



POWER SCADA

**Establishment of SCADA based smart panel
for control & monitoring of power supply
at Bharat Nirman Rajeev Gandhi Seva Kendra
at Gram Panchayat level in Rajasthan**

Date : 08 March 2019

BRIEF OVERVIEW / BACKGROUND OF PROJECT

- ✓ DoIT&C providing e-governance services namely e-Mitra/ e-Mitra plus/ RajNET/ Wi-Fi etc to citizens at Rajiv Gandhi Seva Kendra up to Gram Panchayats level. For success of any e-governance project, continuous power supply is required.
- ✓ The IT equipment's were provided with two type of power supply - Solar Power (Installed by Panchayati Raj Dept. through REIL in 2011) & electricity connection from DISCOM at Rajiv Gandhi Seva Kendra at Panchayat level but there was no mechanism to utilize and monitor these power sources in integrated manner to ensure uninterrupted power supply at these locations.
- ✓ In view of above, it was decided to implement an SCADA system at each GP location so that power supply status at each location can be centrally monitored and controlled either on Solar or Discom power.

BRIEF OVERVIEW/ BACKGROUND

- ✓ A preliminary project was prepared & get approved in 60th meeting of SeMT on dated 22.12.15 for Rs. 101.85 Cr.
- ✓ The financial sanction of project is accorded for Rs. 101.85 Cr. on dated 09-06-2016.
- ✓ Work order Issued to M/s L&T of Rs. 73.10 Cr. (including approx. 20 Cr. for O&M phase – approx. 1 Cr. per quarter for 20 quarters of O&M phase of 5 Years) on dated 14.09.2017.
- ✓ Project Locations – All Rajeev Gandhi Seva Kendra at GP level in Rajasthan (Total - 9892)
- ✓ Scope of Work - Supply, Installation, Testing and Commissioning of SCADA based smart panels at each location + SCADA Servers at central level + 5 years O&M.

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PROJECT PROFILE

Owner

Department of Information Technology and
Communications, Govt. of Rajasthan

Locations

All Bharat Nirman Rajeev Gandhi Seva Kendra
at Gram Panchayat of Rajasthan

Scope of Work

Supply, Installation, Testing and Commissioning
of SCADA based smart panels at each
location + SCADA Servers at central level +
5 years O&M.

SCOPE OF WORK

Field Level:

- ✓ Supply, Installation, Testing & Commissioning of SCADA based Smart Panels at 10,000 locations across 33 districts of Rajasthan

Central Level:

- ✓ SCADA Solution for collecting data from smart panels and monitoring the same.
- ✓ Development and deployment of a Web Based Portal for monitoring the progress of implementation of the project

O&M:

- ✓ O & M for 5 years

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PROJECT OBJECTIVES

- ✓ Project was designed to monitor the status of Discom/ Solar power supply, measuring the energy consumption & Control to utilize Solar power over Electricity board Supply at GP offices.
- ✓ Solar energy was prioritised over DISCOM power so that if solar power is not available then only Discom (Paid energy) will be used.
- ✓ Intelligent selection between solar and Discom Power supplies.
- ✓ Uninterrupted power supply for Emitra, Emitra+ and Rajnet at GP office.
- ✓ Measuring Energy consumption at SCADA application.
- ✓ Solar power usage can be monitored from SCADA application.



BHARAT NIRMAN RAJEEV GANDHI SEVA KENDRA BUILDING

Initiative of Government of Rajasthan

*Delivering Services
At Citizen
Door Steps*



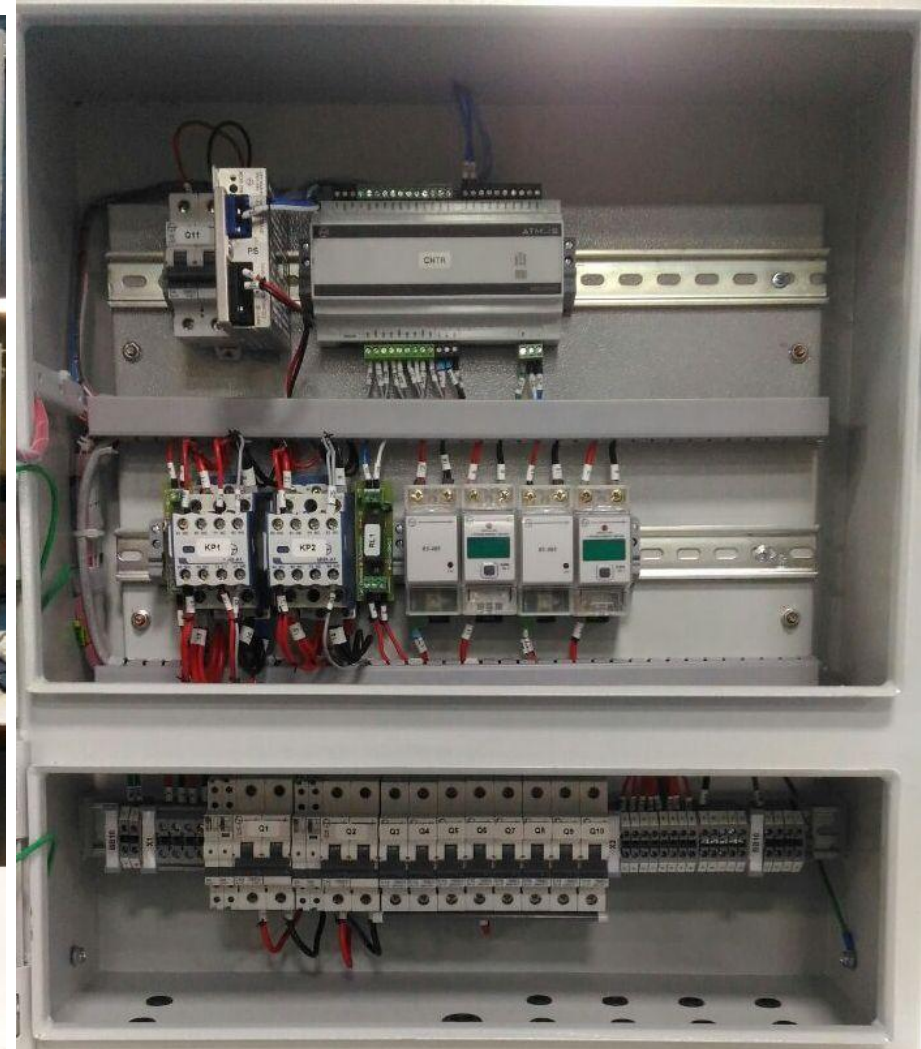
Smart Panel Working Structure



SITE PHOTOS



Smart Panel Overview - I



Smart Panel Overview - II

Smart panel divided into two sections.

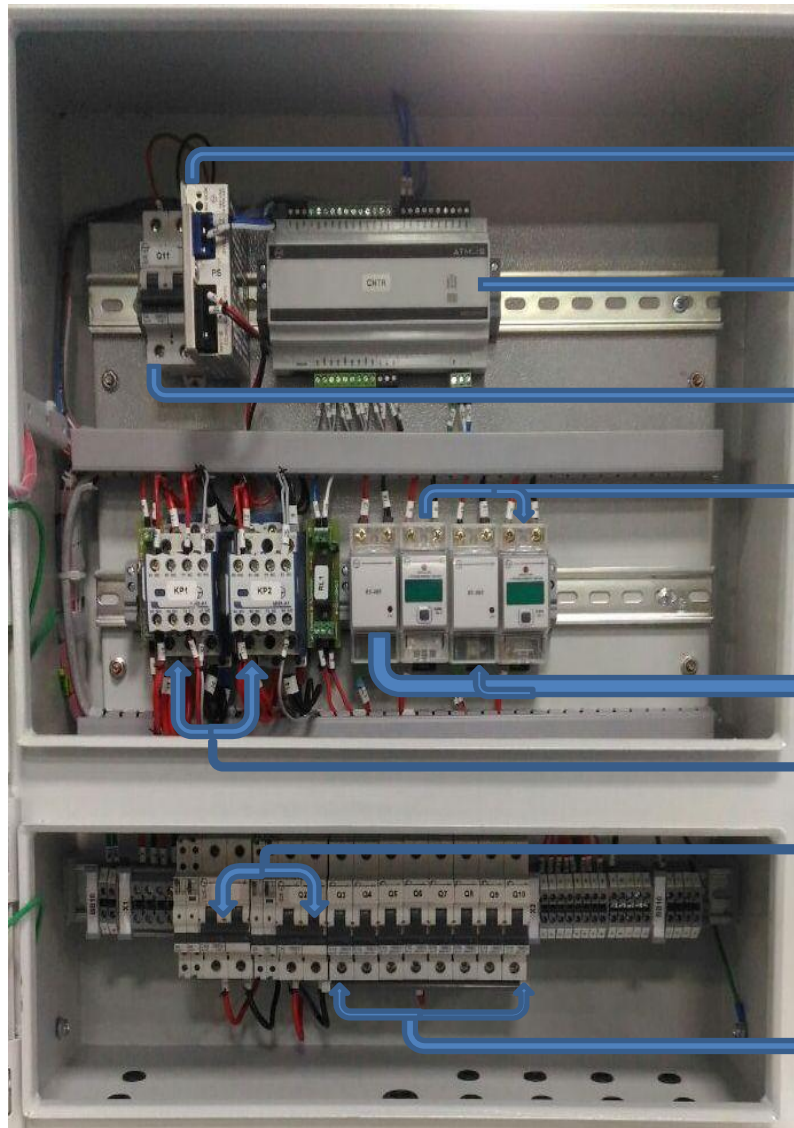
Section 1 – Containing Smart IO Module, Interposing relays, Contactor, Energy meters

Section 2 – Containing outgoing MCBs, Incomer MCBs.

There are separate outer door for section 1 & another separate door for section 2.

- Two indicating lamps are available on the smart panel for indication of the status of solar and electricity board supply.
- Power supply to smart IO module supplied via 1 kVA separate UPS on site (Provided by RajNET) to avoid any power failure.
- Control supply to be used for the smart IO module is 24V DC.
- Smart IO module connected to SCADA server through RAJNET network.

Smart Panel Overview - III



24DC, 1.2A, Power supply for controller.

Controller for communication with SCADA.

Q-11 (Double pole MCB For controller supply).

kWH Single phase energy meter.

RS-485 Module for communication with SCADA.

40A, 4P contactor with 2NO+2NC power contacts.

Q1-Q2 (Double pole, 40 A) For input supply from discom and solar.

Q3-Q10 (Single pole, 10 A) For giving output to E-mitraa room, 16A socket etc.



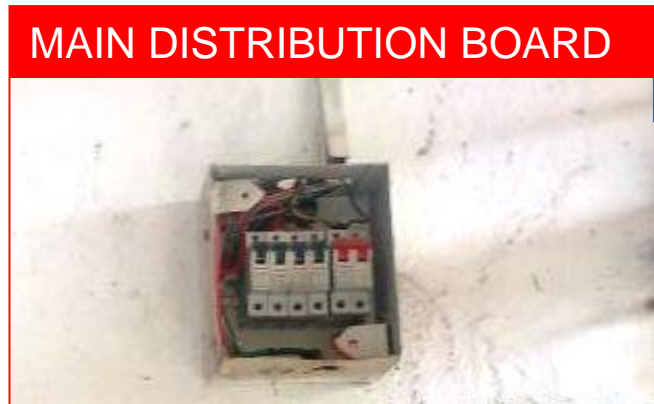
INPUT CONNECTIONS TO SMART PANEL



Power connection



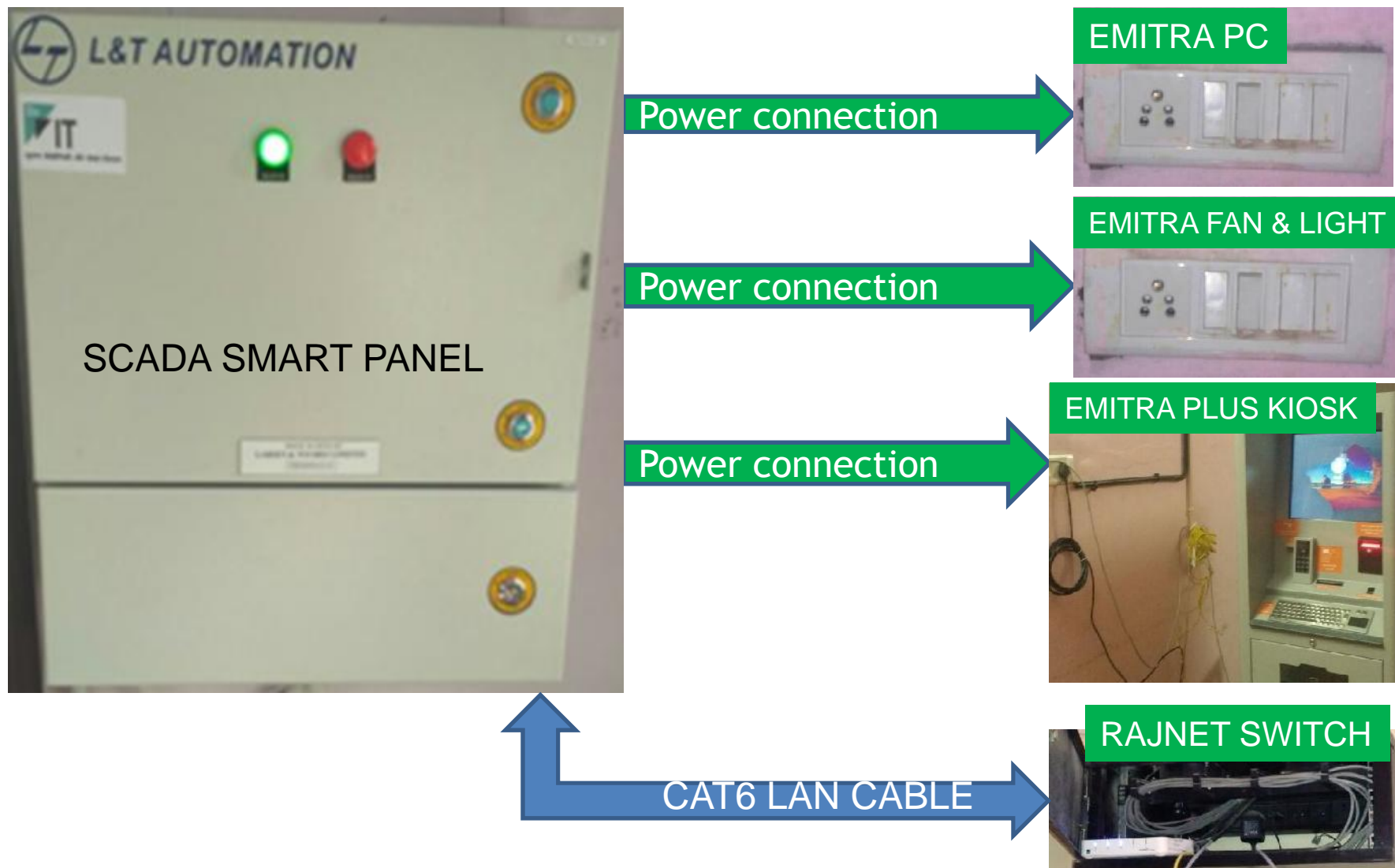
Power connection



Power connection

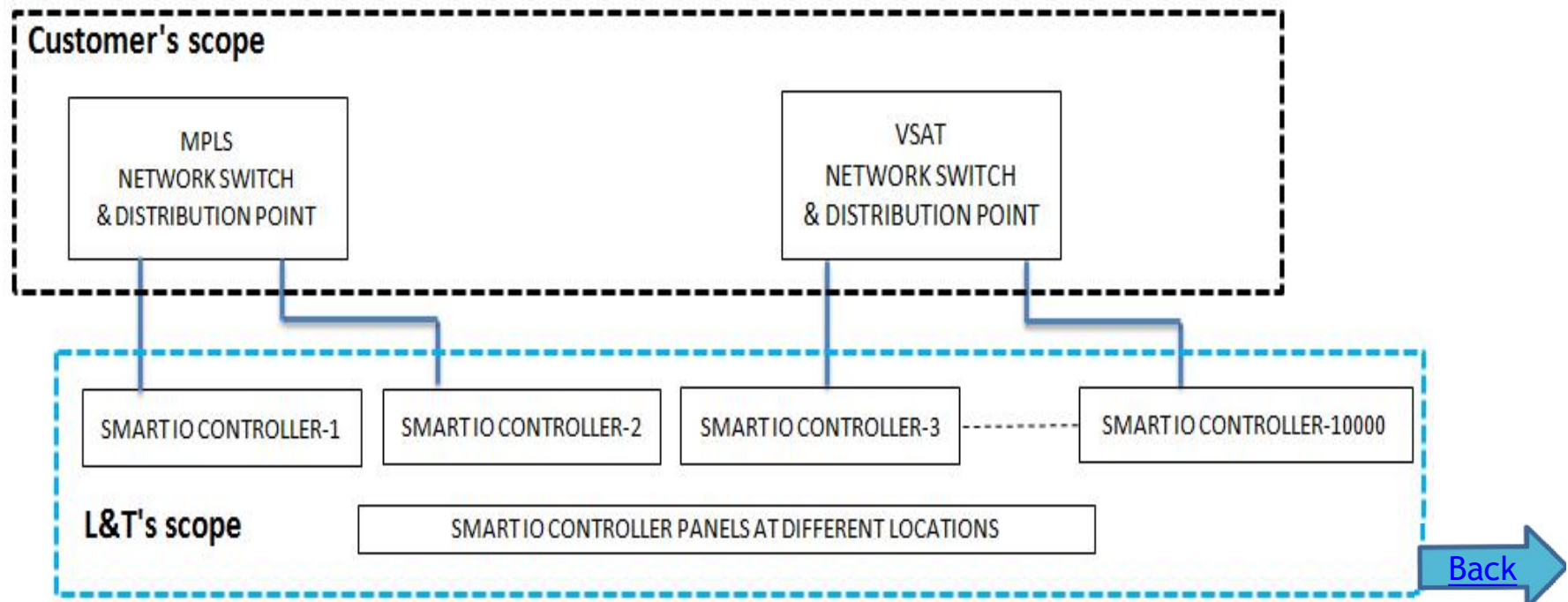


OUTPUT CONNECTIONS FROM SMART PANEL



Methodology

- ✓ The Smart IO controller panel will be installed at Rajeev Gandhi Seva Kendra. Wiring of the panel will ensure that by default, the loads will be driven by solar supply and if solar supply is not available, automatic switchover from Solar to state electricity supply will be done.
- ✓ Individual Smart IO controllers will be communicating with SCADA system over [Modbus TCP/IP protocol](#) (through VSAT/MPLS network). At State Data Centre, SCADA servers will be connected to the network through RajNet switches.




CONTROLLER WEB PAGE

- Smart IO controller having inbuilt web pages for monitoring, control, metering, configuration, diagnostics and alarm notifications.
- The inbuilt web pages are viewable on windows based browsers (internet explorer/Google chrome etc.) .
- Inbuilt web pages showing the following information -
 - Status of changeover, kWh metering, No. Of ON/OFF and Trip operations MCB, No. of operations of changeover, Operating hours of solar and electricity board supply, communicate data to centralized SCADA directly from the smart IO module via register addressing.

CONTROLLER WEB PAGE


Mail - ashishkg.doit@rajasthan.g... | Inbox (5,123) - ashish.kag@gmail... | iVisionmax Ultralight Web Client... | ELESTA RCOWeb Application... | +

← → ↻ ⚠ Not secure | 172.28.69.214/RCOWEB.HTM#0



L&T Electrical & Automation
Control & Automation

ATAL Seva Kendra, Rajasthan



Department of Information Technology and Communication

General Information

Controller Info

Date	27.11.18
Time	10:38:34
Gram Panchayat	RAJOLI
IP Address	172.28.69.214
Subnet Mask	255.255.255.240
Gateway	172.28.69.209
Controller ID	3994

Solar UPS Info

Battery Charge Status	0.0%
Communication Status	UPS COMM FAIL ●


Change over Command Solar to DISCOM


OFF

ACTIVE ALARMS ▶


ALARM HISTORY ▶

Solar Data		DISCOM Data	
Parameter	Status	Parameter	Status
Solar MCB Status (Q1 AUX)	ON ●	DISCOM MCB Status (Q2 AUX)	ON ●
Solar MCB TRIP Status (Q1 AUX)	HEALTHY ●	DISCOM MCB TRIP Status (Q2 AUX)	HEALTHY ●
Solar MCB OFF Count	3	DISCOM MCB OFF Count	2
Solar MCB Trip Count	0	DISCOM MCB Trip Count	0
Change over Contactor			
Solar Contactor Status (KP1)	OFF ●	DISCOM Contactor Status (KP2)	ON ●
Solar Cumulative Run Hours	0.0Hrs.	DISCOM Cumulative Run Hours	1488.9Hrs.
No. of Changeover Operations From Solar to DISCOM		0	
Solar Meter		DISCOM Meter	
Solar Total Active Power	0.00kW	DISCOM Total Active Power	0.01kW
Solar Cumulative Active Energy	0.0kWh	DISCOM Cumulative Active Energy	38.5kWh
Diagnostics			
Solar Meter Communication Status	Meter COMM FAIL ●	DISCOM Meter Communication Status	Meter COMM OK ●
Solar Meter Serial Number	0	DISCOM Meter Serial Number	712884






SCADA Application



SCADA FOR SMART IO CONTROLLER


User:ashish

Pratapgarh | **Chhotisadri** | Jaloda Jageer

Communication OK

Solar Power Supply

Cumulative Energy

830.000

kWh

Avg energy: 2.704 kWh


Total active power: 0.381 kW

- SPV contactor ON
- SPV incomer MCB ON
- SPV MCB Healthy

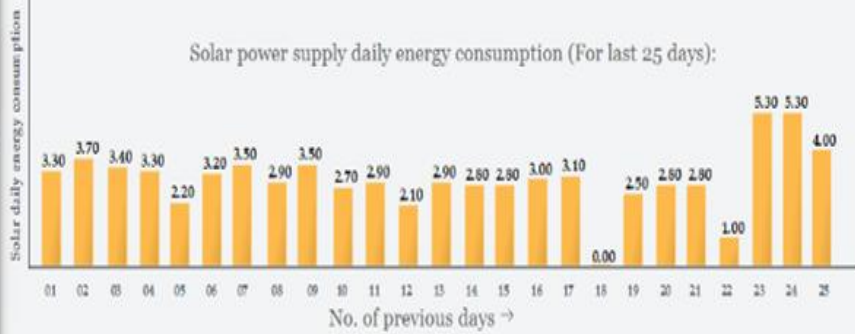
SPV - Solar

Changeover

SPV-DISCOM



Solar power supply daily energy consumption (For last 25 days):




Day	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Consumption (kWh)	3.30	3.70	3.40	3.30	2.20	3.20	3.50	2.90	3.50	2.70	2.90	2.10	2.90	2.80	2.90	3.00	3.10	0.00	2.50	2.80	2.90	1.00	5.30	5.30	4.00

Avg. SPV Run Hours: 11.18 Hrs

Avg. DISCOM Run Hours: 10.01 Hrs

One day cycle



First Connected on 04.05.2018 2:15:49 PM
Last Connected on 07.03.2019 12:11:32 PM

DISCOM Supply

Cumulative Energy

499.100

kWh


Avg energy: 1.626 kWh

Total active power: 0.000 kW

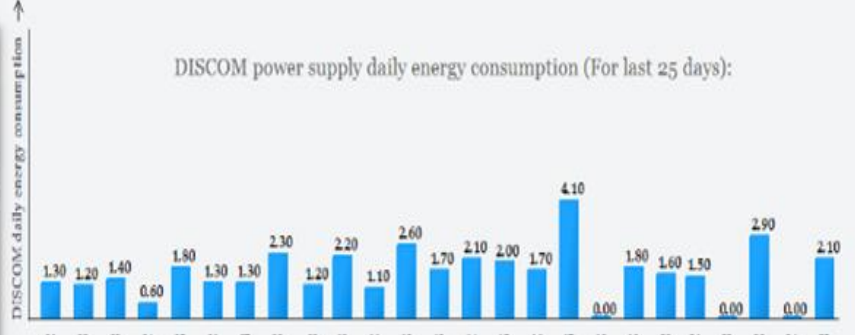
- DISCOM contactor OFF
- DISCOM incomer MCB ON
- DISCOM MCB Healthy

Changeover

DISCOM-SPV



DISCOM power supply daily energy consumption (For last 25 days):



Day	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Consumption (kWh)	1.30	1.20	1.40	0.60	1.80	1.30	1.30	2.30	1.20	2.20	1.10	2.60	1.70	2.10	2.00	1.70	4.10	0.00	1.80	1.60	1.50	0.00	2.90	0.00	2.10

Single Line Diagram

I/P FROM SPV
I/P FROM DISCOM



0.381 kW

0.000 kW

Troubleshooting Page

MCB OFF count

SPV	8
DISCOM	7

MCB Trip count

SPV	1
DISCOM	1

Changeover count

SPV	210
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Run hours

SPV	3430
DISCOM	3071

Battery charge

0 %

Carbon Footprint

CO₂ Reduction

0.4913600

metric ton

No. of trees saved

49.1360000

Zone

-Ajmer
-Bharatpur
-Bikaner
-Jaipur
-Jodhpur
-Kota
-Udaipur

DISTRICT OVERVIEW PAGE

IVisionmax_1: basepanel

DoIT
Department of Information Technology & Communication

SCADA FOR SMART IO CONTROLLER

User:ashish

Zone

- Ajmer
- Bharatpur
- Bikaner
- Jaipur
- Jodhpur
- Kota
- Udaipur

Ganganagar

District	Panchayat Samiti	No. of GPs	Atleast once connected GPs	Avg connected days per GP	Solar						Discom					
					Run Hours			Consumption (kWh)			Run Hours			Consumption (kWh)		
					Cumulative	Cumulative/GP	Avg RunHr per Day / GP	Cumulative	Cumulative/GP	Avg kWh per Day / GP	Cumulative	Cumulative/GP	Avg RunHr per Day / GP	Cumulative	Cumulative/GP	Avg kWh per Day / GP
Ganganagar	Anupgarh	28	28	273	14601.73	521.49	1.91	940.20	33.58	0.12	62912.22	2246.87	8.23	8246.10	294.50	1.08
Ganganagar	Ganganagar	45	45	262	33835.09	751.89	2.87	1722.40	38.28	0.15	103838.70	2307.53	8.81	9726.30	216.14	0.82
Ganganagar	Gharsana	32	32	262	9269.42	289.67	1.11	1934.00	60.44	0.23	70163.88	2192.62	8.37	9212.90	287.90	1.10
Ganganagar	Karanpur	35	35	270	41194.58	1176.99	4.36	3472.00	99.20	0.37	101243.73	2892.68	10.71	8078.90	230.83	0.85
Ganganagar	Padampur	36	35	237	11056.78	315.91	1.33	1222.90	34.94	0.15	83518.06	2386.23	10.07	9436.50	269.61	1.14
Ganganagar	Raisinghnagar	47	47	257	40828.02	868.68	3.38	4752.20	101.11	0.39	114440.65	2434.91	9.47	15036.00	319.91	1.24
Ganganagar	Sadulshahar	31	31	266	20706.52	667.95	2.51	1809.30	58.36	0.22	99964.98	3224.68	12.12	10239.00	330.29	1.24
Ganganagar	Sri_Vijaynagar	28	27	239	9421.93	348.96	1.46	570.00	21.11	0.09	34707.36	1285.46	5.38	4552.50	168.61	0.71
Ganganagar	Suratgarh	38	38	237	15504.88	408.02	1.72	2029.50	53.41	0.23	89061.98	2343.74	9.89	11594.30	305.11	1.29
Ganganagar	9	320	318	256	196418.96	617.67	2.41	18452.50	58.03	0.23	759851.56	2389.47	9.33	86122.50	270.83	1.06

Project Monitoring Software

A web based Project Monitoring Software (PMS) (<http://atalsmartpanel.rajasthan.gov.in/>) is developed under "Power SCADA" project for effective monitoring of the project implementation & grievance redressal during O&M phase of project.

