

Week Seven Assignment

Wednesday, November 20, 2019

12:16 AM

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.
-

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

Sub 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

Select Year by:

☐ Calendar Year 2000
☒ First Day of Year Sunday

Daylight Savings Time: off

Starts

☐ Define by Day of The Week And Month First Sunday January
☐ Define by Date 1/1/2000

Ends

☐ Define by Day of The Week And Month First Sunday January
☐ Define by Date 1/1/2000


Design Days

Date	Temperature	Humidity	Pressure Wind Precipitation	Solar	Custom
Design Day Name	All	Day Of Month	Month	Day Type	Daylight Saving Time Indicator
	<input type="checkbox"/>	Apply to Selected	Apply to Selected	Apply to Selected	
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 

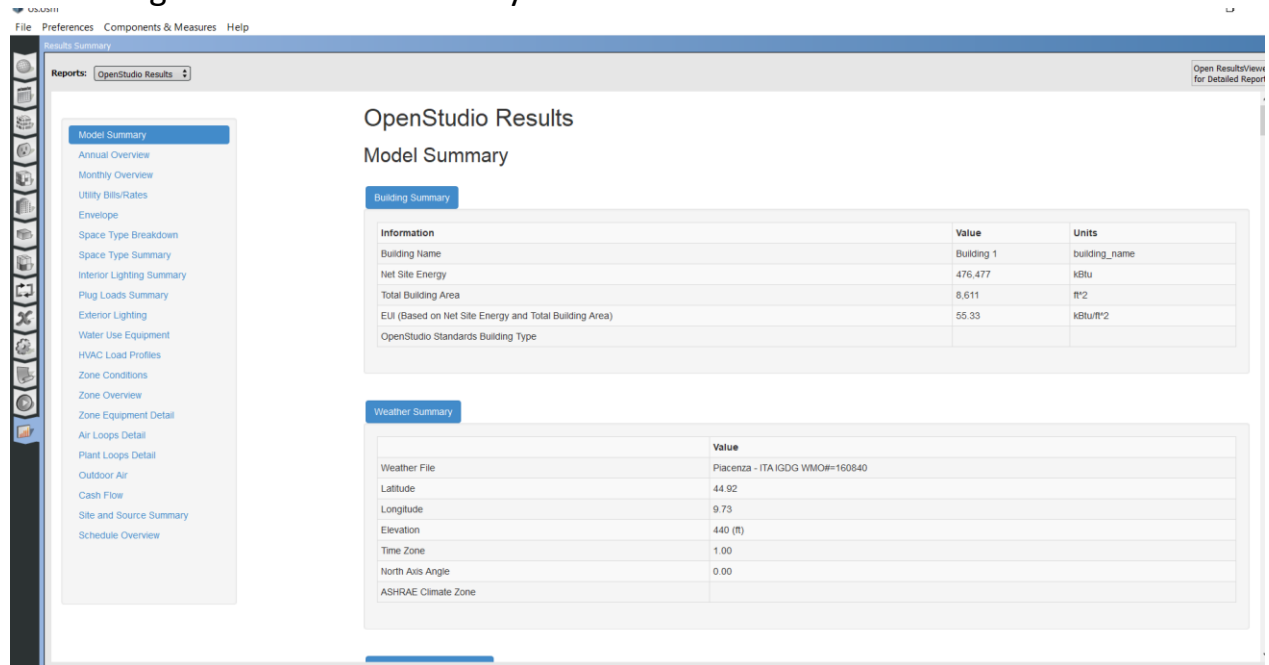
Running

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



The screenshot shows the 'OpenStudio Results' window with the 'Model Summary' tab selected. The left sidebar lists various report categories, and the main area displays the 'Building Summary' and 'Weather Summary' tables.

OpenStudio Results
Model Summary

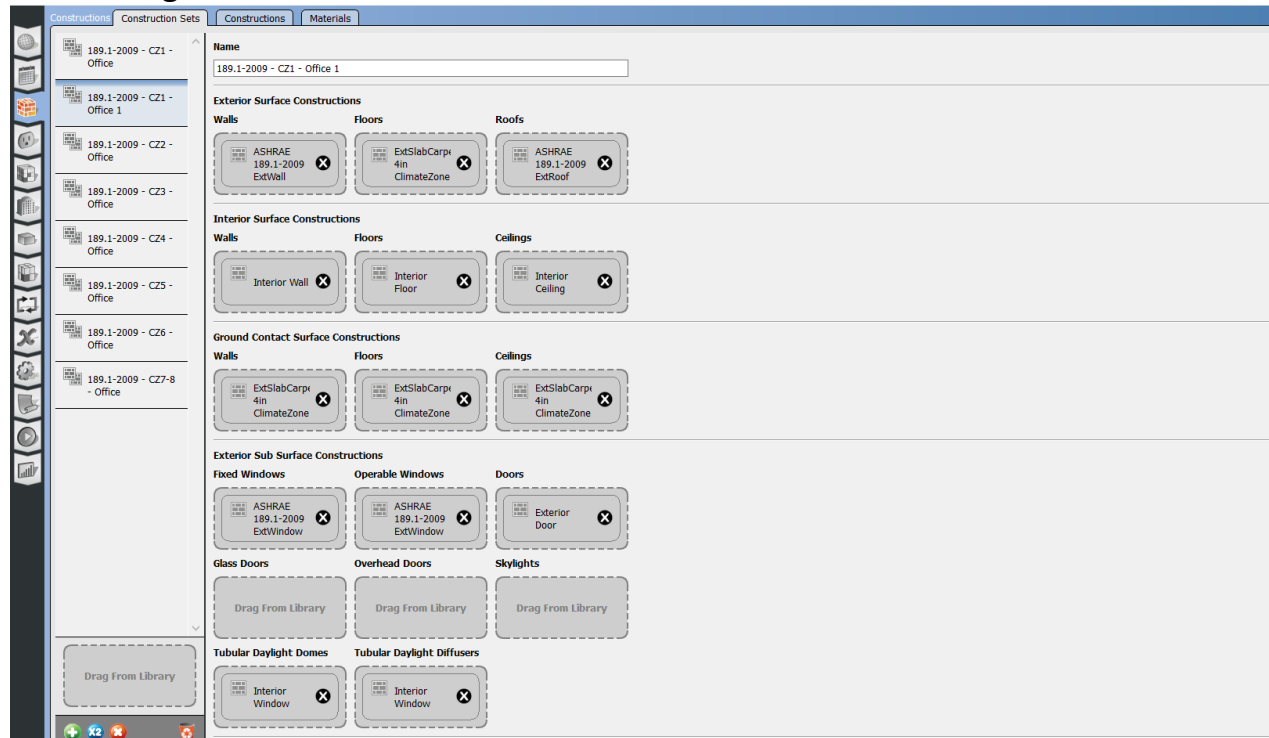
Building Summary

Information	Value	Units
Building Name	Building 1	building_name
Net Site Energy	476,477	kBtu
Total Building Area	8,611	ft²
EUI (Based on Net Site Energy and Total Building Area)	55.33	kBtu/ft²
OpenStudio Standards Building Type		

Weather Summary

	Value
Weather File	Piacenza - ITA IGDG WMO#-160840
Latitude	44.92
Longitude	9.73
Elevation	440 (ft)
Time Zone	1.00
North Axis Angle	0.00
ASHRAE Climate Zone	

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



The screenshot shows the 'Constructions' window with the 'Construction Sets' tab selected. The left sidebar lists various construction sets, and the main area displays the 'Exterior Surface Constructions' and 'Interior Surface Constructions' sections.

Constructions **Construction Sets** **Constructions** **Materials**

Exterior Surface Constructions

Walls **Floors** **Roofs**

ASHRAE 189.1-2009 ExtWall X
ExtSlabCarpx 4in ClimateZone X
ASHRAE 189.1-2009 ExtRoof X

Interior Surface Constructions

Walls **Floors** **Ceilings**

Interior Wall X
Interior Floor X
Interior Ceiling X

Ground Contact Surface Constructions

Walls **Floors** **Ceilings**

ExtSlabCarpx 4in ClimateZone X
ExtSlabCarpx 4in ClimateZone X
ExtSlabCarpx 4in ClimateZone X

Exterior Sub Surface Constructions

Fixed Windows **Operable Windows** **Doors**

ASHRAE 189.1-2009 ExtWindow X
ASHRAE 189.1-2009 ExtWindow X
Exterior Door X

Glass Doors **Overhead Doors** **Skylights**

Drag From Library
Drag From Library
Drag From Library

Tubular Daylight Domes **Tubular Daylight Diffusers**

Interior Window X
Interior Window X

5-cutomize the wall properties

Constructions

Construction Sets

Constructions

Materials

ClimateZone 2-3

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

Drag From Library

Name:

Mycustomizedwall189

Measure Tags (Optional):

Standard:

Intended Surface Type:

ExteriorWall

Fenestration Type:

Fenestration Number of Panes:

Fenestration Divider Type:

Fenestration Gas Fill:

Standard Source:

Standards Construction Type:

Mass

Fenestration Assembly Context:

Fenestration Frame Type:

Fenestration Tint:

Fenestration Low Emissivity Coating:

off

Layer:

Outside

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:**

+ x2 x

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

