

## A REVIEW OF ELECTRICITY STATE IN RAJASTHAN

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### ABSTRACT

*This paper provides a review of the progress made by Rajasthan in strengthening its power sector and to deal with the problems of village electrification and meeting the demand supply gap. In this paper we have also discussed how Rajasthan has been able to tap its renewable energy resources and the problems that are still unattended in this area. In this paper year wise contribution of various sources in the available installed capacity has been discussed sector wise. Distribution of power sector has been provided for the installed capacity so that the contribution made by state, private and central sectors in various sources can be analyzed.*

**Keywords:***Rajasthan, electrification, solar energy, power sector.*

### I. INTRODUCTION

Power sector of a state plays vital role in its sound commercial growth. Rajasthan has strengthened its power sector and it is due to this reason that many private players are attracted towards Rajasthan. Rajasthan being India's largest state by area enjoys a solar radiation of the range 4 to 6 kWm<sup>-2</sup> day<sup>-1</sup>. Rajasthan is blessed with these renewable energy conserves that are available in abundance. In this paper we have discussed the performance of Rajasthan's state power sector in the past couple of years. We have discussed various sectors and sources which have been the foundation of Rajasthan's power sector growth. Rajasthan has developed a good renewable energy policy that has led to appreciable growth in installation of renewable energy projects. In this paper, we can see in the data provided how Rajasthan power sector has been able to lower its energy deficit and meet up its peak load demands. An overview of Rajasthan power sectors growth has been provided which helps us in tracking its future challenges and remedies.

Table 1 Contribution of various sources in installed capacity of Rajasthan from 2012-2018 in MW

Year	Thermal	Nuclear	Hydro	RES	Grand Total
2012	5879.48	556.74	1515.38	2356.84	10308.44
2013	7086.97	556.74	1548.95	3084.09	12276.75
2014	9658.96	556.74	1626.21	3377.64	15229.55
2015	9780.01	556.74	1663.51	3916.61	15926.87
2016	10225.75	573.0	1729.49	5425.20	17953.44
2017	10225.75	573	1829.49	5677.46	18303.70
2018	11730.15	556.74	1930.97	6736.68	20954.54

Table 2 Installed capacity 2018

Sector	Mode wise breakup							
	thermal				Nuclear	Hydro	Res	G.T
	Coal	Gas	Diesel	Total				
STAT E	5850	603.8	0	6453.8	0	411	23.85	6888.65
PRIVA TE	2400	0	0	2400	0	0	6418.83	8818.83
CENT RAL	250	419.33	0	669.33	1180	0	294	2143.33
GRAN D TOTA L	8500	1023.13	0	9523.13	1180	411	6736.68	17850.81

It can be seen from the table 1 that total installed capacity for the year 2018 is almost twice the installed capacity of 2012. It shown the progress made by Rajasthan in the past six years. The hydel power projects and the nuclear power projects has made a slow or almost negliable growth on the other hand. Thermal and renewable

energy sources have made the major contribution. The contribution of thermal sources has almost doubled from that in 2012 to 2018. For the year 2018 there has been almost 15% growth in the installed capacity of thermal sources which contribute to 55% of the total installed capacity. Renewable energy sources have also made their contribution in strengthening the power sector of Rajasthan and have almost tripled its installed capacity from 2012 to 2018. For the last year only almost 1000 MW of renewable energy sources have been installed. RES are almost 30% of the total installed capacity for the year 2018.

Table 3 Contribution of various sectors in available installed capacity of Rajasthan excluding renewable for years 2012-2018

year	state	shared	central	private	total
2012	4097.35	972.95	2265.30	616.0	7951.6
2013	4207.35	947.95	2576.48	1460.00	9191.78
2014	4457.35	947.95	2796.66	2792.00	10993.96
2015	5357.35	853.44	2803.47	2986.00	12000.26
2016	6781.76	811.26	2549.95	3196.00	13338.97
2017	6881.76	811.45	2550.49	3196.0	13439.7
2018	7541.76	811.45	2690.1	3986.0	15029.3

The above table 3 provides us contribution of various sectors in the available installed capacity of Rajasthan. State sectors share is almost 50% of the total installed capacity of Rajasthan. There has been steady growth in the installed capacity under state sector. There has been a 10% increase in the state sector's installed capacity for year 2017 to 2018. Other than state sector, private players have also shown a remarking progress. The private sector has become six times to that it used to be in 2012, for the year 2018 the share of private sector in the installed capacity of Rajasthan is almost 26%. In last year only the private sector growth rate has been almost 30% other than state and private sector the growth rate in the shared and central sector is very less. The percentage share state sector is 50%, private sector is 26%, central sector is 18% and that of shared sector is 5%.

## II. DEMAND SUPPLY POSITION-

Table4. Peak demand and deficit/surplus status

period	Peak demand	Peak met	Peak deficit/ surplus	Peak deficit/ surplus (%) (-/+)
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	(MW)	(MW)	(MW) (-/+)	
2007-2008	6374	5564	-810	-12.7
2008-2009	6303	6101	-202	-3.2
2009-2010	6859	6859	0	0
2010-2011	7729	7442	-287	-3.7
2011-2012	8188	7605	-583	-7.1
2012-2013	8940	8515	-425	-4.8
2013-2014	10,047	10,038	-9	-0.1
2014-2015	11,000	10,271	-729	-6.6
2015-2016	11,000	11,128	128	1.2
2016-2017	11,500	11,610	110	1.0
2017-2018	11,490	12,382	892	7.8

Table 5: Energy deficit and surplus in Rajasthan

Period	Energy requirement	Energy availability	Energy deficit/ surplus (MU) (-	Energy deficit/ surplus (%) (-/+)
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	(MU)	(MU)	/+)	
2007-2008	36738	35597	-1141	-3.1
2008-2009	37797	37388	-409	-1.1
2009-2010	44109	43062	-1047	-2.4
2010-2011	45261	44836	-425	-0.9
2011-2012	51474	49491	-1983	-3.9
2012-2013	55538	53864	-1670	-3.0
2013-2014	58202	58042	-160	--0.3
2014-2015	62540	57197	-5343	-8.5
2015-2016	72,132	74,470	2338	3.2
2016-2017	72,070	71,900	-170	-0.2
2017-2018	72,535	77,291	4756	6.6

from the above table we can see that the energy demands of Rajasthan for the period 2007-2017 has been in deficit but with continuous efforts Rajasthan has achieved a surplus 4756 MU in year 2017-2018. Which is almost 6.6% this shows the progress made by Rajasthan to meet the requirement of its users and lower the gap between the energy requirement and energy availability. Also the above table shows the scenario of peak demand (MW) and peak met (MW). From the table we can see that from the year 2015-2016. Rajasthan has

been able to meet its demand during the peak durations and is in a strong position in this area too. For the year 2017-2018 a surplus of 892 MW which is almost 7.8% was available.

### **III. CHALLENGES AND FUTURE TARGETS-**

With the increasing population and rise in demand of technology it has become necessary to keep up with growth of the power sector. It is not only the growth of power sector which is necessary we should also emphasis on the usage of energy efficient equipments that will allow bring the growth rate. Bringing our requirement down can help us in mending the huge gap of our future requirements and availability. It is also necessary for us to target renewable energy sources. For Rajasthan has shown a tremendous growth in its renewable sector, still there is an abundant of these resources available to Rajasthan. Rajasthan can provide a bench mark for energy efficiency model to all the other states. Rajasthan has been able to electrify all of its inhabitant villages, a target which was achieved in the November of 2017. State government has shown a consistency in the growth rate of installed capacity of power sector and it is only through these efforts that Rajasthan's power sector has strengthened. It is also necessary that local skill is developed for proper repair and maintenance of the system for an efficient running.

### **IV. CONCLUSION-**

If we see the overall power sector scenario of Rajasthan, then we can conclude that Rajasthan has been able to develop in all perspectives to strengthen its power sector. It is through the continuous growth that Rajasthan has almost doubled. It's installed capacity from year 2012 to 2018. The state and private sectors whose share is almost 50% and 25% respectively are the foundation of the growth shown. Also renewable energy has played a vital rate in the growth of Rajasthan power sector with a share of almost 30%. But there is strong need to emphasis on the effective maintenance and skill development so that maximum efficiency can be achieved from it. Rajasthan has been able to fill the gap of its energy requirement and availability and now produces 6.6% surplus. Rajasthan has achieved 100% electrification of villages under the Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY). Now, it is necessary to develop a proper distribution network in order to reduce Transmission and distribution losses and also reducing theft. It is also necessary to promote usage of off grid, rooftop and grid connected installations of solar for better results.

### **REFERENCES**

1. Installed capacity of Rajasthan 2012[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
2. Installed capacity of Rajasthan 2013[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
3. Installed capacity of Rajasthan 2014[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>

4. Installed capacity of Rajasthan 2015[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
5. Ministryofpower[online].Available:[http://www.cea.nic.in/reports/monthly/installedcapacity/2016/installed\\_capacity-06.pdf](http://www.cea.nic.in/reports/monthly/installedcapacity/2016/installed_capacity-06.pdf)
6. Installed capacity of Rajasthan 2012[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
7. Installed capacity of Rajasthan 2013[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
8. Installed capacity of Rajasthan 2014[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
9. Installed capacity of Rajasthan 2015[online].Available: <http://www.rvpn.co.in/power-position/Installedcapacity.shtml>
10. Installed capacity of Rajasthan [online].Available:  
<http://energy.rajasthan.gov.in/content/dam/raj/energy/corporate-one-lines-viewer/pdf/PowerPosition/InstalledCapacity/IC16-17.pdf>
11. Installed capacity of Rajasthan [online].Available:  
<http://energy.rajasthan.gov.in/content/dam/raj/energy/corporate-one-lines-viewer/pdf/PowerPosition/InstalledCapacity/IC16-17.pdf>
12. Installed capacity of Rajasthan 2018 [online].Available:  
[http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed\\_capacity-02.pdf](http://www.cea.nic.in/reports/monthly/installedcapacity/2018/installed_capacity-02.pdf)
13. Load generation balance report [online]. Available: <http://www.cea.nic.in/reports/annual/lgbr/lgbr-2017.pdf>
14. Load generation balance report [online]. Available: <http://www.cea.nic.in/reports/annual/lgbr/lgbr-2016.pdf>
15. Installed capacity of Rajasthan 2018 [online].Available:  
[http://www.cea.nic.in/reports/monthly/installedcapacity/2017/installed\\_capacity-02.pdf](http://www.cea.nic.in/reports/monthly/installedcapacity/2017/installed_capacity-02.pdf)
16. Report – 24X7 Power for all. Joint initiative of *Government of India and Government of Rajasthan*, December 2014.
17. Load Generation Balance Report 2014-15[online].Available:  
<http://www.cea.nic.in/reports/annual/lgbr/lgbr-2014.pdf>
18. Load Generation Balance Report 2015-16[online].Available:  
<http://www.cea.nic.in/reports/annual/lgbr/lgbr-2015.pdf>