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17 November 2019 23:50

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Task 1: Summary about 'Solar Radiation'

Solar Radiation is the radiant energy emitted by the sun from a nuclear fusion reaction that creates electromagnetic energy. The energy that comes to the earth is modified due to the phenomenon of dispersion and absorption.

Dispersion:
When the sun rays are inclined to the earth's surface, energy becomes disperse or spread out in greater area. If the available energy reaching the atmosphere is constant and is dispersed over a greater area. The amount of energy at any given point within the area decreases, therefore the temperature is lower. Dispersion of insolation in the atmosphere is caused by the rotation of the earth.

Scattering:
About 25% of the incoming solar radiation is scattered or diffused by the atmosphere. This phenomena occurs when solar radiation passes through air and deflected in all directions by the molecules of grasses, suspended particles and water vapour. It acts as prism and produce variety of colours. Various wavelengths and particle sizes result in complex scattering produces the colour of the sky, Blue.

When sun emits radiant energy, some of it is transmitted, while other is absorbed by the earth's atmosphere. Earth reflects an average of 36% of the insolation. Solar radiation absorption is due to some atmospheric components which absorbs the incident radiation in specific wavelength bands, which modifies its energetic spectrum.

Air Mass:
When the sun is perpendicular to the plan of horizon, solar radiation crosses the minimum thickness of atmosphere.
When the sun is at an angle, solar radiation crosses a large thickness of the atmosphere.

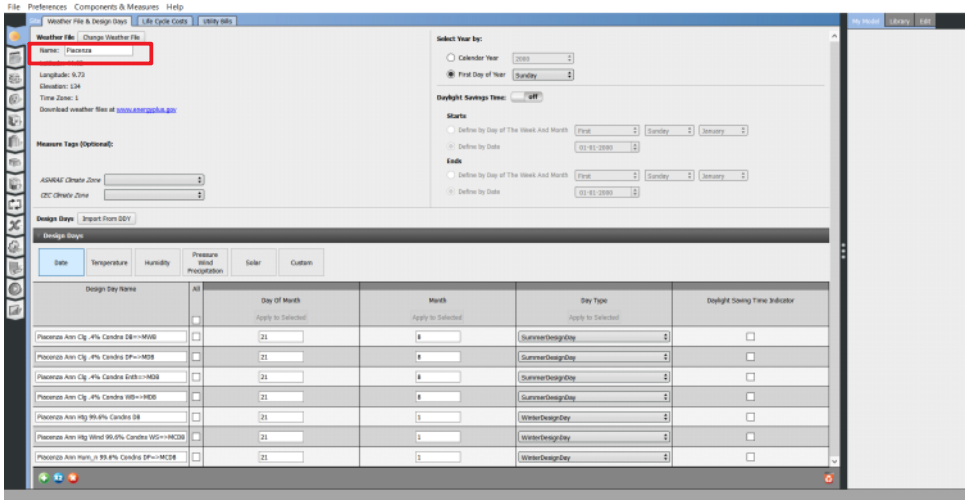
Solar Radiation Depends on:
The solar radiation available on the earth's surface for conversion in other energy forms depends on:

1. The sun position in the sky(altitude and azimuth angles)which changes daily and seasonally (declination angle δ)
2. The weather condition.
3. The sunshine hours.

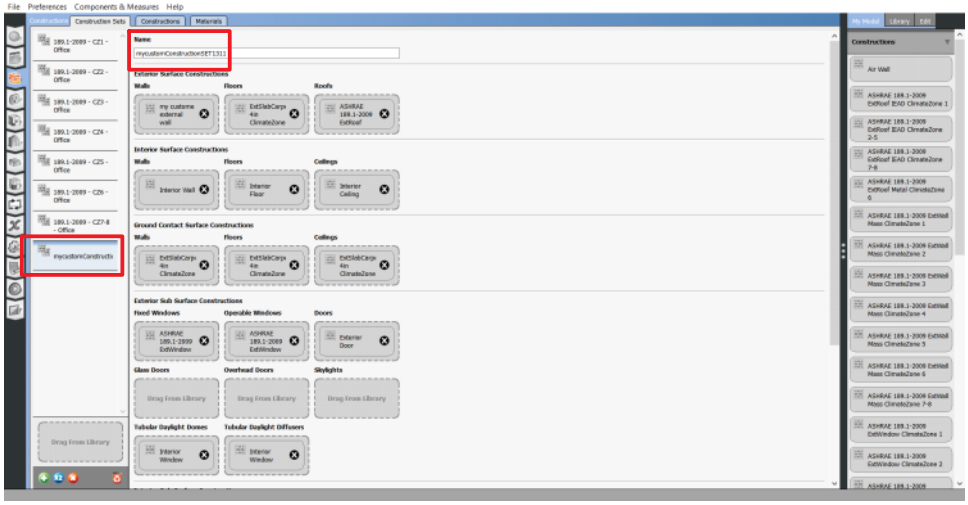
Measuring Solar Radiation:
Pyranometer is used to measure the Total Solar Irradiance (direct or diffuse).
Pyranometer with shadow band only measures diffuse irradiance.
Normal Pryrheliometer is a sun tracking instrument which only observe direct solar radiation.

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!)

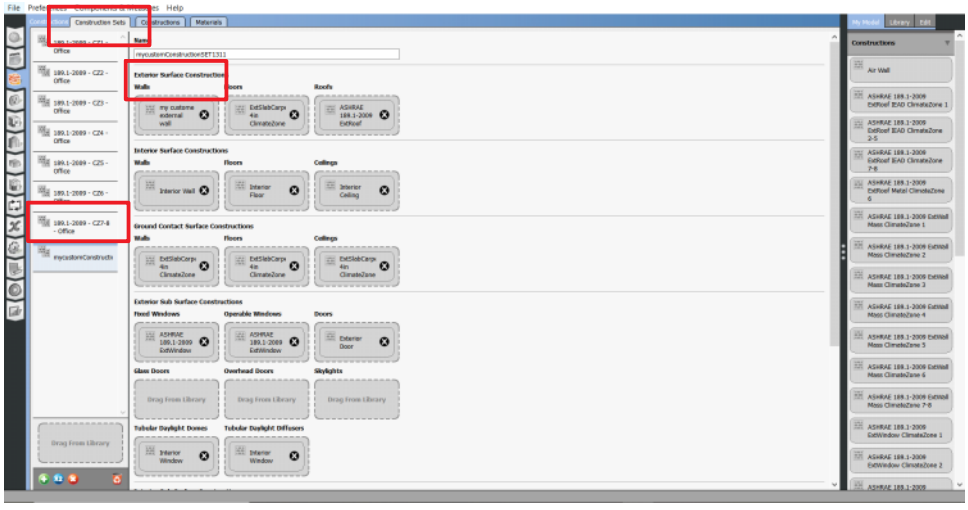
1. Open, 'Open Studio App' and load the 'Piacenza' weather file. Also open the model file and press on 'Discard'



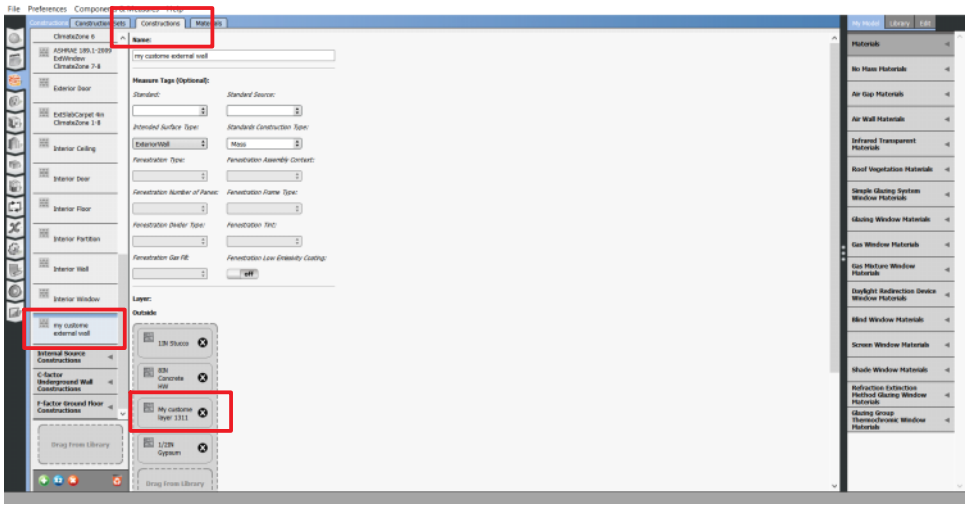
2. Creating Construction Set, by duplicating the layer and rename it.



3. Customising walls, following the same step of duplicating and renaming.



4. Customising walls and adding the new material in 'layers' tab.



5. To change the characteristics of the material, go to material tab. For modifications, duplicate the layer, rename it and use it.