Capacity Factor Estimation

January 25, 2026

Phoenix, AZ | System Performance Modeling

BASE GHI

5.75 kWh/m²/day

BEST CAPACITY FACTOR

25.4%

TRACKING BOOST

+25%

ANALYSIS LOCATION

Phoenix, AZ

System Configuration Comparison

Configuration	Capacity	Mount Type	System Eff.	Annual Gen.	Capacity Factor
Residential (5 kW)	5 kW	Fixed	78%	8,182 kWh	18.7%
Commercial (100 kW)	100 kW	Fixed	80%	167,829 kWh	19.2%
Utility (1 MW)	1,000 kW	Tracking	85%	2,228,977 kWh	25.4%

Capacity Factor Benchmarks

Rating	Capacity Factor Range	Typical Locations
Excellent	> 25%	Desert Southwest with tracking
Good	20-25%	Southwest US, fixed-tilt

Average	15-20%	Most of continental US
Below Average	< 15%	Pacific Northwest, Northeast

Key Findings:

- Single-axis tracking increases capacity factor by ~25% vs fixed-tilt
- Phoenix, AZ supports capacity factors of 25.4% for utility-scale
- Temperature derating reduces effective output in hot climates

Methodology: Capacity Factor = Annual Generation / (Capacity × 8760 hours). System efficiency accounts for inverter losses, wiring, soiling, and temperature derating. Tracking boost of 25% is typical for single-axis horizontal trackers. Data from NASA POWER API covering 12-month period.

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Data Source: NASA POWER API