

फैक्स/स्पीड पोस्ट /FAX/SPEEDPOST

भारत सरकार केंद्रीय विद्युत प्राधिकरण दक्षिण क्षेत्रीय विद्युत समिति बेंगलूरु - 560 009	 सत्यमेव जयते	Government of India Central Electricity Authority Southern Regional Power Committee Bengaluru - 560 009	
Web site: www.srpc.kar.nic.in	e-mail: mssrpc-ka@nic.in	Ph: 080-22287205	Fax: 080-22259343
सं/No.	SRPC/SE-II/2018/	दिनांक / Date	24.12.2018

To

As per enclosed list

Sir,

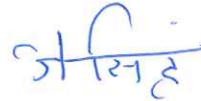
Sub: Special Meeting on Ramp Rates – Reg

As noted in the 34th SRPC meeting, a Special meeting to discuss the Ramp Rates would be held at **11.00 hrs on 21.01.2019 (Monday) at SRPC, Bengaluru.** Brief Agenda note is enclosed.

It is requested to kindly attend the meeting or nominate the concerned officials to the meeting.

धन्यवाद /Thanking you,

भवदीय / Yours faithfully



(असित सिंह / Asit Singh)

अधीक्षक अभियंता / Superintending Engineer

Copy to

1. Chief Engineer, Thermal Engineering & Technology Development Division, CEA, New Delhi - with a request to attend or nominate concerned official to the meeting

Copy to for kind information

1. Chief Engineer, GM Division, CEA, New Delhi
2. Chief Engineer, NPC, CEA, New Delhi

Mailing list for the Meeting

1. Chief Engineer (Gen), APGENCO, Vijayawada
2. Chief Engineer (HPC & Hydro Projects), APGENCO, Vijayawada
3. Chief Engineer (ED), KPCL, Bengaluru
4. Chief Engineer (Project & ED), KSEBL, Thiruvananthapuram
5. Chief Engineer (Mech.Thermal), TANGEDCO, Chennai
6. Chief Engineer (Hydro), TANGEDCO, Chennai
7. Chief Engineer (Gen.), TSGENCO, Hyderabad
8. Chief Engineer (Projects), TSGENCO, Hyderabad
9. AGM, NTPC, SRHQ, Hyderabad
10. ED, Ramagundam STPS, NTPC, Ramagundam
11. CGM, Simhadri STPS, NTPC, Simhadri
12. GM, Talcher STPP, NTPC, Talcher
13. GM, NTECL, Vallur
14. GM, TS-II, NLC, Neyveli
15. GM, TS-I Expansion, NLC, Neyveli
16. GM, TS-II Expansion, NLC, Neyveli
17. GM, NTPL, Tuticorin
18. STE (E&I), SO/G, Kaiga III & IV, Karwar
19. OS, MAPS, Kalpakkam
20. OS, KKNPP, Kudankulam
21. Senior Vice President, JSWEL, Toranagallu
22. Head Operation, UPCL, Padubidri, Udupi
23. Chief Manager-Electrical, SEL, Nellore
24. Lead Engineer-Electrical, MEPL, Nellore
25. AGM, TPCIL, SEIL, Nellore
26. AGM, SGPL, SEIL, Nellore
27. AGM-Electrical, IL & FS, Nagipatnam
28. Advisor-Electrical, Coastal Energen, Tuticorin
29. VP, O&M, HNPCL, Vishakapatnam
30. VF(O), LKPL, Kondapalli, Ibrahimpatnam
31. ED, SRLDC, Bengaluru
32. Chief Engineer (LD) APTRANSCO, Vijayawada
33. Chief Engineer (LD), KPTCL, Bengaluru
34. Chief Engineer (SO), KSEBL, Kalamassery
35. Chief Engineer (O), TANTRANSCO, Chennai
36. Chief Engineer (LD), TSTRANSCO, Hyderabad

Agenda for meeting on Ramp Rates/Technical Minimum/Hot, Warm & Cold Starts to be held on 21.01.2019

1. Ramp up and ramp down rates are assuming significance with higher level of RE penetration, sudden changes in load, sudden PX schedules etc. Details of ramp rates of RRAS stations are enclosed at **Annexure-I**.

2. In CEA (Technical Standard for Construction of Electrical Plant and Electrical Lines the following may be noted:

'2(h) Cold Start in relation to steam turbine, means start up after a shutdown period exceeding 72 hrs (turbine metal temperatures below approximately 40% of their full load values;

.....

2(q) Hot Start in relation to steam turbine, means start up after a shutdown period of less than 10 hrs (turbine metal temperatures approximately 80% of their full load values;

.....

2(zx) Warm Start in relation to steam turbine, means start up after a shutdown period between 10 hrs and 72 hrs (turbine metal temperatures between approximately 40% and 80% of their full load values;

.....

7(2) The unit shall be capable of base load operation. However, the unit shall also be capable of regular load cycling and two-shift operation. The steam turbine shall be designed for a minimum of 4000 hot starts, 1000 warm starts and 150 cold starts during its life.

.....

7(4) the design shall cover adequate provision for quick start up and loading of the unit to full load at a fast rate. The unit shall have minimum rate of loading or unloading of 3% per minute above the control load (i.e. 50% MCR)'.

3. In IEGC Regulations, the following may be noted:

5.2(h)After an increase in generation as above, a generating unit may ramp back to the original level at a rate of about one percent (1%) per minute, in case continued operation at the increased level is not sustainable. Any generating unit not complying with the above requirements, shall be kept in operation (synchronised with Regional grid) only after obtaining the permission of RLDC.

.....

2(iii) The generating company shall certify that:

(a) **The generating station or unit thereof meets the requirement and relevant provisions of the technical standards of Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulations, 2010 and Indian Electricity Grid Code, as applicable.**

.....

6.3B – Technical Minimum Schedule for operation of Central Generating Stations and Inter-State Generating Stations

1. The technical minimum for operation in respect of a unit of a Central Generating Station of Inter-State Generating Stations shall be 55% of MCR loading or installed capacity of the unit of at generating station.

.....

6.5.14 While finalising the above daily despatch schedules for the ISGS, RLDC shall ensure that the same are operationally reasonable, particularly in terms of ramping-up/ramping down rates and the ration between minimum and maximum generation levels. A ramping rate of upto 200 MW per hour should generally be acceptable for an ISGS and for a regional entity (50 MW in NER), except for hydro-electric generating stations which may be able to ramp up/ramp down at a faster rate.

4. In the Standard *Technical Features of BTG System for Supercritical 660/ 800 MW Thermal Units* brought out CEA in July 2013, the following may be noted:

6.4.6 Mode of steam generator operation and rate of loading

.....

ii) The Steam Generators shall be designed for minimum rate of loading/unloading mentioned below without compromising on design life of pressure parts:

a) Step load change : Minimum $\pm 10\%$

b) Ramp rate : Minimum $\pm 3\%$ per minute above 30% load

12.1.4 Operational capabilities

.....

v) Fast Start- up and Loading/ Unloading Rate: The TG set shall be capable of being started from cold condition to full load operating conditions in as short time as possible. The TG set shall be designed for minimum rate of loading/ unloading mentioned below without compromising on design life of the machine:

- a) *Step load change : Minimum $\pm 10\%$ to facilitate fast loading/unloading of the unit.*
- b) *Ramp Rate : Minimum $\pm 3\%$ per minute above 30% load.*

Performance Guarantees

5.1 General Requirements

5.1.1 The equipment shall meet the ratings and performance requirements stipulated for various equipment.

5.1.2 All the guarantees shall be demonstrated during functional guarantee/ acceptance test. The various tests which are to be carried out during performance guarantee/acceptance test are listed in this chapter. The guarantee tests shall be conducted at site on each unit individually.

5.1.5 In case during performance guarantee test(s) it is found that the equipment/system has failed to meet the guarantees, all necessary modifications and/or replacements shall be carried out to make the equipment/system comply with the guaranteed requirements & the same shall be demonstrated by conducting another performance guarantee test at no extra cost to the purchaser.

5.4 Guarantees Under Category-III

The parameters/ capabilities to be demonstrated for various systems/ equipments shall include but not be limited to the following:

.....

5.4.2 Start up time (for one unit only)

Start-up time (upto full load), and loading capabilities for the complete unit (boiler, turbine and generator together) for cold start, warm start and hot start conditions as agreed shall be demonstrated, ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam metal temperature mismatch etc. are within design limits.

5.4.3 Rate of change of load and sudden load change withstand capability

The capability of boiler-turbine-generator in regard to ramp rate and step load change as specified shall be demonstrated.

6.4.2 Minimum load without oil support for flame stabilization

The design of Steam Generator shall be such that it does not call for any oil support for flame stabilization beyond 40% BMCR load when firing any coal from the range specified, with any combination of mills/ adjacent mills in service.

6.4.3 Loading/unloading pattern and adaptability for sudden load changes/load throw off

i) To match the desired plant operating capabilities, the Steam Generator shall be designed for cyclic/two shift operation. Expected numbers of Steam Generator startups during design life of minimum 25 years are as follows:

- a) *Cold Start (after shut down period exceeding 72 hours) : 150*

- b) Warm Start (after shut down period between 10 hours and 72 hours): 1000
- c) Hot Start (after shut down period less than 10 hours): 4000

5. In the Standard Technical Specification for Main Plant Package of Sub- Critical Thermal Power Project 2 x (500 MW or above) brought out CEA in September 2008, the following may be noted:

2.1.14 Mode of Steam Generator Operation and Rate of Loading

ii) The steam generators shall be designed for minimum rate of loading/ unloading mentioned below from 50% to 100% (TMCR) loads without compromising on design life of pressure parts.

- a) Step load change : Minimum + 15%
- b) Ramp rate : Minimum + 3% per minute under variable pressure operation
Minimum + 5% per minute under constant pressure operation

Performance Guarantees

iii) The Contractor shall demonstrate all the guarantees covered herein during functional guarantee/acceptance test.

v) In case during tests it is found that the equipment/system has failed to meet the guarantees, the contractor shall carry out all necessary modifications and/or replacements to make the equipment/system comply with the guaranteed requirements at no extra cost to the purchaser.

1.6.4 Guarantees under Category-III

The parameters/ capabilities to be demonstrated for various systems/equipments shall include but not be limited to the following:

- i) Start up (for one unit only)

Start-up time (upto full load), and loading capabilities for the complete unit (Boiler, Turbine and Generator together) set for cold start conditions (greater than 72 hours shutdown), warm start conditions (between 10 and 72 hours shutdown) and hot start conditions (less than 10 hours shutdown) as indicated by the Contractor in the offer and accepted by the purchaser shall be demonstrated, ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam metal temperature mismatch etc. are within design limits.

- iv) Rate of change of load and sudden load change withstand capability

The contractor shall demonstrate capability of boiler-turbine-generator in regard to ramp rate and step load change as specified.

2.1.10 Minimum Load without Oil support for Flame Stabilization

The design of steam generator shall be such that it does not call for any oil support for flame stabilization beyond 40% BMCR load when firing any coal from the range specified, with adjacent mills in service and mill load not less than 50% of its capacity. This shall be guaranteed and demonstrated by the Contractor.

2.1.11 Cyclic Load Capability and Adoptability for Sudden Load Changes/ Load Throw Off

i) To match the desired plant operating capabilities, the steam generator shall also be designed for regular cyclic/ two shift operation. The total number of start ups shall be as under:

- a) Hot starts (less than 10 hours of unit shutdown) : 4000
- b) Warm starts (between 10 and 72 hours of unit shutdown) : 1000
- c) Cold starts (greater than 72 hours of unit shutdown) : 150

6. The issue had been discussed in the 34th SRPC meeting held on 11.08.2018 wherein, the following was noted:

- It was noted that Kudgi, NTPL and NTECL units had had come after 2010 and in case any issue is being faced by generators in adhering to the Regulations, they may need to approach CEA/Regulators.
- ISG stations under RRAS had started giving at least a ramp of 0.5%/minute which was implemented from 16.06.2018. This had resulted in an increase in ramp of around 262 MW/block.
- SLDCs should also ensure the enhanced ramp rates from the state generators. All units irrespective of control area jurisdiction/ownership need to contribute with higher ramp rates.
- CEA had informed that both in technical specifications as well as Regulations, it has been mentioned that ramp rates of 3% needs to be ensured. CEA's Regulations were applicable to units of Central and State and also the IPPs.
- NPC had pointed out that units need to meet requirements specified for TE clearance and also specified in the Regulations subsequently. Further, forum could consider possibility of a mechanism that could be in place for self-improvement in ramp rates by generators.
- NLDC had informed that ramps as informed by generators were being implemented under RRAS. Ramp rate being furnished by generators needs to be examined wrt design ramp rate as per CEA's Regulation. NLDC had assured that this issue would be taken up with ISG stations at all India level.
- SRLDC had pointed out that the demand rates and the RE injection/withdrawal was within 3,000 MW/block. But as per estimate, once SR touches 4,000 MW variation/block, present ramp rates would not suffice. Higher ramp rates in both the direction were very much required.
- PCKL had pointed out that more clarity on the ramps was required since there were certain discrepancies in the Regulations / Technical Specifications. Higher ramp rates were very essential in the present high RE scenario.
- NTECL, NTPL and NLCIL had agreed to consider increasing the ramp rates in both the directions.
- SRPC agreed on TCC's suggestion that provisions with regard to ramp requirement as specified in various Regulations / specifications could be looked into by a Committee.
- **SRPC had noted the TCC observation that ramp rates need to be increased, considering high level of RE penetration. State sector / IPP generators were requested to kindly improve ramp rates. SLDCs were also kindly requested to examine and implement the same.**

7. Subsequently, POSOCO vide letter dated 04.09.2018 (**Annexure-II**) addressed to Member (Thermal), CEA had taken up the following issues:

- Minimum generation levels or turn-down levels
- Ramp rate (Up & Down)
- Start-up time / Minimum up time / Minimum down time

8. It may be noted that all the units of Central sector, States sector and IPPs need to comply to the technical requirements specified in various Regulations /Technical Specifications to meet the high level of RE penetration / load variability etc. In this regard, all the stations are requested to furnish the information as given below:

Parameters	Presently being declared	As per Technical Specifications	Complying to CEA Regulations / Technical Specifications	Performance guarantee test conducted	Remarks
Ramp up %/minute					
Ramp down %/minute					
Technical minimum					
Startup Time from Hot conditions					
Startup Time from Warm conditions					
Startup Time from Cold conditions					

RRAS Provider Rate 16th December 2018 to 15th January 2019

Sl No	RRAS Provider Name	Region	installed Capacity (MW)	Fixed cost (Paisa/kWh)	Variable cost (Paisa/kWh)	Ramp Up (MW/Block)	Ramp Down (MW/Block)	Technical Minimum (MW)
1	AGTPP - Agartala*	AR	130	172.1	159.8	8	8	70
2	AGBPP - Kathalguri	AR	291	205.7	209.5	34	34	264
3	BongaigaonGTPP	AR	250	271.4	311.2	15	15	138
Total Installed Capacity			671					
Source- NERPC- http://www.nerpc.nic.in/Ancillary%20Service.php								
4	Talcher STPS - I	ER	1000	96.4	193.8	48	48	518
5	Nabinagar Thermal Power Project	ER	500	242.6	183.4	20	20	275
6	Barh TPS	ER	1320	186.5	201.7	90	90	684
7	Kahaigaon STPS - II	ER	1500	109.8	213.5	113	113	778
8	Kahaigaon STPS - I	ER	840	106.5	223.4	90	90	421
9	Farakka STPS - I & II	ER	1600	83.5	242.3	120	120	823
10	Farakka STPS - III	ER	500	150.4	243.9	38	38	259
11	MTPS Stage-II	ER	390	234.9	256.0	15	15	195
Total Installed Capacity			7650					
Source- ERPC- http://erpc.gov.in/as-3-formats								
12	Singrauli STPS	NR	2000	65.7	135.3	135	197	1400
13	Rihand TPS Stage - II	NR	1000	71.2	134.7	100	150	518
14	Rihand TPS Stage - I	NR	1000	85.8	135.3	100	150	507
15	Rihand TPS Stage - III	NR	1000	145.6	137.7	100	150	518
16	Uncharhar TPS Stage - IV*	NR	500	149.8	275.0	35	35	275
17	Uncharhar TPS Stage - I	NR	420	109.6	316.3	35	35	210
18	Uncharhar TPS Stage - II	NR	420	101.3	316.3	15	15	210
19	Uncharhar TPS Stage - III	NR	210	136.4	316.3	15	15	105
20	Indra Gandhi STPS	NR	1500	162.8	342.9	150	150	782
21	Dadri TPS Stage - II	NR	980	145	339.3	100	100	509
22	Anta Gas Power Project GF	NR	419	71.7	321.1	225	225	225
23	Dadri TPS Stage - I	NR	840	98.7	361.9	80	80	422
24	Dadri Gas Power Project GF	NR	830	58.2	325.7	50	50	445
25	Auraiya Gas Power Project GF	NR	663	64.2	383.0	138	138	356
26	Anta Gas Power Project RF	NR	419	71.7	916.6	225	225	225
27	Dadri Gas Power Project RF	NR	830	58.2	1048.1	50	50	445
28	Auraiya Gas Power Project RF	NR	663	64.2	1103.4	138	138	356
29	Dadri Gas Power Project LF	NR	830	58.2	1243.7	50	50	445
30	Auraiya Gas Power Project LF	NR	663	64.2	1253.9	138	138	356
31	Anta Gas Power Project LF	NR	419	71.7	1271.6	225	225	225
Total Installed Capacity			11782					
Source- NRPC- http://www.nrpc.gov.in/comm/ancillaryservices.html								
32	Talcher STPS - II	SR	2000	72.1	192.4	150	150	1037
33	NLC TPS - II Exp	SR	500	234.7	236.9	36	27	248
34	NLC TPS - I Exp	SR	420	102.5	236.9	36	45	211
35	Ramagundam STPS - III	SR	500	77.6	250.2	38	38	259
36	Ramagundam STPS - I & II	SR	2100	73.2	255.7	142	142	1078
37	NLC TPS - I	SR	630	80.5	258.6	54	68	312
38	NLC TPS - II	SR	840	83.4	258.6	72	90	416
39	Simhadri STPS - I	SR	1000	95.1	274.1	75	75	521
40	Simhadri STPS - II	SR	1000	153.3	274.7	75	75	521
41	NTPPL - Tuticorin TPS	SR	1000	156.2	333.4	75	75	516
42	NTECL - Vallur TPS	SR	1500	178.4	319.7	113	113	770
43	Kudgi STPS I	SR	2400	155.2	355.4	180	180	1244
Total Installed Capacity			13890					
Source- http://www.srpc.kar.nic.in/html/all_uploads.html								
44	SIPAT TPS Stg-I	WR	1980	131.54	119.2	90	90	1026
45	SIPAT TPS Stg-II	WR	1000	124.87	122.9	69	69	518
46	Korba STPS STG (III)	WR	500	139.6	124.7	30	30	256
47	Korba STPS STG (I & II)	WR	2100	68.9	126.7	105	105	820
48	Sasan Power Ltd	WR	3950	17	131.4	180	180	2400
49	Vindhyachal-III	WR	1000	105.5	144.4	70	70	518
50	Vindhyachal-V	WR	500	168.65	144.7	35	35	256
51	Vindhyachal-IV	WR	1000	158	144.4	70	70	518
52	Vindhyachal-II	WR	1000	70.1	144.1	70	70	518
53	Vindhyachal-I	WR	1260	86.4	153.9	90	90	631
54	Costal Gujarat Power Ltd	WR	4150	90.3	184.34	150	150	2090
55	NTPC-SAIL Power Company Pvt. Ltd	WR	500	172.5	233.9	30	30	250
56	Gandhar Gas Power Project GF	WR	657.39	105.7	266.0	293	293	354
57	Kawas Gas Power Project GF	WR	656.2	85.4	266.9	208	208	352
58	Ratnagiri Gas & Power Pvt Ltd GF	WR	663.54	130	249.0	300	300	354
59	Gandhar Gas Power Project NAPM	WR	657.39	105.7	288.3	293	293	354
60	Mouda STPP Stage-II	WR	1320	142.2	283.1	70	70	686
61	Kawas Gas Power Project NAPM	WR	656.2	85.4	294.3	208	208	352
62	Mouda STPP Stage-I	WR	1000	189.4	278.7	70	70	518
63	Ratnagiri Gas & Power Pvt Ltd IR	WR	663.54	130	410.0	300	300	354
64	Solapur Super Thermal Power Project	WR	660	215.6	435.1	30	30	343
65	Ratnagiri Gas & Power Pvt Ltd RF	WR	1122	130	465.0	300	300	354
66	Kawas Gas Power Project RF	WR	656.2	85.4	789.9	208	208	352
67	Gandhar Gas Power Project RF	WR	657.39	105.7	801.7	293	293	354
68	Kawas Gas Power Project LF	WR	656.2	85.4	1115.5	208	208	352
Total Installed Capacity			23907					
http://www.srpc.gov.in/Commercial_rras_dat.asp?ln=e								
All India Total Installed Capacity			57901					

*Details mentioned are as per previous AS3 Format (Charges yet to submit by plant for period 16th December 2018 to 15th January 2019)

पावर सिस्टम ऑपरेशन कॉर्पोरेशन लिमिटेड
(भारत सरकार का उद्यम)
POWER SYSTEM OPERATION CORPORATION LIMITED
(A Govt. of India Enterprise)



पंजीकृत एवं केन्द्रीय कार्यालय : प्रथम तल, बी-9, कुतब इंस्टीट्यूशनल एरिया, कटवारिया सराय, नई दिल्ली-110016
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CIN : U40105DL2009GOI188682, Website : www.posoco.in, E-mail : posococo@posoco.in, Tel.: 011- 41035696, Fax : 011- 26536901

संदर्भ संख्या:पोसोको/एनएलडीसी/2018/ 227

दिनांक: 04th सितंबर, 2018

To,
The Member (Thermal),
Central Electricity Authority,
Sewa Bhawan, R. K. Puram,
Sector-1, New Delhi - 110 066

विषय: Flexibility of coal fired power stations.

महोदय,

Flexibility of coal fired power stations in India has assumed centre stage both in the context of changing electricity demand profiles as well as penetration of Renewable Energy (RE) resources. In the context of flexibility, three (3) attributes assume importance from the viewpoint of proper balancing of the system.

- (i) Minimum generation levels or turn-down levels.
- (ii) Ramp rate (Up & Down).
- (iii) Start-up time/Minimum up time/ Minimum down time.

(i) On the issue of minimum generation levels, Part B, section 7(3) of the Central Electricity Authority (Technical Standards for Construction of Electrical Plants and Electric Lines) Regulation, 2010 already provides for a 'control load' of 50% of Maximum Continuous Rating (MCR). With effect from 15th May 2017, in line with amendments in the Indian Electricity Grid Code (IEGC) by CERC all plants under the jurisdiction of Regional Load Despatch Centres (RLDCs) are considering 55% of capacity on bar as minimum (generally the load centre plants are required to frequently go down to this level) for the purpose of scheduling. As ISGS is just about 40% of the country's thermal capacity, it is requested that CEA may kindly take up the issue with State GenCos & other entities and facilitate 55% technical minimum at these plants too. Possibility of some load centre plants to go below 55% to say 40% could also be initiated as any mismatch in demand projection & RE capacity growth could lead to a scenario of much higher instantaneous RE penetration level. Ideally plant should be able to run continuously at their minimum load & be able to ramp up to the Maximum Continuous Rating (MCR) & quickly ramp down to the minimum load.

(ii) On the second issue of ramp rates also, the above CEA Technical Standards, specify 3%. However, the ramp rates provided by about fifty (50) plants under the Reserve Regulation Ancillary Services (RRAS) is much less than 3% of the order less than 1%, as

Mansur

contd/-

(2/6)

would be evident from Annexure-1. Incidentally, on 22nd June 2018, Dadri stage -II (2X490MW) units were tested for 3% ramp rate as part of exercise under National Task Force on Flexibility. The poor ramp rates would mean that a 800 MW unit would take 90 minutes to ramp up from 440 MW (55% technical minimum) to 800 MW. It is requested that this aspect may also be taken up by CEA with the Generating Companies. Ramp Up rate and Ramp Down rate could be different. Further the CEA standards should have a clear definition of ramp-rate & its measurement. Generally, the issue of ramp rates would become more important for plants lower down in the merit order.

(iii) The third attribute of cold start is important for units sitting on the margin viz having a moderate to high variable charges. The CEA Technical Standards mentioned above are silent on the start up time for cold start, warm start & hot start. The information submitted by about fifty (50) plants under RRAS is enclosed as Annexure-2. While 6-8 hours for a cold start is understood, a few 800 MW units like Kudgi STPS and CGPL Mundra have indicated 35 hours and 72 hours respectively which appears too high. While CGPL Mundra has low variable cost & is rarely under cold reserve, Kudgi is a marginal unit often under cold reserve. Earlier, Kudgi had indicated 6 hours for cold start but could not bring within this period (when instructed by NLDC/SRLDC) and leading to a subsequent reduction in availability declaration. Now, the cold start time has been revised by the power plant for period 16th August to 15th September'18. It is requested that this aspect may also be taken up by CEA with the Generating companies and start-up time codified in the CEA standards. Minimum up-time/minimum down-time for units might also be suitably defined.

It is requested that CEA may kindly intervene in the above three(3) flexibility attributes which would go a long way in ensuring reliable, economic & sustainable operation of the Indian electricity grid.

सादर धन्यवाद,

Encl: As above

भवदीय

एस. आर. नरसिम्हन

(एस.आर. नरसिम्हन)

कार्यकारी निदेशक,

रा. मा. प्रे. के.

(3/6)

Annexure-1

Ramp rate of RRAS* Providers (Thermal Stations) as furnished

Sl No	Plant Name	Region	Installed Capacity (MW)	Installed Capacity (MW)	Variable cost (Paisa/kWh)	Ramp UP (MW/Min)	Ramp Down (MW/Min)	Ramp Up Rate Furnished by Plant(%)	Ramp Down Rate Furnished by Plant(%)
1	Dadri -II	NR	980	2X490	346	3.33	3.33	1.7	1.7
2	Kahalgaoon-I	ER	840	4X210	237	1.5	1.5	0.8	0.8
3	Rihand -I	NR	1000	2x500	128.9	3.33	5	0.7	1.1
4	Ramagundam- I & II(500)	SR	2100	3x200+3x500	248	3.33	3.33	0.7	0.7
5	Ramagundam- I & II(200)	SR	2100	3x200+3x500	248	1.33	1.33	0.7	0.7
6	Rihand-II	NR	1000	2x500	128.3	3.33	5	0.7	1.1
7	Rihand-II	NR	1000	2x500	130.9	3.33	5	0.7	1.1
8	Ramagundam- III	SR	500	1x500	243	3.33	3.33	0.7	0.7
9	Jhajjar	NR	1500	3X500	332.3	3.33	3.33	0.7	0.7
10	NLC- I	SR	630	3x210	254	1.2	1.5	0.6	0.8
11	NLC- II	SR	840	4x210	254	1.2	1.5	0.6	0.8
12	NLC- I Exp	SR	420	2x210	234.8	1.2	1.5	0.6	0.8
13	Nablnagar	ER	500	2X250	194.2	1.33	1.33	0.6	0.6
14	Singrauli(200)	NR	2000	5X200+2X500	133.3	1	1.3	0.5	0.7
15	Valur	SR	1500	3x500	296	2.5	2.5	0.5	0.5
16	Korba(I & II)(200)	WR	2100	3x200+3x500	130.5	1	1	0.5	0.5
17	Farakka-I&II(200)	ER	1600	3x200+2x500	234.1	1	1	0.5	0.5
18	Farakka-I&II(500)	ER	500	3x200+2x500	234.1	2.5	2.5	0.5	0.5
19	NLC- II Exp	SR	500	2x250	235.1	1.2	0.9	0.5	0.4
20	NTPL	SR	1000	2x500	304	2.5	2.5	0.5	0.5
21	Farakka-III	ER	500	1x500	235.6	2.5	2.5	0.5	0.5
22	Kahalgaoon-II	ER	1500	3x500	226.6	2.5	2.5	0.5	0.5
23	Talcher- II	SR	2000	4x500	189.9	2.5	2.5	0.5	0.5
24	Simhadri- I	SR	1000	2x500	268.3	2.5	2.5	0.5	0.5
25	Simhadri- II	SR	1000	2x500	268.8	2.5	2.5	0.5	0.5
26	Unchahar-I	NR	420	2x210	284.6	1	1	0.5	0.5
27	Unchahar-II	NR	420	2x210	284.6	1	1	0.5	0.5
28	Unchahar-III	NR	210	1x210	284.6	1	1	0.5	0.5
29	Vindhyachal-I	WR	1260	6x210	153.9	1	1	0.5	0.5
30	Vindhyachal-II	WR	500	1X500	275	2.33	2.33	0.5	0.5
31	Vindhyachal-III	WR	1000	2X500	144.1	2.33	2.33	0.5	0.5
32	Vindhyachal-IV	WR	1000	2x500	144.2	2.33	2.33	0.5	0.5
33	Vindhyachal-V	WR	1000	2x500	144.5	2.33	2.33	0.5	0.5
34	Mouda-I	WR	1000	2X500	309.9	2.33	2.33	0.5	0.5
35	SIPAT-II	WR	1000	2X500	131	2.3	2.3	0.5	0.5
36	Barh TPS (660)	ER	1320	2x660	233.9	3	3	0.5	0.5
37	BGTTP (250)	AR	250	1x250	310.4	1	1	0.4	0.4
38	Singrauli(500)	NR	2000	5X200+2X500	133.3	2	3.33	0.4	0.7
39	Korba(I & II)(500)	WR	2100	3x200+3x500	130.5	2	2	0.4	0.4
40	Korba(III)	WR	500	1x500	128.2	2	2	0.4	0.4
41	NSPCL	WR	500	2x250	240.3	1	1	0.4	0.4
42	Mouda-II	WR	1320	2X660	276.8	2.33	2.33	0.4	0.4
43	Talcher-I	ER	1000	2x500	189.9	1.6	1.6	0.3	0.3
44	Sasan	WR	3960	6x660	132.5	2	2	0.3	0.3
45	SIPAT-I	WR	1980	3X660	127.2	2	2	0.3	0.3
46	Solapur	WR	1320	2X660	455.2	2	2	0.3	0.3
47	Dadri- I	NR	840	4X210	369.1	1.3	1.3	0.3	0.3
48	CGPL	WR	4150	5x830	164.37	2	2	0.3	0.3

*RRAS-Reserves Regulation Ancillary Services

(A/B)

Warm and Cold Start Time (Hrs) as furnished by RRAS* Provider(Thermal)

Sl No	RRAS Provider Name	Region	Installed Capacity (MW)	Unit size	Warm start time (Hrs)	Cold start time (Hrs)
1	Unchahar TPS Stage - III	NR	210	1x210	2Hr 40Min	3Hr 25Min
2	Unchahar TPS Stage - I	NR	420	2x210	2Hr 50Min	3Hr 30Min
3	Unchahar TPS Stage - II	NR	420	2x210	2Hr 35Min	3Hr 30Min
4	Singrauli STPS	NR	2000	5x200+2x500	2Hr 30Min	4Hr
5	Simbadi STPS - I	SR	1000	2x500	2Hr 30Min	4Hr
6	Simbadi STPS - II	SR	1000	2x500	2Hr 30Min	4Hr
7	NTPC-SAIL Power Company Pvt. Ltd	WR	500	2x250	2Hr 30Min	4Hr 20Min
8	Unchahar TPS Stage - IV	NR	500	1x500	3Hr	5Hr
9	Vindhyachal-I	WR	1760	6x210	3Hr	5Hr
10	Vindhyachal-II	WR	1000	2x500	3Hr	5Hr
11	Vindhyachal-III	WR	1000	2x500	3Hr	5Hr
12	Vindhyachal-IV	WR	1000	2x500	3Hr	5Hr
13	Vindhyachal-V	WR	500	1x500	3Hr	5Hr
14	Farakka STPS - I & II	ER	1600	3x200+1x500	200 MW=3Hr; 500MW=4Hr 30 Min	200 MW=5Hr; 500MW=6 Hr 30 Min
15	Farakka STPS - III	ER	500	1x500	3 Hr 30 Min	5 Hrs 30Min
16	Daadi TPS Stage - I	NR	840	4x210	3Hr	6Hr
17	Daadi TPS Stage - II	NR	980	2x490	3Hr	6Hr
18	Indira Gandhi STPS	NR	1500	3x500	3Hr	6Hr
19	Talcher STPS - II	SR	2000	4x500	3Hr 30Min	6Hr
20	Korba STPS STG (I & II)	WR	2100	3x200+3x500	4Hr	6Hr
21	Korba STPS STG (III)	WR	500	1x500	4Hr	6Hr
22	Talcher STPS - I	ER	1000	2x500	3Hrs	6 Hr
23	Bongaigaon TPP	AR	250	1x250	4 Hrs	6 Hr 5min
24	Ramagundam STPS - III	SR	500	1x500	3Hr 45Min	6Hr 10Min
25	NTECL - Vallur TPS	SR	1500	3x500	3Hr 45Min	6Hr 10Min
26	Kahaigaon STPS - II	ER	1500	3x500	2Hr 50 Min	6 Hr 40 Min
27	Barh TPS	ER	1920	2x660	4	6 Hr 40 Min
28	Ramagundam STPS - I & II	SR	2100	3x200+3x500	200 MW=3Hr; 300MW=3Hr 45Min	200 MW=5 Hr 30 Min; 500MW=6 Hr 10 Min
29	NTPC - Tuticorin TPS	SR	1000	2x500	3Hr 30Min	7 Hr
30	SIPAT TPS Stg-II	WR	1000	2x500	5Hr 30Min	7Hr
31	Mouda STPP Stage-I	WR	1000	2x500	4Hr 5Min	7Hr
32	Nabinagar Thermal Power Project	ER	500	2x250	5Hrs	8 Hr
33	Kahaigaon STPS - I	ER	840	4x210	3 Hrs 20 Min	8 Hr
34	NLC TPS - I Exp	SR	420	2x210	3Hr	8Hr
35	Sasan Power Ltd	WR	3960	6x660	6-8 Hr	8-10 Hr
36	NLC TPS - II	SR	840	4x210	4Hr 30Min	8Hr 45Min
37	Rihand TPS Stage - I	NR	1000	2x500	5Hr	9Hr
38	Rihand TPS Stage - II	NR	1000	2x500	5Hr	9Hr
39	Rihand TPS Stage - III	NR	1000	2x500	5Hr	9Hr
40	SIPAT TPS Stg-I	WR	1980	3x660	6Hr	10Hr
41	Solepur Super Thermal Power Project	WR	1320	2x660	8Hr	10Hr
42	Mouda STPP Stage-II	WR	1920	2x660	9Hr	10Hr
43	NLC TPS - I	SR	680	3x210	4Hr 30Min	11Hr
44	NLC TPS - II Exp	SR	500	2x250	6Hr 30Min	12 Hr
45	Kudgi STPS I	SR	1600	2x800	3Hr 50Min	5Hr
46	Costal Gujarat Power Ltd	WR	4150	5x830	Not Available	72Hr

*RRAS-Reserves Regulation Ancillary Services

(5/6)

Copy to :

1. Joint Secretary(Thermal), Shram Shakti Bhawan, New Delhi - 110 001
2. Secretary ,CERC, 3rd & 4th Floor, Chanderlok Building, 36, Janpath, New Delhi- 110001
3. Member Secretary, NRPC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
4. Member Secretary, WRPC, F-3,MIDC Area,Andheri (East),Mumbai-400093
5. Member Secretary, SRPC, 29,Race Course Cross Road,Bangalore-560009
6. Member Secretary, ERPC, 14,Golf Club Road , Kolkata-700033
7. Member Secretary, NERPC, NERPC Complex, Dong Parmaw ,Lapalang, Shillong – 793006
8. Chief Engineer (Grid Management),CEA, Sewa Bhawan, R. K. Puram, Sector-1, New Delhi
9. Chief Engineer(NPC), NRPC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
- 10.Executive Director, ERLDC,14, Golf Club Road , Kolkata-700033
- 11.Executive Director, WRLDC,F-3,MIDC Area,Andheri (East),Mumbai-400093
- 12.Executive Director, NERLDC, Dongtiah, Lower Nongrah, Laplang, Shillong-793006
- 13.Executive Director, NRLDC,18/A,SJSS Marg, Katwaria Sarai,New Delhi-110016
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