

Knowledge Sharing for Solar power Generation Plant (Continue)

Experience of Project Reference

30 MW Thapyaywa Solar Power Plant

20 MW Taung Taw Gwin Solar Power Plant

Presented By U SHWE

PE 0063

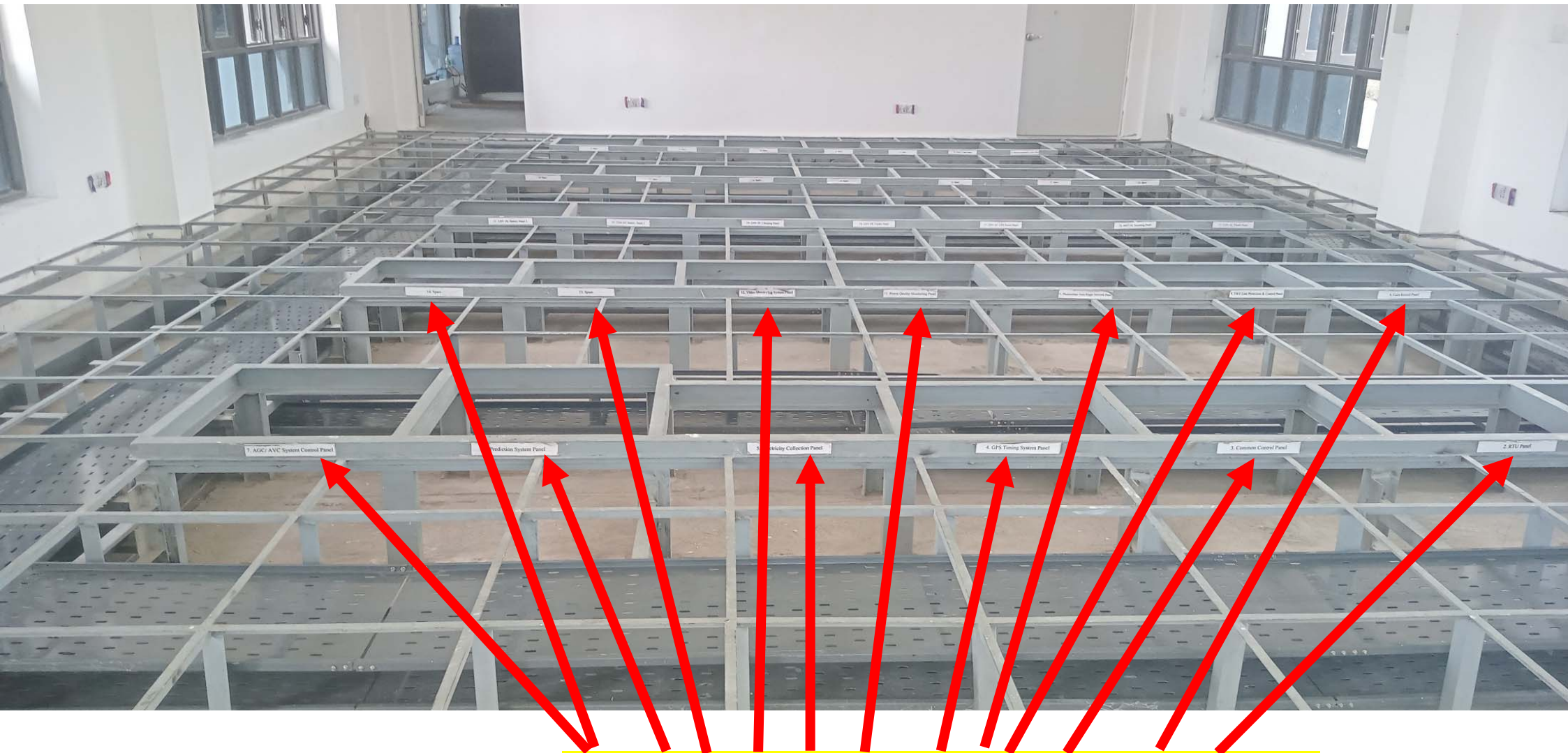
Fed-MES Member – 020646 – M/EP

Date- 17-6-2023

20. High Voltage panels, control and monitoring system panels installation and wire connection.

Sr. No	Control Panel Name
1	AGC/AVC System Control Panel (GDSE 8000)
2	GYC 8000 Prediction System Panel
3	GKE 6400 Electricity Collection Panel
4	GATS-3100 GPS Timing System Panel
5	GCK 851 C-G-12 Common Control Panel
6	GYC 811-121 RTU Panel
7	GSE 8000-21 Integrated Application Server Panel
8	GXH3A-121 33KV Line Protection & Control Panel
9	Power System Dynamic Recording Device
10	GTW-8000 Photovoltaic Area Room Network Panel
11	GPQ F335 Power Quantity Monitoring Panel
12	Video Security System Panel
13	230V AC Feed Panel
14	400V AC Incoming Panel
15	220V DC Feeder Panel
16	230V AC UPS Power Panel
17	220V DC Charging Panel
18	220V DC Battery Panel-1
19	220V DC Battery Panel-2
20	PABX System
21	Optical Communication system
22	Aircon Indoor & Outdoor Fan Checking
23	Weather System Panel

Raise floor inside Power House



Control Panel Layouts to quick placing

Control and Power Cables Supporting System And Termination works



Central control inside Power House



33kV Switchgear inside Power House



Control panels inside Power House



Control panels inside Power House



Weather Station (Thapyaywa)



Weather Station (Taung Taw Gwin)



21. Tracking motor drive control box wiring and program configuration.

Drive unit control box



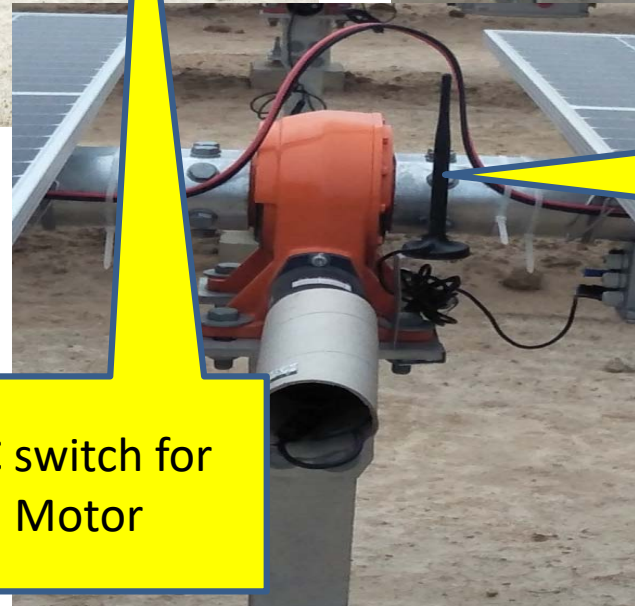
24V DC
Power for
drive motor
300-600V
/32V
DC/DC
converter



DC switch for
Motor



Antenna for remote
control
LoRA Wi Fi



Weather Status

DSE8000
Monitoring
System

The main
wring diagram

Communication
Status

Page Index

Five Prevention input/exit

Input

Eliminate Flash

Wind direction	352.00 °
Wind speed	20.70 m/s
2-minute wind speed	16.40 m/s
10 minute wind speed	10.50 m/s
rainfall	0.00 mm
Ambient temperature	30.10 °C
Maximum temperature	37.10 °C
Minimum temperature	25.90 °C
Ambient humidity	60.00 %RH
Dew point temperature	21.60 m/s
Pressure	990.60 hPa
Horizontal total radiation	0.00 W/m ²
Tilted total radiation	0.00 W/m ²
Anti total radiation	0.00 W/m ²
Total horizontal daily	-86.78 MJ
Total daily accumulation of tilt	113.94 MJ
Daily accumulation of anti radiation	-79.76 MJ
Total monthly accumulation of horizontal	3845.00 MJ
Total monthly accumulation of tilt	4701.00 MJ
Monthly accumulation of anti radiation	1230.00 MJ

Total annual accumulation of horizontal	3845.00 MJ
Total annual accumulation of tilt	4701.00 MJ
Annual accumulation of anti radiation	1230.00 MJ
Daily radiation	0.00 W/m ²
Scattered radiation	0.00 W/m ²
Daily accumulation of direct radiation	6.15 MJ
Daily accumulation of scattered radiation	10.39 MJ
Monthly accumulation of scattered radiation	117.00 MJ
Monthly accumulation of scattered radiation	275.00 MJ
Annual accumulation of radiation	1425.00 MJ
Annual cumulative of radiation	1333.00 MJ
Sunshine hours	5.00 h
Back temperature	28.60 °C

Output area	
	All
Tag	Document
<input type="checkbox"/>	2023-05-
<input type="checkbox"/>	2023-05-

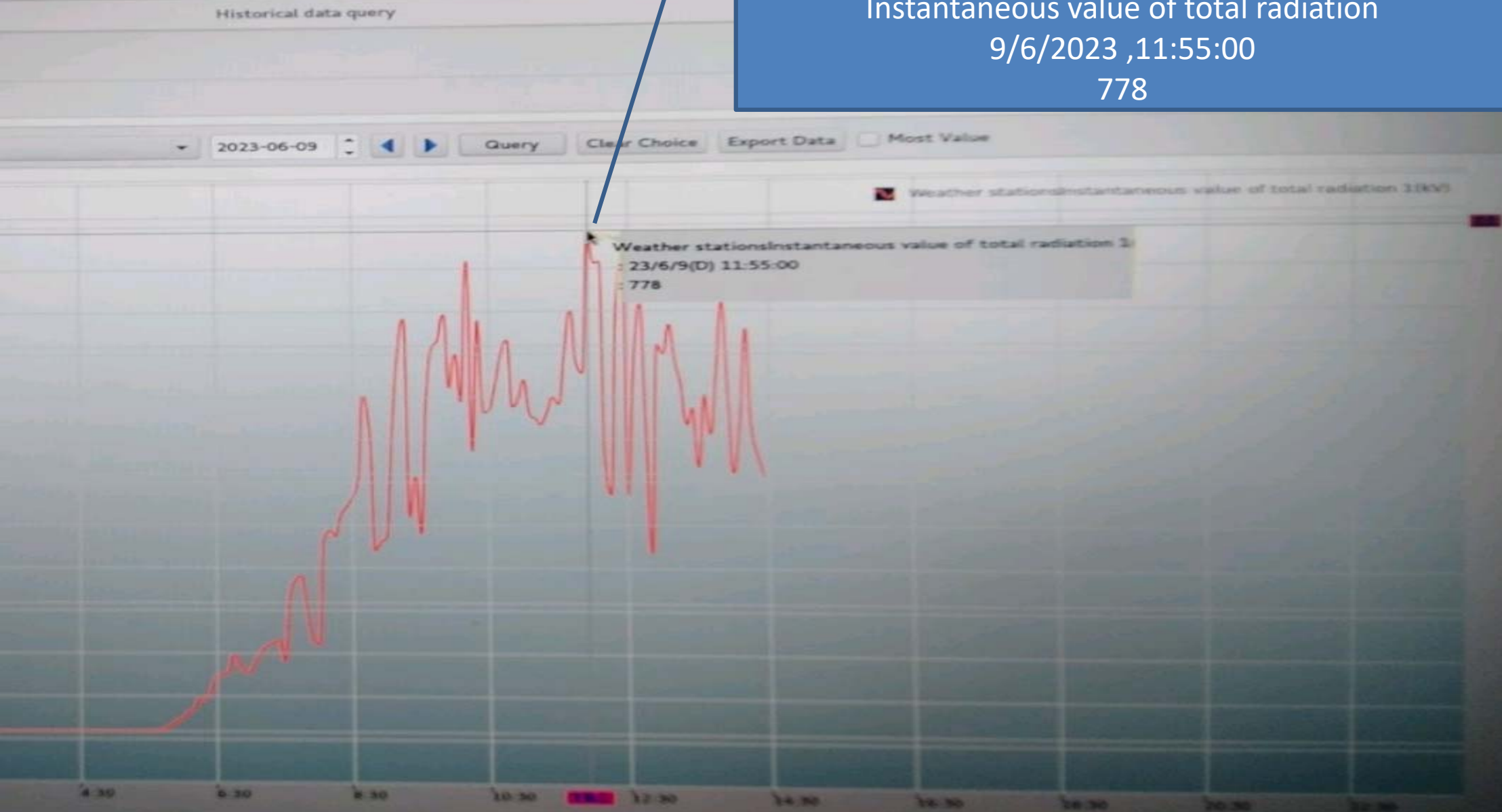
Weather Status

Wind direction	352.00 °
Wind speed	20.70 m/s
2-minute wind speed	16.40 m/s
10 minute wind speed	10.50 m/s
rainfall	0.00 mm
Ambient temperature	30.10 °C
Maximum temperature	37.10 °C
Minimum temperature	25.90 °C
Ambient humidity	60.00 %RH
Dew point temperature	21.60 m/s
Pressure	990.60 hPa
Horizontal total radiation	0.00 W/m ²
Tilted total radiation	0.00 W/m ²
Anti total radiation	0.00 W/m ²
Total horizontal daily	-86.78 MJ
Total daily accumulation of tilt	113.94 MJ
Daily accumulation of anti radiation	-79.76 MJ
Total monthly accumulation of horizontal	3845.00 MJ
Total monthly accumulation of tilt	4701.00 MJ
Monthly accumulation of anti radiation	1230.00 MJ

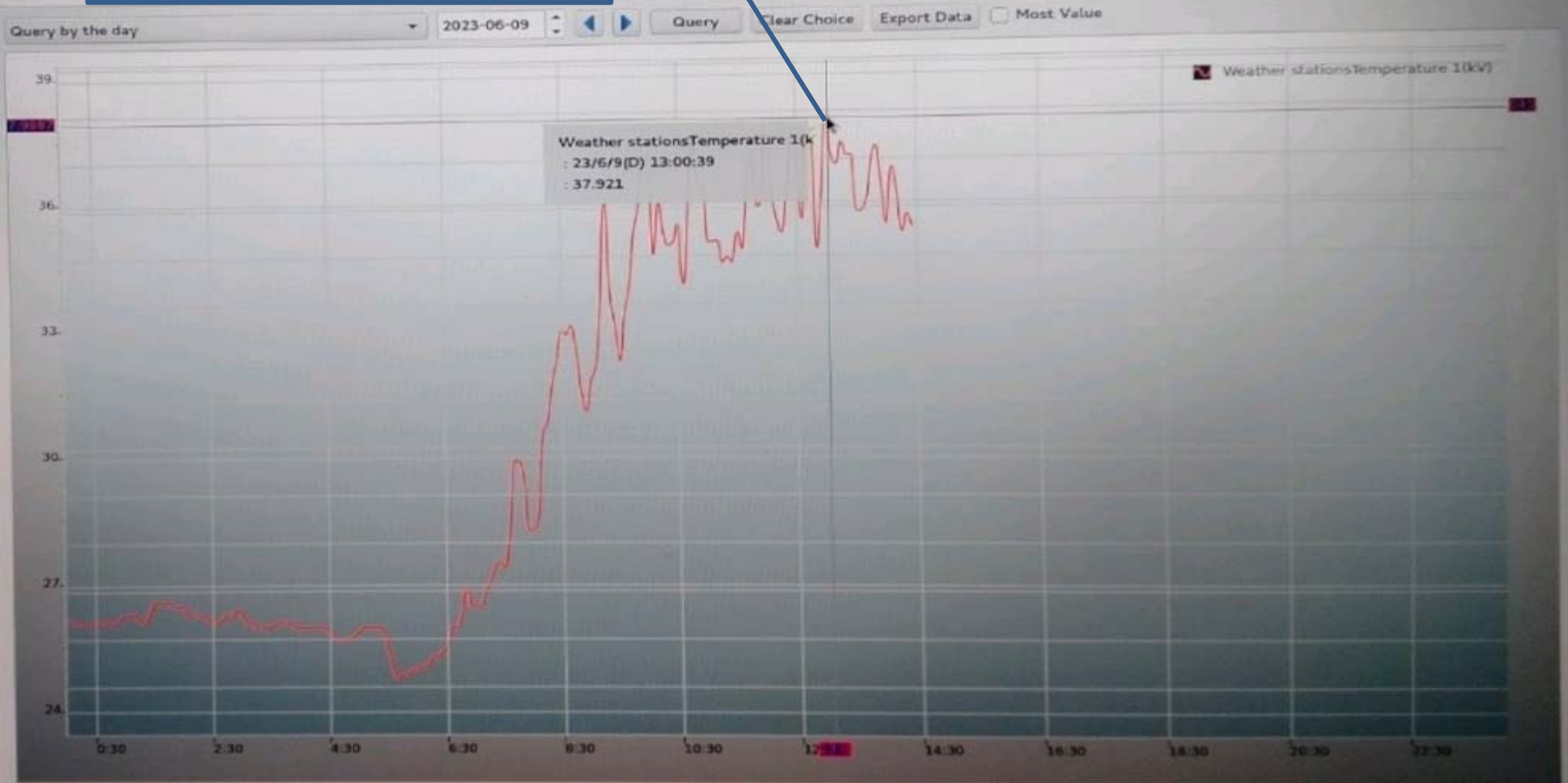
Weather Status

Total annual accumulation of horizontal	3845.00	MJ
Total annual accumulation of tilt	4701.00	MJ
Annual accumulation of anti radiation	1230.00	MJ
Daily radiation	0.00	W/m ²
Scattered radiation	0.00	W/m ²
Daily accumulation of direct radiation	6.15	MJ
Daily accumulation of scattered radiation	10.39	MJ
Monthly accumulation of scattered radiation	117.00	MJ
Monthly accumulation of scattered radiation	275.00	MJ
Annual accumulation of radiation	1425.00	MJ
Annual cumulative of radiation	1333.00	MJ
Sunshine hours	5.00	h
Back temperature	28.60	°C

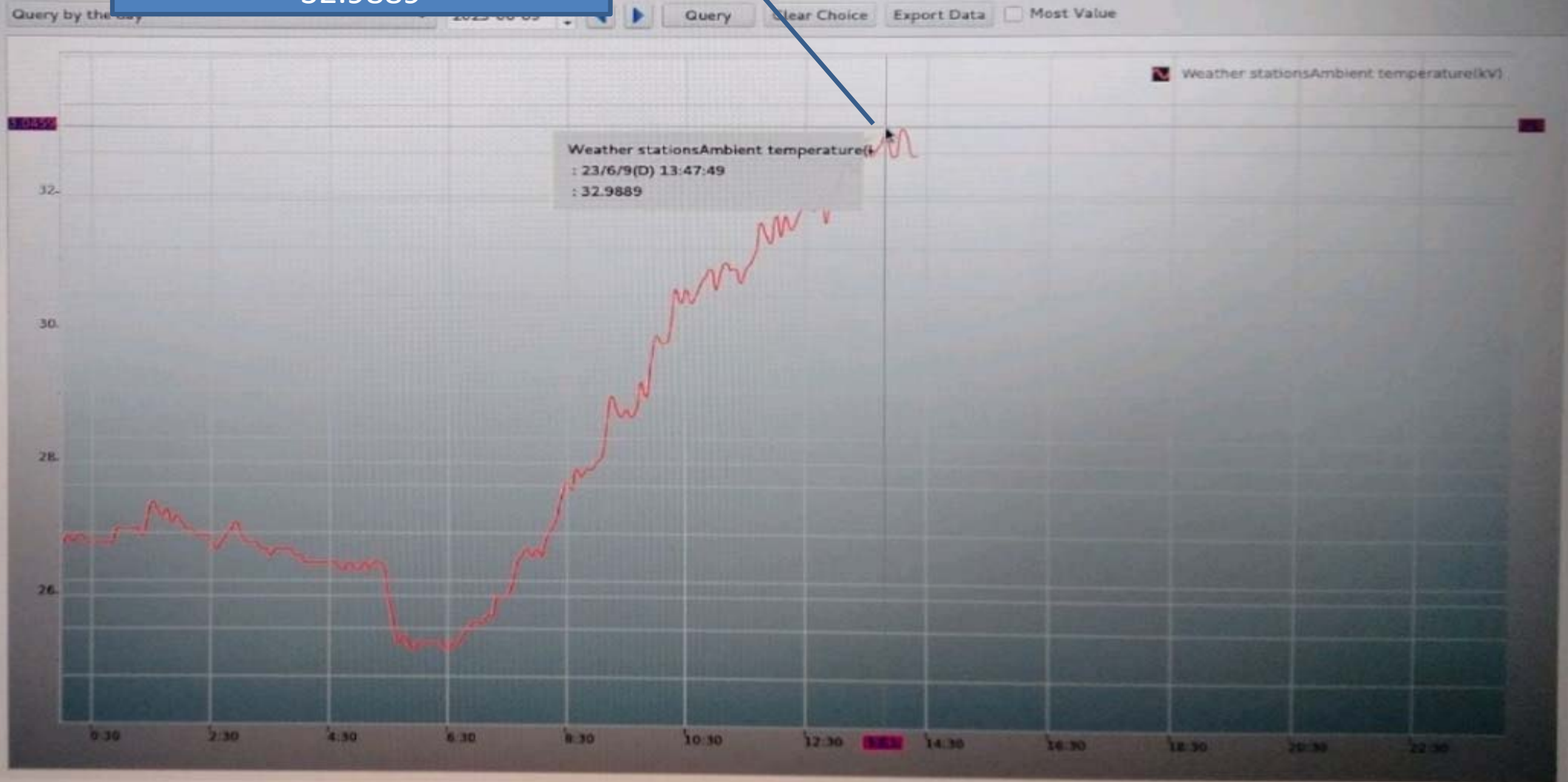
Weather station
Instantaneous value of total radiation
9/6/2023 ,11:55:00
778



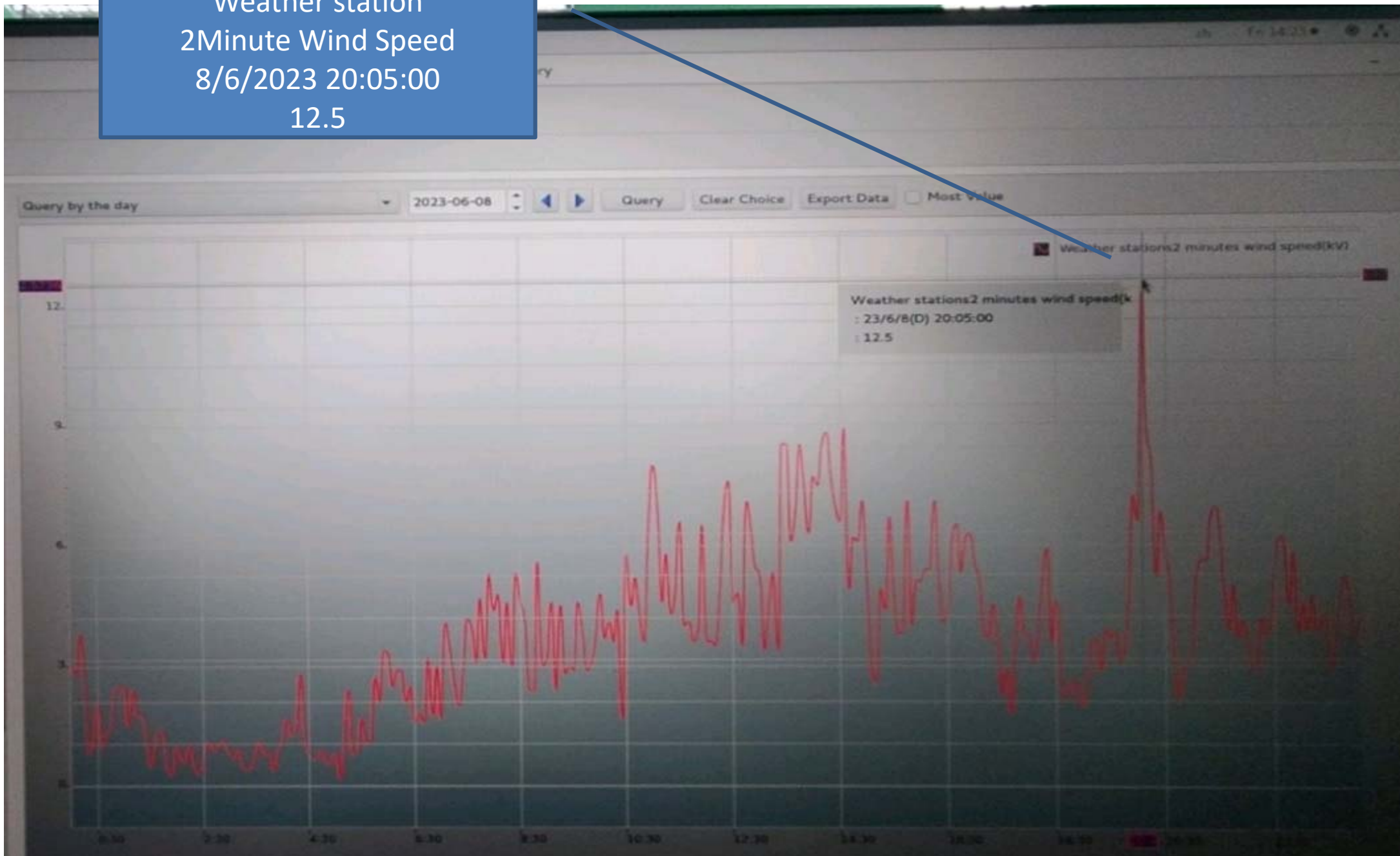
Weather station
Ambient Temperature
9/6/2023 ,13:00:39
37.921



Weather station
Ambient Temperature
9/6/2023 ,13:47:49
32.9889

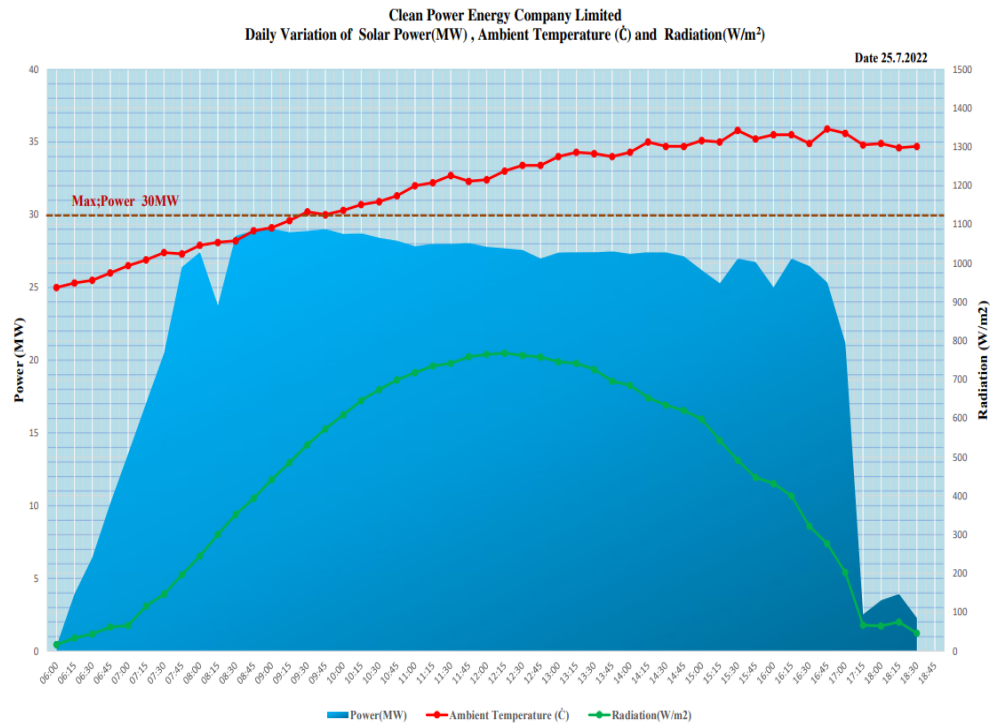


Weather station
2Minute Wind Speed
8/6/2023 20:05:00
12.5

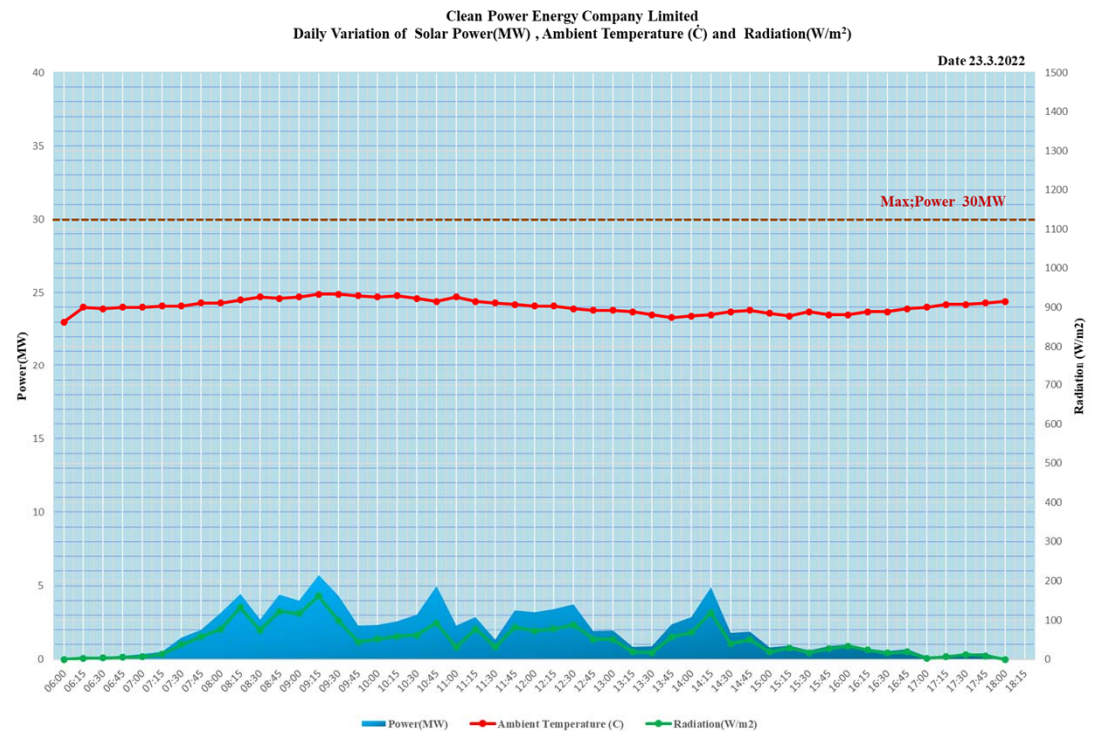


Comparison status of Daily Variation

25-July-2022



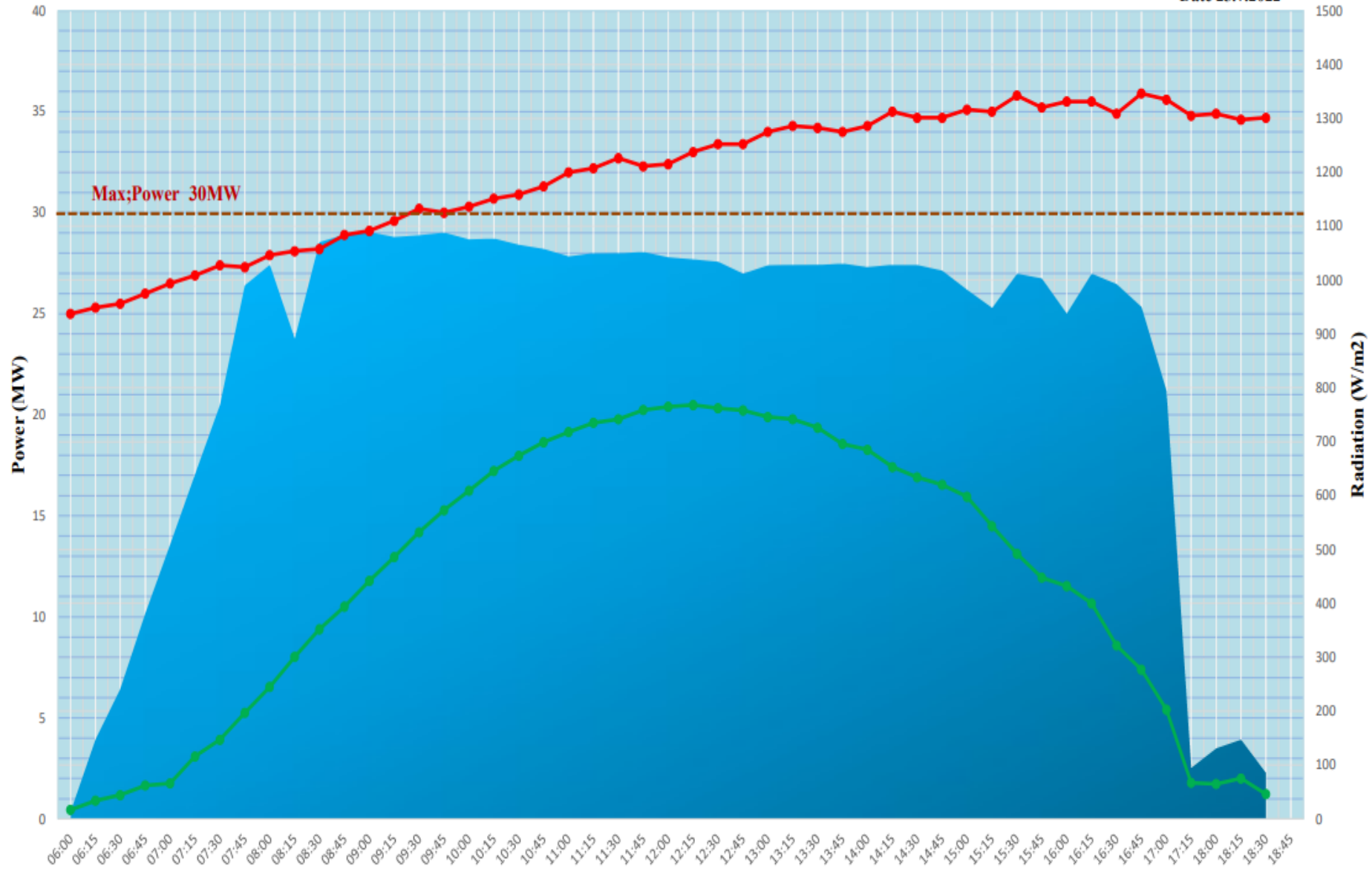
23-Mar-2022



	Maximum	Minimum
Power Generating	284,930 kWh (25-July-22)	24,660 kWh (23-Mar-22)
Pmax	30.73 MW (10-May-22)	6.86 MW (23-Mar-22)

Clean Power Energy Company Limited
Daily Variation of Solar Power(MW) , Ambient Temperature (°C) and Radiation(W/m²)

Date 25.7.2022



Power(MW)



Ambient Temperature (°C)



Radiation (W/m²)

Returns the main wiring diagram

Weather stations

Ambient temperature	32.20	℃	Ultraviolet radiation instantaneous value	493.00	W/m2	Cumulative net radiation days	21.79	MJ/m2
Temperature1	33.30	℃	Instantaneous wind direction	188.00		Daily accumulation of photosynthetic radiation	22.75	MJ/m2
Dew point temperature	23.64	℃	Instantaneous wind speed	6.40	m/s	Daily cumulative UV radiation	25.12	MJ/m2
environment humidity	60.40	RH	2 minutes wind speed	5.30	m/s	Collector power	13.20	V
Air pressure	982.70	hPa	10 minutes wind speed	4.50	m/s			
Instantaneous value of total radiation 1	176.00	W/m2	Rainfall interval accumulation	0.00	mm			
Instantaneous value of scattered radiation 1	187.00	W/m2	Sunshine time interval accumulation	30.00	min			
Instantaneous value of direct radiation 1	183.00	W/m2	Total radiation 1 interval accumulation	0.41				
Instantaneous value of total radiation 2	370.00	W/m2	Cumulative radiation interval	0.44	MJ/m2			
Net instantaneous radiation value	410.00	W/m2	Direct radiation interval accumulation	0.31	MJ/m2			
Instantaneous value of photosynthetic radiation	446.00	W/m2	Total radiation 2 interval accumulation	0.76	MJ/m2			
			Net radiation interval accumulation	0.83	MJ/m2			
			Photosynthetic radiation interval accumulation	0.88	MJ/m2			
			UV radiation interval accumulation	0.97	MJ/m2			
			Cumulative rainfall	0.00	mm			
			Sunshine hours	323.00	min			
			Total radiation accumulated in 1 day	15.27	MJ/m2			
			Cumulative radiation days	16.14	MJ/m2			
			Cumulative direct radiation days	4.83	MJ/m2			
			Total radiation accumulated in 2 days	20.96	MJ/m2			

Output area 28 b0

All

Tag	Occurrence
<input type="checkbox"/>	2023-06
<input type="checkbox"/>	2023-06

Ambient temperature	32.20	℃
Temperature1	33.30	℃
Dew point temperature	23.64	℃
environment humidity	60.40	RH
Air pressure	982.70	hPa
Instantaneous value of total radiation 1	176.00	W/m ²
Instantaneous value of scattered radiation 1	187.00	W/m ²
Instantaneous value of direct radiation 1	183.00	W/m ²
Instantaneous value of total radiation 2	370.00	W/m ²
Net instantaneous radiation value	410.00	W/m ²
Instantaneous value of photosynthetic radiation	446.00	W/m ²

Instantaneous wind direction	188.00	
Instantaneous wind speed	6.40	m/s
2 minutes wind speed	5.30	m/s
10 minutes wind speed	4.50	m/s
Rainfall interval accumulation	0.00	mm
Sunshine time interval accumulation	30.00	min
Total radiation 1 interval accumulation	0.41	
Cumulative radiation interval	0.44	MJ/m2
Direct radiation interval accumulation	0.31	MJ/m2
Total radiation 2 interval accumulation	0.76	MJ/m2
Net radiation interval accumulation	0.83	MJ/m2
Photosynthetic radiation interval accumulation	0.88	MJ/m2

UV radiation interval accumulation	0.97	MJ/m ²
Cumulative rainfall	0.00	mm
Sunshine hours	323.00	min
Total radiation accumulated in 1 day	15.27	MJ/m ²
Cumulative radiation days	16.14	MJ/m ²
Cumulative direct radiation days	4.83	MJ/m ²
Total radiation accumulated in 2 days	20.96	MJ/m ²

Five Preventor input/exit input

33kV Thapyaywa 30MW The main wiring diagram

Measurement and control 1

Network diagram

DC System

QXZ

Communication box

Measure & Control Devices

Bracket axle control

33kV Line curve

33kV Line Real time

Watt-hour meter

Box Transformer alarm

Eliminate flash

33kV line

Inverter

Inverter control

Remote

Remote

Remote

Remote

Output area	
All	
Tag	Occurrence
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<input type="checkbox"/>	2023-05-



33kV PT



1#Into the line



2#Into the line



Grounding Transformer

F	50.42	Hz
F	50.40	Hz
UAB	32.26	kV
UBC	32.45	kV
UCA	32.15	kV

IA	449.80	A
UAB	32.20	kV
P	24.85	MW
Q	-3.77	Mvar
COS	-0.99	

IA	174.39	A
UAB	32.25	kV
P	-9.64	MW
Q	1.45	Mvar
COS	-0.99	

IA	276.64	A
UAB	32.23	kV
P	-15.29	MW
Q	2.31	Mvar
COS	-0.99	

IA	1.05	A
UAB	31.41	kV
P	-0.07	MW
Q	-0.00	Mvar
COS	-0.99	

P1

3763.57

kW

P2

4000.16

kW

6#Start/Stop		6#Start/Stop		6#Start/Stop		6#Start/Stop		6#Start/Stop	All
7#Start/Stop		7#Start/Stop		7#Start/Stop		7#Start/Stop		7#Start/Stop	Tag Occurrence
8#Start/Stop		8#Start/Stop		8#Start/Stop		8#Start/Stop		8#Start/Stop	<input type="checkbox"/> 2023-06

P3

3662.18

kW

P4

4290.67

kW

17#Start/Stop		17#Start/Stop		17#Start/Stop		17#Start/Stop	
18#Start/Stop		18#Start/Stop		18#Start/Stop		18#Start/Stop	
19#Start/Stop		19#Start/Stop		19#Start/Stop		19#Start/Stop	
20#Start/Stop		20#Start/Stop		20#Start/Stop		20#Start/Stop	
21#Start/Stop		21#Start/Stop		21#Start/Stop		21#Start/Stop	
22#Start/Stop		22#Start/Stop		22#Start/Stop		22#Start/Stop	
23#Start/Stop		23#Start/Stop		23#Start/Stop		23#Start/Stop	
24#Start/Stop		24#Start/Stop		24#Start/Stop		24#Start/Stop	
25#Start/Stop		25#Start/Stop		25#Start/Stop		25#Start/Stop	
26#Start/Stop		26#Start/Stop		26#Start/Stop		26#Start/Stop	

P5

4496.70

kW

P1	3763.57	kW	P2	4000.16	kW	P3	3662.18	kW	P4	4290.67	kW	P5	4496.70	kW
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Five Prevention input/output

input

33kV Thapyaywa 30MW The main wiring diagram

Returns the main wiring diagram

1 Communication box

1#YC	2#YC	3#YC	4#YC	5#YC
6#YC	1#YX	2#YX	3#YX	4#YX
5#YX	6#YX	7#YX	8#YX	9#YX
10#YX	11#YX	12#YX		

2 Communication box

1#YC	2#YC	3#YC	4#YC	5#YC
6#YC	1#YX	2#YX	3#YX	4#YX
5#YX	6#YX	7#YX	8#YX	9#YX
10#YX	11#YX	12#YX		

3 Communication box

1#YC	2#YC	3#YC	4#YC	5#YC
6#YC	7#YC	1#YX	2#YX	3#YX
4#YX	5#YX	6#YX	7#YX	8#YX
9#YX	10#YX	11#YX	12#YX	

4 Communication box

1#YC	2#YC	3#YC	4#YC	5#YC
6#YC	7#YC	1#YX	2#YX	3#YX
4#YX	5#YX	6#YX	7#YX	8#YX
9#YX	10#YX	11#YX	12#YX	

5 Communication box

1#YC	2#YC	3#YC	4#YC	5#YC
6#YC	7#YC	1#YX	2#YX	3#YX
4#YX	5#YX	6#YX	7#YX	8#YX
9#YX	10#YX	11#YX	12#YX	

Output area	
All	
Tag	Occurrence
<input type="checkbox"/>	2023-06-
<input type="checkbox"/>	2023-06-

Returns the main wiring diagram

Eliminate Flash

Bracket axle control

1#measure & control Device

1#The wind model	
1#Automatic mode	
1#Manual Angle mode	
1#Cleaning mode	
2#The wind model	
2#Automatic mode	
2#Manual Angle mode	
2#Cleaning mode	

2#measure & control Device

1#The wind model	
1#Automatic mode	
1#Manual Angle mode	
1#Cleaning mode	
2#The wind model	
2#Automatic mode	
2#Manual Angle mode	
2#Cleaning mode	

3#measure & control Device

1#The wind model	
1#Automatic mode	
1#Manual Angle mode	
1#Cleaning mode	
2#The wind model	
2#Automatic mode	
2#Manual Angle mode	
2#Cleaning mode	

4#measure & control Device

1#The wind model	
1#Automatic mode	
1#Manual Angle mode	
1#Cleaning mode	
2#The wind model	
2#Automatic mode	
2#Manual Angle mode	
2#Cleaning mode	

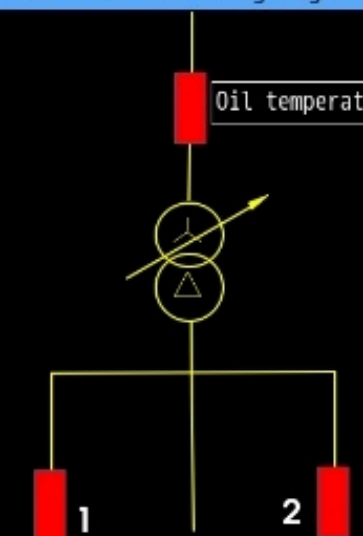
5#measure & control Device

1#The wind model	
1#Automatic mode	
1#Manual Angle mode	
1#Cleaning mode	
2#The wind model	
2#Automatic mode	
2#Manual Angle mode	
2#Cleaning mode	

Output area	
All	
Tag	Occurrence
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<input type="checkbox"/>	2023-06-

Returns the main wiring diagram

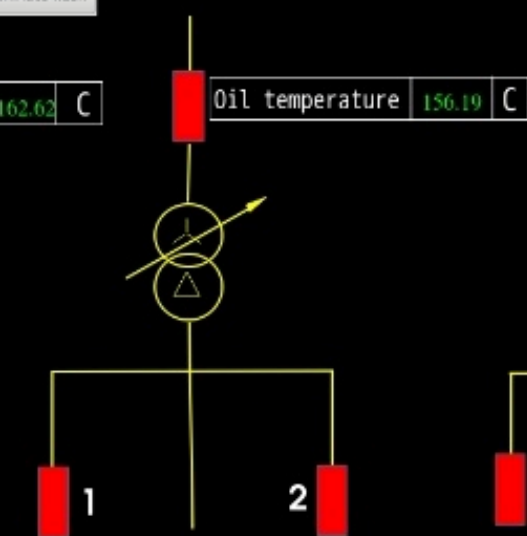
Eliminate flash



1#measure & control
Device

IA1	1363.80	A
UAB1	816.96	V
P1	1915.20	kW
Q1	34.56	kvar
COS1	1.00	

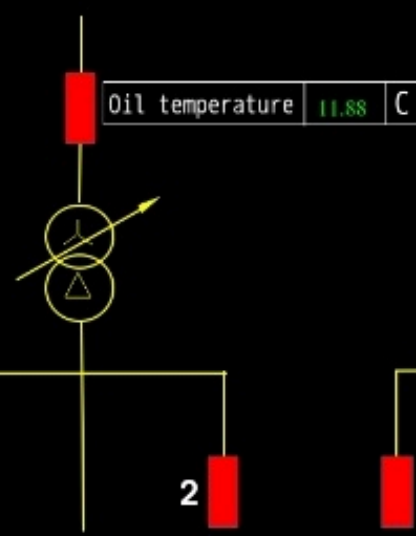
IA2	1246.80	A
UAB2	816.32	V
P2	1746.24	kW
Q2	36.48	kvar
COS2	1.00	



2#measure & control
Device

IA1	1408.80	A
UAB1	816.64	V
P1	1974.72	kW
Q1	41.28	kvar
COS1	1.00	

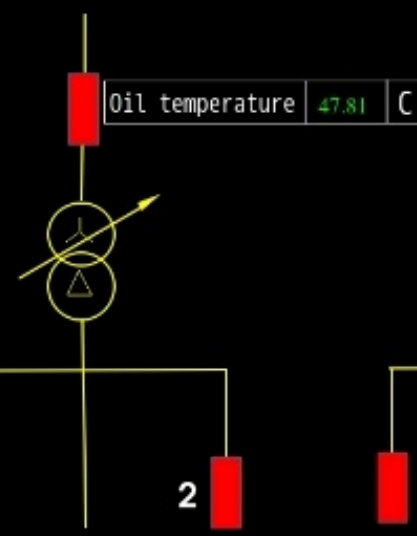
IA2	1552.20	A
UAB2	816.64	V
P2	2177.28	kW
Q2	46.08	kvar
COS2	1.00	



3#measure & control
Device

IA1	1464.60	A
UAB1	815.68	V
P1	2053.44	kW
Q1	41.28	kvar
COS1	1.00	

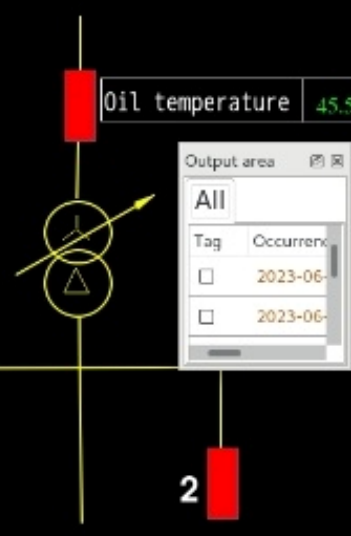
IA2	1561.20	A
UAB2	816.32	V
P2	2189.76	kW
Q2	46.08	kvar
COS2	1.00	



4#measure & control
Device

IA1	1435.20	A
UAB1	815.04	V
P1	2008.32	kW
Q1	47.04	kvar
COS1	1.00	

IA2	1594.80	A
UAB2	816.96	V
P2	2240.64	kW
Q2	48.00	kvar
COS2	1.00	



5#measure & control
Device

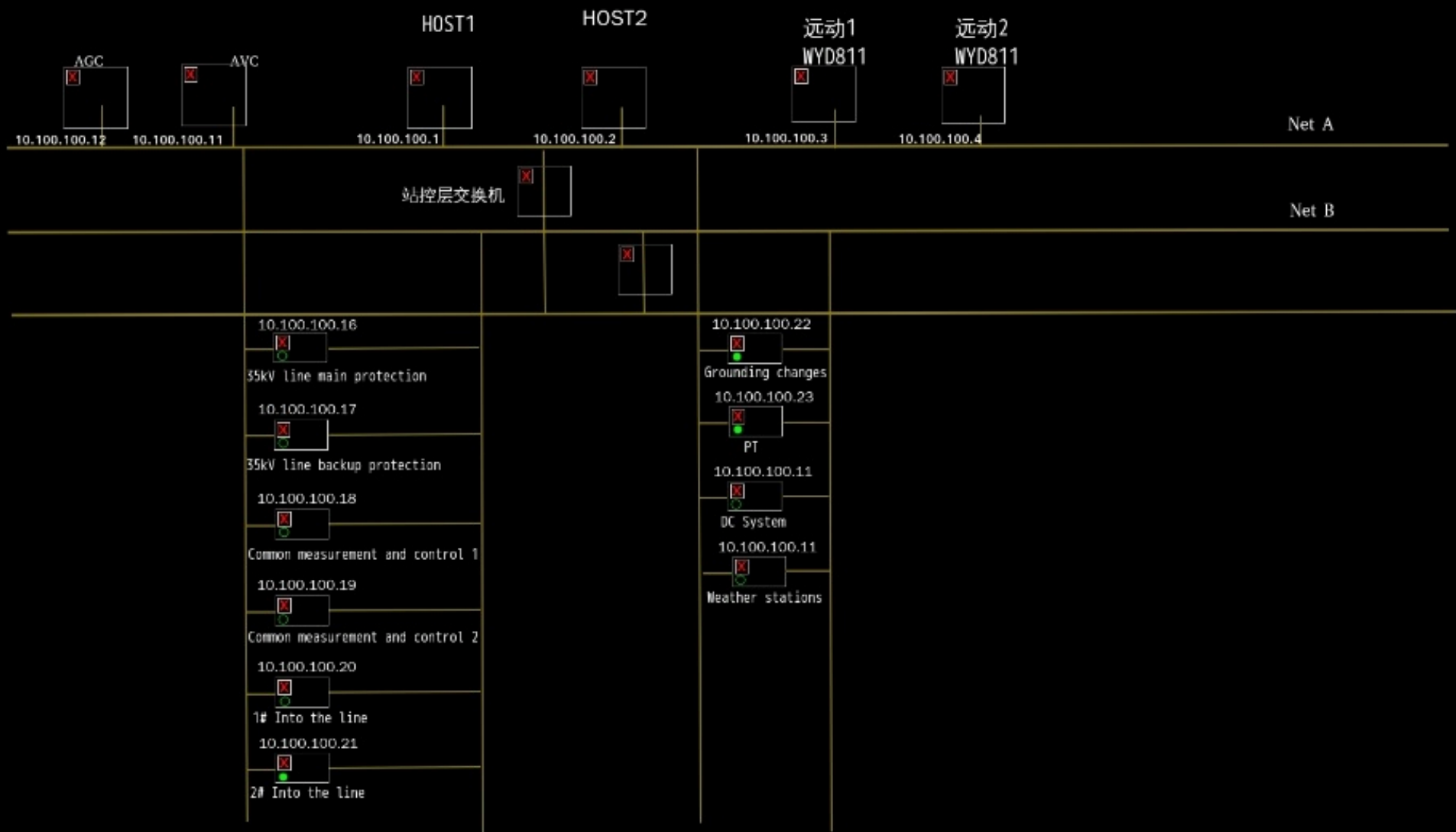
IA1	1699.80	A
UAB1	815.68	V
P1	2387.52	kW
Q1	55.68	kvar
COS1	1.00	

IA2	1512.00	A
UAB2	816.00	V
P2	2125.44	kW
Q2	47.04	kvar
COS2	1.00	

Output area	
All	
Tag	Occurrence
<input type="checkbox"/> 2023-06-	
<input type="checkbox"/> 2023-06-	

Returns the main wiring diagram

Network diagram



Output area	
All	
Tag	Occurrence
<input type="checkbox"/>	2023-06-
<input type="checkbox"/>	2023-06-

Returns the main wiring diagram

1#Into line

1#Into line Positive active	1820.22	kWh
1#Into line Positive reactive	20.58	kvar
1#Into line Reverse reactive	198.23	kvar
1#Into line Reverse active	3.25	kWh

2#Into line

2#Into line Positive active	2803.11	kWh
2#Into line Positive reactive	36.37	kvar
2#Into line Reverse reactive	299.21	kvar
2#Into line Reverse active	4.86	kWh

Grounding Transformer

Transformer Positive active	55.61	kWh
Transformer Positive reactive	1.01	kvar
Transformer Reverse reactive	2.19	kvar
Transformer Reverse active	0.00	kWh

Output area	
All	
Tag	Occurrence
<input type="checkbox"/>	2023-06-
<input type="checkbox"/>	2023-06-

Returns the main wiring diagram

1#measure & control Device

● 1XBTransformer trip over high temperature
● 1XBTransformer high Temperature alarm
● 1XBSwitch gas relay alarm
● 1XBSwitching gas relay trip
● 1XBHigh voltage load switch alignment
● 1XBHigh voltage load switch loci
● 1XB1# low voltage circuit breaker is closed
● 1XB1# low voltage circuit breaker switching
● 1XB2# low pressure side synapse
● 1XB2# low pressure lateral loci
● 1XBThe 1# low-voltage circuit breaker is faulty
● 1XBThe 2# low-voltage circuit breaker is faulty
● 1XBThe disconnecting switch closes
● 1XBThe ground switch is turned on
● 1XBNo storage of circuit breaker
● 1XBHigh-pressure chamber door status
● 1XBLow pressure chamber personnel in and out of the state
● 1XBMaintenance door status of low pressure chamber
● 1XBSmoke alarm status
● 1XBIn remote control
● 1XBRepair clamp
● 1XBAir sensor 1 is faulty
● 1XBirradiator 1 is faulty
● 1XBirradiator 2 is faulty
● 1XBirradiator 3 is faulty

2#measure & control Device

● 2XBTransformer trip over high temperature
● 2XBTransformer high Temperature alarm
● 2XBSwitch gas relay alarm
● 2XBSwitching gas relay trip
● 2XBHigh voltage load switch alignment
● 2XBHigh voltage load switch loci
● 2XB1# low voltage circuit breaker is closed
● 2XB1# low voltage circuit breaker switching
● 2XB2# low pressure side synapse
● 2XB2# low pressure lateral loci
● 2XBThe 1# low-voltage circuit breaker is faulty
● 2XBThe 2# low-voltage circuit breaker is faulty
● 2XBThe disconnecting switch closes
● 2XBThe ground switch is turned on
● 2XBNo storage of circuit breaker
● 2XBHigh-pressure chamber door status
● 2XBLow pressure chamber personnel in and out of the state
● 2XBMaintenance door status of low pressure chamber
● 2XBSmoke alarm status
● 2XBIn remote control
● 2XBRepair clamp
● 2XBAir sensor 1 is faulty
● 2XBirradiator 1 is faulty
● 2XBirradiator 2 is faulty
● 2XBirradiator 3 is faulty

3#measure & control Device

● 3XBTransformer trip over high temperature
● 3XBTransformer high Temperature alarm
● 3XBSwitch gas relay alarm
● 3XBSwitching gas relay trip
● 3XBHigh voltage load switch alignment
● 3XBHigh voltage load switch loci
● 3XB1# low voltage circuit breaker is closed
● 3XB1# low voltage circuit breaker switching
● 3XB2# low pressure side synapse
● 3XB2# low pressure lateral loci
● 3XBThe 1# low-voltage circuit breaker is faulty
● 3XBThe 2# low-voltage circuit breaker is faulty
● 3XBThe disconnecting switch closes
● 3XBThe ground switch is turned on
● 3XBNo storage of circuit breaker
● 3XBHigh-pressure chamber door status
● 3XBLow pressure chamber personnel in and out of the state
● 3XBMaintenance door status of low pressure chamber
● 3XBSmoke alarm status
● 3XBIn remote control
● 3XBRepair clamp
● 3XBAir sensor 1 is faulty
● 3XBirradiator 1 is faulty
● 3XBirradiator 2 is faulty
● 3XBirradiator 3 is faulty

Output area	
All	
Tag	Occurrence
<input type="checkbox"/>	2023-06-
<input type="checkbox"/>	2023-06-

returns the main wiring diagram

DC System

Ac 1 channel A-phase voltage	232.90	V	Dc bus voltage	233.90	V	#4 rectifier module temperature	29.00	C	UPS1 AC input voltage	231.30
Ac 1 channel B-phase voltage	230.20	V	Female forward to ground resistance	600.00		Insulated bus 1 positive voltage to ground	116.90		Incoming line 1 way A phase voltage	233.80
Ac 1 channel C-phase voltage	229.90	V	#1 Rectifier module operating status	2457.60		Insulated bus 1 negative to ground voltage	117.30	V	Incoming line 1 way B phase voltage	233.70
Ac 2 channel A-phase voltage	232.90	V	#1 rectifier module voltage	233.90	V	Resistance of insulated bus 1 to ground	600.00		Incoming line 1 way C phase voltage	228.10
Ac 2 channel B-phase voltage	230.30	V	#1 rectifier module current	1.20	A	Insulated bus 1 negative resistance to ground	600.00		Incoming line 1 way AB line voltage	404.90
Ac 2 channel C-phase voltage	230.00	V	#1 rectifier module temperature	26.00	C	Resistance of insulated bus 2 to ground	600.00		Incoming line 1 way BC line voltage	399.90
Charging device output voltage	233.90	V	#2 Rectifier module operating status	2457.60		Insulated bus 2 negative resistance to ground	600.00		Incoming line 1 way CA line voltage	400.00
The rectifier outputs the total current	5.00	A	#2 rectifier module voltage	233.90	V				Incoming line 1 way A phase current	75.80
			#2 rectifier module current	0.90	A				Incoming line 1 way B phase current	63.60
			#2 rectifier module temperature	28.00	C				Incoming line 1 way C phase current	90.80
			#3 Rectifier module operating status	2457.60					Incoming line 2 way A phase voltage	12.20
			#3 rectifier module voltage	234.30	V				Incoming line 2 way B phase voltage	17.40
			#3 rectifier module current	1.50					Incoming line 2 way C phase voltage	16.90
			#3 rectifier module temperature	27.00	A				Incoming line 2 way AB line voltage	25.90
			#4 Rectifier module operating status	2457.60					Incoming line 2 way BC line voltage	29.70
			#4 rectifier module voltage	233.90	V				Incoming line 2 way CA line voltage	25.60
			#4 rectifier module current	1.30	A					0.00

Output area 88 88

All

Tag

Occurrence

☐ 2023-06-01

☐ 2023-06-01

The advantages of **Horizontal single axis tracker** system.

1. This projects are using **HORIZONTAL SINGLE AXIS TRACKER (HSAT)** system in Myanmar with advance control systems and equipments.

Advantages of trackings system are:-

- a) Independent row by row trackers.
 - b) It is stable, Simple, Best cost structure.
 - c) Specially designed D-Tube and easy to install.
 - d) LoRa-wireless communication, it is long range, low power consumption.
 - e) String powered with backup li-ion battery.
 - f) Strong wind resistance capability.
 - g) The tracking technology uses geographic latitude, longitude, and time as the main parameters and astronomical algorithms.
 - h) To avoid shadow occlusion between PV arrays, backtracking technology is provided.
- 2 We can get more power production even the same capacity rather than fixed type system.

SOLAR TRACKER FUNCTIONALITY OVERVIEW

Automatic system which drives solar panels to receive solar irradiation.

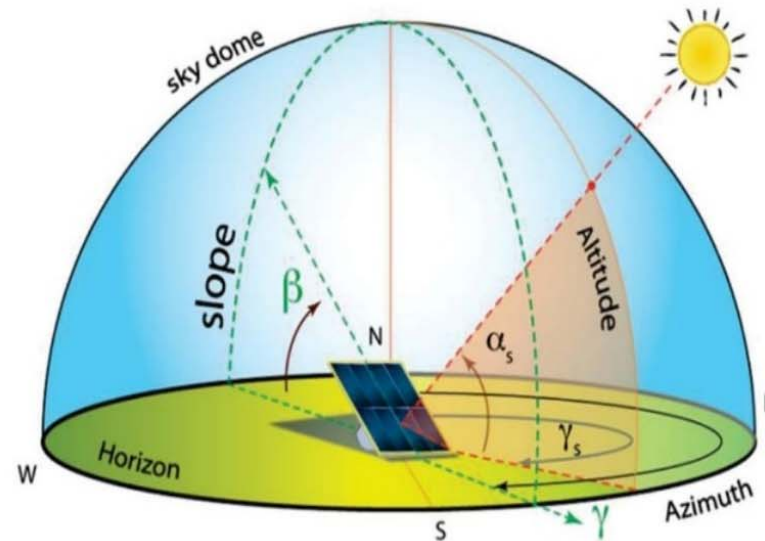
HORIZONTAL SINGLE AXIS TRACKER (HSAT)

The rotation axis is horizontal with respect to the ground.

DAYTIME TRACKING

This tracking technology uses geographic latitude, longitude, and time as the main parameters, and astronomical algorithms (a general formula for the sun's position and horizontal coordinates) to calculate the sun's altitude α and azimuth γ .

The mechanical system is then driven by the intermittent drive motor of the control system. At the same time, the rotation position of the real time photovoltaic power generation system is detected by the inclination sensor, to achieve the purpose of closed-loop control further optimizing the tracker accuracy.



BACKTRACKING

During sunrise and sunset, shadow will be casted on consecutive PV arrays due to the low altitude of the Sun. Increasing row spacing can effectively reduce power caused by shadow occlusion, but it will increase investment costs such as land, cables, and construction.

Backtracking technology is a reverse-direction tracking routine. Its application in PV tracking systems can avoid shadow occlusion between PV arrays ensuring the optimisation of power generation of PV systems, and reducing the land area.

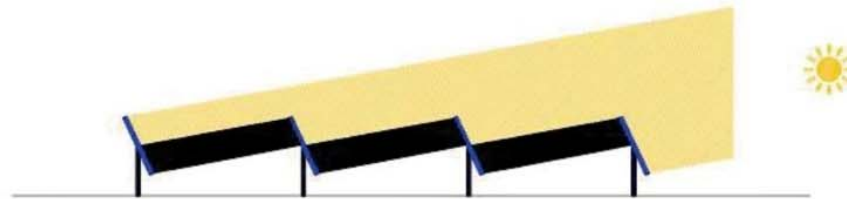


Figure. PV arrays in the morning or evening without backtracking

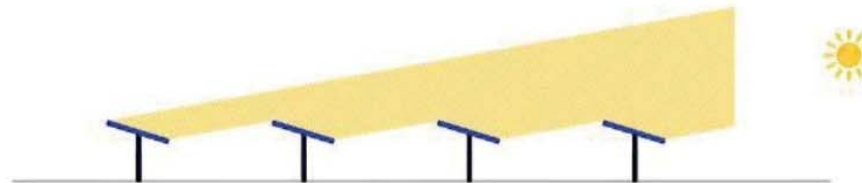


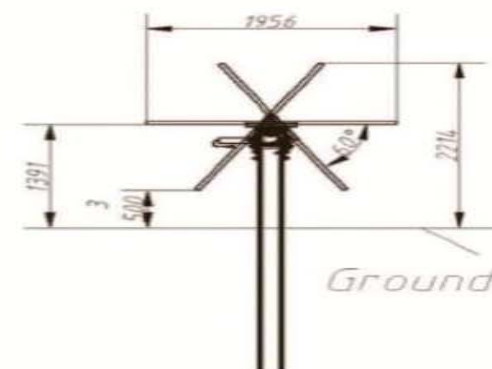
Figure PV arrays in the morning or evening with backtracking

SKYLINE TRACKER SPECIFICATIONS

Tracking Type	Independent horizontal single-axis tracker
Tracking Range	$\pm 60^\circ$
Driving System	Slew drive, 28VDC motor
Modules per Tracker	Up to 90 modules per tracker
System Voltage	1,000 V or 1,500 V
Ground Coverage Ratio	Typical $\geq 25\%$
Foundation Options	All foundation types
Terrain Adaption	Up to 20% N-S slope
Structure Material	Hot dipped galvanized/Pre-galvanized steel
Power Consumption	Typical 0.02kWh/day
Daily Energy Consumption	Powered by PV strings, back-up Li-ion battery
Standard Design Wind Speed	105mph (47m/s) per ASCE7-10, higher wind load available
Module Supported	All commercially available modules
Operation Temperature	$-20^\circ\text{C} - 60^\circ\text{C}$ ($-30^\circ\text{C} - 60^\circ\text{C}$ Optional)

ELECTRONIC CONTROLLER SPECIFICATIONS

Control System	1 controller per tracker
Control Algorithm	Astronomical algorithms + Tilt sensor close loop
Tracking Accuracy	$\leq 2^\circ$
String-Powered	Yes
Backtracking	Yes
Communication Options	LoRa wireless /RS 485 cable
Night Position	Yes



SkyLine Side View

Advantages of bifacial solar panel

1. Photovoltaic Panel are bifacial solar panel, it is not one face solar panel. Back side of solar panel also produce energy by reflected radiation from ground.



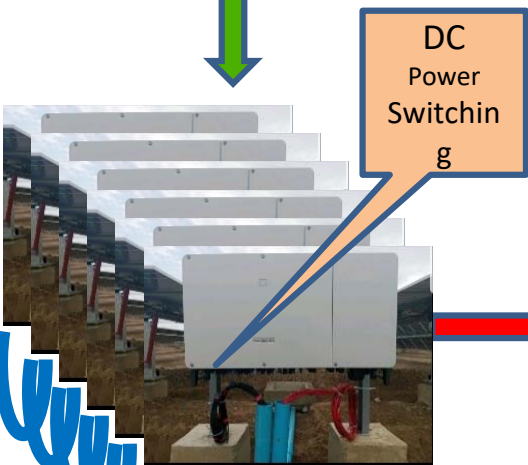
Antena for remote operation



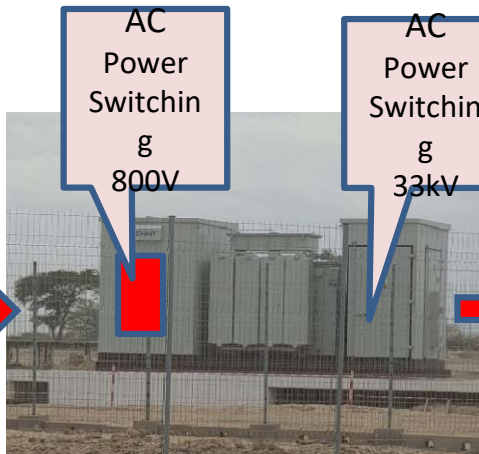
DC power Route

Operation & monitoring cable Route

AC power Route



DC Power Switching cabinet



AC Power Switching cabinet 800V

AC Power Switching cabinet 33kV



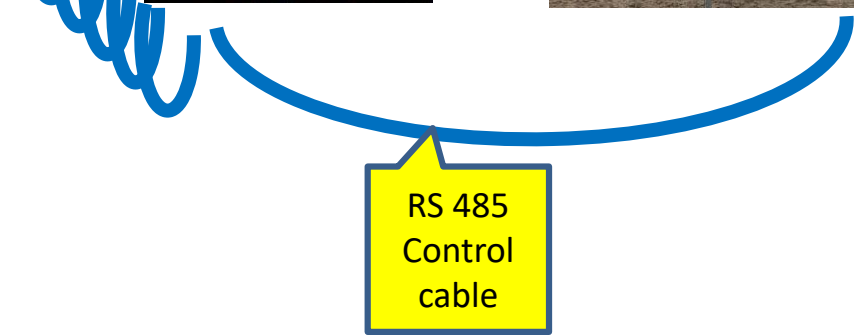
AC Power Switching cabinet 33kV



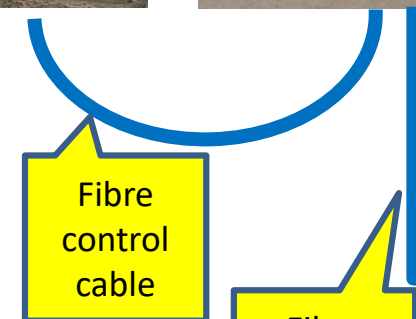
36kV switchgear

AC Power Switching cabinet 33kV

Thapyaywa 230/33kV



RS 485 Control cable



Fibre control cable



Fibre control cable



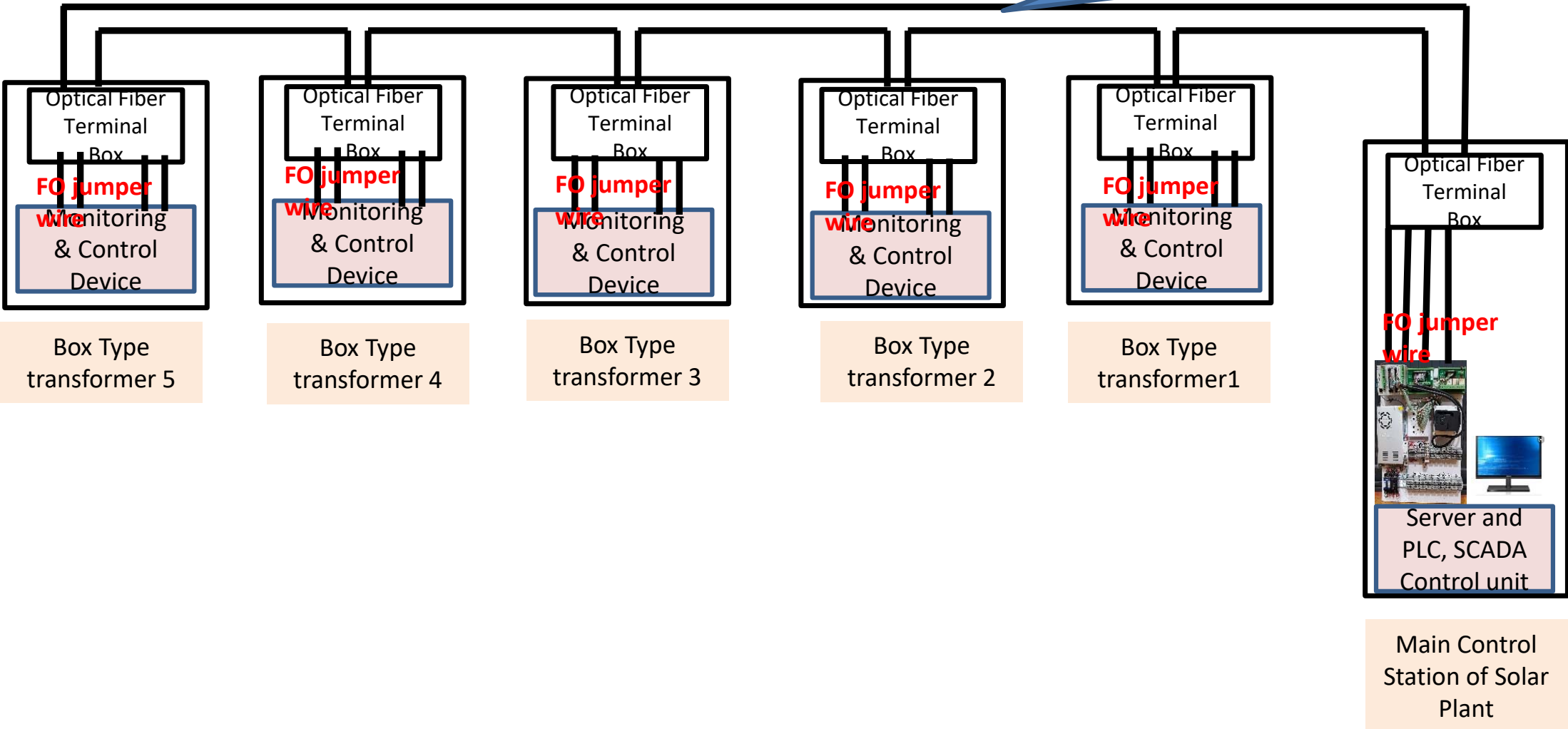
Server



Monitor

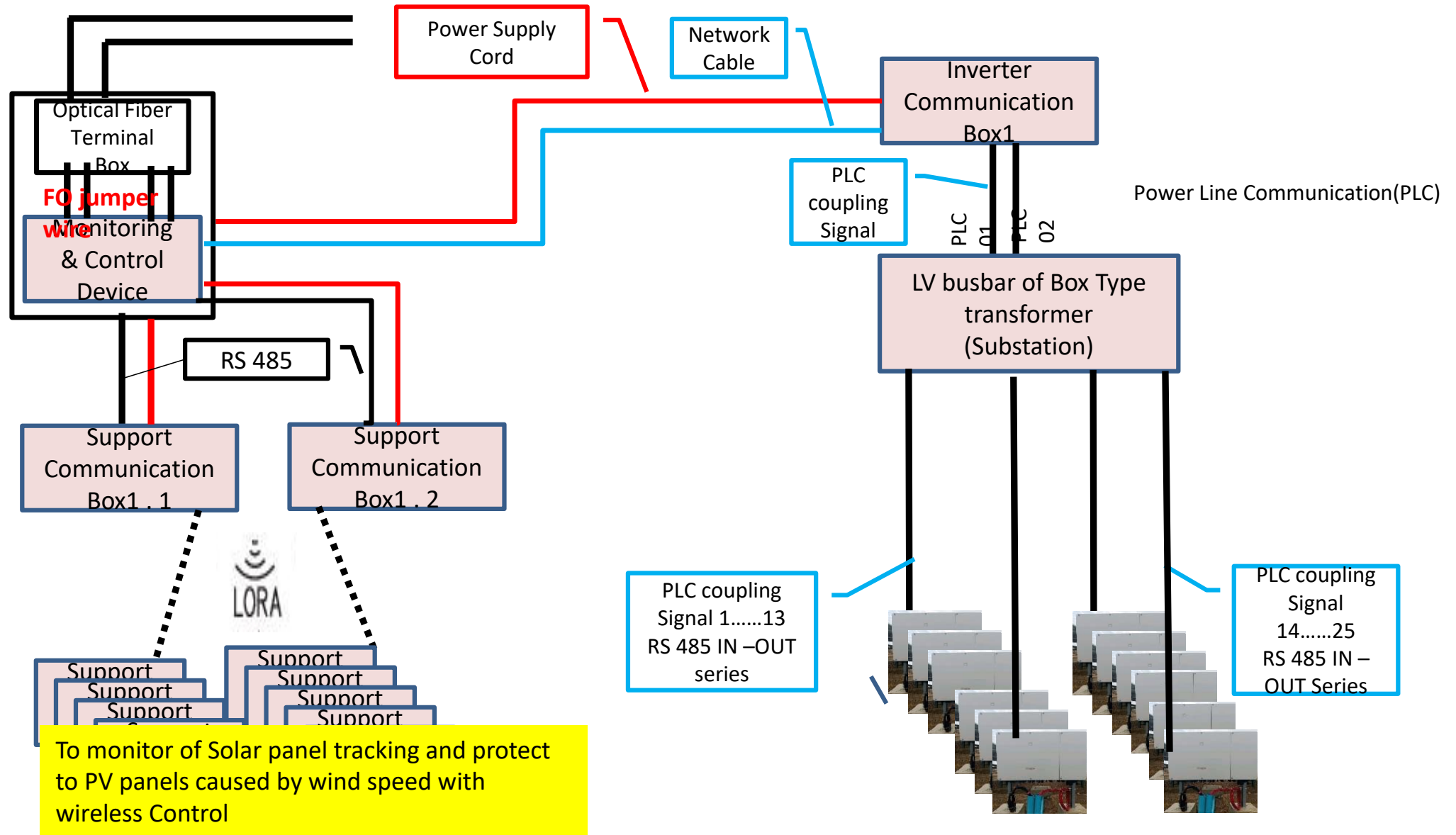
Solar Operation and Monitoring System

12 C Single Mode armored Optical fiber Cable



Solar Operation and Monitoring System

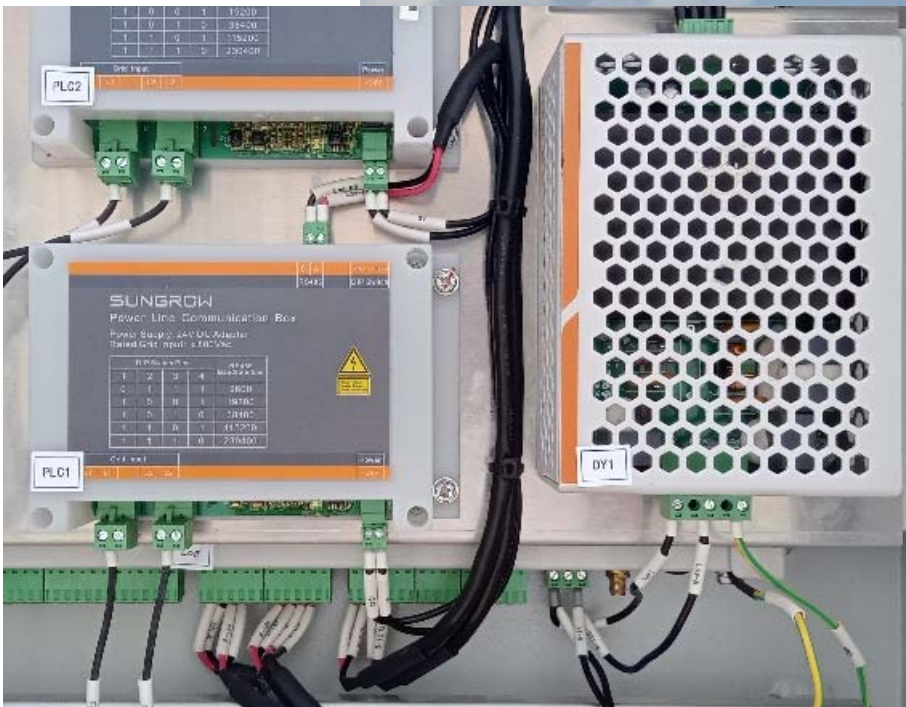
Box Type transformer



Configuration of row by row Tracking System



Power Line Communication(PLC) LoRA wi fi system



Tracker configuration
link cable

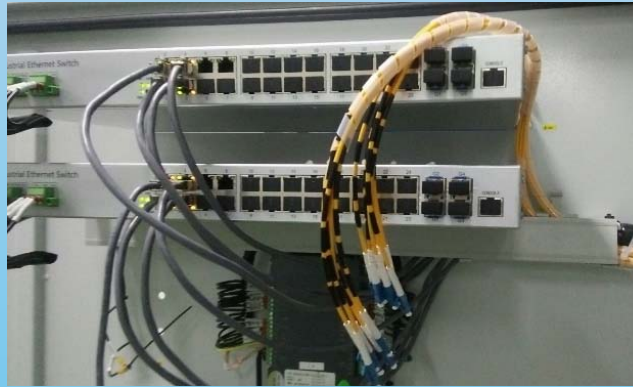
22. Final testing of new transmission line and float charge test.



OPGW Cable combines the functions of grounding and communications



Station and box transformer communication joining

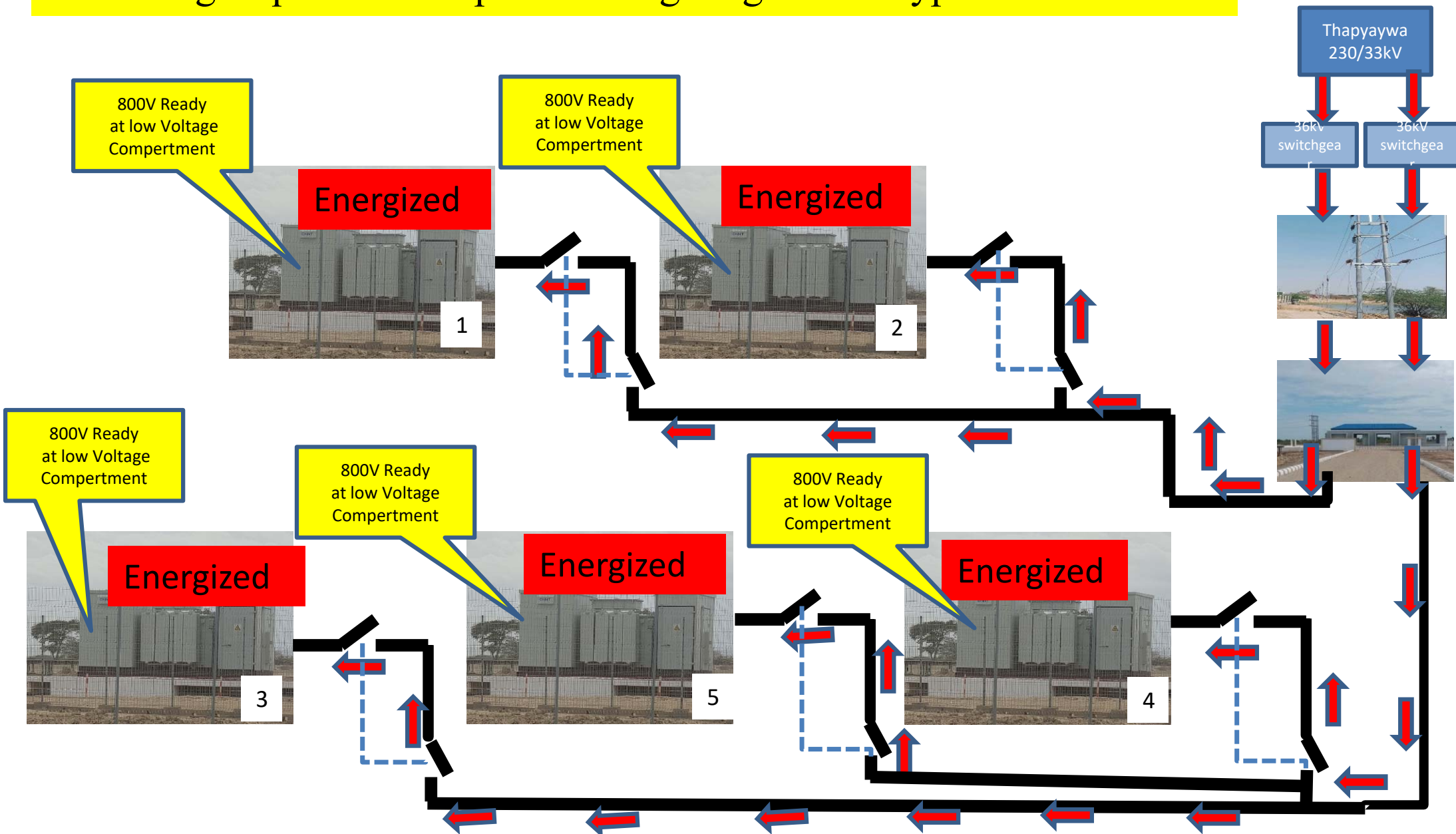


23. Individual final inspection and testing by supplier expert.



24. Power connecting with Grid

Testing sequences and power energizing to Box-type transformer



SVG (Static Var Generator)

SVG (Static Var Generator) is the modern solution for power factor correction.

SVG is a power electronics-based device connected in parallel with the load that requires harmonics mitigation.



25. Combine test with both supplier and power authority inspectors



**Power Station HT
Switch gear panel
testing**



26.Combine COC Test
(Contracted Operation Characteristics)

I. Contracted Operating Characteristics(CoC) test

1. Active power capability

2. Minimum generation

3. Reactive power capability

3.1 Leading 0.95 in POI at 1.0 p.u. (**P**oint **o**f **I**nterest) (**p**er **u**nit)

3.2 Lagging 0,95 in POI at 1.0 p.u

4. Loading/De-loading rate

5. Start up and Shutdown Time

1. Start- up from all the plant switch off

2. Start-up from power and inverter transformers already energized

3. Shut-down

II. Net Capacity Test

1. Two consecutive days test result
2. Attachment (Maximum Active Power Export, Data log)

III. Reliability Test

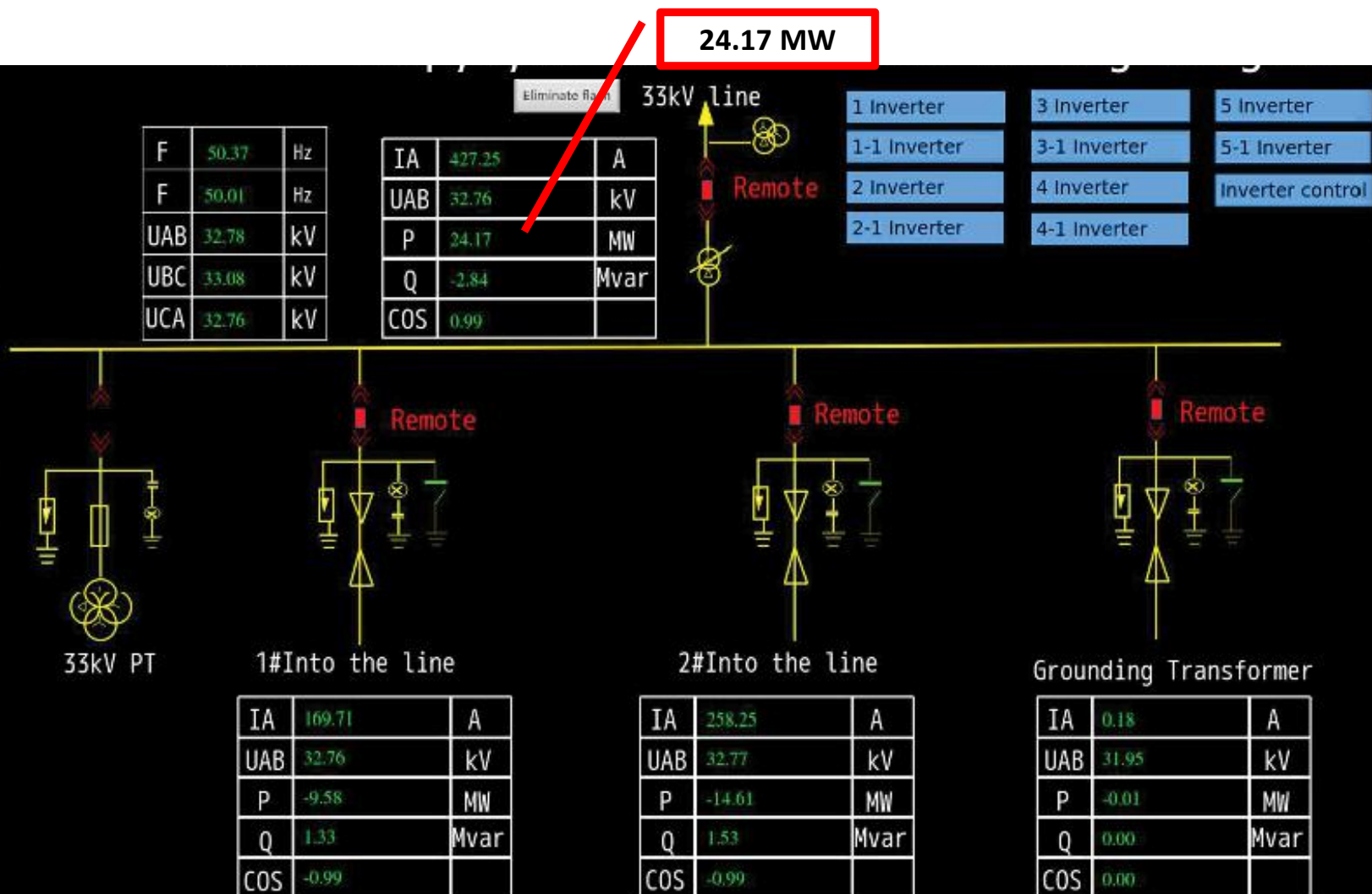
a).Day#1 Test

1. Inverter Communication Test
2. PLC Communication Test
3. Power Analyzer Communication Test
4. SCADA Communication Test
5. Operation mode Test
 - 5.1 Active Power Curtailment at AGC
 - 5.2 Ramp Rate Control at AGC
 - 5.3 On Demand Q at Logger
 - 5.4 Power Factor Control at Logger

b).Day#2 Test

1. Inverter Communication Test
2. PLC Communication Test
3. Power Analyzer Communication Test
4. SCADA Communication Test
5. Operation mode Test
 - 5.1 Active Power Curtailment at AGC (Automatic Generating Control)
 - 5.2 Ramp Rate Control at AGC
 - 5.3 On Demand Q at Logger
 - 5.4 Power Factor Control at Logger
 - 5.5 Reactive Power limitation as a function of Active Power

33kV Line main
Measurement and control 1
Network diagram
DC System
QXZ
1 Communication box
2 Communication box
3 Communication box
4 Communication box
5 Communication box
Measure & Control Devices
Bracket axle control
33kV Line curve
33kV Line Real time
Wallhour meter
Box Transformer alarm



Output area
All
Receive time
2021-12-13 09:56:53.180
2021-12-13 09:56:53.180

Actual available power at POI = 24.17MW

9:40hr

2. Minimum Generation

Day no.	Date and Time (YY/MM/DD)	Data Logger /Live (D/L)	Irradiance Reading from Weather Station (W/m ²)	Temperature at PV Module (° C)	Measured output power (Min) (MW)	Passed (Yes/No)	Note
1	2021/12/13 06:45:30	Live	31	18.0	0.25	Yes	
2	2021/12/14 06:45:12	Live	8	16.3	0.17	Yes	

Notes and comments;

Irradiance reading to check the Instantaneous value of total radiation 1.

- 1) The Minimum generation, the measured output power as mentioned above the table is recorded in morning time.
- 2) According to PV module Specification is 100W/m² per I-V Curves.

3. Reactive Power Capability Test (Reactive and Active Power Restriction Test)

3.1 Leading 0.95 in POI at 1.0 p.u

Date and Time (YY/MM/DD) 2021/12/13 (hh:mm:ss)	Active Power Available (MW)	Active Power Set Point (MW)	Power Factor Set Point (PF)	Reactive Power Measured (MVar)	Power Measured (MW)	Passed (Yes/No)	Note ** Include reading error is acceptable value
10:36:32	24.83	30	0.9	-14.66	0.86	Yes	(<+/- 10%)
10:47:50	24.28	30	0.95	-10.77	0.92	Yes	
10:56:20	25.39	30	1	-2.21	1	Yes	

Notes and comments;

- 1) Nominal reactive plant power Max/Min +/- 18.9MVar at AGC.

3.2 Lagging 0.95 in POI at 1.0 p.u

Date and Time (YY/MM/DD) 2021/12/13 (hh:mm:ss)	Active Power Available (MW)	Active Power Set Point (MW)	Power Factor Set Point (PF)	Reactive Power Measured (MVar)	Power Measured (MW)	Passed (Yes/No)	Note ** Include reading error is acceptable value
11:37:20	25.98	30	1.0	-2.16	1	Yes	(<+/- 10%)
11:15:33	25.12	30	-0.95	6.63	0.97	Yes	
11:24:50	24.88	30	-0.9	10.52	0.86	Yes	

Notes and comments;

- 1) Nominal reactive plant power Max/Min +/- 18.9MVar at AGC.

4. Loading /De Loading rate

Date and Time (YY/MM/DD) 2021/12/13 (hh:mm:ss)	Active Power Available (MW)	Active Power Set Point (MW)	Active Power Measured (MW)	Response Time (mm:ss)	Passed (Yes/No)
11:54:20	24.95	24.95	24.95	11:54:22	Yes
11:55:10	24.93	18.70	18.44	11:56:30	Yes
11:57:23	18.47	12.46	12.97	11:58:46	Yes
11:58:50	12.87	0	-0.02	11:59:00	Yes
11:59:12	-0.02	24.95	24.72	12:04:40	Yes
12:05:10	24.72	12.46	12.45	12:06:25	Yes
12:07:00	12.45	18.70	18.52	12:08:20	Yes

5. Start-up and Shutdown time

5.1 Start-up from all the plant switch off

Power Starting condition	Starting Time	Power final condition	Final Time	Duration	Passed	Note
(MW)	(YY/MM/DD) (hh:mm:ss)	(MW)	(hh:mm:ss)	(minute/Sec)	(Yes/No)	
0	13:25:00	24.09	13:35:00	10 min	Yes	

5.2 Start-up from power and inverter transformers already energized

Power Starting condition	Starting Time	Power final condition	Final Time	Duration	Passed	Note
(MW)	(YY/MM/DD) (hh:mm:ss)	(MW)	(hh:mm:ss)	(minute/Sec)	(Yes/No)	
0	12:25:00	24.53	12:30:00	5min	Yes	

5.3 Shut-down (Normal)

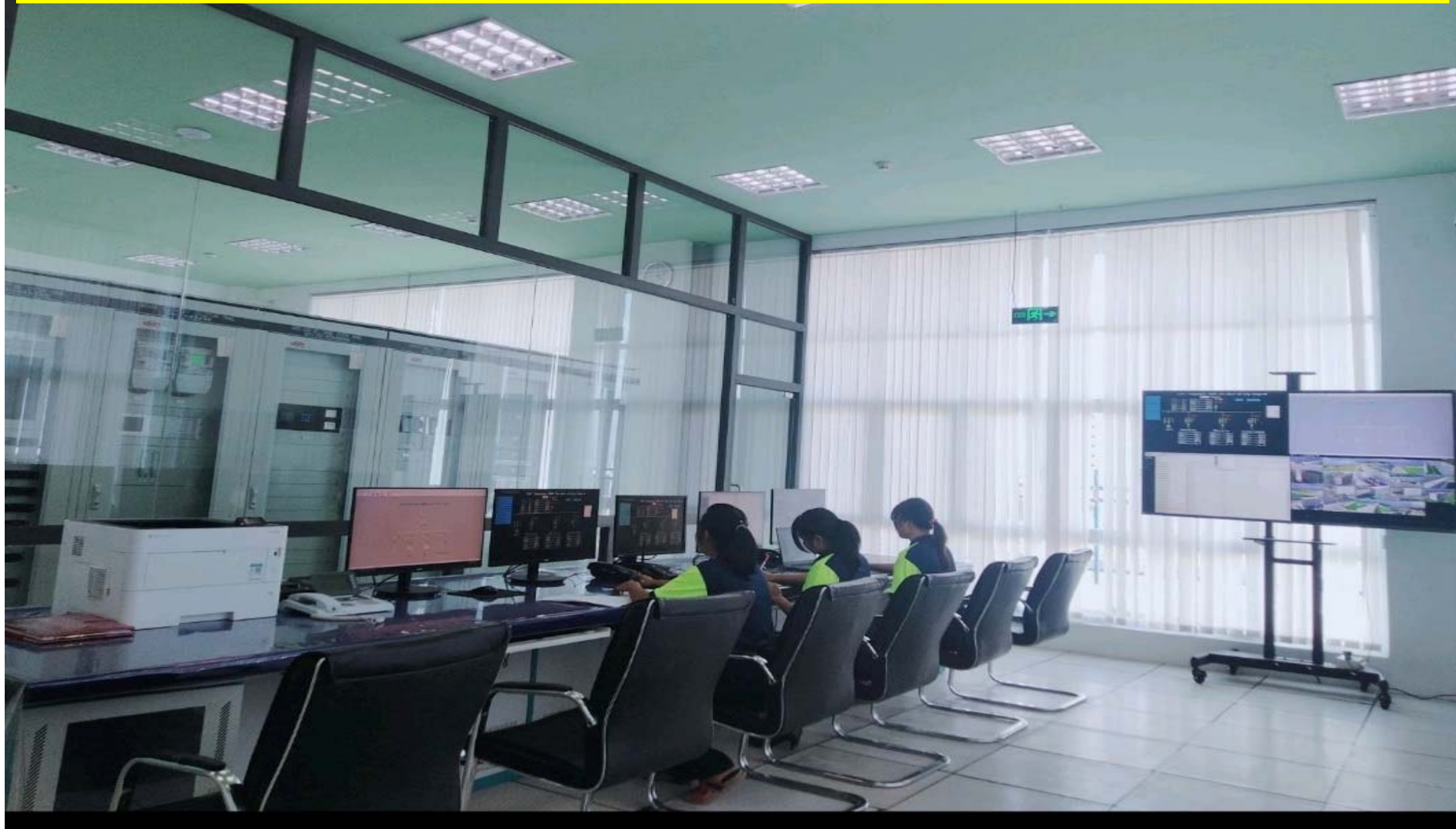
Power Starting condition	Starting Time	Power final condition	Final Time	Duration	Passed	Note
(MW)	(YY/MM/DD) (hh:mm:ss)	(MW)	(hh:mm:ss)	(minute/Sec)	(Yes/No)	
24.95	12:23:19	0	12:23:25	6 sec	Yes	

6.4 Shut-down (Break-down)

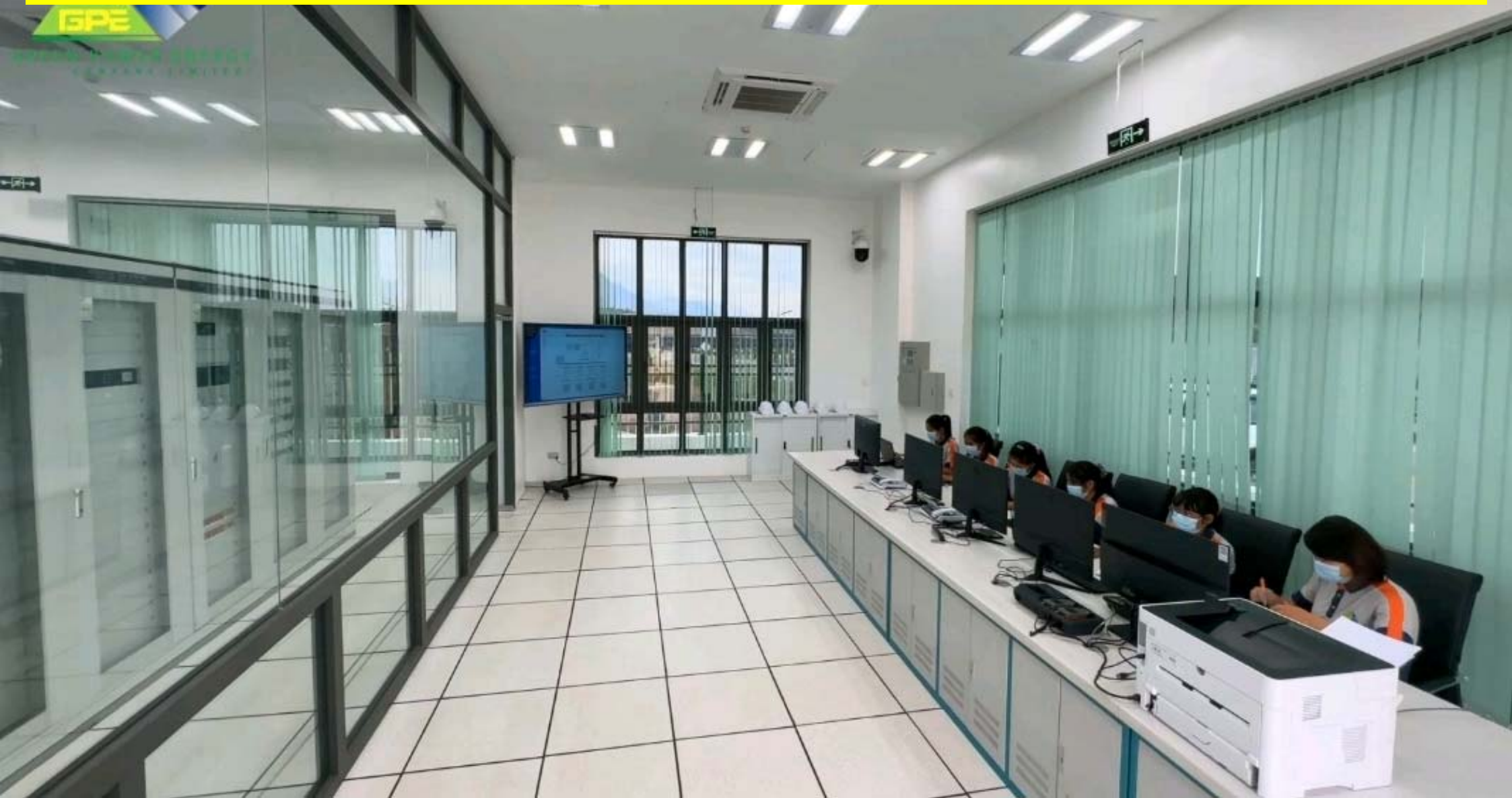
Power Starting condition	Starting Time	Power final condition	Final Time	Duration	Passed	Note
(MW)	(YY/MM/DD) (hh:mm:ss)	(MW)	(hh:mm:ss)	(minute/Sec)	(Yes/No)	
24.93	13:07:34	0	13:07:34	0 sec	Yes	

27. Operation
and
Training

Operation Control Centre(Thapyaywa)



Operation Control Centre (Taung Taw Gwin)



Duty Engineers



		MONTHLY POWER GENERATION & PPA ENERGY			
Sr. no	Month	PPA Energy	Sent out Energy	% of PPA	Remark
	For Year 2022,				
1	January	6,214,000	5,709,440	92%	
2	February	5,658,000	6,042,240	107%	
3	March	6,565,000	5,974,410	91%	
4	April	6,162,000	6,564,920	107%	
5	May	6,514,000	6,475,270	99%	
6	June	6,037,000	6,121,990	101%	
7	July	5,700,000	6,221,960	109%	
8	August	4,854,000	5,672,120	117%	
9	September	5,438,000	5,280,990	97%	
10	October	5,791,000	6,083,360	105%	
11	November	5,730,000	5,641,930	98%	
12	December	5,934,000	4,795,050	81%	
	Total	70,597,000	70,583,680	100%	

Single Axis Solar Tracker with Motor Drive

Usually rotate from the east to the west and follow the sun's direction.

Can fix as require.

Single Axis Solar Tracker System is about 30% more efficiency than fix system



Comparison status of Fix- Type and Tracker -Type

Tracking system is 30% more production than Fixed-type solar system
And
Peak Sun Hour of Fix Type solar is a range of 4 ~ 5.75 Hr

(Search From Web- Site)

Analys on practical

fix Type solar system's average per day Peak Sun Hour = **6.265 Hr**

Tracking Type solar system's average per day Peak Sun Hour = **8.035 Hr**

In Practically found that = **$8.035/6.265 = 1.28$ (Mean 28% more)**

Conclusion : Solar Tracking System is 28% more efficiency than Fixed-Type Solar System

Training

SUNGROW

Clean power for all

SG250HX String Inverter Service Training

Lecturer: Date: 2023/6/11 Confidential



Training

Features

SG33/40/50CX



SG250HX



- High efficiency, multi-MPPT
- Support bifacial PV module, Max. PV current 13A
- Support 2 string -1 input, saving DC cable costs
- PID recovery at night to increase yields
- Q at Night function
- IP66 protection, C5 anti-corrosion
- String detection and I-V scanning
- Proactive fault diagnosis

Training



Electrical safety (Part-1)

Presentation by

U Shwe

PE0063 (Electrical) (Building Services)

ACPE, National Counterpart

EI Certificate, (Ahtoo Ka/166)

Consultant

Triple Shwe Engineering Co., Ltd.

Contact: Mobile Ph (+95)

095007162, 09799949720

20-10-2020

Electrical Control Systems

Presentation By U Shwe

21- 3-2018





Meeting with Local Fire Fighting Authority



28. Problems and Solving

INVERTER OVERHEATING

**BOX_TRANSFORMER BUSBAR CUBICLE
OVERHEATING**

Problems of Inverter overheating



Possible causes of Inverter overheating

1. Electronic components are come out heat by itself while it is running with full function operation.
2. Temperature sensor that built in electronic circuits compartment has reached to setpoint temperature (about 40 ° C) cooling fan start running to cool down for electronic compartment.
3. But the cooling air can not enough cool down to internal electronic circuit boards with built in aluminium heat -sink. Then air exhaust as a hot air about 70° C. It can become overheat caused by cooling fan clogged with dust.
4. Long time operation, internal electronic circuits are raising more temperature and become overheat an may be burnt the inverter.
5. Inverter have included protection itself by de-rating mode when internal temperature reach 65 ° C

Supplier Instruction

Pay attention to these points in the maintenance of the inverter in summer,
suitable temperature,
humidity,
ventilation,
no dust and no interference,
and clean the inverter inside and outside.

Solving the Problems

Request Supplier' advise.

Cleaning the inverter cooling fan
regular checking and cleaning



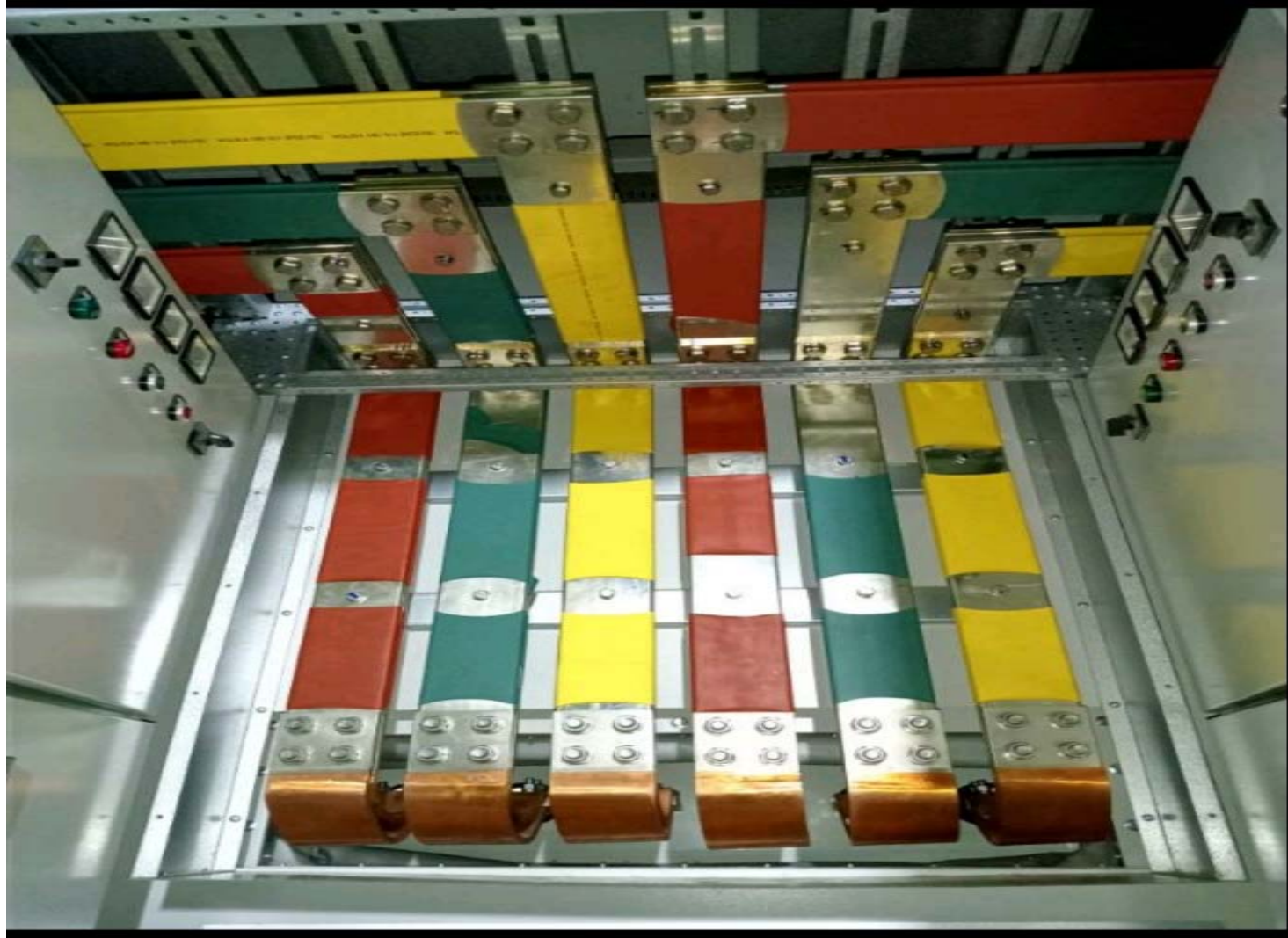
Discuss with designer to place
inverter orientation because
direct sunlight on inverter front
face is more hot.



Construct additional roof on
inverter to protect direct sunlight.



Overheat inside the busbar Chamber



BOX_TRANSFORMER BUSBAR CUBICLE OVERHEATING

Main causes of busbar chamber is loosing bolt and nuts at busbar joints

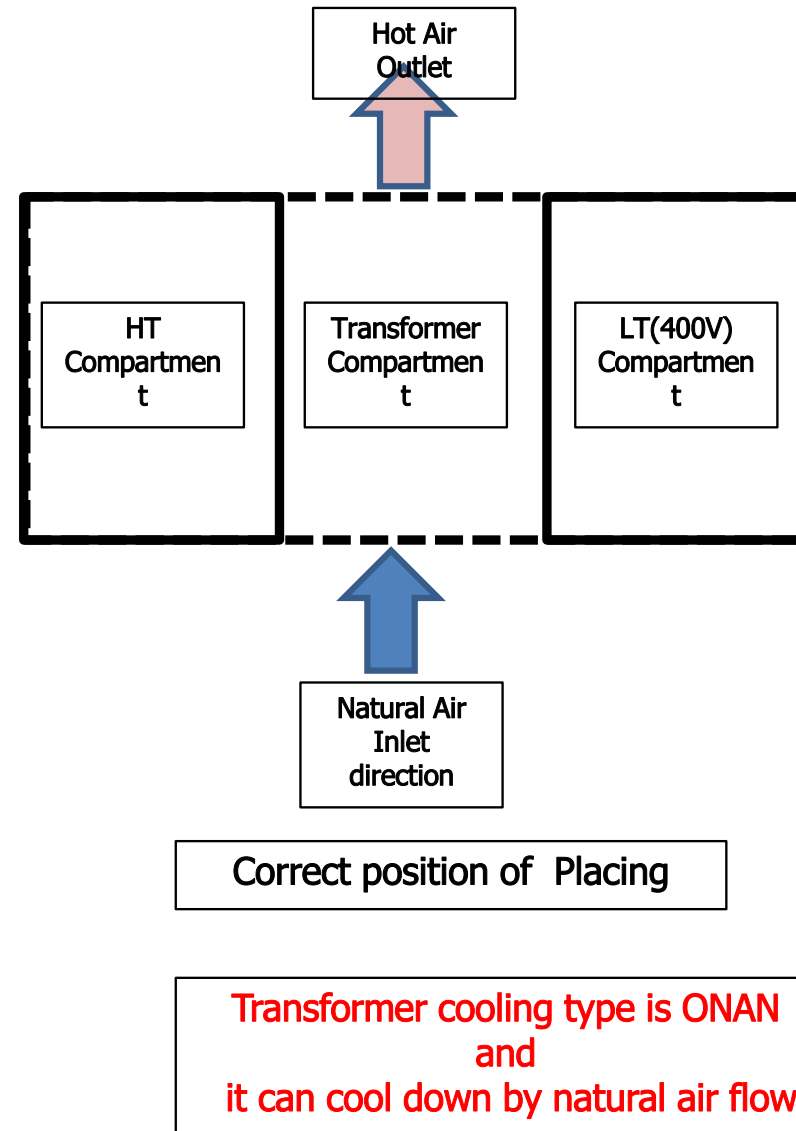
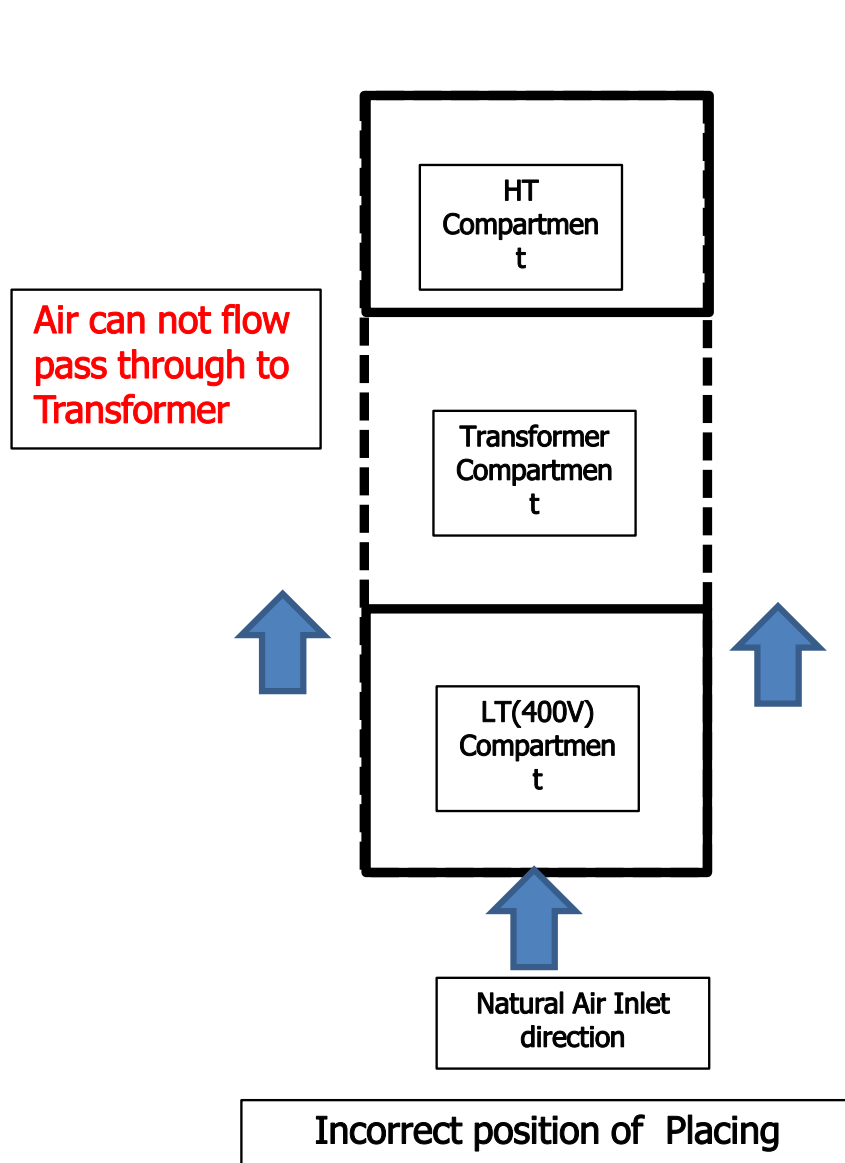
Termination Joints

Not enough cooling fan and exhaust fan.

Orientation of transformer position.

Checking the suitable size of busbar.

Orientation Of Box type Transformer placing .



Solving Problems

Re-tiding of all joint after permission from supplier

Add Cooling and Exhaust fan with adequate size.

For the next project pre checking and tide bolts and nuts before start operation.

29. Regular maintenance

Inverter Checking & Cleaning



Box Transformer Checking



Solar Tracking function checking



Solar Panel Cleaning



PV Modules Cleaning



Mowing Grass Between Solar Rows



What is the different between this 2 photo's appearance.?



**Before Cleaning of
solar panels**



**After Cleaning of
solar panels**



Study of Solar Panel Cleaning work

Green Power Energy Co., Ltd.
Solar Power Plant Project (Taung Taw Gwin)
Version of Inverter Data (PV Module Cleaning)

	Box X mer-1 (kWh)	Box X mer-2 (kWh)	Box X mer-3 (kWh)	Box X mer-4 (kWh)
1	1326.4	1329.5	1313.6	1313.6
2	1335.3	1326.5	1317.7	1317.7
3	1323.9	1327.6	1321.3	1321.3
4	1317.2	1336.7	1302.3	1302.3
5	1317.3	1349.5	1299.9	1299.9
6	1316.1	1320.1	1310.6	1310.6
7	1309.6	1347.9	1327.4	1327.4
8	1313.9	1317.9	1324.7	1324.7
9	1325.4	1452.9	1319.3	1319.3
10	1312.5	1431.7	1328.7	1328.7
11	1326.8	1404.6	1310.5	1310.5
12	1319.2	1320.9	1297.3	1297.3
13	1317.9	1401.6	1411.3	1411.3
14	1322.4	1315.5	1413.1	1413.1
15	1320.6	1303.9	1414.5	1414.5
16	1333.1	1323.3	1426.7	1426.7
17	1404.4	1321.5	1375.5	1375.5
18	1423.3	1407.9	1399.9	1399.9
19	1327.6	1324.3	1354.2	1354.2
20	1419.2	1403.6	1409.4	1409.4
21	1348.9	1337	1409.4	1409.4
22	1432.4	1418.9	1397.5	1397.5
23	1394.2	1234.5	1447.1	1447.1
24	1391	1241.4	1417.6	1417.6
25	1252.6	1423.3	1423.3	1423.3
TOTAL	31832.6	33562.2	30080.4	21438.9
Average PV Module Cleaning Finished Each Inverter	1,340.79	1,342.09	1,424.35	1,339.93
Average PV Module Cleaning Not Finished Each Inverter	1,167.60	-	1,161.10	-

Total Average Cleaning Finished Inverter 1,361.79 kWh



Total Average Cleaning Not Finished Inverter 1,164.35 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished

Sr No	Cleaning Inverter Box Xmer-1 (kWh)	Cleaning Inverter Box Xmer-2 (kWh)	Cleaning Inverter Box Xmer-3 (kWh)	Cleaning Inverter Box Xmer-4 (kWh)
1	1376.5	1376.5	1376.5	1376.5
2	1384.6	1375.5	1375.5	1364.1
3	1374.7	1374.8	1366.6	1366.6
4	1367.8	1384.5	1371.6	1371.6
5	1367.0	1401.5	1343.3	1343.3
6	1367.3	1366.6	1356.5	1356.5
7	1359.9	1396.7	1346.2	1376.9
8	1365.2	1364.6	1372.6	1372.6
9	1374	1507.4	1366.6	1366.6
10	1362.9	1484.6	1375.6	1375.6
11	1376.6	1458.5	1355.1	1355.1
12	1369.9	1370.1	1345.9	1345.9
13	1366.9	1455.4	1453.3	1453.3
14	1371.1	1364.9	1467.1	1467.1
15	1369.4	1354.6	1466.8	1466.8
16	1382.1	1372.7	1480.4	1480.4
17	1466.7	1370.4	1381.5	1381.5
18	1476.7	1462.2	1482.4	1482.4
19	1373.8	1376.4	1351.2	1351.2
20	1471.8	1454.8	1397.5	1397.5
21	1398.7	1388.2	1500.6	1500.6
22	1484.8	1473.6	1343.3	1343.3
23	1351.3	1253.9	1527.6	1527.6
24	1369	1289.4	1483.3	1483.3
25	1301.5	1486.7	1486.7	1486.7
TOTAL	33022.5	34782.5	32208.5	22233.5
Average PV Module Cleaning Finished Each Inverter	1,321.02	1,391.30	1,452.61	1,389.59
Average PV Module Cleaning Not Finished Each Inverter	1,210.05	-	1,224.46	-

Total Average Cleaning Finished Inverter 1,406.13 kWh

Total Average Cleaning Not Finished Inverter 1,217.25 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished

Sr No	Cleaning Inverter Box Xmer-1 (kWh)	Cleaning Inverter Box Xmer-2 (kWh)	Cleaning Inverter Box Xmer-3 (kWh)	Cleaning Inverter Box Xmer-4 (kWh)
1	1584	1584.5	1573.3	1583.8
2	1590	1577.2	1562.7	1563.1
3	1574.7	1575.6	1565.1	1565
4	1567.8	1588.7	1565	1572.1
5	1567.2	1604.7	1562	1538.3
6	1566.1	1567.4	1578.3	1555.4
7	1555.7	1603.4	1577.1	1578.4
8	1565.6	1567.1	1597.9	1574
9	1576	1725.9	1599.9	1568.2
10	1560.1	1702.5	1599.6	1577
11	1579.1	1674.4	1598	1564.7
12	1571.7	1568.3	1511.7	1543.1
13	1569	1669	1585.3	1677.8
14	1577.3	1562.6	1499.4	1682.3
15	1573.2	1554.1	1573.7	1682.1
16	1587.5	1572.6	1571.6	1698.4
17	1674	1575.1	1565.9	1698.4
18	1692	1679.1	1736.3	1698.4
19	1568.9	1570.7	1562.8	1559
20	1686.7	1668.4	1441.2	1612.6
21	1598.8	1592	1716.3	1545.2
22	1703.6	1690.2	1509.5	1635.2
23	1325.4	1432.4	1751.2	1597.9
24	1361.8	1480	1708.7	1609
25	1492.3	1721.9	1721.9	1721.9
TOTAL	37866.5	39874.2	37506.7	25493.7
Average PV Module Cleaning Finished Each Inverter	1,594.99	1,594.97	1,604.43	1,593.36
Average PV Module Cleaning Not Finished Each Inverter	1,388.35	-	1,387.43	-

Total Average Cleaning Finished Inverter 1,596.94 kWh

Total Average Cleaning Not Finished Inverter 1,387.89 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished

TAUNG TAW GWIN

Sr No	Cleaning Inverter Box Xmer-1 (kWh)	Cleaning Inverter Box Xmer-2 (kWh)	Cleaning Inverter Box Xmer-3 (kWh)	Cleaning Inverter Box Xmer-4 (kWh)
1	1475.7	1484	1484	1563.8
2	1481.1	1478.4	1393.3	1563.1
3	1466.5	1477.9	1395.2	1565
4	1469.2	1487.5	1386.2	1572.1
5	1459.2	1495.6	1382	1538.3
6	1457.6	1473.8	1382.7	1555.4
7	1448.7	1494	1478.9	1578.4
8	1454.6	1469.7	1494.1	1574
9	1472.3	1610.9	1499	1568.2
10	1462.3	1583.3	1489	1577
11	1472.8	1565.9	1395.4	1554.7
12	1461.8	1468.1	1496.7	1543.1
13	1463.5	1561	1386.4	1677.8
14	1465.8	1461.2	1507.4	1682.3
15	1467.6	1452.6	1393.7	1682.1
16	1481	1469.5	1386.3	1698.4
17	1560.2	1467.4	1391.8	1698.4
18	1578.2	1569.8	1622.7	1698.4
19	1467.7	1472.3	1494.6	1559
20	1571.5	1562.8	1559	1612.6
21	1494.5	1485.3	1545.2	1635.2
22	1586.9	1575.9	1545.2	1597.9
23	1424.3	1345	1635.2	1609
24	1175.3	1384.7	1597.9	1721.9
25	1492.3	1721.9	1721.9	1721.9
TOTAL	35293.3	37297.4	35737.9	25493.7
Average PV Module Cleaning Finished Each Inverter	1,486.30	1,491.00	1,548.48	1,593.36
Average PV Module Cleaning Not Finished Each Inverter	1,297.30	-	1,300.63	-

Total Average Cleaning Finished Inverter 1,530.01 kWh

Total Average Cleaning Not Finished Inverter 1,298.97 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished



After Cleaning



Before Cleaning

Total Average Cleaning Finished Inverter

Total Average Cleaning Not Finished Inverter

1,361.79 kWh

1,164.35 kWh

197.44 kWh

Total Average Cleaning Finished Inverter

Total Average Cleaning Not Finished Inverter

1,406.13 kWh

1,217.25 kWh

188.88 kWh

Total Average Cleaning Finished Inverter

Total Average Cleaning Not Finished Inverter

1,596.94 kWh

1,387.89 kWh

209.05 kWh

Total Average Cleaning Finished Inverter

Total Average Cleaning Not Finished Inverter

1,530.01 kWh

1,298.97 kWh

231.04 kWh

Green Power Energy Co.,Ltd
20MW Solar Power Plant Project (Taung Taw Gwin)
Comparsion of Inverter (kWh Output)

Sr No	Date	<u>After</u> Cleaning of Solar Panel Average Output/Inverters (kWh)	<u>Before</u> Cleaning of Solar Panel Average Output/Inverters (kWh)	Average More Production of Inverters (kWh)	Clean of Solar Panel for Inverters/Total Inverters	Clean of Solar Panel for Inverters/Total Inverters (%)
1	13.2.2023	1361.79	1164.35	197.44	(67/90)	74.4%
2	14.2.2023	1406.13	1217.25	188.88	(70/90)	77.8%
3	15.2.2023	1596.94	1387.89	209.05	(76/90)	84.4%
4	16.2.2023	1530.31	1298.97	231.34	(76/90)	84.4%

TAUNG TAW GWIN

Green Power
20MW Solar Power Plant Project (Taung Taw Gwin)
Comparison of Inverter Data (PV Module Cleaning)

15.3.2023

Green Power Energy Co.,Ltd
20MW Solar Power Plant Project (Taung Taw Gwin)
Comparison of Inverter Data (PV Module Cleaning)



14.3.2023

Sr No	PV Module Cleaning Inverter Box X'mer-1 (kWh)	PV Module Cleaning Inverter Box X'mer-2 (kWh)	PV Module Cleaning Inverter Box X'mer-3 (kWh)	PV Module Cleaning Inverter Box X'mer-4 (kWh)	Total Inv; 90Nos (kWh)
1	1349	1416.9	1382.3	1395.3	5544
2	1315.6	1412.8	1358.7	1405	5492
3	1302.7	1414.1	1348.1	1403.4	5468
4	1292.9	1429.1	1348.8	1405.5	5476
5	1296.8	1323.9	1353.2	1391.2	5365
6	1292.3	1406.1	1399.7	1394.2	5492
7	1285.5	1323.9	1417.3	1398.5	5425
8	1287	1405.5	1392.1	1397.5	5482
9	1419.5	1430.8	1404.8	1394.4	5650
10	1282.3	1411.2	1369.5	1409.1	5472
11	1415.7	1402.2	1401.3	1387.4	5607
12	1287.1	1413.6	1322.5	1387.4	5411
13	1413.3	1395.4	1398.7	1504.9	5712
14	1286.1	1403.9	1333.3	1500	5523
15	1416.3	1298.2	1330.6	1514.4	5560
16	1423.1	1412.8	1321.9	1523.8	5682
17	1520.3	1407.5	1337.4		4265
18	1520.3	1398.8	1510.9		4430
19	1311.7	1407.3	1340		4059
20	1503.6	1395.7	1460.8		4360
21	1339.5	1413.9	1502		4255
22	1524.9	1388.6	1496.4		4410
23	1524.4	1318.7	1516.2		4359
24	1249.4	1445.2	1492.1		4187
25		1456.7	1500.8		2958
TOTAL	32859.3	34932.8	35039.4	22812.0	125643.5
Average PV Module Cleaning Finished Each Inverter	1,468.14	1,411.96	1,463.39	1,425.75	
Average PV Module Cleaning Not Finished Each Inverter	1,298.42	1,383.79	1,360.37	-	

Total Average Cleaning Finished Inverter 1,442.31 kWh

Total Average Cleaning Not Finished Inverter 1,347.53 kWh

94.78 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished



Remark: Today is Sunny.
(14.3.2023) Max Total Radiation = 724 W/m2

Sr No	PV Module Cleaning Inverter Box X'mer-1 (kWh)	PV Module Cleaning Inverter Box X'mer-2 (kWh)	PV Module Cleaning Inverter Box X'mer-3 (kWh)	PV Module Cleaning Inverter Box X'mer-4 (kWh)	Total Inv; 90Nos (kWh)
1	1424	1490.7	1457.5	1467.2	5839
2	1387.6	1484.5	1426.1	1474.7	5773
3	1374.7	1485.3	1416.3	1471.9	5748
4	1364.4	1502.4	1452.6	1471.8	5791
5	1368.6	1397.6	1479.8	1457.1	5703
6	1364.8	1476.7	1483.4	1458.7	5784
7	1357.5	1396.3	1503.1	1466.6	5724
8	1360.6	1476.7	1478.1	1465	5780
9	1498.8	1509.4	1492.9	1461.8	5963
10	1356.5	1489	1470.2	1476.2	5792
11	1495	1471.8	1489	1455.7	5912
12	1362.9	1490.5	1477.4	1455.8	5787
13	1492	1465.5	1491.8	1579.2	6029
14	1362.3	1481.7	1488.9	1577.1	5910
15	1495	1364.4	1483.1	1587.6	5930
16	1502.3	1492	1473.5	1598.7	6067
17	1605.6	1486.3	1485.9		4578
18	1606.3	1470.4	1602		4679
19	1381.7	1486.7	1422.1		4291
20	1589.3	1468.8	1548.9		4607
21	1414.5	1494.7	1592.6		4502
22	1610.3	1470.2	1585.5		4666
23	1608.4	1409.5	1606.9		4625
24	1315.7	1594.1	1575		4485
25		1605.1	1586.1		3191
TOTAL	34698.8	36960.3	37568.7	23925.1	133152.9
Average PV Module Cleaning Finished Each Inverter	1,550.30	1,503.39	1,520.30	1,495.32	
Average PV Module Cleaning Not Finished Each Inverter	1,371.13	1,446.63	1,457.61	-	

Total Average Cleaning Finished Inverter 1,517.33 kWh

Total Average Cleaning Not Finished Inverter 1,425.12 kWh

92.20 kWh

 PV Module Cleaning Finished
 PV Module Cleaning Not Finished

Remark: Today is Sunny.
(14.3.2023) Max Total Radiation = 723 W/m2

TAUNG TAW GWIN

(kWh)

1424

1387.6

1374.7

1364.4

1368.6

1364.8

1357.5

1360.6

1498.8

1356.5

1495

1362.9

1492

1362.3

1495

1502.3

1605.6

1606.3

1381.7

1589.3

1414.5

1610.3

1608.4

1315.7

1,517.33 kWh

1,425.12 kWh

92.20 kWh

THAPYAYWA

Sr No	Inverter No	Box X'mer-1 kWh	Box X'mer-2 kWh	Box X'mer-3 kWh	Box X'mer-4 kWh	Box X'mer-5 kWh	Total Inv: 126 nos (kWh)	Remark
1	1	1579.8	1517.9	1460.3	1452.3	1425.2		
2	2	1524.4	1506.1	1464.1	1444	1450.1		
3	3	1497.6	1513.2	1467.8	1437.5	1443.3		
4	4	1542.9	1513	1461.6	1451.6	1450.9		
5	5	1531.1	1513.3	1467.4	1449.9	1442.2		
6	6	1531.7	1516.4	1454.9	1437	1461.8		
7	7	1518.9	1504.6	1454.8	1448.9	1454.9		
8	8	1505	1503.5	1443.6	1440.9	1457.4		
9	9	1464.4	1496.1	1433.6	1429.8	1459.7		
10	10	1456.9	1496.3	1528.5	1486.6	1400.9		
11	11	1464.1	1476.1	1528.9	1432.3	1446.7		
12	12	1463.6	1502.3	1473.8	1513.3	1449.7		
13	13	1399.7	1510.8	1454.5	1520.2	1454.2		
14	14	1460.7	1514.6	1454	1525.7	1448		
15	15	1451.8	1519.6	1445.4	1515.5	1441.9		
16	16	1449.3	1492.8	1431.4	1524.4	1446		
17	17	1485.1	1503.9	1434.1	1522.2	1421.3		
18	18	1451.9	1502.3	1462	1469.6	1435.6		
19	19	1450.6	1507	1447.1	1404.5	1430.7		
20	20	1462.7	1505.4	1466.2	1414.8	1418.6		
21	21	1418.8	1507.2	1522.4	1414.6	1417.8		
22	22	1418.2	1388.7	1522.6	1425.1	1431.4		
23	23	1445.6	1402.6	1541.8	1439.9	1438.5		
24	24	1413.4	1404.2	1474	1445	1454.8		
25	25	1443.4	1400.8	1556.3	1449.3	1464.3		
26	26					1433.4		
Total (kWh)		36831.8	37221.7	36861.1	36494.9	37479.3	184888.8	184.89
Average PV Module Cleaning Finished Each Inverter		1,528.95	1,505.97	-	1,507.66	-		
Average PV Module Cleaning Not Finished Each Inverter		1,447.07	1,399.08	1,474.44	1,441.18	1,441.51		
Total Average Cleaning Finished Inverter		1,514.19						kWh
Total Average Cleaning Not Finished Inverter		1,440.66						kWh

Sr No	Inverter No	Box X'mer-1 kWh	Box X'mer-2 kWh	Box X'mer-3 kWh	Box X'mer-4 kWh	Box X'mer-5 kWh	Total Inv: 126 nos (kWh)	Remark
1	1	1549.7	1501.8	1545.6	1545.2	1433.3		
2	2	1492.8	1493.9	1548.9	1522.3	1422.3		
3	3	1467.5	1494.9	1555.8	1527.5	1417.8		
4	4	1510.4	1495.1	1548.9	1548.7	1422.8		
5	5	1498.4	1494.4	1557.6	1544.4	1410.2		
6	6	1488.3	1411.1	1546	1499.2	1425		
7	7	1485.3	1405.6	1551.4	1531.5	1413		
8	8	1466.3	1487	1545.6	1523.2	1407		
9	9	1523.4	1476.9	1540.2	1525	1404.5		
10	10	1520.8	1480.9	1616.9	1503.4	1466.4		
11	11	1511.5	1472.4	1614.1	1523.6	1524.6		
12	12	1437.4	1480.2	1549.9	1481.4	1530.7		
13	13	1376.4	1486.6	1545.5	1497.2	1531.6		
14	14	1439.2	1401.4	1539.5	1503.9	1523.8		
15	15	1429.2	1406.8	1538.7	1490.7	1520.1		
16	16	1425	1413.1	1529.9	1499.4	1511.8		
17	17	1551.8	1483.7	1535.2	1486.4	1488.6		
18	18	1517.4	1400.2	1550.9	1489.8	1499.9		
19	19	1522	1398.9	1542.7	1484.6	1419.7		
20	20	1525.5	1483.2	1561.4	1497.4	1387.3		
21	21	1492.9	1396.8	1612.1	1491.7	1377.5		
22	22	1494.4	1495.4	1610.8	1506.2	1370.9		
23	23	1514.4	1401.6	1629.9	1512.1	1409.3		
24	24	1414.9	1404.4	1568	1514	1422		
25	25	1412.9	1484.1	1639.8	1512.8	1420.7		
26	26					1378.6		
Total (kWh)		37077.8	36350.4	39121.5	37771.6	37538.4	187860.7	187.86
Average PV Module Cleaning Finished Each Inverter		1,507.93	1,454.02	1,564.06	1,510.86	1,464.08		
Average PV Module Cleaning Not Finished Each Inverter		1,419.29	-	-	-	1,398.25		
Total Average Cleaning Finished Inverter		1,500.35						kWh
Total Average Cleaning Not Finished Inverter		1,408.77						kWh
		91.58						kWh

Remark : After Solar Cleaning

Sr No	Inverter No	Box X'mer-1 kWh	Box X'mer-2 kWh	Box X'mer-3 kWh	Box X'mer-4 kWh	Box X'mer-5 kWh	Total Inv: 126 nos (kWh)	Remark
1	1	1714.7	1655.6	1710.9	1721.4	1604.5		
2	2	1676.6	1645.7	1710.1	1702.3	1593.2		
3	3	1700.8	1648	1725.5	1703.3	1588.7		
4	4	1701.1	1648.8	1715.9	1718.4	1594.1		
5	5	1692.2	1649.1	1728.9	1717	1580.3		
6	6	1691.4	1651.9	1716.4	1688.9	1597.6		
7	7	1684.6	1644	1721.4	1703.6	1583.9		
8	8	1684.3	1645.2	1715	1702.3	1577		
9	9	1685.4	1639.9	1713.6	1706.3	1574.1		
10	10	1681.8	1650.5	1735	1674.7	1643.9		
11	11	1682.2	1639.6	1730	1704.4	1707.9		
12	12	1686.3	1647.5	1725.2	1654.4	1714.4		
13	13	1620.7	1652.4	1727	1665.9	1715.5		
14	14	1694.2	1655.9	1722.4	1674.4	1696.4		
15	15	1678.6	1660.3	1715.5	1662.9	1702.1		
16	16	1675.3	1670	1710.7	1673.7	1690.6		
17	17	1716.7	1638	1718.9	1672.7	1661.8		
18	18	1682.8	1638.2	1717.4	1657.9	1677.2		
19	19	1682.7	1638.9	1706.1	1653.6	1594.4		
20	20	1689.6	1636.8	1734.6	1669.8	1558.5		
21	21	1654.1	1641.1	1780.9	1664.8	1548.4		
22	22	1656.8	1662.4	1788.5	1682.6	1540.8		
23	23	1679.9	1657.2	1802.6	1691.1	1588.3		
24	24	1636.2	1659.3	1744.3	1694.2	1602.9		
25	25	1676.9	1654	1818.8	1693.6	1598.2		
26	26					1553.9		
Total (kWh)		42025.9	41231.3	43455.6	42154.2	42088.6	210955.6	210.96
Average PV Module Cleaning Finished Each Inverter		1,681.04	1,649.25	1,738.22	1,686.17	1,639.07		
Average PV Module Cleaning Not Finished Each Inverter		-	-	-	-	1,573.18		
Total Average Cleaning Finished Inverter		1,678.75						kWh
Total Average Cleaning Not Finished Inverter		1,573.18						kWh
		105.57						kWh

Total Average Cleaning Finished Inverter

1,514.19 kWh

Total Average Cleaning Not Finished Inverter

1,440.66 kWh

73.54 kWh

Total Average Cleaning Finished Inverter

1,500.35 kWh

Total Average Cleaning Not Finished Inverter

1,408.77 kWh

91.58 kWh

Total Average Cleaning Finished Inverter

1,678.75 kWh

Total Average Cleaning Not Finished Inverter

1,573.18 kWh

105.57 kWh





Notices while Cleaning

Mowing Grass Between Solar Rows

Solar Panel may crack due to mowing machine.

**Solar panel cleaning with water at the day time
(Generation Time)**

**Inverter may automatically shutdown by changes
resistance of solar panel if water leakage into
panel.**

Bird's-eye view of current project site

Box Transformer No.4

Box Transformer No.3

Box Transformer No.5



Box Transformer No.2



Box Transformer No.1



Power Station



33-KV Transmission Line



The background of the entire slide features a stylized illustration of blue solar panels with white grid lines, angled upwards. In the lower right corner, there are green bushes and a small tree. The text boxes are overlaid on this background.

Advantages of Solar Power

Solar energy is a clean and renewable energy source.

Once a solar panel is installed, solar energy can be produced free of charge.

Solar energy will last forever whereas it is estimated that the world's oil reserves will last for 30 to 40 years.

Solar Power Plants don't produce any air, water, or noise pollution and doesn't emit any greenhouse gases.

Solar cells make absolutely no noise at all. On the other hand, the giant machines utilized for pumping oil are extremely noisy and therefore very impractical.

Very little maintenance is needed to keep solar cells running. There are no moving parts in a solar cell which makes it impossible to really damage them.

In the long term, there can be a high return on investment due to the amount of free energy a solar panel can produce, it is estimated that the average household will see 50% of their energy coming in from solar panels.

1. Location of this area is good irradiation from Sunlight in Myanmar.
2. We can use land from waste un-agriculture to become valuable.
3. This power plant is one of the Green & Clean Power Plant
4. Support to the development of that region and job opportunity for the people of that township.
5. Zero Carbon emission.



Goal

To develop renewable energy Knowhow to support Nation a better choice for the social environment and immediate benefit for the regions in Myanmar



BEFORE



THAPYAYWA

AFTER



BEFORE

TAUNG TAW GWIN



AFTER









Other Solar Installation

ROOF TOP SOLAR SYSTEM

Donation of 110 kW RoofTop Solar system to Waibargi Infectious Hospital



ROOF TOP SOLAR SYSTEM

Office building 200 kW Roof-Top Solar System



ROOF TOP SOLAR SYSTEM

Car Parking 200 kW Roof-Top Solar System



ROOF TOP SOLAR SYSTEM

Electrical Plant & Pump House 400 kW Roof-Top Solar System



What is the specification of Solar Inverters of Roof-Top Solar System

Three Phase, 400 V, 50 Hz

Grid Tie Solar System

Q & A

Thank You For Your Times And Attention



**Let's go together
to
Renewable Energy World**