ASSIGNMENT #7

18 Kasım 2019 22:08

#Week 7
** Task 1** Provide a summary of the main concepts that went through about solar radiation (formulas are not needed)

** Task 2** Y 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!)

TASK 1

SOLAR RADIATION

As we know basically, the radiation of the sun rays occurs radially. Accordingly we realized that the solar radiation is the radiant energy emitted by the sun, especially electromagnetic energy can be mentioned. It is kind of a nuclear fusion reaction that generates electromagnetic energy which is created by the sun, including visible and ultraviolet light and infrared radiation.

Solar radiation is a natural and abundant resource because it has great potential for a wide range of applications, along with other forms of renewable energy, because it is abundant and accessible.

Solar radiation availability depends on:
The weather condition, sunshine hours, the sun position (in terms of daily and seasonally) , the site altitude over the sea level.

On the horizontal surface, the total radiation from the solar observations should be distinguished as **direct radiation** and **diffuse radiation**. Direct radiation is sometimes also referred to as "beam radiation" or "direct beam radiation". It is used to describe the sun's rays that move in a straight line from the sun downwards. Diffuse radiation defines sunlight that is dispersed by molecules and particles in the atmosphere, but still reduces it to the surface of the earth.

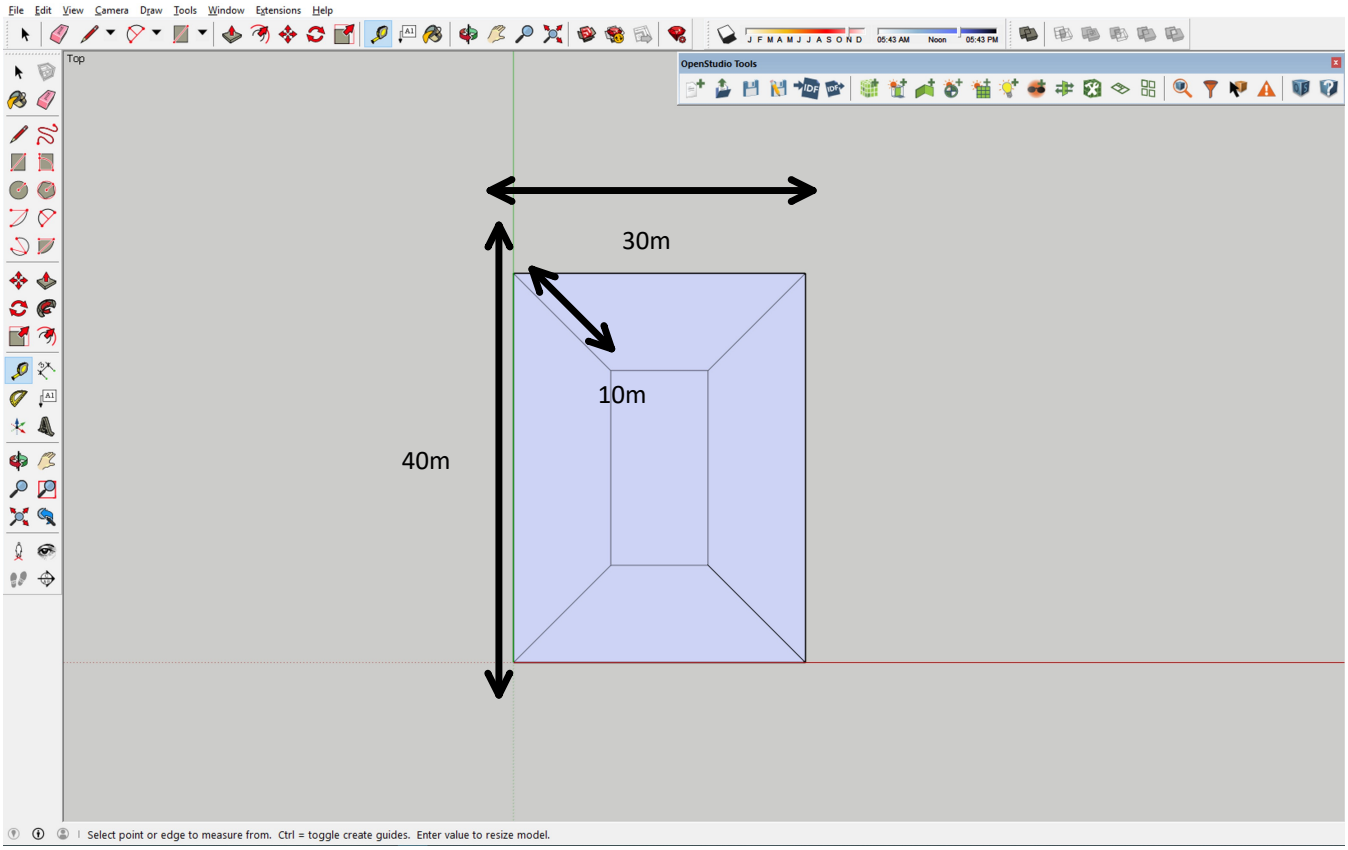
Atmosherc absorption, is the other main mechanism by which electromagnetic radiation interacts with the atmosphere. Ozone, carbon dioxide and water vapor are three main atmospheric components that absorb radiation.

TASK 2

PREVIOUS WORK ON SKETCHUP

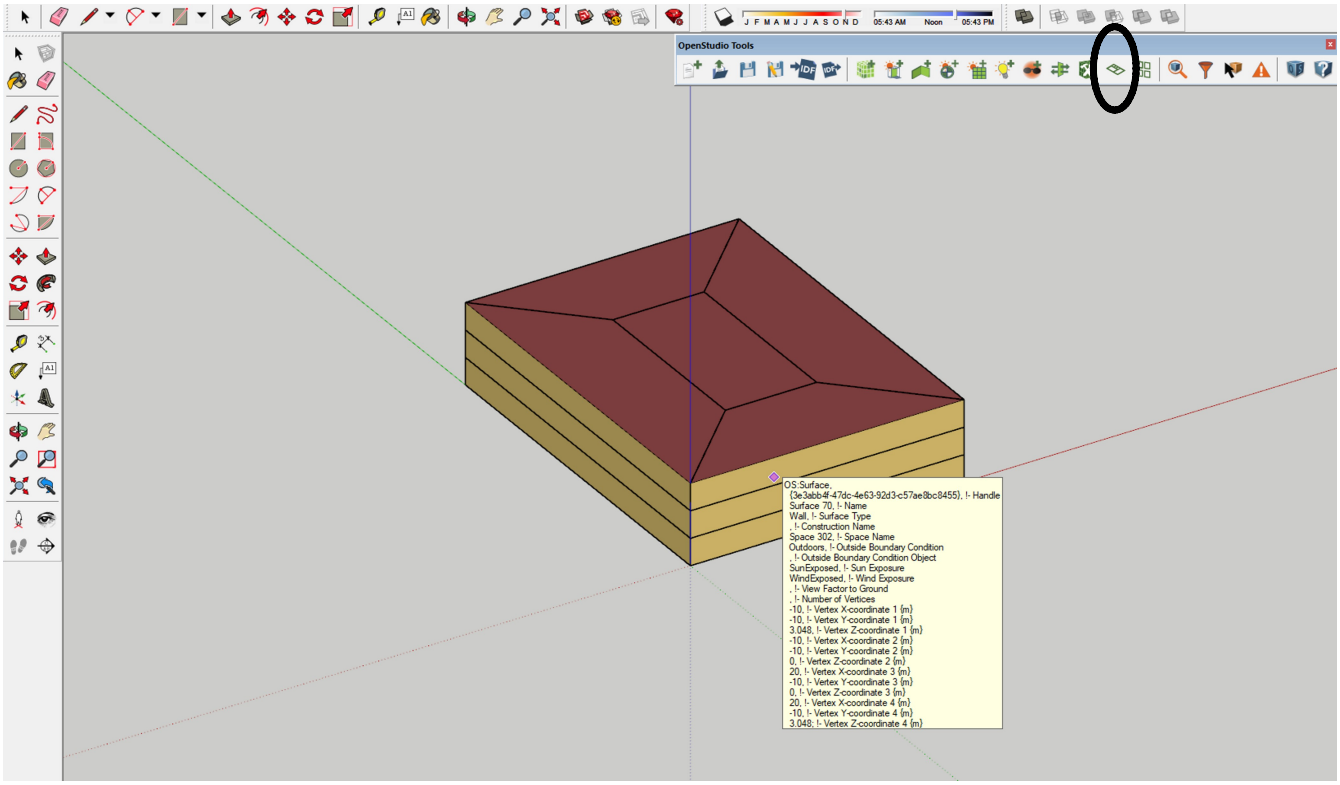
STEP-1

A planar rectangle was drawn with 40x30m measurement and 10 m offsetted through inside to create smaller rectangle.



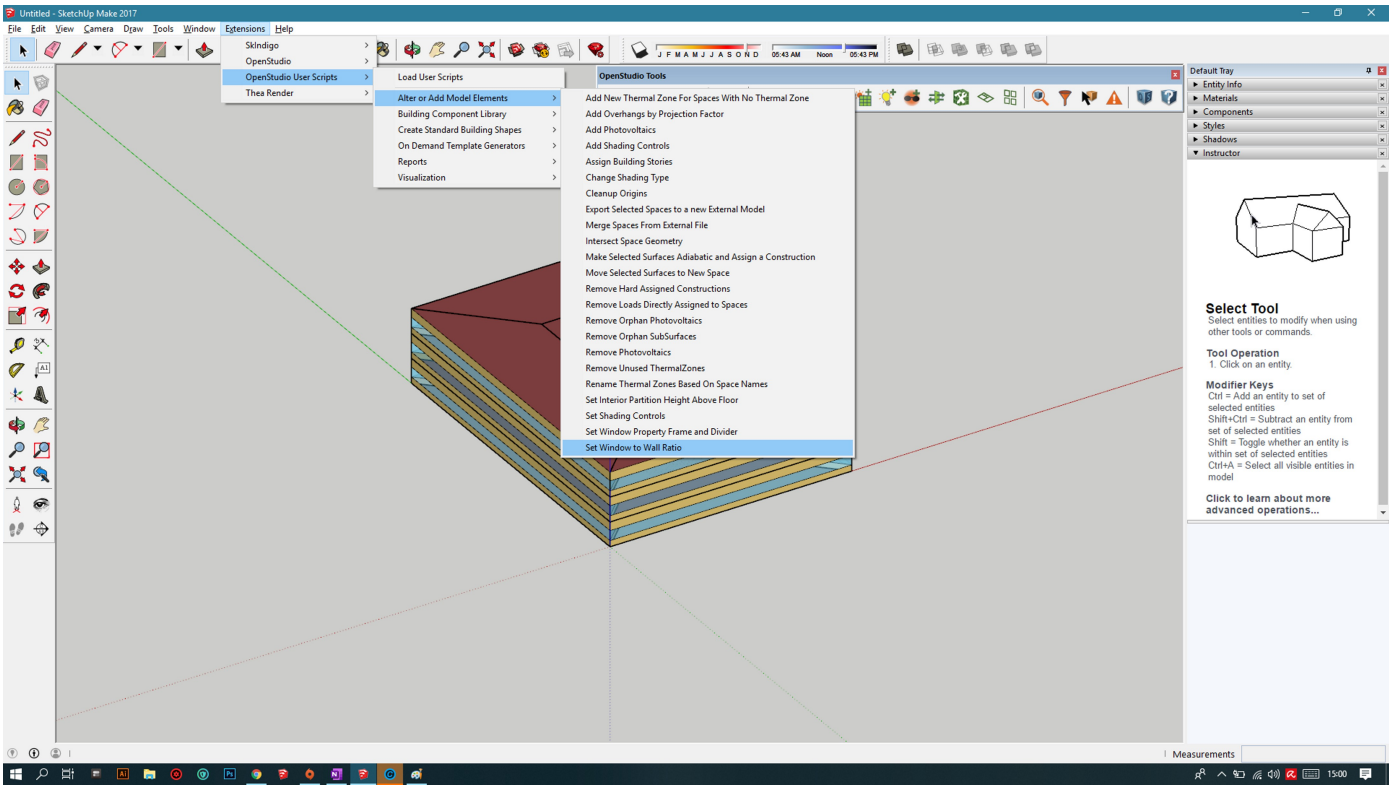
STEP-2

Create spaces from diagram button was selected and 3 floor were created equally.



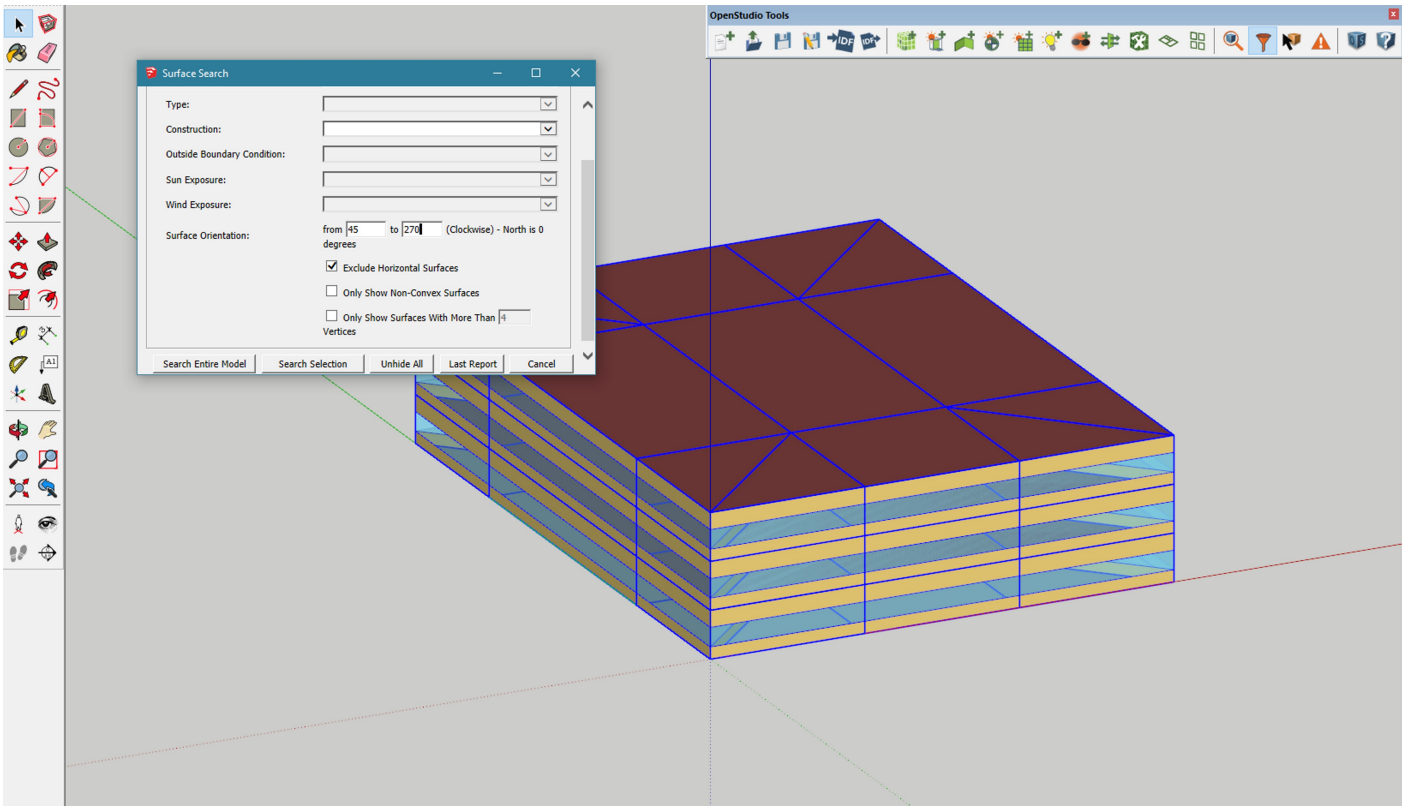
STEP-3

Set window to wall ratio button created windows surrounding the building in every floor, this will help to sun lights get in the building to provide heating.



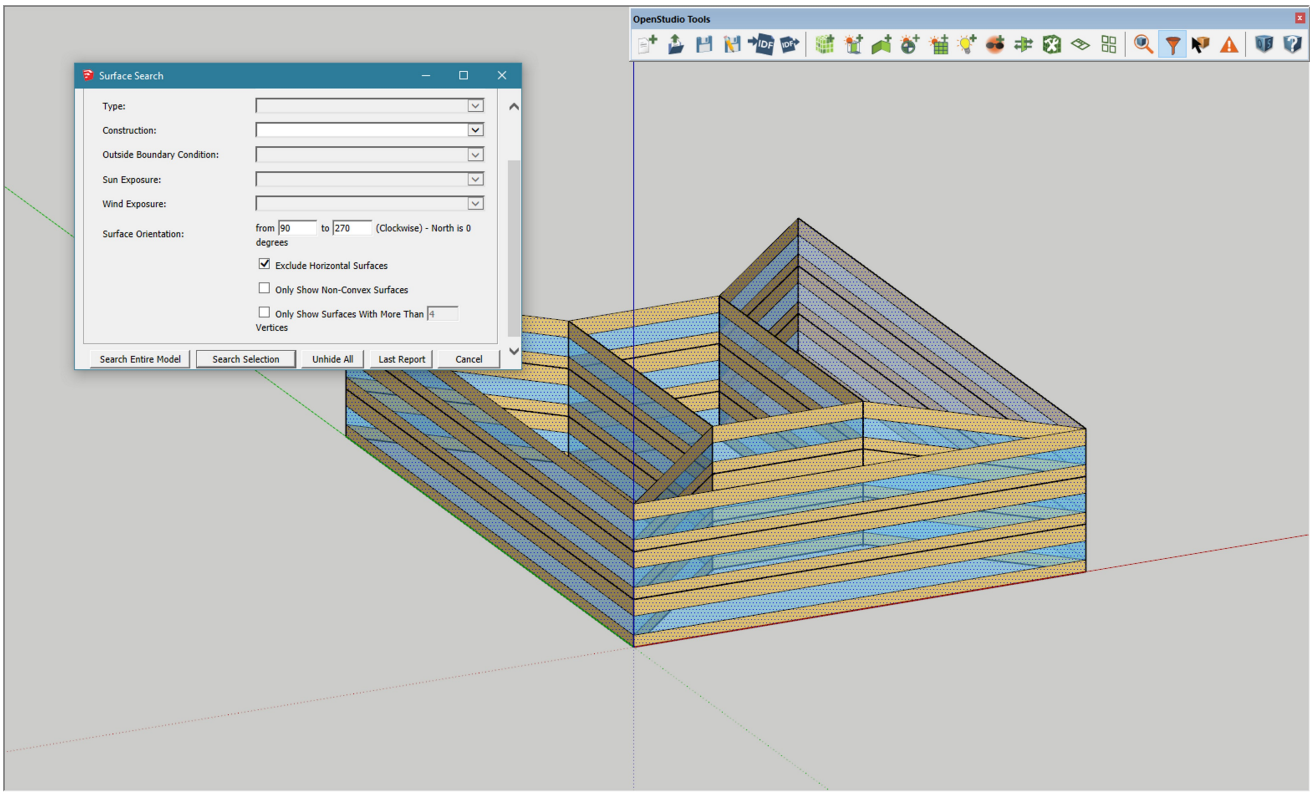
STEP-4

Surfaces were selected exept north side (because north façade doesn't need sun shading so it doesn't receive enough daylight already!)



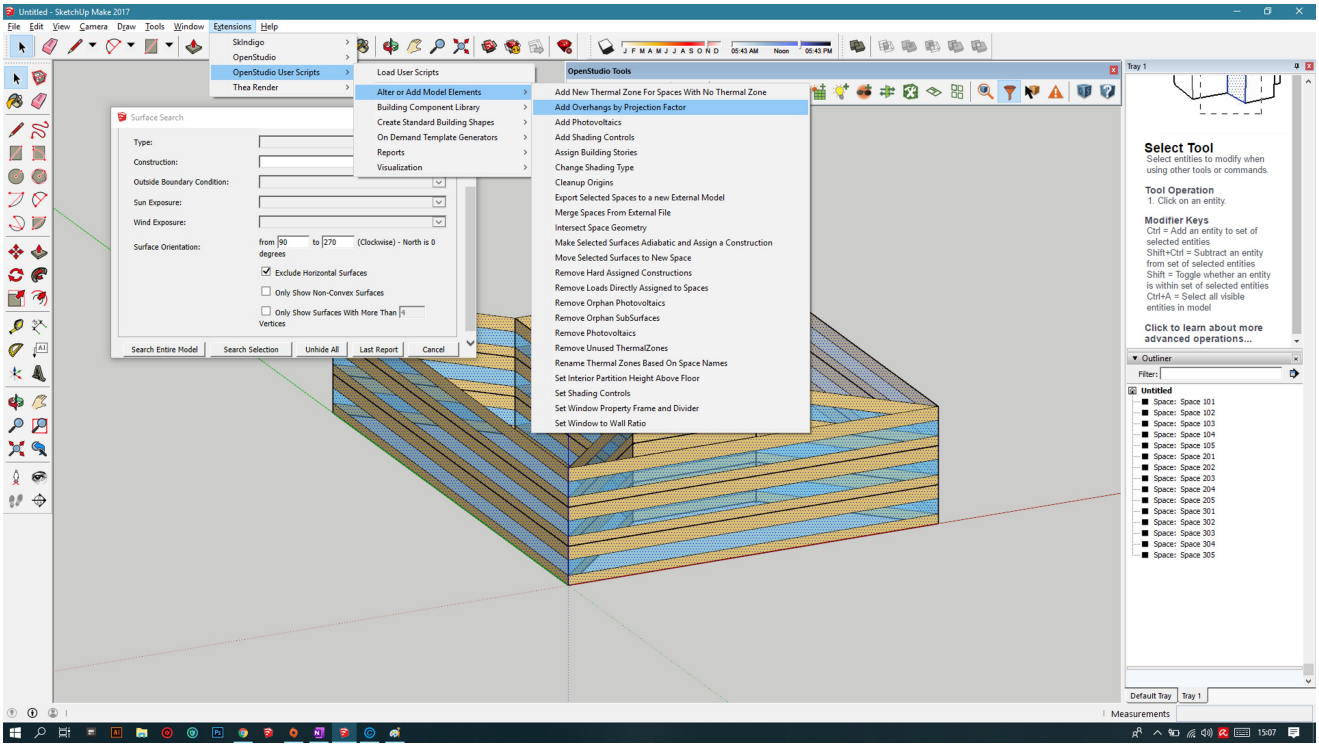
STEP-5

Angle was setted from 90 to 270 degree as work space to neglect the northern façade.



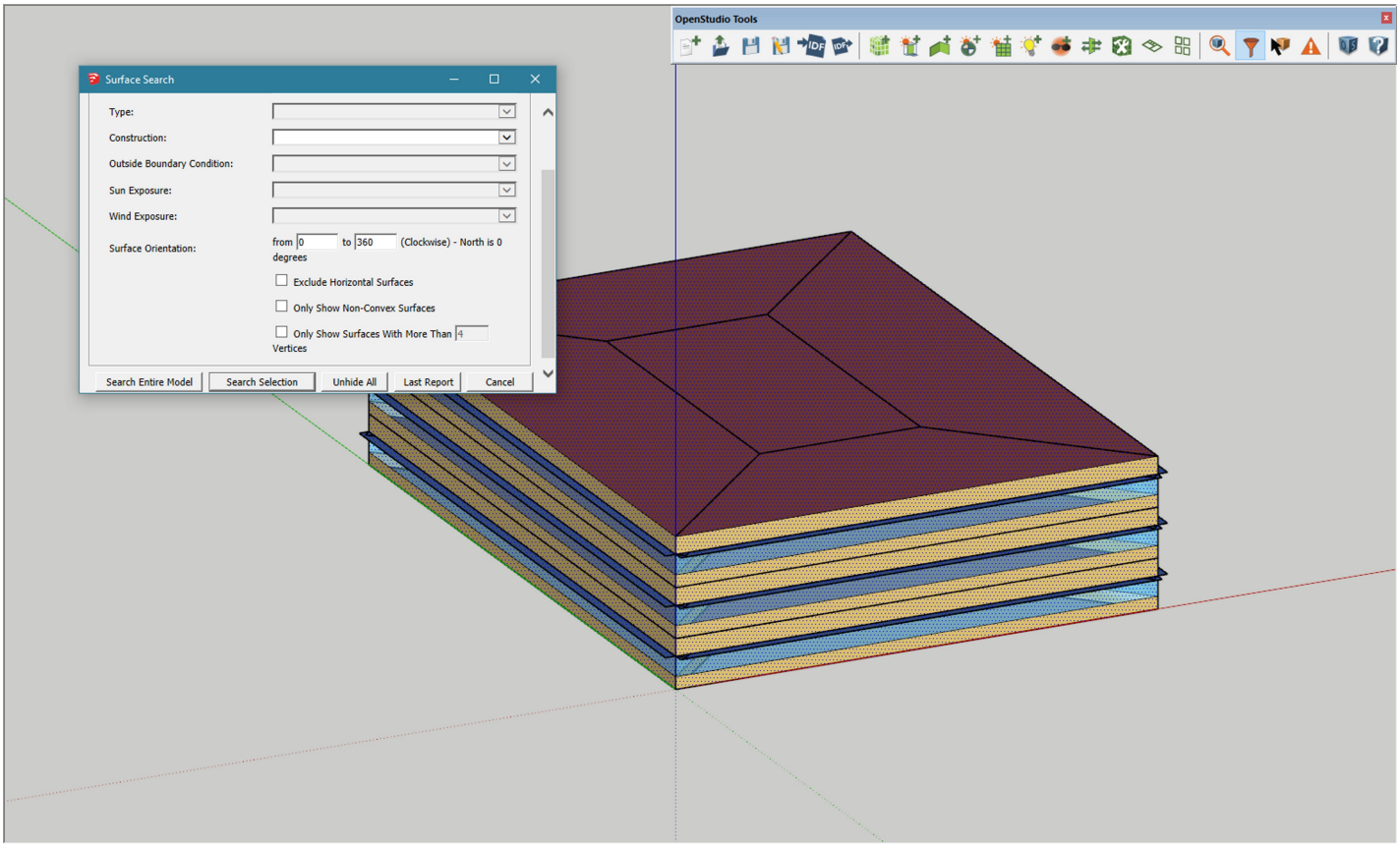
STEP-6

For creating sun shading element; Add overhang by projection factor button was selected. Sun shading elements will provide blocking the sun light which is coming directly inside the building so it can solve the problem of overheating in summer .



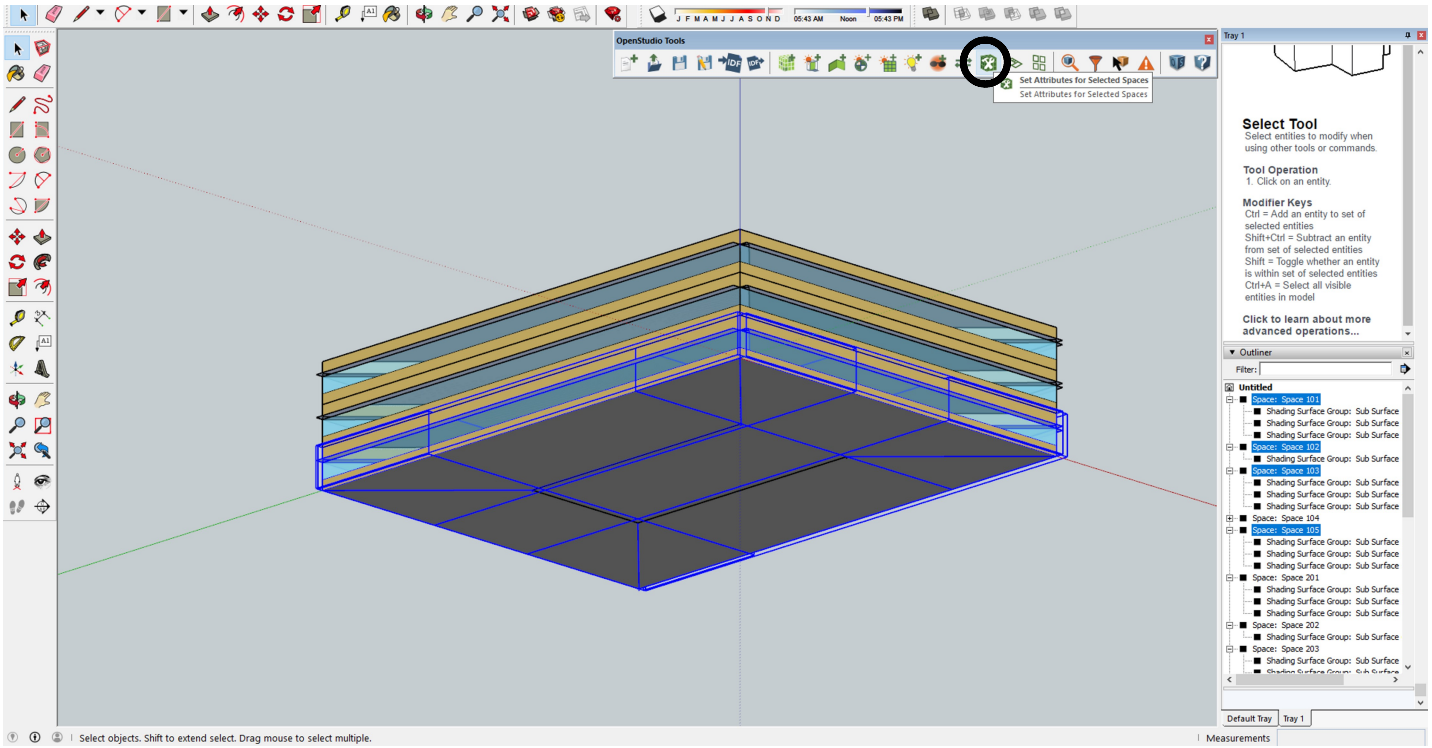
STEP-7

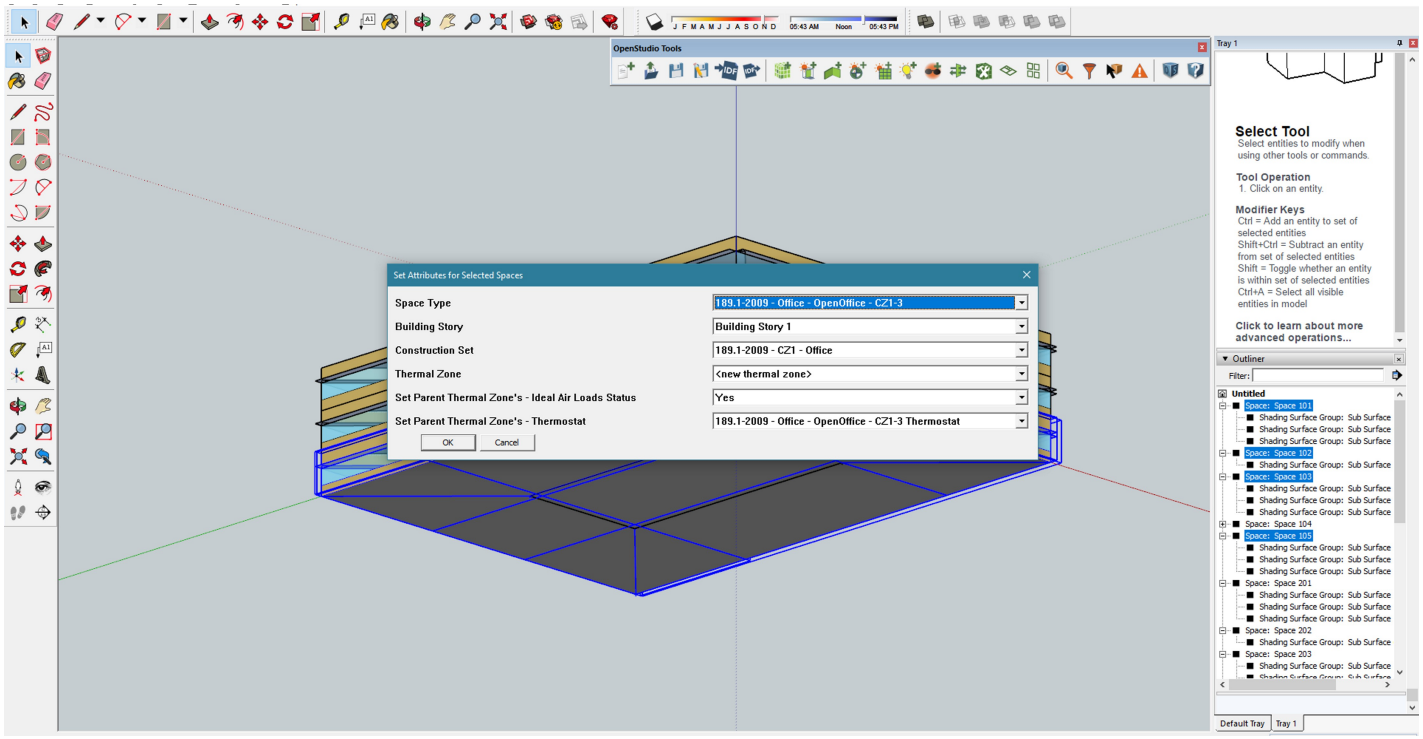
Surface selection settings were returned to normal.



STEP-8

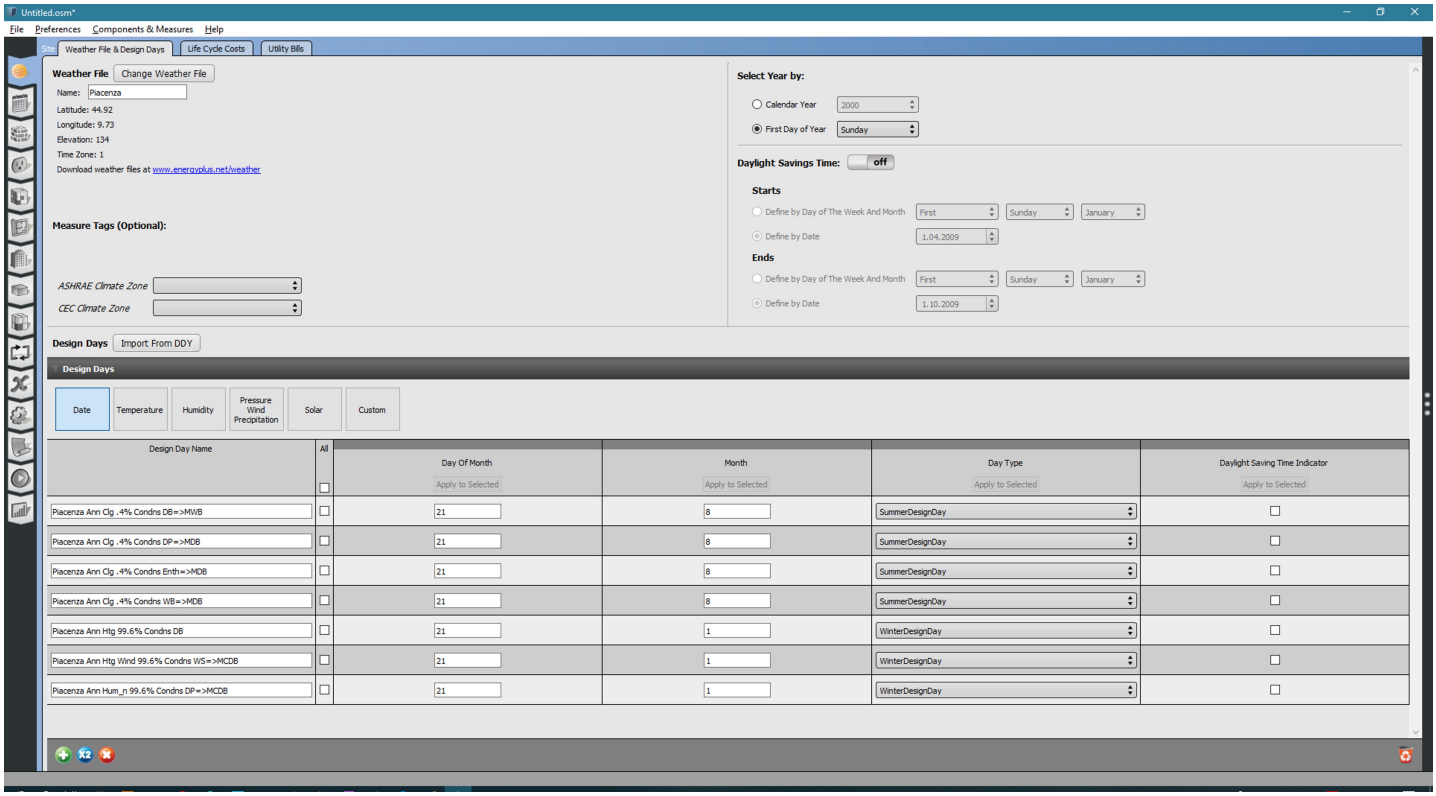
Relevant floor spaces were selected from outliner and set attributes for selected spaces button was pushed and the following settings have been applied to the structure



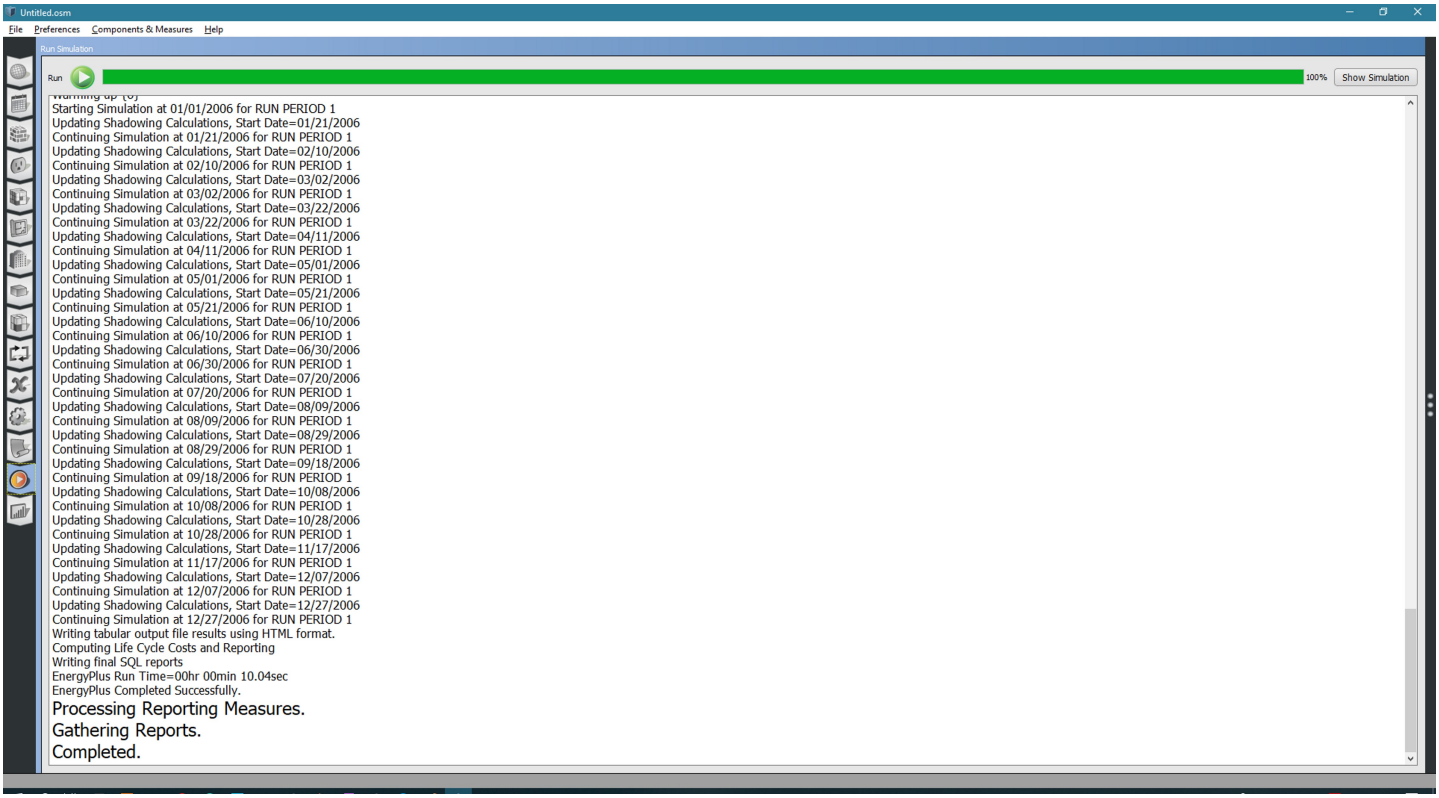


STEP-9

.Epw and .ddy file imported to the program to reach Piacenza's real weather informations so the report will provide us the real calculations.

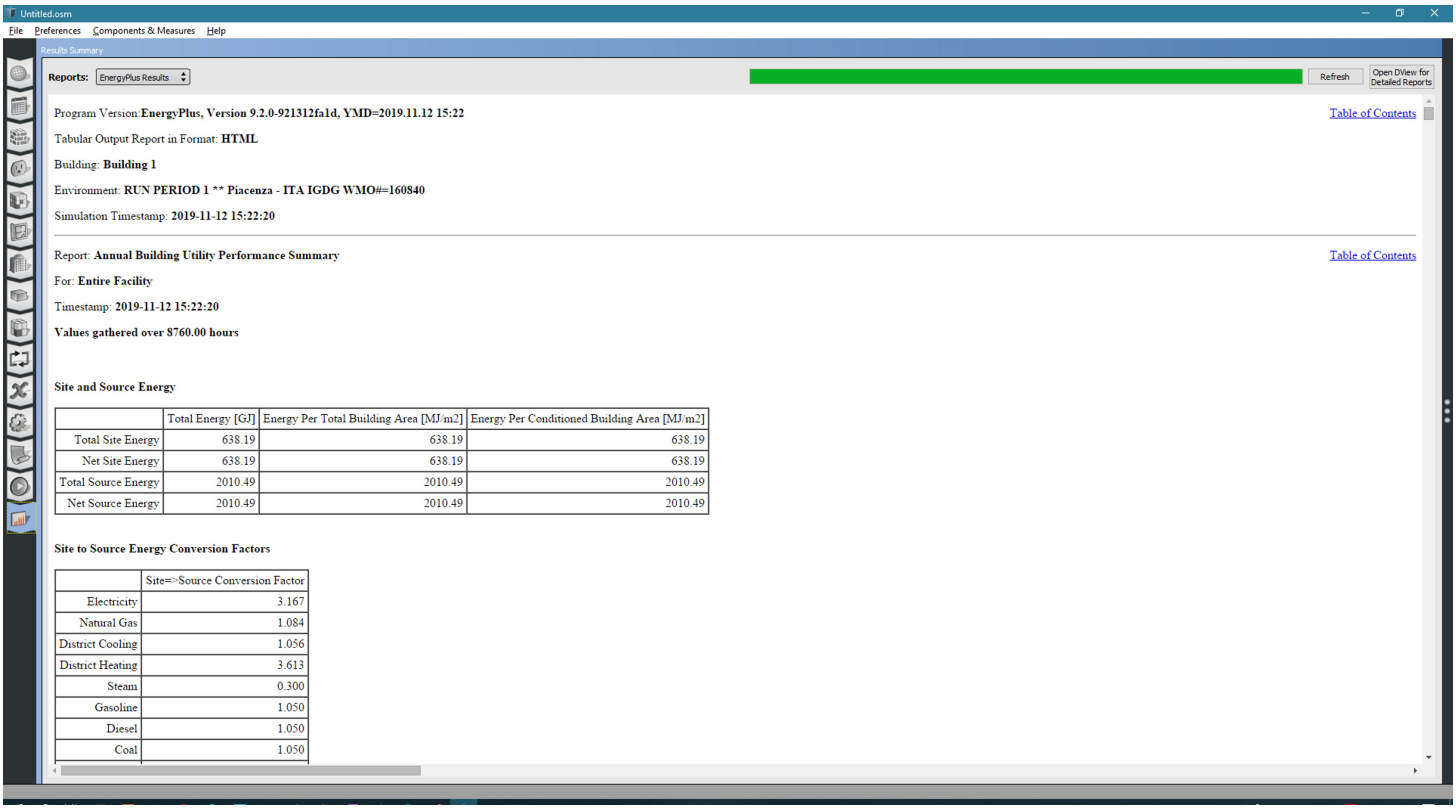


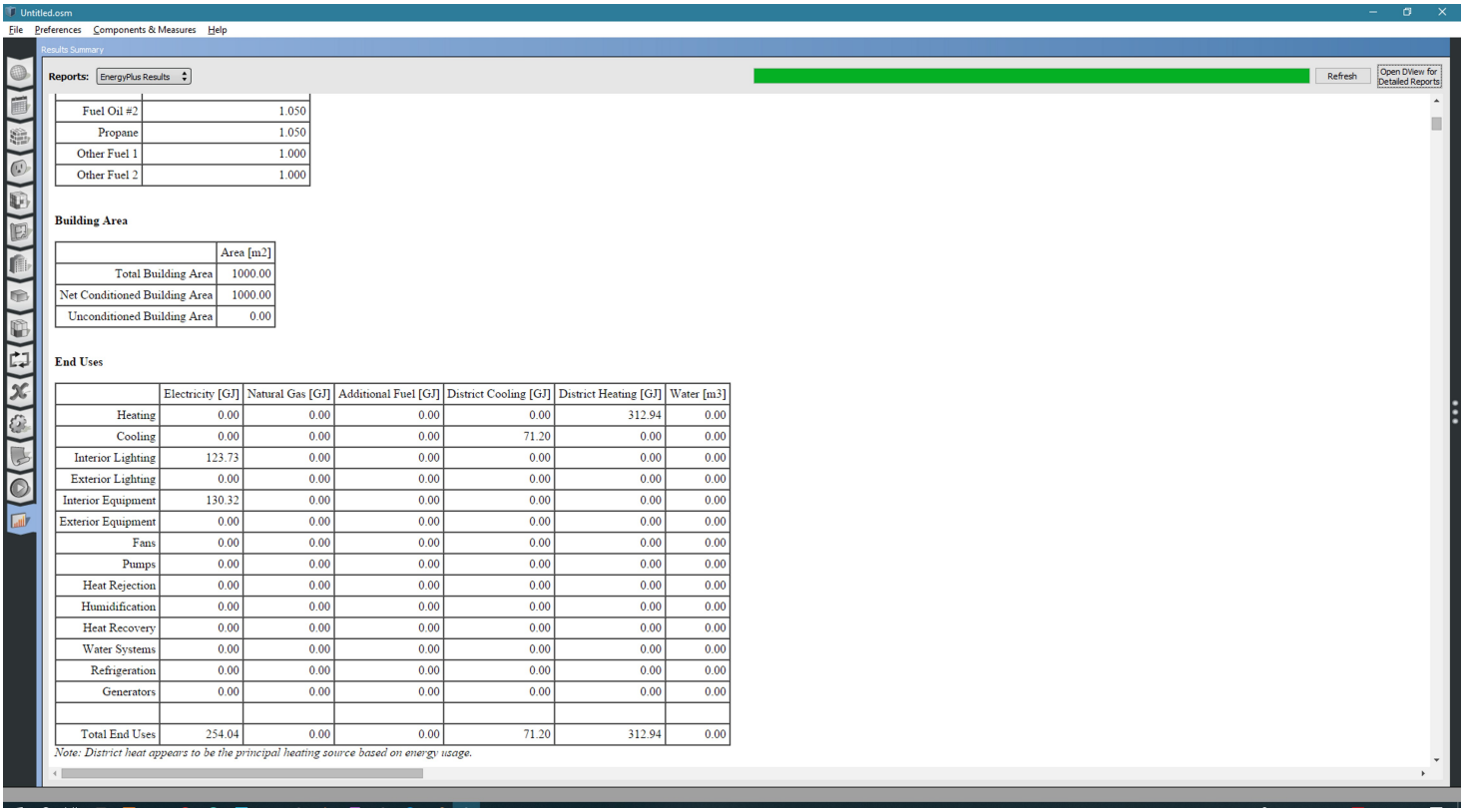
STEP-10 Clicked to the run button tho start to calculation



STEP-11

Finally reached to the annual building utility performance report





Fuel Oil #2	1.050
Propane	1.050
Other Fuel 1	1.000
Other Fuel 2	1.000

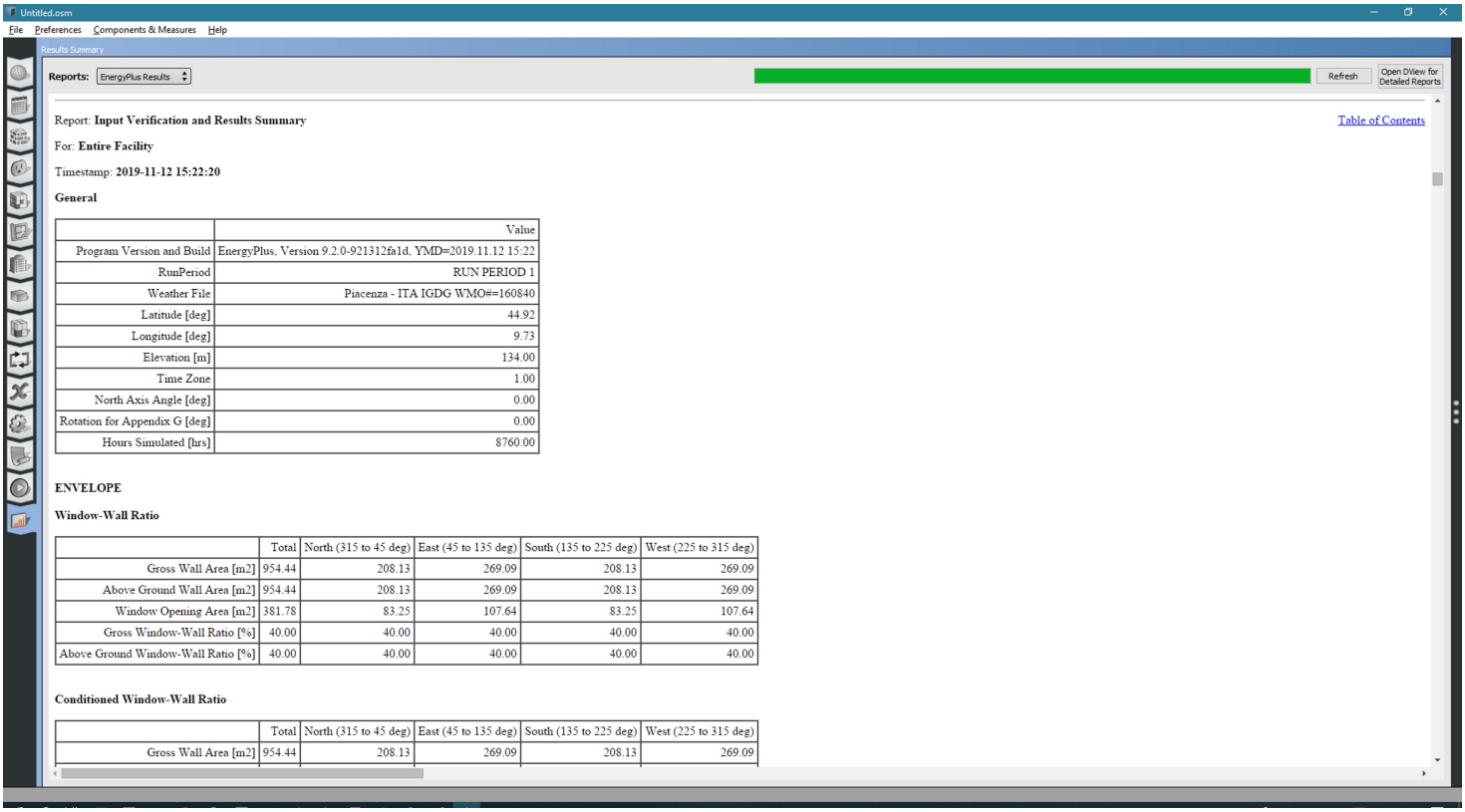
Building Area

	Area [m2]
Total Building Area	1000.00
Net Conditioned Building Area	1000.00
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	312.94	0.00
Cooling	0.00	0.00	0.00	71.20	0.00	0.00
Interior Lighting	123.73	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	130.32	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
Heat Rejection	0.00	0.00	0.00	0.00	0.00	0.00
Humidification	0.00	0.00	0.00	0.00	0.00	0.00
Heat Recovery	0.00	0.00	0.00	0.00	0.00	0.00
Water Systems	0.00	0.00	0.00	0.00	0.00	0.00
Refrigeration	0.00	0.00	0.00	0.00	0.00	0.00
Generators	0.00	0.00	0.00	0.00	0.00	0.00
Total End Uses	254.04	0.00	0.00	71.20	312.94	0.00

Note: District heat appears to be the principal heating source based on energy usage.



Report: **Input Verification and Results Summary**

Table of Contents

For: **Entire Facility**

Timestamp: **2019-11-12 15:22:20**

General

	Value
Program Version and Build	EnergyPlus, Version 9.2.0-921312fa1d, YMD=2019.11.12 15:22
RunPeriod	RUN PERIOD 1
Weather File	Piacenza - ITA IGDG WMO#=160840
Latitude [deg]	44.92
Longitude [deg]	9.73
Elevation [m]	134.00
Time Zone	1.00
North Axis Angle [deg]	0.00
Rotation for Appendix G [deg]	0.00
Hours Simulated [hrs]	8760.00

ENVELOPE

Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	954.44	208.13	269.09	208.13	269.09
Above Ground Wall Area [m2]	954.44	208.13	269.09	208.13	269.09
Window Opening Area [m2]	381.78	83.25	107.64	83.25	107.64
Gross Window-Wall Ratio [%]	40.00	40.00	40.00	40.00	40.00
Above Ground Window-Wall Ratio [%]	40.00	40.00	40.00	40.00	40.00

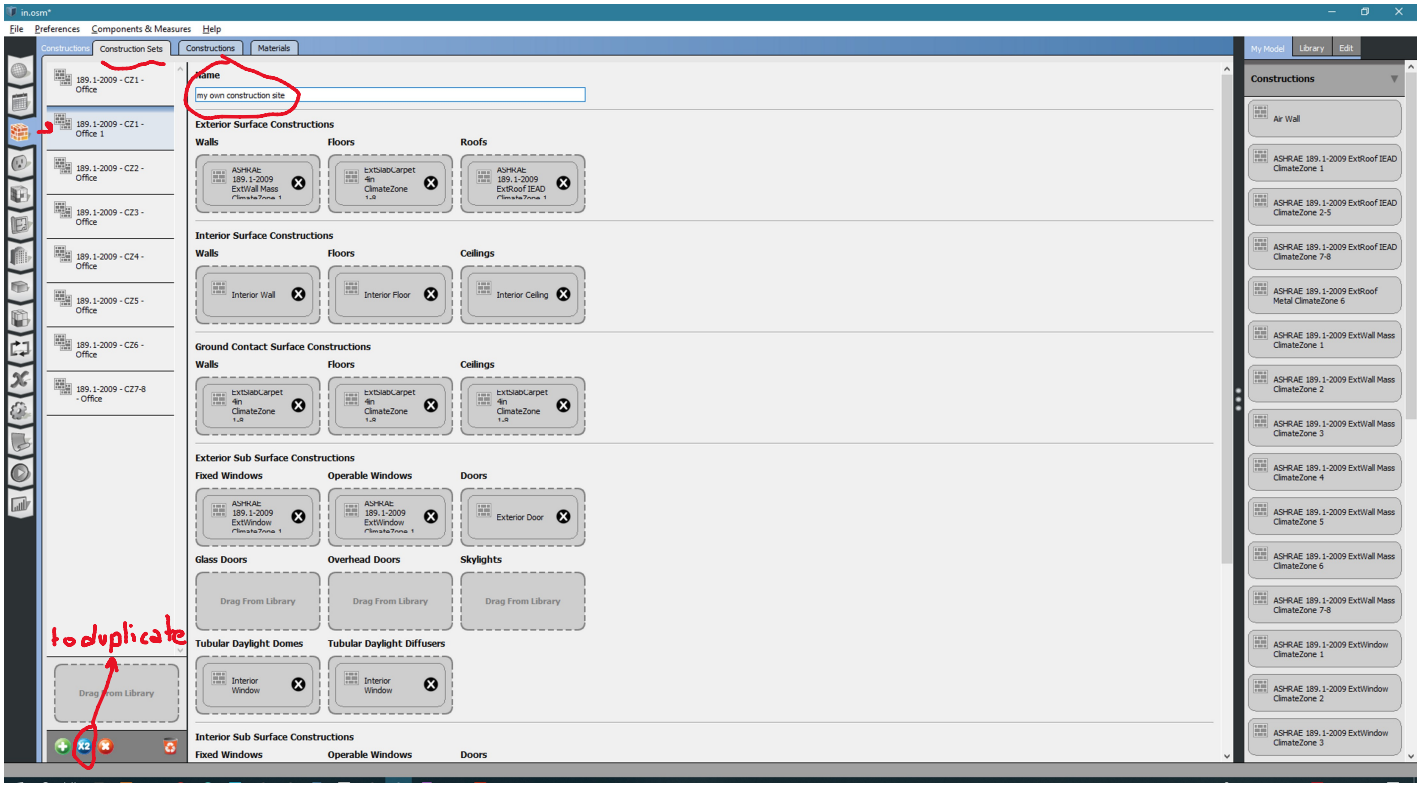
Conditioned Window-Wall Ratio

	Total	North (315 to 45 deg)	East (45 to 135 deg)	South (135 to 225 deg)	West (225 to 315 deg)
Gross Wall Area [m2]	954.44	208.13	269.09	208.13	269.09

FOLLOWING STEPS TO CUSTOMIZE OUR OWN CONSTUCTION ADJUSTMENTS

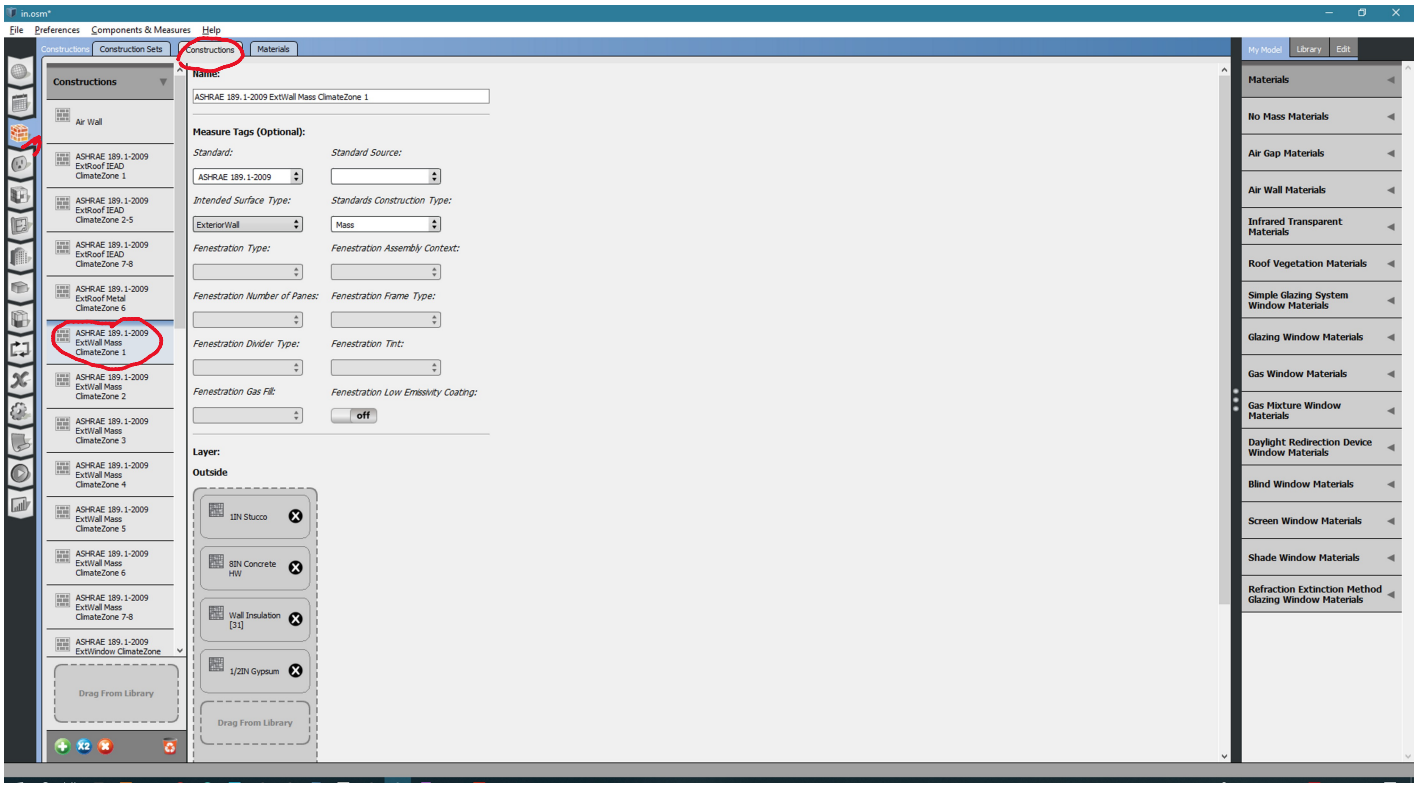
STEP 1

Open OpenSpace launch ! 3rd tab show contruction that was chosen. Now we sshould duplicate the Construction set and Rename it as a new work.

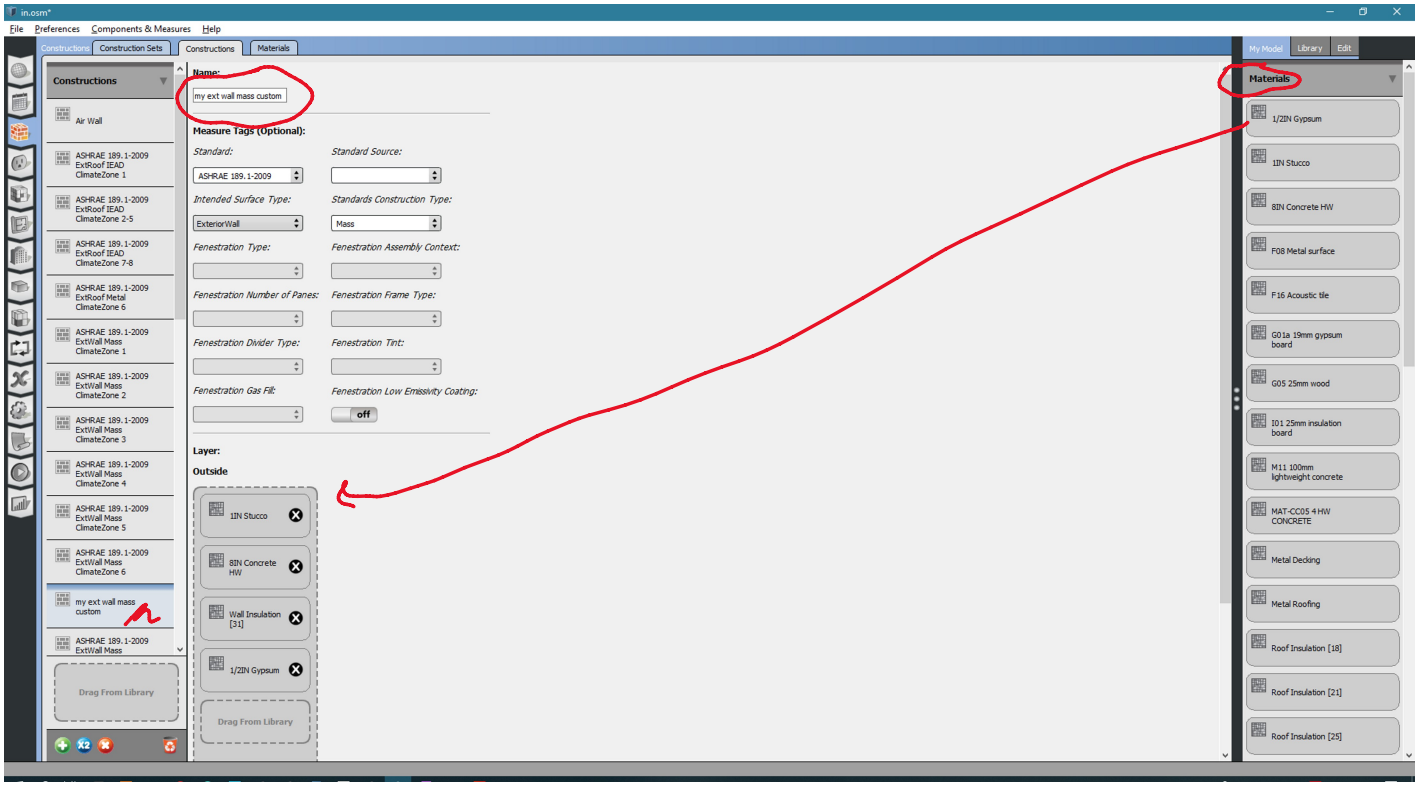


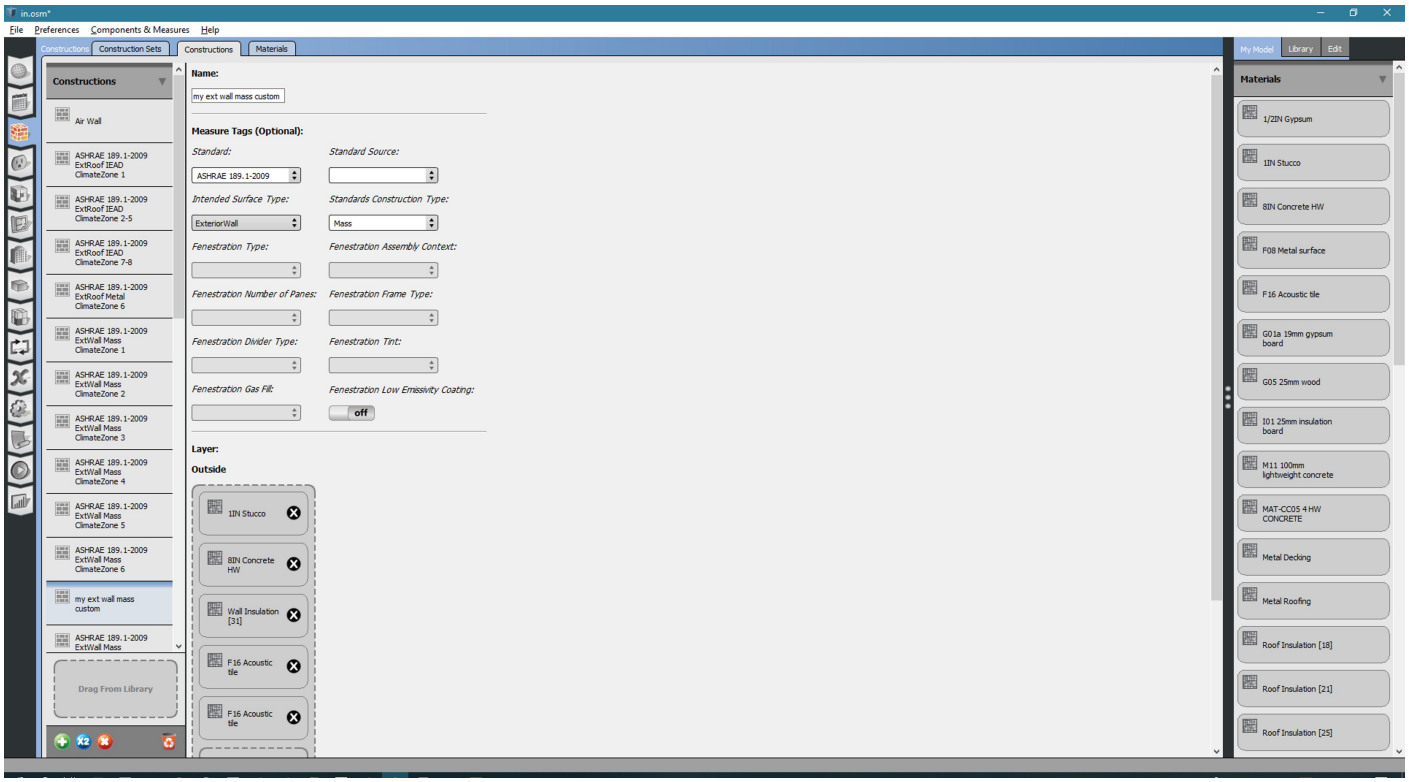
STEP 2

Contuctions tab shows part of a construction. We chose Exterior wall mass part to customize and duplicated. Renamed it as "my custom extwall"



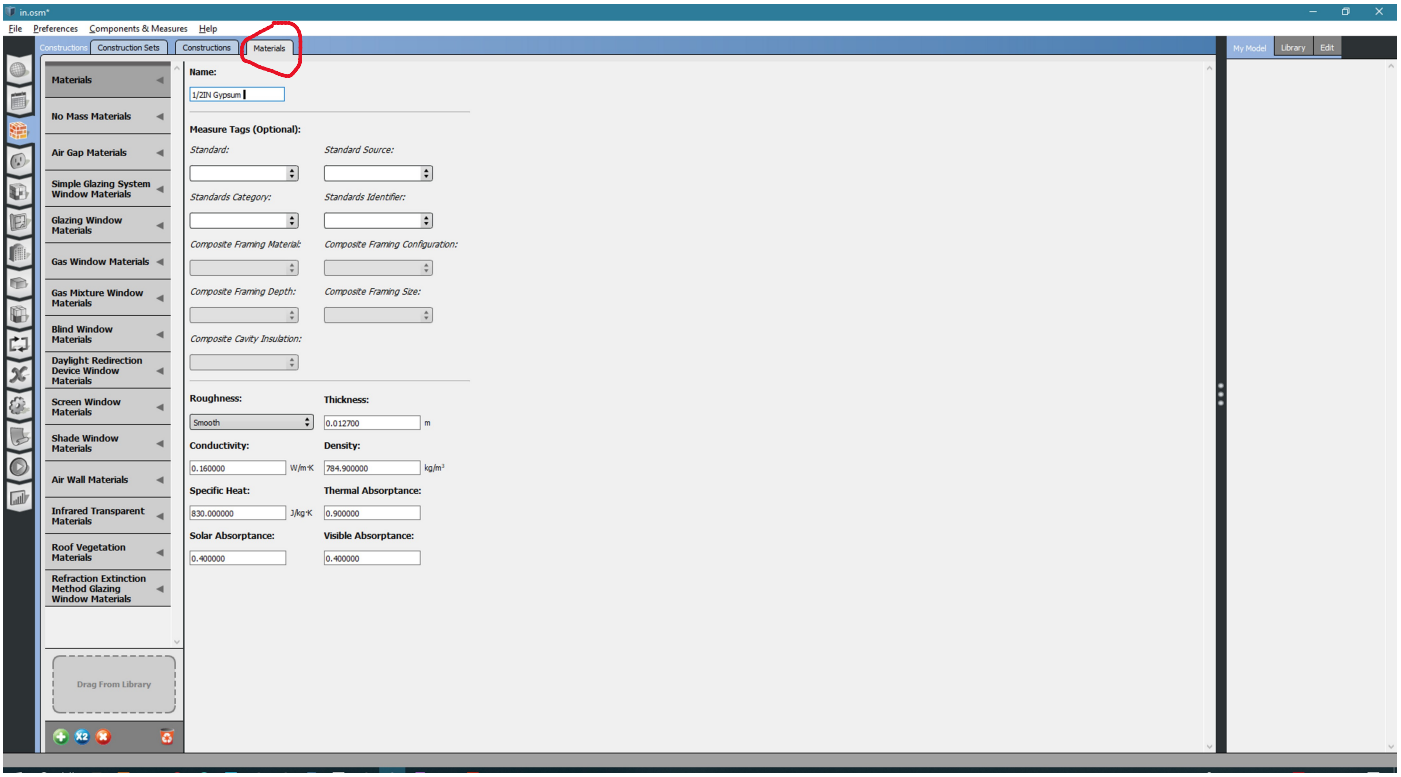
We can see layer of a standart exterior wall. To customize it we should delete them and drag materials from the right tab as we need. But layers should be from outside to the inside.



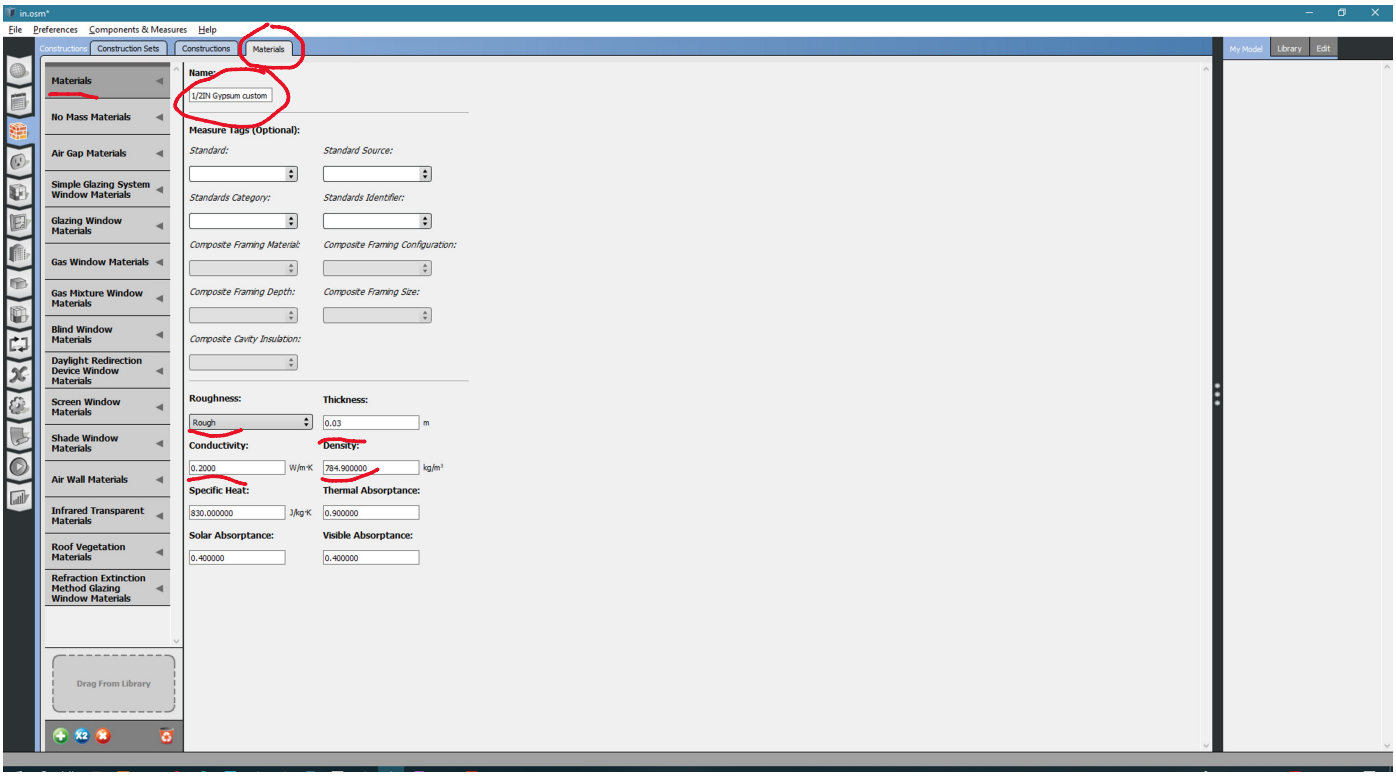


STEP 3

To define customize materials go to the materials tab and chose your material that you want to change. You will see that there is existing values of the material you've chosen!

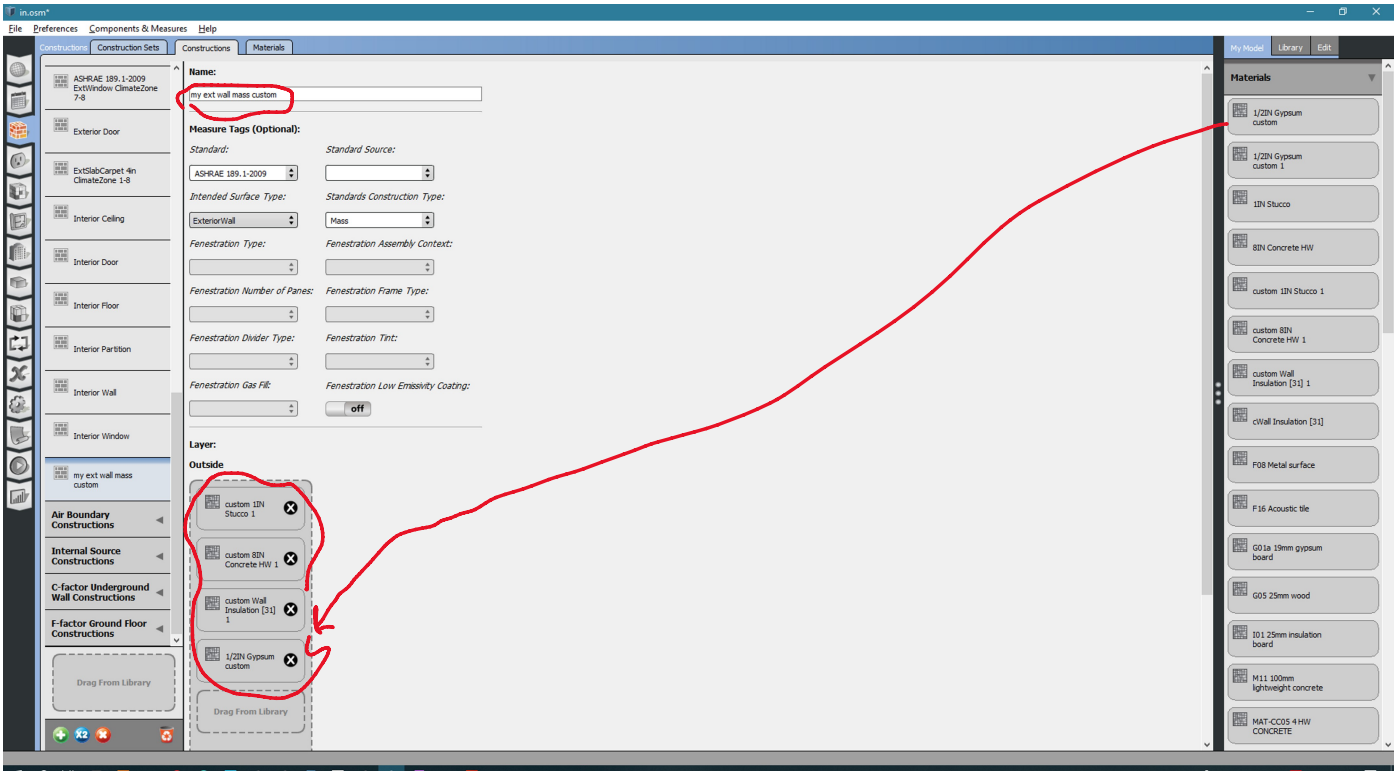


Now we should duplicate the material and change its features. All the changes that we have done from now on, will provides us customized constuction set.



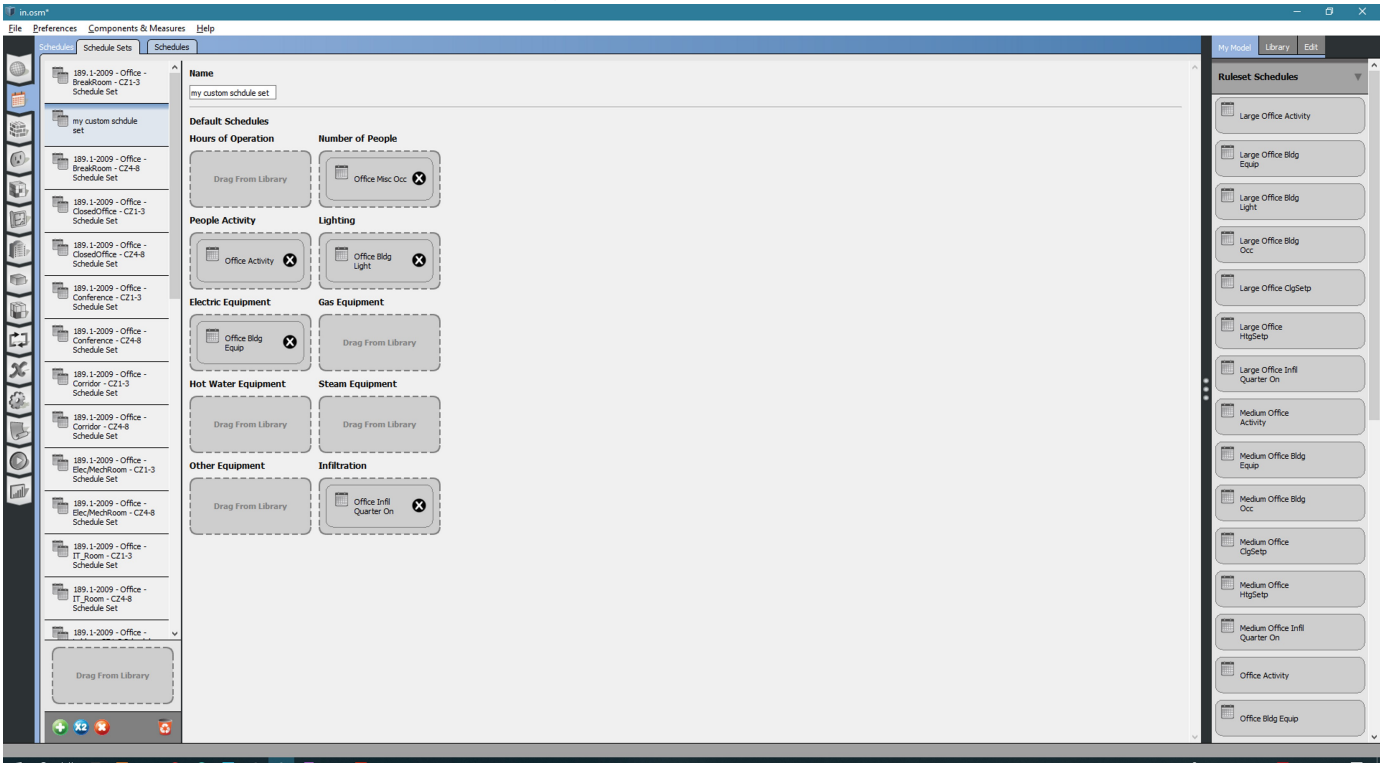
STEP 4

After all, we drag the customized materials again one by one. And finalize our construction customization.



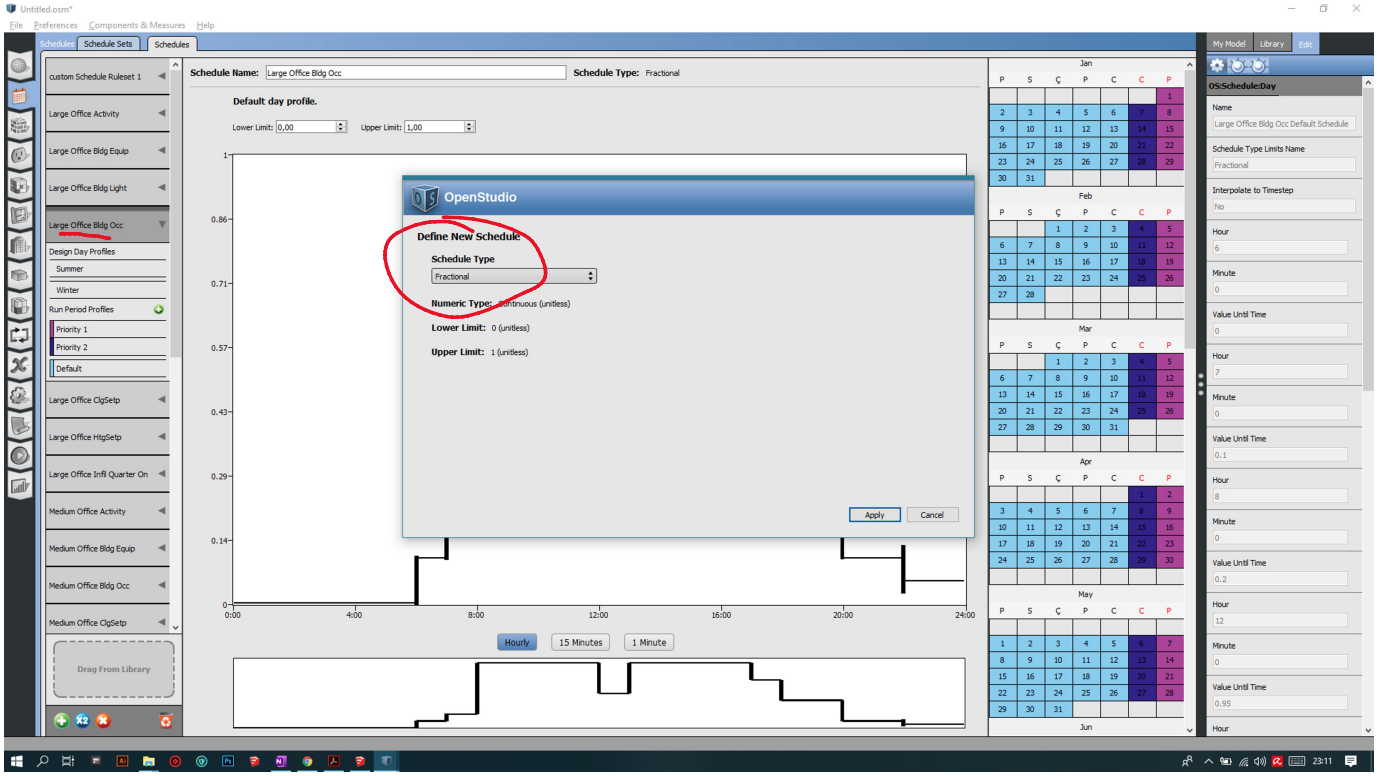
STEP 5

2nd tab is show timetables and schedules calculation of a office. After we choose it we come to schedule set tab to create our own schedule. Duplicate it and rename.



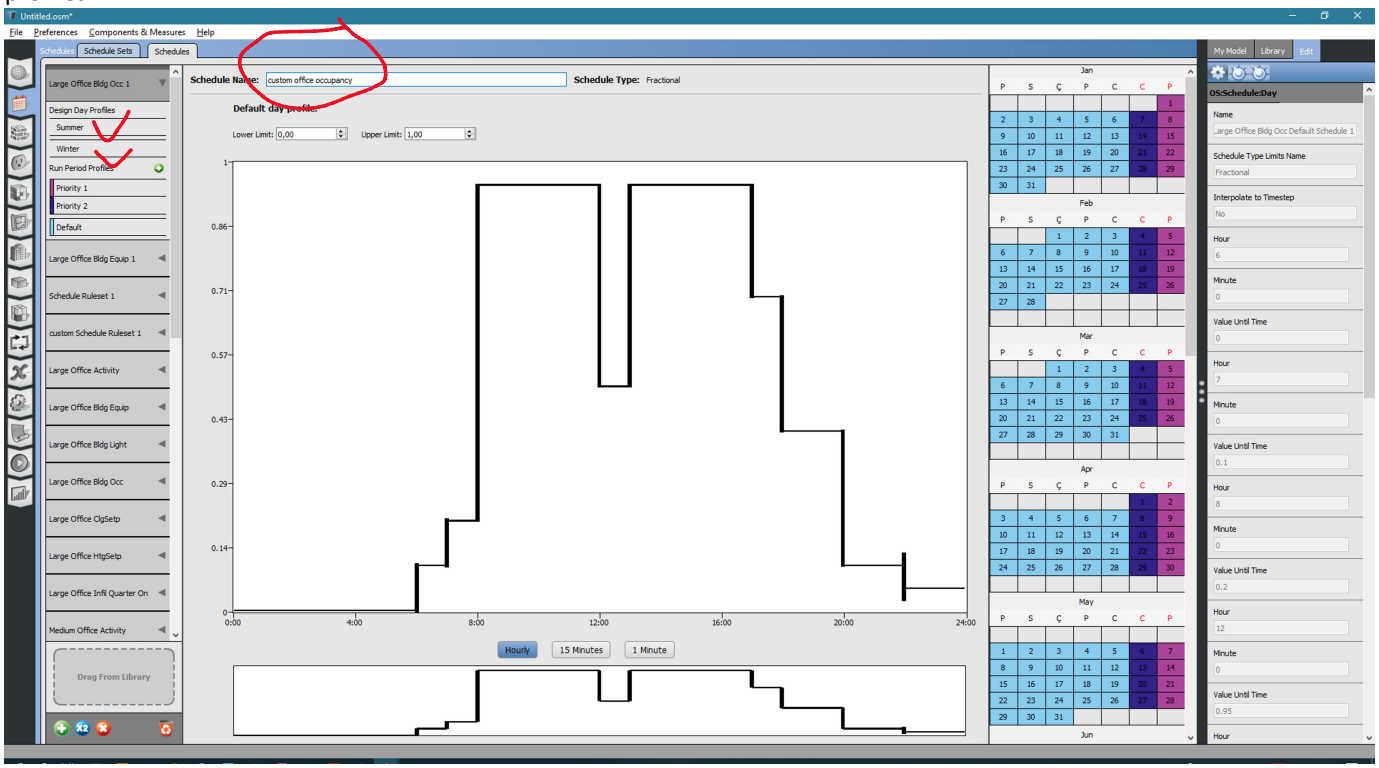
STEP 6

Come to the schedule tab and duplicate and rename your own schedule. Fractional schedule type has been chosen.



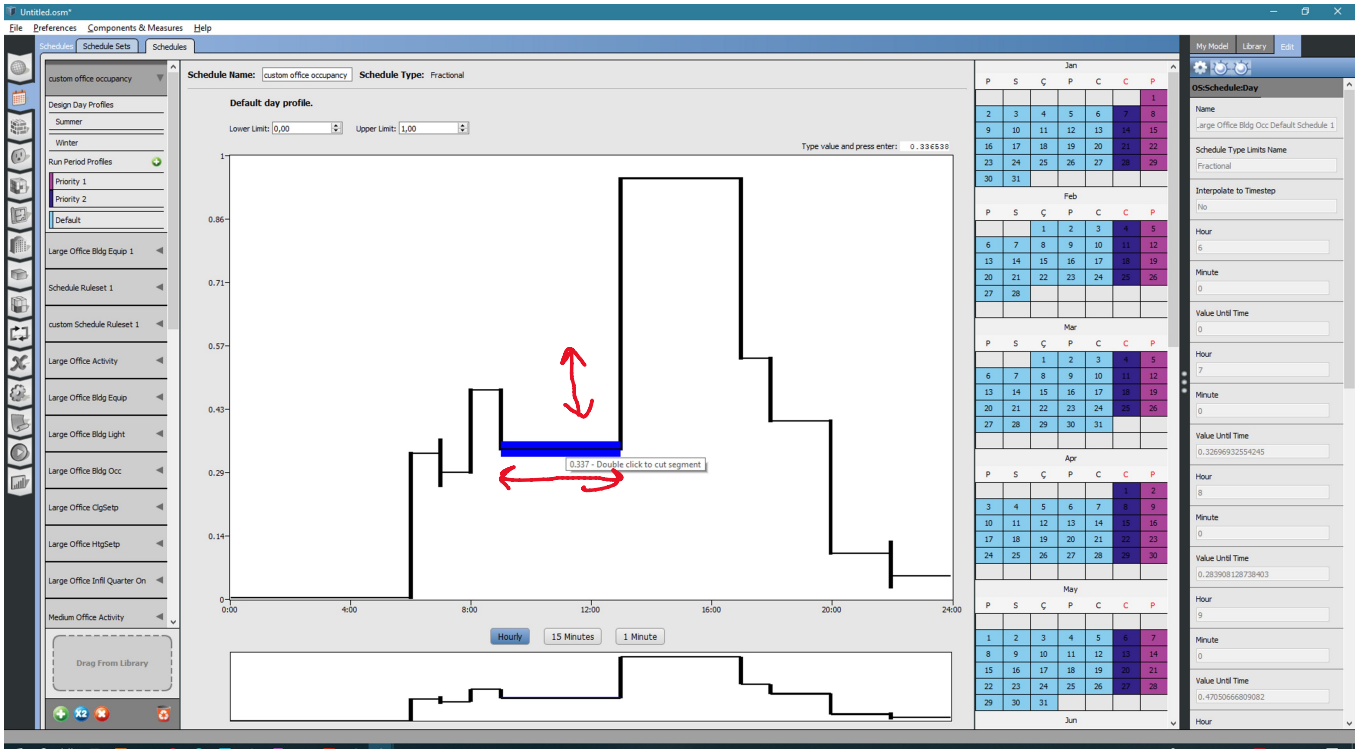
STEP 7

There is default day profile. Also we can see summer and winter situations. So we will design day profiles.



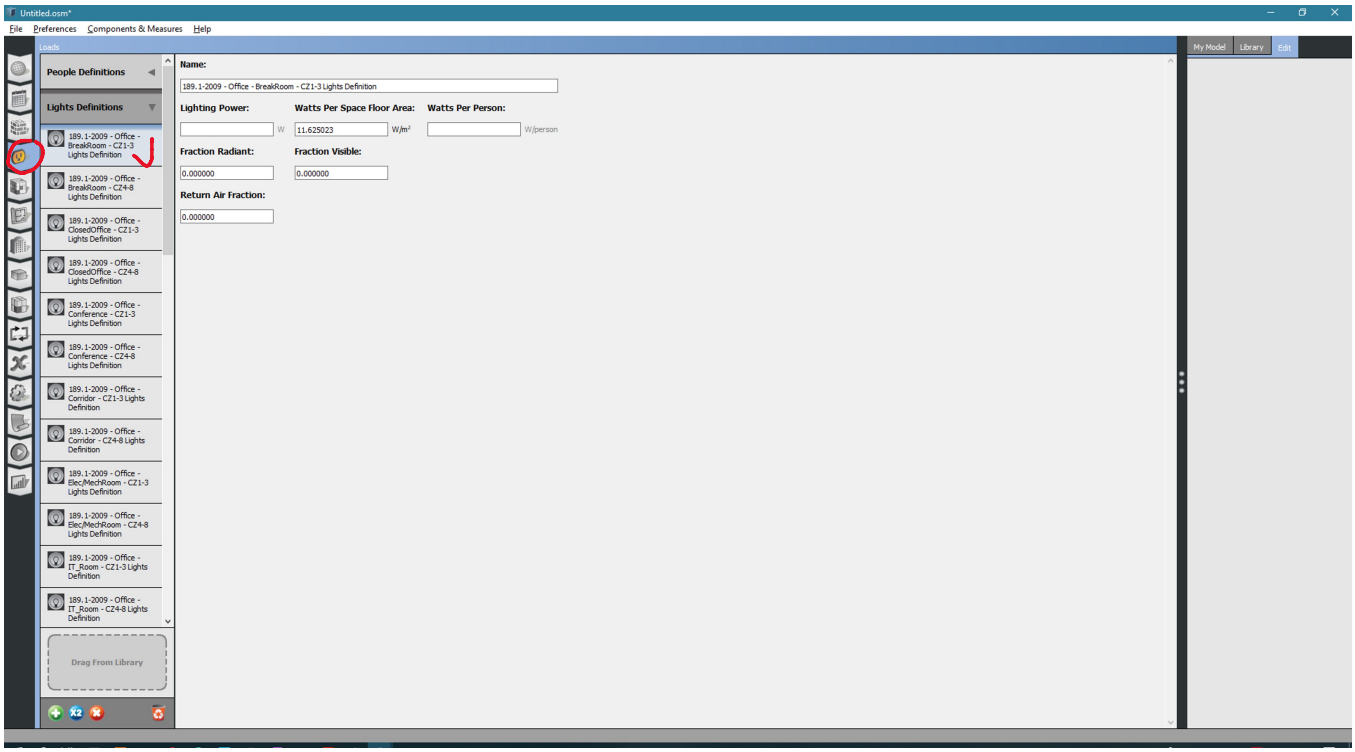
STEP 8

We can play with the timetable according to the working hours, lunch breaks etc..



STEP 9

4th left tab is shows definitions. Again we should duplicate the default light definition.



STEP 10

Rename it and change the measurements as we required.