

Week 7

Wednesday, November 20, 2019

4:00 pm

Task 1:

Provide a summary of the main concepts that went through about solar radiation.

Solar radiation:

often called the solar resource, is a general term for the electromagnetic radiation emitted by the sun. Solar radiation can be captured and turned into useful forms of energy, such as heat and electricity, using a variety of technologies. However, the technical feasibility and economical operation of these technologies at a specific location depends on the available solar resource.

-Every location on Earth receives sunlight at least part of the year. The amount of solar radiation that reaches any one spot on the Earth's surface varies according to:

- Geographic location
- Time of day
- Season •
- Local landscape
- Local weather.

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DIFFUSE AND DIRECT SOLAR RADIATION

As sunlight passes through the atmosphere, some of it is absorbed, scattered, and reflected by:

- Air molecules
- Water vapor
- Clouds
- Dust
- Pollutants
- Forest fires
- Volcanoes.

This is called **diffuse solar radiation.** **direct beam solar radiation:** The solar radiation that reaches the Earth's surface without being diffused.

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.

MEASUREMENT:

Scientists measure the amount of sunlight falling on specific locations at different times of the year. They then estimate the amount of sunlight falling on regions at the same latitude with similar climates. Measurements of solar energy are typically expressed as total radiation on a horizontal surface, or as total radiation on a surface tracking the sun.

Radiation data for solar electric system(photovoltaic)are often represented as kilowatt-hours per square meter (kWh/m²). Direct estimates of solar energy may also be expressed as watts per square meter (W/m²).

Radiation data for solar water heating and space heating systems are usually represented in British thermal units per square foot (Btu/ft²).

DISTRIBUTION:

The solar resource across the United States is ample for photovoltaic (PV) systems because they use both direct and scattered sunlight. Other technologies may be more limited. However, the amount of power generated by any solar technology at a particular site depends on how much of the sun's energy reaches it. Thus, solar technologies function most efficiently in the southwestern United States, which receives the greatest amount of solar energy.

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.

1-First of all is adding the data of the weather of piacenza

File Preferences Components & Measures Help

Weather File & Design Days Life Cycle Costs Utility Bills

Weather File Change Weather File

Name: Piacenza
Latitude: 44.92
Longitude: 9.73
Elevation: 134
Time Zone: 1
Download weather files at www.energyplus.gov

Measure Tags (Optional):

ASHRAE Climate Zone
CEC Climate Zone

Design Days Import From DDY

Design Days


Date Temperature Humidity Pressure Wind Precipitation Solar Custom

Design Day Name	All	Day Of Month	Month	Day Type	Daylight Saving Time Indicator
Piacenza Ann Clg .4% Condns DB=>MWB	<input type="checkbox"/>	21	8	SummerDesignDay	<input type="checkbox"/>
Piacenza Ann Clg .4% Condns DP=>MDB	<input type="checkbox"/>	21	8	SummerDesignDay	<input type="checkbox"/>
Piacenza Ann Clg .4% Condns Enth=>MDB	<input type="checkbox"/>	21	8	SummerDesignDay	<input type="checkbox"/>
Piacenza Ann Clg .4% Condns WB=>MDB	<input type="checkbox"/>	21	8	SummerDesignDay	<input type="checkbox"/>
Piacenza Ann Htg 99.6% Condns DB	<input type="checkbox"/>	21	1	WinterDesignDay	<input type="checkbox"/>
Piacenza Ann Htg Wind 99.6% Condns WS=>MCDB	<input type="checkbox"/>	21	1	WinterDesignDay	<input type="checkbox"/>
Piacenza Ann Hum_n 99.6% Condns DP=>MCDB	<input type="checkbox"/>	21	1	WinterDesignDay	<input type="checkbox"/>

2-run the data we analyzed

File Preferences Components & Measures Help

Run Simulation Output Tree

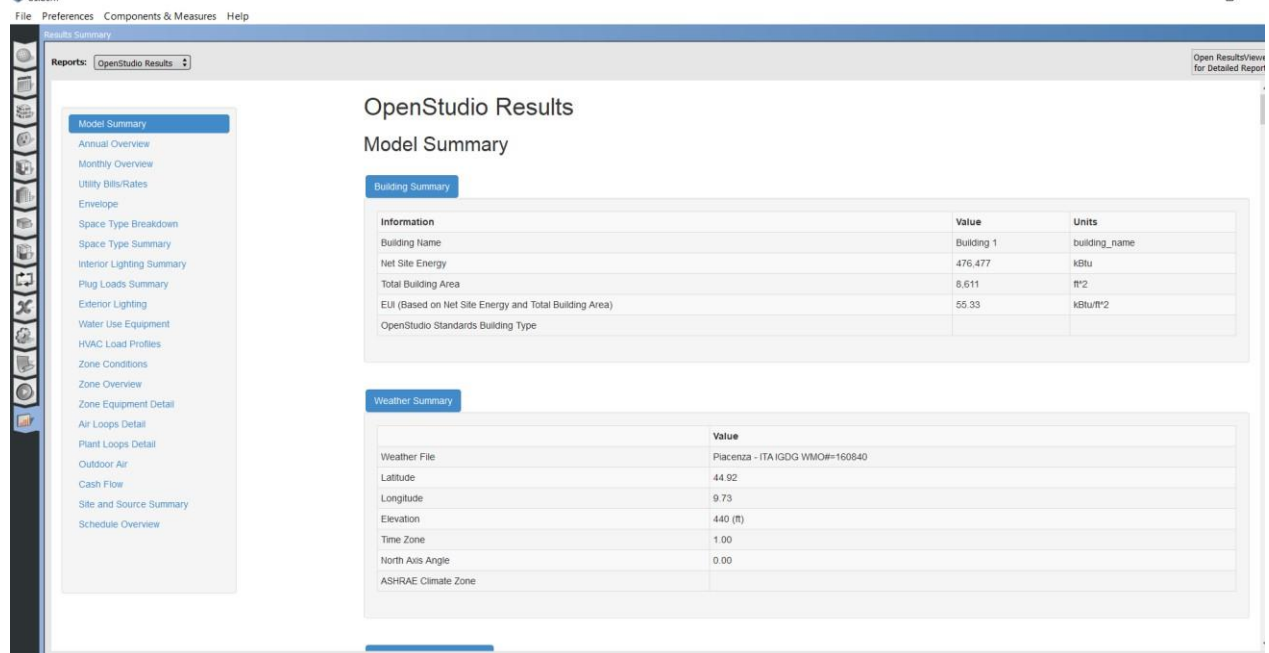
Run 

Running

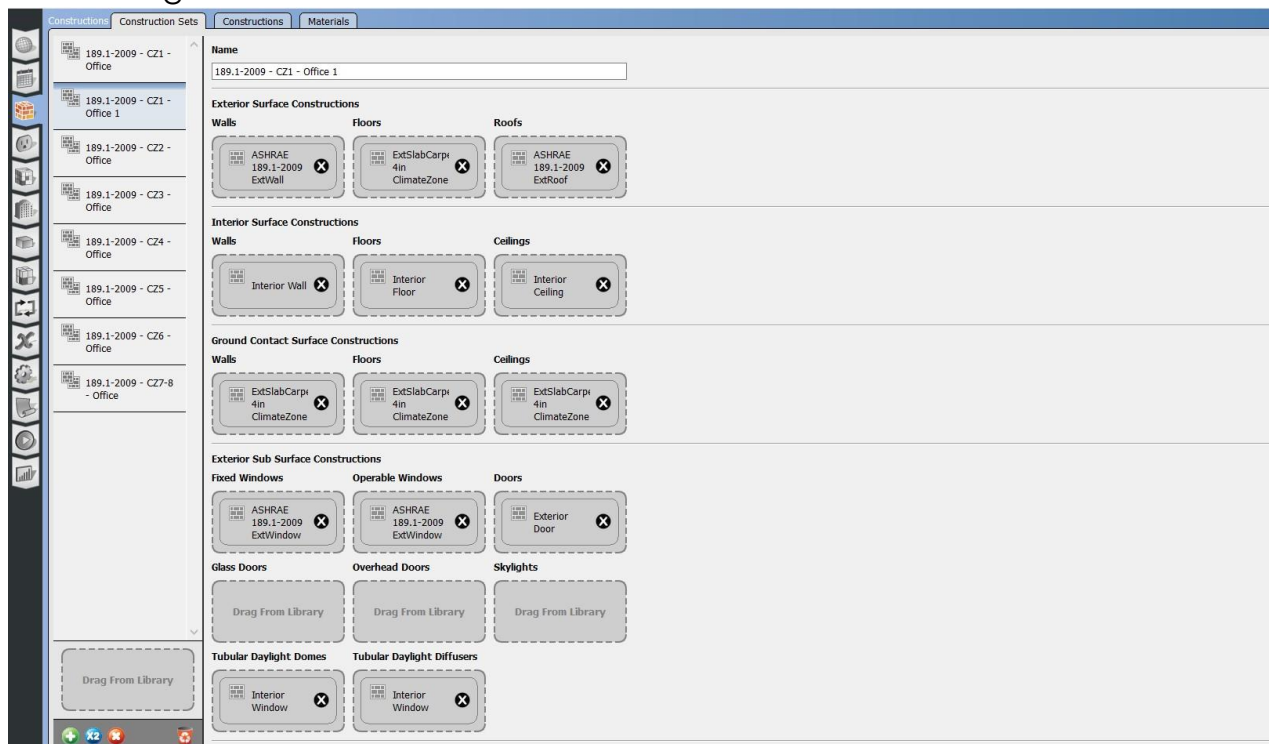
Warnings: 12
Errors: 0
Output

ExpandObjects Started.
Begin reading Energy+.idd file.
Done reading Energy+.idd file.
ExpandObjects Finished. Time: 0.219

3-showing the results of the analysis



4-opening the construction sets to choose the customized walls and materials and then change the name



5-customize the wall properties

ConstructionsConstruction SetsConstructionsMaterials

ClimateZone 2-8

ASHRAE 189.1-2009
ExtRoof IEAD
ClimateZone 7-8

ASHRAE 189.1-2009
ExtRoof Metal
ClimateZone 6

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 1

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 2

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 3

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 4

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 5

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 6

Mycustomizedwall18

ASHRAE 189.1-2009
ExtWall Mass
ClimateZone 7-8

ASHRAE 189.1-2009
ExtWindow
ClimateZone 1

ASHRAE 189.1-2009
ExtWindow
ClimateZone 2

ASHRAE 189.1-2009
ExtWindow

Name:
Mycustomizedwall189

Measure Tags (Optional):
Standard:
Intended Surface Type:
Fenestration Type:
Fenestration Number of Panes:
Fenestration Divider Type:
Fenestration Gas Fill:
Standard Source:
Standards Construction Type:
Fenestration Assembly Context:
Fenestration Frame Type:
Fenestration Tint:
Fenestration Low Emissivity Coating:
Layer:
Outside

Drag From Library

Drag From Library

6-and also customize the materials by adding the wanted properties

File Preferences Components & Measures Help

Constructions Construction Sets Constructions Materials

Materials

- 1/2IN Gypsum
- Mysustomized material 189**
- 1IN Stucco
- 8IN Concrete HW
- F08 Metal surface
- F16 Acoustic tile
- G01a 19mm gypsum board
- G05 25mm wood
- I01 25mm insulation board
- M11 100mm lightweight concrete
- MAT-CC05 4 HW CONCRETE
- Metal Decking

Drag From Library

Name:

Mysustomized material 189

Measure Tags (Optional):

Standard: *Standard Source:*

Standards Category: *Standards Identifier:*

Composite Framing Material: *Composite Framing Configuration:*

Composite Framing Depth: *Composite Framing Size:*

Composite Cavity Insulation:

Roughness: **Thickness:** m

Conductivity: W/m·K **Density:** kg/m³

Specific Heat: J/kg·K **Thermal Absorptance:**

Solar Absorptance: **Visible Absorptance:**

7-we here can add the new materials that we chose for the customized wall we made

