

02nd September, 2015
CREG/MUM/MERC/15/244

Principal Secretary,
Maharashtra Electricity Regulatory Commission,
13th Floor, Centre No-1, World Trade Centre
Cuffe Parade, Colaba
Mumbai 400 005

Dear Sir,

Subject: Additional Submission regarding Case 182 of 2014

This has reference to the Network Rollout Plan submitted post the judgment of the Hon'ble ATE in Appeal 246 of 2012 dated 28th November, 2014 and the Hearings held in the matter in MERC.

In line with the directives of the Hon'ble MERC during the Hearing held on 12th August, we have duly made submissions on 19th August, 2015. Subsequently, meetings were held with BEST and the data regarding Reliability Indices of R-Infra became available.

In view of this, a need was felt to include analysis of optimistic, realistic and pessimistic scenarios in the network rollout plan maintaining the original principles intact. Additionally a section on comparative analysis of the Reliability data has also been included. We are accordingly making a further submission in this regard and enclosing as Appendix to this letter.

We request the Hon'ble Commission to consider this submission for the Network Rollout Plan.

We trust the same is in order.

Yours faithfully,

Bhaskar Sarkar
Head Business Strategy & Regulations (MO)

Encl:

TATA POWER

The Tata Power Company Limited

Oharavi Receiving Station Regulations Department Matunga Mumbai 400019

Tel 91 22 6717 2636 Telefax 91 22 6717 2603

Registered Office Bombay House 24 Homi Mody Street Mumbai 400 001

CIN : L28920MH1919PLC000567 Website : www.tatapower.com Email : tatapower@tatapower.com



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BEFORE THE MAHARASHTRA ELECTRICITY REGULATORY COMMISSION
WORLD TRADE CENTRE, CENTRE NO.1,
13th FLOOR,
CUFFE PARADE, MUMBAI 400005

CASE NO. 182 OF 2014

IN THE MATTER OF:

The Tata Power Company Limited

... Petitioner

Versus

BEST Undertaking & Ors.

... Respondents

**Additional Submission on behalf of The Tata Power Company Limited with
regard to the Daily Order of the Hon'ble Commission dated 12.08.2015 with
respect to Network Rollout Plan for Mumbai City Area**

The Tata Power Company Limited ("Tata Power") most respectfully submits as under:-

1. Tata Power has filed the present Petition seeking approval of its Network Rollout Plan in accordance with the directions of this Hon'ble Commission in its Order dated 14.08.2014 in Case No. 90 of 2014. By the said Order, this Hon'ble Commission had:-
 - (a) Granted a Distribution Licence to Tata Power, being Distribution Licence No. 1 of 2014, for a period of 25 years from 16.08.2014.
 - (b) Directed Tata Power to submit its revised Network Rollout Plan in terms of the directions. It was laid down that the Network Rollout Plan approved by this Hon'ble Commission would form part of the Specific Conditions of Licence as specified by it in terms of Section 16 of the Electricity Act, 2003 ("Electricity Act").
2. Pursuant to this Hon'ble Commission's Order dated 14.08.2014 in Case No. 90 of 2014, Tata Power had submitted its Revised Network Rollout Plan on 09.10.2014.
3. During the pendency of this Petition, the Hon'ble Appellate Tribunal for Electricity ("Hon'ble Tribunal") disposed off Appeal No. 246 of 2012 and batch titled as *Tata Power Company Limited Vs. Maharashtra Electricity Regulatory Commission and Ors.* by its Judgment dated 28.11.2014 ("Judgment dated 28.11.2014"), returning certain findings, observations and directions. These were cross-appeals filed by Tata Power and Reliance Infrastructure Limited ("R-Infra") challenging this Hon'ble Commission's Order dated 22.08.2012 in Case No. 151 of 2011. In view of the observations and directions of the



Hon'ble Tribunal in its Judgment dated 28.11.2014, Tata Power revised its Network Rollout Plan and submitted the same to this Hon'ble Commission on 12.02.2015, and updated the same by filing it on 06.08.2015 pursuant to daily order dated 30.07.2012. In this revised Network Rollout Plan, Tata Power applied the principles of network rollout enunciated by the Hon'ble Tribunal even to Mumbai City Area.

4. It is stated that, the captioned Petition was listed for hearing before this Hon'ble Commission on 12.08.2015. During the said hearing, this Hon'ble Commission directed Tata Power to revise its Network Rollout Plan for Mumbai City area i.e. area overlapping with BEST, as the provision of open access was not available in Mumbai City area and the consumer should have a choice. The directions of the Hon'ble Commission in the Daily Order for 12.08.15 are reproduced below:

The Commission observed that provision of open access is not available for networks of BEST. Hence, the two areas i.e. area common with BEST and area common with Rlnfra, need to be treated differently. The Commission further directed the Petitioner to review its proposal for BEST's area. It will be necessary for the Petitioner to enter into formal dialogue with BEST for this purpose.

5. In view of the above, Tata Power is making the following revised submissions with respect to Network Rollout Plan for Mumbai City Area (Licence Area common to BEST and Tata Power).

6. The Hon'ble Commission had also directed Tata Power to enter into a formal dialogue with BEST in this matter. While we are in the process of having this dialogue with BEST, we are making this submission to the Hon'ble Commission in the interest of time. We will make submissions with respect to Minutes of the Meeting/s held and any further additional submissions required, based on the outcome of the dialogue with BEST.

B. MUMBAI CITY NETWORK ROLLOUT ADDITIONAL SUBMISSION

Re: Load Projection

7. Tata Power has estimated the Load projection in Mumbai City area for the next 5-7 years based on the following:

- i. Existing demand currently being catered in Mumbai City by Tata Power and BEST
- ii. Considered the load projections after assuming an increase in the load to be catered in Mumbai City on account of following:
 - (a) Estimated natural load growth of existing consumers (yellow field areas)
 - (b) Estimated load growth due to redevelopment of existing properties (brown field areas)

(c) Estimated addition in load on account of opening up of new areas for development (green field areas)

This estimation of load addition and the methodology adopted for load estimation under yellow field, brown field and green field areas, has been explained in detail in our Additional Submission dated 06.08.2015.

8. Based on the above, Tata Power-D has projected the overall estimated load projection of Mumbai City in the next 5-7 years under following three scenarios:

- a. Optimistic Scenario – This is the scenario presented above, wherein all the growth projections are expected to materialise during the Network Rollout period.
- b. Realistic Scenario – This is the scenario wherein only 60% of the Brown Field and 50% of the Green Field projections are expected to materialise during the Network Rollout period.
- c. Pessimistic Scenario – This is the scenario wherein, no load growth in Green Field areas and only 50% of the load growth in Brown Field areas would realise in the Network Rollout period.

Table No.1: Estimation of Load Projection in Mumbai City

| Particulars | | Optimistic Scenario (MW) | Realistic Scenario (MW) | Pessimistic Scenario (MW) |
|---|-----------|--------------------------------|-------------------------------|---------------------------------|
| Existing Peak Demand of BEST | a | 900 | 900 | 900 |
| Existing Peak Demand of Tata Power at Distribution Level | b | 94 | 94 | 94 |
| Existing Peak Demand of Mumbai City | c=a+b | 994 | 994 | 994 |
| Add: | | | | |
| Growth in Yellow Field Areas | d | 101 | 101 | 101 |
| Growth in Brown Field Areas | e | 114 | 69 | 57.10 |
| Growth in Green Field Areas | f | 64 | 32 | - |
| Estimated Peak Demand of Mumbai City - Sensitivity Analysis | g=c+d+e+f | 1,273 | 1,196 | 1,152 |

Re: Ward wise assessment of Load Projection

9. The estimated Load Projection in the wards is further estimated based on the actual trend of load demand pattern of usage categories i.e. residential (apartment and slums), commercial and industrial in each ward which in turn is assessed based on actual built up land base as available in the Development Plan of Municipal Corporation of Greater Mumbai (MCGM). The Ward wise estimation of existing Load is as presented in the Table below:

Table No.2: Ward-wise Estimation of Existing Load in Mumbai City

| Ward | Area details | Existing Load (at Dist. level) (MW) |
|--------------|----------------------|---|
| A Ward | Marine Lines, Colaba | 152 |
| B Ward | J J Hospital | 30 |
| C Ward | Chandanwadi | 32 |
| D Ward | Nana Chowk | 109 |
| E Ward | Byculla | 115 |
| F North Ward | Matunga | 128 |
| F South Ward | Parel | 169 |
| G North Ward | Mahalaxmi | 118 |
| G South Ward | Dadar | 141 |
| Mumbai City | | 994 |

10. Although the total load projection in Mumbai City has been estimated under the three scenarios, for the purpose of assessing ward wise load projection and to plan the ward wise network, a Realistic Scenario has been considered. Based on the above the ward wise Load projections on realistic basis works out to as follows:

Table No.3: Ward wise Load Projection for Mumbai City

| Ward | Existing Load (at Dist. level) (MW) | Load Addition (Yellow field area) (MW) | Load Addition (Brown field area) (MW) | Load Addition (Green field area) (MW) | Total Load Estiamted in Mumbai City (MW) |
|--------------|---|--|---|---|--|
| | a | b | c | d | e=a+b+c+d |
| A Ward | 152 | 19 | 0 | 0 | 172 |
| B Ward | 30 | 4 | 0 | 2 | 36 |
| C Ward | 32 | 3 | 0 | 0 | 36 |
| D Ward | 109 | 10 | 9 | 0 | 127 |
| E Ward | 115 | 11 | 36 | 9 | 171 |
| F North Ward | 128 | 10 | 4 | 10 | 152 |
| F South Ward | 169 | 15 | 12 | 11 | 207 |
| G North Ward | 118 | 11 | 5 | 0 | 134 |
| G South Ward | 141 | 16 | 3 | 0 | 160 |
| Mumbai City | 994 | 101 | 69 | 32 | 1196 |

Re: Distribution Sub-station (DSS) Capacity

11. Tata Power has proposed its network Roll out Plan to cater to 50% of the total Load projection of Mumbai City Area as estimated above. This is in line with the directions of Hon'ble Commission in the Licence Order in case 90 of 2014 as extracted below:

"Network Development Plan considers 50% of the load serving 31% of the consumers creating a mismatch in capacity and consumer addition" (Para 6.6.40)



"The existing LT network of TPC is a small fraction of the LT networks of Rlnfra and BEST and therefore it will have to expand its LT network substantially for last mile connectivity even to achieve servicing of 50% of the demand as envisaged in its Business Plan." (Para 7.1.4 (a))

12. Likewise the DSS capacity required to be installed in the Mumbai City area shall depend on the 50% of the anticipated capacity based on the estimated load projection as shown in the Table No. 3 above minus the existing capacity. For the purpose of this submission, it is considered that the new DSS to be developed shall be of 40 MVA capacity each.

13. Tata Power submits that to assess the DSS capacity requirement from the peak demand, a reasonable diversity factor needs to be considered. Tata Power-D has studied various technical codes at a diversity factor. Tata Power has referred to International Standard (IEC – International Electrotechnical Commission) to arrive at a diversity factor of 0.80 to be considered for circuits emanating from distribution sub-station.

14. The quantum of estimated peak demand considered for designing DSS network is MW and assuming Tata Power would develop its network to cater to 50% of this Demand. The following table shows the overall approach adopted by Tata Power in its Network Rollout Plan for computation of projected number of DSS and its corresponding capacity.

Table No.4: Projected DSS & its Capacity – Mumbai City

| Particulars | | Units | Total |
|--|------------|-------|-------|
| Estimated Peak Demand of Mumbai City at Distribution Level | a | MW | 1,196 |
| Diversity Factor for DSS | b | | 0.80 |
| DSS capacity required | $c=a/b$ | MVA | 1,494 |
| 50% Target by Tata Power | $d=c*50\%$ | MVA | 747 |
| Tata Power Existing Capacity (incl. 22kV Capacity) | e | MVA | 409 |
| Additional DSS capacity Required | $f=d-e$ | MVA | 338 |
| Capacity of one DSS | g | MVA | 40 |
| No. of DSS projected | $h=f/g$ | Nos. | 9 |

15. The ward wise DSS spread planned and expected to be executed depending on the availability of space is as shown in the following table:

Table No.5: Ward wise Projected DSS (40 MVA) – Mumbai City

| Ward | Total Load Estiamted in Mumbai City (MW) | DSS (MVA) Required for 50% load | Existing - HT Transformation Capacity (MVA) | Existing - HT Capacity @ 22kV (MVA) | Additional DSS Capacity Required (MVA) | No. of DSS Projected |
|--------------|--|---------------------------------------|---|---|--|-------------------------|
| | a | b=(a/0.8)*50% | c | d | e=b-c-d | f |
| A Ward | 172 | 107 | 0 | 0 | 107 | 2 |
| B Ward | 36 | 23 | 0 | 17 | 5 | 0 |
| C Ward | 36 | 22 | 0 | 0 | 22 | 1 |
| D Ward | 127 | 80 | 0 | 0 | 80 | 2 |
| E Ward | 171 | 107 | 0 | 0 | 107 | 2 |
| F North Ward | 152 | 95 | 32 | 161 | -98 | 0 |
| F South Ward | 207 | 130 | 0 | 132 | -2 | 0 |
| G North Ward | 134 | 84 | 0 | 67 | 17 | 0 |
| G South Ward | 160 | 100 | 0 | 0 | 100 | 2 |
| Mumbai City | 1196 | 747 | 32 | 377 | 338 | 9 |

Re: HT Network Addition

16. It has been assumed that the on an average a source RSS would be at a distance on about 5 kms from the DSS. In view of this, 10 km of 33 kV cable has been considered for every DSS to be installed considering two incoming cables from same/ different RSS.

17. The table below provides the projected 33 kV HT cable requirement:

Table No.6: Projected 33 kV HT Cable requirement – Mumbai City

| Particulars | Units | Total |
|----------------------|-------|--------|
| No. of DSS projected | a | Nos. 9 |
| 33kV cable per DSS | b | km 10 |
| 33kV cable in Length | c=a*b | km 90 |

18. Tata Power-D has opted for a Ring Network Design for 11 kV network. In order to achieve the spread of 11 kV network in the load centre, it is planned to have 4 rings of 8 kms each. Thus, around 32 km of 11 kV network would be laid for every DSS. The table below provides the projected 11 kV HT cable requirement in Mumbai City area.

Table No.7: Projected 11 kV HT Cable requirement – Mumbai City

| Particulars | Units | Total |
|-----------------------|-------|--------|
| No. of DSS projected | a | Nos. 9 |
| 11 kV cable per DSS | b | km 32 |
| 11 kV cable in Length | c=a*b | km 288 |

Re: Consumer Sub-station (CSS) Capacity

19. The Hon'ble Commission in its Order dated 14.08.2014 in Case No. 90 of 2014, had directed Tata Power to increase the reach at LT level. Accordingly, Tata Power-D has considered the respective CSS: DSS capacity ratio of the existing distribution utilities in Mumbai. The ratios computed in the range of 1.20 to 1.50. However for the purpose of this



network rollout plan, the computation of CSS capacity has been done considering the ratio of 1.10. This ratio is considered for Mumbai City as the load is much concentrated and the density of load is higher in Mumbai City area. Further, as the CSS capacities may differ, depending on the requirement, an average capacity of 1.25 MVA per CSS has been considered for the purpose of network planning.

20. The details of the projected CSS capacity is given in the table below:

Table No.8: Projected CSS Capacity – Mumbai City

| Particulars | | Units | |
|--------------------------|---------|-------|------|
| Projected Number of DSS | a | Nos. | 9 |
| Existing Number of DSS | b | Nos. | 1 |
| Total Number of DSS | c=a+b | Nos. | 10 |
| Existing Capacity of DSS | d | MVA | 40 |
| Capacity of one DSS | e | MVA | 40 |
| Total DSS capacity | f=a*e+d | MVA | 400 |
| CSS:DSS Ratio | g | | 1.10 |
| Total CSS Capacity | h=f*g | MVA | 440 |
| Existing CSS Capacity | i | MVA | 75 |
| Additional CSS Planned | j=h-i | MVA | 365 |

Re: LT Network

21. To arrive at the LT network requirement for Tata Power, the average of LT network density of private urban utilities operating in metro cities have been evaluated. Since Tata Power-D is placed in Mumbai, the LT network density of BEST & R Infra-D has been given preference for consideration for computation of LT Network requirement.

22. The LT network density has also been computed for BEST as given below:

Table No.9: LT Network Density for BEST

| Distribution Utility | Area (sq.km) | LT Mains (ckt.km) | LT Density (ckt/sq.km) |
|--|--------------|-------------------|------------------------|
| BEST | 65 | 8047 | 123.8 |
| Source: BEST MYT petition (assumption for FY13-14) | | | |

23. It is pertinent to point out that BEST's LT network figure of 8047 km in 65 sq.km area, is unfathomable and seemingly impossible. As for the BEST figure of 124 ckt. km per sq.km, it means that for about every 1 sq.km area, 124 kms of LT cable would have to be laid in around 31 concentric meshes and this too in an area which has a vertical growth rather than spread. As this seems to be overstated, the figures of BEST have not been considered for analysis/ assumption.

24. Tata Power-D submits that Hon'ble Commission in the license order has mentioned about 17715 km of LT network of R Infra-D. However, upon referring to various submissions of R Infra-D in ARR/ MYT petitions and its Licence Application in 2011, the

figure also appears to be overstated when compared to their MYT submissions. Further, even referring to R Infra's MTR Petition the LT network is presented as 5,764 km for FY 2012-13 which also seems to be much higher than the submissions made in R Infra-D in MYT petitions and its Licence Application in 2011. Therefore, as comparison of past submissions of R Infra-D show consistency with the above mentioned figure of 4980 ckt.km. and the same has been considered.

25. Further, as Tata Power would be developing network to reach 50% consumers, LT network density in the range of @50% and @70% of that of R Infra-D density has been planned to achieve the desired spread. The table below shows the LT network density:

Table No.10: Computation of Network Density

| Distribution Utility | Area (sq.km) | LT Mains (ckt.km) | LT Density (ckt/ sq.km) | | |
|----------------------|--------------|-------------------|-------------------------|---------|---------|
| | | | | @50% | @70% |
| a | b | c | d=c/b | e=d*50% | f=d*70% |
| R-Infra | 430 | 4980 | 11.6 | 5.80 | 8.10 |

Source: R-Infra - MYT figures of FY 14-15.

26. LT network density shall vary area wise depending on the presence of low end residential consumers in the area i.e. higher the presence of low end consumers, higher would be the LT network required for serving consumers and vice versa.

27. The table below provides the projected LT network requirement.

Table No.11: Projected LT network requirement

| Particulars | Units | Considering | Considering |
|--|----------|-------------|-------------|
| | | 5.8 km | 8.1 km |
| Area of Operation | a Sq.km | 65 | 65 |
| LT NW Norm Per Sq. km | b km | 5.80 | 8.06 |
| LT Cable required in Mumbai | c=a*b km | 377 | 524 |
| Existing LT NW of Tata Power | d km | 26 | 26 |
| Additional LT NW projected to be developed | e=c-d km | 351 | 499 |
| Range of LT NW planned | km | 350 to 500 | |

28. Tata Power submits that with the projected LT network it would be able to cater the targeted number of consumers mainly in low end category. LT network density shall vary area wise depending on the presence of low end residential consumers in the area i.e. higher the presence of low end consumers, higher would be the LT network required for serving consumers and vice versa. However, for the purpose of this Network Rollout projection, Tata Power has considered the LT network density of 8.1 km.



Re: Ward wise Network Rollout in Mumbai City

29. The ward wise network rollout projected by Tata Power-D in Mumbai City to cater to 50% of the load in Mumbai City area and to reach to 50% of the LT consumers is as follows:

Table No.12: Projected Network requirement

| Ward | Network Projected in Mumbai City Area | | | | | |
|--------------------|---------------------------------------|--------------------|--------------------------|--------------------------|--------------------|-----------------------|
| | No. of DSS Proposed | DSS Capacity (MVA) | 33 kV Cable Network (km) | 11 kV Cable Network (km) | CSS Capacity (MVA) | LT Cable Network (km) |
| | a | b | c | d | e | f |
| A Ward | 2 | 80 | 20 | 64 | 96 | 72 |
| B Ward | 0 | 0 | 0 | 0 | 0 | 17 |
| C Ward | 1 | 40 | 10 | 32 | 32 | 15 |
| D Ward | 2 | 80 | 20 | 64 | 65 | 59 |
| E Ward | 2 | 80 | 20 | 64 | 88 | 53 |
| F North Ward | 0 | 0 | 0 | 0 | 0 | 96 |
| F South Ward | 0 | 0 | 0 | 0 | 23 | 72 |
| G North Ward | 0 | 0 | 0 | 0 | 0 | 65 |
| G South Ward | 2 | 80 | 20 | 64 | 61 | 50 |
| Mumbai City | 9 | 360 | 90 | 288 | 365 | 499 |

30. It is submitted that although network requirement is projected ward wise, the year wise as well as ward wise phasing of the Network Rollout Plan needs to be flexible and is dependent upon actual ground level realities like applications received, space, actual load growth in an area, etc., while the overall growth & network development plan is expected to always even out.

Re: Capex projected in Mumbai City

31. Based on the above projected network rollout for Mumbai City Area, the capex projected is presented in the following table:

Table No.13: Capex Projected in Mumbai City

| Network Components | Network Projected | Unit price (Rs. Crore) | Capex Projected (Rs. Crore) |
|--------------------------|-------------------|------------------------|-----------------------------|
| | a | b | c=a*b |
| No. of DSS of 40 MVA | 9 | 25.43 | 229 |
| 33 kV Cable Network (km) | 90 | 0.74 | 67 |
| 11 kV Cable Network (km) | 288 | 0.82 | 237 |
| No. of CSS | 365 | 0.59 | 215 |
| LT Cable Network (km) | 499 | 0.36 | 182 |
| Total | | | 930 |

32. It is submitted that this Network Rollout Plan is based on the assumptions as explained in earlier paragraphs. The actual network rollout may get modified based on

various factors like consumer demand and preference, socio economic developments, transmission outlet availability, triggers for opening up of Green Field areas, etc. In case the triggers for opening up of Green Field areas are delayed and only part of the Brown Field areas materialise during the Network Rollout period, it is likely that the Network Rollout projected may get directly get affected. In view of this, we have also provided the Network Rollout and Capex projected under various scenarios.

33. Based on the projected demand under the Scenario Analysis, the distribution network and the capex required has been presented in the following table:

Table No.14: Network Rollout and Capex - Scenario Analysis

| Network Components | Optimistic Scenario | Realistic Scenario | Pessimistic Scenario |
|------------------------------|---------------------|--------------------|----------------------|
| No. of DSS of 40 MVA | 10 | 9 | 8 |
| 33 kV Cable Network (km) | 100 | 90 | 80 |
| 11 kV Cable Network (km) | 320 | 288 | 256 |
| No. of CSS | 409 | 365 | 321 |
| LT Cable Network (km) | 499 | 499 | 499 |
| <i>Rs. Crore</i> | | | |
| Network Capex | Optimistic Scenario | Realistic Scenario | Pessimistic Scenario |
| DSS of 40 MVA | 254 | 229 | 203 |
| 33 kV Cable Network | 74 | 67 | 59 |
| 11 kV Cable Network | 264 | 237 | 211 |
| CSS | 241 | 215 | 189 |
| LT Cable Network | 182 | 182 | 182 |
| Total Capex Projected | 1015 | 930 | 845 |

34. In line with direction of the Hon'ble Commission, Tata Power has projected the network required to rolled out in Mumbai City to be in a readiness to cater to 50% of the load and to reach out to 50% of the LT consumers. However, Tata Power in its additional submission dated 06.08.2015, has considered the principles enunciated by the Hon'ble Tribunal while proposing a network rollout even in Mumbai City Area. In view of this, Tata Power request the Hon'ble Commission to give appropriate consideration also the additional submissions made on 06.08.2015, while approving the Network Rollout Plan.

III. Comprehensive Network Rollout plan for entire Tata Power Licence area

35. Tata Power-D has made additional submissions on 06.08.2015, in which Tata Power has presented ward wise network rollout plan based on the directions of Hon'ble ATE in its Judgment dated 28.11.2014 in Appeal No. 246 of 2012. The principles determined by Hon'ble ATE in this judgment were also adopted for Mumbai City Area. However, as per the directions of the Hon'ble Commission in the hearing held on 12.08.2015 in Case No. 182 of 2014, Tata Power-D has estimated the network rollout required in Mumbai City Area based on the direction of the Hon'ble Commission in its Order dated 14.08.2014 in Case

No. 90 of 2014 and for Mumbai Suburbs as per the principles determined by Hon'ble AT in this judgment. In providing the ward wise Comprehensive Network Rollout Plan, Tata Power has considered the Realistic Scenario. A Comprehensive Ward wise Network Rollout Plan for the entire Licence Area based on the above, is set out in the Table below:

Table No. 15: Ward wise Comprehensive Network Rollout Plan for the entire Licence Area based on Realistic scenario

| Ward | Network Projected - Realistic Scenario | | | | |
|---------------------------|--|--------------------------|--------------------------|--------------------|-----------------------|
| | DSS Capacity (MVA) | 33 kV Cable Network (km) | 11 kV Cable Network (km) | CSS Capacity (MVA) | LT Cable Network (km) |
| | a | b | c | d | e |
| A Ward | 80 | 20 | 64 | 96 | 72 |
| B Ward | 0 | 0 | 0 | 0 | 17 |
| C Ward | 40 | 10 | 32 | 32 | 15 |
| D Ward | 80 | 20 | 64 | 65 | 59 |
| E Ward | 80 | 20 | 64 | 88 | 53 |
| F North Ward | 0 | 0 | 0 | 0 | 96 |
| F South Ward | 0 | 0 | 0 | 23 | 72 |
| G North Ward | 0 | 0 | 0 | 0 | 65 |
| G South Ward | 80 | 20 | 64 | 61 | 50 |
| Mumbai City | 360 | 90 | 288 | 365 | 499 |
| H East Ward | 20 | 10 | 16 | 13 | 9 |
| H West Ward | 0 | 0 | 0 | 7 | 5 |
| K East Ward | 40 | 20 | 32 | 89 | 61 |
| K West Ward | 100 | 50 | 80 | 89 | 61 |
| L Ward | 0 | 0 | 0 | 9 | 6 |
| M East Ward | 20 | 10 | 16 | 16 | 11 |
| M West Ward | 0 | 0 | 0 | 11 | 8 |
| Mira Bhayander Municipal | 40 | 10 | 32 | 98 | 67 |
| N Ward | 90 | 30 | 72 | 88 | 60 |
| P North Ward | 0 | 0 | 0 | 41 | 28 |
| P South Ward | 10 | 0 | 8 | 27 | 19 |
| R Central Ward | 40 | 10 | 32 | 13 | 9 |
| R North Ward | 0 | 0 | 0 | 21 | 14 |
| R South Ward | 0 | 0 | 0 | 19 | 13 |
| S Ward | 40 | 10 | 32 | 40 | 27 |
| Mumbai Suburbs | 400 | 150 | 320 | 581 | 399 |
| Total Licence Area | 760 | 240 | 608 | 946 | 898 |

36. Although, network requirement is projected ward wise, the year wise as well as ward wise phasing of the Network Rollout Plan needs to be flexible and is dependent upon actual ground level realities like applications received, space, actual load growth in an area, etc., while the overall growth & network development plan is expected to always even out.

37. Based on the above projected network rollout for the entire Licence Area as well as to keep cushion to take care of the ground level realities, the comprehensive network plan

Table No. 18: Year wise Capex Phasing of the Network Rollout Plan

Rs. Crore

| Network Components | Year 1 | Year 2 | Year 3 | Year 4 | Year 5 | Year 6 | Year 7 | Total |
|---------------------------------------|------------|------------|------------|------------|------------|------------|------------|--------------|
| DSS of 20 MVA | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 10 to 30 | 102 to 127 |
| DSS of 40 MVA | 20 to 80 | 20 to 80 | 20 to 80 | 20 to 80 | 20 to 80 | 20 to 80 | 20 to 80 | 331 to 381 |
| 33 kV Cable Network | 20 to 30 | 20 to 30 | 20 to 30 | 20 to 30 | 20 to 30 | 20 to 30 | 20 to 30 | 156 to 186 |
| 11 kV Cable Network | 60 to 80 | 60 to 80 | 60 to 80 | 60 to 80 | 60 to 80 | 60 to 80 | 60 to 80 | 448 to 527 |
| CSS - 0.5 MVA | 10 to 20 | 10 to 20 | 10 to 20 | 10 to 20 | 10 to 20 | 10 to 20 | 10 to 20 | 104 to 130 |
| CSS - 1 MVA or more | 30 to 50 | 30 to 50 | 30 to 50 | 30 to 50 | 30 to 50 | 30 to 50 | 30 to 50 | 274 to 315 |
| Additional Transformer for CSS | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | 3 to 6 | 28 to 35 |
| LT Cable Network | 42 to 47 | 42 to 47 | 42 to 47 | 42 to 47 | 42 to 47 | 42 to 47 | 42 to 47 | 299 to 328 |
| Capex in Mumbai City (Rounded Values) | 240 to 290 | 240 to 290 | 240 to 290 | 240 to 290 | 240 to 290 | 240 to 290 | 240 to 290 | 1740 to 2030 |

39. It is submitted that this Network Rollout Plan is based on the assumptions as explained in earlier paragraphs. The actual network rollout may get modified based on various factors like consumer demand and preference, transmission outlet availability, triggers for opening up of Green Field areas, etc.



E. ANALYSIS OF RELIABILITY DATA SUBMITTED BY R INFRA AS PER THE DIRECTIONS OF THE HON'BLE COMMISSION.

40. In line with the directions of the Hon'ble Commission and the formats finalised during the meeting convened by the office of the Hon'ble Commission, both Tata Power and R-Infra have made their submissions with respect to the format finalised.

41. A brief comparative analysis based on the submissions made by both the Distribution Utilities is presented below. Further as there are no standards available to define threshold limits of Reliability Indices, for the purpose of comparison, the Reliability Indices of certain other Utilities as available in public domain are used.

Table 1: Comparison of Reliability Indices of Various Distribution Utilities

| | Tata Power# | R Infra# | MSEDCL* | Torrent# | BEST* |
|-------------|-------------|----------|---------|----------|--------|
| SAIFI (Nos) | 1.10 | 1.69 | 12.05 | 5.63 | 3.60 |
| SAIDI (Min) | 17.83 | 53.94 | 82.36 | 4.58 | 151.11 |
| CAIDI (Min) | 16.16 | 31.91 | 6.84 | 0.81 | 41.51 |

* - MSEDCL and BEST data is for FY 2013-14

- Tata Power, R-Infra and Torrent Data for FY 2014-15

42. As can be seen from the above Table, the Reliability Indices for Tata Power are better on all counts as compared to R-Infra. In comparison to the Reliability Indices of other Utilities, except Torrent, Tata Power Reliability Indices are better than the other Utilities considered.

43. RInfra, in their submission have provided a detailed description of their Mesh network towards having a reliable network. However, the adverse values of Reliability Indices of RInfra, indicate ageing network leading to increased number of faults. Further, it is apparent from the above Table that the restoration time for power supply is higher. This is inspite of R-Infra having a OMS and DMS system in place as submitted by RInfra.

44. It may be pertinent to note here that while providing the Reliability data, Tata Power has considered the interruptions to consumers even on account of cable faults due to external damages whereas the same are not considered by R-Infra. The Reliability indices would be much better for Tata Power than that presented in the Table 1 above, had the impact of cable faults on account of external damages been removed.

45. In view of the above, it may be inferred that there are reliability issues associated with R-Infra distribution Network which need to be further examined. Further, the format 4 as prescribed by Hon'ble Commission also required submission of Zone/ Division wise Reliability Indices data by both the Distribution Utilities. However, R-Infra has not submitted the zone wise data but submitted cluster wise Reliability Indices data. The data as submitted by Tata Power is presented below:

Table 2: Zone wise Reliability Indices of the Distribution Utilities

| Zone | Tata Power | | | R Infra | | |
|---------------|------------|-------|-------|---------|-------|-------|
| | SAIFI | SAIDI | CAIDI | SAIFI | SAIDI | CAIDI |
| South | 0.72 | 15.16 | 20.02 | | | |
| South Central | 1.19 | 18.01 | 15.72 | | | |
| Central | 0.94 | 12.24 | 15.98 | | | |
| North | 0.79 | 12.80 | 17.30 | | | |
| East | 1.80 | 31.45 | 15.09 | | | |

46. The cluster wise data is unique to R-Infra, based on their internal definition of cluster, hence, the comparable Reliability Indices at a subordinate level which would have better helped in identifying the problem zones cannot be identified. An analysis of the cluster wise Reliability data indicates the Reliability Indices parameters on the higher side in the East Division followed by the Central Division. However, the same can only be established if zone/ Division wise data is also made available.

Loading of Network

47. As submitted by R-Infra, they have been developing the distribution network for a period of over 80 years and have a substantial spread of the HT and LT network across its Licence Area. A comparison of the network parameters of Tata Power and R-Infra are presented below:

Table 3: Network Parameters

| Network Component | Units | Tata Power | R Infra |
|--|-------|------------|---------|
| 33-22/11 kV Substations | Nos. | 31 | 77 |
| Power Transformer Installed Capacity | MVA | 995 | 3297 |
| Average Loading of Power Transformers | % | 22% | 61% |
| 33 kV Network | km. | 949 | 880 |
| 11 kV Feeders | Nos. | 346 | 1047 |
| 11 kV Network | km. | 856 | 3200 |
| Average Loading of 11 kV Network | % | 10% | 47% |
| Consumer Substations | Nos. | 643 | 6735 |
| Distribution Transformer Installed Capacity | MVA | 677 | 4606 |
| Average Loading of Distribution Transformers | % | 23% | 51% |
| LT Network | km. | 1113 | 5897 |

48. As can be seen from the above Table, the loading of Tata Power network is lower as compared to the network loading of R-Infra. This can further be substantiated by zone wise % loading of Transformers presented in the Table below:

Table 4: Zone wise % Loading of Transformers

| Division | Tata Power | | | | R Infra | | | |
|---------------|------------|-----------|------------|---------|---------|-----------|------------|---------|
| | <= 50 % | 50 – 80 % | 80 – 100 % | > 100 % | <= 50 % | 50 – 80 % | 80 – 100 % | > 100 % |
| South | 72% | 23% | 4% | 0% | 41% | 55% | 2% | 0% |
| South Central | 90% | 10% | 6% | 0% | 52% | 47% | 1% | 0% |
| Central | 91% | 9% | 1% | 0% | 36% | 59% | 5% | 0% |
| North | 94% | 6% | 0% | 0% | 33% | 60% | 6% | 1% |
| East | 93% | 7% | 0% | 0% | 48% | 45% | 6% | 1% |
| Total | 89% | 10% | 1% | 0% | 42% | 53% | 4% | 0% |

49. As can be seen from the above Table, 89% of the Distribution Transformers of Tata Power are loaded less than 50% of their capacity i.e. they are currently under loaded. In view of such a scenario, in the interest of consumers and to improve reliability, it may be prudent to ensure that all network assets are optimally loaded for effective utilisation of assets and investments.

50. Further, we have carried out a mapping of the existing network of both the Utilities wherein the Power Transformers of R-Infra which are significantly loaded are mapped against Power Transformers of Tata Power in the vicinity which are sub-optimally loaded. R-Infra Power transformers (highlighted in red below) which are loaded beyond 60% have been considered for this comparison, since, in our opinion it is difficult to maintain (N-1) compliance beyond a loading of 60%. Also, it is unclear from the data submitted by RInfra as per Format 1, how, even without specific relation to capacity being added (WIP) the peak loading has been shown to be significantly reduced. Similarly for 11 kV network also, this observation holds good.



Table 5: Mapping of Tata Power Under-loaded Transformers against R-Infra overloaded Transformers

| R-Infra | | | | | | Tata Power | | | | | |
|-----------------------|--------------------------------|---------------------|---------------------|------------------------|----------------|----------------------------------|--------------------------------|---------------------|---------------------|----------------|---------------------------|
| Name of 33-22/11kV SS | Total Installed Capacity (MVA) | Total Loading (MVA) | Overall Loading (%) | R-Infra Spare Capacity | N-1 Compliance | Name of 33-22/11kV SS | Total Installed Capacity (MVA) | Total Loading (MVA) | Overall Loading (%) | N-1 Compliance | Tata Power Spare Capacity |
| Siddharth Nagar | 10 | 10 | 100% | 0.47 | No | Vrindavan DSS | 30 | 4 | 13% | Yes | 26 |
| Gorai | 50 | 42 | 84% | 6.30 | No | Ensel World DSS | 10 | 2 | 18% | Yes | 8 |
| Shanti Star Mira | 45 | 55 | 122% | 9.82 | No | Mira Road DSS | 40 | 3 | 8% | Yes | 37 |
| Palm Court | 40 | 31 | 77% | 9.30 | No | Mindspace DSS | 60 | 12 | 19% | Yes | 49 |
| RNA Royal Park | 40 | 31 | 77% | 9.44 | No | Malad DSS | 20 | 2 | 8% | Yes | 19 |
| Meghawadi | 40 | 30 | 75% | 9.72 | No | Qberoi JVL R DSS | 40 | 0 | 0% | Yes | 40 |
| Juhu | 32 | 24 | 75% | 8.06 | No | Arogyanidhi DSS | 40 | 3 | 6% | Yes | 38 |
| Goregaon | 70 | 52 | 74% | 17.68 | No | Mindspace DSS | 60 | 12 | 16% | Yes | 49 |
| Bhayander (W) | 40 | 29 | 72% | 10.74 | No | Mira Road DSS | 40 | 3 | 8% | Yes | 37 |
| Bombilwadi | 40 | 29 | 72% | 11.04 | No | BMC Pumping Bandra | 35 | 6 | 17% | Yes | 29 |
| Anik | 30 | 22 | 73% | 8.57 | No | Vrindavan DSS | 30 | 4 | 13% | Yes | 26 |
| Malad | 40 | 29 | 72% | 11.24 | No | Malad DSS | 20 | 2 | 8% | Yes | 19 |
| Kalina | 30 | 22 | 73% | 8.44 | No | MAL DSS-1 | 40 | 6 | 15% | Yes | 34 |
| Bandra | 60 | 43 | 72% | 17.28 | No | BMC Pumping Bandra | 35 | 6 | 17% | Yes | 29 |
| Bhayander | 60 | 43 | 72% | 17.34 | No | Mira Road DSS | 40 | 3 | 8% | Yes | 37 |
| Shimoli | 20 | 14 | 70% | 5.79 | No | Borivali RSS | 10 | 23 | 32% | No | 48 |
| Seepz | 60 | 42 | 70% | 17.64 | No | Reservoir Plot DSS Pocket 10 DSS | 60 | 19 | 32% | Yes | 41 |
| Chandivali SRA | 30 | 14 | 47% | 5.94 | No | Killick Nixon DSS | 40 | 5 | 11% | Yes | 36 |
| Bandra Terminus | 10 | 7 | 70% | 2.99 | No | RFC DSS | 50 | 30 | 50% | Yes | 30 |
| Ambivali | 80 | 56 | 70% | 24.74 | No | Versova | 40 | 8 | 20% | Yes | 32 |
| Cama | 20 | 14 | 70% | 6.12 | No | NESCO | 40 | 9 | 22% | Yes | 31 |
| Kandivali | 20 | 14 | 70% | 6.13 | No | Malad DSS | 20 | 2 | 8% | Yes | 19 |
| Chembur | 50 | 34 | 68% | 15.99 | No | Vrindavan DSS | 30 | 4 | 13% | Yes | 26 |
| Chunabhatti | 40 | 31 | 77% | 8.95 | No | | No DSS | | | | |
| Chakala | 20 | 14 | 70% | 6.40 | No | DSS-3, Reservoir Plot DSS | 90 | 22 | 24% | Yes | 68 |
| Saraswati Road | 40 | 27 | 67% | 12.88 | No | Arogyanidhi DSS | 40 | 5 | 13% | Yes | 35 |
| Hingwala Lane | 20 | 13 | 65% | 6.55 | No | Address DSS | 40 | 1 | 3% | Yes | 39 |
| Borrosli | 10 | 7 | 70% | 3.41 | No | Reservoir Plot DSS | 50 | 16 | 32% | Yes | 34 |
| Devidas Lane | 60 | 39 | 65% | 20.52 | No | Sureshwar DSS (Proposed) | 30 | 0 | 0% | Yes | 40 |
| Mira | 50 | 33 | 66% | 17.10 | No | Mira Road DSS | 40 | 3 | 8% | Yes | 37 |
| Vile Parle | 50 | 33 | 66% | 17.27 | No | DSS-3 DSS-1 | 80 | 12 | 15% | Yes | 68 |
| Olindorhi | 70 | 45 | 64% | 24.70 | No | ESIC DSS | 20 | 2 | 10% | Yes | 18 |
| Dahisar | 50 | 32 | 64% | 17.84 | No | Dahisar DSS | 30 | 5 | 13% | Yes | 35 |
| Tagore Nagar | 50 | 19 | 38% | 10.94 | No | Vikhroli RSS | 90 | 29 | 32% | Yes | 61 |
| Mahananda | 40 | 25 | 62% | 14.76 | No | NESCO DSS | 40 | 9 | 22% | Yes | 31 |
| Ghodhunder | 60 | 38 | 63% | 22.30 | No | Mira Road DSS | 40 | 3 | 8% | Yes | 37 |
| Juhu North | 30 | 24.96 | 83% | 15.04 | No | Arogyanidhi DSS | 40 | 3 | 6% | Yes | 38 |
| Tilak Nagar | 50 | 32.13 | 64% | 17.87 | No | | No DSS | | | | |
| Versova | 80 | 49.88 | 62% | 30.12 | No | Versova | 40 | 8 | 20% | Yes | 32 |
| Hiranandani | 40 | 24.7 | 61% | 15.30 | No | Supreme Housing DSS | 40 | 5 | 11% | Yes | 36 |
| Nitlen | 60 | 37 | 61% | 23.00 | No | NESCO | 40 | 9 | 22% | Yes | 31 |
| Shivaji Nagar | 50 | 30.82 | 61% | 19.18 | No | Manthurd RSS | 20 | 1 | 5% | Yes | 19 |
| Kurla | 50 | 30.68 | 61% | 19.32 | No | Market City DSS | 40 | 5 | 13% | Yes | 35 |
| Saki | 90 | 55.145 | 61% | 34.86 | No | Killick Nixon DSS | 40 | 5 | 11% | Yes | 36 |
| 24th Road | 30 | 12.02 | 40% | 7.98 | No | BMC Pumping Bandra | 35 | 6 | 17% | Yes | 29 |

51. Utilisation of the under loaded transformers of Tata Power to ease the loading on the critically loaded substations of R-Infra would help improve the reliability of the network without significant expenditure by either of the Distribution Utilities and help loading of the existing transformers optimally.

52. From the above, in our humble submission, it is inferred that:

1. There exists Reliability concerns with the RInfra network
2. The under loaded Tata Power network already existing in such areas may be utilised to improve network reliability

We request the Hon'ble Commission to consider the Reliability aspect and the network loading aspect, while approving the Network Rollout Plan of Tata Power.

BEFORE THE MAHARASHTRA ELECTRICITY REGULATORY
COMMISSION

WORLD TRADE CENTRE, CENTRE NO.1, 13th FLOOR,
CUFFE PARADE, MUMBAI 400005

CASE NO. 182 OF 2014

IN THE MATTER OF:

The Tata Power Company Limited ... Petitioner

Versus

BEST Undertaking & Ors. ... Respondents

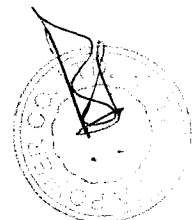
AFFIDAVIT

I, Mr. Bhaskar Sarkar, son of Mr. Arup Kumar Sarkar, aged 49 years, Head Business & Regulations (Mumbai Operation) of The Tata Power Company Limited ("Petitioner/ Tata Power"), having my office at Dharavi Receiving Station, Near Shalimar Industrial Estate, Matunga, Mumbai 400 019, Maharashtra, India, do hereby state on solemn affirmation as under:-

1. I state that I am the authorized signatory of Tata Power, the Petitioner, in the present Petition and as such I am fully conversant with the facts and circumstances of the present case and I am duly authorized and competent on behalf of Tata Power to swear and affirm this Affidavit.

2. I state that I have read and understood the accompanying Submissions in the captioned Petition and the same has been drafted under my instructions and after carefully going through the same, I state that the content of the same are true and correct to my knowledge and belief and it is stated that no part of it is false and nothing material has been concealed there from.

Ms. ROSHAN M. MASTER
NOTARY, GREATER BOMBAY
2403, ORCHID TOWER A
BELLASIS ROAD,
MUMBAI - 400 008.




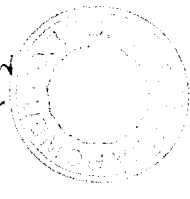
3. I state that the annexures along with the accompanying Submissions, if any, are true copies of their respective originals.

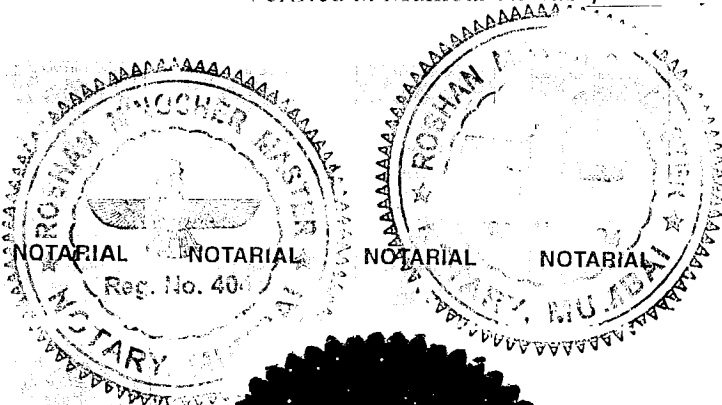

DEPONENT 

VERIFICATION

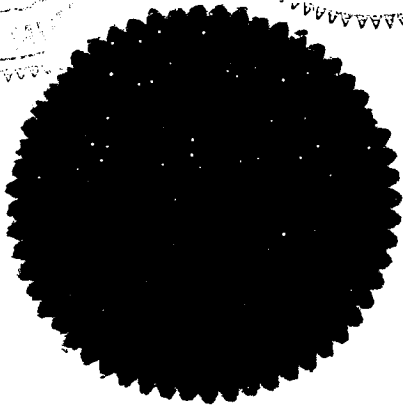
I, the deponent above named, do hereby verify that the contents of my above Affidavit are true and correct, no part of it is false and nothing material has been concealed therefrom.

Verified at Mumbai on this 1st day of September, 2015.


DEPONENT 



NOTARIAL



Ms. ROSHAN M. MASTER
NOTARY, GREATER BOMBAY
2403, ORCHID TOWER A
BELLASIS ROAD,
MUMBAI - 400 008.

S. no 1401

1-9-2015

