Technical Environmental Solutions/ Submission no.7/ Leyana Altemawy

Task no.1

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

Solar Radiation is a general term for the electromagnetic radiation, emitted by the sun. It can be captured and turned into useful forms of energy, such as heat and electricity, using a variety of technologies. Each location on earth receives sunlight differently. The amount of solar radiation that reaches any one spot on the earth's surface varies according to many aspects: geographic location, season, time of the day, local weather and landscape.
The sun strikes the earth surface at different angles, ranging from 0° to 90°. When the sun's rays are vertical, the Earth's surface gets all the energy possible. The Earth revolves around the sun in an elliptical orbit and is closer to the sun during part of the year.

When the sun is nearer the Earth, the Earth's surface receives a little more solar energy. The Earth is nearer the sun when it is summer in the southern hemisphere and winter in the northern hemisphere. The rotation of the Earth is also responsible for hourly variations in sunlight. In the early morning and late afternoon, the sun is low in the sky. Its rays travel further through the atmosphere than at noon, when the sun is at its highest point.
As sunlight passes through the atmosphere, some of it is absorbed, scattered, and reflected by: Air molecules, water vapor, douds, dust, pollutants…etc.

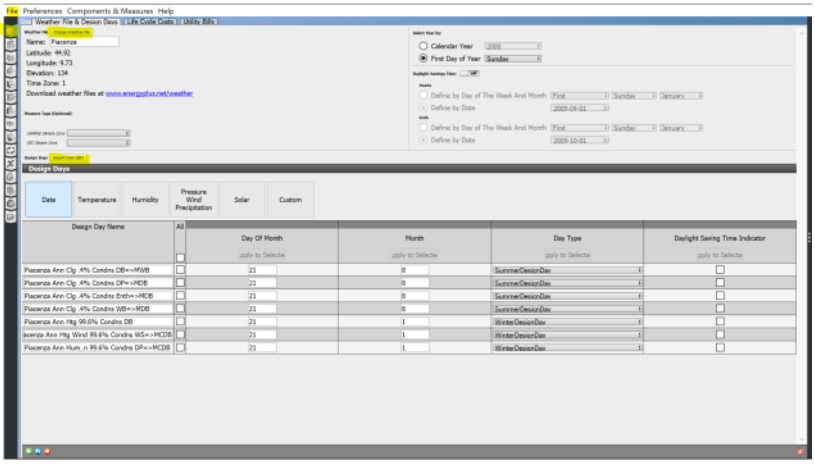
This is called diffuse solar radiation. The solar radiation that reaches the Earth's surface without being diffused is called direct beam solar radiation. The sum of the diffuse and direct solar radiation is called global solar radiation. Atmospheric conditions can reduce direct beam radiation by 10% on clear, dry days and by 100% during thick, cloudy days.
Measurements of solar energy are typically expressed as total radiation on a horizontal surface, or as total radiation on a surface tracking the sun.

Task no.2

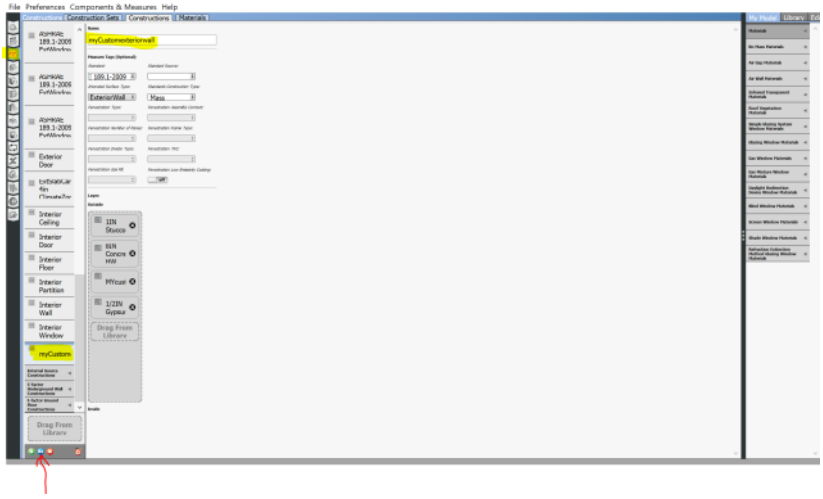
Create a pdf file with screenshots of all of the steps we went through in the second lesson on Open Studio, and explain briefly the reason behind the use of each step. (in your own words!)

We can make some modifications and adjustments in the specifications of our model, for example adding layer to an exterior wall, changing layer thickness or materials, building functions, artificial lighting, space usage, number of occupants…etc. and run the software according to these adjustments to give us different results of the model behavior to help us choose the best scenario.
We can use the following procedures:

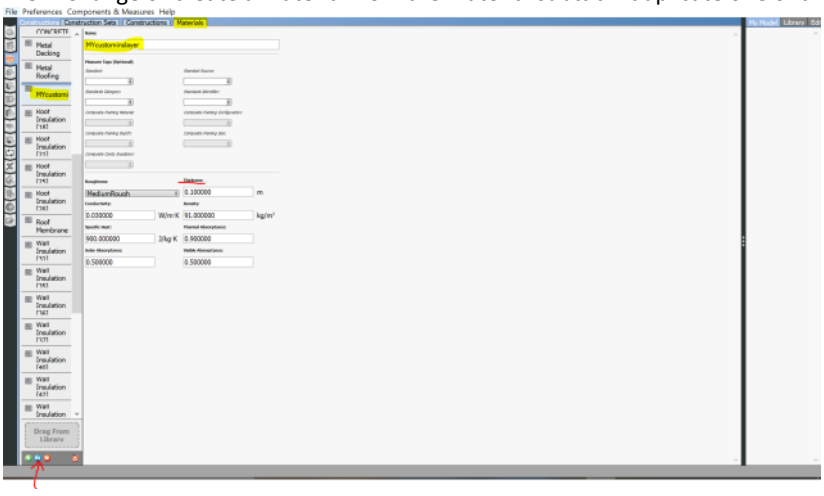
1- Open the .osm file, check if the weather data and design days data area uploaded.



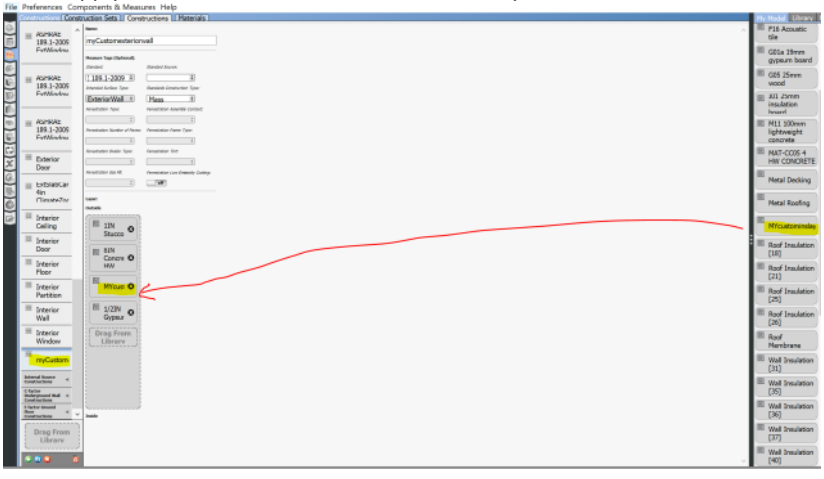
2- In order to change or create a custom layers in wall, we can select the construction tab---construction subtab--- duplicate the desired element--- rename it.



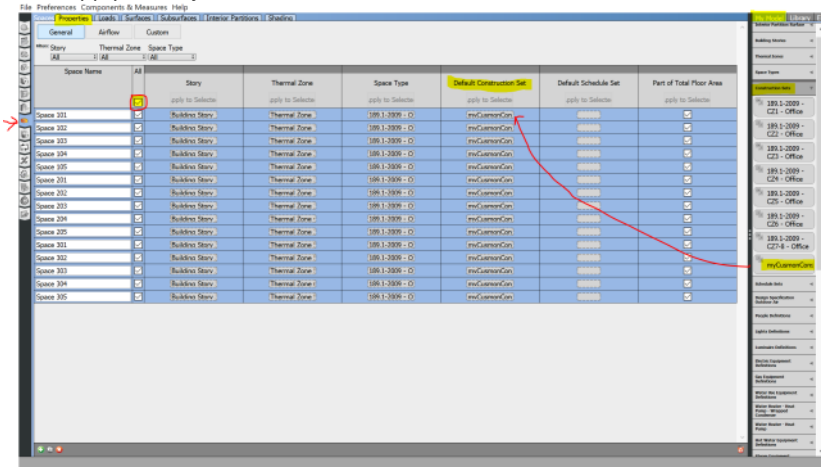
3- Change or create a material from the material subtab---duplicate one of the existence material---adjust it.



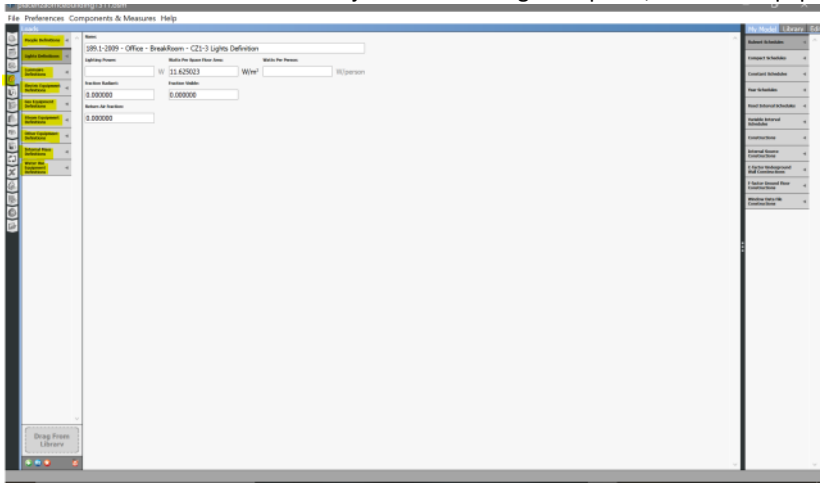
4- Apply the customized material to the wall layers.



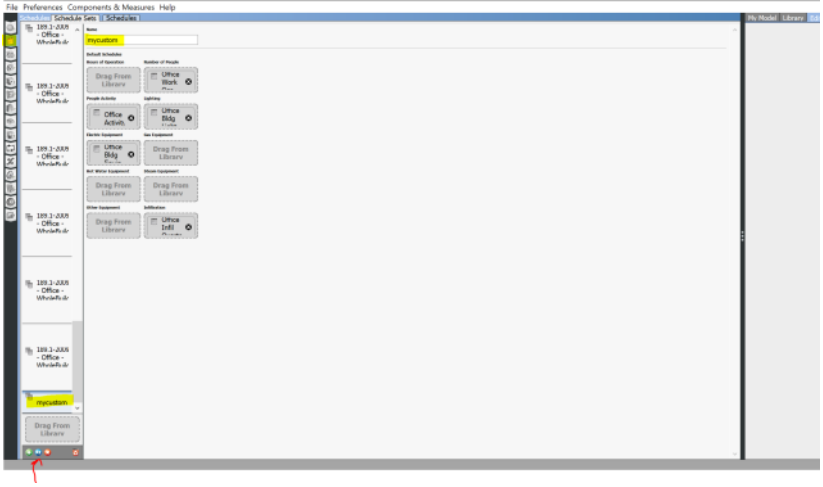
5- Apply the adjusted wall into the selected construction set.



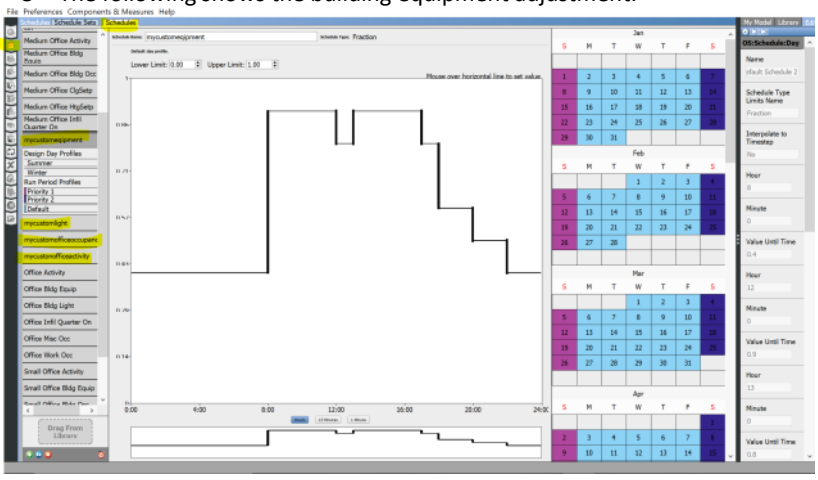
6- From the load tab we can adjust the following: occupants, electrical equipment, gas equipment, water equipment.



7- From the schedule tab, schedule set we can create schedules related to the office activity, building equipment, building light…etc.



8- The following shows the building equipment adjustment.



9- In the schedule set, we can apply the schedules we have created in the previous step.