# Solar Panels Rough Estimate for Residential Use (Right Sizing Grid Tie System: Target - zero bill or 100% offset)

Consumer Welfare and Promotion Office 2024

# Solar Panels Rough Estimate for Residential Use (Right Sizing Grid Tie System: Target – zero bill or 100% offset )

- Method 1. Uses the Specific Photovoltaic Power Output from Global Solar Atlas
- Method 2. Uses Sun Peak Hour from Solar Resource Map
- Method 3. Uses Solar PV Capacity Factor from case study: Mott MacDonald study results for Independent Solar Energy Yield Assessment in the Philippines

- Note 1. PVout specific indicates how much energy (in kWh) a solar panel system produces for every kilowatt-peak (kWp) of module capacity during a typical or actual year.
- Note 2. Sun peak hours is the hour of the day when the sunlight intensity reaches 1000 watts/square meter
- Note 3. Solar PV capacity factor is the measure how the solar PV system efficiently generates electrical power compared to its maximum potential output. In the Philippines it ranges from 14.1% to 20.4%. In this example we use 16%

# Method 1. Uses the Specific Photovoltaic Power Output

1

- Step 1. Get the PVout specific value for your location from global solar atlas.(https://globalsolaratlas.info/map)

➢ Search the PVout in your specific location by typing the address location in the search portion.

➢ Example by typing Metro Manila in the search, the PVout specific will show 1402.1kWh/kWp

- Note: PVout specific indicates how much energy (in kWh) a solar panel system produces for every kilowatt-peak (kWp) of module capacity during a typical or actual year.

# Method 1. Uses the Specific Photovoltaic Power Output


- Step 2. Estimate your Annual Energy Consumption

- Information of your monthly energy consumption is in your monthly electric bill. Your annual energy consumption is the total of your 12 monthly bills.
- You can also approximate by multiplying 12 to your one-month bill.
- Example, your May bill registered 350kWh. Then 350*12 = 4,200kWh is your approximate 12 months total energy consumption

# Method 1. Uses the Specific Photovoltaic Power Output


- Step 3. Select the Solar Panel Wattage you intend to use.

➢ Popular wattages ranges from 400Wp to 650Wp.

- Depending on the brand, wattages are 400Wp, 420Wp, 500Wp, 550Wp, 600Wp, and 650Wp etc.

# Method 1. Uses the Specific Photovoltaic Power Output


- Step 4. Computation for system wattage(Wp)

➢ Total wattage for your system = annual energy consumption divided by Pvout specific

✓ From step 1 Metro Manila has PVout specific = 1,402.1kWh/kWp

✓ From step 2 your annual energy consumption is = 4,200kWh

➢ Total wattage for your system = 4,200kWh/(1,402.1kWh/kWp)

➢ Total wattage for your system = 2.9955kWp = 2,995.5 Wp

# Method 1. Uses the Specific Photovoltaic Power Output


- Step 5. Compute the number of panels

➢ From step 4, Total wattage for your system = 2.9955kWp = 2,995.5 Wp

➢ From step 3. choose 500Wp panel

➢ Total number of panels = Total system Wp divided by panel Wp

➢ Total number of panels = 2995.5Wp/500Wp = 5.991 or 6 panels

❖ Therefore, you need six pieces 500Wp panel for your system.

❑ For safe and efficient grid tie operation, the inverter input rating should be properly matched to the PV array.

# Method 2. Uses Sun Peak Hour

- Step 1. Use same 350 kWh monthly consumption
- Step 2. Get the average sun peak hour per day for Philippines from Resource map. The value is 4.5 to 5 hours
- Step 3. From step 1, compute the daily consumption in Wh using 30 days per month.

  = 350*1000/30 = 11,666.667wH per day
- Total number of panels = Daily consumption in Wh divided by (average sun peak multiplied by panel Wp)
- Total number of panels = 11,666.67/(4.5*500Wp) = 5.19 or 6 panels, at 4.5 hours average sun peak
- Therefore, you need six pieces 500Wp panel for your system.
- For safe and efficient grid tie operation, the inverter input rating should be properly matched to the PV array.
- Note: Sun peak hour - refers to time of the day wherein the sunlight intensity reaches 1000w per square meter

# Method 3. Uses Solar PV Capacity Factor

- Step 1. Use same 350 kWh monthly consumption
- Step 2. From step 1, compute the daily consumption in Wh using 30 days per month.

  = 350*1000/30 = 11,666.667Wh per day
- Step 3. Using a PV capacity factor of 16% as used by some DU's for net metering

  System wattage = Average daily kWh demand/(24h*0.16)

  = 11.6667kWh/3.84

  = 3.039kW
- Total number of panels = 3039/(500Wp) = 6.08 or 6 panels
- Therefore, you need six pieces 500Wp panel for your system.
- For safe and efficient grid tie operation, the inverter input rating should be properly matched to the PV array.

- Note: Sun peak hour - refers to time of the day wherein the sunlight intensity reaches 1000w per square meter

# Tabulated Comparison of the three methods

- Use same 350 kWh monthly consumption and same 500Wp panel

| PV out specific (Global Solar Atlas) | Sun peak hours (Solar Resource Map ) | Solar PV Capacity Factor |
|---|---|---|
| PV out specific =1402.1kWh/kWp for Metro Manila | Sun peak hours = 4.5 to 5 | Capacity factor = 16% |
| Annual energy consumption = 350*12 = 4,200kWh | Daily energy consumption = 350/30 =11,666.667Wh | Daily energy consumption = 350/30 =11,666.667Wh |
| System Wattage = 4200/1402.1 =2,995.51 Wp | System wattage = 11,666.67/4.5 = 2,592.59W | System wattage = Average daily kWh demand/(24h*0.16) =11.6667kWh/3.84 =3.039kW |
| No. of panels = 2995.51/500 = 5.99 0r 6 pcs 500 Wp panels | Number of panels = 2,5992.59/500 = 5.19 or 6pcs. 500Wp panels | Number of panels = 3039/500 = 6.08 or 6 pcs. 500Wp panels |

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# End of Presentation

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