

Chhattisgarh A BOOMING SOLAR POWER HUB

Presentation by
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Chhattisgarh State Renewable Energy Development Agency (CREDA)



Chhattisgarh

- 26th State of the Union of India
- Carved from erstwhile Madhya Pradesh on 1.11.2000
- 9th largest State in area



Chhattisgarh Facts File

- Area of 1,35,000 sq kms.
- About 44% forest cover.
- Population is **2.55 Crores** (**16th** in India)
- Appropriate Population density of **190 per KM Square**
- **Fifth Best Gender** Ratio (991) amongst all Indian States



Chhattisgarh Strengths

THE ENERGY HUB

- The only State achieving ZERO power cut in both rural and urban areas
- Likely capacity addition in next 5 years is of 30,000 MW with an investment of Rs. 1,50,000 crores
- State to get 10,000 MW of power from above capacity addition at a very competitive rate.
- Korba city will have installed capacity of around 10,000 MW by 2013 and will become the Energy Capital of India
- Out of National Target of 1,06,000 MW in 12th Plan, 46,000 MW likely to be commissioned in Chhattisgarh



State Power Scenario

• Thermal (coal Based)	4418MW
• Hydro (Above 25 MW)	120 MW
• Small Hydro (up to 25 MW)	20 MW
• Bio Mass	249 MW
• Waste Heat Recovery	590 MW
• Solar PV	4 MW
• Other (co-gen)	6 MW
Total Installed Capacity	<u>5407 MW</u>



Deployment of Renewable Power in state

- **CREDA – the State Nodal Agency of Ministry of New & Renewable Energy (Govt. of India) responsible for Development, Deployment and Promotion of Renewable Energy in the state .**
- **Total Installed Capacity of Power Generation – 5407 MW**
- **RE based Power plant - 279 MW**
- **Contribution of RE Power - over 5 %**



STATE INITIATIVES

- State Electricity Regulatory Commissions (SERC) has mandated Renewable Purchase Obligations to promote RE.
- Obligated entities require to procure RE Power up to 20% (by 2020) of their power consumption.
- RE Power generation is declared as priority sector under state industrial policy.
- Announced attractive state policy for promotion of Solar, Wind, Hydro & Biomass power project. New Solar Policy to be announced soon.



Village Electrification Status

(As on May - 2012)

1 . No. of Inhabited Villages	(as per 2001 Census)	19744
2 . No. of Electrified Villages		19338
3. Majra-Tola Electrification		24218
4 . Percentage of Village Electrification		98 %
5 . Un electrified Villages	(as per 2001 Census)	406

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Achievement so far in RE Sector (Rural)

- Electrification of 1439 remote UE villages & hamlets through SPV PP of total capacity 3500 KW benefiting 58000 families and 9,500 nos of street light points.

(the rest 406 UE Villages are being electrified)

- Electrification of 1137 tribal hostels.
- Electrification of 306 health centers.
- Electrification of 209 Remote Police Stations/Camp.
- Installation of 265 SPV Pumps for drinking water Supply in remote villages.
- Installation of 232 SPV Pumps for irrigation in far flung locations from grid.



Achievement so far in RE Sector (Urban)

- Roof top SPV Power Plant of total 13.6 MW capacity in 1089 locations.
- Solar Water Heating Systems of total 12 lakh LPD capacities in 2500 locations.
- Raipur and Bilaspur City of state selected as **Solar city** Project of MNRE. Target is to reduce energy consumption up to 10% (from base year 2011) in next 10 years through Energy Efficiency & Renewable Energy installation .



Potential & Achievements of RE in state

Sector	Approx. Potential(MW)	Potential Harnessed (MW)	% Achieved
Solar PV Grid	@ 20 MW per Sq. KM	4	--
Solar PV Roof Top	500	14	2.8%
Small Hydro (up to 25MW)	1000	20	2.0%
Biomass	1000	249	25%
Waste to Energy (U & I)	30	-	-
Geothermal	50 - 500	-	-
Wind	300	0	-

ELECTRIFIED VILLAGE & MAJRATOLA by CREDA as on 25-06-2012

S. No.	District	No. of Village & Majratola	Benefited Beneficiary	Un-Electrified Villages
1	Raipur	0	0	0
2	Gariaband	128	4265	0
3	Baloda Bazar	22	1535	0
4	Mahasamund	5	165	0
5	Rajnandgaon	51	1401	0
6	Durg	0	0	0
7	Balod	0	0	0
8	Bemetara	0	0	0
9	Kabirdham	67	2795	0
10	Bilaspur	50	1216	0
11	Mungeli	45	2413	0
12	Raigarh	12	552	0
13	Korba	238	9142	0
14	Janjgir-Champa	1	62	0
15	Sarguja	15	721	0
16	Balrampur	2	306	0
17	Surajpur	42	2066	0
18	Jashpur	183	7262	0
19	Koria	123	6354	0
20	Dhamtari	41	1911	0
21	Kanker	114	3179	0
22	Kondagaon	5	324	0
23	Jagdalpur	44	2037	5
24	Sukma	4	430	125
25	Dantewada	215	8562	36
26	Narayanpur	9	170	131
27	Beejapur	23	1100	109
Total		1439	57968	406

Census 2011 recognized the RE connections

As per the Census Survey 2011 the electricity connections through SPV have been recognized in accessible districts of state and reported under “HOUSEHOLDS BY MAIN SOURCE OF LIGHTING” are as below :- [\(Source Census 2011 Data\)](#)

Source of Lighting	Nos . Of Households
Electricity	4231941
Kerosene	1306320
Solar Energy	49798 *
Other oil	10463
Any Other	7698
No Lighting	16638
Total Nos . of House Holds	5622850

Factors / Strategies Contributing to Success of RVE

- State and central financial support for installation of systems.
- Annual Budgetary support from state Govt. for O & M of the installed systems.
- Organizational set up for every plant to ensure functionality & monitoring of systems through service providers .
- Community participation/involvement from site survey to completion of projects. Which encourage ownership of villagers.
- Need/demand based system's capacity assessment and readiness of users /consumers to pay charges.
- Timely completion of projects and capacity enhancement wherever required.

ऊर्जा विभाग

मंत्रालय, दाऊ कल्याण सिंह भवन, रायपुर

रायपुर, दिनांक 18 अगस्त 2005

विषय :—सौर विद्युत संयंत्रों का नियमित रखरखाव व संचालन

क्रमांक 2325/ऊ.वि./अपारं.ऊ./2005.—छत्तीसगढ़ राज्य अक्षय ऊर्जा विकास अभिकरण (क्रेडा) द्वारा प्रदेश के अविद्युतीकृत ग्रामों में आपारंपरिक ऊर्जा स्रोतों से विद्युत उत्पादन हेतु स्थापित संयंत्रों के नियमित रख-रखाव एवं संचालन व संधारण सुनिश्चित करने के लिये राज्य शासन एतद्वारा निम्नानुसार दिशा-निर्देश जारी करता है :—

(1) क्रेडा द्वारा स्थापित किये जाने वाले सौर ऊर्जा आधारित विद्युतीकरण संयंत्रों के नियमित रख-रखाव व संचालन का कार्य क्रेडा द्वारा किया जावेगा. उक्त संयंत्रों की वारंटी अवधि पूर्ण होने के पश्चात् संयंत्रों के संधारण का दायित्व क्रेडा का होगा. इन संयंत्रों का संचालन व संधारण सुनिश्चित करने हेतु क्रेडा में प्रधान कार्यालय स्तर पर एक संचालन एवं संधारण सेल का गठन किया जाएगा, जो संयंत्रों के नियमित संचालन व संधारण हेतु उत्तरदायी होगी.

(2) सौर फोटोवोल्टेइक संयंत्र के नियमित व पूर्ण क्षमता के साथ संचालन के लिये फील्ड कार्यकर्ता एवं अर्थ संसाधनों की व्यवस्था क्रेडा द्वारा की जावेगी. इस हेतु हितग्राहियों से क्रेडा या क्रेडा के प्राधिकृत प्रतिनिधि द्वारा निम्नानुसार शुल्क प्राप्त किया जाएगा :—

1. उपभोग	-	घरेलू	रुपए 30/- प्रतिमाह
		व्यावसायिक	रुपए 60/- प्रतिमाह
2. कनेक्शन हेतु आवेदन शुल्क (प्रथम बार)	-	गरीबी रेखा के नीचे सामान्य	रुपए 100/- प्रतिमाह
		शास./अर्द्ध शास./	रुपए 200/- प्रतिमाह
		व्यावसायिक	रुपए 500/- प्रतिमाह

विद्युत उत्पादन संयंत्र, पथ प्रकाश संयंत्र, बैटरी रख-रखाव एवं कन्ट्रोल यूनिट की मरम्मत के लिये आवश्यक व्यय क्रेडा द्वारा किया जाएगा. संयंत्रों के रख-रखाव में होने वाले आकस्मिक व्यय, जिनकी प्रतिपूर्ति ग्राम में एकत्रित होने वाले राजस्व से संभव न हो (जैसे समस्त बैटरियों को बदलना, पैनल बदलना आदि), की पूर्ति क्रेडा के वार्षिक बजट से की जायेगी. संयंत्रों के रख-रखाव के लिये क्रेडा के वार्षिक बजट में पृथक से प्रावधान किया जाएगा.

(3) राज्य शासन द्वारा सौर ऊर्जा आधारित ग्रामीण विद्युत संयंत्रों के संचालन/संधारण हेतु क्रेडा को ग्रामीण विद्युतीकरण मद में उपलब्ध बजट में से स्थापना लागत का 5% प्रतिवर्ष की दर से राशि विमुक्त की जाएगी.

छत्तीसगढ़ के राज्यपाल के नाम से तथा आदेशानुसार,
पी. के. मिश्रा, संयुक्त सचिव.

**छत्तीसगढ़ शासन, ऊर्जा विभाग,
दाऊ कल्याण सिंह भवन, मंत्रालय, रायपुर**

(109)

क्र. 1009 /ऊ.वि./अपारं.ऊ./2007

रायपुर, दिनांक 19 जून 2007

अधिसूचना

विषय:- सौर विद्युत संयंत्रों का नियमित रखरखाव व संचालन।

ऊर्जा विभाग द्वारा जारी अधिसूचना क्र. 2325/ऊ.वि./अपारं.ऊ./2005, दिनांक 18 अगस्त 2005 की कंडिका (2)(1) में निम्नानुसार आंशिक संशोधन किया जाता है:-

"सौर फोटोवोल्टेईक संयंत्रों से विद्युतीकृत ग्रामों में घरेलू हितग्राहियों से रु. 30/- प्रति माह के स्थान पर रु. 05/- प्रति माह की दर से विद्युत उपभोग शुल्क प्राप्त किया जायेगा।"

उक्त संशोधन 01 अप्रैल 2007 से प्रवृत्त हुए समझे जायेंगे।

छत्तीसगढ़ के राज्यपाल के नाम से तथा आदेशानुसार,

✓ (अनिल दुटेजा)

संयुक्त सचिव, ऊर्जा विभाग
रायपुर, दिनांक 19 जून 2007

पृ.क्र. 1010 /ऊ.वि./अपारं.ऊ./2007

प्रतिलिपि :-

1. माननीय मुख्यमंत्रीजी/मंत्रीजी, ऊर्जा विभाग/अध्यक्ष, क्रेडा को सूचनार्थ।
2. मुख्य सचिव, छत्तीसगढ़ शासन, मंत्रालय, रायपुर।
3. शासन के समस्त विभागों के अतिरिक्त मुख्य सचिव/प्रमुख सचिव/सचिव।
4. सचिव, वित्त, वाणिज्य कर, योजना, आर्थिक एवं सांख्यिकी विभाग, रायपुर।
5. सचिव, महामहिम राज्यपाल का सचिवालय/मुख्यमंत्री सचिवालय/विधानसभा सचिवालय।
6. मुख्य कार्यपालन अधिकारी, क्रेडा, मंत्रालय, रायपुर को सूचनार्थ एवं आवश्यक कार्यवाही हेतु।
7. सचिव, छत्तीसगढ़ राज्य विद्युत मंडल, डंगनिया, रायपुर।
8. मुख्य विद्युत निरीक्षक, छ.ग. शासन, रायपुर।
9. संचालक, जनसम्पर्क को सूचनार्थ एवं आवश्यक कार्यवाही हेतु।

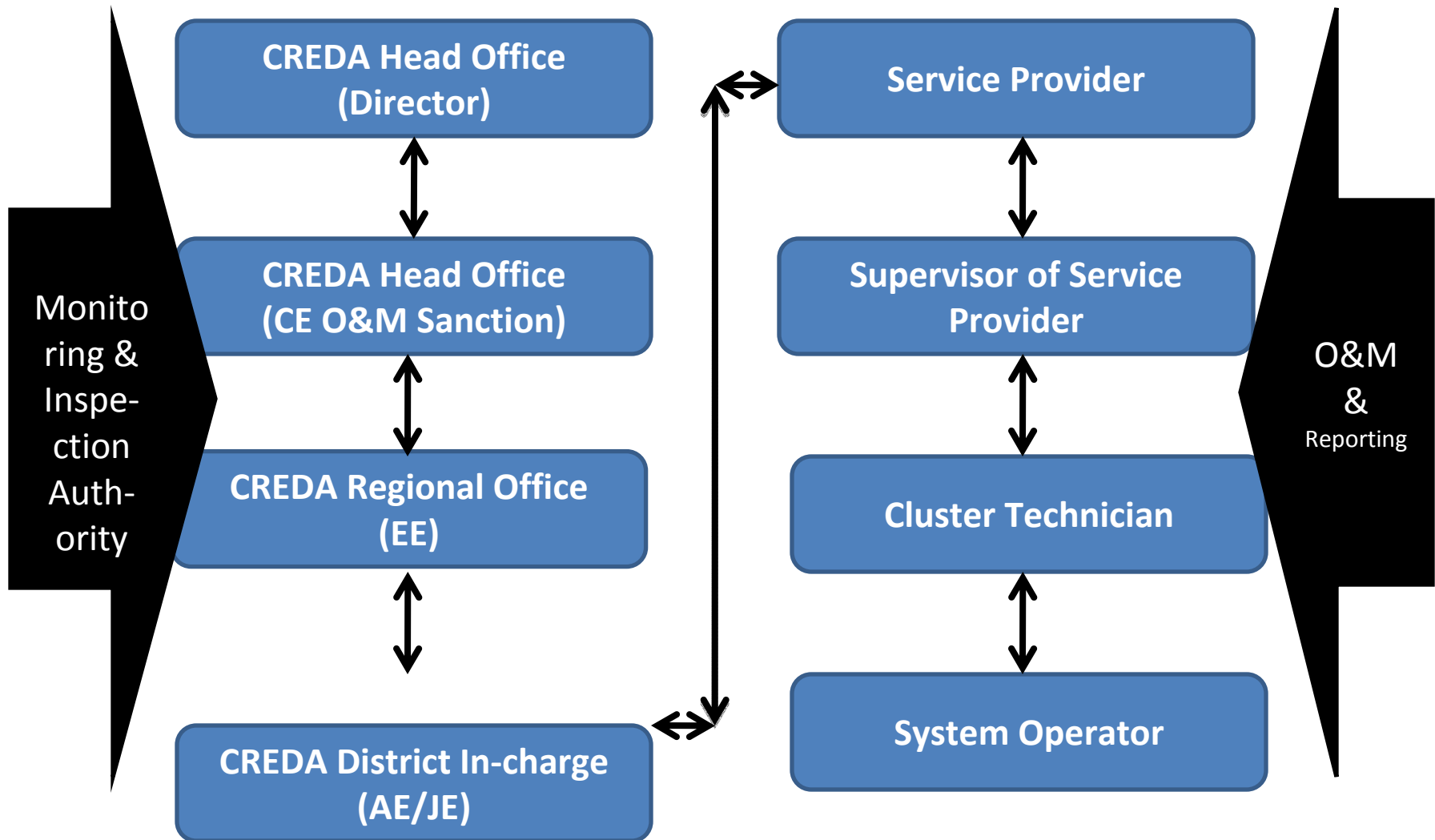
SPV Power Plant Design Parameter

System Capacity	Max. Allowable WH/Day	Battery Bank Capacity with two days Autonomy	No. of CFL of 11 watt @ 6 hrs./day operation
1 KW	3000 WHr.	48 Volts - 400 AH	30-35
2 KW	6000 WHr	48 Volts - 600 AH	70-75
3 KW	9000 WHr	48 Volts - 900 AH	90-100
4 KW	12000 WHr	96 Volts - 600 AH	140-150
5 KW	15000 WHr	96 Volts - 800 AH	180-200
6 KW	18000 WHr	96 Volts - 1000 AH	240-250

Operation - Monitoring & Reporting

- Daily energy meter reading & recording at plant level by plant operator.
- Routine maintenance of plant & PDN by operator .
- Weekly checking & maintenance of complete plant and PDN by cluster technician.
- Attending complaints by Cluster technician at call.
- Supervisor of service provider visits each plant on monthly basis to ensure the operation & maintenance and record the energy meter reading and he submits the monitoring report in prescribed [format](#) to concern office of CREDA through service provider.
- Service provider is paid the maintenance charges @ Rs.45/- per connection for the functional connections/systems.

O&M Set-Up



Roles & Responsibilities of service Provider

Socio- Economic Benefits

- Employment opportunity in rural areas .
- Reduction in GHG Emission.
- Improved quality of life and living standard.
- Lighting & Energy Security.
- Increased information flow through TV, Mobile , Radio and literacy improvement .
- Electricity enables access to educational information and information communications.

contd...



Socio- Economic Benefits

contd.....

- Street lighting improves safety especially for women and girls.
- Lighting enables community activities and studying in night time also. This facilitates the women and children with additional time for house hold work and studies, recreation, sports and social activities.
- Improvements in health clinic facilities and services.
- Safer homes for children and household work due to increased quality of lighting.
- Reduction in indoor air pollution due to decreased fuel burning for indoors lighting .
- Lighting permits income-generating activities beyond daylight hours.
- Using energy to power machinery . Reduction of manual labour ,Increased productivity in enterprises.





RVE Programme Photo Gallery



RVE programme



Control Room



Pre Fabricated Control Room



Battery cum Control Room



System with maintenance free Gel Batteries



Control Panels



Control Panels



Ground Mounted Power Plant



Power Distribution Network



STREET LIGHT



House Lighting



House Lighting



Lighting in Tribal School



Lighting in Tribal Hostel/ Ashram

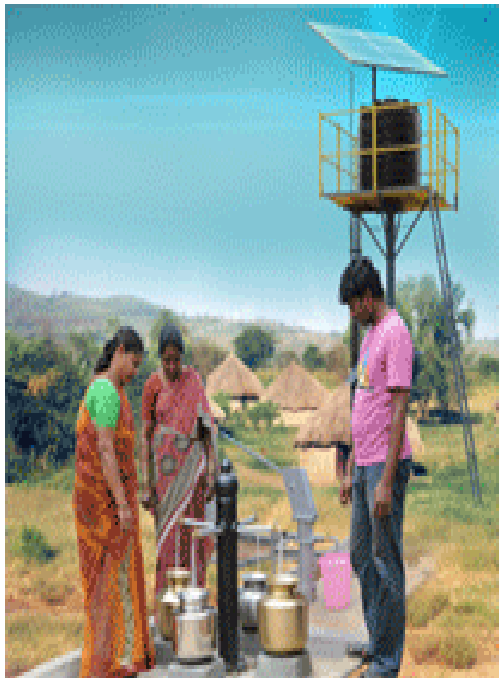


Lighting in Health Centers



SPV Systems for Water Pumping

1. 98 surface SPV Pumps for irrigation under “Shakambhari Yojna” .
2. 175 SPV Pumps for drinking water supply in UE Villages .
3. 32 SPV Submersible Pumps irrigation in forest villages.
4. 248 SPV cum Hand Pump are under installation for drinking water supply .



Installation For Community
Water Supply



Installation For Irrigation



Installation For Rural
School Program



Solar Pumps

Solar Pumps for minor irrigation



SPV Hand cum Submersible Pump





Major Roof Top Installations in Chhattisgarh

**2 MW SPV Installation at
Sharda Energy
(Kharora, Distt. Raipur)**



80 Kw Solar Power Plant at CREDA/CSERC Building



**100 Kw Solar Power Plant at Bhilai Institute of
Technology, Raipur**





Ambedkar Hospital, Raipur



Nagar Nigam New Building, Raipur



SPVPP in Collectorates



Banyan Tree Residential Colony, Raipur



SPVPP in Govt. Building



Forest Research Center, Raipur





Sarda Energy, Siltara, Raipur



Jindal Power Plant, Raigarh



Thanks

CREDA - Energetic Agency With everlasting Energy Sources