CENTRAL ELECTRICITY REGULATORY COMMISSION

NEW DELHI

Petition No.103/MP/2014

Coram:
Shri Gireesh B. Pradhan, Chairperson
Shri A. K. Singhal, Member
Shri A S Bakshi, Member

Date of Hearing: 7.8.2014
Date of Order: 5.4.2016

In the matter of:

Petition under Section 79 (1) (c), (f) and (k) of the Electricity Act, 2003 read with the CERC (Conduct of Business) Regulations, 1999 for keeping in abeyance the ongoing trial operation of the incomplete SR Synchronization [synchronization of SR Grid with NEW Grid over 765 KV Raichur (SR)-Sholapur (WR) -1 * S/C lines] till the satisfactory resolution of all concerns arising out of the trial run of the SR Synchronization and serious issues causing major grid disruption.

.

And

In the matter of:

Maharashtra State Electricity Transmission Company Limited, 4th Floor, Prakashganga,
Plot No. C-19, E-Block, Bandra-Kurla Complex,
Bandra (East), Mumbai-400 051 ……**Petitioner**

Vs

1. National Load Despatch Centre
   B-9, 1st Floor, Qutab Institutional Area,
   Katwaria Sarai, New Delhi-110 016

2. Central Electricity Authority
   2nd Floor, Sewa Bhawan, R.K.Puram,
   New Delhi-110 066

3. Power Grid Corporation of India Limited
   Saudamini, Plot No. 2, Sector-29,
   Gurgaon-122 001

4. Western Regional Power Committee
   F-3, MIDC Area, Marol, Andheri (East),
   Mumbai-400 093

5. Southern Regional Power Committee
   29, Race Course Cross Road,
   Bangalore-560 009 **Respondents**

The following were present:

Shri M Y Deshmuk, Advocate, MSETCL
Shri Sandeep Bajaj, Advocate, MSETCL
Shri Subhash G Kelkar, MSETCL
Shri Sanjay S Kuklarni, MSETCL
Shri H K Pandey, CEA
Shri Ravinder, CEA
Shri Smarajit Sahoo, APNRL
Shri KVS Baba, POSOCO

ORDER

The Petitioner is the State Transmission Utility (STU) engaged in the transmission of electricity in the State of Maharashtra and responsible for the safe and secure integrated operation of the power system and maintenance of transmission network throughout the State. It has filed the present petition seeking the following reliefs:

(i) Direct the ongoing trial operation of the incomplete SR

Synchronization [synchronization of SR Grid with NEW Grid over 765 KV Raichur (SR)- Sholapur (WR) -1 * S/C line] to be kept in abeyance till the satisfactory resolution of all concerns arising out of the trial run of the SR Synchronization and serious issues causing major grid disruption; and

(ii) Pass any other order as may be deemed fit in the circumstances of the case and in the interest of justice

2. Gist of the submissions by the petitioner is as under:

(a) The synchronization of the SR Grid with the NEW Grid over 765 KV Raichur (SR) - Sholapur (WR) -1 * S/C lines had commenced on trial basis on 31.12.2013.

(b) The Chief Executive Officer (POSOCO), NLDC, had set out the procedure for the SR Synchronization (Synchronization Manual) vide letter dated 27.12.2013. As specified in the Synchronization Manual, two separate circuits were being developed for the purposes of the SR Synchronization of the RS Line. One circuit was to be developed by POWERGRID and another by Raichur-Solapur Transmission Company Limited (RSTCL). The circuit to be developed by POWERGRID (Circuit-1) was commissioned by the end of December, 2013 while the circuit to be developed by RSTCL (Circuit-2) was to be commissioned by February, 2014. However, at the time of filing of the Petition, only the Circuit-1 was commissioned while Circuit-2 was still under

construction.

(c) The trial period of the SR Synchronization was continuing for more than four months during which the following serious issues, setbacks and difficulties had surfaced as acknowledged by Western Regional Power Committee (WRPC) and TCC:

(i) SR Synchronization over the RS Line does not fulfil the n-1 criterion stipulated by the Manual on Transmission Planning, 1994 and the National Electricity Plan (Volume-II) – Transmission which covers the transmission plan for the 12th Plan Period (that is, from 2012-2013 to 2016-2017).

(ii) The requisite back end transmission network at Solapur (PG) including the 765 KV Wardha-Aurangabad D/C Line, 765 KV Pune-Solapur (PG) D/C Line to be charged on 400 KV and the 765 KV Aurangabad-Solapur D/C Line was not complete while conducting the SR Synchronization. In the absence of back end transmission network, the entire power flow on Circuit-1 passed through the 400 KV Wardha- Parli D/C and 400 KV Parli-Solapur D/C Lines. Further, the power flow on Circuit-1 was not steady and was frequently changing in respect of direction and quantum.

(iii) Circuit-1 being the only interconnection between the Southern Region Grid and the Western Region Grid, all imbalances in the load generation balance of both these Grids are reflected on the

power flow in Circuit-1 with consequential adverse effect on the power flow on Circuit-1.

(iv) Any sudden export to SR Grid resulted in operation of Special Protection Scheme (SPS) on the 400 KV Wardha-Parli D/C Line. In the month of March, 2014, out of 19 incidents of SPS operation designed for controlling the line flow on the 400 KV Wardha (PG)-Parli (PG) D/C Line, 10 were attributable to SR Grid. Thus, the operation of SPS which is envisaged only as a matter of contingency in extreme cases, was a regular feature during the trial of SR Synchronization.

(v) The SPS operation on the 400 KV Wardha-Parli D/C Line flow results in backing down of APML, Tiroda generation having long term PPA with State DISCOM as well as reduction of generation in the State of Maharashtra which in turn results in over-drawal of power from the Central Grid. In addition to the backing down of APML, Tiroda generation, load shedding in Western Maharashtra is proposed in the SPS logic which is compensated with picking up Koyna generation which is a matter of serious concern since the precious Koyna generation is being used for the purpose for which it is not envisaged and thus, the entitlement of the State of Maharashtra to use the water from the Koyna Dam is at the brink of being exhausted which has serious long term ramifications. Backing down of intra-state long term low cost generation and carrying out

load shedding is itself in violation of the rights of the consumers in the State of Maharashtra.

(vi) As a result, the distribution utility of Maharashtra, i.e. MSEDCL has expressed serious concern over the SR Synchronization.

(vii) In the revised SPS, additional generators having long term PPA with the State DISCOM are also covered and no relief is extended to the State of Maharashtra.

(viii) The RS Line was planned for the import of power from the SR as the State of Maharashtra is having allocation of 800 MW from Krishnapattnam UMPP. However, due to delay in commissioning of Krishnapattnam UMPP and deficit in the Southern Region, the RS Line is now being used for export to the Southern Region for which it was never set up.

(d) WRPC and TCC have also acknowledged various issues arising out of the trial operation of SR Synchronization. These issues were considered by the TCC in its meeting held on 3.2.2014 and by the WRPC in its meeting held on 4.2.2014. The Minutes of the 25th Meeting of WRPC held on 4.2.2014 highlights the following concerns:

(i) WRLDC had given a presentation on the SR Synchronization in which the WRLDC made certain observations and raised many

concerns and as follow-up action, TCC recommended for forwarding the concerns to NLDC.

(ii) The Minutes also record about the meeting held on 17.12.2013, i.e. prior to the SR Synchronization, at WRLDC, to discuss the preparedness of the WR Constituents wherein the WR Constituents had raised certain concerns relating to the following issues:

A. Power flow and voltage conditions ;
B. NLDC-SPS-Concerns were shared by generators who were participating in NLDC-SPS to include more generators in the scheme so that the burden could be shared by all;
C. Concerns raised by Jindal Power regarding STOA transactions;
D. Concerns raised by NTPC regarding backing down of 200 MW at NTPC Mouda;
E. Issue of transmission of two separate signals raised by the representatives of Jindal Power Limited in the 120th PCM.

(iii) TCC discussions took place in respect of the aforementioned issues in which the GM, WRLDC stated that after the SR Synchronization, the SPS criterion was met 22 times in the month of January, 2014 for all the SPS formulated by NLDC. The SPS operating on 22 occasions within a span of about 1 month was an issue of concern which meant that either the limits were not realistic

or the system was always operating on the edge of security threats. Further, the TCC also made certain observations in the nature of measures/solutions to some of the issues.

(iv) The TCC Chairman and WRPC also considered the benefits of SR Synchronization and observed that instead of any tangible benefits, the results in the present case were otherwise and ultimately suggested that the concerns of the WR Constituents be forwarded to NLDC/CEA.

(e) Apart from the above issues by the WRPC, certain other organizations also highlighted their concerns on the operation of the SR Synchronization:

(i) Before commencing the trial operation of the SR Synchronization over the RS Line, a meeting of all constituents was held on 3.10.2013 for determination of available transfer capability. The Minutes of the said meeting, at paragraph 4.0 (b), inter alia, records that in the Minutes of the Meeting of the CEA held on 9.9.2013, it was concluded that no scheduled exchange of energy will be allowed on the RS Line for the first six months of synchronisation operation. Thus, if the first synchronization of SR Grid with NEW Grid takes place by January, 2014, the LTA/MTOA allocations shall be made from 1.7.2014 onwards. It was further decided in the said meeting of CEA that any delay in the first synchronization beyond January,

2014 would accordingly delay the effective start of LTA/MTOA. Hence, the SR Synchronization was conducted on trial basis.

(ii) Paragraph 7 of the Minutes of the Meeting held on 3.10.2013 further records that the CEO, POSOCO stated that the commissioning of the RS Line involves interconnection of two large grids. Therefore, a cautious approach needs to be adopted for permitting power flow over these lines. Further, a reference was made of earlier Standing Committee proceedings in 2007 which clearly indicated that the SR Region was expected to be surplus and exporting up to 6000 MW power to the NEW Grid for which the transmission system, that is, the RS Line, had been planned thereby reiterating the fact that the RS Line was planned for import of power from the Southern Region to the State of Maharashtra but the Minutes of the Meeting categorically recorded that the situation was now vastly different with the SR deficit.

(iii) Paragraph 9 of the Minutes of the Meeting held on 3.10.2013 also records that the CEO, POSOCO stated that since large number of reinforcements in the WR and SR were scheduled for completion during July, 2014 to November, 2014, approving any LTA/MTOA from July, 2014 would be premature as on date. He further stated that ideally the situation must be reviewed in July, 2014 when the status of those elements would

be clear and there would be operational experience of six months. He also said that the synchronization should be attempted after both the 765 KV Solapur-Raichur lines are commissioned.

(iv) Thus, the CEO, POSOCO was of the view that ideally the SR Synchronization should have been attempted after the Circuit-2 was commissioned. As on date, Circuit-2 is still under construction and the work is in progress. Hence, the operation of the SR Synchronization on Circuit-1 alone without the commissioning of Circuit -2 is a matter of serious concern.

(f) In the 25th Meeting of WRPC held on 4.2.2014, the presence of NLDC representatives was specifically pursued with NLDC. In spite of NLDC being a member of WRPC, there was no participation from NLDC and, therefore, WRLDC was requested to give rationale for setting the limits on various line flows and suggest the actions to be taken. It is also seen from Item No. 2 of the Minutes that certain concerns relating to SR Synchronization which were discussed in the 25th WRPC Meeting have already been forwarded to NLDC for necessary action since NLDC is the apex body to ensure integrated operation of the national power system. In fulfilment of its functions, NLDC issued the Synchronization Manual for SR Synchronization. However, the trial operation of the SR Synchronization so far has given rise to various serious issues of great concern including security threat

as set out hereinabove. Furthermore, the SPS for the SR Synchronization formulated by the NLDC in consultation with WRPC and SRPC has resulted in grave hardship to the constituents and consumers in the State of Maharashtra.

(g) Apart from the above issues faced by the Petitioner, the DISCOMS and the generators are also facing huge losses on recurring basis due to generation back down. Furthermore, the consumers are facing recurrent load shedding due to the current ongoing trial operation of the SR Synchronization.

(h) The Petitioner, MSETCL is acting in the capacity of SLDC and STU. As SLDC, the Petitioner is responsible for ensuring safe and secure integrated operation of the power system in the State of Maharashtra in view of the duties enshrined under Section 32 of the Electricity Act, 2003. Further, being a STU, the Petitioner is also responsible for the safe and secure operation and maintenance of transmission network throughout the State as per its functions and duties under Sections-39 and 40 of the Electricity Act, 2003 and hence, when the issues arising out of SR Synchronization are matters of serious concern, they must be adequately addressed at the earliest to avoid any serious impact or consequences on the efficient transmission of electricity in the State.

3. NLDC has vide affidavit dated 20.6.2014 submitted as under

(a) The formation of the National Grid is an initiative towards fulfilment of the national objective for optimal utilization of the national resources - conventional as well as renewable that are unevenly dispersed across the vast geographical area of India. Since the Indian grid is already operating synchronously with the grid of Bhutan and is also interconnected with Nepal and Bangladesh, the synchronous interconnection of the SR grid is also a stepping stone towards realizing the SAARC grid.

(b) As a System Operator, the respondent shall facilitate commissioning of each transmission element and take precautionary steps to ensure the security of the system is not compromised at any step.

(c) After implementation of the Central Electricity Regulatory Commission (Deviation Settlement Mechanisms and related Matters) Regulations, 2014 w.e.f. 17.2.2014, utilities are trying to minimize deviation from schedule. In order to keep the flow through the AC link under control, power flow through the HVDC links between NEW grid and SR grid is modulated. To take care of sudden increases in flow due to contingencies, SPS have been provided to shed load in SR and reduce generation in WR.

(d) Though SR has been synchronized with NEW grid through Raichur-Solapur line, scheduled power flow on WR-SR corridor is

limited to capacity of HVDC Bhadrawati link only. In real time operation also normally the line is kept floating and only inadvertent exchange takes place. All efforts are made by the system operators to ensure secure operation by taking suitable control actions.

(e) The upstream transmission network is in the process of being developed and 765 kV Wardha-Aurangabad D/C is expected to be commissioned shortly, followed by 765 kV Pune-Solapur line (expected to be commissioned in October, 2014) as per data available at CEA website.

(f) Further, in the Meeting held on 29.4.2014 to revise the SPS settings on Raichur-Solapur, Maharashtra was also present and agreed to pick up Koyna generation whenever the flow on Wardha flow-gate crosses 2480 MW. MSETCL also agreed to implement generation reduction in the identified generators in Maharashtra as per revised SPS.

(g) There are over 85 operations of SPS during 31.3.2014 to 13.6.2014. On close analysis, it may be seen that on 53 occasions, the operation was either directly caused by Maharashtra system or attributable to incident related to Maharashtra area. Therefore, the frequent operation of SPS relates to the inadequate transmission system of the State sector.

(h) The petitioner's reference to the 25th WRPC meeting of 4 Feb`

2014 appears to be out of context. During the meeting, the concerns raised by the constituents were only about the SPS settings and not relating to the interconnection or SR-NEW grid synchronization. All the members had praised the formation of "One All India Grid". Actions/Remedial measures for SPS operation were discussed in the meeting, however, at no point taking into shut down, the Solapur-Raichur line was considered.

(i) The trial operation has been a learning experience and the identified issues are being addressed with cooperation of all stakeholders. It is incorrect to state, however, that consumers are suffering due to the synchronization of the SR-NEW grid. The primary reason for backing down has been the non availability of the State system.

(j) Further, taking down of the line will not resolve the issues as raised by the petitioner. As already stated, these issues are a result of the lack of preparedness and system augmentation on behalf of MSETCL itself.

4. After the hearing on 24.6.2014, the Commission issued an interim order on 2.7.2014, In the above order, the Commission observed that the problem highlighted by Maharashtra needs to be deliberated by all the parties involved. Accordingly, the Commission directed that a meeting be convened under the Chairmanship of Member, CEA in which representatives of CTU,

NLDC and MSETCL at the senior level shall participate within a period of 10 days and consider all the aspects of ongoing trial run of synchronization with the Southern Region and its impact on Maharashtra utilities and suggest and implement remedial measures to address the concern of Maharashtra. A report to that effect was to be filed before the Commission by 15.7.2014

5. NLDC has vide letter dated 30.6.2014 intimated that suitable modifications of SPS settings, as decided in the WRPC meeting on 22.6.2014, would be implemented by POWERGRID in the shutdown of 765 kV Solapur-Raichur line. Further, 765 kV Wardha-Aurangabad D/C Line was to be commissioned shortly whereupon SPS setting would be further reviewed by NLDC after the above elements are in operation.

6. During the hearing on 7.8.2014, the representative of Central Electricity Authority (CEA) submitted that as per the Commission's direction dated 2.7.2014, a meeting was convened on 30.7.2014 under the chairmanship of Member, (GO&D), CEA with representatives of CTU, NLDC and MSETCL to consider all the aspects of ongoing trial run of synchronization of NEW grid with the Southern region via 765 kV Solapur-Raichur lines and its impact on Maharashtra utilities. The following transpired during the aforesaid meeting:

(a) The main issue which appeared to be the cause of concern to Maharashtra was overloading of Wardha-Parli section, which was leading to frequent operation of SPS and consequential backing down of generation/ load-shedding in the State. Though SPS operations

were expected to be rare occurrence, there were as many as 27 operations of SPS during 1.4.2014 to 2.6.2014. There was no SPS operation since 3.6.2014 due to increase in wind generation by about 1000 MW, reduction in demand of Maharashtra by about 10-12% and revised setting of SPS installed on 400 kV Wardha-Parli D/C from 1500 to 1700 MW with 2.5 sec time delay. Further, it was emphasized that though the situation was under control, it may recur from October 2014 onwards when the demand in the State would rise and the wind generation would reduce.

(b) The uncertainties in load-growth and generation and transmission development vis-à-vis those as planned were difficult to avoid. Under such circumstances, SPS was the best option for optimal utilization of the existing transmission network until new transmission system as planned gets commissioned. It was opined that loading of 400 kV Wardha-Parli-Solapur D/C line should be monitored closely and manual corrective action should be taken immediately after power-flow on this line tends to go beyond 750 MW per ckt. This would avoid operation of SPS and therefore, automatic backing down of generation at Tiroda, load shedding in Western Maharashtra, etc. would also be avoided. SPS of Wardha-Parli line may be reviewed at WRPC level, particularly with regard to backing down of generation in Maharashtra so as to avoid frequent backing down at any specific generating station.

(c) CTU had carried out study for October, 2014 scenario with transmission network as existing in July 2014. The study results were presented in the meeting. It was noted that with Solapur-Raichur flow as 1000 MW, Koyna generation as 460 MW, Tiroda generation as 2300 MW (4 units), Maharashtra load of 18000 MW and wind generation as Nil, there would be flow of about 650 MW per ckt on Wardha–Parli D/C line. This flow being considerably less than the setting of 850 MW per ckt, frequent SPS operation was not expected in future. If wind generation, which is concentrated mostly in Southern Maharashtra, is also taken into consideration, the loading on this line would further reduce. The representative of MSEDCL suggested CTU to carry out study with Maharashtra load as 19000 MW which was likely to be the scenario in Maharashtra after October 2014. CTU representative assured that the required study would be carried out and the same along with the results would be shared with Maharashtra utilities, POSOCO and CEA.

(d) PGCIL should expedite commissioning of transmission system upstream as well as downstream of Solapur-Raichur inter-regional corridor to ease the loading of the existing inter-State and intra-State transmission network in Maharashtra.

(e) MSETCL should expedite the commissioning of intra-State transmission system in Maharashtra, particularly the evacuation system associated with APML, Tiroda and the transmission lines

beyond Aurangabad.

(f) Augmentation of the network beyond Aurangabad towards western/coastal Maharashtra at the inter-State as well as intra-State level line is also essential to avoid overloading / congestion of transmission system in that area

(g) CEA would convene another meeting with Maharashtra power utilities, CTU and POSOCO in case frequent SPS operation on Wardha-Parli line is observed in future

7. In the above hearing, learned counsel for MSEDCL submitted that the main concern was the frequent SPS operation prior to 3.6.2014. There was no SPS operation since 3.6.2014 due to increase in wind generation by about 1000 MW, reduction in demand of Maharashtra by about 10-12% and revised setting of SPS with 2.5 sec time delay. He further submitted that the SPS operation would worsen by October, 2014 when the demand in the State would rise and the wind generation would reduce. With commissioning of 2nd ckt by the private licensee, CTU has declared ATC of 1350 MW for WR-SR on Raichur- Solapur lines. Learned counsel of MSEDCL requested the Commission to direct CTU to maintain ATC of 1350 MW till October, 2014.

8. The representative of CTU submitted that there is a process for declaring ATC for inter-State transfer of power and 1350 MW of ATC have been declared after consultation of all stakeholders and considering reliability margins.

9. After hearing the learned counsel for the petitioner and representatives of the parties, the following direction was given to the parties:

(a) CTU shall carry out another study with Maharashtra load as 19000 MW, which is likely to be the scenario in Maharashtra after October 2014 and share the results with Maharashtra utilities, POSOCO and CEA. CTU to maintain ATC of 1350 MW for WR-SR corridor till October, 2014

(b) CEA shall convene another meeting in October 2014 to assess the position in respect of SPS operation and file a report to that effect latest by 14.11.2014.

(c) Due date of filing the report should be strictly complied with.

(d) The petition shall be listed for hearing, if required after receipt of report from CEA.

10. In compliance of the above directions, a meeting was conducted on 29th October 2014 with participation by the Members of CEA, MSETCL, MSEDCL and NLDC. In the meeting, MSEDCL highlighted the experience during the months of September and October 2014 and made the following submissions:

(a) During the month of September and October, 2014, on account of heavy power flow through Raichur-Solapur line, Central Sector

Power in the State reached 7500 MW during day time. Due to heavy loads during normal schedule drawal, no margin was available on the 400 kV Parli (PG)-Solapur (PG) corridor carrying the loads in Western part of Maharashtra.

(b) Even with SR schedule of around 350 MW, the loading on 400 kV Parli (PG)-Solapur (PG) corridor was more than the approved limit of 1200 MW.

(c) Even after the commissioning of 765 kV Wardha-Aurangabad D/C and 400 kV Akola-Aurangabad (Taptitanda) S/S lines, congestion on 400 kV Parli (PG)-Solapur (PG) corridor continued and sometimes even got worsened.

(d) Maharashtra is the largest State in India in terms of energy consumption and therefore MSEDCL is a large distribution utility catering to maximum demands in the country. During the month of October 2014, the peak demand of MSEDCL was 17694 MW and the State as a whole catered a power demand of about 20795 MW. In energy terms, Maharashtra catered around 439 MUs per day.

(e) Due to change in the SPS settings and time delay of 2.5 seconds, the SPS operations are reduced. However the 400 kV Parli (PG)-Solapur (PG) line is getting over loaded due to transmission of power through 765 kV Solapur-Raichur line necessitating load shedding. Further, to cater the demand in the Western part of

Maharashtra and to control the line loading, Koyna generation is required to be picked up.

(f) During 1st September to 15th October 2014, more than 15 TMC water was utilized for Koyna generation as against 9.5 TMC used for the same period last year (i.e. around 60% more), which is alarming. This may affect power availability during Summer.

(g) Transmission constraints and consequential load shedding led to financial loss to MSEDCL and also unrest among the consumers. Load shedding had to be implemented even during Diwali festival and exam time.

(h) During September and October 2014, the wind generation, mainly located in Western Part of Maharashtra, is drastically reduced and at the same time, the agriculture load in Western Maharashtra is increased. Due to transmission of power in the Southern Region, the overloading of Parli-Solapur line gets worse.

(i) The 765 kV Aurangabad-Solapur D/C line and 765 kV Pune-Solapur D/C line, which are the backend lines support for the Raichur-Solapur line, are not yet commissioned resulting in further aggravation of corridor constraint.

(j) While any flow in WR-SR corridor already resulted in overloading of 400 kV Parli (PG)-Solapur (PG) Corridor, NLDC's

declaration revising ATC of WR-SR corridor from 1200 MW to 1350 MW from 22nd October 2014 increased overloading of the lines.

11. Subsequently, MSEDCL filed an additional submission dated 29.12.2014 placing the following on record:

(a) During the month of October 2014, the peak demand of MSEDCL was 17694 MW and the State as a whole catered for demand of about 20795 MW. In energy terms, Maharashtra had catered around 439 MUs per day.

(b) During the month of September and October 2014, as there was heavy power flow through RS Line, Central Sector Power in Maharashtra reached to 7500 MW during day time. Due to said heavy loads during normal schedule drawal, no margin was available on the 400 kV Parli (PG)-Solapur (PG) line (hereinafter referred to as "PS Line") which is carrying the loads in Western part of Maharashtra. This resulted in overloading of the PS Line.

(c) Even SR Schedule of around 350 MW, was contributing to overloading of PS Line by more than the approved limit of 1200 MW.

(d) Even after the commissioning of 765 kV Wardha-Aurangabad D/C and 400 kV Akola-Aurangabad (Taptitanda) S/C lines, congestion on PS Line continued and sometimes even got worse.

(e) During September and October 2014, wind generation which is

mainly located in Western part of Maharashtra drastically reduced and at the same time, the agriculture load in Western Maharashtra increased. As a result of transmission of power in the Southern Region, the overloading of PS Line got worse.

(f) Flow of WR-SR corridor, results in overloading of PS line. Further NLDC has declared the ATC of WR-SR Corridor as 1200 MW which was later on 22.10.2014 revised to 1350 MW, resulting into increase in overloading of the lines.

(g) POWERGRID lines being shorter, have lower impedance than S/C line of Maharashtra, and the same is further contributing in overloading and consequential SPS operations on the PS Line.

(h) Although SPS operations are reduced due to change in SPS settings and time delay of 2.5 seconds, PS Line is getting over loaded due to transmission of power through RS Line resulting in carrying out load shedding to maintain the safety of the Grid.

(i) Distribution of the available power gets mismatched due to power flow through Raichur-Solapur line. Disturbance of the equilibrium of the power leads to load-shedding and also forced Koyna hydro generations. While there is no load shedding on the eastern part of Maharashtra, due to overloading of the existing other line, Western part of Maharashtra is witnessing frequent load shedding and thereby causing disparity and unrest amongst the Consumers on the western

part of Maharashtra.

(j) To cater the demand in the Western part of Maharashtra and to control the line loading, the Koyna generation is required to be picked up to the extent possible. As a result, during September – October 2014, more than 15 TMC water is utilized for Koyna generation as against 9.5 TMC used for the same period in last year (i.e. around 60% more). Consequently, availability of power from Koyna Generation may suffer during summer.

(k) MSETCL also raised the same issue and stated that in order to keep the power flow on the RS Line below SPS setting of 1700 MW, they had to operate Koyna generation to the maximum possible extent very often resulting into excess discharge of water. Moreover, it was also stated that they had discharged 17 TMC of water from Koyna against schedule of 12 TMC during 1st September to 27th October 2014. Considering the available water level and generating the power to the extent possible from Koyna, MSEDCL has been managing to keep the load shedding at possible minimum level.

(l) Due to load shedding on account of transmission constraint, there is revenue loss to MSEDCL. :Load Shedding had to be implemented even during the Diwali festival and exam time, despite earlier commitment by MSEDCL to provide continuous supply of power.

(m) Due to non availability of Gas no power is generated at Ratnagiri gas and Power Pvt. Ltd. (RGPPL) power station of 1967 MW capacity. Power generation is reduced due to high cost of generation, at Jaigad power station and coal shortage at Bhusawal and Parli Power Stations.

(n) As a result of reduced generation from Parli and overloading of the specified transmission line due to power flow through Raichur Solapur line, MSEDCL is required to either utilize more of Koyna Hydel Power or procure power from outside. This results in rising of financial burden on the MSEDCL, as they have to pay price against purchase of electricity from outside sources on short term basis.

(o) Delay in commissioning of 765 kV Aurangabad-Solapur D/C line and 765 kV Pune-Solapur D/C line which are the backend lines support for the RS line result in aggravation of corridor constraint.

(p) MSEDCL conveyed the above vide its letter dated 12.11.2014 to CEA and asked them to record them in Minutes of the Meeting held at 29.10.2014.

(q) However, CEA while forwarding the minutes of the meeting dated 20.10.2014 vide letter dated 13.11.2014 ignored the letter issued by MSEDCL and the point raised by MSEDCL's representative in the meeting. Despite a further reference to CEA by MSEDCL vide letter dated 21.11.2014 no action was taken by CEA in the matter.

(r) Further operation of RS line shall be suspended till the time back end transmission lines are ready so that the overloading issues of 400 kV Parli (PG)-Solapur (PG) line can be resolved.

12. The following transpired from the minutes of the meeting held on 30.07.2014 under the chairmanship of Member (GO&D) Central Electricity Authority:

(a) MSETCL representative gave a brief presentation outlining the problems being faced by Maharashtra due to synchronisation of NEW Grid with SR through 765 kV Solapur-Raichur lines. He stated that any export to SR on 765 kV Solapur-Raichur resulted in increased loading on 400 kV Wardha-Parli D/C line. The power flow beyond 750 MW per ckt resulted in SPS operation causing backing down of generation at their power station APML, Tiroda and NTPC's Mauda TPS. To compensate for this generation loss, Koyna HEP generation had to be increased resulting in excess utilization of water by end of May, 2014. The power generated at Tiroda was cheaper than most of the power stations in Maharashtra including Koyna HPS. Thus, SPS operation caused un-economic operation of their power plants and also forced them to resort to load shedding to keep their drawal within the schedule due to backing down of generation at Tiroda and Mauda. He mentioned that there were as many as 27 operations of SPS during the period 1st April, 2014 to 2nd June, 2014, which is abnormal. He added that there was no SPS operation since 3rd June, 2014 due to increase in

wind generation by about 1000 MW, reduction in demand of Maharashtra by about 10-12% and revised setting of SPS installed on 400 kV Wardha-Parli D/C from 1500 to 1700 MW with 2.5 sec time delay. MSETCL representative emphasized that though presently the situation was under control, it may deteriorate from October, 2014 onwards when the demand in the state would rise and the wind generation would reduce. He suggested that there should be no scheduled transaction on 765 kV Solapur-Raichur D/C link (S-R line) till adequate back end network was established.

(b) MSEDCL representative while endorsing the views of MSETCL added that subsequent to operation of SPS on Wardha-Parli line, load shedding had to be carried out in Western Maharashtra, whereas Eastern part remained unaffected. This led to unrest among consumers of Western Maharashtra. Besides they had to face adverse financial impact on account of frequent operation of SPS as already explained by MSETCL.

(c) NLDC representative further informed that they had recommended enhanced SPS settings of Wardha-Parli-Solapur section as early as 11th April 2014. However, the same was implemented only by end of June 2014, after discussion in WRPC forum. With revised SPS settings and commissioning of 765 kV Wardha-Aurangabad D/C lines in end June 2014, SPS operations were expected to be reduced substantially in the months ahead. He emphasised augmentation of the

network beyond Aurangabad towards western/coastal Maharashtra at the inter-state as well as intra-state level as a long term solution.

(d) After detailed deliberations, Member (GO&D), CEA summarised the observations, conclusions and agreement as under:

(i) Instance of SPS operation of 400 kV Wardha-Parli D/C line even when the flow of power as from SR to WR on Solapur-Raichur line showed that overloading of Wardha-Parli line could not be attributed solely to export of power to SR over 765 kV Solapur-Raichur line. Therefore, opening of Solapur-Raichur line was not considered technically appropriate.

(ii) As informed by MSETCL, there has been no incident of operation of SPS of Wardha-Parli line since 3rd June 2014. With enhanced SPS settings, commissioning of 765 kV Wardha-Aurangabad D/C lines in June 2014 end, and expected commissioning of some more lines upstream of Solapur-Raichur inter-regional link by October 2014, loading of Wardha-Parli line is likely to ease further and therefore, SPS operations were expected to reduce substantially in the months ahead. This had also been corroborated by the power-flow studies conducted by the CTU considering 18000 MW load of Maharashtra.

(iii) Operation of SPS should be avoided by WRLDC/Maharashtra SLDC by taking advance manual action for shedding load in

suitable areas/reducing generation at suitable power stations in case flow of power over Wardha-Parli D/C line tends to rise beyond 750 MW per ckt.

(iv) SPS of Wardha-Parli line may be reviewed at WRPC level particularly with regard to backing down of generation in Maharashtra so as to avoid frequent backing down at any specific generating station.

(v) Powergrid to expedite commissioning of transmission system upstream as well as downstream of Solapur-Raichur inter-regional corridor to ease the loading of the existing inter-state and intra-state transmission network in Maharashtra.

(vi) MSETCL to expedite the commissioning of intra-state transmission system in Maharashtra, particularly the evacuation system associated with APML, Tiroda and the transmission lines beyond Aurangabad.

(vii) As desired by MSETCL, CTU would carry out load flow study in consultation with MSETCL considering Maharashtra load as 19000 MW and share the same along with the study-results with Maharashtra utilities, POSOCO and CEA.

(viii) Augmentation of the network beyond Aurangabad towards Western/coastal Maharashtra at the inter-state as well as intra-

state level line is also essential to avoid overloading/congestion of transmission systems in that area.

(ix) CEA would convene another meeting with Maharashtra power utilities, CTU and POSOCO in case frequent SPS operation on Wardha-Parli line is observed in future.

13. CTU filed a written submission dated 12.2.2015 emphasizing the following

(a) The stance of MSEDCL that the high loading of Parli-Solapur 400 kV D/C line is solely on account of export of power to Southern Region is wrongly placed. In this context it is significant that the demand of Southern part of Maharashtra is to be met through the Parli-Solapur line together with generations at Dabhol, Jaigad, Koyna, Parli and Bhusawal and some wind generations. In the event of reduction in the net power generated at these generating stations, a large part of the power demand of Southern Maharashtra is fed through Parli-Solapur line which may cause high loading the line. Maharashtra has admitted in their submission, that in the month of Sep-Oct'14 the generation at the above mentioned generating plants was very low and this led to high loading of Parli-Solapur line. It may be mentioned here that the entire load of Southern Maharashtra cannot be solely met through the Parli-Solapur line. The demand of southern Maharashtra is huge and particularly during the agricultural season it reaches the order

of 7500 MW which cannot be met through the ISTS only. Maharashtra needs to adequately maintain the state generation to meet the huge demand of the Southern part of Maharashtra.

(b) Load flow studies have been carried out for present scenario considering the reduced generation in Maharashtra. Studies show that the loading on Parli-Solapur line is sensitive to the generation and load in Southern part of Maharashtra. Since during the period reported by MSETCL (Sep-Oct'14), few thermal generations and wind generation were low and agricultural load increased, high loading of Parli-Solapur 400 kV D/C line has been experienced irrespective of any variation in Koyna generation.

(c) Further, the Tiroda-Akola-Aurangabad 765 kV lines of Tiroda system which connect the Tiroda generation complex to the load centers located in Western part of Maharashtra is only partially available, even though 4 out of the 5x600 MW units at Tiroda have been commissioned. Studies show that the additional injection of power at Wardha from 4x600 MW Tiroda generation leads to an increase in power flow on the Wardha-Parli-Solapur. It is observed that with the availability of complete Tiroda transmission system, the loading on Wardha-Parli-Solapur corridor may be further relieved as the injection of power at Wardha would reduce and also Tiroda generation would directly feed the load centres of western Maharashtra.

(d) In the Operational feedback of POSOCO for Jan'15 the high loading on Wardha-Parli-Solapur corridor during Sep/Oct' 14 is attributed to the high demand of Maharashtra during morning peak, no generation at RGGPL and Low generation at Jaigad and Parli.

(e) Further, it is submitted that Maharashtra cannot be the sole beneficiary of an inter-state transmission system. Suspension trial operation of Raichur-Solapur 765 kV 2xS/c line to control over loading of Parli-Solapur line which is caused due to reasons attributable to Maharashtra shall hamper the efforts that are being made for integrated operation of all the regional grids and to facilitate power transfer to the Southern Regional grid.

(f) The Southern Region is experiencing huge deficit of power and the Raichur-Solapur 765 kV corridor is seen as a lifeline considering it connects the power deficit Southern States with the power surplus States of Eastern and Western regions. The present flow of power over the Raichur-Solapur line has been limited to 350 MW considering downstream and upstream network of this line. However, the upstream lines viz. Raipur-Wardha-Aurangabad 765 kV have been commissioned and the Pune-Solapur 765 kV S/c line is expected to be commissioned shortly. Further, Powergrid is putting its best effort for the timely implementation of Aurangabad-Solapur 765 kV D/c line. It is expected that with the commissioning of Pune-Solapur and

Aurangabad-Solapur 765 kV lines the export capacity over Raichur-Solapur line shall progressively increase to the order of 2000 MW.

(g) It is suggested that the state thermal generations of Maharashtra at Bhusawal/Jaigad/RGGPL/Parli may be kept at a value to feed demand of Southern Maharashtra and loading on Parli-Solpaur line remains within acceptable limits. This would also help in saving part of Koyna generation for meeting the peak demand.

Analysis and Decision:

14. The Petitioner, Maharashtra State Electricity Transmission Co. Ltd. (MSETCL) had requested to keep in abeyance the trial operation of SR grid and NEW grid over 765 kV Raichur-Solapur-1 S/C line. Petitioner has submitted that the circuit to be developed by POWERGRID (Circuit-1) was commissioned by the end of December, 2013 while the circuit to be developed by RSTCL (Circuit-2) was to be commissioned by February, 2014. The trial period of the SR Synchronization had been continuing for more than four months/ In the course of these four months, serious issues, setbacks and difficulties have surfaced which have been concurred upon and acknowledged by Western Regional Power Committee (WRPC) and TCC. The issues raised by the petitioner in its submission includes (i) non-fulfilment of n-1 criterion, (ii) inadequate back-end transmission system causing overloading of 400 kV Wardha-Parli-Solapur lines, (iii) frequent operations of System Protection Scheme (SPS) leading to reduction in state generation/load shedding and

further resulting into financial losses to MSEDCL.

15. The Petitioner has submitted that it is a matter of serious concern that although the Manual on Transmission Planning, 1994 and the National Electricity Plan (Volume-II) – Transmission which covers the transmission plan for the 12th Plan Period (that is, from 2012-2013 to 2016-2017) stipulates the fulfilment of n-1 criterion for the transmission of electricity, yet the SR Synchronization over the RS Line does not fulfil the said criterion as on date.

16. The Petitioner has added that requisite back end transmission network at Solapur (PG) including the 765 kV Wardha-Aurangabad D/C Line, 765 kV Pune-Solapur (PG) D/C Line and the 765 kV Aurangabad-Solapur D/C Line is not complete while conducting the SR Synchronization and in the absence of back end transmission network, the entire power flow on Circuit-1 passes through the 400 KV Wardha- Parli D/C and 400 KV Parli-Solapur D/C Lines.

17. The Petitioner has further submitted that any sudden export to SR Grid results in operation of Special Protection Scheme (SPS) on the 400 kV Wardha-Parli D/C Line. While the operation of SPS should be only as a matter of contingency in extreme cases, in the trial of the SR Synchronization, the SPS operation has been very frequent and almost regular. Further, SPS operation on the 400 KV Wardha-Parli D/C Line flow results in backing down of APML, Tiroda generation having long term PPA with State DISCOM. The SPS operation leads to reduction of generation in the State of Maharashtra ultimately resulting in over drawal of power from the Central Grid by the State.

As a result, load shedding is sometimes required to be carried out to reduce over drawal of the State when the Koyna generation needs to be picked up to reduce over drawal. In addition to the backing down of APML, Tiroda generation, load shedding in Western Maharashtra is proposed in the SPS logic which is compensated with picking up Koyna generation which is a matter of serious concern since the precious Koyna generation is being used for the purpose for which it is not envisaged and thus, the entitlement of the State of Maharashtra to use the water from the Koyna Dam is at the brink of being exhausted and this has serious long term ramifications.

18. NLDC vide affidavit 20.06.2014 has submitted that in order to keep the power flow through the AC link under control, power flow through the HVDC links between NEW grid and SR grid is modulated. To take care of sudden increases in flow due to contingencies, SPS have been provided to shed load in SR and reduce generation in WR. There are over 85 operations of SPS during 31.3.2014 to 13.6.2014. Out of these 85 SPS operations, there are several occasions (53), the operation either directly caused by Maharashtra system or due to incident related to Maharashtra area.

19. As directed by the Commission vide interim order dated 2.7.2014, Member GO&D, CEA conducted a meeting with officers of MSETCL, MSEDCL, POSOCO, CTU and WRPC on 30.7.2014. The findings of the aforesaid meeting are as under:

(a) Main cause of concern to Maharashtra was overloading of

Wardha-Parli section, which was leading to frequent operation of SPS and consequential backing down of generation/ load-shedding in the State.

(b) There was no SPS operation since 3.6.2014 due to increase in wind generation by about 1000 MW, reduction in demand of Maharashtra by about 10-12% and revised setting of SPS installed on 400 kV Wardha-Parli D/C from 1500 to 1700 MW with 2.5 sec time delay. Though the situation was under control in July, it may deteriorate from October 2014 onwards when the demand in the State would rise and the wind generation would reduce.

(c) Loading of 400 kV Wardha-Parli-Solapur D/C line should be monitored closely and manual corrective action should be taken immediately after power-flow on this line tends to go beyond 750 MW per ckt.

(d) Overloading of Wardha-Parli line could not be attributed solely to export of power to SR over 765 kV Solapur-Raichur line. Therefore, opening of Solapur-Raichur line was not technically appropriate.

(e) SPS of Wardha-Parli line may be reviewed at WRPC level, particularly with regard to backing down of generation in Maharashtra.

(f) PGCIL to expedite commissioning of transmission system upstream as well as downstream of Solapur-Raichur inter-regional

corridor to ease the loading of the existing inter-State and intra-State transmission network in Maharashtra. (vii) MSETCL should expedite the commissioning of intra-State transmission system in Maharashtra.

20. The petitioner vide letter dated 12.11.2014 and additional affidavit dated 29.12.2014 has submitted that due to change in the SPS settings and time delay of 2.5 seconds, the SPS operations are reduced. However the 400 kV Parli (PG)-Solapur (PG) line was getting over loaded due to transmission of power through 765 kV Solapur-Raichur line thereby load shedding was required to be carried out. NLDC has declared the ATC of WR-SR Corridor as 1200 MW which was later on 22.10.2014 revised to 1350 MW, resulting into increase in overloading of the lines. Further, to cater the demand in the Western part of Maharashtra and to control the line loading, the Koyna generation is required to be picked up. Due to transmission constraint, there is a financial loss to MSEDCL by way of loss of revenue from the consumers due to implementation of load shedding and also result in unrest among the consumers.

21. The CTU vide affidavit dated 12.02.2015 submitted that the demand of Southern part of Maharashtra is to be met through the Parli-Solapur line together with generations at Dabhol, Jaigad, Koyna, Parli and Bhusawal and some wind generations. In the event of reduction in the net power generated at these generating stations, a large part of the power demand of Southern Maharashtra is fed through Parli-Solapur line which may cause high loading of the line. Load flow studies have been carried out for considering the reduced

generation in Maharashtra. Studies show that the loading on Parli-Solapur line is sensitive to the generation and load in Southern part of Maharashtra. High loading of Parli-Solapur 400 kV D/C line has been experienced irrespective of any variation in Koyna generation. In the Operational feedback of POSOCO for Jan'15 the high loading on Wardha-Parli-Solapur corridor during Sep/Oct' 14 is attributed to the high demand of Maharashtra during morning peak, no generation at RGGPL and Low generation at Jaigad and Parli. Suspension of trial operation of Raichur-Solapur 765 kV 2xS/c line to control over loading of Parli-Solapur line which is caused due to reasons attributable to Maharashtra shall hamper the efforts that are being made for integrated operation of all the regional grids and to facilitate power transfer to the Southern Regional grid. The Southern Region is experiencing huge deficit of power and the Raichur-Solapur 765 kV corridor is seen as a lifeline considering it connects the power deficit Southern states with the power surplus states of Eastern and Western regions.

22. We have considered the submissions of the petitioner and the respondents. The 1st circuit of the Raichur-Solapur Line was synchronized on 31.12.2013 and 2nd circuit was synchronized on 30.6.2014. In addition 765 kV Narendra (SR) – Kolahpur (WR) D/C lines being operated at 400 kV have also been commissioned in November, 2015. With the commissioning of these lines between WR-SR grids, violation of n-1 criterion for the transmission of electricity between WR and SR during normal operation is no longer there.

23. The back end transmission network at Solapur for interregional links of WR-SR grids has been strengthened after commissioning of following transmission lines:

(a) 765 KV Wardha-Aurangabad D/C Line circuit-1 – 08.07.2014

(b) 765 KV Wardha-Aurangabad D/C Line circuit-2 – 01.04.2015

(c) 765 KV Aurangabad-Solapur D/C Line – 07.10.2015

(d) 765 KV Pune-Solapur S/C Line – 06.03.2015

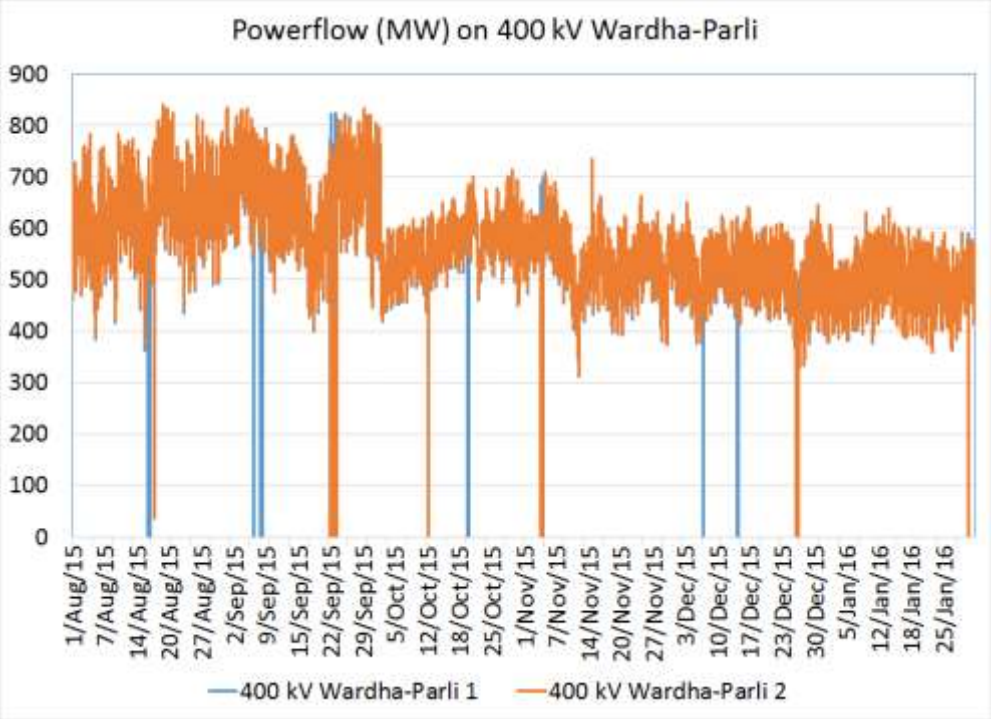
(e) Other than the above lines, 765 kV Raipur-Wardha-Aurangabad D/C lines and 400 kV Aurangabad-Pune & Parli-Pune D/C lines have also been commissioned.

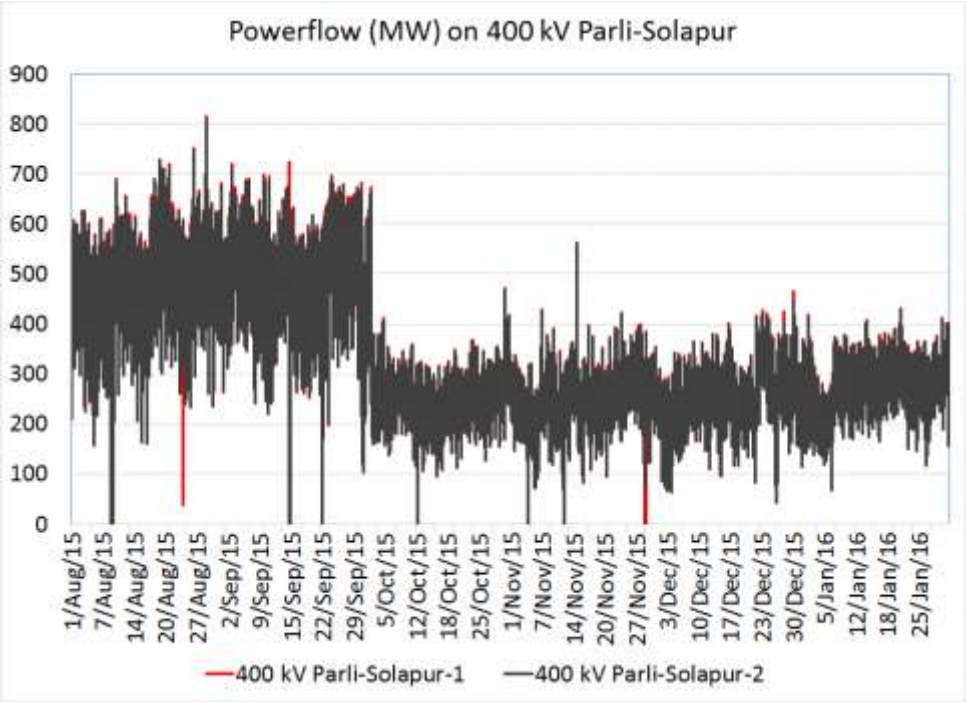
24. To be doubly sure, we have also obtained latest data in regard to frequency of SPS operations in 400 kV Wardha-Parli line and for 765 kV Raichur-Solapur line and loading pattern of 400 kV Wardha-Parli-Sholapur line. The frequency of SPS operations for overloading of 400 kV Wardha-Parli and 765 kV Raichur-Solapur lines and for loss of import of power due to tripping of 765 kV Solapur-Raichur lines as per NLDC's email dated 12.02.2016 are given hereunder:

Name of SPS	Frequency of Operation of SPS for overloading of 400 kV Wardha-Parli	Frequency of Operation of SPS for overloading of 765 kV Solapur-Raichur	Frequency of SPS operation for loss of import of power due to tripping of 765 kV Solapur-Raichur lines
Jan-15	0	0	0
Feb-15	0	0	0
Mar-15	5	0	0
Apr-15	0	0	0
May-15	5	4	0

Jun-15	1	3	0
Jul-15	2	2	0
Aug-15	4	1	0
Sep-15	5	1	0
Oct-15	0	4	0
Nov-15	0	0	0
Dec-15	0	0	0
Jan-16	0	2	0
Feb-16	1	0	0

25. Further we have also perused the loading pattern of 400 kV Wardha-Parli-Solapur lines in recent times which is as under:





256 We are also informed that TTC/ATC of WR grid to SR grid has progressively increased from 1000 MW in December, 2013 to 4000 MW in December, 2015.

28. We have perused the latest data of SPS operations in 400 kV Wardha-Parli line and for 765 kV Raichur-Solapur line and also the loading pattern of 400 kV Wardha-Parli-Solapur lines. We note that since October, 2015 there were practically no SPS Operations except for 2 operations in case of Raichur-Solapur line during January, 2016 and one operation in case of Wardha-Parli line in February, 2016 (up to 11th February 2016), which are much less in comparison to 85 operations cited by the petitioner during 31.3.2014 to 13.6.2014. We also find that the overloading of 400 kV Wardha-Parli-Solapur lines has considerably reduced after October, 2015.

29. As pointed by NLDC in its affidavit dated 20.6.2014, formation of National Grid is an initiative towards fulfillment of the national objective for optimal utilization of the national resources-conventional as well as renewable that are unevenly dispersed across the vast geographical area of India. Since the India grid is already operating synchronously with the grid of Bhutan and is also interconnected with Nepal and Bangladesh, the synchronous interconnection of the SR grid is also a stepping stone towards realizing the SAARC grid. In our view an interconnected power system has evolved because it is more reliable than an isolated power system. In case of disruption in one part of the system, power can be fed from alternate paths, thus, maintaining continuity of service. An interconnected power system also makes it possible to implement an economic load dispatch. There is no doubt that synchronization of National Grid is required in larger public interest as it provides the way for smooth transfer of power between NEW grid and SR grid, mitigates congestion and brings down prices of electricity in the market and stabilizes frequency in the National Grid.

30. In the light of our observations at para 27 hereinabove, we believe that the troubles during the trial operation are of the nature of teething troubles. With the commissioning of both the circuits of the 765 kV Raichur-Solapur line and commissioning of 765 kV Narendra– Kolahpur D/C lines being operated at 400 kV in November, 2015, the WR-SR corridor is facilitating the power deficit Southern States with the power surplus states of Eastern and Western regions. Under these circumstances, the prayer of the petitioner to keep in

abeyance the trial operation of SR grid and NEW grid over 765 kV Raichur-Solapur- 1 S/C line no more survives.

31. This order disposes of Petition No. 103/MP/2014.

Sd/-	**sd/-**	**sd/-**
(A. S. Bakshi)	**(A.K. Singhal)**	**(Gireesh B. Pradhan)**
Member	**Member**	**Chairperson**