

Student Name:

ESCI-61 - Introduction to Photovoltaic Systems

Final Project

The objective of this homework is to design and size a PV system for your home or small business (residential scale).

List all documents and online tools and resources you used to complete this homework assignment.

We assume the following:

- You want to design and size a grid tied PV system (as opposed to standalone or bimodal PV systems), so there are no batteries
- You want to use flat plate collectors (as opposed to concentrating collectors)
- You will install the modules at fixed tilt (as opposed to 1- or 2-Axis tracking system)
- You want to optimize the average annual energy output of the PV system
- You're using string inverter technology (as opposed to micro-inverter one)

Question 1 (8 points): performance of the PV system

What is the average electricity usage of your home? (energy and cost per tier and per year, month and day)

How much electricity do you want to generate per year from this PV system?

Explain all the math and reasons that lead your figure.

Question 2 (8 points): sun resources

How much sun resources do you have in your PV system location?

List all the documents and online tools you used to answer this question.

Question 3 (8 points): site evaluation

Describe the site (house or small business) where you want to install this PV system. This description should include, but is not limited to:

- address
- satellite picture
- description of roof conditions (orientation, tilt, dimensions, ..., etc.)
- shading analysis (trees, poles, chimneys, vents, neighboring buildings, ..., etc.)
- location of utility meter and main panel
- any other information that could affect your PV system design or sizing

Question 4 (8 points): design and sizing of your PV system

Design and size your PV system as described in class

Describe all documents and online tools you used to design and size your PV system.

This section should include but is not limited to:

- de-rating factors
- number, and model of PV modules
- model of the inverter
- string sizing, if applicable

Question 5 (8 points): cost of your PV system

Provide an estimate of the cost of your PV system.

Cost should include, but is not limited to the itemized cost of the following items:

- PV modules
- inverter
- Balance Of System
- labor
- other costs (permitting, inspection, ..., etc.)
- California Solar Initiative rebate
- Federal Tax Credit Incentive

Provide all documents and online tools you used to determine this cost.

Extra Credits (4 points): diagrams

You can use the companion document “Residential (Single-Family) Solar Photovoltaic System Utility Grid-Tie Connection” as an example to answer the following questions.

- Provide a PV Array Layout and Wiring Plan
- Provide a one line electric diagram of your PV system