Photo by Dennis Schroeder, NREL 58003

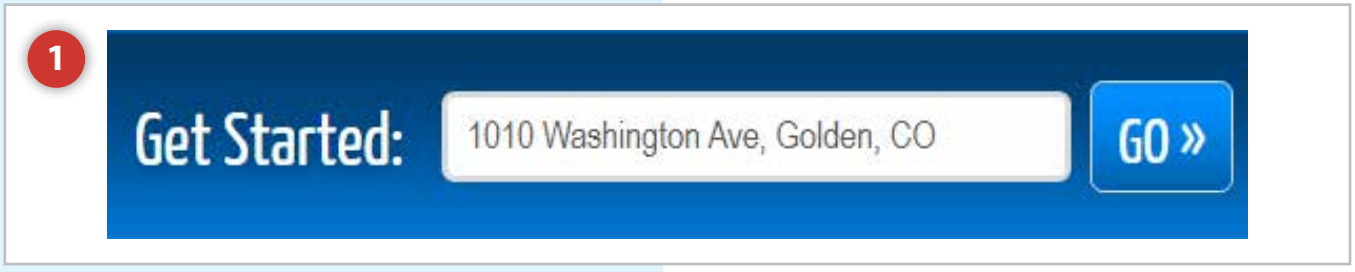
PVWatts® and the System Advisor Model (SAM) Webinar Guide

PVWatts and SAM are included in this joint Office of State and Community Energy Programs and National Renewable Energy Laboratory webinar series designed to assist and inform communities participating in the Energy Efficiency and Conservation Block Grant Program. PVWatts and SAM deliver data and visuals that can provide the following information for state and local jurisdictions:

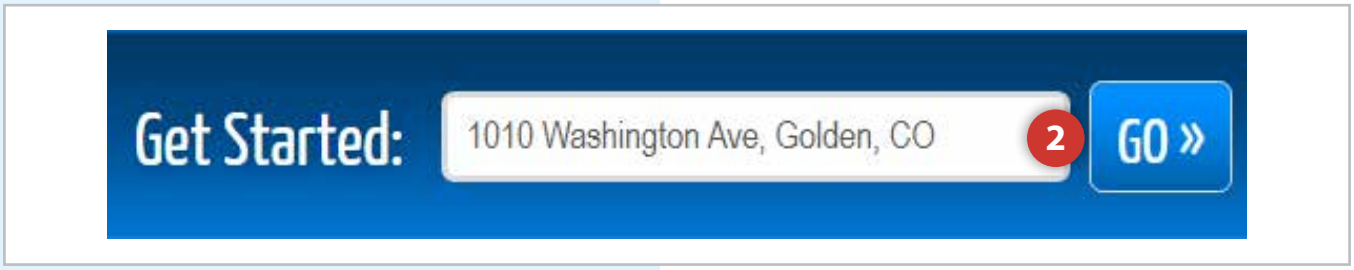
Understanding Solar Array Performance with PVWatts

"How can I model a solar array system in PVWatts?"

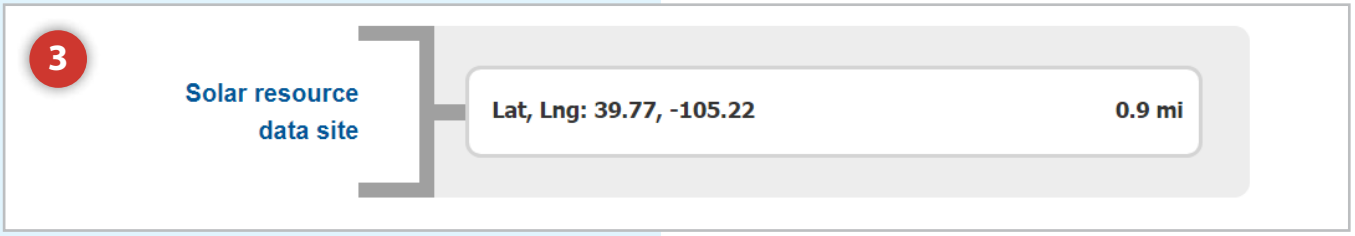
☐ **1.** At the top of the page, next to "**Get Started**," enter the home or business address you would like to do a solar array analysis on. For this example, we will be using the Golden Visitors Center in Golden, Colorado.

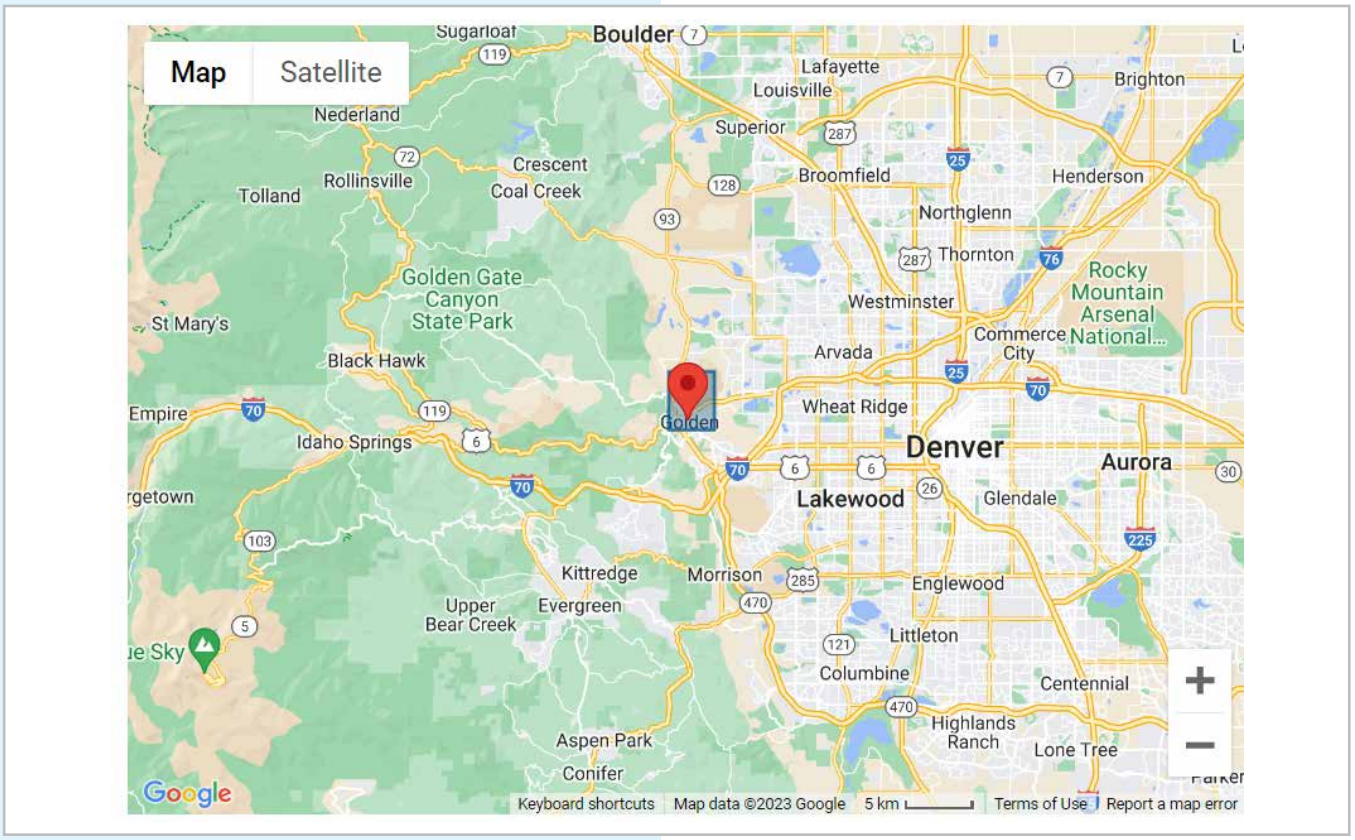


☐ **2.** Select the blue "**GO**" button.

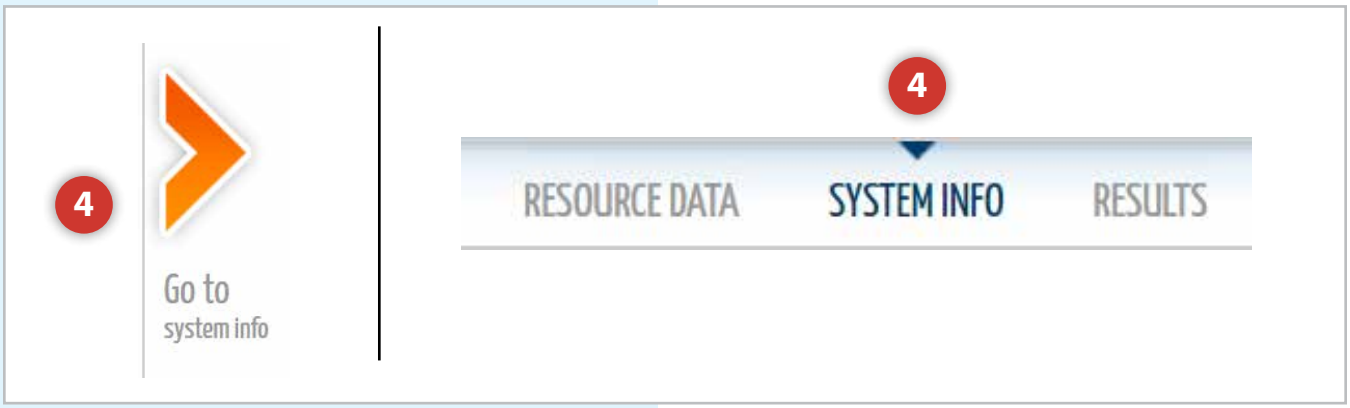


☐ **3.** You will be taken to the "**Solar Resource Data**" tab which will show the latitude and longitude of your input location as well as a map below to visualize and double check if the location is correct. PVWatts uses the location to acquire solar radiation duration and length to calculate the amount of electricity the solar array will produce.

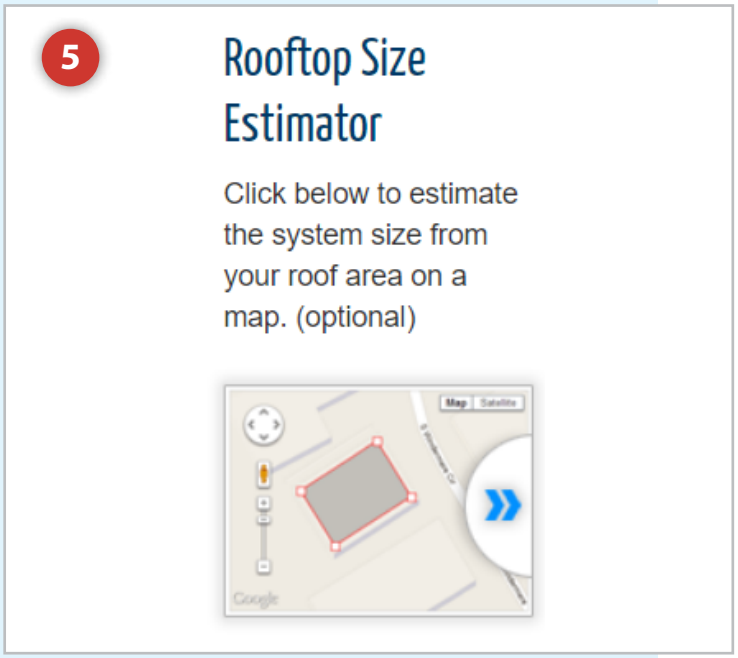




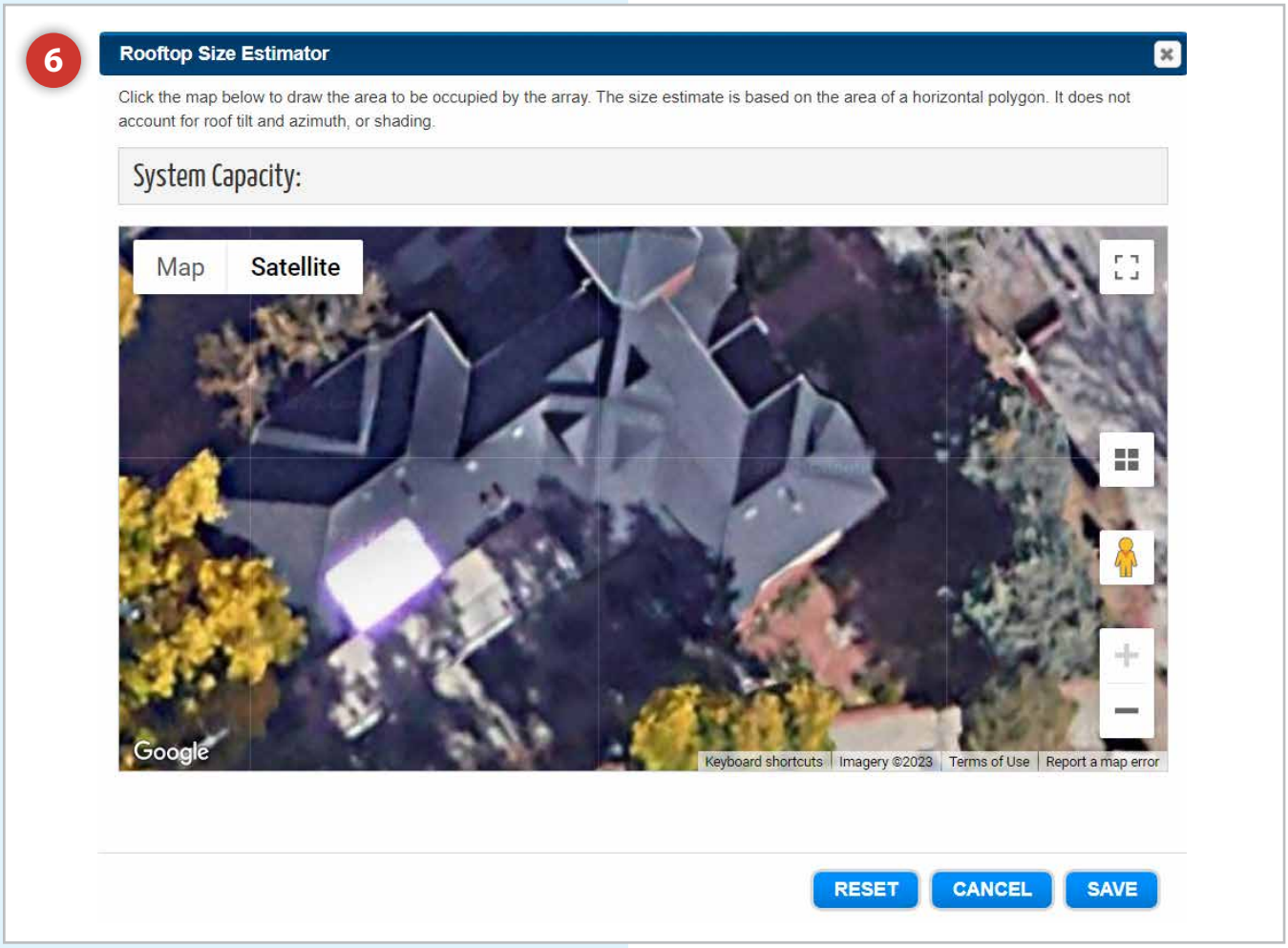
☐ **4.** Once the location has been confirmed, select either the orange arrow on the right-hand side of the screen or the "**System Info**" tab at the top of the screen.



☐ **5.** Select the image under "**Rooftop Size Estimator**."

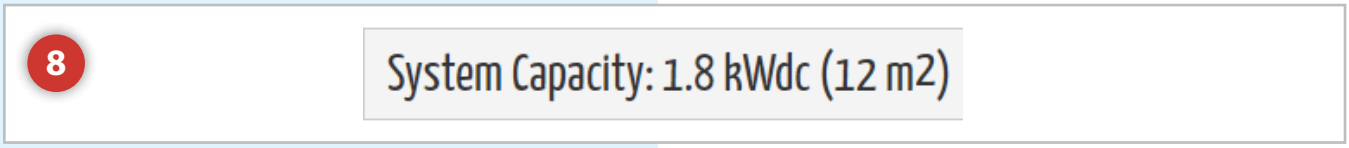


☐ **6.** A new window will appear with a satellite view of the building that was selected.



☐ **7.** Select the area for your solar system by clicking on each of the four corners of the area you would like for the system.

☐ **8.** At the top of the window, it will show the area for the selected system and the power output for a system of this size.

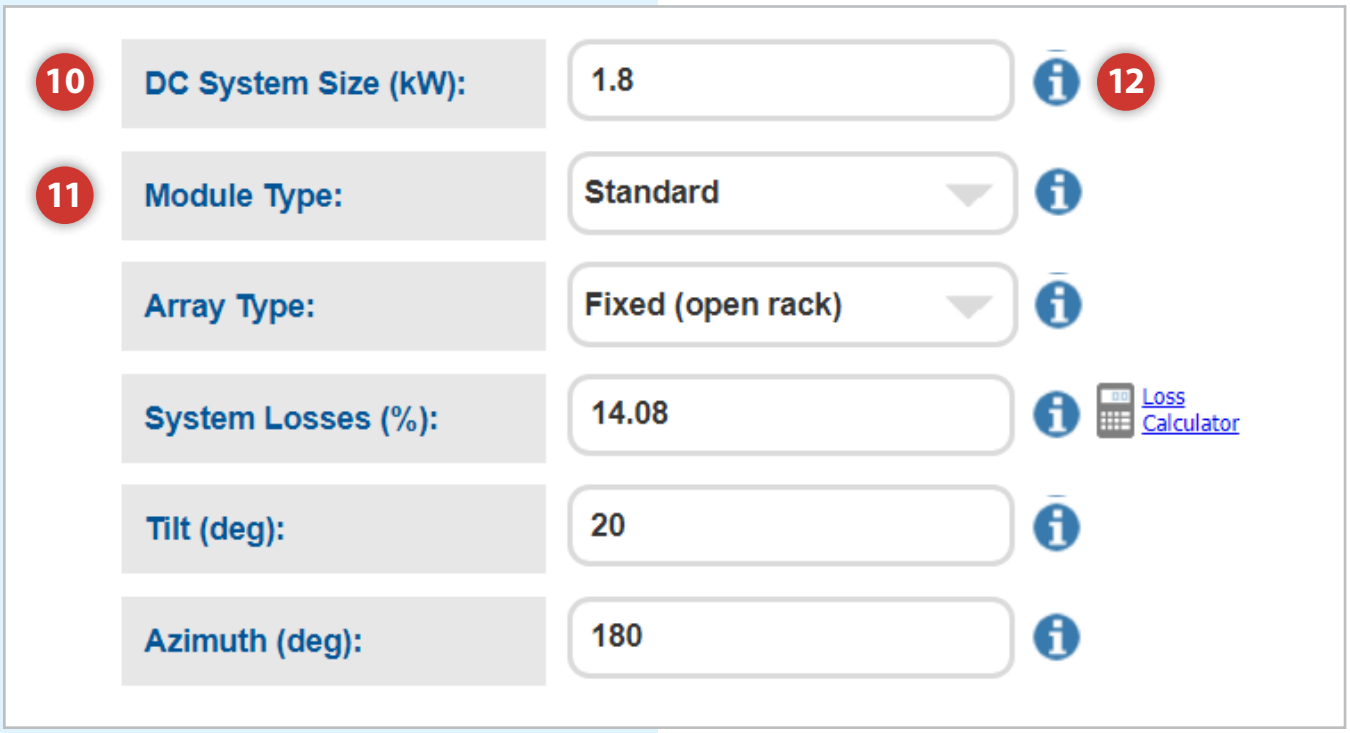


☐ **9.** Select the blue "**Save**" button at the bottom of the window.

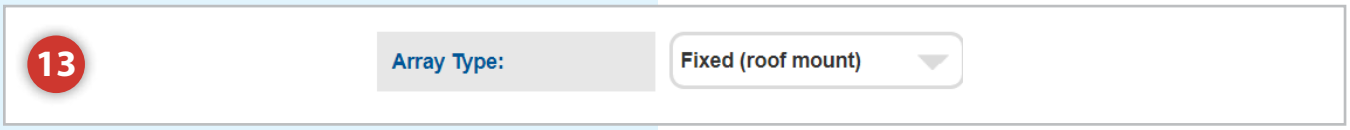
☐ **10.** The "**DC System Size**" is now set.

☐ **11.** For this example, we will leave the "**Module Type,**" "**System Losses**," and "**Tilt**" at the default values.

☐ **12.** If you want to learn more about each of these variables, you can select the blue information button on the right-hand side of each variable.



☐ **13.** For "**Array Type**" select "**Fixed (roof mount).**"



☐ **14.** For "**Azimuth**," enter "**135**" instead of "**180**". In our image for the rooftop of the Golden Visitor Center we can see that the section we selected is facing southeast. If you select the blue information icon next to "**Azimuth**," a table will appear showing what number/degree should be entered respective to the direction the solar array will be facing. For southeast, the angle is 135 degrees.

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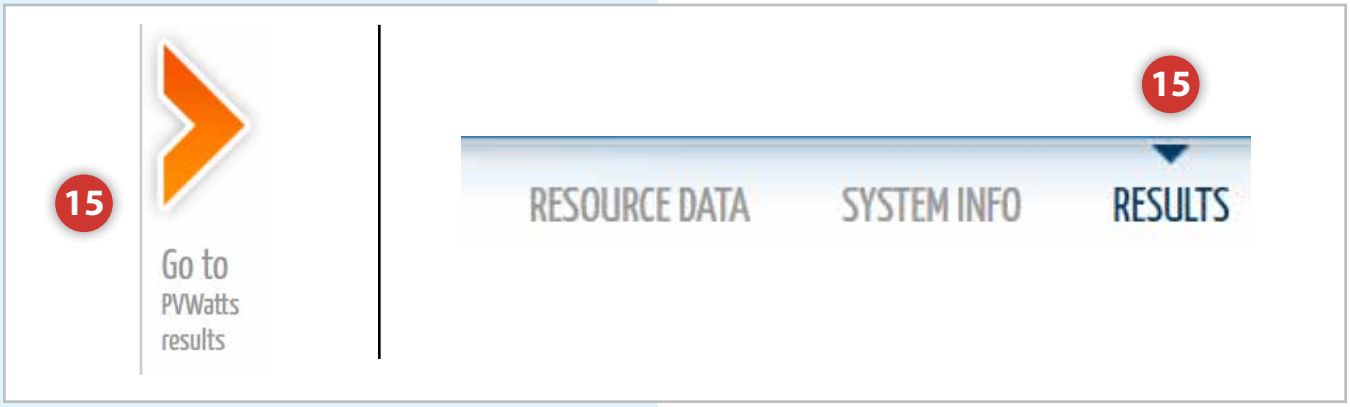
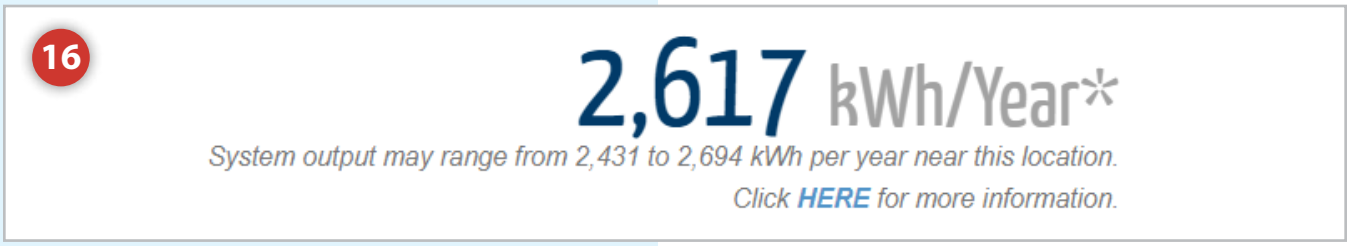
Heading	Azimuth Angle
N	0°
NE	45°
E	90°
SE	135°
S	180°
SW	225°
W	270°
NW	315°

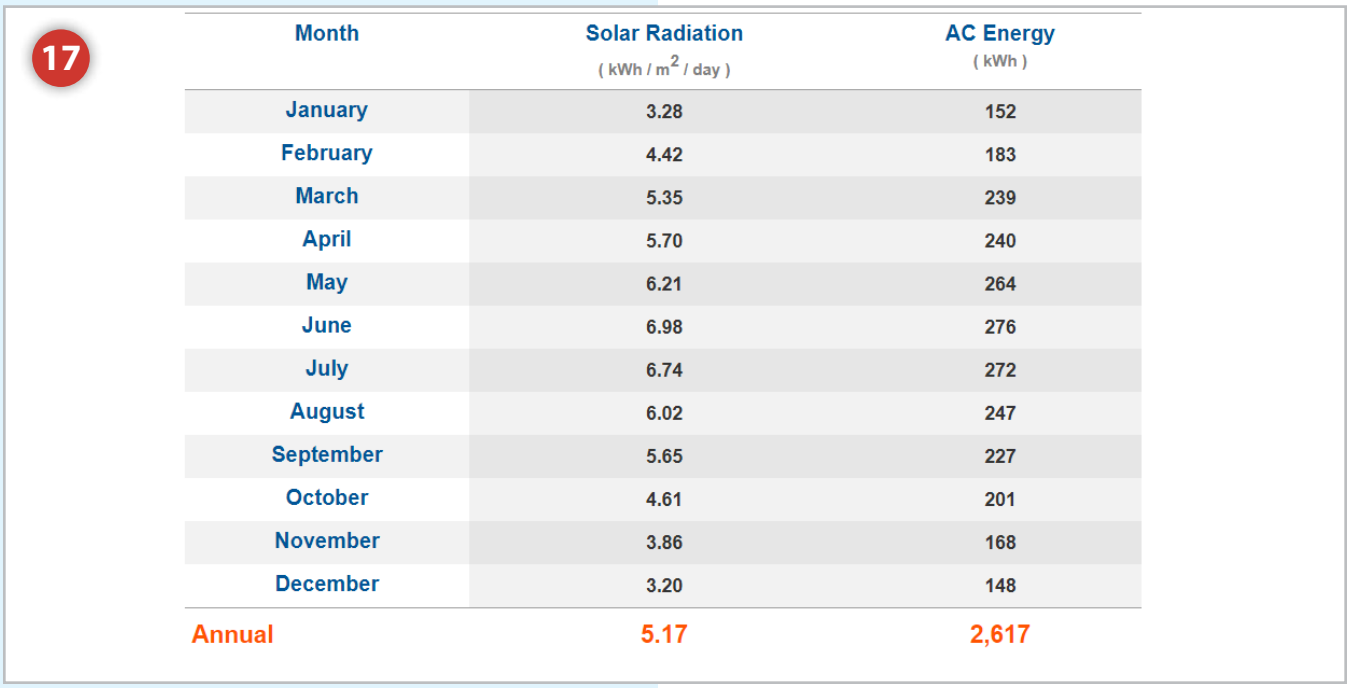
☐ **15.** Select either the orange arrow on the right-hand side of the screen or the "**Results**" tab at the top of the screen.



☐ **16.** At the top of the screen, the **annual kWh** output will be shown.

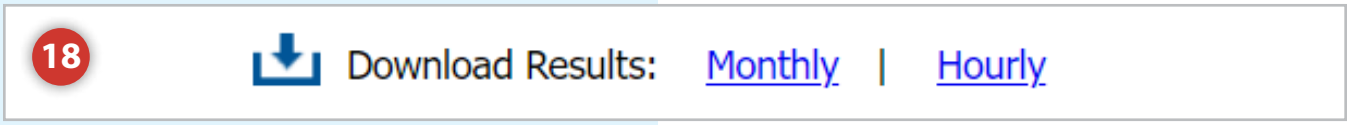


☐ **17.** An average **daily breakdown** of the kWh output per month will be shown.



Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	3.28	152
February	4.42	183
March	5.35	239
April	5.70	240
May	6.21	264
June	6.98	276
July	6.74	272
August	6.02	247
September	5.65	227
October	4.61	201
November	3.86	168
December	3.20	148
Annual	5.17	2,617

☐ **18.** You can download the monthly or hourly data by selecting the blue "**Monthly**" and "**Hourly**" links under the monthly breakdown table.



☐ **19.** The "**Location and Station Identification**," "**PV System Specifications**," and "**Performance Metrics**" data are shown at the bottom of the page.

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Location and Station Identification

Requested Location	1010 Washington Ave, Golden, CO
Weather Data Source	Lat, Lng: 39.77, -105.22 0.9 mi
Latitude	39.77° N
Longitude	105.22° W

PV System Specifications

DC System Size	1.8 kW
Module Type	Standard
Array Type	Fixed (roof mount)
System Losses	14.08%
Array Tilt	20°
Array Azimuth	135°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4
Albedo	*From weather file*
Bifacial	No (0)
Monthly Irradiance Loss	Jan Feb Mar Apr May June 0% 0% 0% 0% 0% 0% July Aug Sept Oct Nov Dec 0% 0% 0% 0% 0% 0%

Performance Metrics

DC Capacity Factor	16.6%

Understanding Solar Array Performance with SAM

"How can I model a solar array system in SAM?"

- [ ] **1.** SAM can be accessed at **http://sam.nrel.gov/download**.
- [ ] **2.** There is extensive help documentation:
    - Website: **http://sam.nrel.gov**
        - Support Forum—Ask your question!
        - General information, online help file and contact information.
    - **YouTube Channel**: All prior webinars and seminars.
    - **Bi-Monthly Round Table sessions**: SAM team asks questions live and interactively.
    - **Email Support**: SAM support can provide email support if a question or bug is involved.