



02<sup>nd</sup> 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 28<sup>th</sup> 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 12<sup>th</sup> August, we have duly made submissions on 19<sup>th</sup> 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**

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BEFORE THE MAHARASHTRA ELECTRICITY REGULATORY COMMISSION  
WORLD TRADE CENTRE, CENTRE NO.1,  
13<sup>th</sup> 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
<b>Add:</b>				
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
<b>Mumbai City</b>		<b>994</b>

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)
	<b>a</b>	<b>b</b>	<b>c</b>	<b>d</b>	<b>e=a+b+c+d</b>
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
<b>Mumbai City</b>	<b>994</b>	<b>101</b>	<b>69</b>	<b>32</b>	<b>1196</b>

**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
<b>Additional DSS capacity Required</b>	$f=d-e$	<b>MVA</b>	<b>338</b>
Capacity of one DSS	g	MVA	40
<b>No. of DSS projected</b>	$h=f/g$	<b>Nos.</b>	<b>9</b>

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.

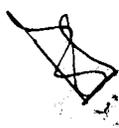
26. LT network density shall vary area wise depending on the presence of low end residential consumers in the area i.e. higher the presence of low end consumers, higher would be the LT network required for serving consumers and vice versa.

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
<b>Mumbai City</b>	<b>9</b>	<b>360</b>	<b>90</b>	<b>288</b>	<b>365</b>	<b>499</b>

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
<b>Total</b>			<b>930</b>

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
<b>Total Capex Projected</b>	<b>1015</b>	<b>930</b>	<b>845</b>

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 ATJ 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
<b>Mumbai City</b>	<b>360</b>	<b>90</b>	<b>288</b>	<b>365</b>	<b>499</b>
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
<b>Mumbai Suburbs</b>	<b>400</b>	<b>150</b>	<b>320</b>	<b>581</b>	<b>399</b>
<b>Total Licence Area</b>	<b>760</b>	<b>240</b>	<b>608</b>	<b>946</b>	<b>898</b>

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

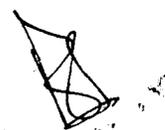


**Table No. 18: Year wise Capex Phasing of the Network Rollout Plan**

*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	102 to 127						
DSS of 40 MVA	20 to 80	331 to 381						
33 kv Cable Network	20 to 30	156 to 186						
11 kv Cable Network	60 to 80	448 to 527						
CSS - 0.5 MVA	10 to 20	104 to 130						
CSS - 1 MVA or more	30 to 50	274 to 315						
Additional Transformer for CSS	3 to 6	28 to 35						
LT Cable Network	42 to 47	299 to 328						
Capex in Mumbai City (Rounded Values)	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 I: 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 I 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%	56%	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 I, 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**

Name of 33-22/11kV SS	R-Infra			R-Infra Spare Capacity	N-1 Compliance	Name of 33-22/11kV SS	Tata Power				Tata Power Spare Capacity
	Total Installed Capacity (MVA)	Total Loading (MVA)	Overall Loading (%)				Total Installed Capacity (MVA)	Total Loading (MVA)	Overall Loading (%)	N-1 Compliance	
Siddharth Nagar	10	10	100%	0.47	No	Vrindavan DSS	30	4	13%	Yes	26
Gorai	50	42	84%	6.20	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	DLeroi JVR DSS	30	0	0%	Yes	30
Juhu	32	24	75%	8.06	No	Arogyandhi DSS	40	3	6%	Yes	38
Goregaon	70	52	74%	17.68	No	Mindspace DSS	60	12	18%	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	15%	Yes	26
Malad	40	29	72%	11.24	No	Malad DSS	20	2	8%	Yes	19
Kalina	30	22	73%	8.44	No	MIAL DSS-1	40	6	15%	Yes	34
Bandra	60	43	71%	17.28	No	BMC Pumping Bandra	35	6	17%	Yes	29
Bhayander	60	43	71%	17.34	No	Mira Road DSS	40	3	8%	Yes	37
Shimoli	20	14	70%	5.79	No	Borivali RSS	70	23	32%	No	48
Seepz	60	42	70%	17.64	No	Reservoir Plot DSS Pocket 10 DSS	60	19	32%	Yes	41
Chandwari SRA	30	14	47%	5.94	No	Killick Nixon DSS	40	5	11%	Yes	36
Bandra Terminus	10	7	70%	2.97	No	BKC DSS	60	30	50%	Yes	30
Ambivoli	80	56	70%	24.24	No	Verova	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%	8.55	Yes		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	Arogyandhi 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
Devdas Lane	60	39	65%	20.52	No	Sureshwar DSS (Proposed)	30	0	0%	Yes	30
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	60	12	18%	Yes	49
Gindorhi	70	45	64%	24.70	No	ESIC DSS	20	2	10%	Yes	18
Dahisar	50	37	74%	17.84	No	Dahisar DSS	40	5	13%	Yes	35
Tagore Nagar	50	19	38%	10.94	No	Vikhroli RSS	90	29	32%	Yes	61
Mahabanda	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 Marth	30	24.96	83%	15.04	No	Arogyandhi DSS	40	3	6%	Yes	38
Tilag Nagar	50	32.13	64%	17.87	No		No DSS				
Verova	80	49.86	62%	30.12	No	Verova	40	8	20%	Yes	32
Hiranandani	40	24.7	61%	15.20	No	Supreme Housing DSS	40	5	11%	Yes	36
Nrlich	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%	7.68	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, 13<sup>th</sup> FLOOR,  
CUFFE PARADE, MUMBAI 400005

CASE NO. 182 OF 2014

IN THE MATTER OF:

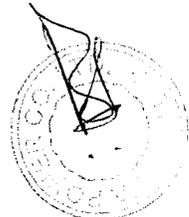
The Tata Power Company Limited ... Petitioner  
Versus  
BEST Undertaking & Ors. ... Respondents

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.





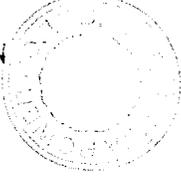
3. I state that the annexures along with the accompanying Submissions, if any, are true copies of their respective originals.

  
  
DEPONENT

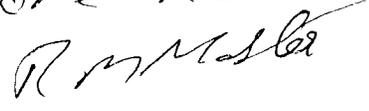
**VERIFICATION**

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 1<sup>st</sup> day of September, 2015.

  
  
DEPONENT


Before me:  


**Ms. ROSHAN M. MASTER**  
NOTARY, GREATER BOMBAY  
2403, ORCHID TOWER A  
BELLASIS ROAD,  
MUMBAI - 400 008.  
S. no 1401  
1-9-2015

NOTARIAL

