

**Annexures
Annexures 1**

State RPO's (Solar)

S.No	RPO (Solar) %	Year	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
	States													
1	Andhra Pradesh	0.25	0.25	0.25	0.25	0.25								
2	Assam	0.05	0.1	0.15	0.2	0.25								
3	Bihar	0.25	0.5	0.75	1	1.25								
4	Chhattisgarh	0.25	0.25											
5	Gujarat	0.25	0.5	0.1										
6	Haryana	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5	2.75	3	
7	Himachal Pradesh	0.1	0.1	0.1										
8	Jharkhand	0.25	0.5	1										
9	Karnataka	0.25												
10	Kerala	0.25												
11	Madhya Pradesh	0.4	0.6	0.8	1									

12	Maharashtra	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.5	0.5								
13	Meghalaya	0.2	0.3	0.4															
14	Nagaland	0.25	0.25	0.25															
15	Orissa	0.5	0.75	1	1.25														
16	Rajasthan	0.5	0.75	1															
17	Tamil Nadu	0.15	0.25	0.25															
18	Uttrakhand	0.03	0.05																
19	Uttar Pradesh	0.25	0.5	1															
20	West Bengal	-	-	0.25	0.30	0.40	0.50	0.60											
21	Goa and UT	0.25	0.3	0.4															
22	Manipur	0.25	0.25	0.25															
23	Mizoram	0.25	0.25	0.25															

Annexure 2

Total Installed Capacity Through Grid Connected Solar PV

S. No.	Date of Update:	9th March 2013		
	States	Installed Capacity (MW)	Projects	Capacity (MW)
1	Andhra Pradesh	92.9	Projects Under JNNSM	686.85
2	Arunachal Pradesh	0	Projects under the State Policy	1170.4
3	Chhattisgarh	5.1	Projects Under RPSSGP/GBI Scheme	91.8
4	Delhi	3.0138	Projects Under REC Scheme	296
5	Goa & UT	0	Other projects	78.91
6	Gujarat	860.4		
7	Haryana	7.8		
8	Jharkhand	16		
9	Karnataka	31		
10	Kerela	0.025		
11	Madhya Pradesh	195.315		
12	Maharashtra	237.25		
13	Odisha	15.5		
14	Punjab	9.3		
15	Rajasthan	666.75		
16	Tamil Nadu	31.8217		
17	Uttarakhand	5.05		
18	Uttar Pradesh	17.375		
19	West Bengal	7.05		

Note : The data is compiled on the basis of information obtained from IREDA, NVVN, State Agencies and Project Developers

Annexure 3
Questionnaire

Annexure 4

Rotated Component Matrix^a

	Component								
	1	2	3	4	5	6	7	8	9
V1	.000	.047	-.025	.008	-.040	.055	.039	.106	.821
V2	.028	-.006	.068	.055	.142	.039	-.007	.050	.801
V4	-.047	.131	.316	.171	.467	-.343	-.182	.128	.199
V6	.270	.069	.595	.266	-.108	-.234	.178	.068	.049
V7	.206	.017	.655	.022	.133	-.162	-.211	.259	.060
V8	-.009	.066	.642	.216	.183	.043	.060	.068	.023
V9	.122	-.073	.687	-.036	.014	.321	.029	.114	-.059
V11	-.061	.106	.129	.145	.036	-.027	.103	.675	.144
V12	.076	.044	.269	.275	-.147	.233	-.088	.557	-.034
V13	.223	.109	.068	-.119	.106	-.001	.080	.676	.069
V14	.694	.159	.000	.028	.051	.054	.187	.199	.039
V15	.739	.078	.164	.156	.078	.089	.207	.036	.018
V16	.727	.105	.215	.095	.105	.041	-.041	-.126	-.103
V17	.600	.083	.033	.150	.268	.100	.039	.166	.087
V18	.192	.099	.043	.192	.071	-.043	.813	.070	.012
V19	.137	.100	-.005	.243	.128	.012	.828	.079	.023
V21	.170	.110	.058	.793	.107	.045	.235	.049	.055
V22	.011	.128	.195	.689	.239	.144	.158	.045	.012
V23	.276	.175	.120	.646	.078	.157	.114	.103	.026
V25	.046	.055	-.021	.257	.324	.525	-.069	.180	.196
V26	.124	.124	-.041	.205	.133	.689	-.106	.044	.003
V27	.299	.068	.066	.304	.609	.248	.141	-.093	.077
V28	.237	-.003	.128	.153	.678	.161	.074	-.057	.065
V29	.109	.277	.032	.001	.595	.199	.227	.311	-.087
V30	.089	.337	.402	-.010	.326	.489	.205	-.102	.076
V31	.075	.505	.365	-.105	.236	.484	.232	-.007	.062
V32	.248	.524	.113	.143	-.086	.415	.197	.010	.095
V33	.138	.849	-.054	.191	.108	.053	.012	.119	.078
V34	.135	.837	.031	.149	.092	.046	.073	.167	-.070

Extraction Method: Principal Component Analysis.
 Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 12 iterations.

Annexure 5

Case Study Protocol

Summary of Case Study Protocol Following Yin (2003)

A. Introduction to the Case Study and purpose of Protocol

A1: Case Study Questions, Hypotheses and Propositions

Research Question:

To find out how the State(s) of Gujarat and Rajasthan have responded to the role of identified barriers and challenges on the growth of grid connected Solar PV installation in their respective region.

A2: Role of protocol in guiding the case study investigator

Agenda for the line of inquiry and basis for data collection

B. Data collection procedures

B1: Names of sites to be visited, including number of person contacted

Gujarat		Rajasthan	
Term Used	Interviewee	Term Used	Interviewee
G1	1 st respondent from Gujarat	R1	1 st respondent from Rajasthan
G2	2 nd respondent from Gujarat	R2	2 nd respondent from Rajasthan
G3	3 rd respondent from Gujarat	R3	3 rd respondent from Rajasthan
G4	4 th respondent from Gujarat	R4	4 th respondent from Rajasthan
G5	5 th respondent from Gujarat	R5	5 th respondent from Rajasthan
G6	6 th respondent from Gujarat	R6	6 th respondent from Rajasthan
G7	7 th respondent from Gujarat	R7	7 th respondent from Rajasthan

B2: Data collection plan

Interviews

S.no	Steps in collection	Gujarat	Rajasthan
1	Initial contact and arrangement	February 2013	February 2013
2	Visits	March – April 2013	May – June 2013
3	Review of case report for internal validity	March – April 2013	May – June 2013
4	Additional data collection	July 2013	July 2013
5	Total number of interviews	7	7

Documents

To gather necessary information, researcher extensively reviewed all documents with regards to the solar PV energy. Documents reviewed were solar PV projects implementation reports, national and federal solar missions, sector development reports, national and federal regulation and power sector regulations, gazette orders by the regulators of state and central government, policy documents, reports by various organizations.

Observation

1. Visit to plant site in Phalodi district in Rajasthan where a 17 MW grid connected solar PV power plant is installed.
2. Visit to Gujarat Solar Park in Charanka district in Gujarat, which is Asia 1st Solar Park, having a installed capacity of 224 MW all through grid connected solar PV power plants.

B3: Expected preparation prior to site visits

Identifying specific documentation, such as planning documents and implementation status, to be reviewed

C. Outline of case study report

C1: Within-Case analysis for how State(s) of Gujarat and Rajasthan have responded to the role of identified barriers and challenges on the growth of grid connected Solar PV installation in their respective region.

C2: Cross-Case analysis of response of Gujarat and Rajasthan to the role of identified barriers and challenges on the growth of grid connected Solar PV installation in their respective region.

D. Case study questions

Interview Protocol

1. Solar Energy sector currently requires high Investment. I am keen to know some details about your project
 - a. How is your project financed?
 - i. Initial stages
 - ii. Operational stages
 - b. How did you address the issues of High investments & long payback?
 - c. How were you able match up the cost related to Up-front (net worth) for your project?
 - d. How did you optimize your Pre-installation Cost?
 - e. What role did the Banks / Financial institutes play in your project to make it viable?

2. What are your views on the competitive eco-system/market/environment for Solar PV in India?

3. There are limited presence of registered PV (cells & module) manufacturers and presence of unqualified manufacturers (which hamper the sector growth)
 - a. How did you ensure quality?
 - b. From where have you sourced your PV modules?
 - c. What are your views on limited presence manufacturers in India?

4. What has been your experience on Land acquisition for the project?
 - a. How did you identify the potential land?
 - b. What information were collected for the identified Land?

- c. What are your views on the clearances required for reserved/protected areas?
 - d. What level of interest the Local Government showed for the identification of land?
5. What was your approach to make your PPA bankable?
6. What type of Grid connectivity you have for your project?
- a. What challenges you faced for achieving the connectivity?
7. How was your organization able to attain a reliable Data on DNI for the location of the project?
8. What has been your experience with the License & Multi-tiered Government Approvals?
9. How you have gone about matching the Capital Cost benchmarking by the Regulator for the project?
- a. Your thoughts on the Reverse Bidding
10. What are your observations on the incentives being provided by Government (Central / State) for SPV-GC power plants?
11. What has been the role of Government policies (Central / State) in your project?
- a. To what level the Political involvement has played an important role?

12. What is your experience in finding out skilled work force specific to your project?

- a. At construction stage
- b. Operation & Maintenance stage

13. What kind of interaction your organization has with the

- a. Universities for diffusion of knowledge
- b. R&D Centre for development technology
- c. What are your views on level of R&D in our country?

14. How has the current R&D activities & facilities has assisted your project?

- a. Present technological development of PV cells / Module
- b. Cost involved in their transition from demonstration to commercialization stage

15. What all factors were important for you to choose this State for your project investments?

Annexure 6

Confirmation Letter

BARRIERS & CHALLENGES FOR SOLAR PV GRID CONNECTED POWER PLANTS IN
INDIA
Case Study
of
Gujarat & Rajasthan

Department of Power & Infrastructure Management
College of Management & Economic Studies
University of Petroleum & Energy Studies

Overview of the Research

I am Karan Kapoor, a research scholar at University of Petroleum & Energy Studies (UPES). Dehradun, Uttarakhand

I am conducting a research on Barriers & Challenges faced by the Solar PV (SPV) Grid connected Power Plants (Utility Scale) in India. I am interested in finding out the factors which hamper the growth prospect of the Indian Solar energy sector.

I am also keen on studying the cases of Gujarat & Rajasthan to understand what they have done differently to become the forerunners in terms of installed capacity of SPV Grid connected Power Plants.

To be able to do so, I need inputs from the Practitioners, Thought Leaders of the industry. So I might request for roughly an hour time to know your views on the above.

Your support & thoughts will help me suggesting ways to augment the growth of SPV Grid Connected Power Plants in India

Thank you

KARAN KAPOOR

Doctoral Research Fellow

University of Petroleum & Energy Studies

Annexure 7

CONFIDENTIALITY AGREEMENT

This Agreement made on the..... day of.....2013 relates to all communications (whether written, oral or otherwise) between the parties named below on or after.....(notwithstanding the date of signature of this Agreement) and applies any Information relating to the Subject Matter as hereinafter defined.

Information shall mean any supply, communication or exchange of information of any kind including without limitation, know-how, drawings, data, software, and other technical matter.

Proper Use shall mean discussions between the Parties to further the research and development project in the area of the Solar Energy. Subject Matter shall mean all information relating to the expertise and know-how of the Solar Energy & research at the University of Petroleum & Energy Studies, involved in the analysis of information regarding the Research study.

Now it is hereby agreed as follows:-

1. All Information which it receives from the other (whether directly or indirectly) will be regarded as, and kept confidential and no part of it will be divulged by the recipient to any third party at any time and in any form whatsoever without the prior consent, in writing, to be obtained specifically on each occasion of the other party except as outlined in paragraph 4.
2. Information received by one party from the other will be used only by the recipient for the Proper Use and the recipient undertakes to take no action to otherwise use or exploit Information without specific prior written agreement of the owning party.
3. For the avoidance of doubt, ownership of Information shall remain the property of the party providing the same. No licence is granted hereunder to the recipient and no licence shall be deemed to have arisen.
4. Information may be revealed to employees of the recipient (incase necessary or asked for) but only to the extent that this is necessary for the Proper Use or to further communications between the parties or to carry out such work as it is agreed in writing between the parties that

one party will undertake for the other. The recipient will bind such employees to keep such Information confidential both during and after their current employment and will take appropriate steps to enforce the obligations of such employees in relation thereto. With the consent of the party obtained in writing, whose consent shall not be unreasonably withheld, the recipient may disclose Information to the extent required by statute.

5. This Agreement shall not apply to any Information which:-
- a) at the date of this Agreement is in the public domain or subsequently comes into the public domain through no fault of the recipient and not in breach of this Agreement;
 - b) was already known to the recipient on the date of disclosure, provided that such prior knowledge can be substantiated and proved by documentation;
 - c) properly and lawfully becomes available to the recipient from sources independent of the owning party;
 - d) either party is required to disclose pursuant to a judicial or other lawful government order, but only to the extent of such order.

Signed	Signed
Name	Name
Position	Position
Date	Date
On behalf of	
Witness	Witness
Name.....	Name
Home Address	Home Address

Annexure 8
Projects in Gujarat

Sr. No.	Name of the Company	Capacity (MW)	Technology	Scheme
1	Aatash Power Pvt. Ltd	4.99	Solar PV	State Policy
2	Abellon Clean Energy	3	Solar PV	State Policy
3	Acme Telepower Ltd.	15	Solar PV	State Policy
4	Adani Enterprises Ltd. (Bitta Solar Plant)	40.11	Solar PV	State Policy
5	AES Solar Energy Gujarat Private Limited	14.92	Solar PV	State Policy
6	Alex Astral Power Private Limited	25.07	Solar PV	State Policy
7	APCA Power Pvt. Ltd.	5	Solar PV	State Policy
8	Aravali Infrapower Ltd.	5	Solar PV	State Policy
9	Astonfield Solar (Gujarat) Private Limited	11.51	Solar PV	State Policy
10	Azure Power India Pvt. Limited	5	Solar PV	State Policy
11	Azure Power India Pvt. Limited (Azure Power Haryana)	10.2	Solar PV	State Policy
12	Backbone Enterprises	5	Solar PV	State Policy
13	CBC Solar Technologies Pvt Ltd	10	Solar PV	State Policy
14	Chattel Constructions Pvt. Ltd.	25	Solar PV	State Policy
15	Claris Life Sciences Ltd.	1.99	Solar PV	State Policy
16	Dreisatz My Solar24 (P) Ltd.	14.99	Solar PV	State Policy
17	EI Technologies Pvt. Limited	1	Solar PV	State Policy
18	Emami Cement Limited	10.06	Solar PV	State Policy
19	EMCO Ltd	5	Solar PV	State Policy
20	Environmental Systems	5	Solar PV	State Policy
21	Essar Power	1	Solar PV	State Policy
22	Euro Solar Power Pvt. Ltd.	5.12	Solar PV	State Policy
23	Ganeshvani Merchandise Pvt Ltd	5.04	Solar PV	State Policy
24	Ganges Entertainment Pvt Ltd	25.08	Solar PV	State Policy

25	GHI Energy Pvt Ltd	10	Solar PV	State Policy
26	GIPCL	5.01	Solar PV	State Policy
27	GMDC Ltd.	5	Solar PV	State Policy
28	GMR Gujarat Solar Power Company	25	Solar PV	State Policy
29	GPCL	5	Solar PV	State Policy
30	GSPC Pipavav Power Company Limited	5	Solar PV	State Policy
31	Green Infra Solar Energy Ltd	10	Solar PV	State Policy
32	GSEC:Pilot Plant on Narmada Branch Canal	1	Solar PV	State Policy
33	GSEC-TPS	1	Solar PV	State Policy
34	Harsha Engineers	1	Solar PV	State Policy
35	Hirako Renewable Energy Pvt Ltd	20.11	Solar PV	State Policy
36	Integrated Coal Mining Ltd.	9	Solar PV	State Policy
37	JaiHind Project Ltd.	5	Solar PV	State Policy
38	Konark Gujarat PV Pvt Ltd.	5	Solar PV	State Policy
39	Lanco Solar	15.01	Solar PV	State Policy
40	Lanco Solar	5	Solar PV	State Policy
41	Lanco Solar	15.01	Solar PV	State Policy
42	Louroux Bio Energies Ltd	25	Solar PV	State Policy
43	MBH Power Pvt Ltd	1	Solar PV	State Policy
44	MI My Solar24 (P) Ltd.	14.99	Solar PV	State Policy
45	Millenium Synergy Pvt Ltd	9.27	Solar PV	State Policy
46	Mono Steel (India) Ltd.	10	Solar PV	State Policy
47	Moserbaer Energy & Development Ltd	15.02	Solar PV	State Policy
48	NKG Infrastructure Limited	10	Solar PV	State Policy
49	Palace Solar Energy Pvt Ltd.	15	Solar PV	State Policy
50	PDP-UP-GPCL-GEDA	1	Solar PV	State Policy

51	PLG Photovoltaic	20	Solar PV	State Policy
52	Precious Energy Services Pvt Limited	15.2	Solar PV	State Policy
53	Rajesh Power Services Pvt Ltd	1	Solar PV	State Policy
54	Rasna Marketing Services LLP	1	Solar PV	State Policy
55	Responsive Sutip Ltd.	25	Solar PV	State Policy
56	Roha Dyechem Pvt. Ltd	25.04	Solar PV	State Policy
57	S J Green Park Energy Pvt. Ltd.	5.12	Solar PV	State Policy
58	Sandland real estate Pvt. Ltd.	25	Solar PV	State Policy
59	SEI Solar Power Gujarat Pvt. Ltd	25	Solar PV	State Policy
60	SolarField Energy Pvt. Ltd.	20.06	Solar PV	State Policy
61	Solar Semiconductor	20	Solar PV	State Policy
62	Solitaire Energies Pvt Ltd a Moser Baer Group Company	15	Solar PV	State Policy
63	Som Shiva Ltd	1	Solar PV	State Policy
64	Sunborne Energy Technologies	15	Solar PV	State Policy
65	Sunclean Renewable Power Pvt. Ltd.	6	Solar PV	State Policy
66	Sunkon Energy Pvt. Ltd.	10	Solar PV	State Policy
67	Surana Telecom & Power Limited	5	Solar PV	State Policy
68	Tata Power Company Ltd	25	Solar PV	State Policy
69	Unity Power Pvt Ltd	5	Solar PV	State Policy
70	Universal Solar System	2	Solar PV	State Policy
71	Visual Percept Solar projects Pvt Ltd	25	Solar PV	State Policy
72	Waa Solar Pvt Ltd	10.22	Solar PV	State Policy
73	Welspun Urja India Limited	15	Solar PV	State Policy
74	Yantra e-Solar India Pvt. Ltd	4.95	Solar PV	State Policy
75	ZF Steering Gear (India) Limited	5	Solar PV	State Policy
Total		860		

Annexure 9

Projects in Charanka Solar Park

Name of the Company	Capacity (MW)
Z F Steering Gear	5
NKG Infrastructure Ltd.	10
Alex Astral Power	25
SEI Solar Power Gujarat Pvt. Ltd.	25
GSPC Pipavav Power Corporation	5
GMR Gujarat	25
Surana Telecom & Power	5
Solar field Pvt. Ltd.	20
E. I. Technologies Pvt. Ltd.	1
Emami Cement	10
Gujarat Power Corporation Limited	5
Roha Energy	25
Sun Clean Renewable	6
Avtaar Solar	5
AES Solar	15
Lanco Infrastructure Pvt. Ltd.	15
Palace Solar	15
Yantra e Solar Pvt. Ltd.	5
Universal Solar	2
Total	224

Annexures 10

Short listed projects under Rajasthan Solar Policy 2011

Redg. No	Name of Company	Capacity (MW)	Location
S/428/2004	Essel Mining and Industries	20	Phalodi
S/827/2011	Sidhidata Solar Urja Limited	5	Phalodi
S/763/2011	Arjun Green Power Pvt. Ltd.	5	Phalodi
S/331/2004	Star Solar Power Pvt. Ltd.	5	Phalodi
S/339/2004	Sungold Energy Pvt. Ltd	5	Phalodi
S/834/2011	Energo Engineering Projects Pvt. Ltd	10	Phalodi
S/839/2011	Roha Dyechem Pvt. Ltd	25	Phalodi
Total		75	