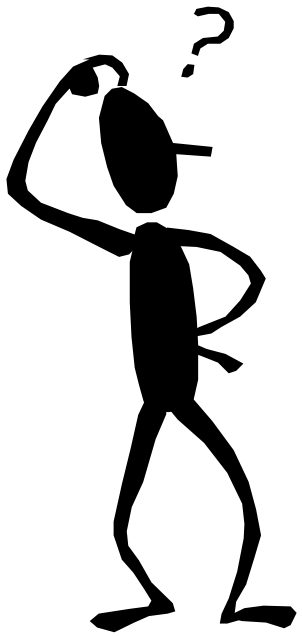
Perform, Achieve & Trade

Distribution loss Reduction Targets for Electricity Distribution Companies Under PAT Cycle - II

Milind Deore, Energy Economist

Contents

Why DISCOMs ?



- Energy intensive industry listed under the EC Act
- High Energy consumption and Energy losses
- Poor financial health
- Significant potential for energy savings
- High variation in T&D losses among various DISCOMs
- Average country level Energy losses are significantly higher than world average
- Prime Minister's Council on Climate Change directed to include Petroleum Refineries, DISCOMs and Railways into PAT scheme

Schedule of the EC Act, 2001

1. Aluminium;
2. Fertilizers;
3. Iron and Steel;
4. Cement;
5. Pulp and paper;
6. Chlor Akali;
7. Sugar;
8. Textile;
9. Chemicals;
10. Railways;
11. Port Trust;
12. Transport Sector (industries and services);
13. Petrochemicals, Gas Crackers, Naphtha Crackers and Petroleum Refineries;
14. Thermal Power Stations, hydel power stations, electricity transmission companies and distribution companies;
15. Commercial buildings or establishments;

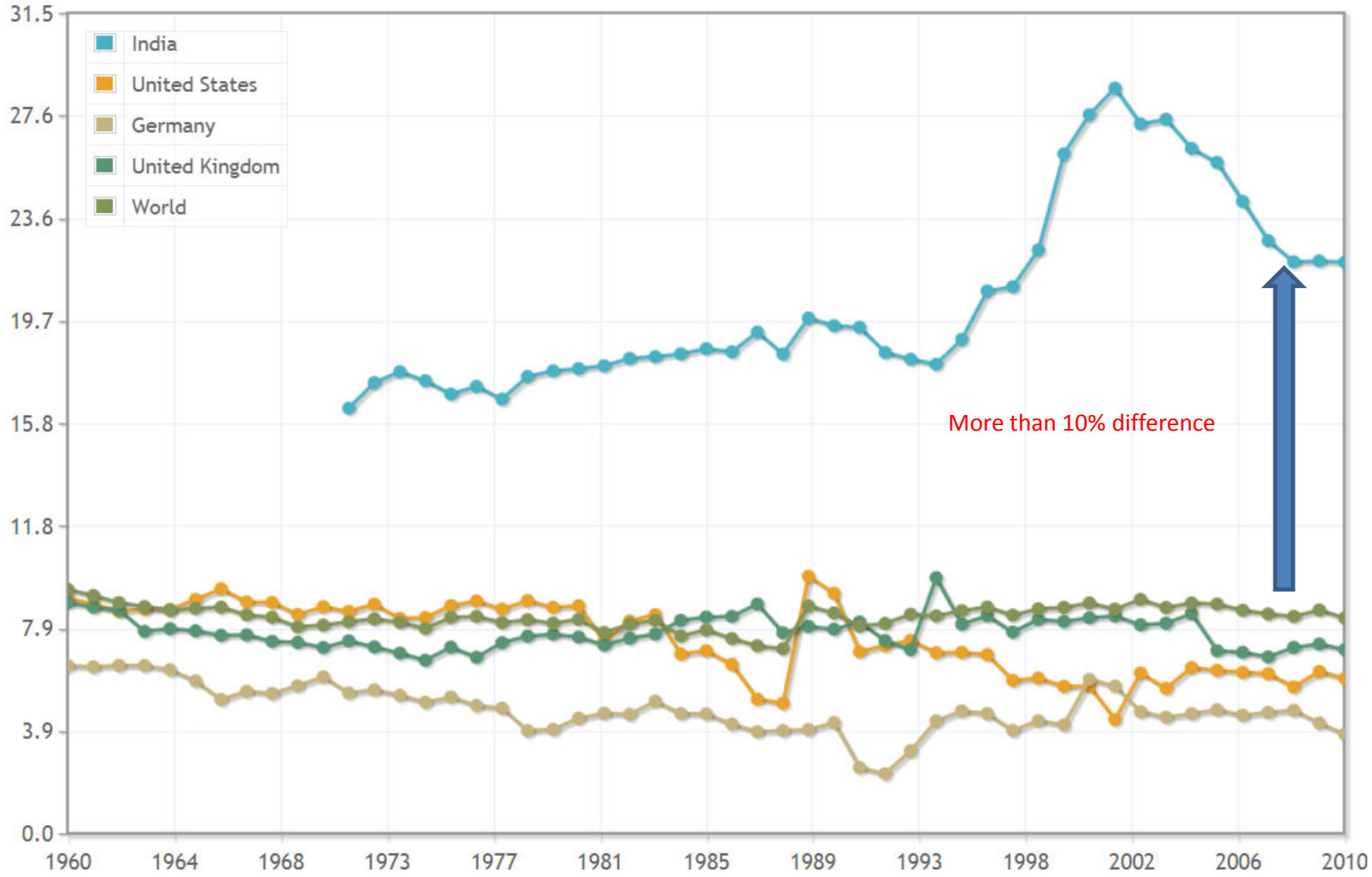
Background- Distribution Sector

- Distribution sector is a crucial link in the value chain of the Electricity sector.
- Total No. of Distribution utilities are 83 and 20 state distribution utilities have achieved corporatisation or have unbundled.
- Total purchase and sales of electricity in the year 2013-14 was 828,386 MU & 742,459 MU and T&D losses were 193,750 MU.
- All India level, loss of electricity due to T&D has decreased from 33.98% during 2001-02 to 23.04% during 2012-13. Aggregate Technical & Commercial (AT&C) losses were 25.38% during 2012-13.
- Physical losses of energy: losses above international norms due to technical reasons or due to non-technical factors.

Source: Annual report 2013-14, The working of state power utilities and electricity departments, Planning commission

The Planning commission

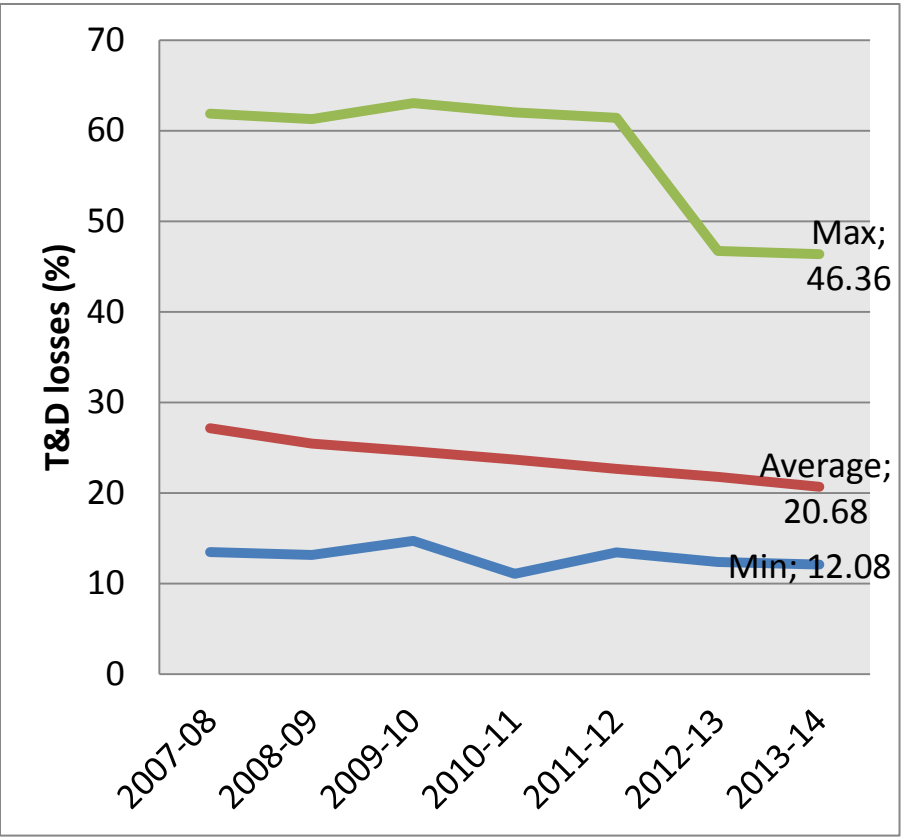
Comparison of T&D losses of India with some other countries



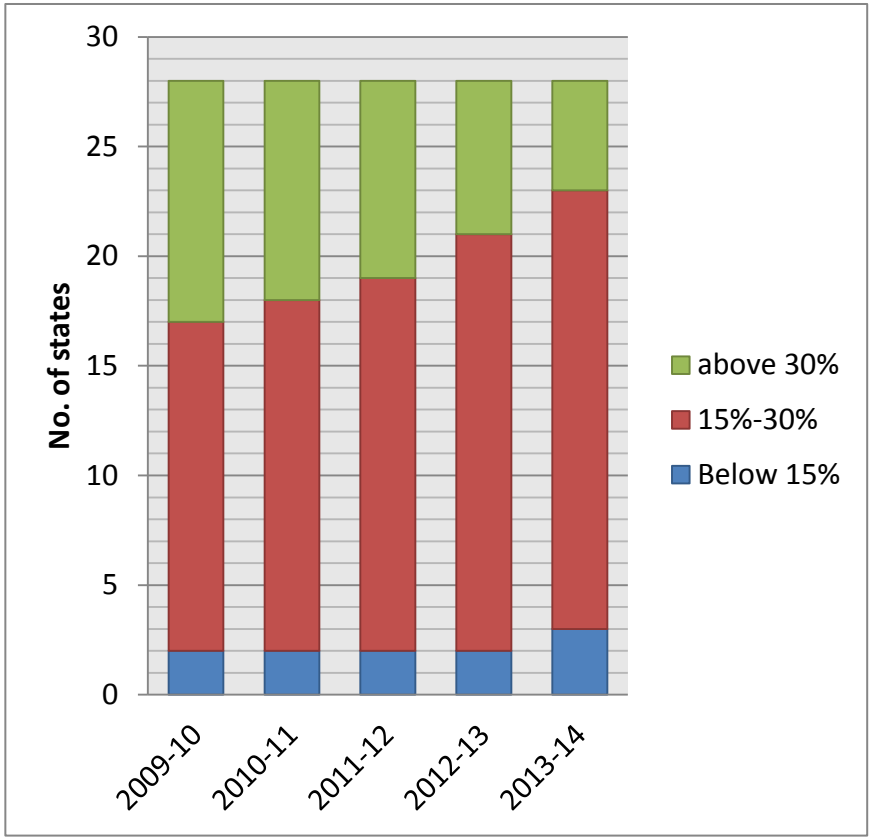
Source: Electric power transmission and distribution losses (% of output), The World Bank

T&D losses of state utilities (2008-2014)

a. T & D losses of state utilities

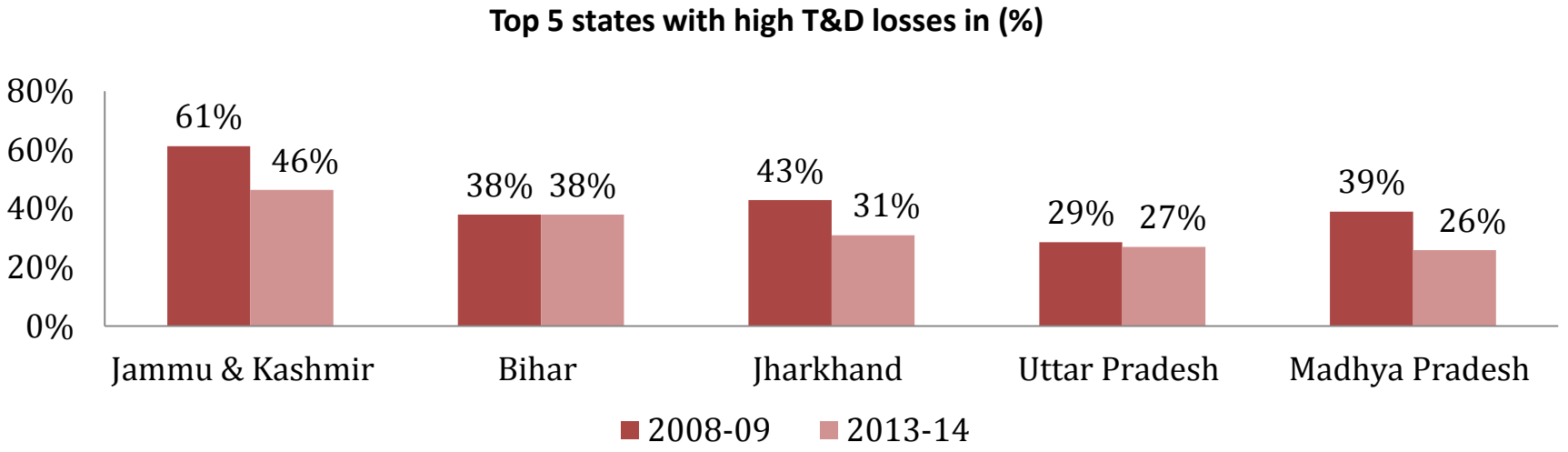


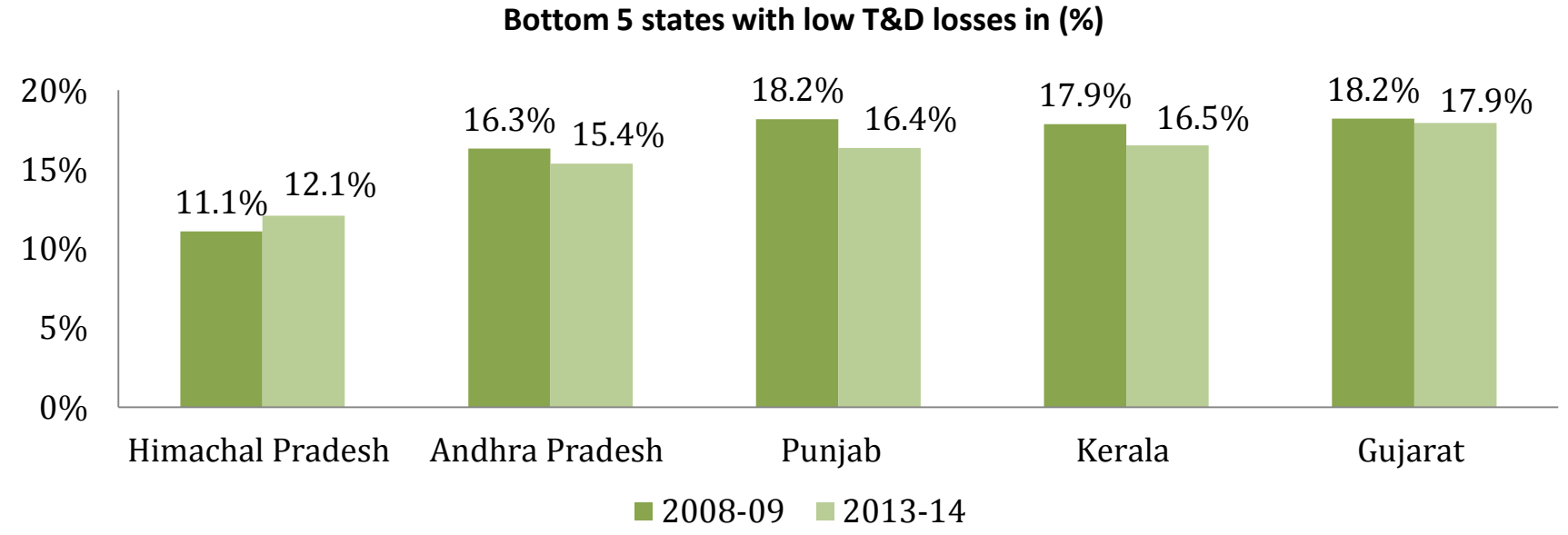
b. T & D losses by states



Source: Annual report 2013-14, The working of state power utilities and electricity departments, Planning commission
The Planning commission

States with high and low T&D losses (%)





Source: Annual report 2013-14, The working of state power utilities and electricity departments, Planning commission

The Planning commission

Benchmark targets & Monetary Savings

System Element Power Losses (%)	Minimum	Maximum
Step-up transformer & EHV Transmission system	0.5%	1.0%
Transformation to intermediate voltage level	1.5%	3.0%
Transmission system and step-down to sub-transmission voltage level	2.0%	4.5%
Distribution lines & service connections	3.0%	7.0%
Total	**7.0%**	**15.5%**

Source: A Review of Losses in Distribution Sector and Minimization Techniques, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

Savings potential by reduction of losses	
Percentage of Present T&D losses	20.68%
T&D losses (in MkWh)	193,750 MkWh
Target for improvement in 5 years	50% (Bring losses down to 10% of total)
Energy Savings (MkWh)	93,690 MkWh
Cost Savings (in Rs. Crore) @ Rs. 5/unit	46,845 Rs. Crore

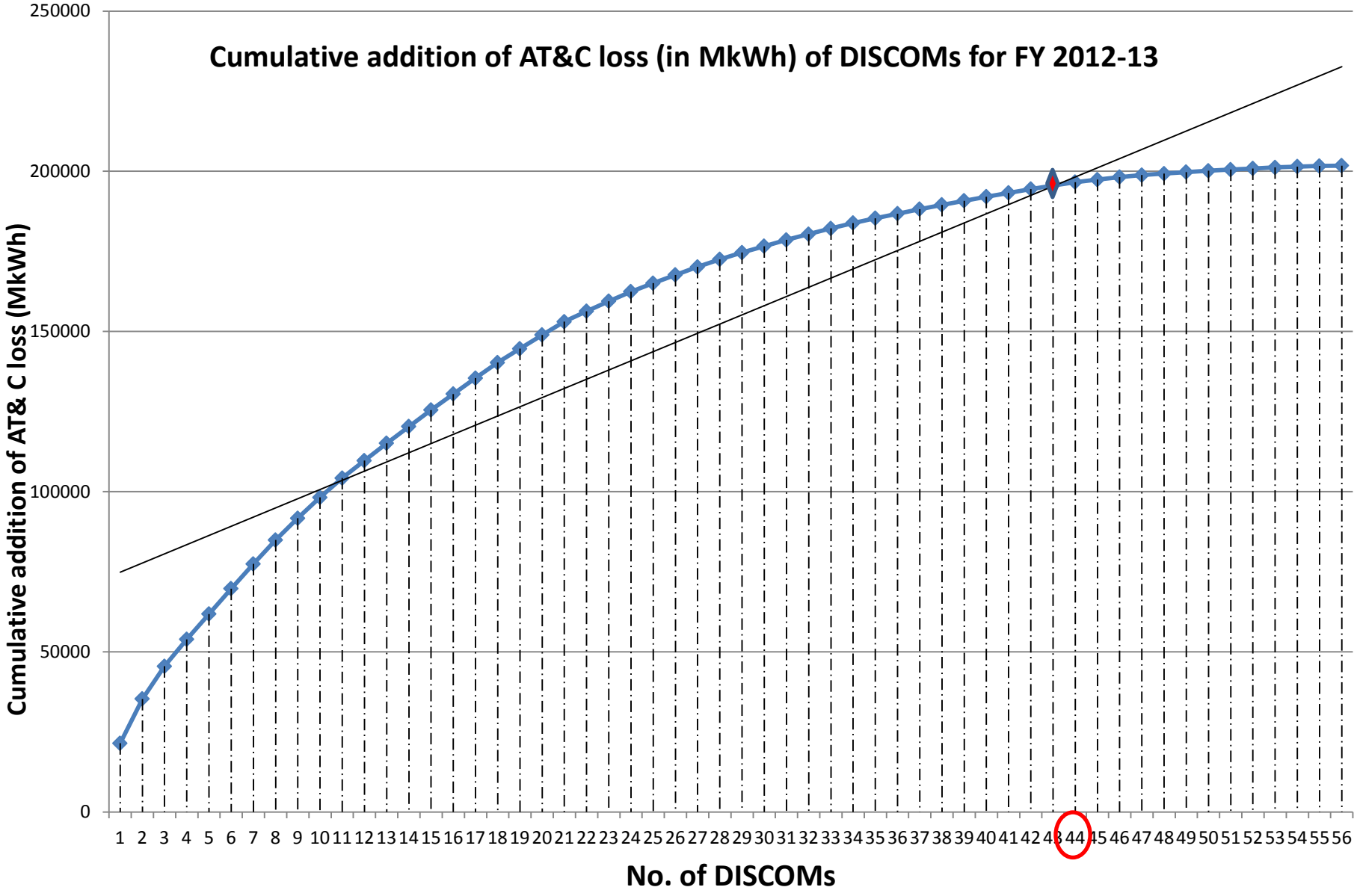
Source; Negawatt makes a Watt, Energy Efficiency Opportunities in India, PGCIL

Threshold limit to be Designated Consumer

S. N.	Sectors	Annual Energy Consumption Norm to be DC (mtoe)
1	Power (Thermal)	30000
2	Iron & Steel	30000
3	Cement	30000
4	Aluminium	7500
5	Fertilizer	30000
6	Paper & Pulp	30000
7	Textile	3000
8	Chlor- Alkali	12000

- DISCOMs having AT&C loss of 1000 MU (86000TOE) and above are notified as DCs.
- The cumulative addition of AT&C loss above the threshold limit covers 44 DISCOMs

AT&C losses of DISCOMs



AT&C losses of DISCOMs

	DISCOM Name	State	AT&C losses (MkWh)
1	TANGEDCO	Tamil Nadu	17279.9025
2	MSEDCL	Maharashtra	14328.8425
3	WBSEDCL	West Bengal	9773.6475
4	PSPCL	Punjab	8102.1258
5	UHBVNL	Haryana	6841.692
6	DHBVNL	Haryana	6813.0984
7	JVVNL	Rajasthan	6799.9932
8	DVVN	Uttar Pradesh	6723.9739
9	TSSPDCL	Telangana	6440.1618
10	J&K PDD	Jammu & Kashmir	5762.6478
11	Pash VVN	Uttar Pradesh	5660.8551
12	PGVCL	Gujarat	5484.888
13	BESCOM	Karnataka	5070.5898
14	MP Purv Kshetra VVCL	Madhya Pradesh	5059.4058
15	MP Madhya Kshetra VVC	Madhya Pradesh	4866.24
16	JDVVNL	Rajasthan	4832.0321
17	CSPDCL	Chattisgarh	4530.4301
18	SBPDCL	Bihar	4122.455
19	MP Paschim Kshetra VVC	Madhya Pradesh	3832.803
20	JBVNL	Jharkhand	3489.9892
21	AVVNL	Rajasthan	3473.504
22	Poorv VVN	Uttar Pradesh	3401.0361
23	CESU	Odisha	3068.0104
24	WESCO	Odisha	2736.274
25	TSNPDCL	Telangana	2478.112
26	APSPDCL	Andhra Pradesh	2375.0683
27	GESCOM	Karnataka	2213.106
28	HESCOM	Karnataka	2158.8024

	DISCOM Name	State	AT&C losses (MkWh)
29	Ut PCL	Uttarakhand	2094.3317
30	MVVN	Uttar Pradesh	2041.0296
31	CHESCOM	Karnataka	2033.8432
32	BSES Rajdhani	Delhi	1940.3715
33	KSEBL	Kerala	1939.4892
34	NBPDCL	Bihar	1909.0729
35	APDCL	Assam	1898.7925
36	NESCO	Odisha	1839.9115
37	DGVCL	Gujarat	1453.386
38	UGVCL	Gujarat	1440.166
39	HPSEB Ltd.	Himachal Pradesh	1293.4637
40	KESCO	Uttar Pradesh	1218.6666
41	SESCO	Odisha	1200.8088
42	MGVCL	Gujarat	1197.9947
43	BSES Yamuna	Delhi	1062.1248
44	APEPDCL	Andhra Pradesh	1004.8204
45	TPDDL	Delhi	783.9
46	MESCOM	Karanatka	679.9555
47	MePDCL	Meghalaya	513.3638
48	Pondicherry-PD	Pondicherry	441.2286
49	Arunachal-PD	Arunachal Pradesh	390.786
50	Goa-PD	Goa	360.8352
51	Sikkam-PD	Sikkam	278.5093
52	TSECL	Taripura	272.8161
53	Manipur-PD	Manipur	246.0575
54	Nagaland-PD	Nagaland	233.6733
55	Mizoram-PD	Mizoram	141.8308

Status of Activities

- First Stakeholder workshop with DISCOMs was conducted on 18th June 2015.
- Technical Committee involving members from MoP, CEA, CERC, PFC and selected DISCOMs is formed. Small Voluntary Group was formed to identify the various related issues.
- Notification issued on 29th Dec 2015 for Electricity Distribution Companies having AT&C losses of 1000MU and above as Designated Consumer.
- Three meetings of the Technical Committee were held to finalize the metric, data and targets.
- Individual PAT targets for reduction in T&D losses are issued for 44 DISCOMs vide notification dated 31st March 2016.
- First Capacity Building Workshop for DISCOMs located into south India was held on 23rd May 2016
- Action Plan and appointment of Energy Manager from 44 DISCOMs.

Baseline Fixation and Target Setting Methodology

PAT Cycles Baseline Fixation

Sr No	Item	PAT Cycle I	PAT Cycle II		
		478 DCs	**Existing DCs 478 Nos**	**New DCs in Existing Sector**	**New DCs in New Sector**
1	Data Reporting	Five Years (2005-10)	One Year (2014-15)	Three Years (2012-15)	Three Years (2012-15)
2	Baseline Year	Average of three years (2007-10)	One year (2014-15)	One year (2014-15)	One year (2014-15)
3	Pro-forma	Through Form I and Pro-forma	Through developed Form I and Pro-forma	Through developed Form I and Pro-forma	Pro-forma development under final stage through Form I and Pro-forma
4	Data Verification	Baseline Energy Audit	M&V	Baseline Data Verification through pro-forma	Baseline Data Verification through pro-forma
5	Data Fixation	Baseline Energy Audit In Assessment year	M&V with certain changes in Formulae of Product and Power mix in AY data	Baseline data Verification Report	Baseline data Verification Report

PAT Cycle Target Fixation

Plant	Baseline Average Production	Baseline Average SEC	Realtive SEC	Total Energy Consumption	%Target	Savings	To be Energy Saving
	Tonne	**toe/t**		**toe**			
Plant 1	369939	1.274	1.000	471302	x	4713.023	4713.02x
Plant 2	358967	1.364	1.071	489631	1.07x	5242.203	5242.20x
Plant 3	178530	1.400	1.099	249942	1.10x	2746.615	2746.61x
Plant 4	79587	1.428	1.121	113650	1.21x	1273.882	1273.88x
Plant 5	37635	1.780	1.397	66990	1.40x	935.9712	935.97x
				1391516		**14911.7**	**14912.7x**

Total Saving	**14912.7x**	**toe**
Target Saving	**104000**	**toe**
x	**6.97**	**%**

PAT Cycle Target Fixation

Plant	Baseline Average SEC	Target %	To be SEC	To be toe
	toe/t		**toe/t**	**toe**
Plant 1	1.274	6.97	1.185	438434
Plant 2	1.364	7.467	1.262	453072
Plant 3	1.400	7.664	1.293	230787
Plant 4	1.428	7.817	1.316	104766
Plant 5	1.780	9.744	1.607	60463
Total energy consumption at the end of three years				**1287523**
Total energy consumption in baseline year				**1391516**
Energy saving during the period				**103993**

Target Setting Methodology

- (I) Average rate of reduction
  - in specific energy consumption across the designated consumers sectors'
- **(II) Policy objectives**
  - of keeping the target of reducing the specific energy consumption a few percentage points above the average rate of reduction

Target Setting

Proposed to be based

- **Average rate of reduction in specific energy consumption (SEC) across all the designated consumers sectors + Policy objectives of keeping the target of reducing the specific energy consumption a few percentage points above the average rate of reduction**

Target Setting

(II) Policy objectives

- INDC
  - **Intended Nationally determined Contribution (INDC): reduction of emission intensity by 33-35% of GDP by 2030 from the base year of 2005**

- GOALS
  - **Reduction in energy intensity between 2016 and 2019 by 7 %**

(II) Policy Objective

Target Fixation for DISCOMs

- Technical Committee chaired by J.S (Distribution), MoP involving members from CEA, BEE, PGCIL, REC, and selected DISCOMs constituted.

- The Committee recommended that T&D loss may be adopted as a proxy indicator/parameter for performance assessment of DCs under the PAT scheme.

- Committee recommends fixing the target for Electricity Distribution Company sector based on an overall reduction of 5.97% for the sector as a whole over a period of 3 years. Baseline data is obtained from SERC, DISCOMs, PFC report etc.

- The targets may be revised in line with SERC target at a later stage as and when target figures for FY 2018-19 are made available. The DISCOMs having single digit T&D loss are given 0% reduction target.

DISCOM wise Notified Targets

S.N	Name of DISCOM	Data Source	State	Baseline T&D in % (2014-15)	Reduction in %	Target T&D in % (2018-19)
1	APEPDCL	PFC	Andhra Pradesh	4.79	0.00	4.79
2	UGVCL	SERC	Gujarat	9.20	0.00	9.20
3	DGVCL	SERC	Gujarat	9.10	0.00	9.10
4	KSEBL	PFC	Kerala	12.97	3.27	12.55
5	APSPDCL	PFC	Andhra Pradesh	11.14	2.81	10.83
6	TSSPDCL	PFC	Telangana	11.30	2.85	10.98
7	HPSEB Ltd.	PFC	Himachal Pradesh	11.19	2.82	10.87
8	TSNPDCL	PFC	Telangana	13.32	3.36	12.87
9	BESCOM	PFC	Karnataka	13.53	3.41	13.07
10	MSEDCL	DISCOM	Maharashtra	14.17	3.57	13.66
11	MGVCL	PFC	Gujarat	12.27	3.09	11.89
12	CHESCOM	PFC	Karnataka	13.88	3.50	13.40
13	BSES Rajdhani	PFC	Delhi	11.60	2.92	11.26
14	PSPCL	SERC	Punjab	16.00	4.03	15.35
15	Ut PCL	SERC	Uttarakhand	18.79	4.74	17.90
16	GESCOM	PFC	Karnataka	18.93	4.77	18.03
17	HESCOM	PFC	Karnataka	16.74	4.22	16.03
18	BSES Yamuna	DISCOM	Delhi	19.54	4.92	15.33
19	AVVNL	SERC	Rajasthan	26.27	6.62	24.53
20	TANGEDCO	PFC	Tamil Nadu	22.11	5.57	20.88

DISCOM wise Notified Targets

S.N	Name of DISCOM	Data Source	State	Baseline T&D in % (2014-15)	Reduction in %	Target T&D in % (2018-19)
21	JDVVNL	PFC	Rajasthan	24.29	6.12	22.80
22	MP Paschim Kshetra VVC	ARR	Madhya Pradesh	21.24	5.35	20.10
23	Pash VVN	PFC	Uttar Pradesh	19.96	5.03	18.95
24	PGVCL	SERC	Gujarat	24.61	6.20	23.08
25	DHBVNL	PFC	Haryana	24.47	6.17	22.96
26	MP Purv Kshetra VVCL	ARR	Madhya Pradesh	22.57	5.69	21.29
27	APDCL	PFC	Assam	21.93	5.53	20.72
28	CSPDCL	ARR	Chattisgarh	22.14	5.58	20.90
29	Poorv VVN	PFC	Uttar Pradesh	23.88	6.02	22.44
30	MVVN	PFC	Uttar Pradesh	22.88	5.77	21.56
31	JVVNL	PFC	Rajasthan	30.46	7.68	28.12
32	DVVN	DISCOM	Uttar Pradesh	29.81	7.51	27.57
33	MP Madhya Kshetra VVC	ARR	Madhya Pradesh	23.48	5.92	22.09
34	KESCO	PFC	Uttar Pradesh	26.04	6.56	24.33
35	WBSEDCL	DISCOM	West Bengal	27.60	6.96	25.68

DISCOM wise Notified Targets

S.N	Name of DISCOM	Data Source	State	Baseline T&D in % (2014-15)	Reduction in %	Target T&D in % (2018-19)
36	UHBVNL	PFC	Haryana	30.58	7.71	28.23
37	JUVNL	PFA Report	Jharkhand	35.92	9.05	32.67
38	NESCO	ARR	Odisha	31.91	8.04	29.34
39	CESU	PFC	Odisha	33.78	8.51	30.91
40	WESCO	ARR	Odisha	35.53	8.95	32.35
41	NBPDCL	PFC	Bihar	33.66	8.48	30.81
42	SESCO	ARR	Odisha	39.17	9.87	35.31
43	SBPDCL	PFC	Bihar	45.07	11.36	39.95
44	J&K PDD	SERC	Jammu & Kashmir	49.02	12.35	42.96

Major Obligations for DCs

- **DCs to appoint or designate energy managers who shall be in charge of activities for efficient use of energy and its conservation (clause 14(l)).**
- **The information with regard to energy consumed (clause 14(a)) in Form 1**
- **Get energy audits conducted by accredited energy auditors**
- **Implement techno-economic viable recommendations**
- **Comply with norms of specific energy consumption**
- **Submit report on steps taken**

Penalties and Adjudication

As per Section 26 of EC Act,

- If any DC fails to comply with the timelines of M&V procedure, he shall be liable for a penalty of Rs. 10 lakh, in addition to Rs. 10,000 per day

- If any DC fails to comply with the provisions, he shall be liable to a penalty of Rs. 10 lakh rupees and, in the case of continuing failure, with an additional penalty of the price of every metric ton of oil equivalent of energy

- Any amount payable under this section, if not paid, may be recovered as if it were an arrear of land revenue.

Status of Action Plan received from DISCOMs.

S.No.	Name of DISCOMS	Status of Action Plan
1	Himachal Pradesh State Electricity Board Limited	Received
2	Kanpur Electricity Supply Company Limited	Received
3	Pashim Gujarat Vij Company Limited	Received
4	Madhya Gujarat Vij Company Limited	Received
5	Dakshin Gujarat Vij Company Limited	Received
6	BSES Rajdhani Poer Limited	Received
7	Uttarakhand Power Corporation Limited	Received
8	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited	Received

Status of Appointment of Energy Manager

S.No.	Name of DISCOMs	Status
1	Chhattisgarh State Power Distribution Company Limited	Received
2	Punjab State Power Corporation Ltd	Received
3	Assam Power Distribution Company Limited	Received
4	Madhya Pradesh Madhya Kshetra Vidyut Vitaran Company Limited	Received
5	Madhya Gujarat Vij Company Ltd.	Received
6	Paschim Gujarat Vij Company Limited	Received
7	Uttarakhand Power Corporation Limited	Received
8	BSES Rajhdani Power Ltd	Received
9	Ajmer Vidyut Vitran Nigam Ltd.	Received
10	Maharashtra State Electricity Distribution Co. Ltd	Received

Support required from SERCs

BEE acknowledge the importance of SERCs as a key partner in facilitating the implementation of PAT scheme for DISCOMs.

- ✓ Provide distribution loss targets for FY 2018-19 issued through MYT order.
- ✓ Provide T&D loss data of DISCOMs for the last 3 years (Projections, Targets and Achievements)
- ✓ Methodology adopted for providing targets and process for monitoring & measurement
- ✓ Provide inputs for development of sector specific proforma
- ✓ Help BEE for synchronization of SERC & PAT targets
- ✓ Capacity building of DISCOM officials

T&D data received from SERCs

S.No	Name of DISCOM	T&D loss Data (in %)			Notified Baseline T&D (in %)	Projection Submitted by SERCs	Target under PAT for 2018-19
		2012-13	2013-14	2014-15	2014-2015	2018-19	2018-2019
1	**APDCL**	25.85	24.11	21.14	21.93	-	20.72
2	**NBPDCL**	NA	33.48	37.89	33.66	-	30.81
3	**SBPDCL**	NA	46.65	49.73	45.07	-	39.95
4	**CSPDCL**	25.75	24.36	22.55	22.14	-	20.9
5	**DGVCL**	11.56	9.03	9.11	9.1	-	9.1
6	**MGVCL**	12.89	12.41	12.27	12.27	-	11.89
7	**PGVCL**	29.9	23.2	24.61	24.61	-	23.08
8	**UGVCL**	14.5	6.54	9.2	9.2	-	9.2
9	**J&K PDD**	NA	49.41	49.02	49.02	29.5	42.96
10	**JBVNL**	25.37	26.05	33.3	35.92	-	32.67

T&D data received from SERCs

S.No	Name of DISCOM	T&D loss Data (in %)			Notified Baseline T&D (in %)	Projection Submitted by SERCs	Target under PAT for 2018-19
		2012-13	2013-14	2014-15	2014-2015	2018-19	2018-2019
11	**PSPCL**	16.77	16.89	16.5	16	-	15.35
12	**JVVNL**	19.09	27.85	30.46	30.46	12.5	28.12
13	**AVVNL**	20.65	20.69	26.08	26.27	12.5	24.53
14	**JdVVNL**	18.13	22.45	24.2	24.29	12.5	22.8
15	**MVVNL**	24.84	24.85	22.88	22.88	-	21.56
16	**DVVNL**	36.56	28.69	29.49	29.81	-	27.57
17	**PVVNL**	28.16	23.08	19.66	19.96	-	18.95
18	**PuVVNL**	25.66	24.73	23.88	23.88	-	22.44
19	**KESCL**	31.41	30.84	26.04	26.04	-	24.33
20	**UPCL**	-3.5	-3.18	-3.29	18.79	-	17.9

T&D data received from SERCs

S.No	Name of DISCOM	T&D loss Data (in %)			Notified Baseline T&D (in %)	Projection Submitted by SERCs	Target under PAT for 2018-19
		2012-13	2013-14	2014-15	2014-2015	2018-19	2018-2019
21	**BRPL**	16.77	14.84	14.73	11.6	-	11.26
22	**BYPL**	21.49	21.07	19.54	19.54	-	15.33
23	**MSEDCL**	14.67	14	13.75	14.17	-	13.66
24	**HPSEBL**	13.64	12.36	N.A.	11.19	12	10.87
25	**MPPKVVCL**	24.5	23.67	21.91	21.24	15	20.1
26	**MPMKVVC**	31.94	29.61	24.63	23.48	17	22.09
27	**MP PuKVVCL**	26	23.68	21.69	22.57	16	21.29
28	**UHBVNL**	31.26	32.4	30.58	30.58	-	28.23
29	**DHBVNL**	23.38	23.66	24.47	24.47	-	22.96
30	**WBSEDCL**				27.6	-	25.68

Format to Submit Updated Data by DISCOMs

Name of the DISCOM																		
Contact Details of the Concerned Official																		
Distribution Loss Reduction target issued by SERC (in %) for given Financial Years											Distribution Loss data submitted by DISCOMs to SERC through ARR or MYT							
Actual								Target/Projection			Actual				Projected			
2012-13		2013-14		2014-15		2015-16		2016-17	2017-18	2018-19	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	
Target	Achievement	Target	Achievement	Target	Achievement	Target	Achievement											

Note:

i. The format will be emailed to all the participants of this workshop with a request share the duly filled format at the earliest.

ii. It is also requested to submit the detailed methodology adopted to calculate the T&D loss in DISCOMs with supporting calculation details used for above indicated years.

Thank You

List of Participants in Small Voluntary Group

S.N	Name of DISCOMs
1.	Madhya Gujarat Vij Company Ltd.
2	Dakshin Haryana Bijli Vitran Nigam (Gurgaon Circle)
3	CSPDCL, Raipur
4	Tata Power Delhi Distribution Ltd.
5	Tata Power Company Ltd. Maharashtra
6	Tata Power Company Ltd. (Mumbai)
7	BSES Yamuna Power Ltd. (BYPL)
8	Central Electricity Authority
9	Dakshinanchal Vidyut
10	Vitran Nigam Ltd. (DVVNL)
11	PVVNL, Meerut
12	Maharastra State Electricity Distribution Company Limited(MSEDCL)
13	BSES Rajdhani Power Ltd.
14	Kerala State Electricity Board ltd.
15	West Bengal State Electricity Distribution Company Ltd (WBSEDCL)

List of Members in Technical Committee

i. Joint Secretary (Distribution), Ministry of Power	Member
i. Representation from Central Electricity Regulatory Commission (CERC)	Member
i. Chief Engineer (Distribution), Central Electricity Authority (CEA)	Member
i. Executive Director, Power Finance Corporation (PFC)	Member
i. Bureau of Energy Efficiency	Member Convenor
i. Representatives from selected DISCOMs (Maharashtra, Andhra Pradesh, Punjab, Delhi, Tamil Nadu, Rajasthan, Uttar Pradesh, Assam & West Bengal)	Member