

PV ARRAY SCENARIOS: 108 AND 96 PANELS

Huawei SUN2000-50K-MC0 (50 kW) with LONGi Hi-MO X10 LR8-66HVD-650M Anti-Glare (650 Wp, bifacial)

Summary. Both scenarios use six strings wired 1 / 2 / 2 / 1 across the four MPPTs. That keeps every MPPT inside its current rating with no current clipping, on a roof, on the ground or on a carport. **108 panels (6 × 18, 70.2 kWp)** gives about **100,300 kWh/year** with almost no AC clipping. **96 panels (6 × 16, 62.4 kWp)** gives about **89,200 kWh/year** with no clipping. Both leave two inverter inputs free for later expansion.

1. Scenario comparison

Item	Scenario A: 108 panels	Scenario B: 96 panels
String layout	6 strings × 18 panels	6 strings × 16 panels
Strings on MPPT 1 / 2 / 3 / 4	1 / 2 / 2 / 1	1 / 2 / 2 / 1
DC power	70.2 kWp	62.4 kWp
DC/AC ratio (50 kW rated)	1.40	1.25
Panel area (2.70 m ² each)	292 m ²	259 m ²
Est. energy per year	~100,300 kWh	~89,200 kWh
Est. energy per day (average)	~275 kWh	~244 kWh
Est. AC clipping loss	~0.1%	0%
Est. peak AC output on a clear day	~55 kW (at the inverter limit)	~52 kW
Inverter inputs used / free	6 / 2 free	6 / 2 free
Suitable for carport / light ground	Yes	Yes

Energy estimates use a simplified model of Chiang Rai sunshine (about 1,430 kWh/kWp/year) and the 55 kW AC limit, not site weather data; use them as guidance. Scenario A adds 12 panels (7.8 kWp) and about 11,100 kWh/year over Scenario B, with almost no clipping, so every added panel still works at full value.

2. String electrical check

Per string	18 panels (A)	16 panels (B)	Inverter limit
Voc at 0 °C (coldest)	940 V	835 V	≤ 1,100 V OK
Vmp at 25 °C	738 V	656 V	Rated 600 V; MPPT 180–1,000 V OK
Vmp at 70 °C (hottest)	655 V	582 V	≥ 180 V OK
Vmp at 0 °C	784 V	697 V	≤ 1,000 V OK
Power per string	11.7 kWp	10.4 kWp	—

Per MPPT (both scenarios)	MPPT 1 and 4 (1 string)	MPPT 2 and 3 (2 strings)
Operating current (Imp)	15.9 A of 30 A OK	31.7 A of 33 A OK
Design Isc, roof (+10% rear gain)	18.6 A of 40 A OK	37.2 A of 44 A OK
Design Isc, carport (+20% rear gain)	20.3 A of 40 A OK	40.6 A of 44 A OK
Current per input	≤ 20.3 A of 23 A OK	

Design conditions: cell temperature 0 °C to 70 °C; Voc −0.20 %/°C, Vmp −0.25 %/°C, Isc +0.05 %/°C; bifacial rear-side gain assumed +10% (roof/ground) and +20% (carport or light ground). Confirm bifaciality on the LONGi datasheet.

3. String layouts

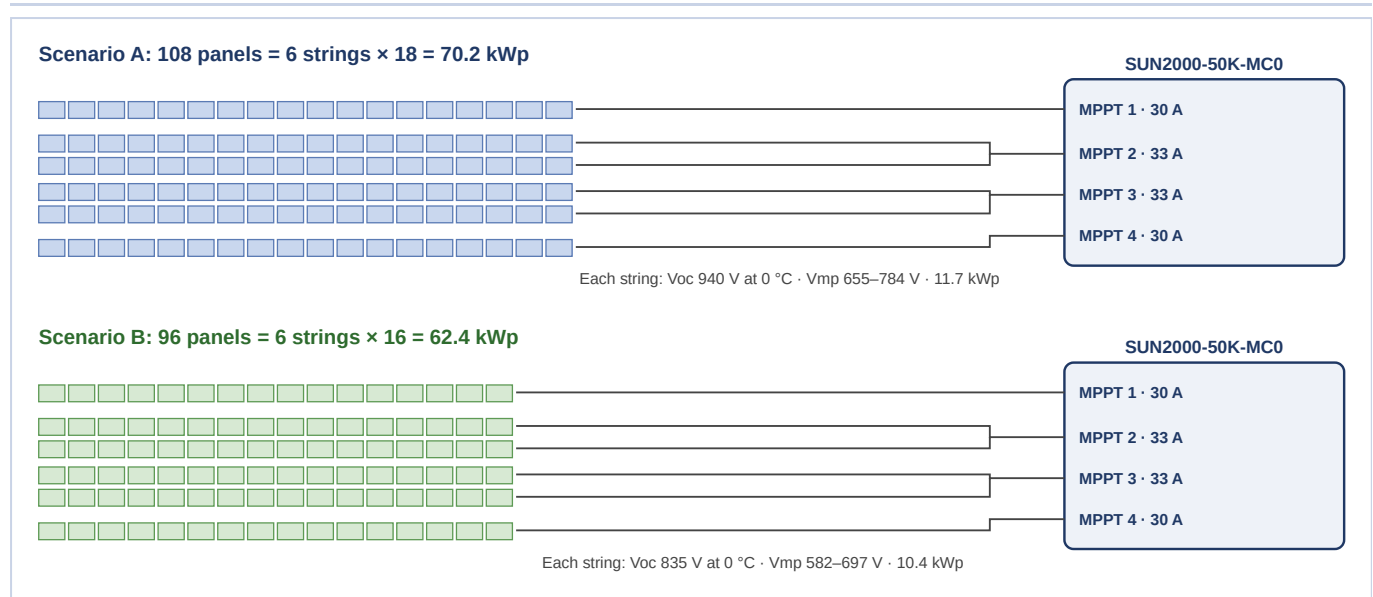


Figure 1 — String layouts. Each pair of strings joins at the inverter's own two inputs on MPPT 2 and MPPT 3; MPPT 1 and MPPT 4 each use one input, leaving one input free on each.

4. Recommendation

- **Scenario A (108 panels)** is the better use of the 50 kW inverter: 11% more energy than Scenario B for 12 more panels, still with almost no clipping. Choose it when the space and budget allow.
- **Scenario B (96 panels)** suits a smaller space or budget. The inverter runs below its limit all year, with the most headroom for hot days.
- **Room to grow:** both scenarios leave one free input on MPPT 1 and one on MPPT 4. A later string of the same length (18 or 16 panels) can be added to each, up to 144 or 128 panels, without changing the inverter. Adding a second string to MPPT 1 or 4 causes slight current clipping on a roof, and is not allowed on a carport or light-coloured ground (see the maximum-input design note).
- Strings on the same MPPT must have the same number of panels, the same orientation and the same tilt.
- For a grid-connected system, check PEA's requirements for the DC/AC ratio. Both ratios (1.40 and 1.25) are moderate.

Sources: Huawei SUN2000-50K-MC0 datasheet, version 01-202510; LONGi LR8-66HVD-650M specifications. Figures are based on manufacturer datasheets and the stated design assumptions; confirm the final design against the latest datasheets and site conditions.