

Using SolarEdge Designer to improve yield factors - Application Note

Version History

- Version 2.1, March 2024: Added links to localized versions.
- Version 2, July 2023: Introduction of yield optimization and yield loss reduction recommendations in SolarEdge Designer
- Version 1, June 2021

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Overview

This application note includes:

- [An introduction to yield factor loss in optimized PV systems](#)
- [System design strategies for improving the yield factor](#)
- [Guidelines for using SolarEdge Designer to identify sources of yield factor loss and to obtain recommendations for loss mitigation.](#)

Links to localized versions

To see the localized versions of this application note, click on the following links:

German – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-de.pdf>

Italian – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-it.pdf>

French – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-fr.pdf>

Dutch – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-nl.pdf>

Japanese – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-jp.pdf>

Chinese – <https://knowledge-center.solaredge.com/sites/kc/files/se-using-designer-improve-yield-factor-technical-documentation-cht.pdf>

Polish – <https://knowledge-center.solaredge.com/sites/kc/files/se-designer-improving-possible-yield-factor-loss-application-note-pl.pdf>

Yield factor loss in optimized PV systems

Yield factor losses in optimized PV systems may occur if environmental conditions severely affect the amount of light to which an entire string is exposed. Common sources of yield factor loss include:

- [Objects located adjacent to the site that create excessive and uneven amounts of shade over parts of a string.](#)
- [PV systems that use very short strings in a non-uniform or multi-faceted orientation.](#)

Yield factor loss due to excessive and uneven shading

If shade falls unevenly on a few PV modules in a string, as illustrated in Figure 1, the shaded modules will produce less energy than the modules that are not affected by shade. To mitigate the lower power production and the negative effect on the rest of the string, the Power Optimizers attached to the unshaded modules increase their output voltage. However, if the Power Optimizers reach their maximum output voltage, yield factor losses may occur.

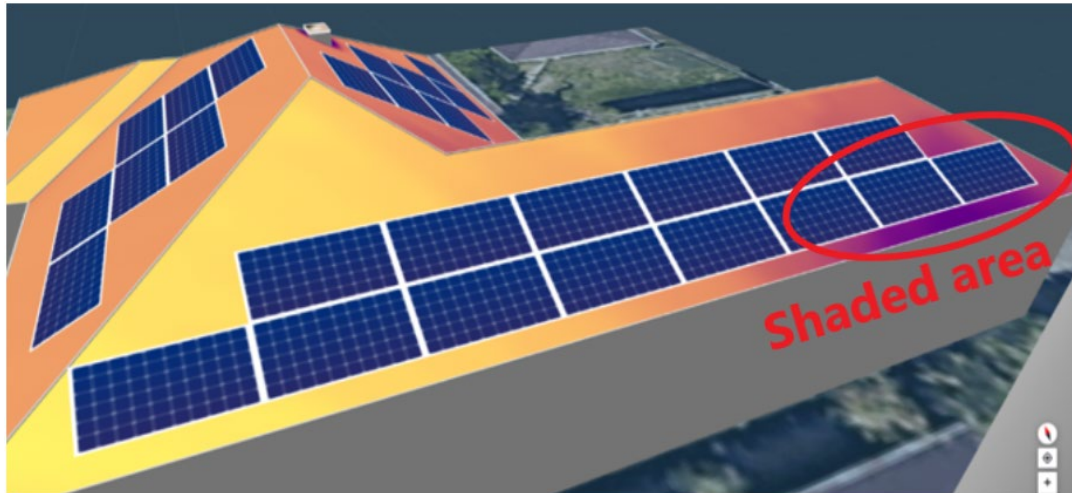


Figure 1: Object Shading Example

Yield factor loss due to short strings in a multifaceted orientation

In designs that use a single string distributed over multifaceted orientations, one facet may be exposed to high irradiance for most of the day, while the other facet may be exposed to lower irradiance, as illustrated in Figure 2. In this case, the modules exposed to lower irradiance will produce less energy. In order to mitigate the lower power production and negative effect on the rest of the string during these periods, Power Optimizers attached to modules exposed to high irradiance will increase their output voltage. However, if the Power Optimizers reach their maximum output voltage, yield factor losses may occur.

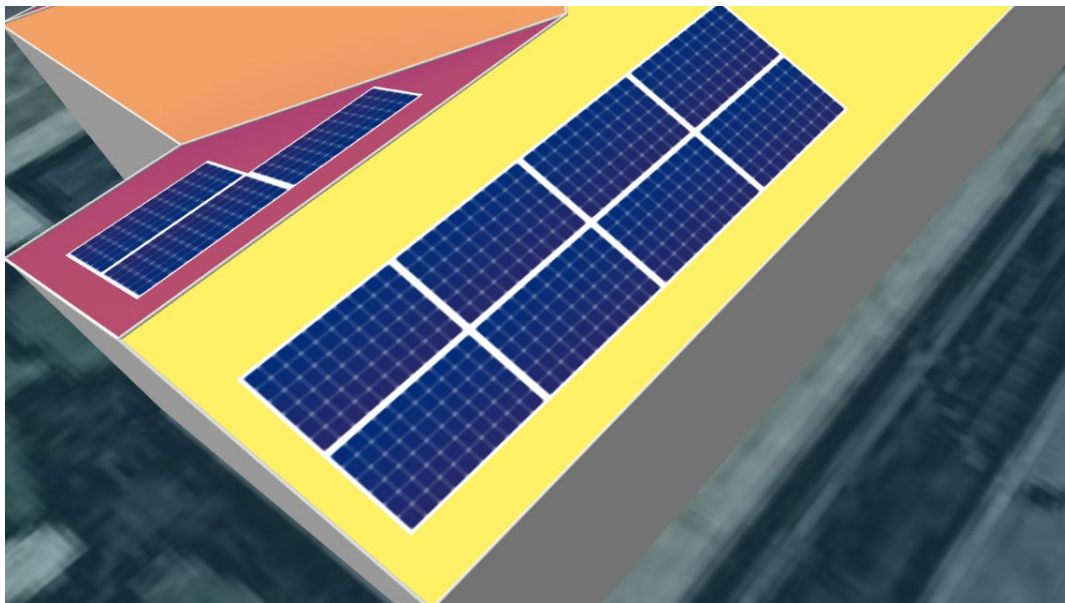


Figure 2: Multifaceted String Distribution Example

System design and yield factor

A well-designed PV System can help avoid or reduce yield factor losses that may occur if conditions severely affect the amount of light to which the entire string is exposed.

Design strategies for reducing yield factor loss include:

- Replace Power Optimizers with higher output voltage Power Optimizers. For example, replace the S440 Power Optimizer that has a maximum output voltage of 60V with the S500B Power Optimizer that has a maximum output voltage of 80V.
- Redesign the module layout to avoid the impact of objects that create excessive amounts of shade.
- Increase the length of the strings where possible.
- Separate the strings according to the modules' facet. Make sure to meet the minimum string length requirements.

Mitigating yield factor loss using SolarEdge Designer

If the PV system production is reduced due to yield factor losses, the System Loss diagram in the SolarEdge Designer Summary and Reports tab shows the extent of the yield factor loss, as shown in the example below. Hover over the **Yield Factor Loss** header to display a tooltip describing the probable cause of the loss and some potential steps for remediation.

SYSTEM LOSS DIAGRAM

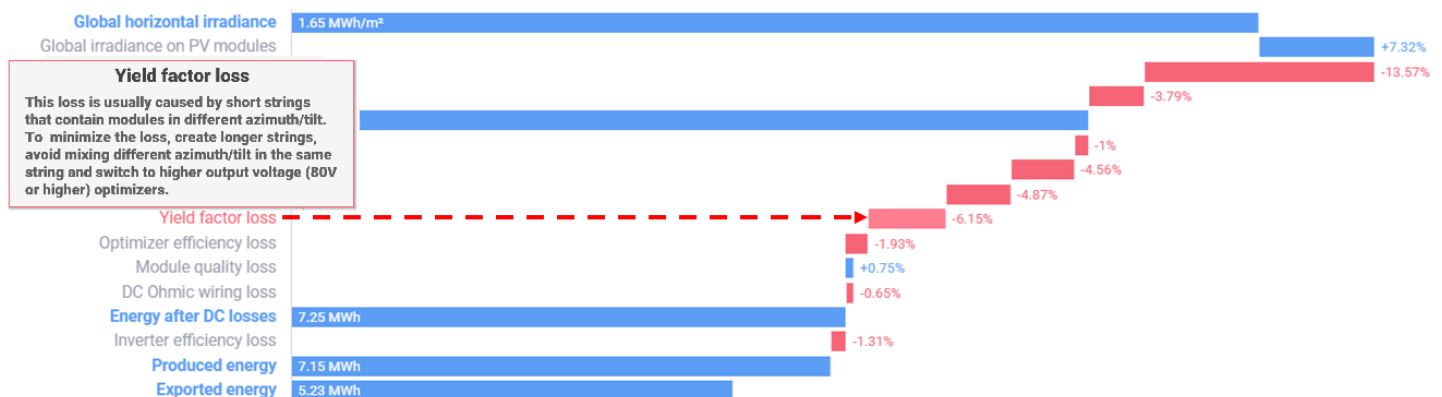


Figure 3: Example System Loss Diagram

If the Yield factor loss is over 2%, SolarEdge Designer also displays the following notification at the top of the **Summary and Reports** tab:

"There is a forecasted yield factor loss of [X]% in this design, please access the Electrical Design tab in order to improve the yield factor. Read more on how to minimize losses."

Click on the "read more" link for further information.

Obtaining recommendations for mitigating yield factor loss

SolarEdge Designer provides real-time design recommendations aimed at optimizing Inverter/Power Optimizer interoperability in order to enhance power generation and reduce losses. The recommendations are available at two stages:

- During the design stage, the system automatically recommends the optimal Power Optimizer for the inverter and strings that will be installed.
- In the event that the optimizer and string design indicate a yield factor loss, SolarEdge Designer recommends a design change that may reduce the loss.

→ To optimize yield factor when losses are identified:

1. Select the **Electrical Design** tab in the Designer and note if warning indications (signified by the exclamation point symbol) appear on the tab, as shown in the figure below.



Figure 4: Yield Factor Loss Indications

2. Hover over an exclamation point on the inverter or optimizer to view an explanation of the warning.

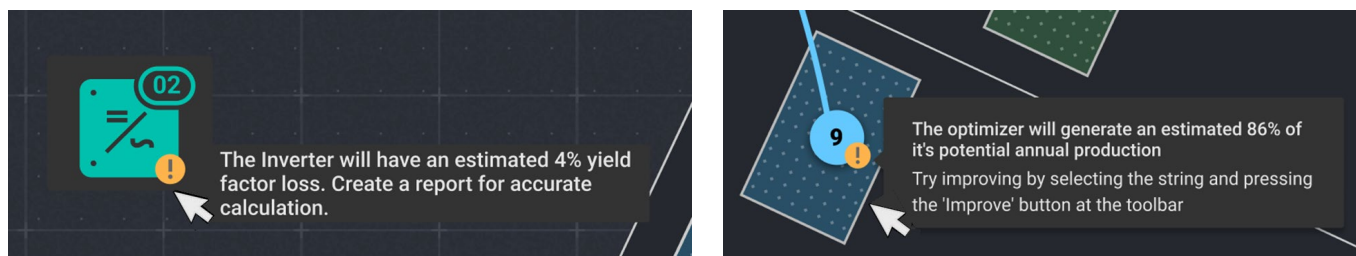


Figure 5: Hover for Explanation of Warning

- Click on the **Read more** link to download a copy of this document. Click on the **Change Optimizer** link to instruct SolarEdge Designer to search for a replacement Power Optimizer model that will improve yield. If a better option is found, it will be automatically selected.

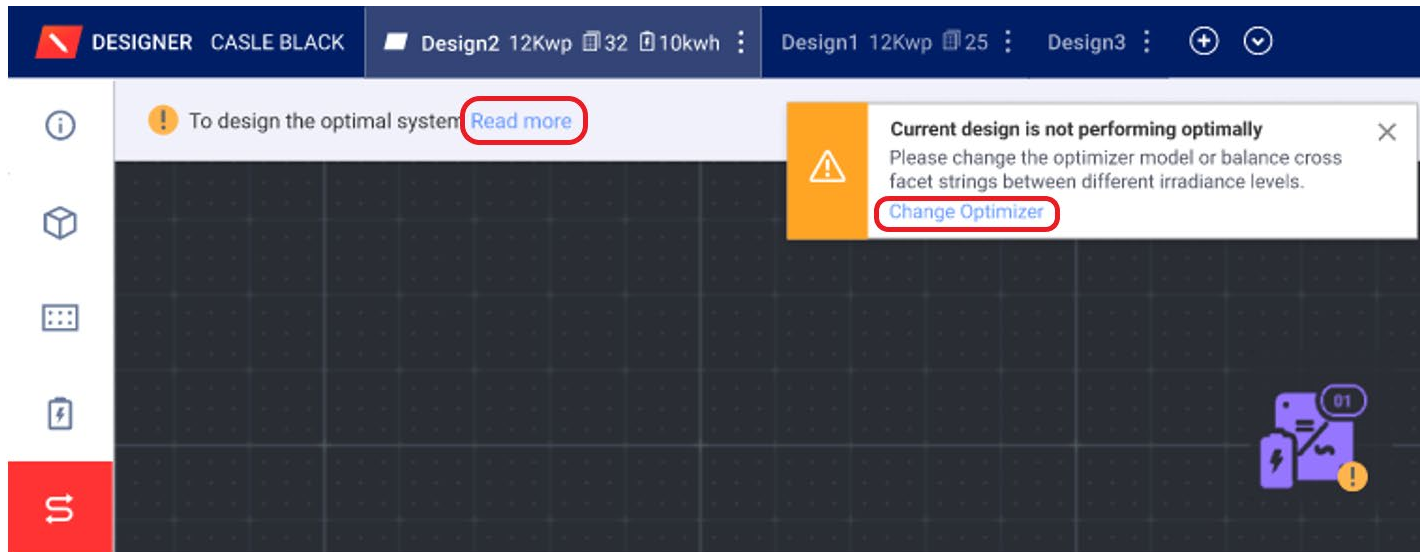


Figure 6: Design Fault Explanation and Remediation

- If a Power Optimizer replacement is suggested, perform one of the following actions:
 - Click on the Power Optimizer dropdown list box to manually select a different model from the list.
 - Click on the **Improve** button to instruct SolarEdge Designer to search for a replacement Power Optimizer model that will improve yield. If a better option is found, it will be automatically selected.

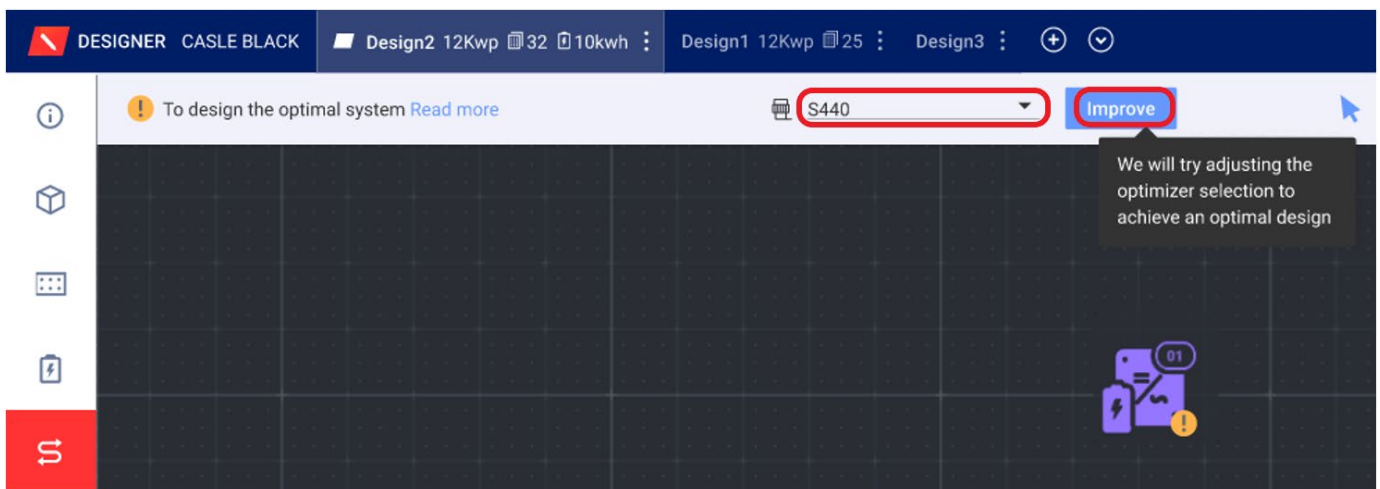


Figure 7: Selection of a Different Power Optimizer

At this point, one of the following scenarios are expected:

- Design was improved. In this case, a Power Optimizer replacement message appears, as shown in the figure below.
- The currently selected Power Optimizer is the best suited to the design. In this case, the message appears: “No other optimizer was found for a better design. Add/remove modules to allow longer strings.”

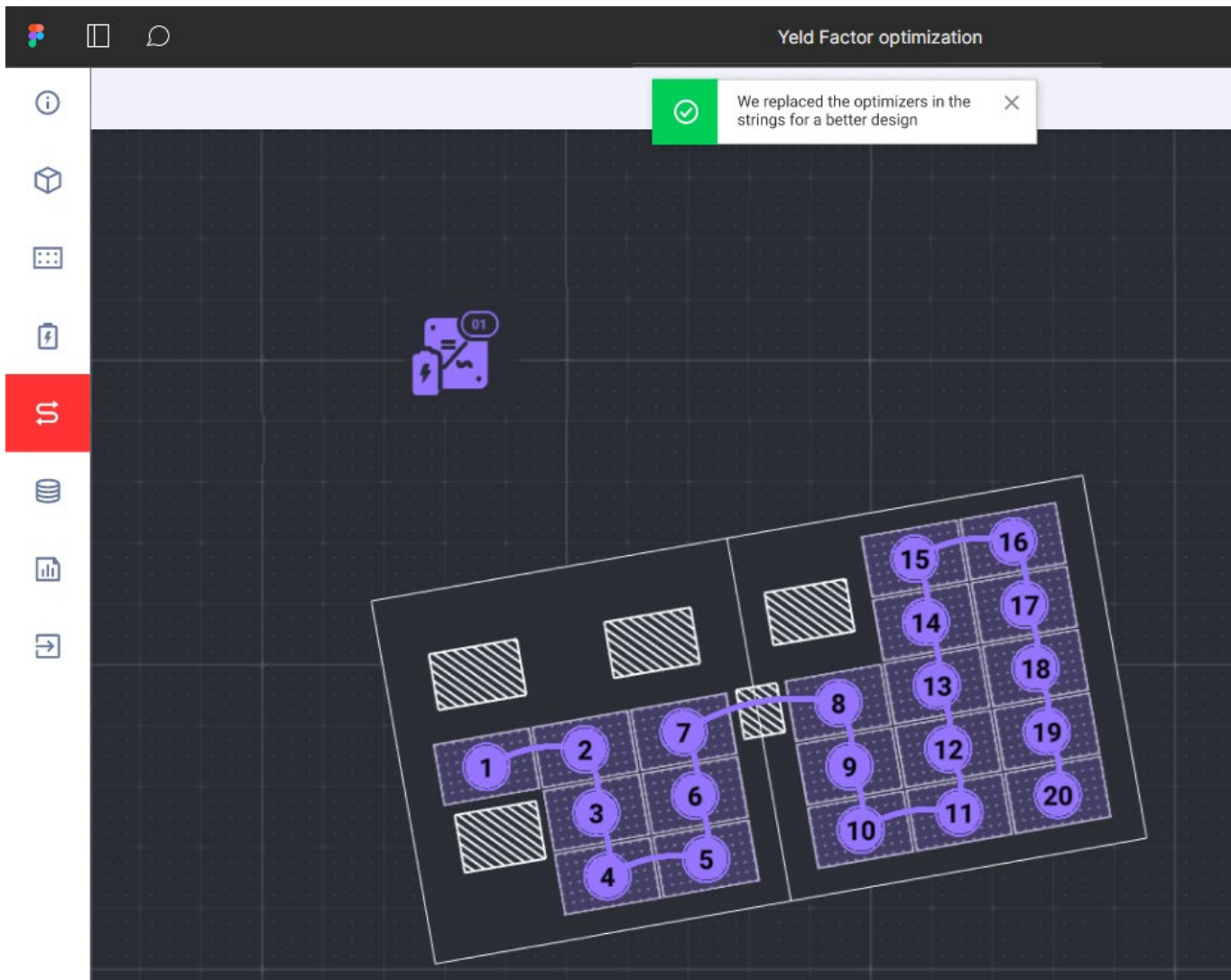
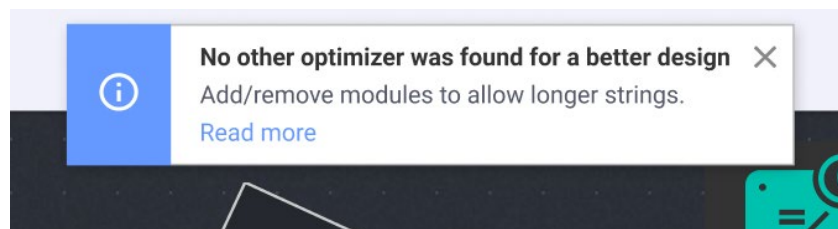


Figure 8: Yield Factor Loss Indicators are Removed Following New Power Optimizer Selection



The newly selected Power Optimizer appears in the tab. In the figure below, the S500B Power Optimizer was selected instead of the S440 model.

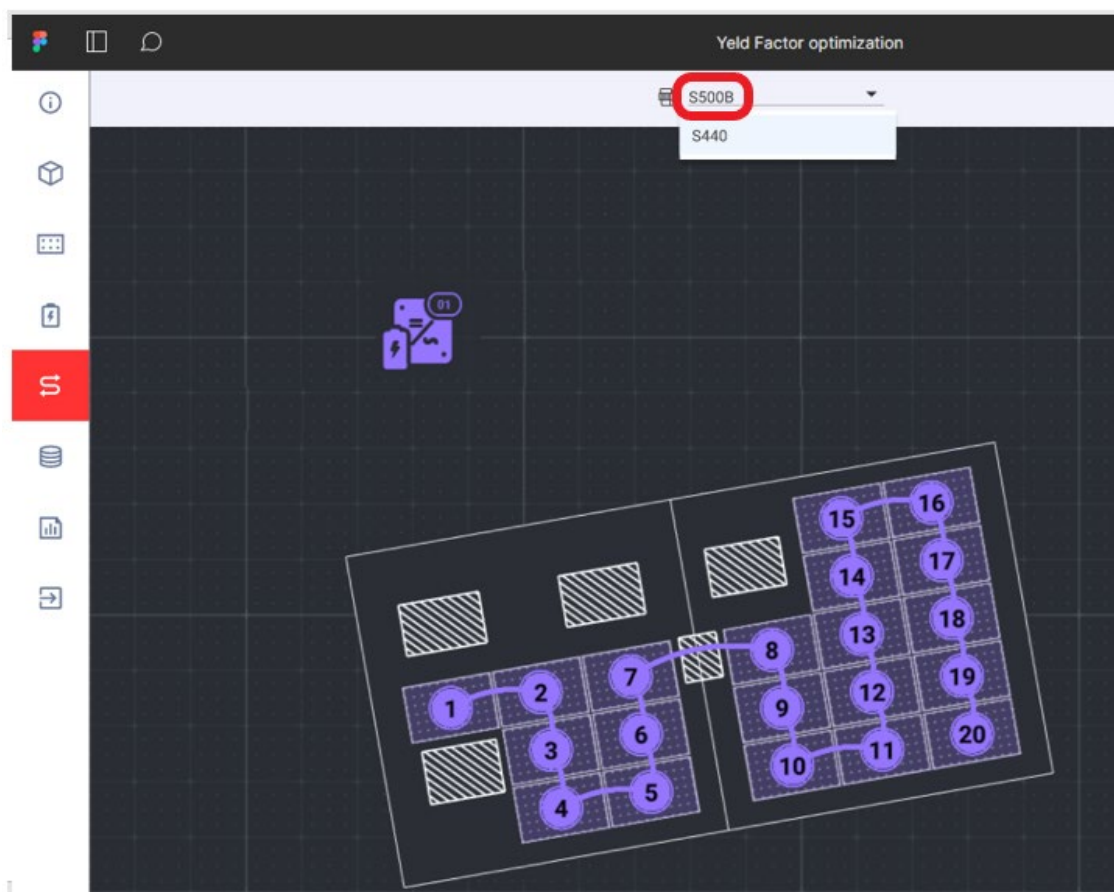


Figure 9: New Power Optimizer Selection is Displayed