# Rooftop Solar PV: Generation, Saving and Payback

First-year generation, bill saving, simple payback and 25-year generation of a rooftop solar PV plant from its size, specific yield, tariff and cost.

**Method:** E = kWp × specific yield; degradation as a geometric series

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Plant size (kWp) | 500.00 | |
| Specific yield (kWh per kWp per year)<br>From a yield study or nearby plants; depends on site, tilt and losses. | 1,450.0 | |
| Tariff avoided per kWh | 8.0000 | |
| Installed cost per kWp | 45,000 | |
| Annual degradation | 0.50000 | % |
| O&M per year (share of cost) | 1.0000 | % |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| First-year generation (kWh) | 725,000 | |
| First-year net saving | 5,575,000 | |
| Simple payback on the first-year saving (years) | 4.0359 | |
| Generation over 25 years (kWh) | 1.7078e+07 | |

**Notes for this case**

- Self-consumed energy saves the full tariff; exported energy may earn less under your net-metering rules.

## Formula and method

$$E_1 = P_p Y, \quad S_1 = E_1 c - O C P_p, \quad E_{25} = E_1 \frac{1-(1-d)^{25}}{d}, \quad t_{pb} = \frac{C P_p}{S_1} \ (S_1 > 0)$$

### Variables

| | | |
|---|---|---|
| $P_p$ | Plant size (kWp) | - |
| $Y$ | Specific yield (kWh per kWp per year) | - |
| $c$ | Tariff avoided per kWh | - |
| $C$ | Installed cost per kWp | - |
| $d$ | Annual degradation | - |
| $O$ | O&M per year (share of cost) | - |
| $E_1$ | First-year generation (kWh) | - |
| $S_1$ | First-year net saving | - |
| $t_{pb}$ | Simple payback on the first-year saving (years) | - |
| $E_{25}$ | Generation over 25 years (kWh) | - |

### Method and standards

Generation and saving.

### Assumptions and limits

- Constant tariff; no discounting, tariff escalation, inverter replacement or separate export tariff (exported energy may earn less under net-metering rules).
- The payback uses the first-year net saving; degradation, which slowly lowers later savings, is not included in it, so the real payback

is slightly longer.
- If the first-year saving does not cover O&M the plant never pays back and no payback is shown.

### References
- E = kWp × specific yield; degradation as a geometric series

## Report details

| | |
|---|---|
| Report reference | FCC-SNC0-DF9V (the same inputs always give the same reference) |
| Generated | 17 November 2026, 19:46 UTC |
| Calculator | Rooftop Solar PV: Generation, Saving and Payback |
| Method last reviewed | 12 November 2026 |
| Software release | FireCAD Calc, release of 17 November 2026 |
| Release checks | 2 reference cases of this calculator, computed independently, are checked on every release |

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

### This calculator online
https://calc.firecad.com/environmental/carbon-energy/solar-rooftop-payback

Open this case on calc.firecad.com →
Reopens the calculator with the inputs of this report.