Solar Power Plan Calculator

User Guide & Reference

Version 1.3.0

pagebloomer.co.nz

February 2026

Compare electricity plans, model solar and EV scenarios, and find the combination that saves you the most.

1. What This Calculator Does

The Solar Power Plan Calculator helps you answer one question: if you install solar panels (and optionally use your EV battery for home storage), which electricity plan gives you the best financial return?

It compares up to three electricity plans across four scenarios, using your actual hourly consumption and solar generation data. The output tells you your current annual cost, what each plan would cost with solar, how much you save, and how long the investment takes to pay back.

The Four Scenarios

Scenario	Description
No Solar (Baseline)	Your current electricity bill with no changes. This is the anchor that all savings are measured against.
S1: Solar Only	Solar panels installed. Excess generation is exported for credit. No EV battery involvement.
S2: Solar + Smart EV Charging	Solar installed, and your EV charging is shifted to solar-surplus and cheap-rate hours to reduce grid import.
S3: Solar + EV + Vehicle-to-Home	Everything in S2, plus your EV battery discharges back to the house during expensive hours (V2H).

NOTE: Each scenario builds on the previous one, so S3 always shows the most optimised result.

2. Key Assumptions

Understanding what the calculator assumes helps you interpret results correctly and know when estimates may diverge from real-world outcomes.

Solar & Battery Model

- **Dispatch priority:** Solar output goes to house load first, then EV charging, then battery storage, then grid export. This maximises self-consumption.
- **Battery efficiency:** Round-trip efficiency (default 90%) is split evenly between charge and discharge as the square root. For 90% round-trip, each direction is approximately 94.9% efficient.
- **Degradation:** Solar output degrades at a fixed annual rate (default 0.5%/year) applied to financial projections. It does not affect the hourly simulation.
- **EV as battery:** The calculator treats your EV battery as home storage. It respects minimum and maximum state-of-charge limits and a morning target SoC so your car is ready to drive.

Pricing Model

- **Two pricing types:** FLAT (same rate all hours) and TOU — Time of Use (multiple rate periods with different prices at different times of day and for weekdays vs weekends). Each plan also has a daily fixed charge and a base price that applies when no TOU period matches.
- **TOU rate periods:** Each period defines a start hour, end hour, rate in $/kWh, and a day filter (Every day, Weekdays only, or Weekends only). You can add as many periods as needed per plan. Periods are checked in order; the first matching period wins. Wrap-around times (e.g. 21:00–07:00) are supported. A rate of $0.00 gives you free hours.
- **Export credit:** Plan A and Plan B have configurable export credit rates. The Current Plan has no export credit field, representing a pre-solar baseline.
- **No demand charges:** The model does not account for demand-based charges or seasonal rate changes.

> **TOU.** To model a free overnight window, add a TOU period with rate = $0. To model a simple off-peak/peak split, add two TOU periods with the appropriate rates. The base price acts as the fallback for any hour not covered by a defined period. Add more periods as needed. Weekday and Weekend options are possible.

Financial Model

- **NPV:** Net Present Value discounts future savings at your chosen discount rate, accounting for solar degradation. Positive NPV means the investment earns more than your required return.
- **IRR:** Internal Rate of Return is the discount rate that makes NPV equal zero. Higher is better. Compare to your opportunity cost of capital.
- **Payback:** Simple payback divides total system cost by year-one savings. It does not account for degradation or discounting, so treat it as optimistic.
- **Capex:** S1 uses solar system cost only. S2 and S3 add battery cost (if any) on top.

What It Does Not Model

- Electricity price inflation (future rate increases would improve returns)
- Battery cycle degradation or replacement costs
- Feed-in tariff caps or tiered export limits
- Seasonal tariff variations or demand charges
- Grid connection or upgrade costs

3. Required Inputs

Tab 1: Current Plan

Your existing electricity plan. This defines the baseline cost that everything is compared against.

Field	What to Enter	Where to Find It
Plan Name	A label for your current plan (e.g. "Provider Plan")	Your power bill or retailer website
Annual Consumption	Total kWh used per year including EV	Your power bill annual summary
Pricing Type	FLAT or TOU (Time of Use)	Your plan terms
Base Price	Price per kWh (e.g. 0.3634). For TOU plans, this is the fallback rate for hours not covered by a period.	Your power bill line items
Daily Fixed Charge	Daily connection fee (e.g. 3.75)	Your power bill line items
Rate Periods (TOU only)	Add one or more rate periods, each with start hour, end hour, rate ($/kWh), and day filter (Every day / Weekdays / Weekends).	Your plan's schedule of rates

Tab 2 & 3: Plan A and Plan B

Alternative electricity plans you are considering. Same fields as the Current Plan, plus an Export Credit rate for solar buyback. Get these from retailer quotes or comparison websites like Powerswitch.

> **Tip:** For plans with free overnight hours (like Gentailer Free Hours), select TOU and add a period with start=21, end=0 (or the appropriate window), rate=$0.00, applying Every day. The base price will apply to all other hours.

Tab 4: Solar System

CSV Data File (Optional)

For accurate results, upload an hourly CSV file with four columns: datetime, pv_generation_kwh, consumption_kwh, and ev_charging_kwh. Columns can be in any order. The datetime format should be YYYY-MM-DD HH:MM (24-hour). Data can come from your inverter monitoring app combined with smart meter export.

> **Without a CSV,** the calculator uses simplified annual estimates with a flat consumption profile and a 25/75 self-use/export split, weighted 5/7 weekdays and 2/7 weekends for TOU pricing. With a CSV, you get accurate hour-by-hour TOU costing, smart EV charge shifting, V2H simulation, and monthly invoice breakdowns.

NOTE: PV generation estimates can be calculated using the NIWA Solar View tool (niwa.co.nz/climate-and-weather/solarview). Hourly consumption kWh can be obtained on request from your current power supplier. EV charging data should be available from your EV charging unit software (e.g. Wallbox).

System Details

Field	What to Enter
Annual Solar Generation	Expected kWh/year from your proposed system (from your installer's quote)
System Cost	Total installed cost of solar panels and inverter
Battery Capacity	Your EV battery size in kWh (e.g. 77 for an EV6)
Battery Cost	Additional cost of V2H hardware (0 if using existing EV charger)
Max Charge Rate	Charger power in kW (e.g. 7.3 for a 32A single-phase)
Max Discharge Rate	V2H discharge power in kW (e.g. 3.6)
Round-Trip Efficiency	Battery round-trip efficiency percentage (default 90%)
Min/Max SoC	Operating range for your EV battery (default 20–80%)
Target SoC / Hour	Minimum charge level by a specific hour (e.g. 60% by 7am for your commute)

Financial Settings

Field	Default	Guidance
Analysis Period	25 years	Typical solar panel warranty period
Discount Rate	5%	Your required rate of return or mortgage rate
Degradation Rate	0.5%/year	Standard panel degradation assumption

4. Understanding the Results

Results are organised into **three sub-tabs**, progressing from simple answers to detailed analysis. Click CALCULATE FINANCIAL ANALYSIS on the **Solar System tab** to generate results; the calculator navigates to the **Results tab** automatically.

Summary Tab

Your Current Annual Cost

A highlighted callout box showing what you pay now on your current plan with no solar. This is the anchor for all comparisons. It is calculated from your actual hourly data (or the annual consumption estimate if no CSV is uploaded) priced at your current plan's rates, including TOU periods and weekday/weekend differentiation.

Would Switching Plans Save Money? (No Solar)

A table comparing all three plans with your current usage and no solar installed. This answers: "should I switch plans regardless of whether I go solar?" If Plan A or Plan B shows a saving here, that saving is available immediately without any capital investment.

With Solar: Annual Costs & Savings

The main comparison table. For each scenario (S1, S2, S3), it shows the annual cost on each plan, the saving versus your current bill, and the payback period. Read across the columns to compare plans; read down the rows to compare scenarios.

Best Option

A highlighted green box identifying the plan + scenario combination that saves you the most money per year versus your current bill. This is the bottom-line recommendation.

Visual Comparison Chart

A bar chart comparing annual costs across all plans and scenarios. The tallest bars are the most expensive options; the shortest bars are the best deals. The chart can be downloaded as a PNG image using the Download Chart button below it.

Monthly Breakdown Tab

Shows how your bill would look month by month. Use the scenario toggle (S1 / S2 / S3) at the top to switch between scenarios.

The "Now (No Solar)" column shows your current monthly cost. The other columns show what each plan would cost with solar that month. Green cells are cheaper than your current bill; red cells are more expensive.

The bottom rows show annual totals, monthly averages, and total annual savings. This table is especially useful for spotting seasonal patterns — for example where summer months show big savings from solar but winter months may still have high bills.

Financial Detail Tab

Contains two detailed tables with investment metrics for those building a business case or comparing solar against other investments.

Versus Current Baseline

Shown first. Compares every plan + scenario against your current real-world bill. This captures both the plan-switching benefit and the solar benefit together. Use this to answer: "what is my total improvement versus doing nothing?"

Within Each Plan

Compares each plan's solar scenarios against that same plan's no-solar cost. This isolates the value of solar on each plan independently. Use this to answer: "how good is solar on this particular plan?"

How to Read the Financial Metrics

Metric	What It Tells You
Annual Savings	How much less you pay per year compared to the baseline.
NPV	Total present value of savings over the analysis period minus system cost. Positive = good investment.
IRR	The annualised return on your solar investment. Compare to your mortgage rate or savings account rate.
Payback	Years to recover the system cost from savings. Shorter is better. Based on year-one savings only.

5. Exports

Button	What You Get	Where
Download Summary Report (PDF)	A branded two-page PDF mirroring the on-screen summary: current cost callout, both comparison tables, best option box, and the visual comparison chart on page two.	Summary tab
Download Chart (PNG)	The visual comparison bar chart as a standalone PNG image, suitable for presentations or reports.	Summary tab
Download Full Analysis (CSV)	All inputs and calculated results in spreadsheet format including rate period definitions.	Summary tab
Download Monthly Invoices (CSV)	Month-by-month cost breakdown for all plans and scenarios.	Monthly tab
Download Invoice PDFs (All Plans)	Mock monthly invoices as a multi-page PDF with branded headers.	Monthly tab
Download Hourly Timeseries (CSV)	Full hourly simulation trace including grid import, export, SoC, price used, and day of week for every hour across all plans and scenarios.	Financial Detail tab

6. Quick Start Guide

1. **Enter your current plan details** on the Current Plan tab. Get your base price and daily charge from a recent power bill. If your plan has time-of-use rates, select TOU and add your rate periods.
2. **Enter one or two alternative plans** on Plan A and Plan B tabs. Include the export credit rate from each retailer's solar buyback terms. For TOU plans, add rate periods using the + Add Rate Period button.
3. **Upload your hourly CSV** on the Solar System tab (optional). If you don't have one yet, enter your annual consumption and the calculator will use simplified estimates.
4. **Enter your solar system details:** expected generation, system cost, and battery parameters if using V2H.
5. **Click Calculate Financial Analysis.** Review the Summary tab first for the headline numbers, then drill into Monthly Breakdown to see seasonal patterns.
6. **Export your results** to share with your installer, partner, or financial advisor. The Summary Report PDF is a good starting point.

7. Tips for Best Results

- Use at least 12 months of hourly data to capture seasonal variation.
- If your EV charging is not separately metered, estimate it from your driving km and vehicle efficiency.
- Try different target SoC and target hour settings to see how much V2H flexibility affects savings.
- Compare plans from multiple retailers. Even small differences in export credit can significantly change the best option.
- Be aware that V2H (S3) can sometimes cost more than S2 if your export credit is higher than your import rate. The calculator will show this correctly — check whether S3 savings are actually better than S2.
- For TOU plans, ensure your rate periods cover all hours correctly. Hours not covered by any period will use the base price as a fallback.
- Rerun the calculator if your circumstances change (new EV, different driving pattern, rate changes). All results recalculate from scratch each time you click the button.
- The "No Solar" plan comparison table is useful even if you decide not to go solar. It might reveal you're on the wrong plan today.

NO WARRANTY

This tool was built as a personal project to help make sense of all the options of solar, power plans and use of battery or EV V2H power storage and release. It is not a commercial product and must not be relied on for critical decision making or investments.

We make no warranties and take no responsibility for any errors in the calculator or its outputs. Use it at your own risk. It is made freely available solely on this basis.

The current code is available on request.

Solar Power Plan Calculator v1.3.0 — pagebloomer.co.nz — February 2026