# Bifacial PV Rear-Side Gain

Rear-side irradiance, bifacial gain and module output of a bifacial PV module from front irradiance, ground albedo, a rear view factor and the module bifaciality.

**Method:** Rear-side irradiance and bifacial gain

## Input parameters

Unit system: SI

| Parameter | Value | Unit |
|---|---|---|
| Front-side irradiance | 0.90000 | kW/m² |
| Global horizontal irradiance reaching the ground | 0.80000 | kW/m² |
| Ground albedo (grass 0.2, sand 0.3, white gravel or snow 0.5–0.8) | 25.000 | % |
| Rear view and shading factor | 55.000 | % |
| Bifaciality factor of the module | 70.000 | % |
| Front-side rating at STC | 0.54000 | kW |
| Power temperature coefficient (per K) | -0.003500 | |
| Cell temperature | 45.000 | °C |

## Calculated results

| Parameter | Value | Unit |
|---|---|---|
| Rear-side irradiance | 0.11000 | kW/m² |
| Bifacial gain φG_r/G_f | 8.5556 | % |
| Equivalent front irradiance | 0.97700 | kW/m² |
| Module output | 0.49065 | kW |
| Output if monofacial | 0.45198 | kW |

**Notes for this case**

• Rear irradiance taken as ρ_g·F_r·G_h, with F_r lumping the view of the bright ground, row shading and structure; equivalent irradiance G_f + φG_r. Annual bifacial gains are about 5–10 % over grass and 10–20 % over bright ground on high trackers; use a view-factor or ray-tracing model for design.

## Formula and method

$$G_r = \rho_g F_r G_h, \quad BG = \frac{\varphi G_r}{G_f}, \quad P = P_{STC}\frac{G_f + \varphi G_r}{1000}[1 + \gamma(T_c - 25)]$$

### Variables

| | | |
|---|---|---|
| $G_f$ | Front-side irradiance | W/m² |
| $G_h$ | Global horizontal irradiance reaching the ground | W/m² |
| $\rho_g$ | Ground albedo (grass 0.2, sand 0.3, white gravel or snow 0.5–0.8) | - |
| $F_r$ | Rear view and shading factor | - |
| $\varphi$ | Bifaciality factor of the module | - |
| $P_{STC}$ | Front-side rating at STC | W |
| $\gamma$ | Power temperature coefficient (per K) | - |
| $T_c$ | Cell temperature | K |
| $G_r$ | Rear-side irradiance | W/m² |
| $BG$ | Bifacial gain φG_r/G_f | - |

| | | |
|---|---|---|
| $G_{eq}$ | Equivalent front irradiance | W/m² |
| $P$ | Module output | W |
| $P_{mono}$ | Output if monofacial | W |

### Method and standards

Bifacial gain estimate.

### Assumptions and limits

- Lumped rear factor; uniform rear irradiance.

### References

Rear-side irradiance and bifacial gain

## Report details

| | |
|---|---|
| Report reference | FCC-5CGV-H8X8 (the same inputs always give the same reference) |
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| Calculator | Bifacial PV Rear-Side Gain |
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| Release checks | 3 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/electrical/solar-pv/bifacial-pv-gain

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.