SAMPLE REPORT - address and identifying details removed; roof shown as a generic schematic; shading is a sample apartment complex, for privacy.

FREE ROOFTOP SOLAR ANALYSIS

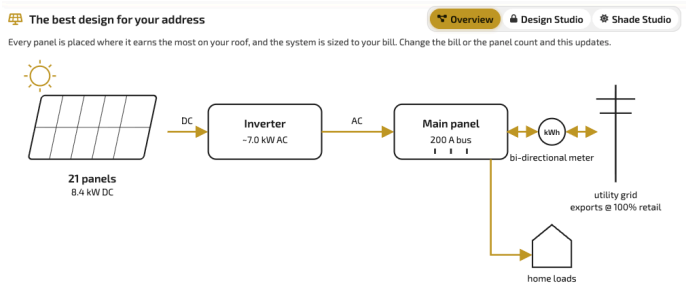
A Pasadena, CA home

A by-hand analysis of whether solar pays for this home — built entirely on the SIA calculator, using your roof, your real electricity bills, and Pasadena Water & Power's actual rates and rebates.

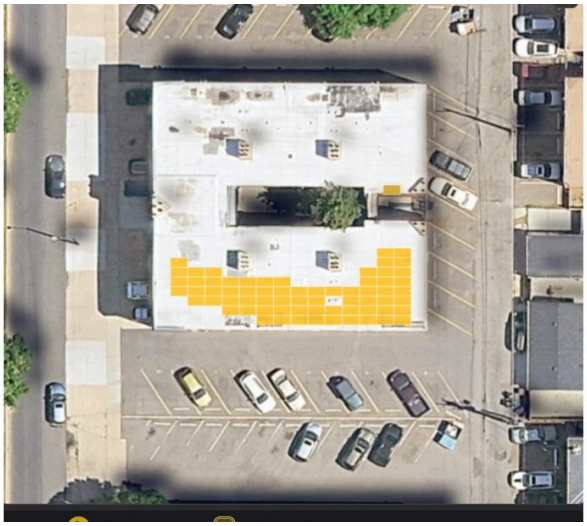
62%	$2,611	6.7 yrs	$74,120
Electric-bill cut (year 1)	Net savings, year 1	Cash payback	25-year net savings

OUR VERDICT — Yes, and the clear winner is a cash purchase of the full rooftop system.

A 7.6 kW system (19 panels, microinverters) cuts this home's bill from about $388/mo to roughly $149/mo — a 62% reduction — pays back in 6.7 years, and returns a 16% effective rate of return over 25 years. Because PWP offers full net metering, a battery adds backup and earns a rebate but does **not** lower the bill further.



Your proposed 19-panel layout (faces S1, S2, S5, S9, S11)



Google Solar annual sunlight map — bright = most sun, dark = shaded

Imagery August 25, 2024 (Google Solar, quality: HIGH). This document is an independent estimate, not a quote, a guarantee of savings, or tax advice. Every figure is reproducible on the SIA calculator.

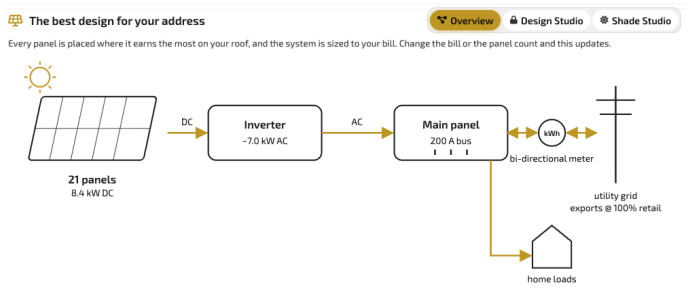
What we found

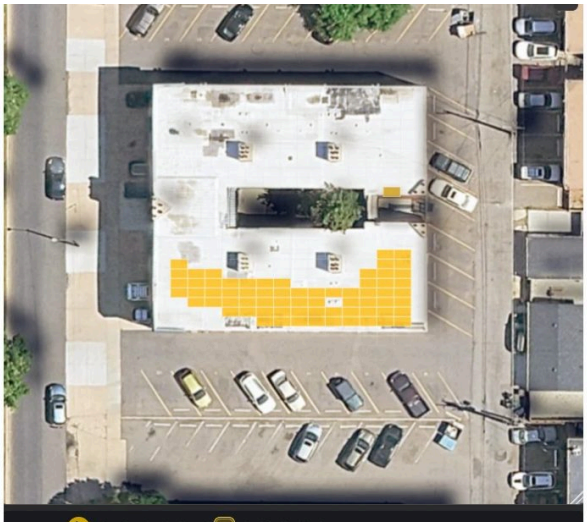
- **Your bill is high because you use a lot — and PWP's rate is steeply tiered.** You use about 16,005 kWh a year (nearly double a typical home), which pushes you deep into PWP's top tier at 36.92¢/kWh. Your last 12 months of bills total about $4,659.
- **Solar offsets 57% of your energy but cuts 62% of your bill.** Solar erases your most expensive kWh first — the 36.92¢ and 25.71¢ tiers — so the dollar savings beat the kWh offset.
- **Your roof is capped at 19 panels** after fire-code setbacks, across five usable faces (S1, S2, S5, S9, S11). That is enough for a 7.6 kW system producing about 9,149 kWh a year.
- **Pasadena pays you to do this.** PWP gives a confirmed 0.60/W solar rebate (about $4,172 here). Note the federal tax credit is **0%** in 2026 — it expired for homeowners at the end of 2025.

> **Recommendation for your goals (cut the bill, maximise ROI):** Buy the full 19-panel system with cash. If an upfront check isn't ideal, a solar loan is cash-flow-positive from year one. Skip the battery unless you want outage protection — under PWP net metering it doesn't add bill savings.

Your roof & its sunlight

We model every roof face from Google's measured annual sunlight raster. Two numbers describe each face: **Sunlight %** (how much of an unshaded roof's sun it actually gets, after trees and obstructions) and **TSRF** (Total Solar Resource Fraction — sun captured versus an ideal, unshaded, optimally-tilted roof here). Your panels go on the five best-balanced faces; your system-weighted TSRF is about **71%**.



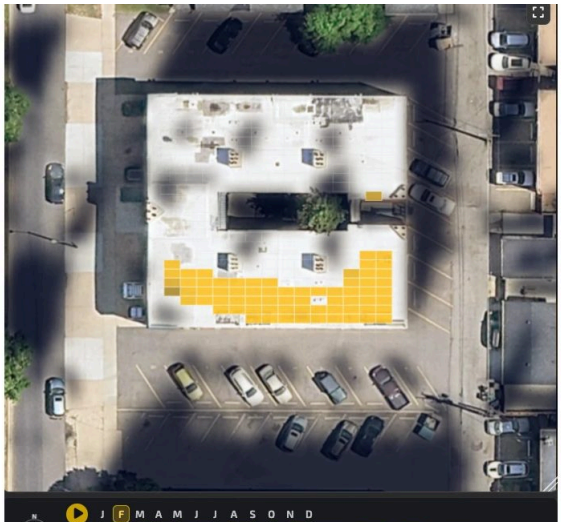


ROOF FACE	PITCH	FACING	AREA	SUNLIGHT	TSRF
S1 In your design	14°	76° ENE	59.2 m²	84%	**72%**
S2 In your design	40°	259° W	21.6 m²	82%	**70%**
S3	41°	317° NW	14.9 m²	100%	**60%**
S4	22°	26° NNE	11.8 m²	98%	**70%**
S5 In your design	33°	253° WSW	12.4 m²	92%	**83%**
S6	18°	249° WSW	10.8 m²	80%	**74%**
S7	19°	154° SSE	9.8 m²	92%	**90%**
S8	31°	99° E	10.4 m²	61%	**53%**
S9 In your design	17°	69° ENE	8.6 m²	80%	**67%**
S10	19°	33° NNE	8.6 m²	86%	**65%**
S11 In your design	31°	81° E	9.1 m²	65%	**53%**
S12	14°	187° S	7.4 m²	91%	**89%**
S13	22°	297° WNW	6.7 m²	75%	**61%**
S14	42°	352° N	6.7 m²	100%	**48%**
S15	35°	321° NW	5.4 m²	65%	**41%**

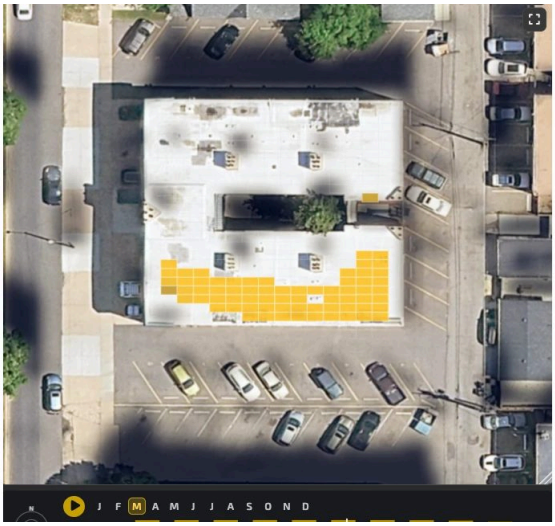
Faces in your design are highlighted. S9 and S11 are smaller, lower-sun faces included to reach 19 panels; the size sensitivity later shows the trade-off of leaving them off.

How sunlight moves across your roof through the year

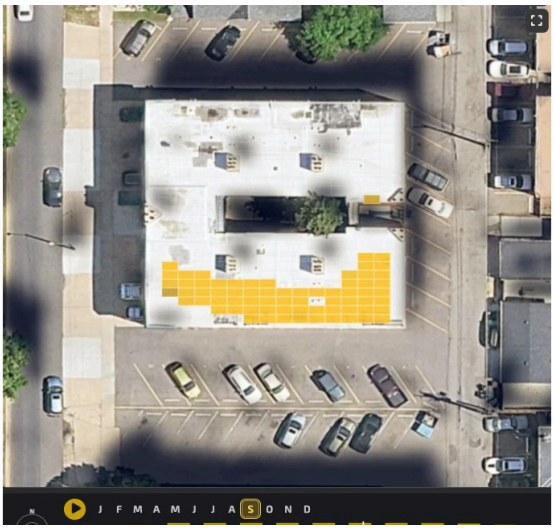
We ran your roof through Google's 3-D shade model (built from imagery captured 2 December 2023), which tracks shadows hour-by-hour across all twelve months. Mature trees to the **east and southeast** throw long morning shadows, so your array "wakes up" late: through much of the year the panels sit largely shaded until mid-to-late morning, then do their real work from midday through the afternoon. The snapshots below show how many of your 19 panels are in direct sun at a given moment (yellow = lit, white = shaded).



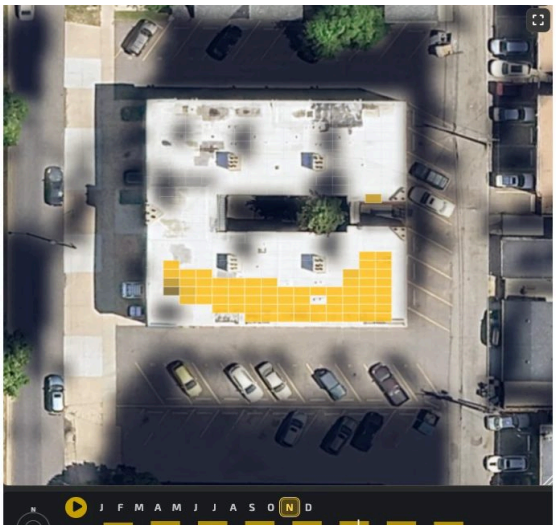
December, 11:45 am — sun low in the south. **6 of 19 panels in sun.** Best winter window is the midday hour.



June, 8:30 am — summer sun rising in the east. **2 of 19 panels in sun.** Thick eastern foliage blocks the early sun.



March, 10:30 am — spring sun in the southeast. **0 of 19 panels in sun.** Mid-morning shadows still cover the array.



September, 10:20 am — autumn sun in the southeast. **0 of 19 panels in sun.** Morning pattern mirrors spring.

Not this homeowner's roof - a copy of a shading analysis on a random apartment complex, shown for privacy.

> **What this means for you — and how the design answers it.** This heavy morning shade is exactly why your roof's resource sits around 71% TSRF and why we model production at 1,204 kWh/kW rather than Pasadena's unshaded ~1,700. Two design choices make the most of it, and **neither involves touching your trees**:

- **Microinverters.** Because the shade falls on some panels and not others throughout the day, each panel must produce on its own. Microinverters do that — a shaded panel never drags down its neighbors, which a traditional string inverter would.
- **Weight the array toward the afternoon-facing roof.** Your west/south-west faces (S2 and S5) clear the tree line when the eastern faces are still shaded — and that afternoon production lines up with your summer cooling load. That's why those faces carry a big share of the panels.

Important: the production and savings throughout this report are computed from Google's measured annual sunlight on your roof — this shading is already baked into every number. We design around your trees; we don't assume you'll remove them.

The system we modeled

Equipment & size

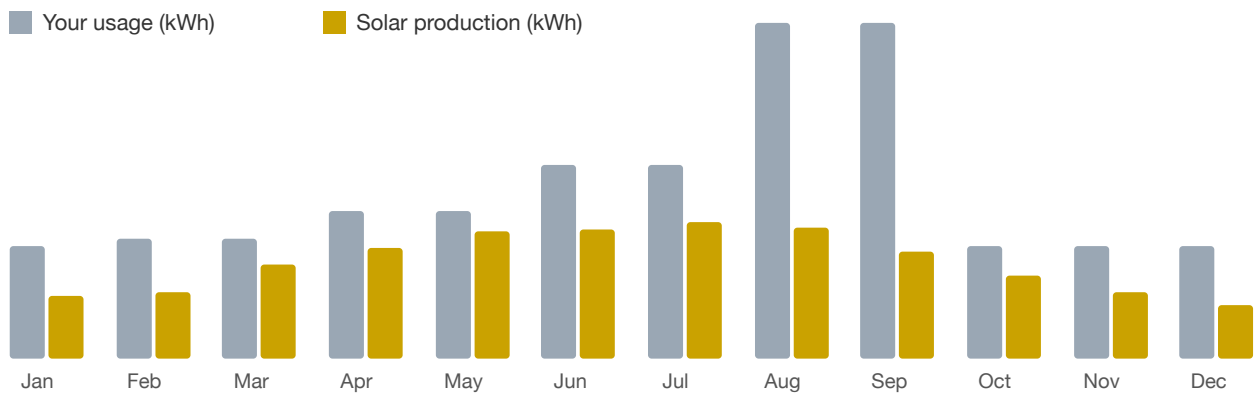
Panels	**19 × 400 W**
System size (DC)	**7.6 kW**
Inverter	**Microinverters (module-level)**
Roof faces used	S1, S2, S5, S9, S11
Year-1 production	**9,149 kWh**
Specific yield	1,204 kWh/kW
Energy offset	57% of your use

Why microinverters

Your array is spread over five roof faces pointing different directions (east, west, and north-east) with uneven shade. Microinverters let each panel produce independently, so a shaded or differently-angled panel never drags down a whole string — the right call for this non-uniform roof. They also give panel-level monitoring and a natural pairing with an Enphase battery later.

Installed-cost basis: $23,028 at $3.03/W (the SIA calculator's Pasadena default). Typical microinverter pricing runs $2.85–$3.25/W — see the sensitivity later in this report.

Monthly production vs. your usage



Your usage peaks hard in late summer — a cooling-driven load, from bills roughly three times your winter use. Solar production also peaks in summer, so a large share is used on-site when you need it most.

Your electricity rate & bill

You are on PWP's **R-1 Residential** rate. It is **tiered**: the more you use in a month, the more each extra kWh costs. We model it tier-by-tier (not as a flat average), combining the flat energy and transmission charges with the stepped distribution charge:

MONTHLY USAGE TIER	ALL-IN RATE
0–350 kWh (per month)	**15.20¢/kWh**
351–750 kWh	**25.71¢/kWh**
Above 750 kWh	**36.92¢/kWh**
Fixed customer charge	$7.76/mo

Validated against your bills

We checked this rate model against your last six PWP statements. It reproduces your actual annual cost to within **–2.3%** (model $4,552 vs. actual $4,659), so the savings below rest on your real spending, not a generic rate.

Effective rate: ~28.4¢/kWh blended — among the reasons solar is so valuable here.

Net metering (confirmed with PWP): Full retail net metering (PWP municipal — not CPUC NEM 3.0); up to 100% annual offset. Because you use far more than this system makes, every solar kWh offsets a retail-rate kWh — so exports are credited at the full retail value (100%). This is **not** CPUC NEM 3.0 (which applies to PG&E/SCE/SDG&E, not PWP).

What it saves — every way to pay

All figures below come from the SIA calculator on the inputs in this report: 7.6 kW, 9,149 kWh/yr, your tiered PWP rate, full net metering, the $4,172 PWP solar rebate, 0% federal credit, 25-year horizon.

OPTION	NET COST	YR-1 SAVINGS	PAYBACK	25-YR NPV	25-YR SAVINGS
Cash — solar only Pay upfront. Best ROI.	$18,858	$2,611	6.7 yrs	$29,850	$74,120
Loan — solar only $0 down, 6.99%/15yr, 20% dealer fee	$23,464	$2,611	cash-flow +	$21,960	$52,467
Lease — solar only $0 down, 25-yr contract	$0 down	$661	—	$10,157	$18,355
PPA — solar only $0 down, pay per kWh	$0 down	$661	—	$12,361	$23,499
Cash — solar + battery Powerwall 3, +resilience	$29,533	$2,551	10.1 yrs	$13,786	$52,515
Loan — solar + battery $0 down, loan + 20% dealer fee	$37,219	$2,551	21.6 yrs	$620	$16,383

Best for your goals: Cash, solar only. It returns the most ($29,850 net present value, $74,120 over 25 years) and a 16% IRR — far above what that cash earns in a savings account. The loan is the next best: with a typical ~20% dealer fee priced in (about $248/mo payment vs. ~$239/mo saved) it roughly breaks even in year one and turns cash-flow-positive as PWP's rates climb — still $52,467 over 25 years with nothing down.

Dealer fee: $0-down, low-rate solar loans carry a fee the lender charges the installer (commonly 15–30% of the price), buried in the price — so the financed system here is priced at $27,634 vs. $23,028 for cash. We've modeled 20%. A fee-free loan (e.g. a home-equity line) would land between the loan and cash rows.

Your bill, before & after (solar, cash)

Today — about **$388/mo** ($4,659/yr)

With solar — about **$149/mo** ($1,789/yr)

A 62% cut. You keep a small bill for the ~43% of use the roof can't cover.

On leases & PPAs

Both need $0 down and still save money, but they are the weakest options here for two reasons: you give up ownership and the 25-year upside, and — confirmed on PWP's site — **leases and PPAs are not eligible for the $4,172 PWP rebate** (customer-owned systems only). If cash or a loan is at all possible, they win decisively.

Should you add a battery?

Short answer for your goals: **only if you want backup power.** Under PWP's full net metering there is no time-of-use penalty and no demand charge to avoid, so a battery earns essentially nothing on your bill (it even loses a little to round-trip losses). Its value is resilience during outages — plus a sizable rebate.

Tesla Powerwall 3 (13.5 kWh)

Installed cost	$15,400
PWP battery rebate (350/kWh)	–$4,725
Net cost	**$10,675**
Whole-home backup	11.5 kW continuous
Bill savings added	~$0 (full net metering)

The honest trade

Adding the battery lowers your 25-year NPV from $29,850 to $13,786 and stretches payback to 10.1 years. That gap (~$16,063) is the price of resilience. The 350/kWh PWP rebate covers about 31% of the hardware, and PWP requires enrolling in its battery/VPP program for 36 months, which may add future value we have not counted.

Sensitivities

System size (cash, $3.03/W)

SIZE	OFFSET	PAYBACK	25-YR NPV
19 panels (7.6 kW)	57.2%	6.7 yr	**$29,852**
15 panels (6.0 kW)	47.2%	6.1 yr	$27,303
12 panels (4.8 kW)	38.1%	5.9 yr	$23,209

Smaller systems pay back slightly faster, but because every panel still offsets expensive top-tier power, the **full 19-panel system returns the most money overall** — the right choice for max ROI.

Installed price (19 panels, cash)

$/W	NET COST	PAYBACK	IRR
$2.85 (low)	$17,488	6.2 yr	17%
$3.03 (base)	$18,856	6.7 yr	16%
$3.25 (high)	$20,528	7.2 yr	14%

Even at the top of the microinverter price range, payback stays near 7 years and IRR above 14%.

Incentives (confirmed, not assumed)

INCENTIVE	AMOUNT	APPLIES HERE
PWP residential solar rebate	0.60/W (CEC-AC)	**Yes — ~$4,172 (owned systems only)**
PWP battery storage rebate	350/kWh	Only if you add a battery (~$4,725)
Federal residential tax credit (25D)	0%	Expired 12/31/2025 (OBBBA) — not available in 2026
California state rebate	—	None for customer-owned residential solar

PWP rebates verified on pwp.cityofpasadena.net (Oct 2026): standard $0.60/W solar and $350/kWh battery; higher tiers exist for income-qualified customers. Solar rebate is on CEC-AC output (~6.95 kW here) and is one rebate per address, within 180 days of interconnection. Leases/PPAs are excluded.

Our recommendation

Buy the 19-panel, 7.6 kW microinverter system with cash.

It cuts your bill about 62% (to ~$149/mo), pays back in 6.7 years, and returns $74,120 over 25 years at a 16% IRR. If paying upfront isn't ideal, a $0-down solar loan is cash-flow-positive from day one and still nets $52,467. Add a Tesla Powerwall 3 only if whole-home backup matters to you — the rebate covers about 31% of it, but under PWP net metering it won't lower your bill.

Why not a lease or PPA?

They need no money down and still save you money, but they forfeit the $4,172 PWP rebate (owner-only), hand the long-term value to a third party, and return roughly a third of what ownership does here. For a homeowner focused on ROI, ownership wins clearly.

What we did not model

- Future PWP rate increases beyond a 3%/yr assumption, and any future time-of-use or demand charges.
- Value from PWP's battery/VPP program (required for the battery rebate) — treated as upside.
- A final engineered layout: panel counts per face may shift slightly after a site survey and fire-setback review.

How this was calculated

Roof geometry, per-face sunlight and shade come from the Google Solar API (imagery August 25, 2024). Production is simulated with NREL PVWatts® v8 at this address, derated by each face's measured shade. Your bill and savings are valued hour-by-hour and tier-by-tier on PWP's filed R-1 rate, calibrated to your own six most-recent statements. Cash, loan, lease and PPA models, battery dispatch, and all incentives are the SIA calculator's standard engine. Rate escalation 3%/yr; panel degradation 0.5%/yr; discount rate 5%; O&M $34/kW/yr; 25-year horizon.

> **Reproducible.** Enter this address in the SIA Solar Design Studio, place 19 panels on faces S1, S2, S5, S9, S11, set your PWP tiered rate and your monthly usage, and you will arrive at these same numbers. Nothing here is hand-waved.

This analysis is provided free by SIA as an independent estimate to help you decide. It is not a quote, a contract, a guarantee of savings, or tax advice; confirm incentive eligibility and final pricing with a licensed installer and a tax professional. Figures depend on the assumptions stated above and will vary with weather, equipment, usage and utility rates. © 2026 Sustainability Incentives Advisor · siapolicy.ai