Attachment F-1

PV Project Production Estimator Instructions

Introduction

The accompanying PV Estimated Annual Production Workbook (Attachment F-2) is designed to guide users through the MRET method for estimating annual production of a proposed PV Project. The Workbook assists in determining whether the PV project meets the performance criterion in MRET's Minimum Technical Requirements (see Attachment D). Please note that other methods that accurately account for orientation and shading are also acceptable.

The Workbook is intended to provide an easy method to perform the minimum production assessment requirement. The Workbook compares the expected annual production (kWh) from the proposed PV project, to an "optimal" system with ideal attributes (e.g. 180 azimuth, 42 degree inclination, no shading).

The workbook was developed to be used in conjunction with a **Solar Pathfinder** - a tool that helps assess the impacts of shading on PV panels. If a Solar Pathfinder is not used, an alternate method detailing shading for each ½ hour of each month during the year will be needed. In certain cases, where it is obvious that there is no shading, this step can be skipped. Please note that while a Solar Pathfinder displays each ½ hour block as a percentage (%) of energy produced for each month, this Workbook uses energy (kWh) in each half hour block.

The sheets in the PV Project Production Estimator Workbook are formatted for printing. The results, as shown in the sheet "Application" should be entered in to the PV Technical Worksheet section of the Application (Attachment A or Attachment B).

For assistance with this Workbook contact:

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See page 2 for the detailed instructions.

Instructions

Step 1: Start Here

In this sheet enter the attributes of the proposed PV project. Fill in only those cells that are shaded green.

[A] Estimated optimal annual production (kWh): The attributes listed in this table will be used to estimate the "optimal" annual energy production based on hypothetical ideal conditions for a "Fixed Tilt" system.[1] Enter the following information:

- City: Choose the city (either Boston or Worcester) that is closest to the location of the proposed project.

- DC Rating (kW): (This is called Total PV system size (DC_{STC} Watts) in the MRET application form, except units are in kW instead of W). Please use the STC (not PTC) rating. The DC rating is simply the DC power rating of the panels to be used, multiplied by the number of panels.

[B] Estimated annual production without shading (kWh): The attributes listed in this table will be used to estimate the annual energy production of the proposed PV project. The effects of shading are not considered at this point.

- Actual Array Tilt (Inclination or Tilt in MRET application)
- Actual Array Azimuth: (e.g. 180 degree = south)

Step 2: Shading

Table 2. Shading Assessment shows the results of production calculations (in kWh) for each half hour of each month, between 5am and 7pm (solar time). To indicate shading for a ½ hour period, delete the number in the corresponding cell. The cell will become shaded. The total solar energy (kWh) for the month will be reduced accordingly in the column labeled Monthly (kWh). If you inadvertently erase the value in one of the cells that should not be shaded, use the MS Excel 'Undo' button to recover the value. When determining whether a cell should be shaded or not please take into account:

- Shading from deciduous trees – no credit for leaf drop in the winter months should be taken. Treat deciduous trees the same as evergreens.
- Trimming – do not take credit for any future trimming or other shade reduction plans.

Results of the shading assessment are automatically transferred to Step 3. "Calculation" in column [D] *Estimated shading reduction to [B] (%)*.

Step 3: Calculation Results

Review the results for the optimal system, proposed PV project without shading, and proposed PV project with shading accounted for. If the results are unreasonable, review the information in Steps 1 and 2.

Step 4: Application

The results of the assessment are listed for convenient transfer to the application form. If the result shown in Cell [H] *Meets Minimum Performance Criteria? (True / False)* is "True" then the proposed PV project meets the minimum criterion for production. If the result is "False" then the proposed PV project does not meet the criterion.

[1] Estimated production from tracking systems may exceed the optimal system as defined here.