

1.3GW Bifacial PERC HSAT System in Karapınar

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Konstanz

kalyonpv.com

Kalyon YEKA Project

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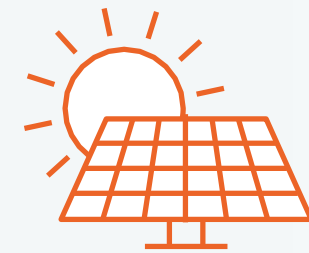


- One of the highest insolation locations in Europe – Turkey
- Middle of Turkey – City of Konya
- Karapınar Desert – Only desert area in Turkey
 - Area: 19.133.189 m²
 - 1.846kWh/m²/year
- Project Details
 - SPP AC Capacity : 1.000MW
 - Vertically integrated domestic production

Vertically Integrated Domestic Production: KalyonPV



100.000 m²
Ankara



1.200 MW
Production Capacity



**Integrated
Manufacturing**
Ingot-Wafer-Cell-Module



>75%
Domestic Production



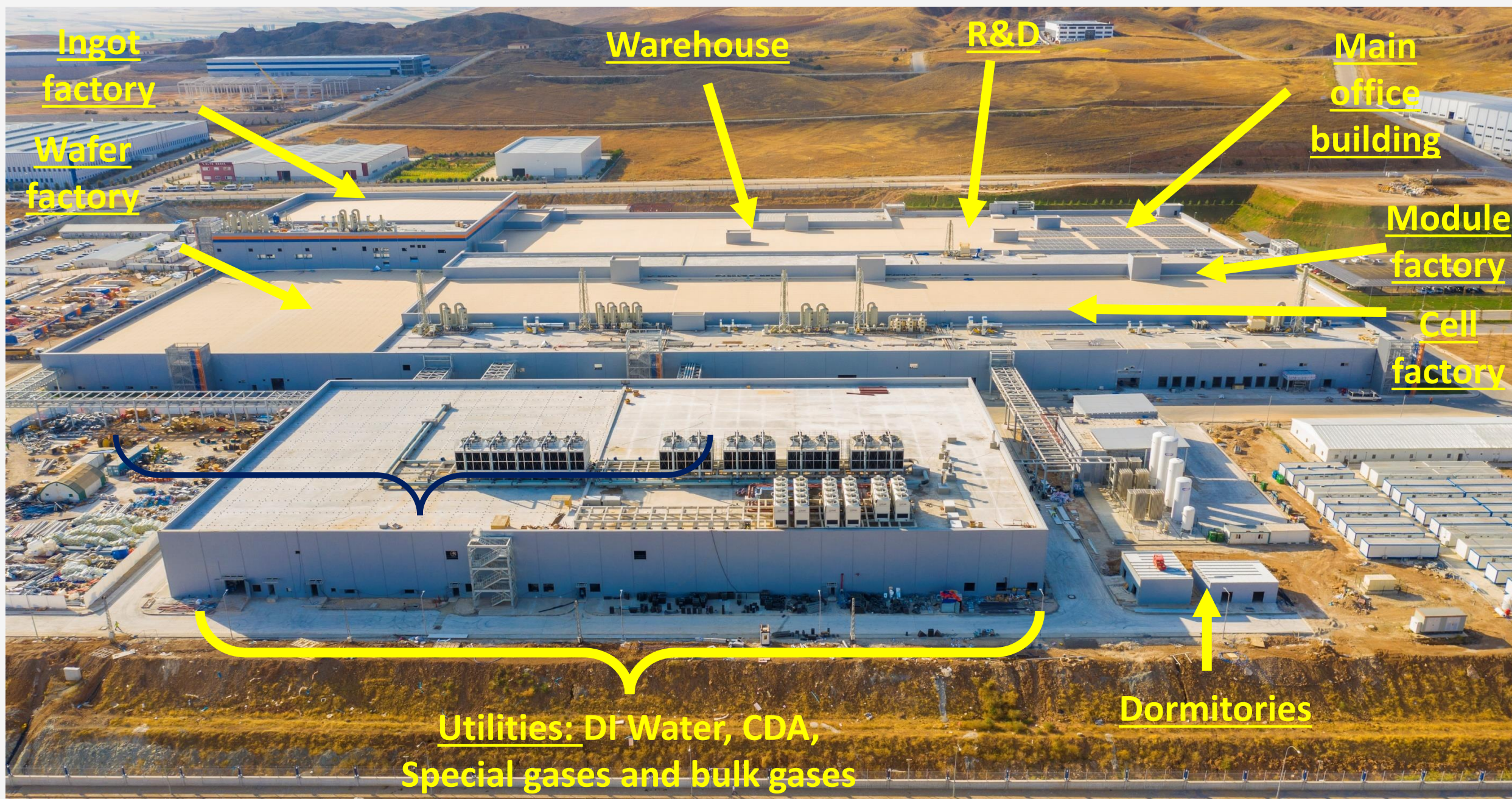
2.100
Personnel



2.500 m²
R&D Center



Vertically Integrated Local Production



Areas	Total area (m ²)
Main building	80.000
Utility building	11.000
Waste water treatment	7.000
Others	3.000

Capacities	
Section	Total (MW)
Ingot	745
Wafer	766
Cell	1.219
Module	1.089



Ingot Factory

CZ Growth - Mono-Crys.
Boron /Ga doped p-Type
3.5 m to 4.5 m per ingot



Wafer Factory

Diamond wire sawing
G1 / M10 wafers full square
180 um



Cell Factory

Mono-PERC technology
Bifacial technology
%22.3+ Efficiency
%70 bifaciality

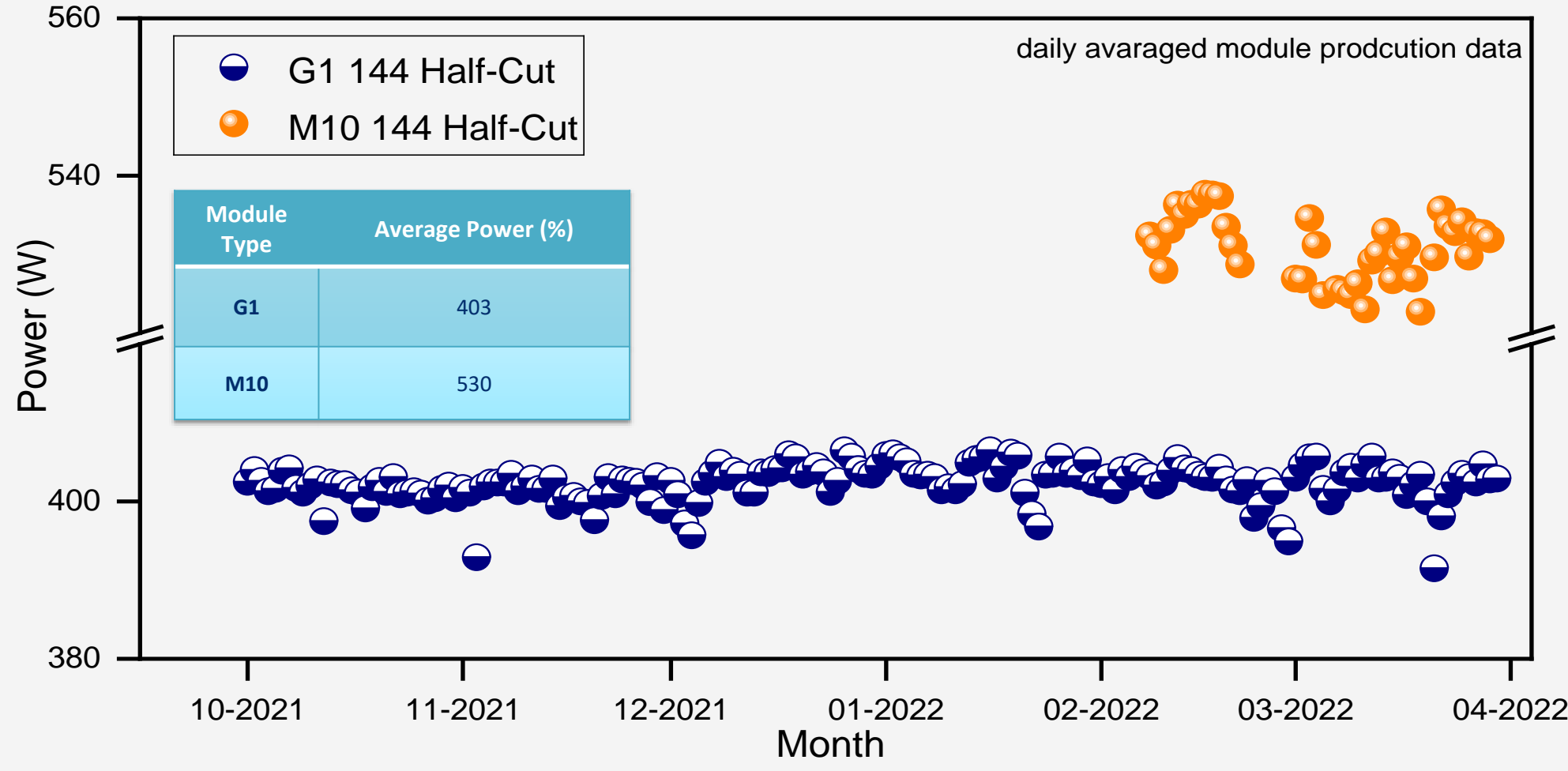
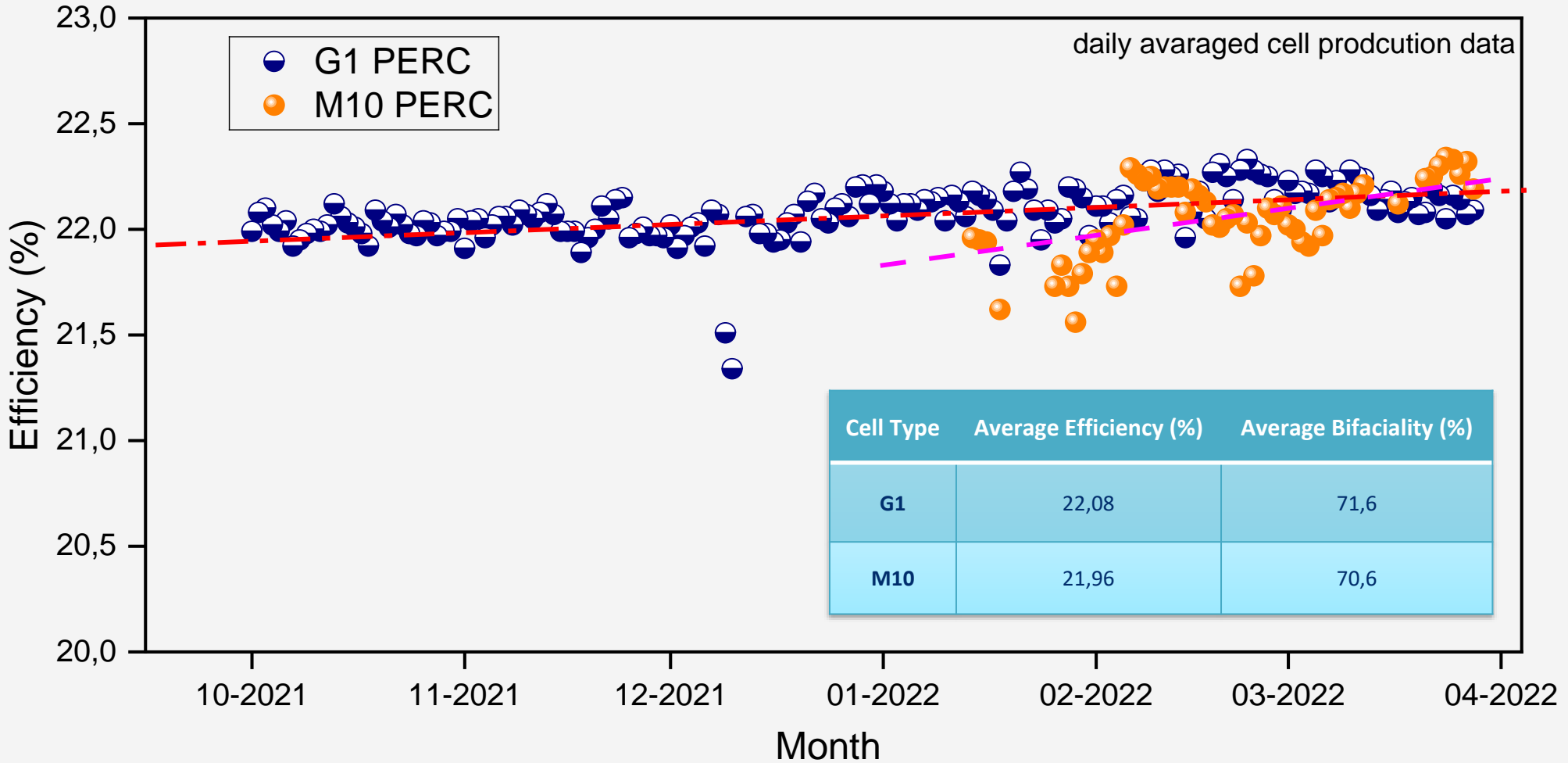


Module Factory

G/G Frameless/framed Bifacial Modules
GB framed modules
Half Cut cells
410W / 530W+ power output
%70+ Bifaciality



Key performance figures



Phase 1 500MW G1 Line Factory Parameters	
No. of ingots/day	37.4
Yield of Ingot production (%)	99.6
Wafer daily throughput (wph)	13,884
Wafer production yield (%)	97.4
Cell daily throughput (wph)	11,825
Cell production yield (%)	98.0
Module daily throughput (pcs/h)	177.9
Module production yield (%)	98.4

Phase 2 M10 Line Factory Parameters	
No. of ingots/day	Ramp Up Phase
Yield of Ingot production (%)	Ramp Up Phase
Wafer daily throughput (wph)	Ramp Up Phase
Wafer production yield (%)	Ramp Up Phase
Cell daily average throughput (pcs/day)	145,218
Cell production yield (%)	97,21
Module daily throughput (pcs/h)	83,3
Module production yield (%)	98

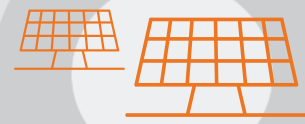
Karapınar Solar Power Plant

1,35 GW_p Solar Power Plant

Worlds 6th Biggest Power Plant Rises In Konya,
Karapınar / Turkey



**Bifacial + Single Axis
Tracking**
High Energy Yield



5400 m²
R&D Test Area



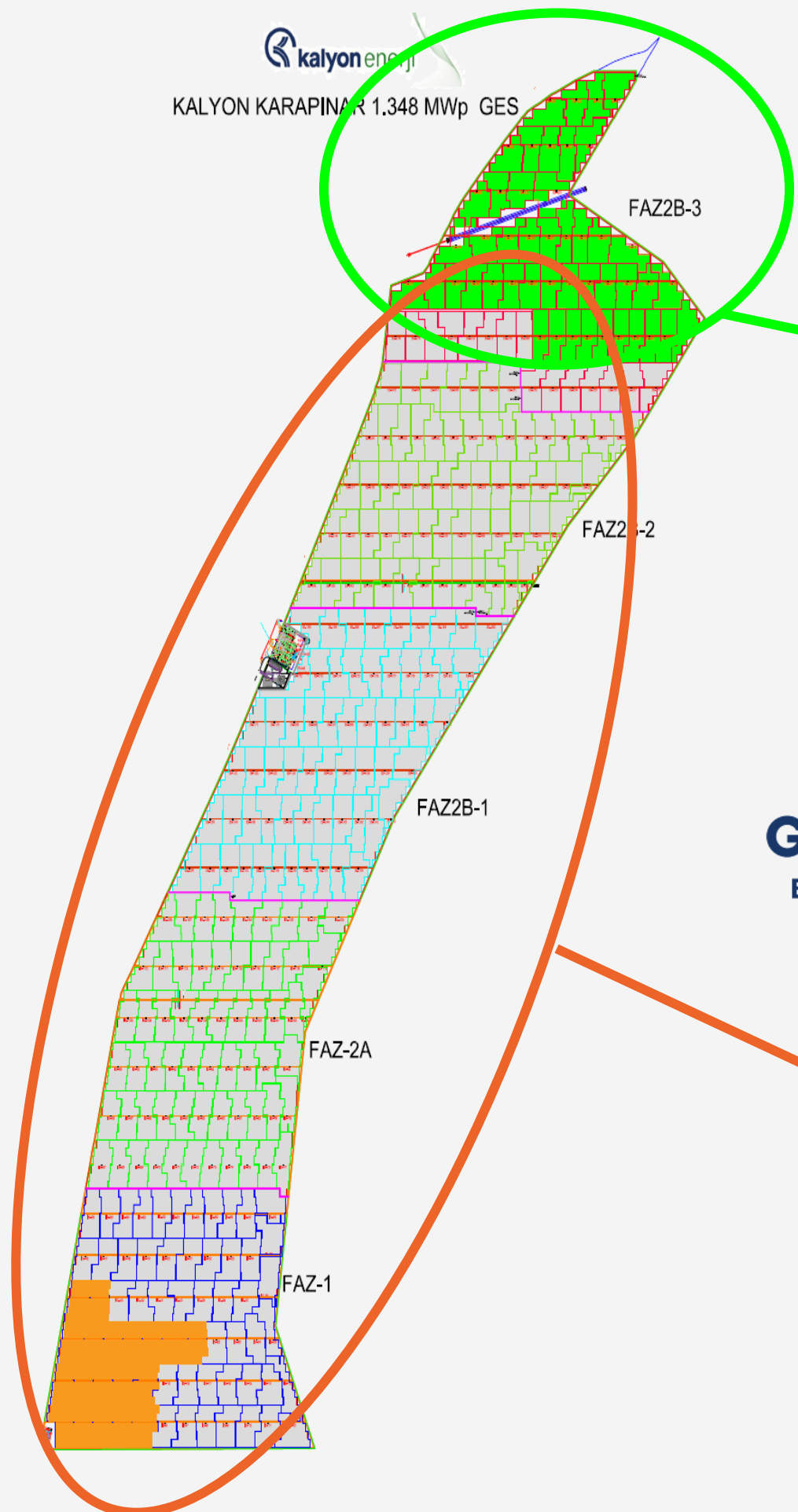
3,3 Milyon
Modules



2 Million
People's anual
electricity useage



Karapınar Solar Power Plant



M10-144 GLASS-GLASS
BIFACIAL HALF CELL DOUBLE GLASS FRAMED MODULE



200MW DC

G1-144 GLASS GLASS
BIFACIAL HALF CUT FRAMELESS MODULE



1.100MW DC



3.40 - 3.7MVA CENTRALIZED INVERTER STATION

- Centralized Inverter
- Step Up Transformer 660 V/34,5 kV

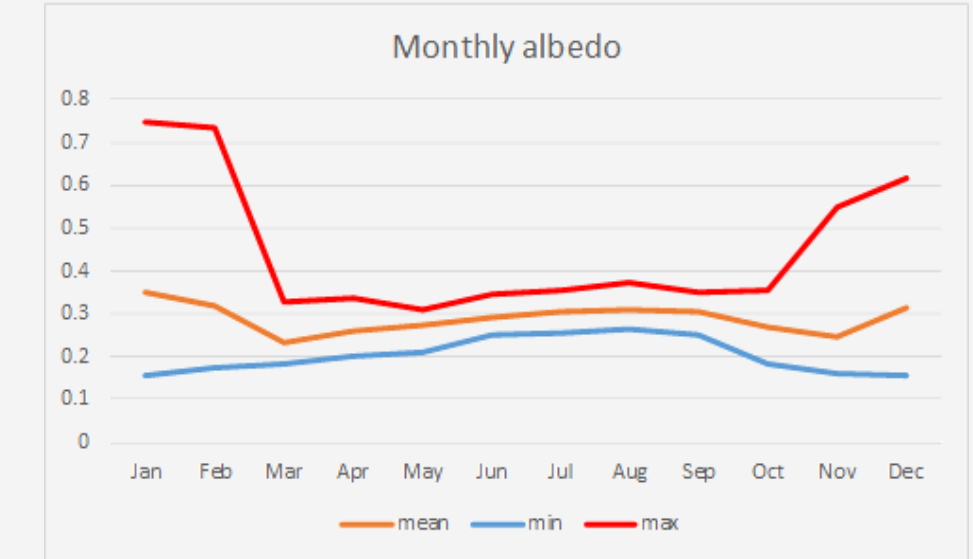
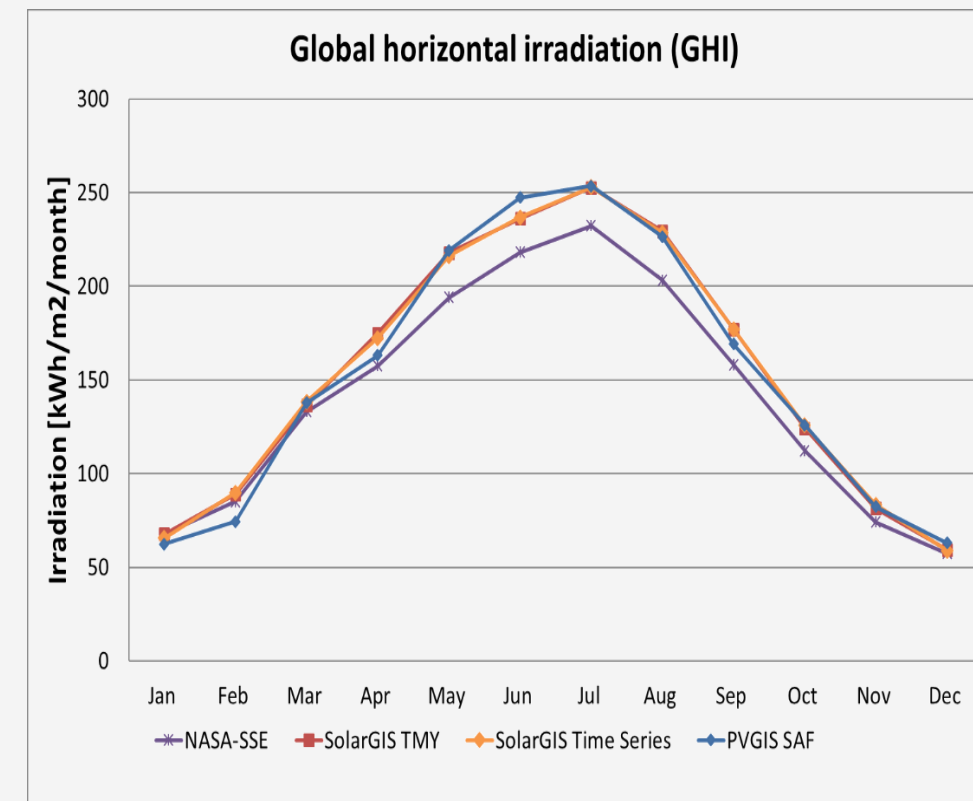
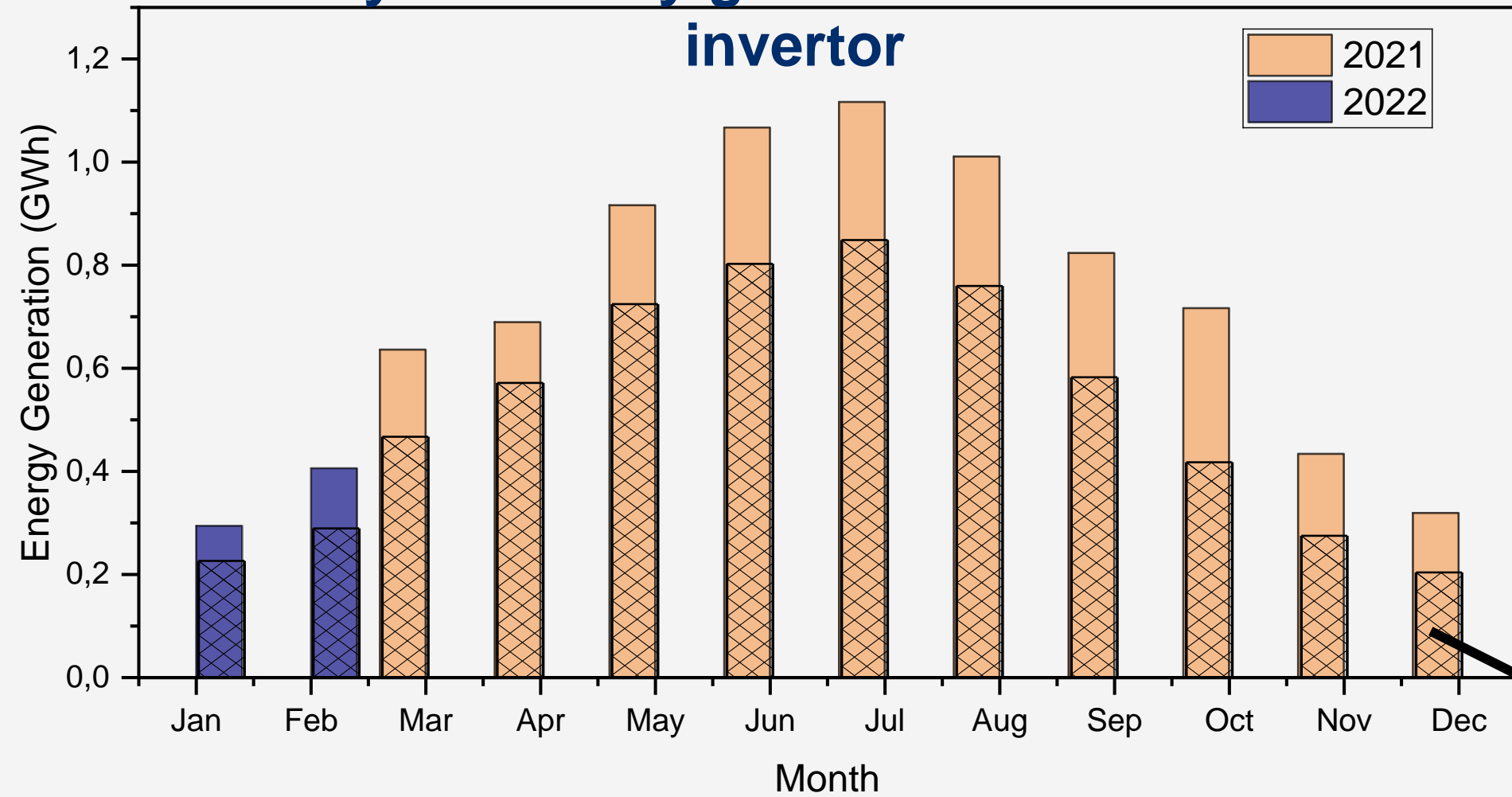


SINGLE AXIS TRACKER SYSTEM

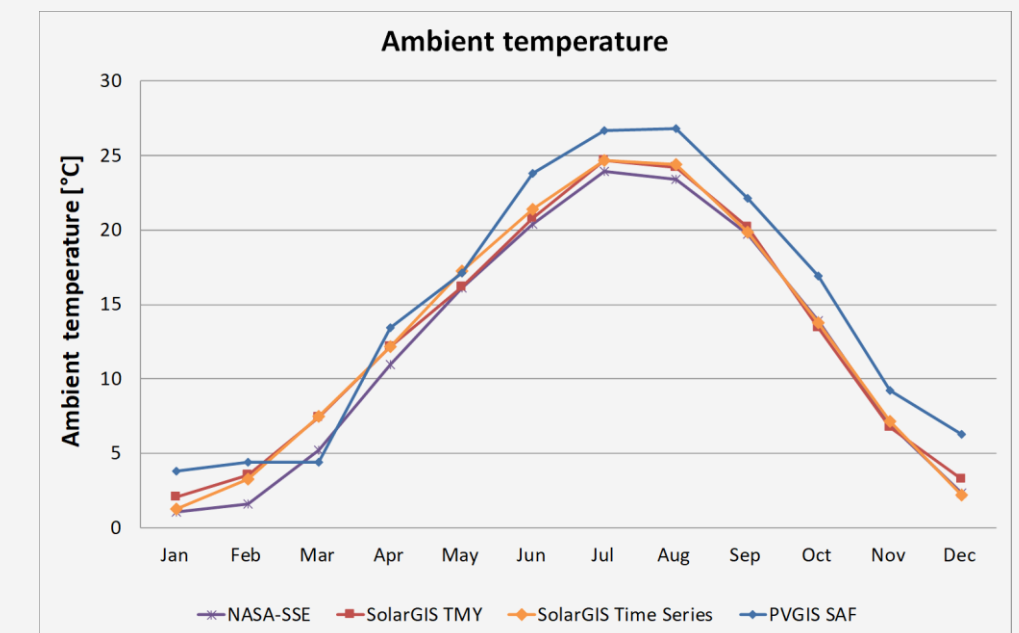
- Battery System with «0» consumption,
- Wireless communication and control,
- Wind Protection

Karapınar Solar Power Plant

Yearly electricity generation data for one inverter

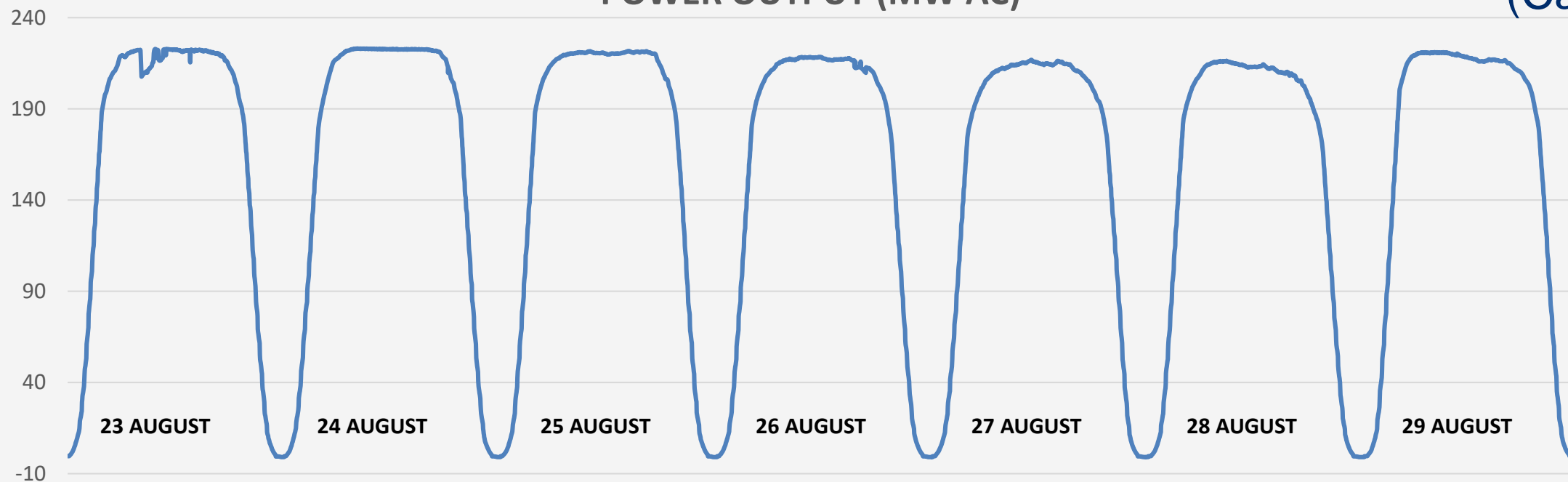


Schaaf, C., Wang, Z. (2015). MCD43B3.005 Albedo 16-Day Global 1km. NASA EOSDIS Land Processes DAAC.



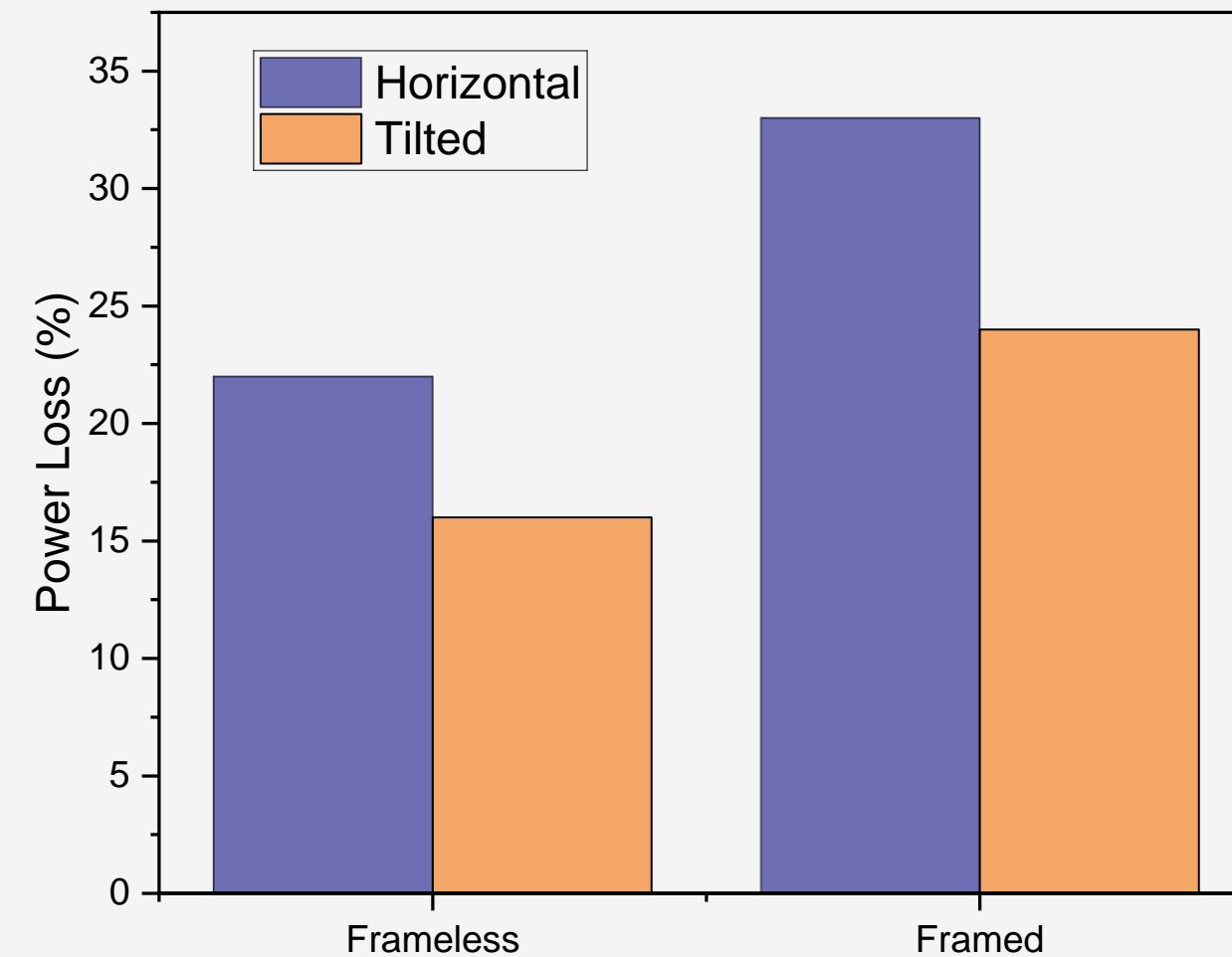
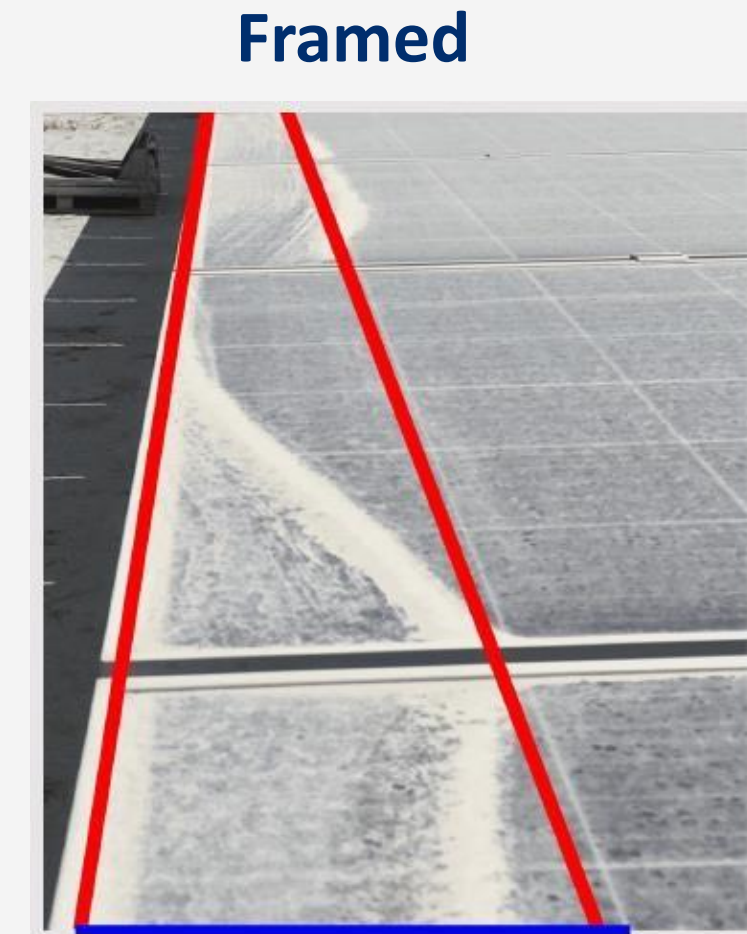
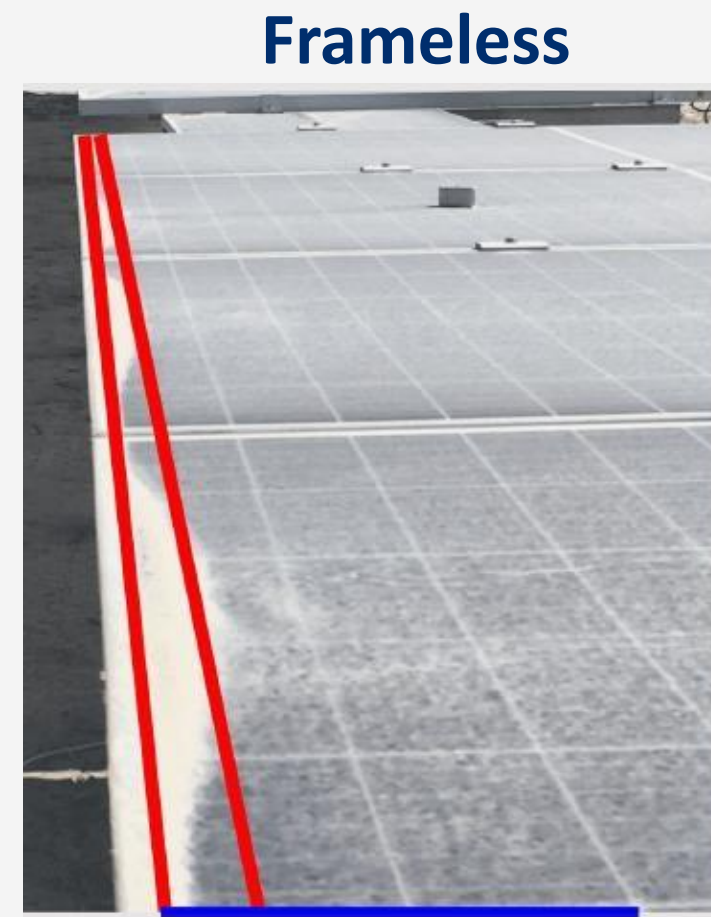
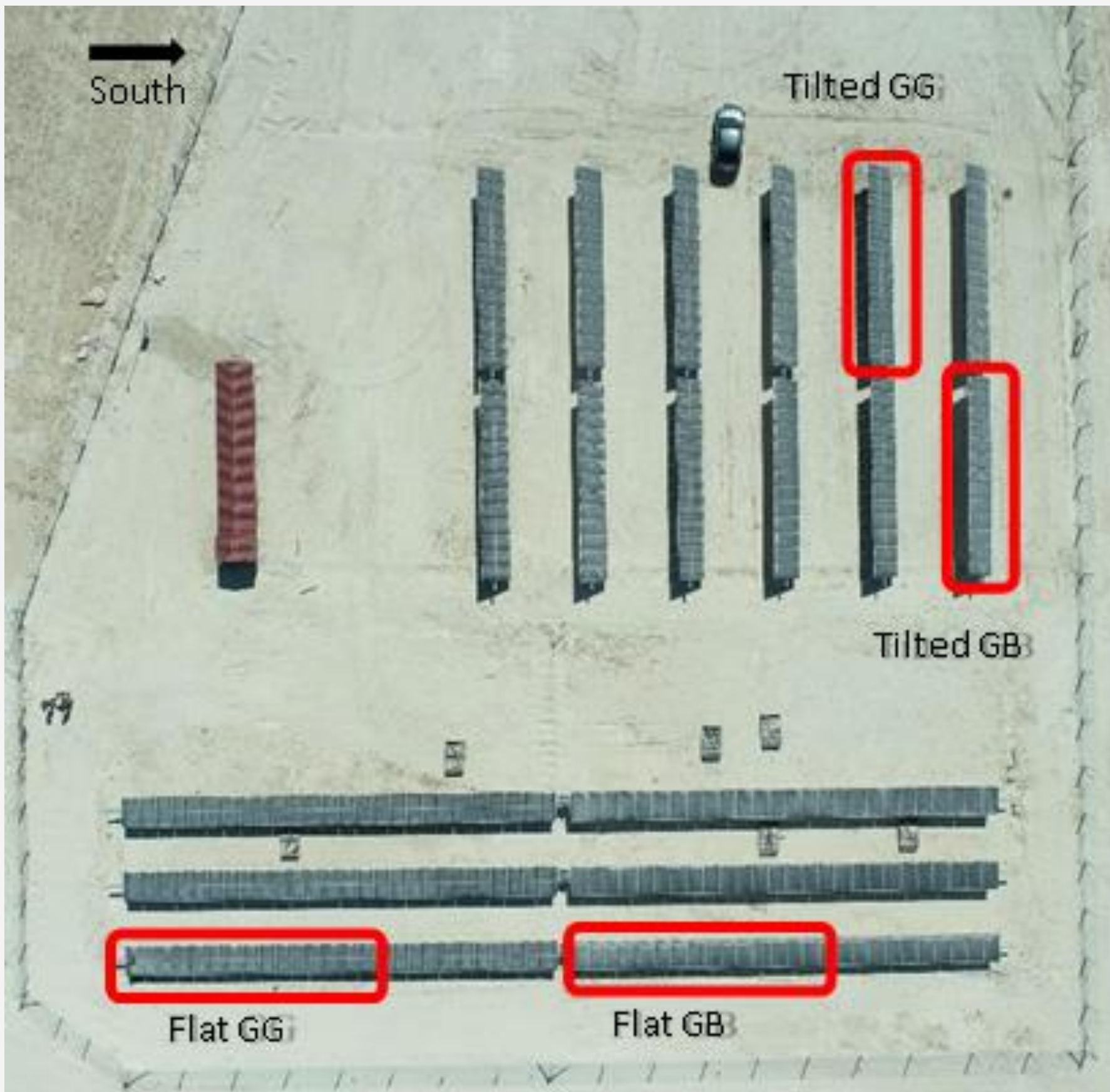
- Monofacial fixed mount (Calculated)

POWER OUTPUT (MW AC)



- Power measurement of (Phase 1: 267MWp (DC) / 227MW(AC))
- Energy obtained per MWp(DC)/MW(AC) installed: 49.05 MWh / week

Framed vs Frameless Experience



$$\text{Soiling Loss} = 1 - P_{\text{max soiled}} / P_{\text{max clean}}$$

Summary

- One of the largest SPP with bifacial and single axis tracking is being realized in Konya.
- To feed the SPP, vertically integrated factory from ingot growth to module fabrication with a capacity of 1.000MW has been realized in Ankara.
- We believe this strategic investment will be an encouraging step taken by Turkey as a starting point for transition of production back to Europe once again.

Thank You



By March 2022 > 600MW Completed