TASK 1

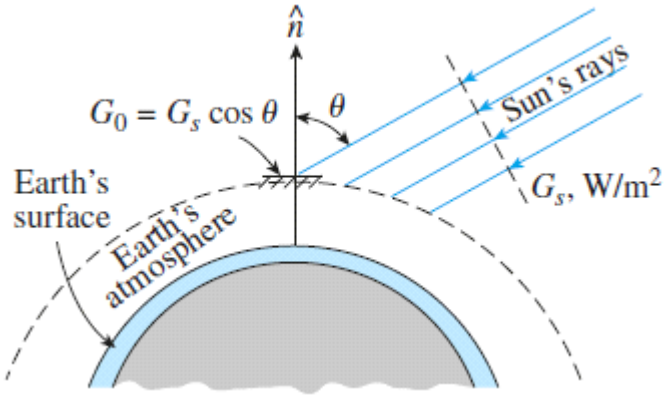
Provide a summary of the main concepts that went through about solar radiation
(formulas are not needed).

The sun is our primary source of energy. The energy coming off the sun, called solar energy, reaches us in the form of electromagnetic waves after experiencing considerable interactions with the atmosphere. The radiation energy emitted or reflected by the constituents of the atmosphere form the atmospheric radiation.

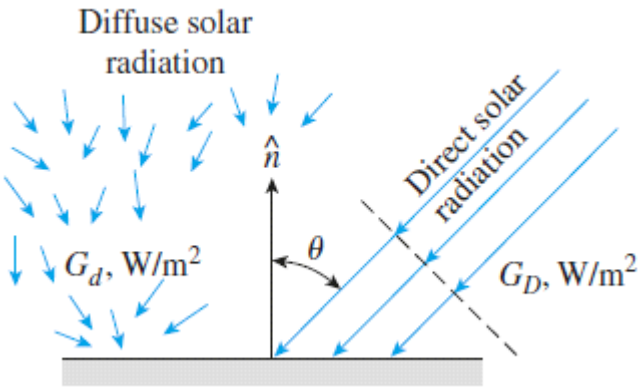
The solar energy reaching the earth's atmosphere is called the total solar irradiance Gs, whose value is

$$G_s = 1373 \text{ W/m}^2$$

The total solar irradiance (also called the solar constant) represents the rate at which solar energy is incident on a surface normal to the sun's rays at the outer edge of the atmosphere when the earth is at its mean distance from the sun.



The solar energy incident on a surface on earth is considered to consist of direct and diffuse parts. The part of solar radiation that reaches the earth's surface without being scattered or absorbed by the atmosphere is called direct *solar radiation* G_D. The scattered radiation is assumed to reach the earth's surface uniformly from all directions and is called *diffuse solar radiation* G_d.

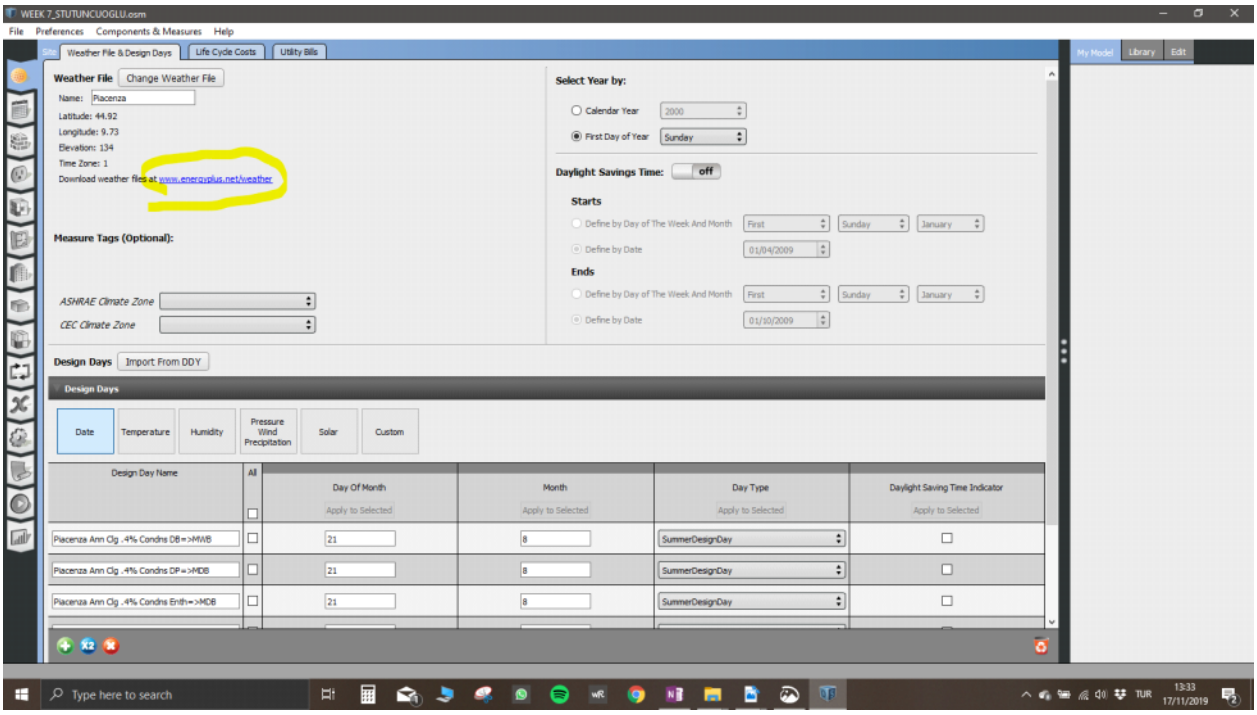


In solar energy applications, the spectral distribution of incident solar radiation is very different than the spectral distribution of emitted radiation by the surfaces, since the former is concentrated in the short-wavelength region and the latter in the infrared region. Therefore, the radiation proper-ties of surfaces are quite different for the incident and emitted radiation, and the surfaces cannot be assumed to be gray. Instead, the surfaces are assumed to have two sets of properties: one for solar radiation and another for infrared radiation at room temperature. Surfaces that are intended to collect solar energy, such as the absorber surfaces of solar collectors, are desired to have high as but low e values to maximize the absorption of solar radiation and to minimize the emission of radiation. Surfaces that are intended to remain cool under the sun, such as the outer surfaces of fuel tanks and refrigerator trucks, are desired to have just the opposite properties.

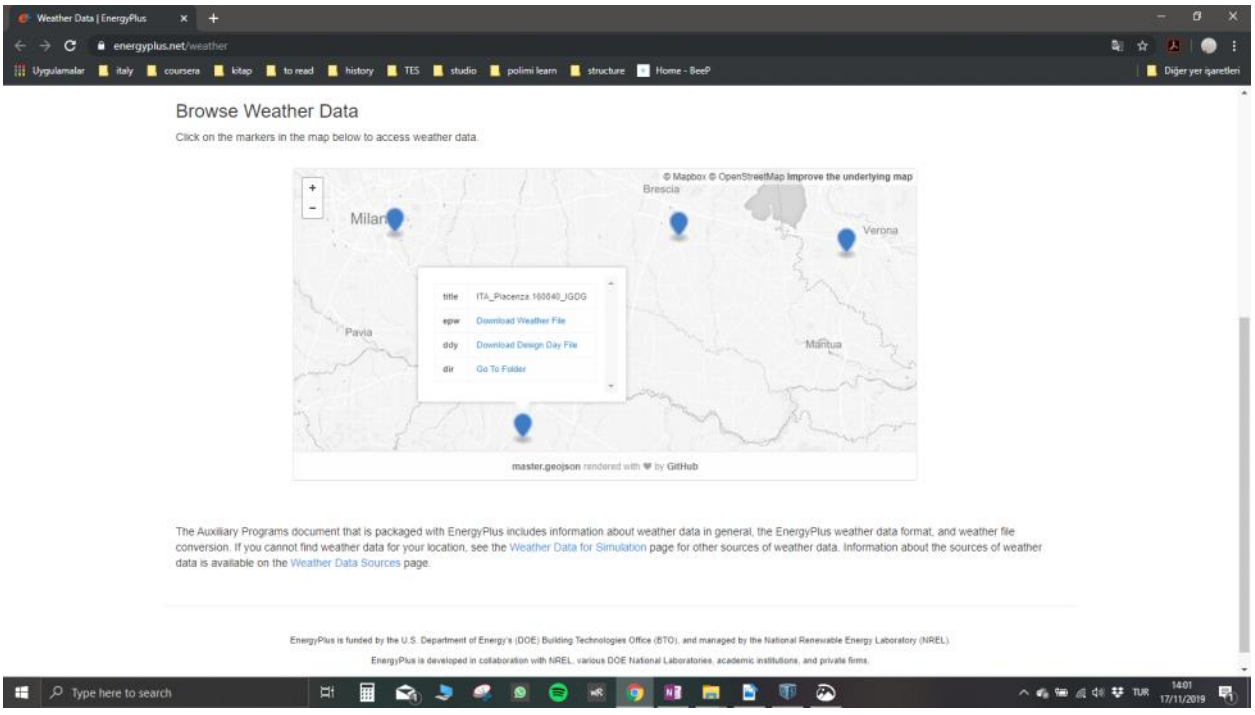
TASK 2

Create a pdf file with screenshots of all of the steps we went through in the second lesson on openStudio and explain briefly the reason behind the use of each step (in your own words!)

Step 1 : Changing weather data
In Open Studio program, Under "site" section, "weather data" there is a link to find weather data for each places.

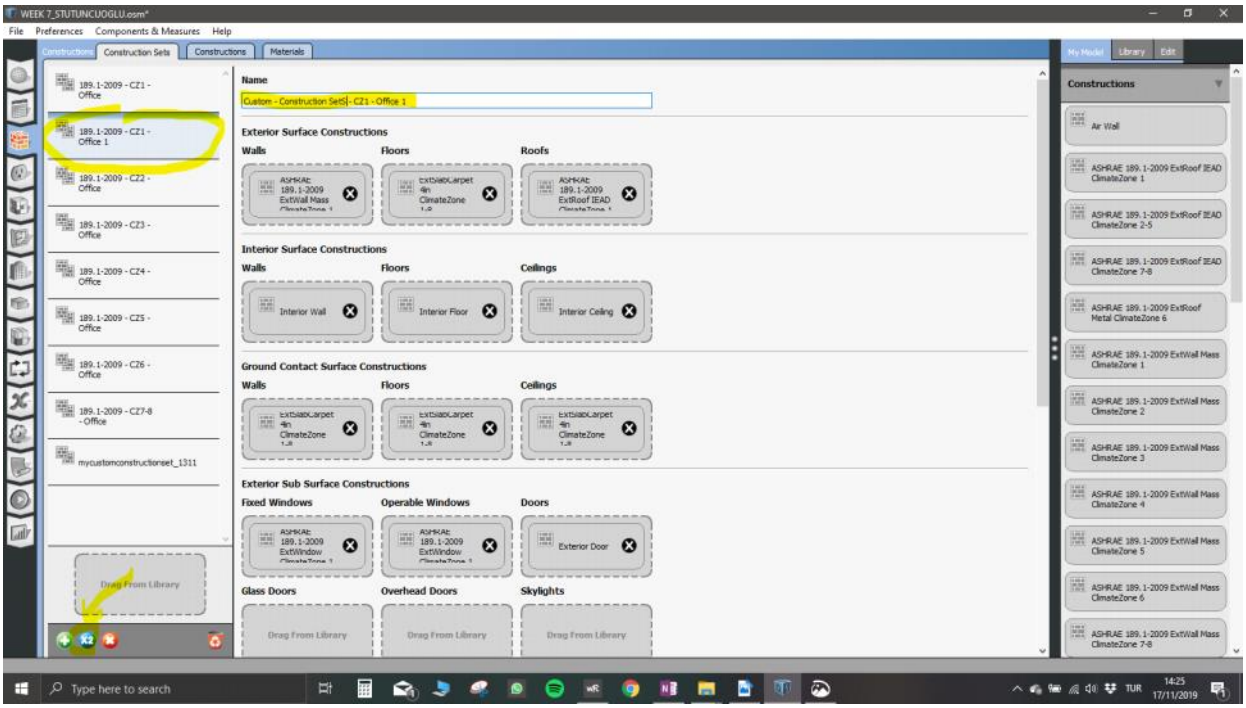


Find the place in the map where you work on it, and click the blue icon. Download both .epw and .ddy files. .ddy means the best and worst day of the year.



Step 2 : Modify and Customise

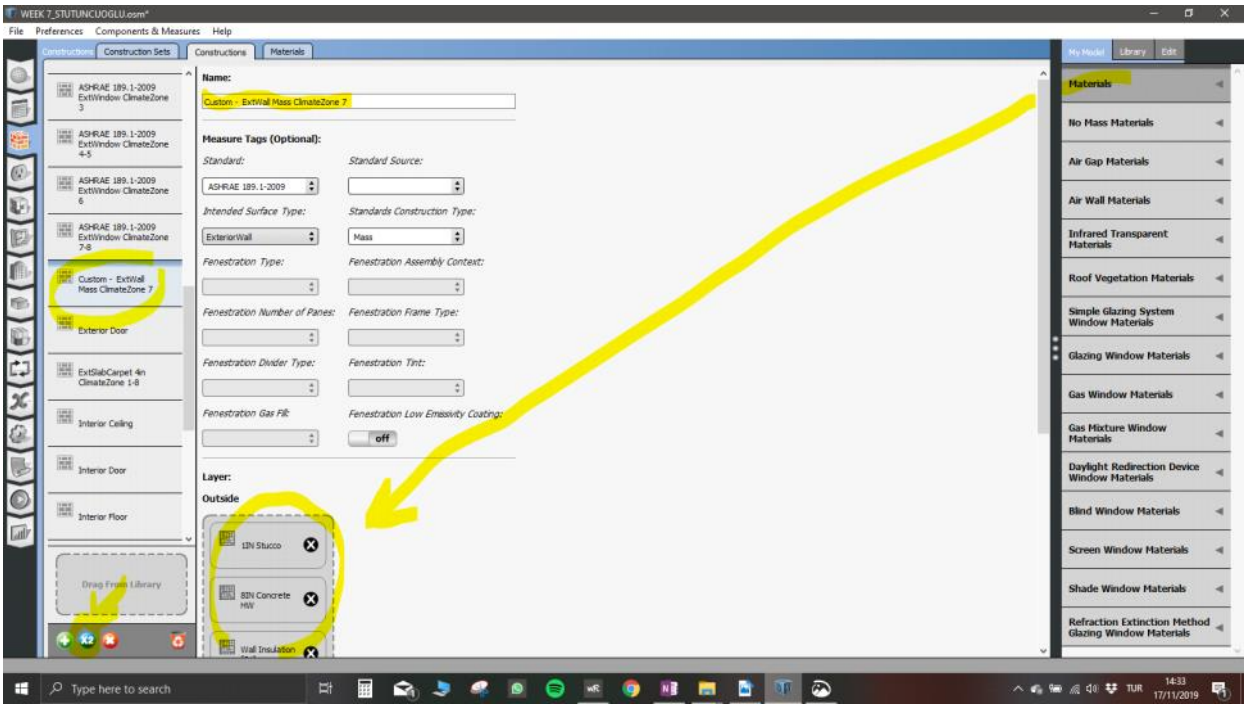
In Open Studio program, Under "constructions" section, there are 3 parts namely; construction sets, constructions and materials. If we want to create a new construction set, we should keep these steps: choose the base construction set > dublicate it > change the name of it .



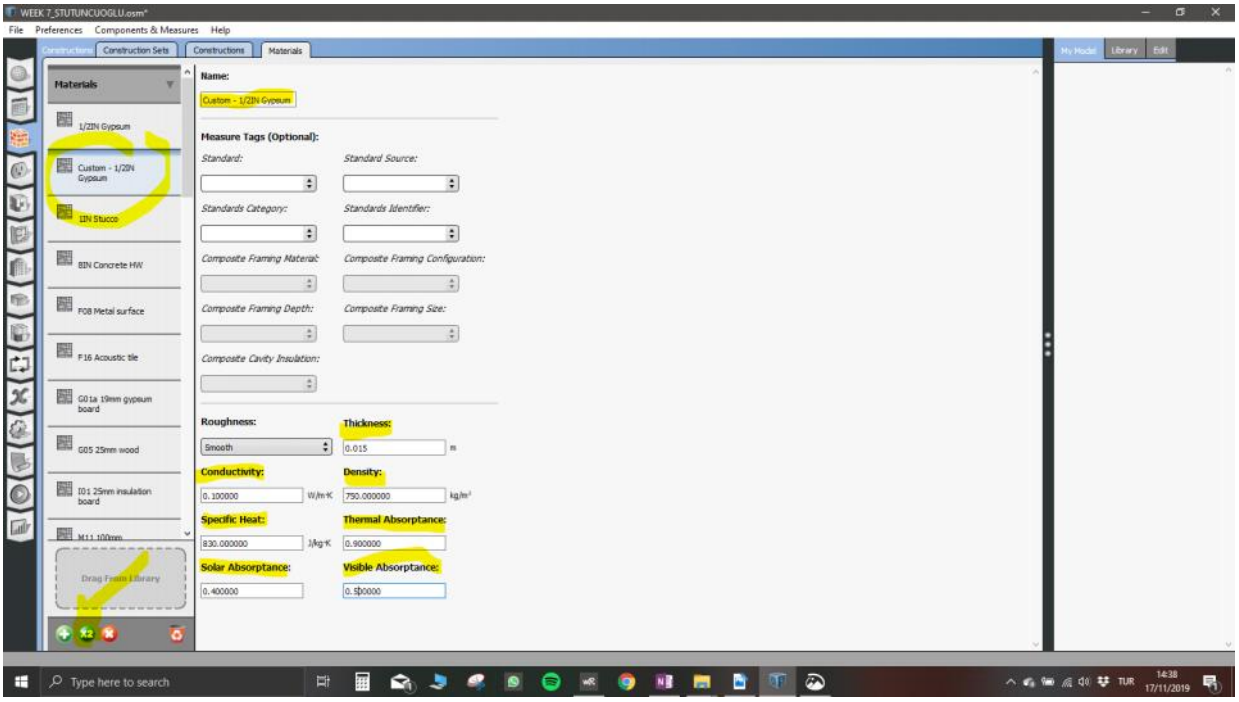
If we want to create a construction to add the new construction set, we should keep the same steps in "constructions" part.

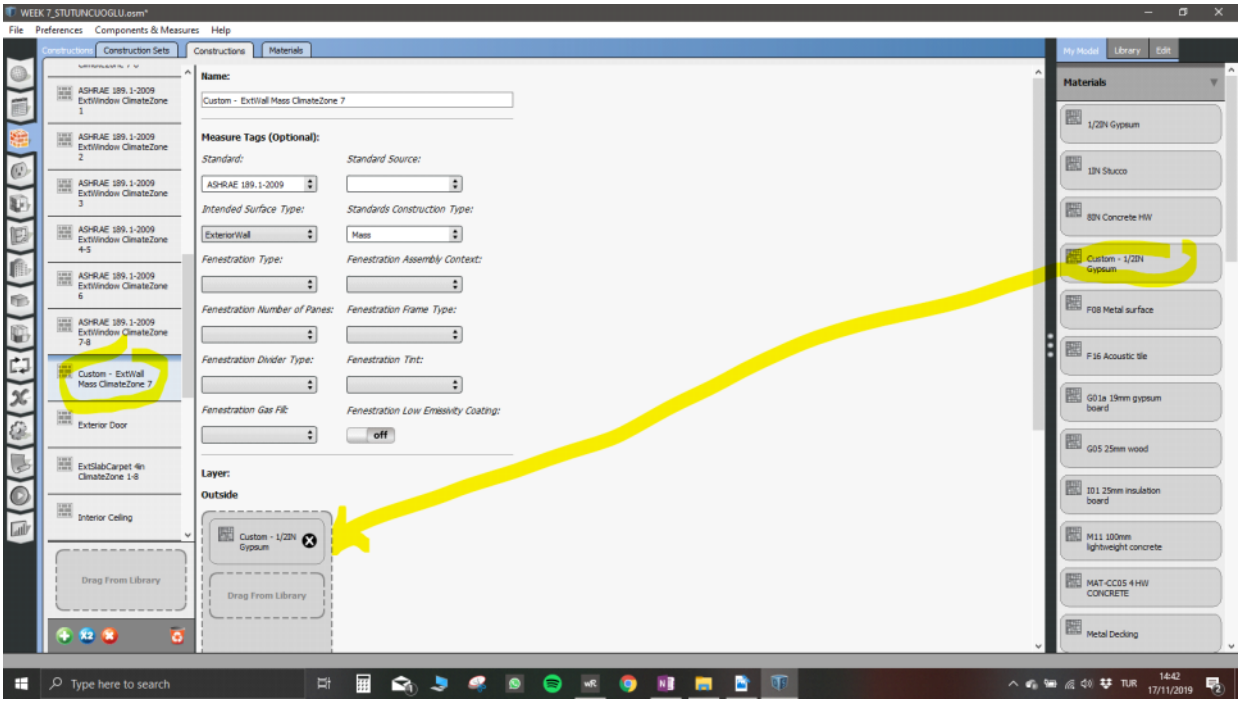
Choose the base construction > dublicate it > change the name of it .

After that you can reorder of the construction materials or customise these materials. In material library, we can choose the new materials > drag and drop it in the layer list.



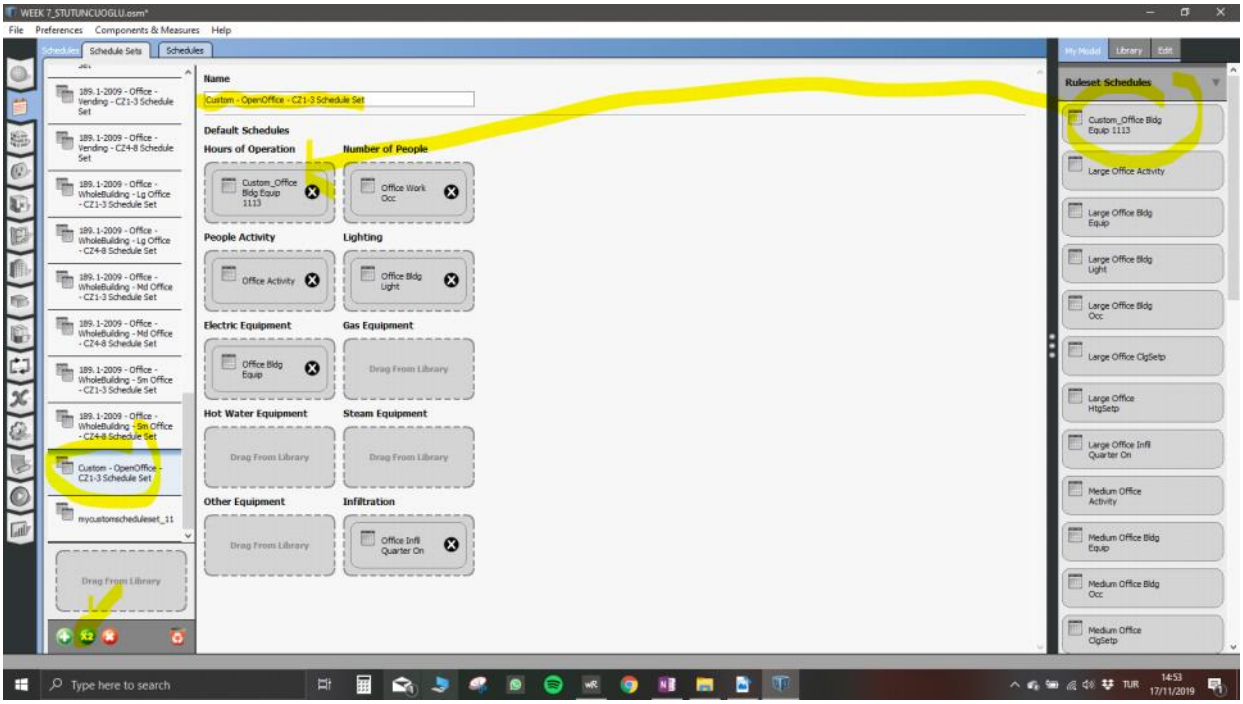
If we can not find the exact materials what we want, we can change the material details in the "materials" part. After do that, we can find this material in our material list so we can drag and drop it into our new construction and we can add our new construction into our new construction set.





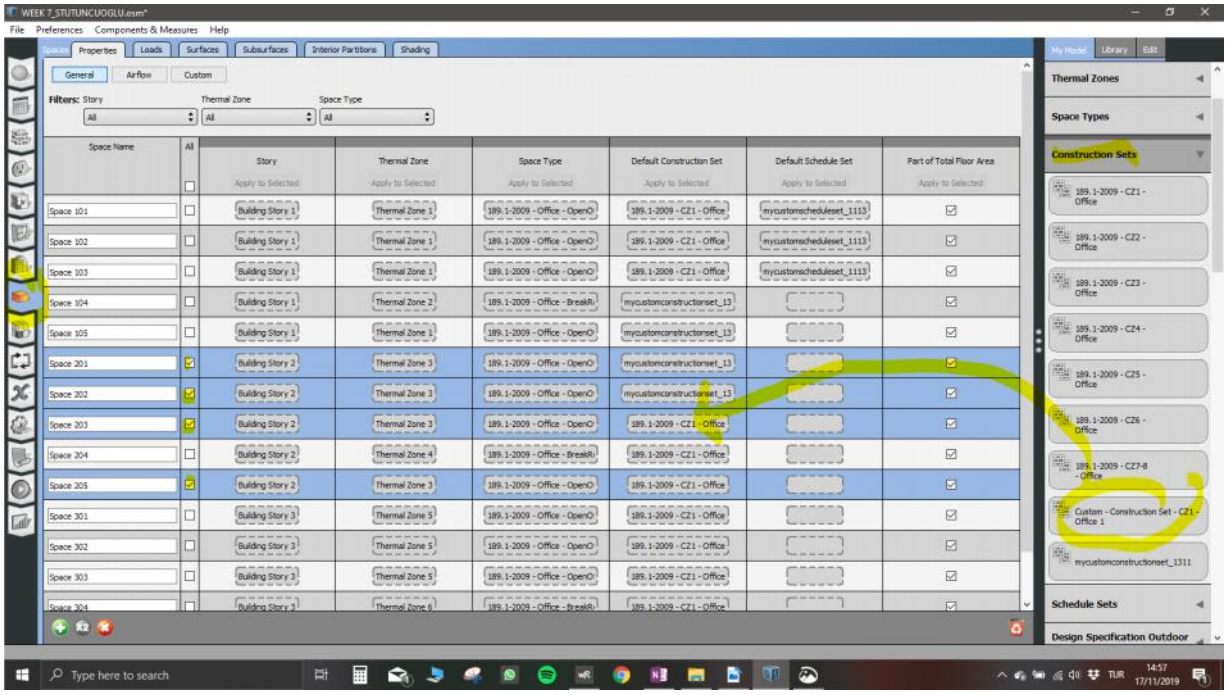
Step 2 : Further Steps
We can apply these methods to change whatever we want in the project in different sections.

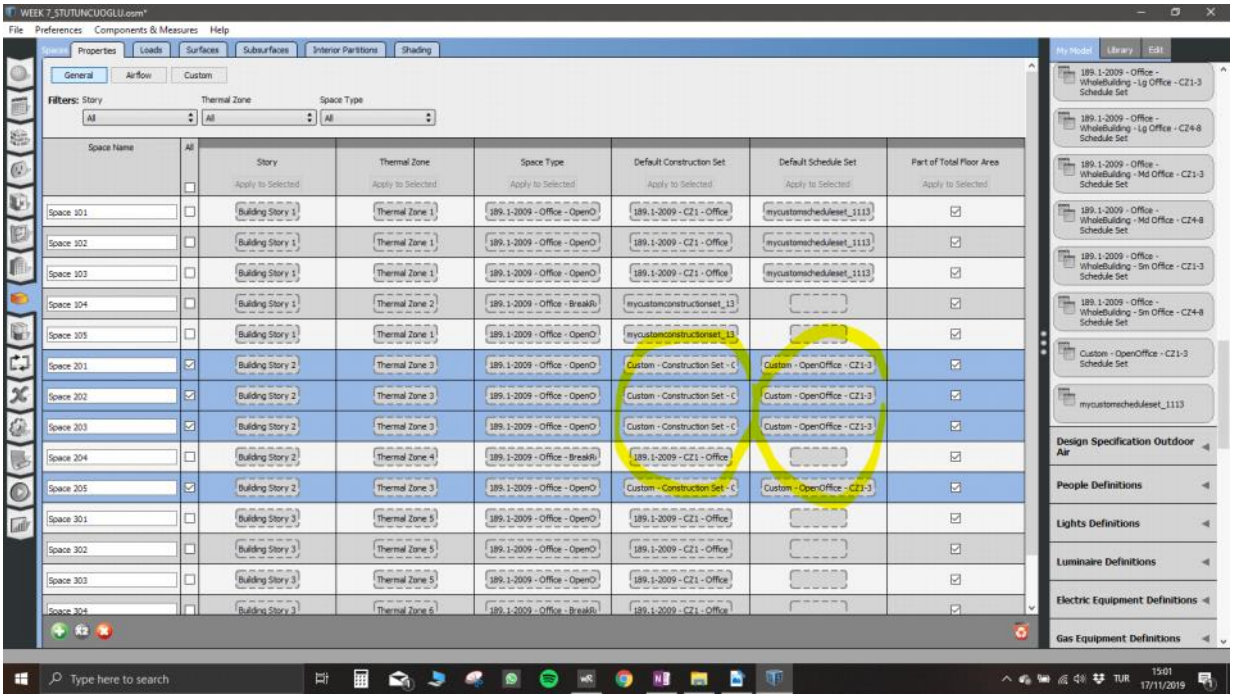
For time schedule of the building > use "schedules" section and modify it.



Step 4 : Appliyng into The model
After modify everything what we want, we should apply them into the our model.
To do it we keep these steps:

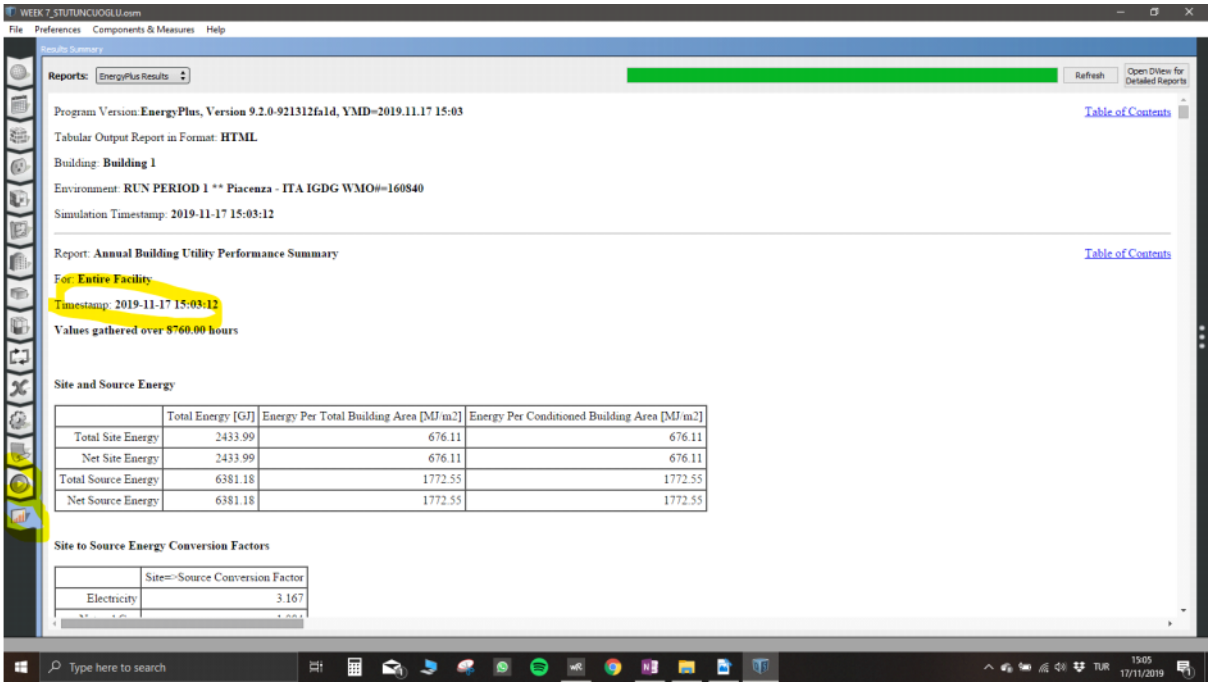
Click "spaces" section> select in my model section what do you want to change > drag and drop it into correspoinding area of the table.
You can choose more than 1 space at the same time and click by "apply selected" buttom you can change all selected item at the same time.





Step 5 : Compare new situation

After applying all changes into the model we can "run" and "result summary" to compare what happened in the model after our changes .



Program Version:**EnergyPlus, Version 9.2.0-921312fa1d, YMD=2019.11.17 15:03**

Tabular Output Report in Format: **HTML**

Building: **Building 1**

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

Simulation Timestamp: **2019-11-17 15:03:12**

Report: **Annual Building Utility Performance Summary**

For: **Entire Facility**

Timestamp: **2019-11-17 15:03:12**

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	2433.99	676.11	676.11
Net Site Energy	2433.99	676.11	676.11
Total Source Energy	6381.18	1772.55	1772.55
Net Source Energy	6381.18	1772.55	1772.55

Site to Source Energy Conversion Factors

	Site=>Source Conversion Factor
Electricity	3.167