

Loss of 7 Billion Units power generation due to raw water shortage at coal based thermal power stations in India from June 2016 to April 2017

Coal based thermal power generation needs huge amounts of water. Water shortages have been affecting power generation at such plants on a regular basis. Manthan is monitoring such loss in generation on an ongoing basis. This brief note documents the loss in power generation at coal based power plants due to shortage of water.

This is based on the daily generation reports of the Central Electricity Authority, which also lists reasons for a power station not generating at the level indicated for the day.

Loss of power generation from 16th June 2016 to 25th April 2017

A total of 13 coal based thermal power facilities in India faced loss of power generation due to raw water problems (this is how CEA lists the problems with regards shortage of water). Out of 13 coal based thermal power stations 11 are inland plants, and two are coastal. In total 24 units with installed capacity of 9483 MW were affected due to raw water shortage related problems. The total loss due to closure of these units due to water shortages during the time period 15th June 2016 to 25th April 2017 was 7151.51 MU (at 80% PLF). It should be noted that several of these units also faced closure for additional days in this time period due to other reasons. However, we have not taken into consideration the loss in generation due to closure for reasons other than water shortage. The details are given in the following table.

Table 1: Coal based thermal power stations / units and the loss of generation in hours and Million Units (MU) during 1st July 2016 to 25th April 2017¹

Sr. No.	Plant Name	Unit	State	Owner	Capacity (MW)	Hours of Closure due to Raw water problem	Loss power generation in MU at 80% PLF
1	OP JINDAL TPS	4	Chhattisgarh	Jindal Power Limited	250	247.08	49.42
2	RATIJA TPS	1	Chhattisgarh	ACB(India)Limited	50	523.73	20.95
3	SVPL TPP	1	Chhattisgarh	ACB(India)Limited	63	714.12	35.99
4	PARLI TPS	3	Maharashtra	MAHAGENCO	210	6936.00	1165.25
5	PARLI TPS	4	Maharashtra	MAHAGENCO	210	4176.00	701.57
6	PARLI TPS	5	Maharashtra	MAHAGENCO	210	4176.00	701.57
7	PARLI TPS	6	Maharashtra	MAHAGENCO	250	2565.85	513.17
8	PARLI TPS	7	Maharashtra	MAHAGENCO	250	2352.00	470.40
9	PARLI TPS	8	Maharashtra	MAHAGENCO	250	2130.25	426.05
10	Tirora TPS	1	Maharashtra	Adani Power	660	354.18	187.01
11	Tirora TPS	2	Maharashtra	Adani Power	660	337.98	178.46
12	Tirora TPS	5	Maharashtra	Adani Power	660	360.00	190.08
13	RAICHUR TPS	7	Karnataka	KPCL	210	858.63	144.25
14	SALAYA TPP	1	Gujarat	Essar Energy Limited	600	224.48	107.75

¹Compiled from Daily Generation Reports of power facilities in India by Central Electricity Authority.

15	SALAYA TPP	1	Gujarat	Essar Energy Limited	600	84.78	40.70
16	STERLITE TPP	2	Odisha	Sterlite Energy Limited	600	2007.43	963.57
17	STERLITE TPP	1	Odisha	Sterlite Energy Limited	600	47.72	22.90
18	BELLARY TPS	2	Karnataka	KPCL	500	155.82	62.33
19	BELLARY TPS	1	Karnataka	KPCL	500	804.68	321.87
20	TALWANDI SABO TPP	1	Punjab	Talwandi Sabo Power Limited	660	806.97	426.08
21	TALWANDI SABO TPP	3	Punjab	Talwandi Sabo Power Limited	660	202.60	106.97
22	SIMHAPURI TPS	2	Andhra Pradesh	Simhapuri Energy Private Limited	150	2688.00	322.56
23	TUTICORIN TPS	1	TamilNadu	TANGENCO	210	783.47	131.62
24	TUTICORIN TPS	2	TamilNadu	TANGENCO	210	1080.00	181.44
25	TORANGALLU TPS(SBU-I)	1	Karnataka	Jindal Power	260	72.05	14.99
				Total	9483	Total	7486.94

Note: Where the outages due to water shortage are not in one continuous period but have been at multiple times, with the plant coming online and then going offline again, separate entries have been made for each such outage period.

In some cases, a unit closed down due to water shortages, and then remained closed, but the reason for the closure changed from raw water shortage to something else like reserve shut down, low schedule, maintenance issues etc. In such cases, we suspect that the unit continued to be affected by water shortages (in some cases this has been corroborated by other reports), but for the table above, we have considered only the period where outages have been attributed to raw water shortage. Parli TPP (except unit 8) is an example of this.

Thus, our estimate of loss in generation due to water shortages is a conservative estimate.

Status of major reservoir and river basins as on 25th April 2017.

According to the status of 91 major reservoirs in India given by Central Water Commission (CWC), as on 25th April 2017, 46.02 BCM water was available in these reservoirs which have a total of 157.79 BCM live capacity. This accounts to 29.16% of the total live storage. However, there are 20 major projects where water availability is less than 10% of their live storage. Out of these 20 major projects 16 are from Karnataka, Kerala, Tamil Nadu, Telangana and Andhra Pradesh. Almost all the major projects in middle and lower Krishna (Except Narayanpur reservoir in middle Krishna), Tungabhadra sub basin, Cauvery and Periyar river basins have less than 10% of live storage water. The southern states of Karnataka, Kerala, and Tamil Nadu have announced drought situation in several parts of the states For more details about water available in major 91 reservoir of India please refer Table 2 in the Annexure.

Thermal power stations which are likely to suffer due to raw water shortage during May-June 2017

Given this situation of various river basins, coal based thermal power stations in Karnataka including Kudagi thermal power station (800MW) of NTPC, Raichur thermal power station (1470MW), Yermarus thermal power station (800MW) of Karnataka Power Corporation Ltd are likely to get affected due to water shortages in the coming period. These thermal power stations are dependent on Almatti and Narayanpur reservoirs on river Krishna where water availability is 0% of live storage in Almatti and 14.72% of live storage in Narayanpur. This water has to meet multiple needs, not just of the thermal power plants.

The Dr. N. Tata Rao thermal power station (1760MW) of Andhra Pradesh Generation Corporation Limited downstream of NagarjunaSagar in Krishna river basin of Andhra Pradesh may also get affect with raw water shortages. Water availability at NagarjunaSagar is 0 % of live storage.

The Mettur thermal power station (1440MW) of Tamil Nadu Generation and Distribution Corporation Limited which is dependent on Mettur Stanley reservoir in Cauvery river basin of Tamil Nadu could also face raw water shortages. The Mettur Stanley reservoir has water only to 6.01% of live storage water.

Statement of Power Minister in Parliament related to raw water shortage and coal based thermal power stations

In response to an Unstarred question² in Lok Sabha on 16th March 2017 in relation to shortage of water in thermal power station, Shri Piyush Goyal, Minister of Power, Government of India, provided the following details about the number of units which had to undergo shutdown during certain periods due to non-availability of water and generation loss thereof.

Year	Number of Units	Loss of generation in MU
2013-14	16	5253
2014-15	9	1258
2015-16	15	4989
2016-up to Feb 2017	21	5870

Conclusion

Despite a good monsoon in northern and central part of India there are a number of power facilities which have faced raw water shortages. Given that several basins are facing an acute water shortage even today and that there are still a few weeks to go before the onset of the monsoon, it is likely that we will see more loss of generation at coal based power plants due to water shortages.

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²Unstarred question no 2419 asked by Dr. Satyapal Singh, Shri Sanjay Dhotre, Shri Rahul Shewale in Lok Sabha of Indian parliament was answered by Minister of Power on 16th March 2017. Web link :

<http://164.100.47.190/loksabhaquestions/annex/11/AU2419.pdf> accessed on 27th April 2017

Annexure

Table no. 1 List of 91 CWC monitored reservoirs in India with their live storage water availability as on 20th April 2017³.

Sl. No	Name	State	Live Capacity (BCM)	Current live storage (BCM)	% of of reservoir filled out of Live capacity
1	NAGARJUNA SAGAR	A.P & TG	6.841	0	0.00
2	ALMATTI	KARNATAKA	3.105	0	0.00
3	SHOLAYAR	TAMIL NADU	0.143	0	0.00
4	DANTIWADA	GUJARAT	0.399	0.004	1.00
5	KABINI(Sancherla Tank)	KARNATAKA	0.444	0.005	1.13
6	TUNGABHADRA	KARNATAKA	3.276	0.051	1.56
7	VANIVILAS SAGAR	KARNATAKA	0.802	0.021	2.62
8	BHADAR	GUJARAT	0.188	0.005	2.66
9	VAIGAI	TAMIL NADU	0.172	0.005	2.91
10	MALAPRABHA(RENUKA)	KARNATAKA	0.972	0.042	4.32
11	PARAMBIKULAM	TAMIL NADU	0.38	0.017	4.47
12	HEMAVATHY	KARNATAKA	0.927	0.047	5.07
13	METTUR(STANLEY)	TAMIL NADU	2.647	0.159	6.01
14	PERIYAR	KERALA	0.173	0.012	6.94
15	MANIKDOH (KUKADI)	MAHARASHTRA	0.288	0.02	6.94
16	BHADRA	KARNATAKA	1.785	0.149	8.35
17	LOWER BHAWANI	TAMIL NADU	0.792	0.069	8.71
18	YELDARI	MAHARASHTRA	0.809	0.072	8.90
19	SRISAILAM	A.P & TG	8.288	0.738	8.90
20	KRISHNARAJA SAGRA	KARNATAKA	1.163	0.112	9.63
21	GHATAPRABHA	KARNATAKA	1.391	0.155	11.14
22	MALAPMUZHA	KERALA	0.224	0.025	11.16
23	PENCH (TOTALADOH)	MAHARASHTRA	1.091	0.127	11.64
24	TEHRI	UTTRAKHAND	2.615	0.317	12.12
25	BHIMA(UJJANI)	MAHARASHTRA	1.517	0.191	12.59
26	SOMASILA	ANDHRA PRADESH	1.994	0.272	13.64
27	LINGANAMAKKI	KARNATAKA	4.294	0.595	13.86
28	NARAYANPUR	KARNATAKA	0.863	0.127	14.72
29	HARANGI	KARNATAKA	0.22	0.034	15.45
30	GOBIND SAGAR(BHAKRA)	HIMACHAL PRADESH	6.229	0.98	15.73
31	RAMGANGA	UTTRAKHAND	2.196	0.351	15.98
32	SHETRUNJI	GUJARAT	0.3	0.052	17.33
33	PONG DAM	HIMACHAL PRADESH	6.157	1.077	17.49

³ Compiled from weekly status report of 91 reservoir published at Central Water Commission of India.

34	ISAPUR	MAHARASHTRA	0.965	0.176	18.24
35	SRIRAMSAGAR	TELANGANA	2.3	0.444	19.30
36	KALLADA(PARAPPAR)	KERALA	0.507	0.098	19.33
37	IDUKKI	KERALA	1.46	0.292	20.00
38	ALIYAR	TAMIL NADU	0.095	0.02	21.05
39	MAYURAKSHI	WEST BENGAL	0.48	0.113	23.54
40	TAWA	MADHYA PRADESH	1.944	0.466	23.97
41	LOWER MANAIR	TELANGANA	0.621	0.154	24.80
42	KOYANA	MAHARASHTRA	2.652	0.682	25.72
43	TILAIYA	JHARKHAND	0.142	0.04	28.17
44	KAKKI	KERALA	0.447	0.127	28.41
45	JHAKAM	RAJASTHAN	0.132	0.038	28.79
46	KONAR	JHARKHAND	0.176	0.051	28.98
47	RANA PRATAP SAGAR	RAJASTHAN	1.436	0.42	29.25
48	IDAMALAYAR	KERALA	1.018	0.299	29.37
49	SALANADI	ODISHA	0.558	0.164	29.39
50	SABARMATI(DHAROI)	GUJARAT	0.735	0.217	29.52
51	DAMANAGANGA	GUJARAT	0.502	0.151	30.08
52	MACHKUND(JALPUT)	ODISHA	0.893	0.274	30.68
53	BARNA	MADHYA PRADESH	0.456	0.141	30.92
54	KANGSABATI	WEST BENGAL	0.914	0.283	30.96
55	INDIRA SAGAR	MADHYA PRADESH	9.745	3.052	31.32
56	DHOM	MAHARASHTRA	0.331	0.109	32.93
57	MULA	MAHARASHTRA	0.609	0.201	33.00
58	JAYAKWADI(PAITHON)	MAHARASHTRA	2.171	0.722	33.26
59	GIRNA	MAHARASHTRA	0.524	0.176	33.59
60	SUPA	KARNATAKA	4.12	1.423	34.54
61	MAHI BAJAJ SAGAR	RAJASTHAN	1.711	0.594	34.72
62	DUDHGANGA	MAHARASHTRA	0.664	0.238	35.84
63	BARGI	MADHYA PRADESH	3.18	1.164	36.60
64	KARJAN	GUJARAT	0.523	0.194	37.09
65	MATATILA	UTTAR PRADESH	0.707	0.263	37.20
66	PANAM	GUJARAT	0.697	0.261	37.45
67	UPPER TAPI	MAHARASHTRA	0.255	0.096	37.65
68	GUMTI	TRIPURA	0.312	0.125	40.06
69	HIRAKUD	ODISHA	5.378	2.161	40.18
70	BALIMELA	ODISHA	2.676	1.106	41.33
71	UPPER WARDHA	MAHARASHTRA	0.564	0.234	41.49
72	BHANDARDARA	MAHARASHTRA	0.304	0.128	42.11
73	MAHANADI	CHHATTIS GARH	0.767	0.325	42.37
74	RIHAND	UTTAR PRADESH	5.649	2.396	42.41
75	UPPER INDRAVATI	ODISHA	1.456	0.623	42.79
76	UPPER VAITARNA	MAHARASHTRA	0.331	0.144	43.50

77	TENUGHAT	JHARKHAND	0.821	0.376	45.80
78	UPPER KOLAB	ODISHA	0.935	0.447	47.81
79	BHATSA	MAHARASHTRA	0.942	0.455	48.30
80	UKAI	GUJARAT	6.615	3.215	48.60
81	KADANA	GUJARAT	1.472	0.822	55.84
82	PANCHET HILL	JHARKHAND	0.184	0.103	55.98
83	GANDHI SAGAR	MADHYA PRADESH	6.827	3.968	58.12
84	THEIN	PUNJAB	2.344	1.386	59.13
85	BANSAGAR	MADHYA PRADESH	5.166	3.092	59.85
86	MINIMATA BANGOI	CHHATTIS GARH	3.046	1.894	62.18
87	SARDAR SAROVAR	GUJARAT	1.566	1.069	68.26
88	MAITHON	JHARKHAND	0.471	0.331	70.28
89	RENGALI	ODISHA	3.432	2.48	72.26
90	GERUSOPPA	KARNATAKA	0.13	0.113	86.92
91	KHADAKVASLA	MAHARASHTRA	0.056	0.053	94.64
		Total	157.799	46.02	29.16