

San Jose

San Jose, California, United States

Variant: Variant 1



SYSTEM SIZE

7.2 kW



ANNUAL ENERGY

12.2 MWh



YEAR 1 SAVINGS

\$2,186



NET PRESENT VALUE

\$11,313

Project

The property, where it is, and the weather year the calculation ran on.

 **Project details**

Location	San Jose
Coordinates	37.3362, -121.8906
Time zone	America/Los_Angeles
Property type	Single-family home

 **Weather**

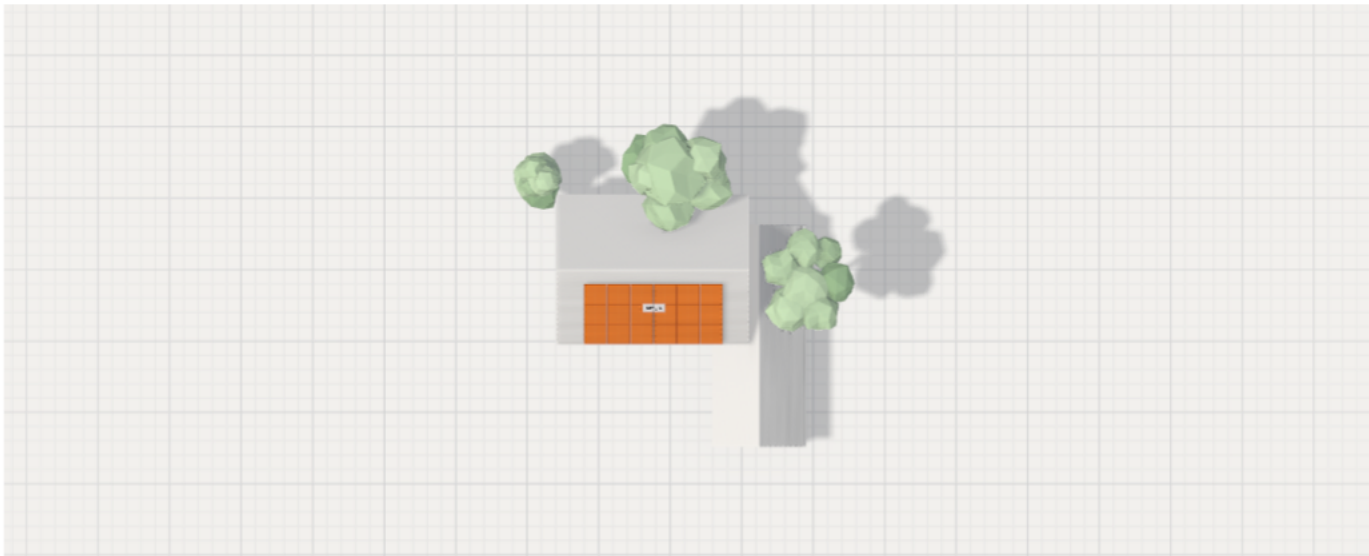
Source	PVGIS 5.3 TMY · ERA5 reanalysis, 2005–2023
Irradiation	1,914 kWh/m² per year
Hours simulated	8760

 Weather: PVGIS 5.3 TMY · ERA5 reanalysis, 2005–2023. Reanalysis data are usually less accurate than satellite data under frequent cloud; import a satellite-based year if you have one.

Layout

What stands on the site, and the arrays placed on it.

 Site model



 Panel arrays

Array A

Modules	18 of 18 (6 × 3) • 400 W
Capacity	7.20 kW
Orientation	40° tilt • 180° azimuth
Footprint	9.7 × 5.4 m, slope down the rows
System losses	14.0%
Ground albedo	0.20 (used where the weather record carries none)

Equipment

The modules on each array, the inverters they feed, and how they are wired.

Modules and wiring

Array A

Module	Canadian Solar · CS1Y-400MS • bundled catalogue, research data
Inverter	Primo GEN24 77 208 - 240 {240V} • MPPT 1
Compatibility	Compatible for modeled checks
Module & inverter	-0.35 %/°C • DC/AC 0.94 • 97.1%

Inverters

Fronius · Primo GEN24 77 208 - 240 {240V}

Type	String inverter • bundled catalogue, research data
AC power	7.69 kW
Carries	Array A
DC/AC ratio	0.94

 Equipment figures are the project's own copy, taken when the device was chosen. The compatibility line is a voltage check at standard test conditions, not an electrical design or a permit-ready document.

Shade loss

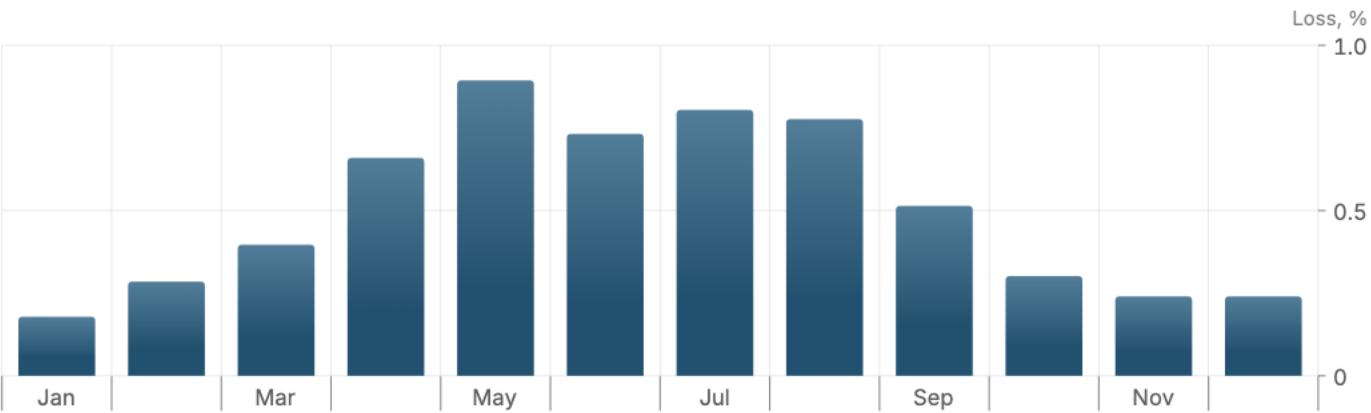
What the site's own objects cost the arrays, hour by hour.

Shading summary

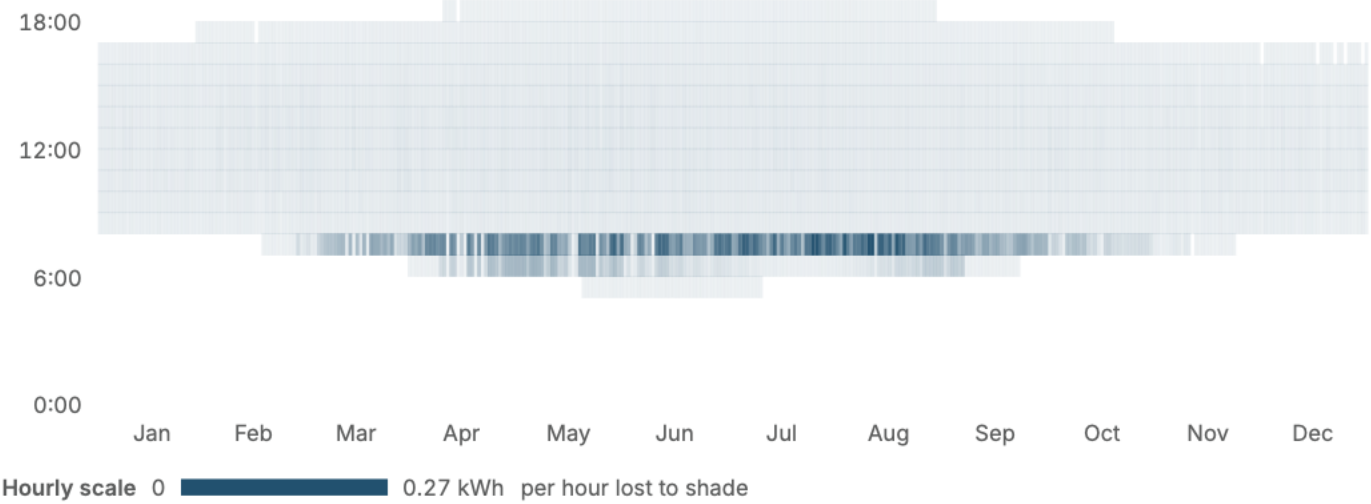
Annual shade loss	0.5%
Lost to shade	65 kWh
Objects included	5

 Shade loss is measured by simulating the year twice, with the site's objects and without them, against traced geometry.

Monthly shade loss



Hours lost to shade



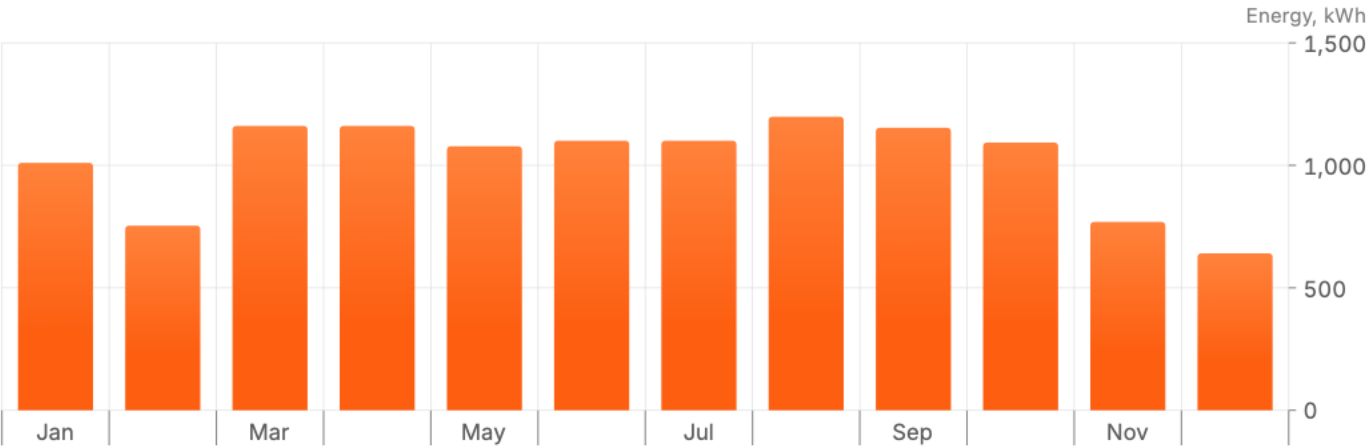
Production

What the arrays make, and what each step of the chain takes.

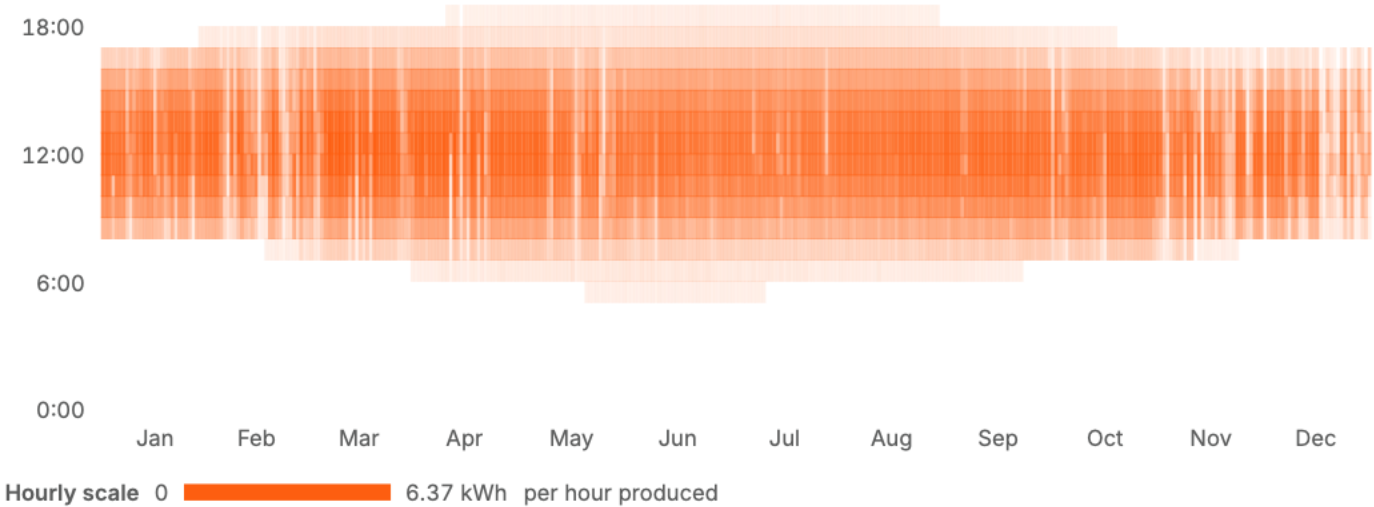
⚡ Production summary

System size	7.20 kW DC
Annual production	12,239 kWh
Specific yield	1,700 kWh/kW
Capacity factor	19.4%
Model	hourly-pv-hdkr-1.1

Production by month



Every hour of the year



 Where the energy goes



Energy over the year, kWh

Shading	Traced against the objects standing in the scene: the beam hour by hour, and the share of the sky dome and of the ground they close off.	0.6%	-97 kWh
Reflection	Light glancing off the module glass, from the angle of incidence.	1.6%	-250 kWh
Cell temperature	From irradiance, air temperature and wind, at the module's stated coefficient.	5.2%	-814 kWh
System losses	Assumed Soiling, mismatch, wiring, connections and availability, as one figure. The model cannot separate them and neither should the chart.	14.0%	-2,057 kWh
Inverter	Part-load efficiency, and clipping in any hour the array offers more than the inverter can pass.	3.1%	-396 kWh
Delivered	of 15,851 kWh reaching the modules	77.2%	12,239 kWh

 The bar is exact in kWh: the losses add up to the gap between what reached the modules and what left the inverter. The percentages are sequential — each is a share of what the step before it left — so they do not add to the same total.

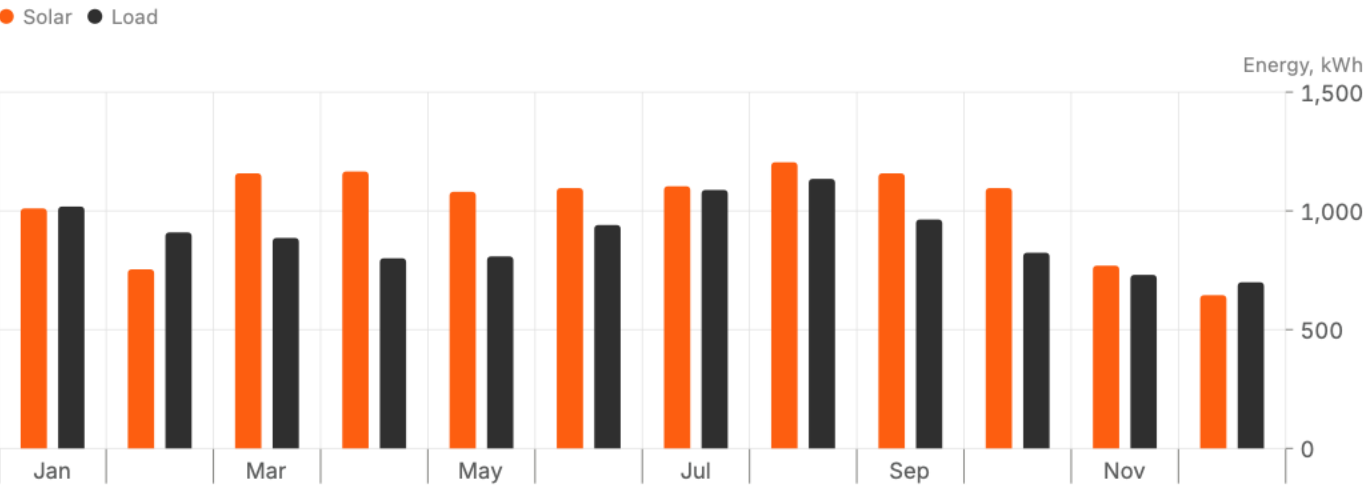
Consumption

What the household uses, and how much of it the arrays meet.

Consumption summary

Annual consumption	10,800 kWh (annual figure, months assumed)
Shape of a day	Morning and evening (assumed)
Self-consumption	33% (computed)
Load met by solar	37%

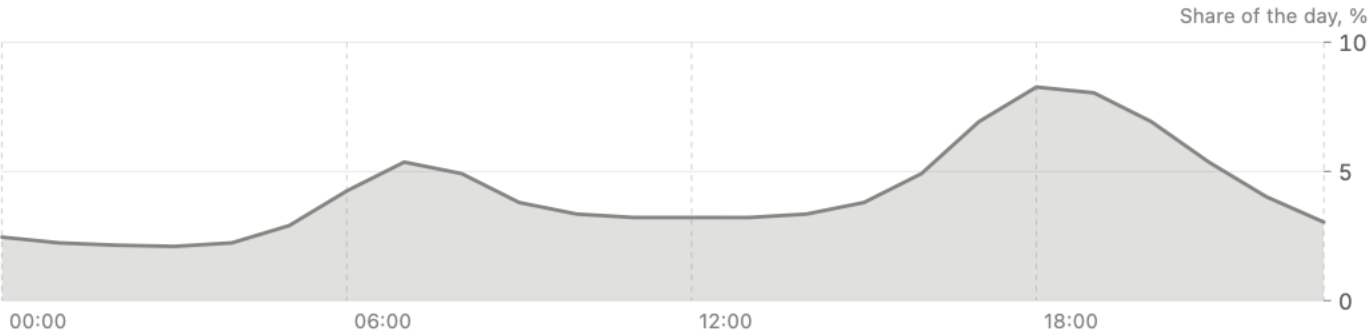
Production and consumption



Consumption by month



Shape of a day



Economics

The money, and every assumption behind it.

Project economics

Cost and return

Installed cost	\$20,520
Incentive	\$0
Net cost	\$20,520
Bill before solar	\$4,320/yr
Bill after solar	\$2,134/yr
Payback	9.1 years
IRR	10.7%
ROI	224%
LCOE	\$0.16/kWh

Assumptions

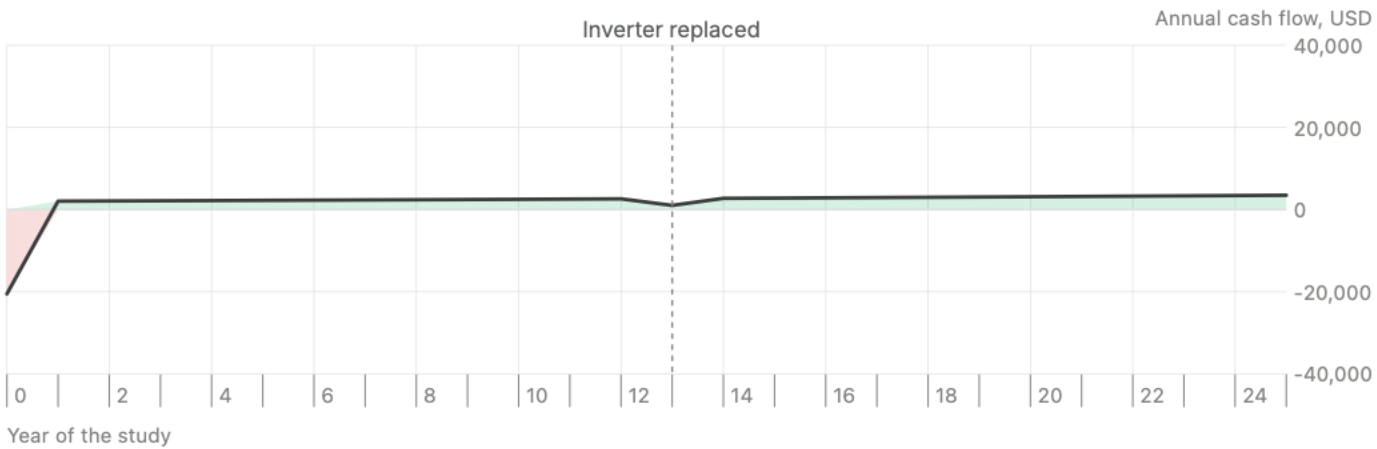
Analysis period	25 years
Utility escalation	2.5%/yr
Solar degradation	0.5%/yr
Discount rate	6.0%
Operating cost	0.6% of price/yr
Financing	Cash

Utility rate

Utility	Example utility
Tariff	Flat rate, net billing
Structure	Flat
Export	Net billing
Fixed monthly charge	\$0.00
Base import rate	\$0.40/kWh
Export credit	\$0.07/kWh

⚠ The tariff has not been confirmed against the utility's published schedule. Every figure in this section rests on it.

Lifetime cash flow



Cash flow by year

The same years as the chart above, in figures.

YEAR		BILL SAVINGS	RUNNING	NET	CUMULATIVE
0		—	—	-\$20,520	-\$20,520
1		\$2,186	-\$123	\$2,063	-\$18,457
2		\$2,235	-\$126	\$2,109	-\$16,348
3		\$2,285	-\$129	\$2,156	-\$14,192
4		\$2,337	-\$133	\$2,204	-\$11,988
5		\$2,389	-\$136	\$2,253	-\$9,735
6		\$2,443	-\$139	\$2,304	-\$7,431
7		\$2,498	-\$143	\$2,355	-\$5,076
8		\$2,554	-\$146	\$2,408	-\$2,668
9		\$2,612	-\$150	\$2,462	-\$206
10	Paid back	\$2,671	-\$154	\$2,517	\$2,311
11		\$2,731	-\$158	\$2,573	\$4,885
12		\$2,792	-\$162	\$2,631	\$7,516

⊞ Cash flow by year (continued)

YEAR	BILL SAVINGS	RUNNING	NET	CUMULATIVE
13	\$2,855	-\$1,821 · inverter	\$1,034	\$8,549
14	\$2,920	-\$170	\$2,750	\$11,299
15	\$2,986	-\$174	\$2,812	\$14,111
16	\$3,053	-\$178	\$2,874	\$16,986
17	\$3,122	-\$183	\$2,939	\$19,924
18	\$3,192	-\$187	\$3,005	\$22,929
19	\$3,264	-\$192	\$3,072	\$26,001
20	\$3,338	-\$197	\$3,141	\$29,142
21	\$3,413	-\$202	\$3,211	\$32,353
22	\$3,490	-\$207	\$3,283	\$35,635
23	\$3,568	-\$212	\$3,356	\$38,992
24	\$3,649	-\$217	\$3,431	\$42,423
25	\$3,731	-\$223	\$3,508	\$45,931

Variants

Every variant side by side: what each one makes, costs and returns.

Variant 1

7.2 kW · 0.5% lost to shade

ANNUAL ENERGY

12.2 MWh

YEAR 1 SAVINGS

\$2,186

PAYBACK

9.1 yr

NPV

\$11,313

Variant 2

5.6 kW · 0.8% lost to shade

ANNUAL ENERGY

9.5 MWh

-2.8 MWh against Variant 1

YEAR 1 SAVINGS

\$1,927

-\$259 against Variant 1

PAYBACK

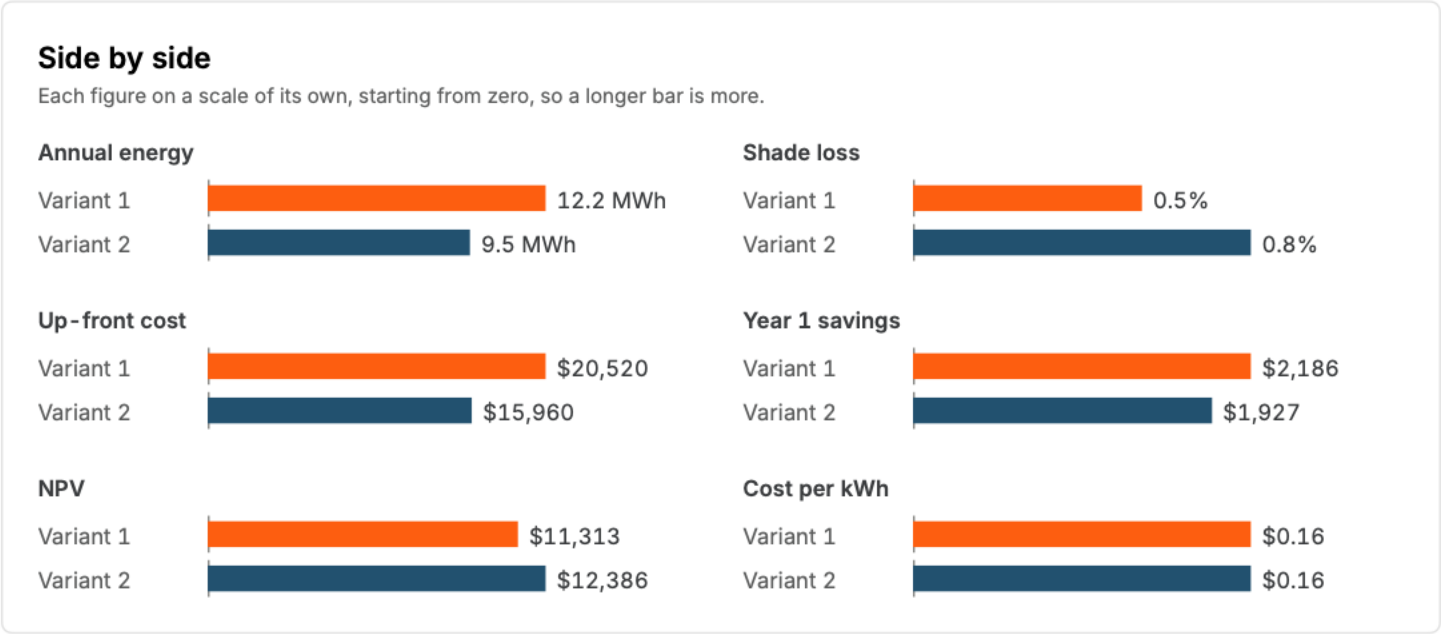
8.1 yr

-1.0 yr against Variant 1

NPV

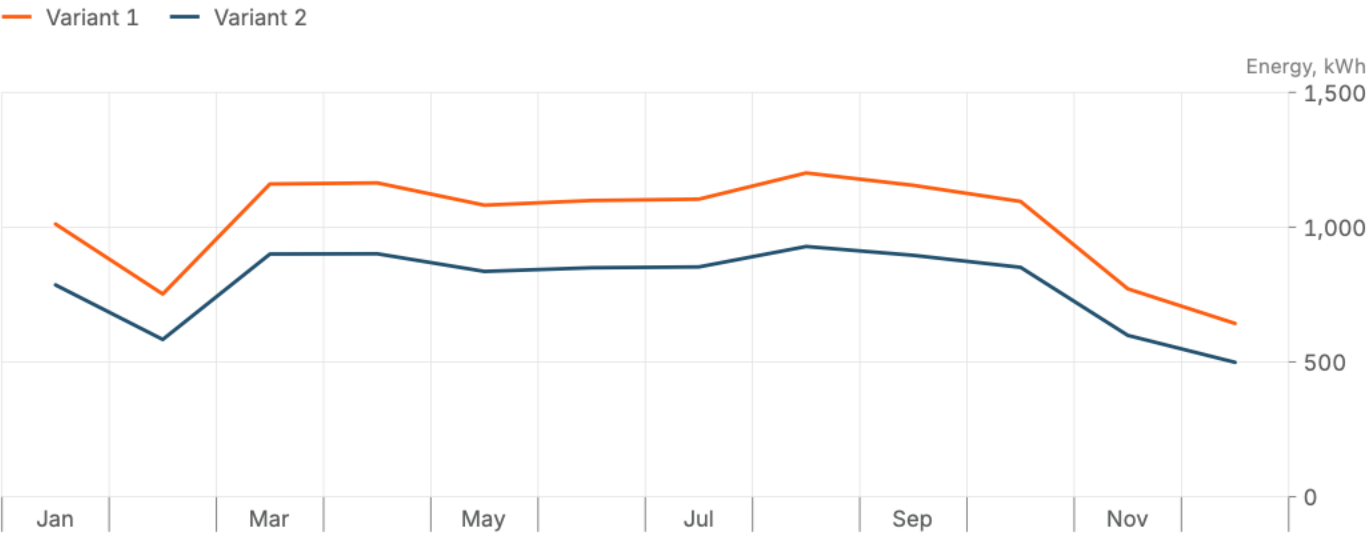
\$12,386

+\$1,073 against Variant 1



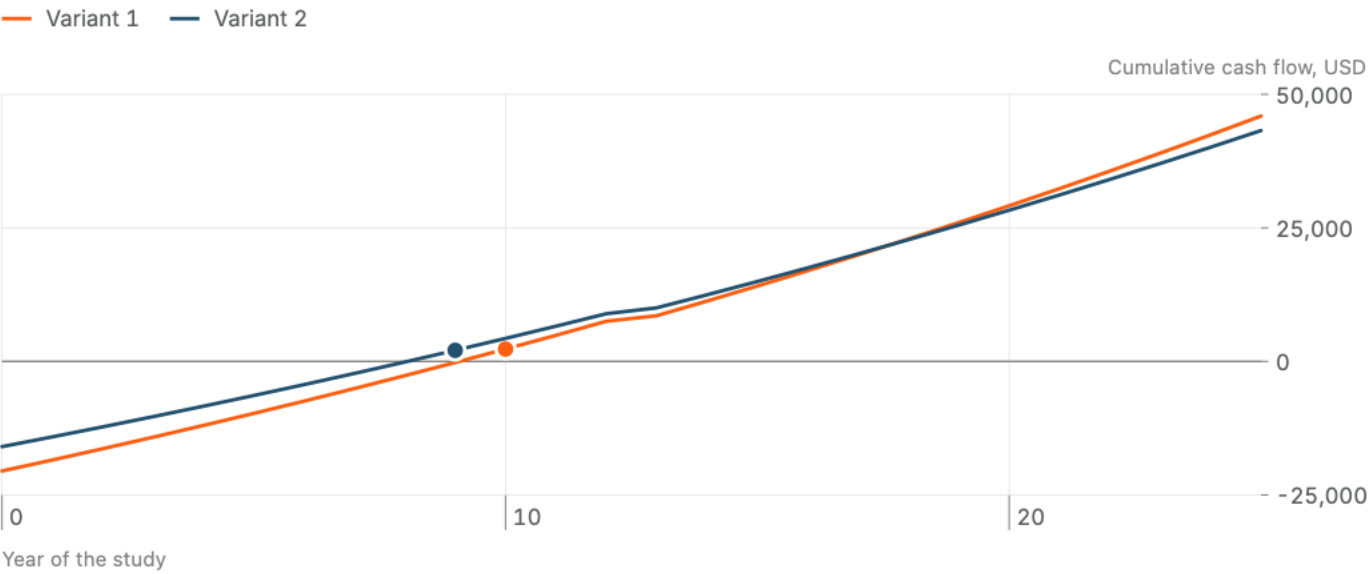
Production through the year

What each variant makes, month by month.



Money over the study

What each variant has saved, less what it has cost, year after year. A dot marks the year its line crosses zero and it has paid for itself.



⊞ Every figure

The numbers behind the cards and charts above.

	VARIANT 1	VARIANT 2
System	7.2 kW	5.6 kW
Annual energy	12.2 MWh	9.5 MWh
kWh per kW	1,700	1,693
Shade loss	0.5%	0.8%
Up-front	\$20,520	\$15,960
Year 1 savings	\$2,186	\$1,927
Payback	9.1 yr	8.1 yr
NPV	\$11,313	\$12,386
Per kWh	\$0.16	\$0.16

⚠ Model disclosures

- Weather: PVGIS 5.3 TMY · ERA5 reanalysis, 2005–2023. Reanalysis data are usually less accurate than satellite data under frequent cloud; import a satellite-based year if you have one.
- Terrain: the skyline is already in this record, from the source's own elevation model.
- Preliminary estimate. Not a permit, structural, electrical, or engineering document.
- Preliminary economics: confirm current utility tariff, export rules, taxes, and incentives before use.
- Tariff values are research placeholders tied to a named utility, not a current rate quote.

 Sources and limitations

Production model	hourly-pv-hdkr-1.1
Economics model	residential-economics-hourly-0.3

Weather: European Commission PVGIS TMY or NASA POWER historical grids, unless a file was imported; the year used is named under Weather above. Address search: © OpenStreetMap contributors via Photon, and the U.S. Census Bureau geocoder. Scene imagery: USDA NAIP / USGS in the contiguous US, or an image of the user's own.

SolarSolution Studio produces preliminary estimates from the information you enter and from public climate data. Results are not a quote, a guarantee of energy production or savings, or engineering, electrical, structural, financial, tax or legal advice. Actual performance and costs will differ. Before buying or installing a system, get a site assessment and a proposal from a licensed installer.