

GLOBAL SOLAR ATLAS

BY WORLD BANK GROUP

Sind

Area: 140779.04 km²

The regional statistics of solar resource and PVOOUT are calculated from long-term averages based on the period from 1994/1999/2007 (depending on the region) to 2018. The statistics were prepared for PV study.

🕒 Report generated: 7 Jun 2023, 11:57

AREA INFO

Map data (min-max range)				Per day
Specific photovoltaic power output	PVOOUT	4.50 — 5.00	kWh/kWp	
Direct normal irradiation	DNI	4.01 — 4.99	kWh/m ²	
Global horizontal irradiation	GHI	5.34 — 5.82	kWh/m ²	
Diffuse horizontal irradiation	DIF	2.41 — 2.66	kWh/m ²	
Global tilted irradiation	GTI	5.85 — 6.41	kWh/m ²	
Optimum tilt of PV modules	OPTA	25 — 29	°	
Air temperature	TEMP	24.1 — 28.6	°C	
Terrain elevation	ELE	0 — 0	m	

Map



PVOUT - AREA ANALYSIS

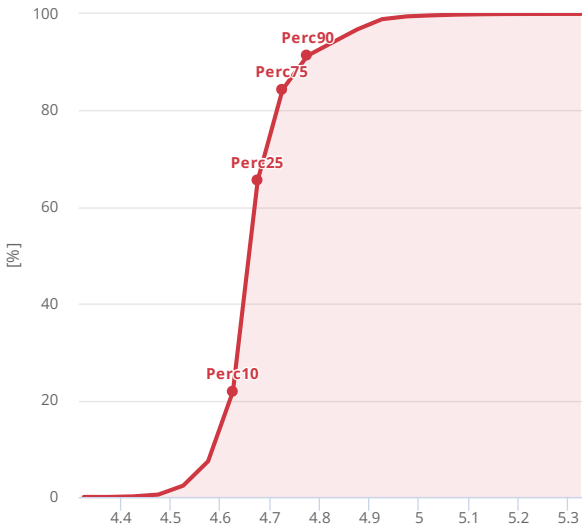
Statistics

Specific photovoltaic power output

Average	4.69 kWh/kWp
Maximum	5.00 kWh/kWp
Percentile 90	4.79 kWh/kWp
Percentile 75	4.72 kWh/kWp
Percentile 50 (Median)	4.68 kWh/kWp
Percentile 25	4.65 kWh/kWp
Percentile 10	4.62 kWh/kWp
Minimum	4.50 kWh/kWp

Cumulative distribution function

Specific photovoltaic power output



Distribution

Specific photovoltaic power output

more than 4.80	8.7 %	<div></div>
4.80 – 4.60	84.0 %	<div></div>
less than 4.60	7.3 %	<div></div>
	100.0 %	

DNI - AREA ANALYSIS

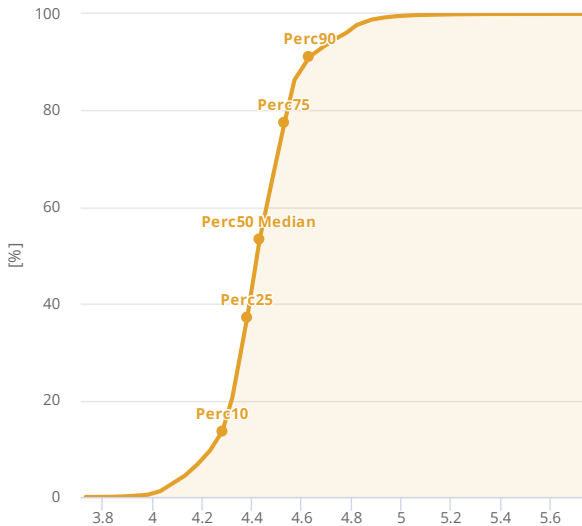
Statistics

Direct normal irradiation

Average	4.45 kWh/m²
Maximum	4.99 kWh/m²
Percentile 90	4.63 kWh/m²
Percentile 75	4.54 kWh/m²
Percentile 50 (Median)	4.44 kWh/m²
Percentile 25	4.37 kWh/m²
Percentile 10	4.26 kWh/m²
Minimum	4.01 kWh/m²

Cumulative distribution function

Direct normal irradiation



Distribution

Direct normal irradiation

more than 4.80	3.9 %	<div></div>
4.80 – 4.60	9.8 %	<div></div>
4.60 – 4.40	49.1 %	<div></div>
4.40 – 4.20	30.4 %	<div></div>
less than 4.20	6.8 %	<div></div>
	100.0 %	

GHI - AREA ANALYSIS

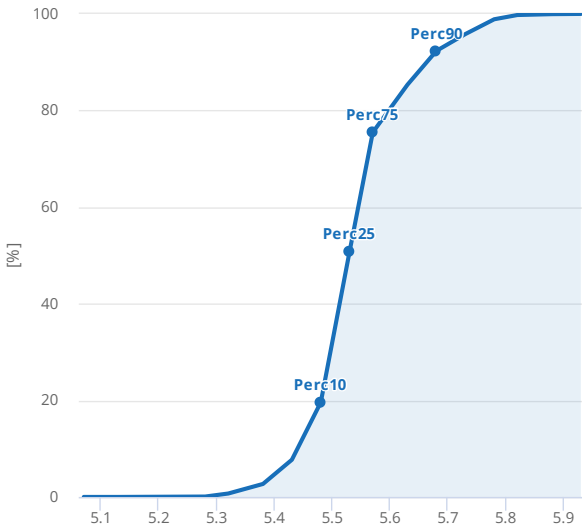
Statistics

Global horizontal irradiation

Average	5.56 kWh/m ²
Maximum	5.82 kWh/m ²
Percentile 90	5.68 kWh/m ²
Percentile 75	5.60 kWh/m ²
Percentile 50 (Median)	5.55 kWh/m ²
Percentile 25	5.51 kWh/m ²
Percentile 10	5.47 kWh/m ²
Minimum	5.34 kWh/m ²

Cumulative distribution function

Global horizontal irradiation



Distribution

Global horizontal irradiation

more than 5.80	1.1 %	<div></div>
5.80 – 5.60	23.4 %	<div></div>
5.60 – 5.40	72.8 %	<div></div>
less than 5.40	2.7 %	<div></div>
	100.0 %	

DIF - AREA ANALYSIS

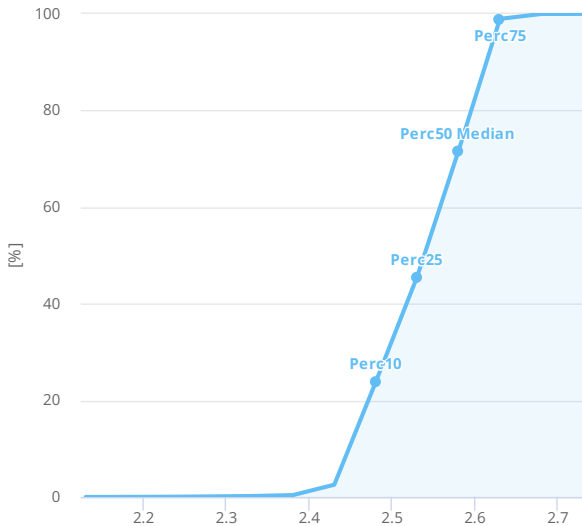
Statistics

Diffuse horizontal irradiation

Average	2.55 kWh/m ²
Maximum	2.66 kWh/m ²
Percentile 90	2.62 kWh/m ²
Percentile 75	2.61 kWh/m ²
Percentile 50 (Median)	2.56 kWh/m ²
Percentile 25	2.50 kWh/m ²
Percentile 10	2.47 kWh/m ²
Minimum	2.41 kWh/m ²

Cumulative distribution function

Diffuse horizontal irradiation



Distribution

Diffuse horizontal irradiation

more than 2.60	28.3 %	<div></div>
less than 2.60	71.7 %	<div></div>
	100.0 %	

GTI - AREA ANALYSIS

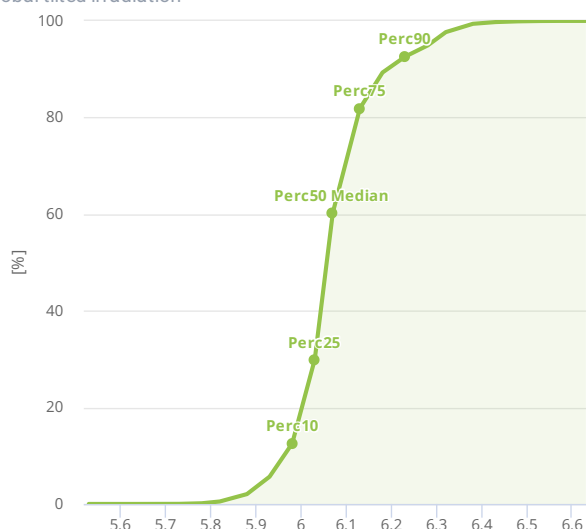
Statistics

Global tilted irradiation

Average	6.09 kWh/m ²
Maximum	6.41 kWh/m ²
Percentile 90	6.21 kWh/m ²
Percentile 75	6.13 kWh/m ²
Percentile 50 (Median)	6.08 kWh/m ²
Percentile 25	6.04 kWh/m ²
Percentile 10	5.99 kWh/m ²
Minimum	5.85 kWh/m ²

Cumulative distribution function

Global tilted irradiation



Distribution

Global tilted irradiation

more than 6.20	10.7 %	<div></div>
6.20 – 6.00	76.8 %	<div></div>
less than 6.00	12.5 %	<div></div>
	100.0 %	

OPTA - AREA ANALYSIS

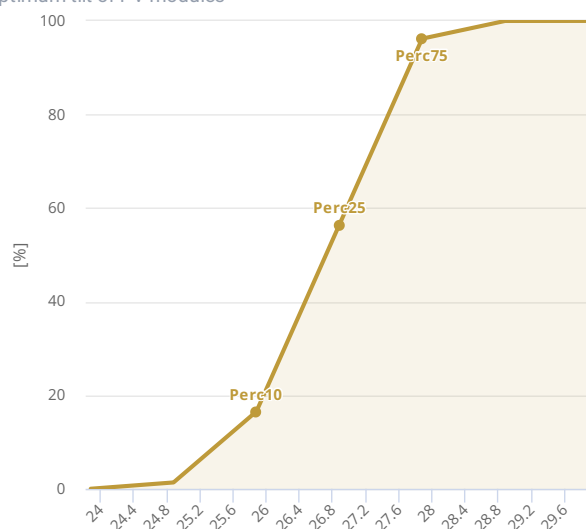
Statistics

Optimum tilt of PV modules

Average	27 °
Maximum	29 °
Percentile 90	28 °
Percentile 75	28 °
Percentile 50 (Median)	27 °
Percentile 25	27 °
Percentile 10	26 °
Minimum	25 °

Cumulative distribution function

Optimum tilt of PV modules



Distribution

Optimum tilt of PV modules

more than 28	3.8 %	<div></div>
28 – 27	39.8 %	<div></div>
27 – 26	39.9 %	<div></div>
26 – 25	15.2 %	<div></div>
less than 25	1.3 %	<div></div>
	100.0 %	

TEMP - AREA ANALYSIS

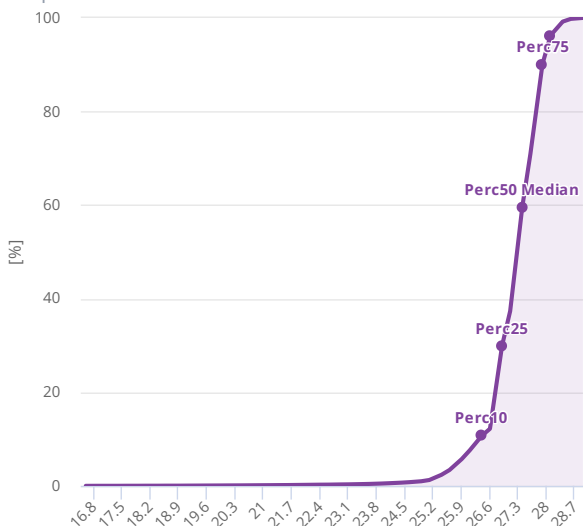
Statistics

Air temperature

Average	27.3 °C
Maximum	28.6 °C
Percentile 90	28.0 °C
Percentile 75	27.8 °C
Percentile 50 (Median)	27.4 °C
Percentile 25	26.9 °C
Percentile 10	26.4 °C
Minimum	24.1 °C

Cumulative distribution function

Air temperature



Distribution

Air temperature

more than 28.0	9.8 %	<div></div>
28.0 – 27.0	60.2 %	<div></div>
27.0 – 26.0	24.3 %	<div></div>
less than 26.0	5.7 %	<div></div>
	100.0 %	

ELE - AREA ANALYSIS

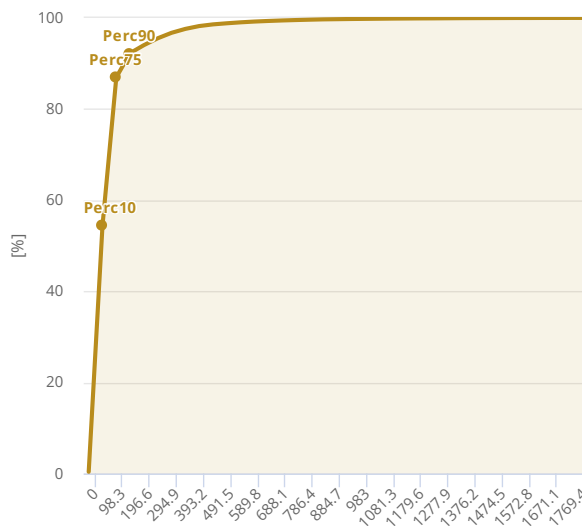
Statistics

Terrain elevation

Average	68 m
Maximum	1777 m
Percentile 90	124 m
Percentile 75	67 m
Percentile 50 (Median)	47 m
Percentile 25	20 m
Percentile 10	7 m
Minimum	-3 m

Cumulative distribution function

Terrain elevation



Distribution

Terrain elevation

more than 400	1.8 %	<div></div>
400 – 200	4.2 %	<div></div>
less than 200	94.0 %	<div></div>
	100.0 %	

GLOBAL SOLAR ATLAS

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GLOSSARY

Acronym	Full name	Unit	Type of use
DIF	Diffuse horizontal irradiation	kWh/m ² , MJ/m ²	Average yearly, monthly or daily sum of diffuse horizontal irradiation (© 2021 Solargis)
DNI	Direct normal irradiation	kWh/m ² , MJ/m ²	Average yearly, monthly or daily sum of direct normal irradiation (© 2021 Solargis)
ELE	Terrain elevation	m, ft	Elevation of terrain surface above/below sea level, processed and integrated from SRTM-3 data and related data products (SRTM v4.1 © 2004 - 2021, CGIAR-CSI)
GHI	Global horizontal irradiation	kWh/m ² , MJ/m ²	Average annual, monthly or daily sum of global horizontal irradiation (© 2021 Solargis)
GTI	Global tilted irradiation	kWh/m ² , MJ/m ²	Average annual, monthly or daily sum of global tilted irradiation (© 2021 Solargis)
GTI_opta	Global tilted irradiation at optimum angle	kWh/m ² , MJ/m ²	Average annual, monthly or daily sum of global tilted irradiation for PV modules fix-mounted at optimum angle (© 2021 Solargis)
OPTA	Optimum tilt of PV modules	°	Optimum tilt of fix-mounted PV modules facing towards Equator set for maximizing GTI input (© 2021 Solargis)
PVOUT_total	Total photovoltaic power output	kWh, MWh, GWh	Yearly and monthly average values of photovoltaic electricity (AC) delivered by the total installed capacity of a PV system (© 2021 Solargis)
PVOUT_specific	Specific photovoltaic power output	kWh/kWp	Yearly and monthly average values of photovoltaic electricity (AC) delivered by a PV system and normalized to 1 kWp of installed capacity (© 2021 Solargis)
TEMP	Air temperature	°C, °F	Average yearly, monthly and daily air temperature at 2 m above ground. Calculated from outputs of ERA5 model (© 2021 ECMWF, post-processed by Solargis)

ABOUT

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