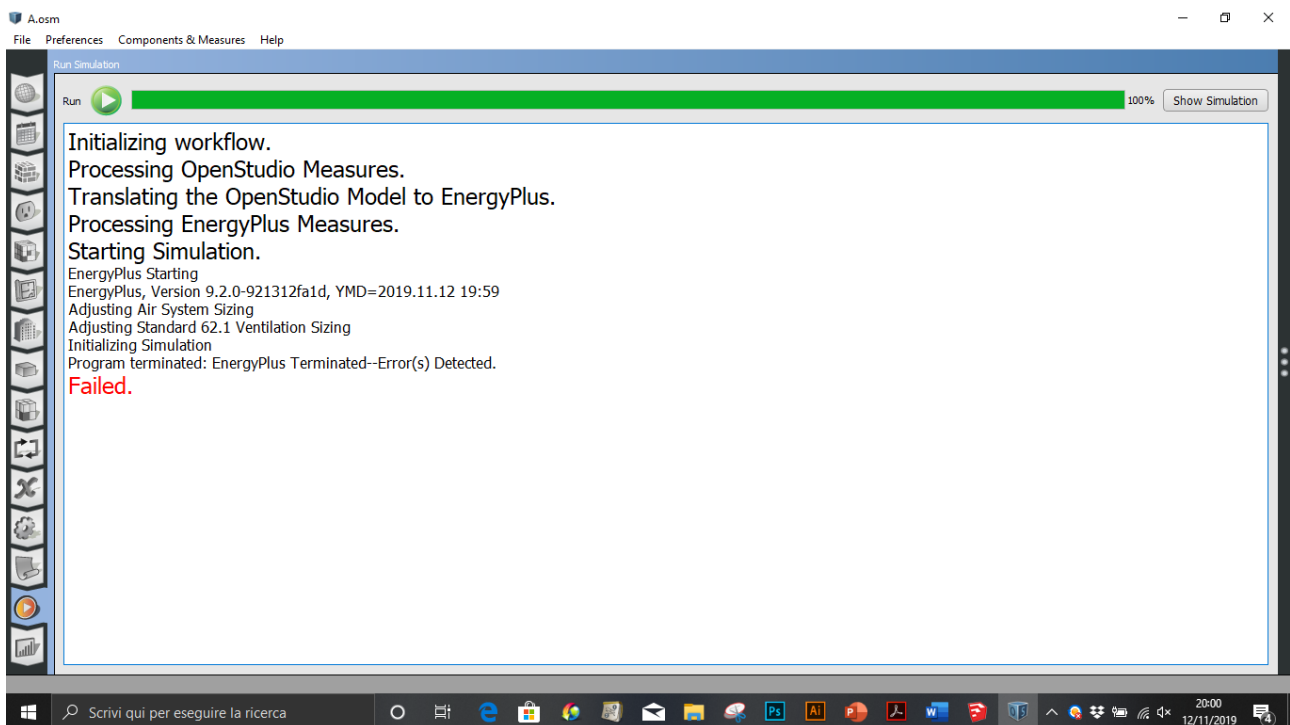4) Next we choose the spaces of each thermal zone and we add specifications:

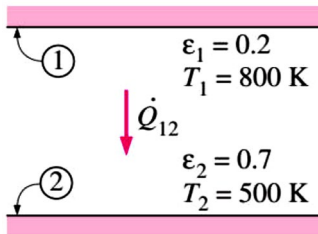5) Adding the weather Data of Piacenza and then run the model

???

Exercise:

Calculate the heat exchange between the two parallel plates:

$\varepsilon_1 = 0.2$
$T_1 = 800$ K

① $\dot{Q}_{12}$

$\varepsilon_2 = 0.7$
$T_2 = 500$ K

②

$$\dot{Q}_{12} = \frac{A\sigma(T_1^4 - T_2^4)}{\frac{1}{\varepsilon_1} + \frac{1}{\varepsilon_2} - 1}$$

$$\dot{Q}_{12} = A\ \frac{5.670 * 10^{-8} * (800^4 - 500^4)}{\frac{1}{0.2} + \frac{1}{0.7} - 1} = A\ \frac{19680,57}{5.4286} = 3625,35\ \frac{W}{m^2}$$

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 ?

$$\dot{Q}_{12,\ N\ shields} = \frac{A\sigma(T_1^4 - T_2^4)}{(N+1)\left(\frac{1}{\varepsilon} + \frac{1}{\varepsilon} - 1\right)} = \frac{1}{N+1}\ \dot{Q}_{12,\ no\ shield}$$

$$N\ scheldes = \frac{5.670 * 10^{-8} * (800^4 - 500^4)}{\left(\frac{1}{0.2} + \frac{1}{0.7} - 1\right) * 3625,35 * 0,01} = \frac{19680,57}{196,80} = 100$$