

Guide to Selecting MLPE for Solaria Panels

Module Level Power Electronics (MLPE) are often a good choice for residential PV systems. In such cases, selecting the right MLPE product is an important step in the overall system design. In this Guide, we will outline three steps for successfully choosing a MLPE pairing for Solaria solar panels.

RECOMMENDED APPROACH FOR SELECTING MLPE FOR A SOLARIA PANEL:

- Select one or more candidate MLPE products.** Table 1 provides a list of Enphase microinverter and SolarEdge DC Optimizers products that generally pair well with Solaria solar panels. This list was compiled using the results of a simulation study presented later in this Guide.

Module	Enphase	SolarEdge
PowerX 400R	IQ7A, IQ7PLUS, IQ8PLUS, IQ8M, IQ8A	P401, S440
PowerXT 400R-PM	IQ7A, IQ7PLUS, IQ8PLUS, IQ8A, IQ8M	P401, S440

Note: In very cold climates (see Table 2 and Figure 1), only SolarEdge optimizers or Enphase microinverters that accept high voltages, such as the IQ7X, may be compatible with the PowerXT-400R-PM due to that panel's high open-circuit voltage.

Table 1: Enphase and SolarEdge MLPE products that, when paired with the indicated Solaria panels, generate high energy yield in most climates

- Verify the pairing is compatible.** Refer to the respective panel and MLPE datasheets to ensure the MLPE can safely accept the panel output in all conceivable conditions at the installation location. Importantly, the panel open-circuit voltage must not exceed the MLPE's maximum input voltage at the minimum temperature that can be expected at that location. Likewise, the panel's short-circuit current must not exceed the maximum current permitted by the MLPE. Other considerations may also be necessary – refer to the MLPE datasheet for details. Enphase offers an online tool (<https://enphase.com/installers/microinverters/calculator>) to verify compatibility of specific panels with their line of microinverters for a given site.
- Verify the pairing will generate a high energy yield.** To secure the highest value for the system owner, use a performance modeling tool such as OpenSolar to determine if the pairing will provide high energy yield in the planned installation location. To demonstrate this, we present simulated energy yield results for three locations intended to be representative of hot, moderate, and cold climates in the mainland United States (listed Table 2).

Climate Name	Location	Min Temperature	Max Temperature
Hot Climate	Phoenix, AZ	2.2°C (36°F)	48.8°C (119.9°F)
Moderate Climate	Oakland, CA	0°C (32°F)	34°C (93.2°F)
Cold Climate	Grand Forks, ND	-32°C (-25.6°F)	35.6°C (96.1°F)

Table 2: Details of the three climates simulated.

The simulations were performed using OpenSolar.^[1] All systems were simulated on shade-free sites with MLPE from either Enphase or SolarEdge. SolarEdge DC optimizers were used with a SolarEdge string inverter that yielded a DC/AC ratio of 1.06.

Figure 1 shows the simulated energy yield for each system, normalized to the case where the Solaria panel is paired with a S440 DC Optimizer. Only pairings that were determined to be compatible (see step 2) are included in these results. ^[2] As we can see, even amongst a set of compatible pairings, the actual energy yield can differ considerably. As such, a full energy yield simulation such as presented here can be necessary to identify the highest energy yield pairing possible.

OpenSolar may issue warnings if internal calculations indicate a certain panel-MLPE pairing is unfavorable for the site in question. The appearance of a warning does not always mean the pairing is incompatible (this should be clearly established in Step 2); in some situations, the warning may just indicate that inverter clipping will occur, and this may or may not be significant.

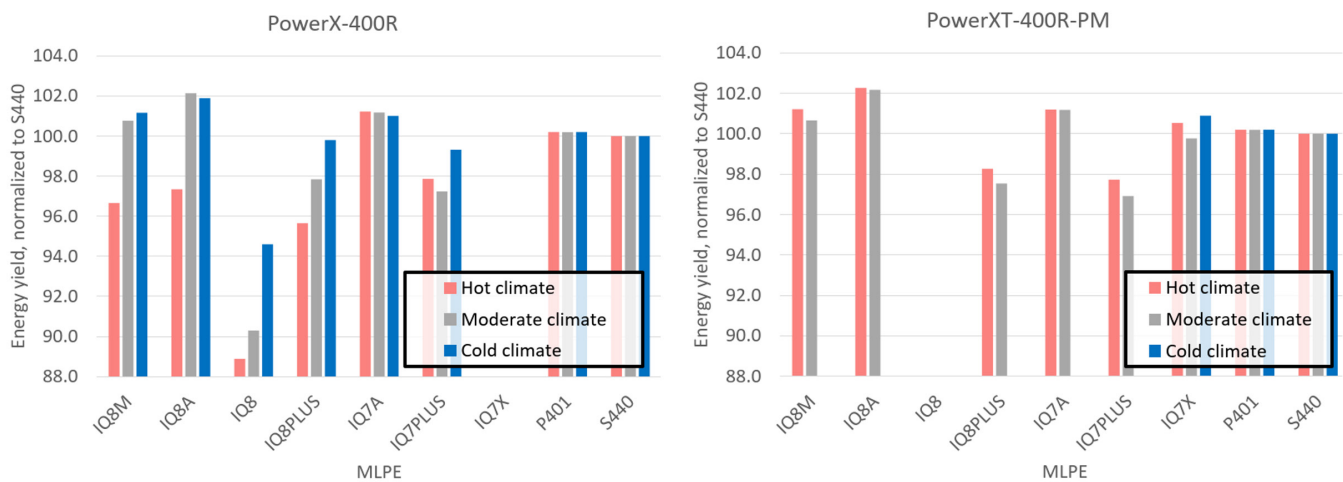


Figure 1: Simulated energy yield for Solaria PowerX-400R (left) and Solaria PowerXT-400R-PM panels (right) paired with the indicated MLPE products.

CONCLUSION

This Guide has detailed three steps for choosing a successful panel-MLPE pairing. Simulating the energy yield of several compatible candidate pairings will usually provide the designer with a reliable indication of the best MLPE pairing for the panel and installation location in question.

References

- [1] "https://app.opensolar.com," [Online]. [Accessed November 2022].
- [2] "https://enphase.com/installers/microinverters/calculator," [Online]. [Accessed December 2022].