

## **CHAPTER - 8**

### **ENERGY**

8.1 Rajasthan is a developing State therefore, increased availability of energy for social and economic development of the State is of paramount importance. State is according highest priority for achieving self sufficiency in power generation to cope up with the growing demand of energy in the domestic sector along with increased level of urbanization and to fulfill the energy needs of Industrial & Agriculture sector.

8.2 Rajasthan introduced Reform process in the Power Sector way back in the year 2000 by unbundling of the erstwhile RSEB into one generation, one transmission and three distribution companies at Jaipur, Jodhpur and Ajmer.

8.3 Subsequent to unbundling of erstwhile RSEB, installed generation capacity of the State has increased from all sources to 14371.61 MW as on 31<sup>st</sup> March, 2014, transmission & distribution system has been strengthened resulting in reduction in T&D losses from 42 % in March, 2000 to the level of 27.50 % in March, 2014.

8.4 The customer rolls have been growing fast since unbundling and now, it stands at 10.7 million. The annual per capita consumption of electricity during 2011-12 of the State was 927.4 kwh as compared to all India average of 883.6 kwh. The State is one of the India's most advanced States in terms of metering and collections. State has undertaken various reform programmes such as feeder renovation program, high voltage distribution system (HVDS), installation of single phase distribution transformers for providing domestic power supply in rural areas.

8.5 As the State is deficient in conventional resources of power generation like water, coal, oil and gas for undertaking new power generation schemes, highest priority is being accorded for augmenting power generation from non-conventional energy sources like wind, solar and biomass. Efforts are being made to encourage public private partnership in power generation and strengthening of transmission & distribution system for reducing T&D losses.

8.6 Efforts are also being made to provide regular and continuous electricity to the farmers on economical rates. Despite growth in connectivity, there are issues like unconnected households and low consumption of electricity that are being improved. Agriculture accounts for above 41.61 per cent and industry for over 27.58 per cent of total consumption of electricity in the State at the end of March, 2014. Though, almost 77 per cent consumers are domestic, they account for only 21.02 per cent of the total consumption. Around 64 per cent households have access to electricity. About 97 per cent villages are connected but electrification has not penetrated adequately at the

household level with around 36 per cent still unconnected rural households.

### **Thrust Areas for the Twelfth Five Year Plan**

8.7 During the Twelfth Five Year Plan and the Annual Plan 2014-15, the main thrust areas of power sector are as follows:

1. Bridging the gap between demand and supply of power by increasing the generation capacity and ensuring availability of quality power.
2. Strengthening of transmission and distribution network.
3. Reducing Transmission & Distribution losses up to the level of 15 per cent by the end of Twelfth Plan..
4. Tariff rationalization and reducing the subsidy requirement
5. Achieving financial turn-around by the Distribution Companies for which, financial restructure plan is under preparation.
6. Improving customer satisfaction by quality supply, network strengthening and using new techniques/Information Technology.
7. Introducing IT up to Sub Division level under RAPDRP for automation, loss reduction and transparent service delivery.
8. Private Sector participation in generation and transmission.
9. Promoting non conventional sources of power generation.

8.8 The company-wise details of the outlay kept for the Twelfth Plan, likely expenditure in 2013-14 and proposed outlay for the Annual Plan 2014-15 are as follows:

**Table No. 8.1  
Proposed Financial Outlays**

(₹ in crore)					
<b>S. No.</b>	<b>Company</b>	<b>Twelfth Plan Outlay</b>	<b>Outlay 2013-14</b>	<b>Likely Exp. 2013-14</b>	<b>Proposed Outlay for 2014-15</b>
1.	Raj. Vidyut Utpadan Nigam Ltd.	47246.00	7199.00	3724.64	6011.00
2.	Raj. Vidyut Prasaran Nigam Ltd.	12600.00	2550.00	1633.11	2450.00
3.	Jaipur Vidyut Vitran Nigam Ltd.	4166.00	1363.32	1900.72	1976.70
4.	Ajmer Vidyut Vitran Nigam Ltd.	3170.00	1060.34	1581.03	1258.04
5.	Jodhpur Vidyut Vitran Nigam Ltd.	3321.00	1062.34	1800.29	1413.66
6.	Raj Renewal Energy Corporation	10.00	8.00	8.00	157.14
7.	FRP- Transitional CashSupport	2210.25	420.00	420.00	441.00

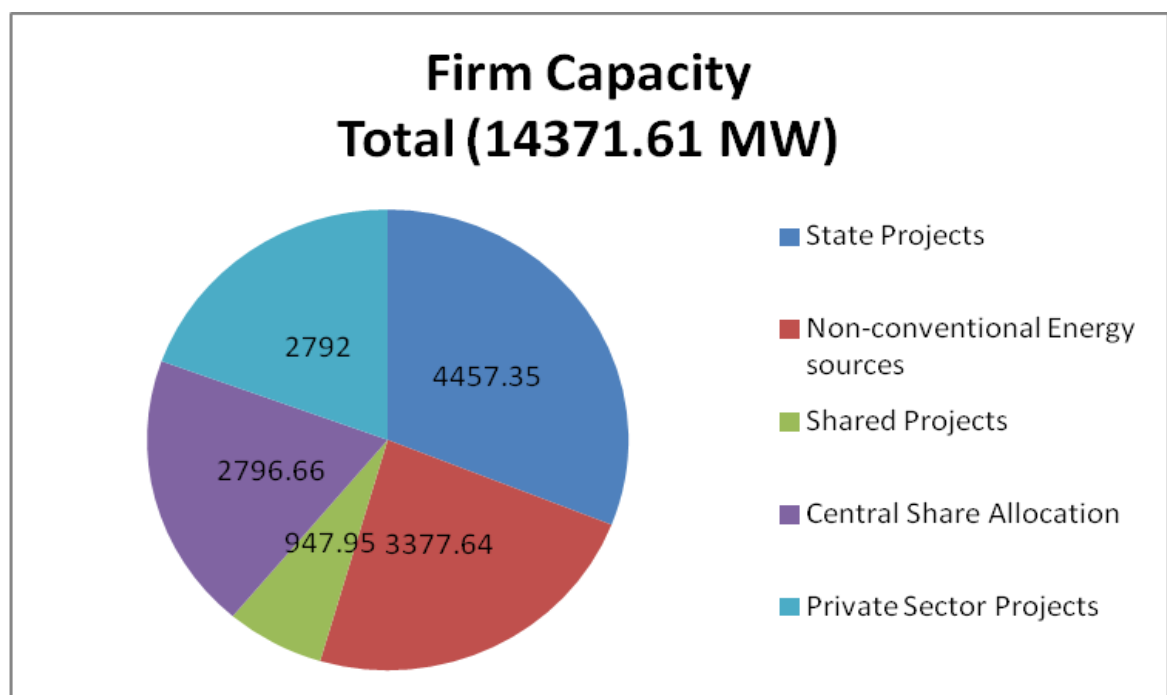
S. No.	Company	Twelfth Plan Outlay	Outlay 2013-14	Likely Exp. 2013-14	Proposed Outlay for 2014-15
8	Power Finance Corporation Ltd.Equity	-	10.00	75.00	0.00
9	Grant for Distributrition of CFL	0.00	0.00	120.00	0.00
	<b>Total</b>	<b>72723.25</b>	<b>13673.00</b>	<b>11262.79</b>	<b>13707.54</b>

**Generation:**

8.9 Source-wise firm capacity available as on 31<sup>st</sup> March, 2014 is as under:-

**Table No. 8.2**

S. No.	Name of Sector Project	Firm Capacity in MW
1	State Projects	4457.35
2	Non-conventional Energy sources	
	a. Wind power	2797.84
	b. Bio-mass	99.30
	c. Solar	480.50
3	Shared Projects	947.95
4	Central Share Allocation	2796.66
5	Private Sector Projects	2792.00
	<b>Total</b>	<b>14371.61</b>



## I. GENERATION COMPANY:

8.10 Rajasthan Rajya Vidyut Utpadan Nigam (RVUN) is engaged in operation of State sector power plants as well as installation of new power projects under State sector. At present, RVUN owns & operates the following Thermal/ Gas/ Hydel power stations in the State sector as on 31<sup>st</sup> March, 2014:-

**Table No. 8.3**

<b>S. No.</b>	<b>Power Stations</b>	<b>Installed Capacity (MW)</b>
<b>A.</b>	<b>Thermal power projects</b>	
i	Suratgarh Thermal Power Station	1500.00
ii	Kota Thermal Power Station	1240.00
iii	Chhabra Thermal Power Plant, Unit-1 to 3	750.00
iv	Giral Lignite Thermal Power Plant Unit-1 & 2	250.00
<b>B.</b>	<b>Gas Based power projects</b>	
i.	Dholpur Combined Cycle Gas Power Plant	330.00
ii	Ramgarh Gas Thermal Power Plant	223.50
<b>C.</b>	<b>Hydro Projects</b>	
i	Mahi Hydel Power Station	140.00
ii	Mini Micro Hydel Schemes	23.85
	<b>Total</b>	<b>4457.35</b>

8.11 In addition to above, RVUN is also Operating & Maintaining following two hydro power stations, which are owned by Rajasthan Vidyut Prasaran Nigam (RVPN):

1. Rana Pratap Sagar Hydel Power Station	172 MW
2. Jawahar Sagar Hydel Power Station	99 MW
<b>Total</b>	<b>271 MW</b>

8.12 Besides above, RVUN has an ambitious plan of generation capacity addition of 7750 MW with five supercritical technology coal based and four gas based thermal power projects during Twelfth Plan, out of which orders for 3 power projects totaling to 2800 MW capacity have been placed. An outlay of ₹ 47246.00 crore was kept in the Twelfth Plan for power generation through RVUN. An expenditure of ₹ 3724.64 crore has been incurred in 2013-14 against an outlay of ₹ 7199.00 crore. An outlay of ₹ 6011.00 crore is proposed for the Annual Plan 2014-15. It is proposed to take loan of ₹ 4845.00 crore from Power Finance Corporation/REC/Commercial Bank/Open market borrowing for financing the plan for 2014-15. Balance amount of ₹ 1166.00 crore will be available as State equity. Details of amount kept for the Twelfth Plan,

outlay & likely expenditure in 2013-14 and proposed outlay for the Annual Plan 2014-15 are as follows:

**Table No 8.4**  
**Proposed Financial Outlays**

( ₹ in crore)

S. N.	Project	Outlay Twelfth Plan	Outlay 2013-14	Likely Exp. 2013-14	Proposed Outlay 2014-15
1.	Chhabra Thermal Power Project Unit- 1 & 2 (2x250 MW)	300.00	176.00	2.78	0.00
2.	Chhabra Thermal Power Project Unit -3 & 4 (2x250 MW)	568.00	456.70	333.78	167.00
3.	Chhabra Supercritical TPP Unit-5 & 6 (2x660 MW)	7605.00	1525.00	665.66	2000.00
4.	Suratgarh Supercritical TPP Unit-7& 8 (2x660 MW)	7625.00	1550.00	1007.39	2000.00
5.	Surtagrah Supercritical TPP Unit - 9 & 10 (2x660 MW)	7920.00	735.00	0.00	200.00
6.	Ramgarh Gas Thermal Power Project Stage III 160 MW	169.00	180.00	127.56	50.00
7.	Ramgarh Gas Thermal Power Project Stage IV 160 MW	640.00	267.00	197.26	285.00
8.	Kalisindh Thermal Power Project Unit -1 & 2(2x600 MW)	2719.00	316.60	1273.20	566.00
9.	Kalisindh Supercritical TPP Unit - 3 & 4 (2x660 MW)	7920.00	750.00	0.00	250.00
10.	Banswara Supercritical TPP Unit-1 & 2 (2x660 MW)	7880.00	800.00	75.01	250.00
11.	Survey Investigation Schemes & carried over liabilities	50.00	9.42	0.00	10.00
12.	Dholpur Gas CCPP Stage-II (3X110MW)	1210.00	-	-	-
13.	Additional Capital Works at TPS, Kota	0.00	291.00	40.00	150.00
14.	Kota Gas Project	1320.00	-	-	-
15.	Chhabra Gas Project	1320.00	-	-	-
16.	Additional Capital Works at TPS, Suratgarh	0.00	142.28	2.00	83.00
	<b>Total</b>	<b>47246.00</b>	<b>7199.00</b>	<b>3724.64</b>	<b>6011.00</b>

**A. RVUN's Plant Under construction:**

8.13 Following units are under advance stage of construction and are expected to be commissioned up to August, 2014:

**(i) Chhabra TPP, Unit-3 & 4 (2x250 MW):**

8.14 Unit-3 of the project was commissioned on 09.09.2013 and commercial operation also commenced from 19.12.2013. Unit-4 was commissioned on 30.06.2014 and COD is expected by August, 2014. Revised project cost is ₹ 3034.00 crore. An outlay of ₹ 167.00 crore is proposed for the Annual Plan 2014-15.

**(ii) Kalisindh Thermal Power Project Unit - 1 & 2 (2x600 MW):**

8.15 Unit-1 of the project was synchronized on coal on 17.09.2013 and COD declared on 07.05.2014. Unit-2 is expected to be commissioned up to Sep., 2014. Revised Project cost is ₹ 7723.00 crore which is further going to upward revision to 9479.51 crore due to increase in interest during construction (IDC) and others. An expenditure of ₹ 1273.20 crore has been incurred in 2013-14 against an outlay of ₹ 316.60 crore. An outlay of ₹ 566.00 crore is proposed for the Annual Plan 2014-15, out of which ₹ 105.00 crore is as equity support from the State Government and remaining ₹ 461.00 crore would be arranged from financial institutions as long term capital loan.

**(iii) Ramgarh Gas TPS Stage III (160 MW):**

8.16 110 MWGT Unit of the Stage-III project was commissioned on 20.03.2013 and commercial operation achieved on 06.12.2013. 50 MW ST unit was commissioned on 01.05.2014 and COD declared on 07.06.2014. Revised project cost is ₹ 890.00 out of which ₹ 178.00 crore will be provided as State Equity and remaining ₹ 712.00 crore would be arranged from financial institution as long term capital loan. An expenditure of ₹ 127.56 crore has been incurred in 2013-14 against an outlay of ₹ 180.00 crore. An outlay of ₹ 50.00 crore is proposed for the Annual Plan 2014-15.

**B. Construction work on the following state sector power projects have been taken during 2013-14.**

**(i) Chhabra Supercritical Thermal Power Project Stage-II Unit - 5 & 6 (2x660 MW)**

8.17 Orders on Engineering Procurement and Construction (EPC) basis was placed to M/s L&T on dated 28.03.2013. Work at site has been commenced and units are targeted for commissioning during Twelfth Plan period. Total Project Cost is ₹ 7920.00 crore. An expenditure of ₹ 665.66 crore has been incurred in 2013-14 against an outlay of ₹ 1525.00 crore. An outlay of ₹ 2000.00 crore is proposed for the Annual Plan 2014-15, out of which ₹ 400.00 crore is equity support from the State Government and remaining ₹ 1600.00 crore would be arranged from financial institutes as long term capital loan.

**(ii) Suratgarh Supercritical Thermal Power Project Stage-V Unit-7 & 8 (2x660 MW)**

8.18 Orders on EPC basis was placed to M/s BHEL on dated 28.03.2013. Work at site has been commenced and units are targeted for commissioning in Twelfth Plan period. Total Project Cost is ₹ 7920.00 crore. An expenditure of ₹ 1007.39 crore has been incurred in 2013-14 against an outlay of ₹ 1550.00 crore. An outlay of ₹ 2000.00 crore is proposed for the Annual Plan 2014-15, out of which ₹ 400.00 crore is equity support from the State Government and remaining ₹ 1600.0 crore would be arranged from financial institutes as long term capital loan.

**(iii) Ramgarh Gas Based Combined Cycle TPP Stage-IV (160 MW)**

8.19 An expenditure of ₹ 197.26 crore has been incurred in 2013-14 against an outlay of ₹ 267.00 crore. An outlay of ₹ 285.00 crore is proposed for the Annual Plan 2014-15, out of which ₹ 53.00 crore is equity support from the State Government and remaining ₹ 232.00 crore would be arranged from financial institutes as long term capital loan.

8.20 Apart from above, following new power projects have also been taken up for implementation for which land identified, water allocated, environmental consultant appointed ToR for Kalisindh and Banswara supercritical have been prescribed by MoEF, GoI, application also submitted to MoC for long term coal linkages and coal block, engineering consultant yet to be appointed. Possibilities are also being explored for enhancing the capacity of these units from 660MW to 800MW. Ratlam-Banswara-Dungarpur Railway line has already been sanctioned. Survey and land acquisition work is under progress.

- 2x660MW Banswara Supercritical TPP Units-1&2
- 2x660MW Kalisindh supercritical TPP Unit - 3&4
- 2x660MW Suratgarh supercritical TPP Unit- 9&10

8.21 Project-wise details for proposed plan out lay for the Annual Plan 2014-15 are as under:-

**Table No 8.5  
Details of project, sources of funds and project cost**

(₹ in crore)

S. No.	Project	Source	Project Cost	Proposed/ Revised Project Cost	Proposed Outlay 2014-15
1	Chhabra Thermal Power Project Unit 3 & 4, 2 x 250 MW	State Equity	520.00	607.00	<b>0.00</b>
		Loan	2080.00	2427.00	<b>167.00</b>
		Sub Total	2600.00	3034.00	<b>167.00</b>
2	Kalisindh Thermal	State Equity	920.00	1895.90	<b>105.00</b>

S. No.	Project	Source	Project Cost	Proposed/ Revised Project Cost	Proposed Outlay 2014-15
	Power Project Unit 1 & 2, 2 x 600 MW	Loan	3680.00	7583.61	<b>461.00</b>
		Sub Total	4600.00	9479.51	<b>566.00</b>
3		Ramgarh GTPP Stage-III, 160 MW	State Equity	128.00	178.00
	Loan		512.00	712.00	<b>50.00</b>
	Sub Total		640.00	890.00	<b>50.00</b>
4	Suratgarh Supercritical Power Project Unit 7 & 8, 2 x 660 MW	State Equity	1584.00		<b>400.00</b>
		Loan	6336.00		<b>1600.00</b>
		Sub Total	7920.00		<b>2000.00</b>
5	Chhabra Supercritical Power Project Unit 5 & 6, 2 x 660 MW	State Equity	1584.00		<b>400.00</b>
		Loan	6336.00		<b>1600.00</b>
		Sub Total	7920.00		<b>2000.00</b>
6	Banswara Supercritical Power Project Unit 1&2, 2x660 MW	State Equity	1584.00		<b>50.00</b>
		Loan	6336.00		<b>200.00</b>
		Sub Total	7920.00		<b>250.00</b>
7	Ramgarh GTPP Stage IV 160 MW	State Equity	128.00		<b>53.00</b>
		Loan	512.00		<b>232.00</b>
		Sub Total	640.00		<b>285.00</b>
8	Suratgarh Supercritical Power Project Unit 9 & 10, 2 x 660 MW	State Equity	1584.00		<b>40.00</b>
		Loan	6336.00		<b>160.00</b>
		Sub Total	7920.00		<b>200.00</b>
9	Kalisindh Supercritical Power Project Unit 3 & 4, 2 x 660 MW	State Equity	1584.00		<b>50.00</b>
		Loan	6336.00		<b>200.00</b>
		Sub Total	7920.00		<b>250.00</b>
10	Additional Capital Works at Kota Thermal Power Station	State Equity			<b>40.00</b>
		Loan			<b>110.00</b>
		Sub Total			<b>150.00</b>
11	Additional Capital Works at Suratgarh Thermal Power Station	State Equity			<b>18.00</b>
		Loan			<b>65.00</b>
		Sub Total			<b>83.00</b>
12	S&I				<b>10.00</b>
	<b>Total</b>	<b>STATE EQUITY</b>			<b>1166.00</b>
		<b>LOAN</b>			<b>4845.00</b>
		<b>TOTAL</b>			<b>6011.00</b>



**C. Private Sector Generation Projects (Implemented By RVPN):**

**(i) Procurement of 1200 MW power from Kawai SuperCritical TPS (2x660 MW) in District Baran**

8.22 Letter of Intent (LoI) was placed on M/s. Adani Power Rajasthan Ltd for Procurement of 1200 MW power. Commercial Operation Date (CoD) for Unit-I & Unit-II was 31.12.2013.

**(ii) Gurha Thermal Power Plant (70 MW)**

8.23 Letter of Intent (LoI) has already been issued to M/s SPML consortium and 50 hectare land has been transferred by RSMML into the name of Gurha Thermal Power Company Ltd. The SPA signed and SPV handed over to M/s SPML consortium. PPA has been executed with Discoms on 26.06.2013. Adoption of tariff passed by RREC on 22.01.2014 and allowed quoted tariff with first year tariff @ 2.263 per kwh for the year 2014-15 and levylised tariff @ 3.2227 per kwh. Power generation is expected in the year 2016.

**D. Shared Generation Projects (being implemented By RVPNL):**

8.24 Renovation, modernization & up-rating of shared projects in Bhakra Beas Management Board (BBMB) will continue. Five units of Bhakra Left Bank earlier scheduled in the Eleventh Plan for up-rating from 108 MW to 126 MW are being taken up in the Twelfth Plan. State will get 15.22 per cent share during the Twelfth Plan. An outlay of ₹ 100.00 crore was proposed for above works in the Twelfth Plan. An expenditure of ₹ 6.28 crore has been incurred in 2013-14 against the same outlay. An outlay of ₹ 20.00 crore is proposed for the Annual Plan 2014-15.

**II. TRANSMISSION COMPANY**

8.25 The Rajasthan Electricity Regulatory Commission (RERC) has granted a licence to Rajasthan Vidyut Prasaran Nigam Limited (RVPNL) for transmission and bulk supply of electricity in the State. RVPNL has been declared as State Transmission Utility by the State Government under the provision of the Electricity Act, 2003. RVPNL provides the pathway for power within the State. RVPNL owns, builds, maintains and operates the high-voltage electric transmission system that helps to keep the power supply in the State. RVPNL also owns the shared generating projects as representative of erstwhile RSEB. RVPNL is an "ISO 9001:2008 Certified Company" and also RVPNL's Meter Testing Laboratories at Jaipur and Udaipur are now "ISO/IEC 17025:2005 Certified".

8.26 The outlays kept for the Twelfth Plan & the Annual Plan 2013-14, likely expenditure incurred in 2013-14 and outlay proposed for the Annual Plan 2014-15 for the activities of RVPNL are as given in the following table:

**Table No. 8.6**  
**Proposed Financial Outlays**

(₹ in crore)

S.N.	Head	Outlay Twelfth Plan	Outlay 2013-14	Likely Exp. 2013-14	Proposed Outlay* 2014-15
1.	Generation	100.00	20.00	6.28	20.00
2.	Transmission	12500.00	2530.00	1626.83	2430.00
	<b>Total</b>	<b>12600.00</b>	<b>2550.00</b>	<b>1633.11</b>	<b>2450.00</b>

\* Approved by the Rajasthan Electricity Regulatory Commission.

8.27 The physical targets kept for the Twelfth Plan, targets & likely achievement in 2013-14 and targets proposed for the Annual Plan 2014-15 are given in the following table:

**Table No.8.7**  
**Proposed Physical Target**

S. No.	Scheme	Unit	Target Twelfth Plan	Target 2013-14 (Revised)	Ach. (upto March, 14)	Proposed target 2014-15
I	<b>Transmission</b>					
	765 KV Sub-station	MVA Nos	7500 2	-----	-----	3000 2
	765 KV Lines	ckt.kM	426	426	425.498	-----
	400 KV Lines	ckt.kM	5800	425	259.350	980
	400 KV Sub-stations	MVA Nos	5040 8	630 2	-----	1260 1
	220 KV Lines	ckt.kM	3650	550	430.369	750
	220 KV Sub-stations	MVA Nos	4600 40	920 8	1200 7	920 8
	132 KV lines	ckt.kM	2150	425	373.244	425
	132 KV Sub-stations	MVA Nos	2875 100	550 20	587.50 18	575 20
II	<b>Augmentation</b>	MVA	7500	1800	2949	1500
III	<b>Capacitor Banks</b>	MVAR	150	75	81.45	150

8.28 During 2013-14, the work on evacuation schemes of Chhabra Supercritical TPS, Kalisind TPS, Suratgarh Supercritical TPS, Kawai Supercritical TPS & Solar and Wind Power is under progress. The work on evacuation scheme of Ramgargh GTPS (160 MW) has been completed in 2013-14. More transmission schemes related to forthcoming generation stations and for expansion of transmission system are approved and have been included in the Annual Plan 2014-15.

8.29 Besides above, looking to the load growth the expansion in transmission system and augmentation of capacity of existing EHV GSS is required.

8.30 An outlay of ₹ 2430.00 crore is proposed for transmission works during the year 2014-15. During 2014-15 the work on evacuation schemes of Chhabra Supercritical TPS, Kalisind TPS, Suratgarh Supercritical TPS, Kawai Supercritical TPS & Solar and Wind Power will be in full swing.

8.31 During 2014-15 major expenditure will be on construction of evacuation schemes which includes 765 kV and 400 kV transmission systems covered under various evacuation schemes.

8.32 Besides above, looking to the load growth the expansion in transmission system and augmentation of capacity of existing EHV GSS is required. During 2014-15 RVPNL has planned to commission 1 No. of 400kV and 8 Nos. of 220 kV GSS and 20 Nos. of 132 kV GSS along with their associated lines. An addition of 1500 MVA transformer capacity under augmentation programme is also proposed in the Annual Plan 2014-15.

**Transmission Projects under PPP mode:**

8.33 Looking to the huge requirement of funds for the power sector and to facilitate smooth and rapid development of transmission capacity, a part of investment is being sought from the private sector. RVPNL is implementing various transmission projects on BOOM basis.

8.34 A State Level Empowered Committee (SLEC) was constituted with a view to encourage competition in private sector participation for development of transmission projects in the State of Rajasthan.

8.35 In pursuance to the decisions of SLEC, the following transmission projects were taken up in First Phase.

**Table No. 8.8**

S. No.	Particulars of Project on BOOM basis	Estimated cost in Crore ₹	Name of SPV	Successful Bidder	Quoted Levelised Charges in Million of ₹	Date of Award
1	RAJ/PPP-1 : 400 kV S/C Bikaner – Deedwana – Ajmer Line alongwith 400 kV GSS at Deedwana and associated schemes / works.	285.00	Maru Transmissi on Service Company Limited	M/s GMR Energy Ltd.	327.84	15.2.11
2	RAJ/PPP-2 :400 kV S/C Hindaun – Alwar Line alongwith 400 kV GSS at Alwar and associated schemes / works.	188.32	Aravali Transmissi on Service Company Limited	M/s GMR Energy Ltd.	203.97	19.1.11
3	RAJ/PPP-3 : 220 kV S/C Sikar – Nawalgarh – Jhunjhunu Line alongwith 220 kV GSS at Nawalgarh and associated schemes / works.	36.28	Shekhawati Transmissi on Service Company Limited	M/s EMCO Ltd.	80.36	25.2.13

8.36 The work of above projects are in full swing and are likely to be completed in financial year 2014-15.

8.37 Further the two nos. Transmission projects i.e. 400 kV D/C Babai (Jhunjhunu) – Jaipur (North) Line along with 400 kV GSS at Jaipur (North) and 400 kV D/C Jodhpur (New) – Udaipur Line along with 400 kV GSS at Udaipur with associated schemes works will be taken up in second Phase.

8.38 In addition to the above, 400kV D/C twin moose Bikaner-Sikar line is also being considered in PPP mode under Viability Gap Funding (VGF). M/s Tata Consulting Engineers Ltd. in association with M/s PWC have been awarded contract for preparation of draft feasibility report including cost estimates, RFP and RFQ documents.

### III. DISTRIBUTION COMPANIES:

8.39 The three distribution companies viz. Jaipur, Ajmer and Jodhpur are responsible to provide services to all categories of consumers in their jurisdiction in the State. These companies are also making investments in expansion of distribution network and rural electrification.

8.40 An outlay of ₹ 12867.25 crore was kept for all the three distribution companies for the Twelfth Plan. An expenditure of ₹ 5702.04 crore has been incurred in 2013-14 against an outlay of ₹ 3907.91 crore. An outlay of ₹ 5089.340 crore is proposed for the Annual Plan 2013-14. Company-wise details are given in the following table:

**Table No. 8.9**  
**Proposed Financial Outlays**  
**(₹ in crore)**

S. No.	Distribution Company	Outlay Twelfth Plan	Outlay 2013-14	Likely Exp.* 2013-14	Proposed for 2014-15
1.	Jaipur	5028.00	1531.32	2608.72	2153.10
2.	Ajmer	3810.87	1188.33	1707.03	1390.34
3.	Jodhpur	4028.38	1188.34	1926.29	1545.96
	<b>Total</b>	<b>12867.25</b>	<b>3907.99</b>	<b>5702.04</b>	<b>5089.40</b>

\* ₹120.00 crore of CFL is included in likely expenditure 2013-14

8.41 Following schemes are proposed to be taken up by the distribution companies during the Annual Plan 2014-15.

#### 1. Sub Transmission & Distribution Work

8.42 Under this scheme, strengthening the system as well as improving the technical parameters of the sub transmission and distribution system activities such as creation of 33/11 KV Sub-station with associate lines, installation of 11/0.4 KV distribution & transmission, erection of 11KV and LT lines etc are to be taken up. For strengthening the power system,

11kV lines for inter connection of feeders are also being erected. An expenditure of ₹ 1661.82 crore has been incurred in 2013-14 against an outlay of ₹ 1450.00 crore. An outlay of ₹ 728.00 crore is proposed for the Annual Plan 2014-15.

## **2. Rural Electrification Works**

8.43 Under the scheme, new agricultural connections are released including extension of 11kV line, installation of 11/0.4 KV Sub-stations along with associated LT lines. Domestic connections for households in Dhanis having population up to 100 persons will also be released under Mukhyamantri Sab Ke Liye Bijali Yojana. An expenditure of ₹ 1880.22 crore has been incurred in 2013-14 against an outlay of ₹ 1633.00 crore. An outlay of ₹ 785.00 crore is proposed for the Annual Plan 2014-15.

## **3. Restructured Accelerated Power Development and Reforms Programme (R-APDRP)**

8.44 It consists of two parts. Part-A includes the projects for establishment of baseline data and IT applications for energy accounting/auditing & IT based consumer service centers. Part-B includes regular distribution strengthening projects.

### **R-APDRP Part-A:**

8.45 Total 87 towns were identified under Part-A of the programme and following schemes were approved:-

**Table No. 8.10**

<b>Discom</b>	<b>Approved Cost (₹ in Crore)</b>	<b>Towns covered</b>
Jaipur	33.00	27
Ajmer	30.00	29
Jodhpur	89.04	31
<b>GRAND TOTAL</b>	<b>152.04</b>	<b>87</b>

8.46 The 5 towns have been declared Go live. Work has not been completed by M/s HCL Info systems except deployment of hardware and development of initial stage of software.

8.47 As per the guidelines issued by GoI, the scheme of SCADA is to be implemented in the towns having population more than 4 lakh and annual input energy of the order of 350 MUs. The following schemes have been sanctioned by PFC:

**Table No. 8.11**

<b>Name of SCADA city / Discom</b>	<b>Total DPR cost (₹in Lakhs)</b>
Jaipur ( Jaipur Discom)	5232.00
Kota ( Jaipur Discom)	2460.00
<b>Total Jaipur Discom,</b>	<b>7692.00</b>
Bikaner ( Jodhpur Discom)	2593.00
Jodhpur ( Jodhpur Discom)	3277.00
<b>Total Jodhpur Discom</b>	<b>5870.00</b>
Ajmer ( Ajmer Discom)	2149.00
<b>Total</b>	<b>15711.00</b>

8.48 M/s Kalki Tec has been appointed as SCADA Consultant in Feb, 2010. Award of contract has been placed upon M/s Dongfang. The firm has completed the site survey work. The factory acceptance test will be done by March, 2014. The pilot sub-station of all 5 towns is under progress.

#### **R-APDRP PART-B:**

8.49 Out of 27 towns of Jaipur Discom eligible for funding under RAPDRP, 23 towns having AT&C losses more than 15 per cent have been selected for execution of the programme. 22 Schemes with an estimated cost of ₹ 465.23 crore have been sanctioned by PFC whereas scheme for Chomu town is not viable due to less IRR as per PFC. Base line losses of all towns have been verified by TPIEA-EA in Sept., 2011. The completion period has now been extended by Ministry of Power up to March, 2016. An expenditure of ₹ 132.72 crore has been incurred till March, 2014 against the release of ₹ 69.81 crore by PFC.

8.50 Under Ajmer Discom 29 Schemes with an estimated cost of ₹ 391.09 crore have been sanctioned by PFC. An expenditure of ₹ 45.25 crore has been incurred till Feb. 2014 against the release of ₹108.33 crore by PFC.

8.51 Under Jodhpur Discom 30 Schemes with an estimated cost of ₹ 684.17 crore have been sanctioned by PFC. The town Abu Road is having losses below 15%, hence not considered eligible under RAPDRP Part-B Program. An expenditure of ₹ 125.00 crore has been incurred till Feb. 2014 against the release of ₹ 102.63 crore by PFC.

#### **Central Assistance Schemes:**

##### **Rajiv Gandhi Gramin Vidyutikaran Yojana (RGGVY)**

8.52 As per objective of the scheme, all the villages/hamlets had to be electrified during the next 5 years and provide access of electricity to

rural households including BPL families. Connections to BPL families had to be given free of cost. Under the scheme, 90 per cent of the cost is being provided as grant by the Central Government and balance 10 per cent as loan. Rural Electrification Corporation is nodal agency for implementation of this scheme. The salient features of the scheme are as follows:

- Villages are being electrified as per new definition of village electrification effective from April, 2004.
- District-wise schemes incorporating electrified, un-electrified villages and dhanies are framed.
- Funds @ ₹ 13.00 lakh per village (₹ 18.00 lakh for desert/hilly area) for village electrification and @ ₹ 4.00 lakh per dhani (₹ 6.00 lakh for desert/hilly area) for intensive electrification are being provided.
- Introduction of franchisee system after electrification of villages otherwise conversion of grant into loan.
- The schemes are being implemented on Turn-key basis.

8.53 Under RGGVY, 40 schemes have been sanctioned with estimated cost of ₹ 1331.18 crore. A sum of ₹ 55.37 crore has been spent till March, 2014 against the release of ₹ 1108.68 crore by REC. The progress under the programme is as follows:-

**Table No. 8.12**

S. No.	Year	No. of Village Electrified	Connection to BPL Family	Connection to APL Family	Total Family
1	2008-09	158	237727	212917	450644
2	2009-10	869	256161	151500	407661
3	2010-11	741	201107	98825	299932
4	2011-12	461	99247	30957	130204
5	2012-13	274	92579	28362	120941
6	2013-14	47	23784	13082	36866

**Table No. 8.13**

Item	Proposed Coverage	Achievement up to Feb, 2014
Un/de-electrified Villages	4239	4178
Intensive Electrification of Villages	33737	33480
Electrification of Dhanis	11588	11515
Connection to BPL Households	1181284	1165983
Connection to APL Households	583922	727633

8.54 In the Twelfth Plan the State Government had to submit 34 projects on the actual field survey for approval to the Central Government for

electrification of hamlets having population of 100 to 300 out of these 28 project of total cost ₹ 1453.00 crore have been sanctioned and remaining five schemes have been submitted to REC for sanction. Remaining one project of Barmer district is under preparation. These projects will benefit around 13.35 lakh families including 4.43 lakh BPL families. An expenditures of ₹ 51.85 crore has been incurred in 2013-14 against an outlay of ₹ 150.00 crore. An outlay of ₹ 175.00 crore is proposed for the year 2014-15.

## **D RENEWABLE ENERGY SOURCES**

8.55 Renewable energy has to play an expanding role in achieving energy security and access in the coming years. The National Action Plan for Climate Change has envisages that the share of renewable electricity in the electricity mix should be 12 per cent by 2016-17. Power generation from Renewable Energy Sources is environmental friendly and saves the environment from global warming. Rajasthan Renewal Energy Corporation is the State Nodal Agency for promotion of New & Renewal Energy Sources, energy conservation and implementation of the schemes of the Central Government in the State. The Corporation was established in August, 2002 with the merger of erstwhile Rajasthan Energy Development Agency (REDA) and Rajasthan State Power Corporation Ltd. The State Government has been according priority for development of Renewable Energy Sources. Following policies have been launched by the State Government in the field of energy for development of renewable energy sources in the State.

- Policy for promoting, generation of electricity through non-conventional energy source-2004.
- Policy for Promoting Generation of Electricity from Biomass 2010
- Rajasthan Solar Energy Policy, 2011
- Policy for promoting generation of electricity from wind, 2012

8.56 An outlay of ₹ 1000.00 lakh was kept for the Twelfth Plan. An outlay of ₹ 15714.06 lakh is proposed for the Annual Plan 2014-15, this includes central assistance of ₹ 5334.00 lakh. The Rajasthan Renewal Energy Corporation is mainly implementing following two programs.

### **1. SPV Pumping Systems**

8.57 SPV Pumping System was introduced by the State Government on pilot basis in 2010-11 in horticulture sector. Under this scheme, 86 per cent subsidy was provided to the beneficiaries in which 30 per cent subsidy component through off-grid solar application program of MNRE, GoI under JNNISM and 56 per cent through Rastriya Krishi Vikas Yojana (RKVY)/GoR. Subsidy under RKVY has been reduced to 30 per cent from the year 2014-15 Till date about 12900 SPV Pumping Systems have been installed in farming fields using drip irrigation upto July, 14. Remaining



work of balance 3100 Nos. SPV Pumps of programme 2013-14 is in progress. This programme is being implemented by Horticulture Department in Rajasthan.

## **2. Solar Power**

8.58 Rajasthan is blessed with maximum solar radiation intensity about 6-7 KWh/m<sup>2</sup>/day and maximum sunny days (more than 325 days) in a year with very low average rainfall and capable of producing millions Giga Watts of electricity from solar. Thus the state known for its dry desert is now fast emerging as the biggest hub of solar power due to the effective Rajasthan Solar Energy Policy 2011. Solar plants will be set up in the State under the National Solar Mission and Rajasthan Solar Energy Policy 2011. It is expected that an additional power capacity of 3000 MW would be set up during the XII Plan with private investment of ₹ 22500.00 crore. Thus, 3725 MW solar power capacity would be available by the end of XII Plan. Solar Power Generation Plants of 480.50 MW capacity has been established by 31<sup>st</sup> March, 2014 in the State.

## **3. Wind Power**

8.59 Till 31<sup>st</sup> March, 2014, 2797.85 MW capacity Wind Power Plants have been established against a total technical potential of 5400 MW. To further exploring the wind potential in the State, it is proposed to carry out wind assessment studies at 30 more locations during the XII Plan under financial support program of the Central Government. The State Transmission Utility is developing strong transmission network in the western region of the State. The State Regulatory Commission has also prescribed a minimum renewable energy purchase obligation in the State. Rajasthan Renewable Energy Corporation Ltd. has established, three Wind Power Plants of total capacity 6.35 MW at Jaisalmer, Phalodi and Devgarh. In addition to this, Wind Power Plants of capacities of 25 MW, 10.2 MW and 10.2 MW have also been established in the year 2004, 2006 and 2010 respectively. It is expected that an additional capacity of 1500 MW wind power would be generated during the next three years with the support of private sector to meet the RPO targets fixed by RREC for State Discoms in these financial years.

## **4. Biomass Power**

8.60 As per orders of the State regulatory commission, studies regarding availability of surplus biomass such a mustard stalk, rice husk & other agro wastes as well as Juliflora, which can be utilized to run power plant was conducted in all the districts of the State during the year 2010-11. Further fresh study is being conducted shortly for financial year 2014-15 & 2015-16. Biomass Power Generation Plants of 99.30 MW capacity have been established by 31<sup>st</sup> March, 2014 in the State.

## **5. Energy conservation Program**

8.61 Energy Conservation is one of the very important demand side management tool through which energy can be saved efficiently i.e. without affecting performance. One unit of energy saved is equivalent to 1.5 units generated. With this concept, the supply side capacity addition can be avoided. 'Rajasthan State Energy Conservation Fund' has been created for execution of energy conservation activities. The fund is administered by a State Level Steering Committee. Different Government Departments are being funded to take up Energy Conservation demonstration projects to show case the energy savings through new technologies. Following energy conservation activities are being taken up under the program:

- Development of Energy Resource Centre at Malviya National Institute of Technology, Jaipur.
- Installation of turbo ventilators under new technology program
- Replacement of existing incandescent bulbs by LED bulbs under LED village campaign.
- Industrial Area Street Lighting Program
- Demonstration projects of LED/Xenon based street lights at various ULBs to showcase the energy savings
- Energy auditing of Government buildings/offices
- Implementation of energy audit findings under Energy Efficient Government Building Program
- Commercial building energy auditing program
- Preparation of DPRs of waste heat recovery in medium and large industries
- Installation of solar water heating systems at various hostels
- Advertisements of star rated products and their saving potential etc.

8.62 As per available Plan ceiling for 2014-15, RREC will be able to cover similar activities further under Energy Conservation Programme as being taken under 2013-14.

## **6. Electrification through Solar in Rural Area:**

8.63 Far Flung villages of the State, where population is less and process of arranging grid availability in these areas is costly option and those areas where reliable power supply is not being provided. For such places, government has announced, during budget 2014-15 to take up programme for electrification and providing reliable power to such villages/places using local solar grid and stand alone solar systems. This programme will be implemented after framing guidelines in consultation with DISCOMs. An outlay of Rs. 10000.01 lakh is proposed for the Annual Plan 2014-15.

## Central Assistance Schemes:

### 7. Rural Electrification Program:

8.64 The main objective of the program is to create awareness and popularizing use of Solar Photovoltaic Systems in the State with a view to achieve 100 per cent household electrification in the rural area of the State. Till 2012-13, RREC used to popularize PV systems by installation of SPV Domestic Lighting Systems which consists of 37 watt SPV module, 40 Ah battery, 2 Nos. 9 watt CFL fixture and Balance Of Systems (BOS). This system is used in illumination purpose only. This system is widely accepted in the State as this is very useful in areas where power grid is not available and also in the areas where public is facing problem during power cut. The cost of the present system was ₹ 9780, out of which 30% subsidy amounting ₹ 2934 per DLS was provided. Balance cost of ₹ 6846 was borne by the beneficiary.

8.65 During 2014-15, RREC has taken up promotion of higher PV capacity systems up to 1 kW PV capacity in rural as well as urban area of the State. RREC proposes to take up programme of 5000 KW PV capacity systems installations during 2014-15.

8.66 Following are the six models of systems of different PV capacity opted for installation under this programme:

S. No.	System Details :	PV Capacity of each system:	Tentative Numbers	Total PV Capacity in kW
1.	37 Wp SPV HLS (Model-ii) (with 2 CFLs of 9W p each)	37 Wp	5000	185
2.	24 Wp SPV HLS (with Four LED Fixtures)	24 Wp	5000	120
3.	100 Wp SPV System (with 3 CFLs of 11Wp each+ DC Fan +Mobile Charger)	100 Wp	5050	505
4.	250 Wp SPV System	250 Wp	2760	690
5.	500 Wp SPV System	500 Wp	3000	1500
6.	1000 Wp SPV System	1000 Wp	2000	2000
			TOTAL :	5000

8.67 As this programme is based on available sanction of MNRE for 30% CFA, presently RREC is having sanction of 2MW PV capacity of 1 kW each from MNRE, GoI. The sanction of other systems is awaited from MNRE, GoI. The programme size will be as per available sanction from MNRE, GoI.

### 8. Roof Top Solar Power Generation Scheme:

8.68 State Government has also taken initiative to promote use of Power generated through SPV technology in area of other than individuals and announced Roof Top Solar Power Generation scheme for four cities i.e Jaipur, Jodhpur, Kota and Ajmer with 30% subsidy support being

provided by MNRE under Jawaharlal Nehru National Solar Mission (JNNSM). Under this scheme, institutions, industries, hotels/resorts, hospitals/nursing homes, government organizations and commercial organizations can take up installation of SPV Roof Top systems with support of subsidy being provided by RREC. During 2014-15, RREC has taken up target of installation of 6 MW PV capacity in these four cities. MNRE, GoI has already issued sanction for 5 MW capacity systems for Jaipur, Jodhpur and Ajmer cities and 1 MW capacity for Kota city to RREC.

## **9. Wind Resource Assessment Programme:**

8.69 The main objective of the programme is to estimate wind power potential in the area for setting up of wind power projects. Wind Resources Assessment is carried by installation of Wind Monitoring Station (Wind Mast) of different height for a period of minimum two years. During this period various parameters like velocity, direction, temperature, pressure of wind are measured and recorded. These data are analysed and used for calculation of assessment of wind power potential in that area. Based on this assessment wind power project capacity decided and installed.

8.70 The Wind Resource assessment programs in India are conducted by Ministry of New & Renewable Energy through Centre for Wind Energy Technology (CWET), Chennai. The C-WET earliest has conducted programs to study wind power at various height in india at 20M/25M, 50M & 80M height and issued wind atlas. Currently C-WET is conducting WRA-2011-12 Programme for study of wind power at 100 m level height.

8.71 During XII Plan, the Ministry of New & Renewable Energy (MNRE) has an ambitious target of 30,000 MW capacity additions through grid connected renewable power. In order to achieve the target of 15,000 MW from wind. The current proposal envisages implementation of Assessment of Wind Power Potential at 100 Meter level in 500 selected locations in 24 States through installation and commissioning of wind masts along with instrumentation from the funds available under NCEF. The project proposal will be implemented by Centre for Wind Energy Technology (C-WET), Chennai. Out of 500 Nos location 30 Nos locations are in Rajasthan.

8.72 The project will be implemented by funding in a ratio of 40% by MNRE with the help of fund available from National Clean Energy Fund (NCEF), 30% by State and balance 30% by Wind Power Developers.

8.73 The cost of 30 Nos. Wind Mast is estimated ₹ 600 Lakh @ ₹ 20.0 Lakh/per wind mast. The RREC being a State Nodal Agency has calculated the share of Rajasthan State as 30% cost is ₹ 180 Lakh and MNRE (Central Govt.) as 40% is ₹ 240 Lakh. Which implicate a cost of ₹ 420 Lakh to the Government (State & Central).