



DEMONSTRATION REPORT — SOLAR PV

Mut, Mersin - solar PV plant (demonstration)

Demonstration project (generated with WaiMAP engines)

Document no.	WMAP-DEMO-SOLARP-20261012
Revision	A
Status	Demonstration — not for construction or investment decisions
Design status	Concept
Approval status	Pre-feasibility only
Report level	Demonstration — sample report
Date of issue	2026-10-12
Project	Mut, Mersin – solar PV plant (demonstration)
Location	Near Mut, Mersin, Türkiye
Coordinates (WGS84)	36.6323, 33.3959
Scope	Solar PV layout, yield, BESS option (screening)
Prepared for	Public demonstration (no client)
Prepared by	WaiMAP - Spatial Intelligence
Data basis	Open atlas data (GSA, GWA, GHSL, JRC) · pvlib · WaiMAP engines

Revision history

Rev	Date	Description	Prepared	Checked	Approved
A	2026-10-12	Demonstration issue	WaiMAP engines	—	—

Public demonstration · Demonstration — not for construction or investment decisions

Demonstration project (generated with WaiMAP engines). Generated from open data with the WaiMAP engines to show the workflow and the method. It is not a study of a real project, makes no statement about any real project, and does not replace site surveys, detailed design, permits or independent review. WaiMAP does not guarantee lender or independent-engineer approval.



Mut, Mersin – solar PV plant (demonstration)

Demonstration project (generated with WaiMAP engines)

1 Purpose and scope

A ~ 50.4 MWp fixed-tilt PV plant on a ~ 65.5 ha demonstration parcel near Mut (Mersin): layout, cabling, BoQ and Class 4 CAPEX, energy yield with pvlib on free data, site conditions, access roads and a BESS option. Demonstration project (generated with WaiMAP engines).

2 Site boundary

Engine: drawn by the user

Method: A 4-corner parcel of ~ 65.5 ha near Mut (Mersin) — demonstration geometry, not a real parcel.

- Area 65.5 ha, fence 3.26 km

3 Site conditions

Engine: Atlas statistics + WaiMAP Solar Suitability

Method: Atlas layers inside the boundary; suitability with re-normalised weights (no slope without a DEM).

- PVO_{UT} 1,747 kWh/kWp, GHI 1,913 kWh/m², air temperature 17.8 °C, wind 150 m 4.76 m/s
- RP100 flood: 0.0 % of the site; population 0 persons/km² (mean); built-up 2025 0.0 %
- Solar Suitability 93 / 100 at the centre
- Terrain and slope: not assessed here (no DEM) — the hills around Mut make a slope check essential before the layout is fixed

4 Layout, cabling and BoQ

Engine: WaiPVL_{ayout}.design

Method: Fixed tables 2 × 28 modules (580 W), tilt 25°, GCR 0.38, 15 m setback, 5 m internal roads; blocks around MV stations; string inverters 330 kW; DC / LV / MV cables sized by ampacity and voltage drop.

- 1,553 tables · 86,968 modules · 50.44 MWp DC / 40.6 MW_{ac} (DC/AC 1.24) · 123 inverters · 7 MV stations · 2 feeders
- Cables: DC 278.1 km, LV 18.5 km, MV 2.6 km; ohmic losses at STC DC 0.43 %, LV 1.19 %, MV 0.17 %
- Class 4 CAPEX USD 25.1 million (USD 0.497/Wp, engine rates — replace with quotes)

5 Energy yield

Engine: pvlib 0.16.1 (PVWatts DC/AC, SAPM cell temperature, physical AOI)

Method: pvlib 0.16.1 clear-sky (Ineichen-Perez, Linke turbidity climatology) scaled ×0.947 to the Global Solar Atlas annual GHI 1917 kWh/m² at the site; Erbs decomposition; air temperature 17.9 °C (GSA long-term mean, constant); wind 1 m/s. Fixed tilt 25°, south; 7 % other losses.

- 95.4 GWh/yr, specific yield 1,892 kWh/kWp, PR 0.859, capacity factor (AC) 26.8 %
- Independent atlas value: Global Solar Atlas PVO_{UT} 1,751 kWh/kWp (optimum tilt, GSA losses) vs pvlib 1,892 kWh/kWp — difference +8.1 %

- The clear-sky-shaped weather year carries more beam irradiance than a measured year, so the tilted-plane yield reads high; the atlas value is the more conservative reference
- No Solargis time series or report was used. A P50 / P90 for financing needs measured or licensed data and an independent review.

6 Access roads and internal roads

Engine: WaiPVLayout (internal) · Logistics (external, in the app)
Method: Internal 5 m roads every 10 rows and around blocks; the external access road and the transformer delivery route need the Logistics module with a routing service.

- Internal roads 9.3 km
- External access and abnormal-load route: runs in the app (Valhalla routing, mapped restrictions)

7 BESS option

Engine: WaiBESS.hybridSizing + WaiBESS.full (synthetic Türkiye market year)
Method: Screening range for energy shifting, then a 20 MW / 2 h LFP case: perfect-foresight dispatch with a forecast capture factor, degradation and augmentation, Class 4 BoQ and project finance.

- Screening range: 15.1–30.3 MW, 45.3–151.5 MWh (Energy shifting / firming (midday PV to the evening peak))
- 20 MW / 40 MWh: CAPEX 231 EUR/kWh, year-1 revenue 22.2 EUR/kW-yr, 364 full cycles, project IRR -13.4 %, LCOS 164 EUR/MWh
- Duration comparison: 1 h — NPV -6,596,653 EUR, LCOS 201; 2 h — NPV -8,591,960 EUR, LCOS 164; 4 h — NPV -13,986,497 EUR, LCOS 150
- Prices: WaiMAP synthetic market year — illustrative only; on this synthetic year the merchant case is not economic, which is itself a screening result; use real hourly prices (EPIAŞ export) for a decision

8 Report

Engine: WaiMAP report engine (lib/wai-report)
Method: Structured report document -> PDF with the official cover (design status, approval status, report level).

- Sample report and calculation summary below

9 Monthly energy (pvlib)

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Mont	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
MWh	6,439	6,887	8,562	8,403	9,567	9,337	9,323	8,985	8,172	7,708	6,223	5,842

10 Bill of quantities and Class 4 CAPEX (WaiPVLayout)

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Item	Quantity	Unit	USD
PV modules 580 Wp	86,968.0	pcs	5,296,351
Fixed tables 2P × 28	1,553.0	pcs	2,774,279
String inverters 330 kW	123.0	pcs	1,298,880
Power stations (MV skid) 6.6 MVA, 800 V / 33 kV	7.0	pcs	4,389,000
Collector substation 33 kV / HV, 50 MVA	1.0	lot	3,600,000

DC string cable 4 mm ² Cu (H1Z2Z2-K)	263,861.0	m	211,089
DC string cable 6 mm ² Cu (H1Z2Z2-K)	14,277.0	m	14,277
LV AC cable 3 × 150 mm ² Al	5,762.0	m	74,906
LV AC cable 3 × 185 mm ² Al	5,741.0	m	86,115
LV AC cable 3 × 240 mm ² Al	6,502.0	m	123,538
LV AC cable 3 × 300 mm ² Al	515.0	m	11,845
MV cable 33 kV 3 × 1 × 95 mm ² Al	1,279.0	m	35,812
MV cable 33 kV 3 × 1 × 240 mm ² Al	946.0	m	39,732
MV cable 33 kV 3 × 1 × 400 mm ² Al	340.0	m	18,700
Cable trenches (LV + MV routes)	13,677.0	m	300,894
Internal and perimeter roads (5 m gravel)	9,284.0	m	510,620
Perimeter fence and gates	3,256.0	m	104,192
Site preparation, drainage	65.5	ha	393,000
SCADA, monitoring, CCTV, weather stations	50.4	MWp	277,420
Earthing and lightning protection	50.4	MWp	201,760
Mechanical and electrical installation	50,441,440.0	Wp	2,774,279
Engineering, permitting, project management	1.0	lot	901,468
Contingency	1.0	lot	1,640,671

11 Site statistics from the atlas (inside the boundary)

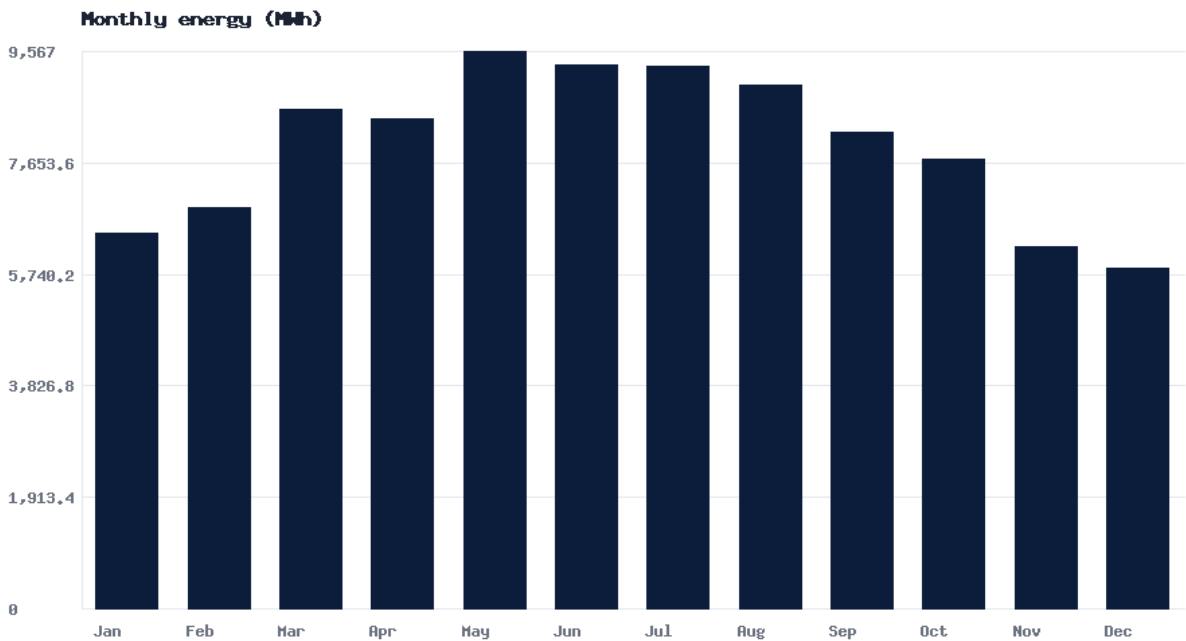
11 Site statistics from the atlas (inside the boundary)

Layer	Mean	Min	Max	Units	Source
Specific PV power output (PVOUT)	1,747	1,747	1,747	kWh/kWp/yr	Global Solar Atlas 2.0 (Solargis)
Global horizontal irradiation (GHI)	1,913	1,913	1,913	kWh/m ² /yr	Global Solar Atlas 2.0 (Solargis)
Air temperature (TEMP)	17.8	17.8	17.8	°C	Global Solar Atlas 2.0 (Solargis)
Mean wind speed at 150 m	4.76	4.76	4.76	m/s	Global Wind Atlas 3 (DTU)
Population density 2025 (GHS-POP)	0	0	0	persons/km ²	GHS-POP R2023A, European Commission, Joint Research Centre (JRC)
River flood depth, 100-year return period	0.00	0.00	0.00	m	JRC / Copernicus Emergency Management Service (CEMS) – GloFAS flood hazard maps, 100-year return period
Built-up surface 2000 (GHS-BUILT-S)	0.00	0.00	0.00	% built-up	GHS-BUILT-S R2023A, European Commission, JRC

Built-up surface 2025 (GHS-BUILT-S) — projection	0.00	0.00	0.00	% built-up	GHS-BUILT-S R2023A, European Commission, JRC
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12 Monthly energy

pvlib monthly energy (MWh).



13 Layout

WaiPVLayout: 1,553 tables, 86,968 modules, 123 inverters, 7 MV stations, 9.3 km internal roads — boundary, 15 m setback, GCR 0.38.



14 Warnings and limitations

- Terrain and slope are not assessed (no DEM on the build machine); hilly ground around Mut can reduce the usable area and change the layout.
- The weather year is a clear-sky shape scaled to the Global Solar Atlas annual GHI — a screening method, not a typical meteorological year; no Solargis or other licensed data were used.
- BESS revenues use a synthetic market year; Türkiye's storage licensing and grid-connection rules must be checked.
- Grid connection capacity, land ownership, permits and environmental constraints are not assessed in this demonstration.
- Unit rates are the engine's Class 4 assumptions (2026); replace them with quotes.

15 How this demonstration was made

Generated on 2026-10-12 23:32 UTC by tools/demos/build_demos.py with the WaiMAP engines on Intel(R) Xeon(R) Processor @ 2.80GHz (2 cores). Engine computation time for the whole story: 2.1 s.