

Perform Achieve & Trade

Energy Reduction Targets for Electricity Distribution Companies for PAT Cycle - II

by
Milind Deore, Energy Economist, BEE

Bangalore

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Contents

1

Background and status of activities

Base line fixation and target Setting Methodology

2

3

Sector wise Targets – PAT Cycle II

DISCOM wise individual SEC targets

4

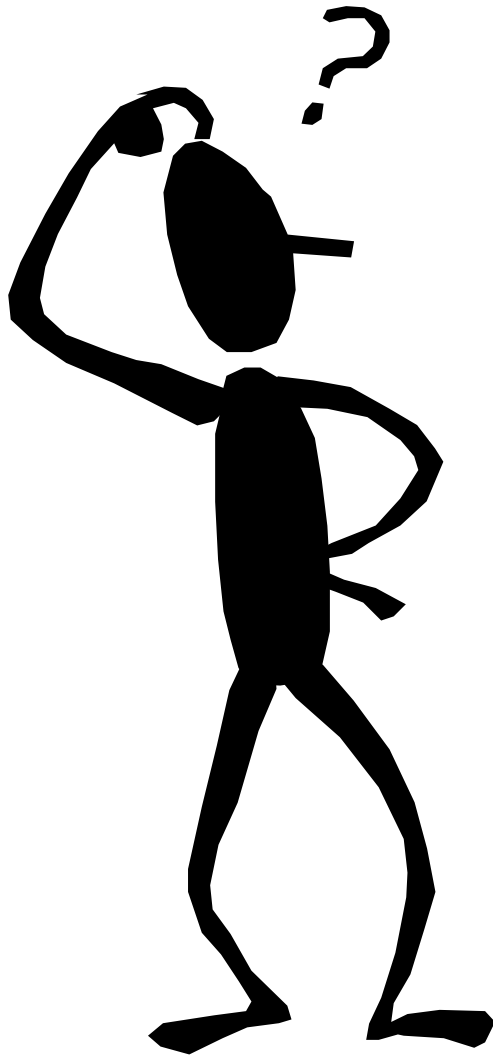
5

Major Obligations for DCs

PAT Rules & role of Designated Consumers

6

Inclsuion of DISCOMs under PAT



5 W + 1 H

What?

Why?

Who?

Where?

When?

How?

Background- Energy Conservation Act

- As per the schedule of the Energy Conservation (EC) Act, 2001, industries in 15 energy intensive sectors are being identified as a “Designated Consumer (DC)”.
- Electricity Distribution Companies (DISCOMs) are one of the identified energy intensive industries under the Act and now it is notified as a DC. A DC need to-
 - Appoint or designate certified energy manager
 - Submit Annual Energy consumption return
 - Get energy audit conducted by an accredited energy auditor
 - Implement techno-economic viable recommendations
 - Comply with energy consumption norms and standards

National Mission for Enhanced Energy Efficiency

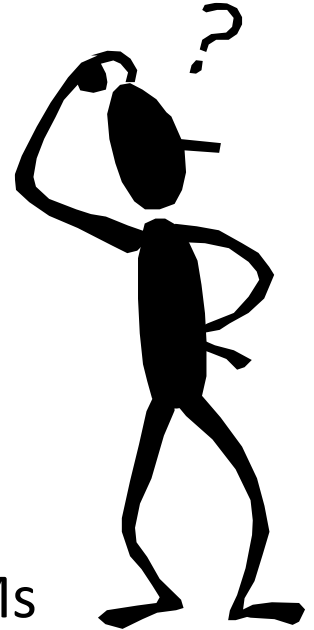
- The National Action Plan on Climate Change (NAPCC) was released by Prime Minister of India in June 2008
- The Action Plan Outlines [8 Missions](#) including National Mission for Enhanced Energy Efficiency (**NMEEE**)
- The basic objective of the NMEEE mission is to ensure a sustainable growth by an approximate mix of 4 E's, namely- Energy, Efficiency, Equity and Environment and unlock energy efficiency opportunities through market based mechanisms.

Perform, Achieve and Trade Scheme

- The key goal of the PAT scheme under National Mission for Energy Efficiency (NMEEE) is to mandate specific energy efficiency improvements for the most energy intensive industries.
- The scheme builds on the large variation in energy intensities of different units in almost every sector
- With respect to Sec 14(g) of the EC act, the Government has notified targets (in the form of SEC) for 478 DCs in the eight industrial sectors during March 2012 under the PAT cycle-I.
- The energy intensity reduction target mandated for each unit is dependent on its current efficiency : the reduction target is less for those who are more efficient, and is higher for the currently less-efficient units.

Why DISCOMs ?

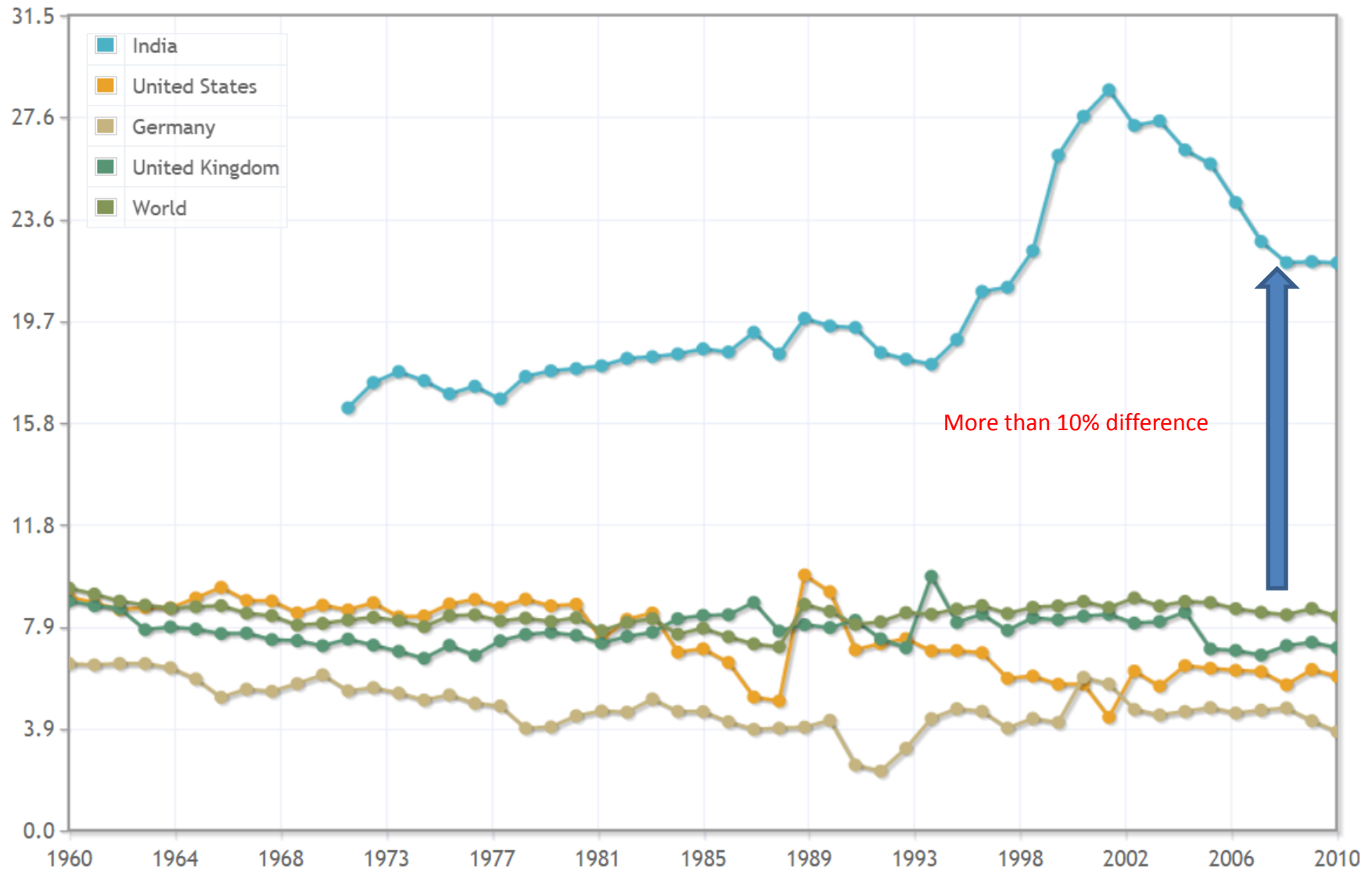
- Energy intensive industry listed under the EC Act
- High Energy consumption and Energy losses
- Poor financial health
- Significant potential for energy savings
- High variation in T&D losses among various DISCOMs
- Average country level Energy losses are significantly higher than world average



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.

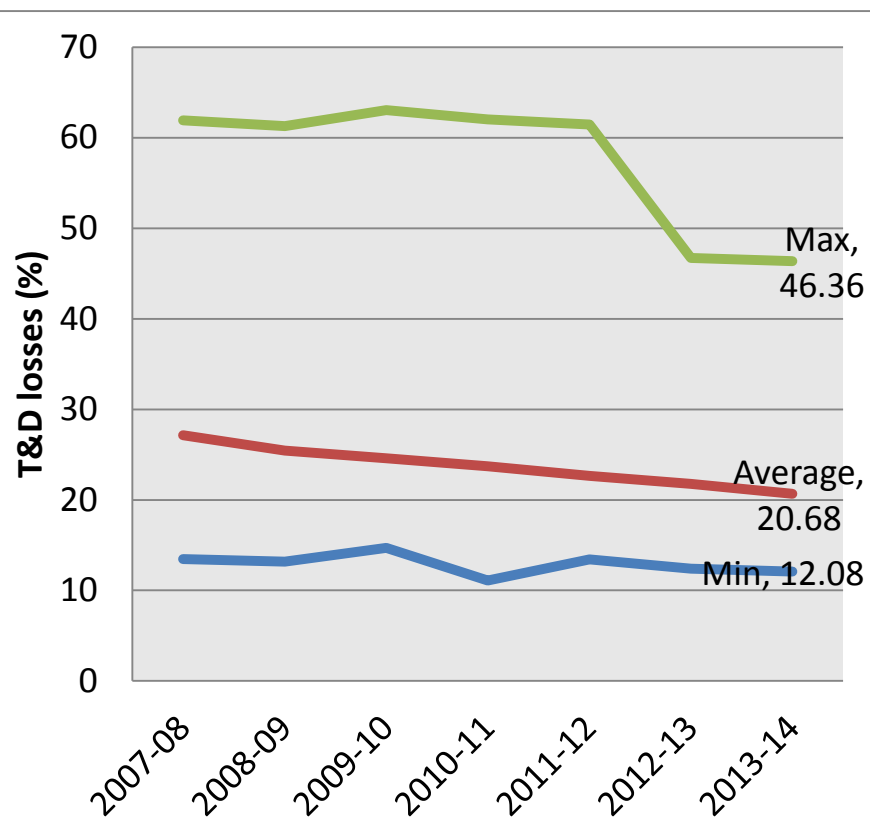
Comparison of T&D losses of India with some other countries



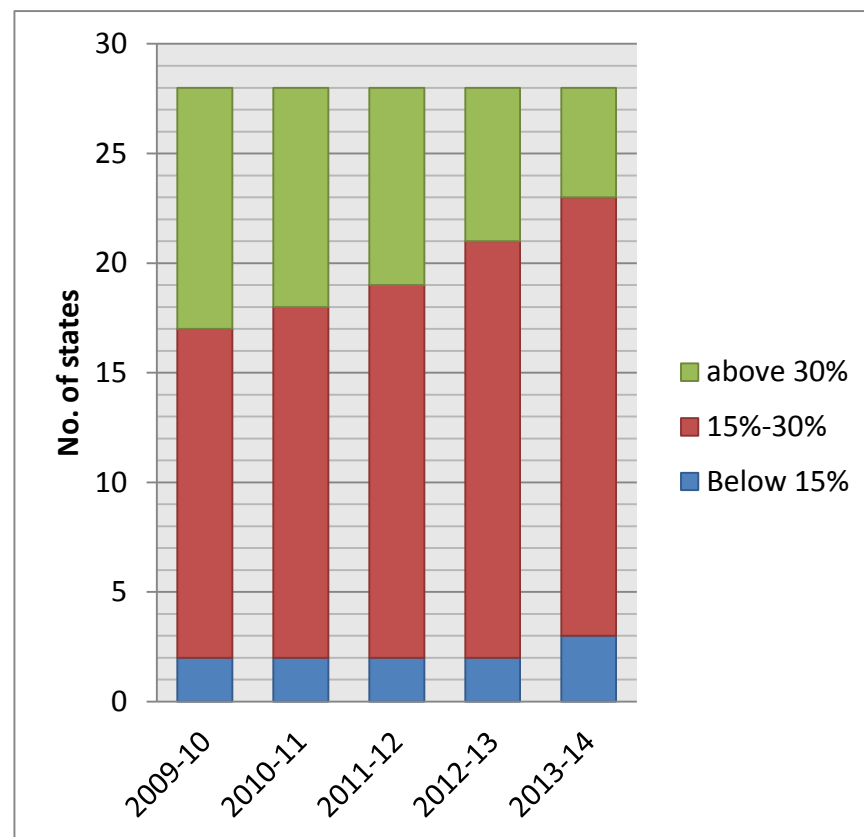
Source: Electric power transmission and distribution losses (% of output), The World Bank

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

a. T & D losses of state utilities



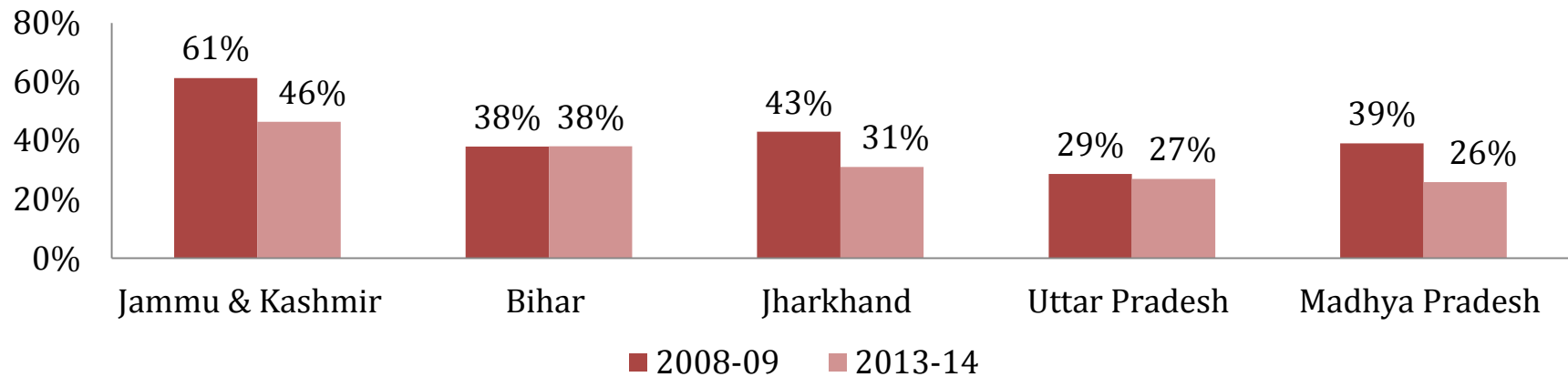
b. T & D losses by states



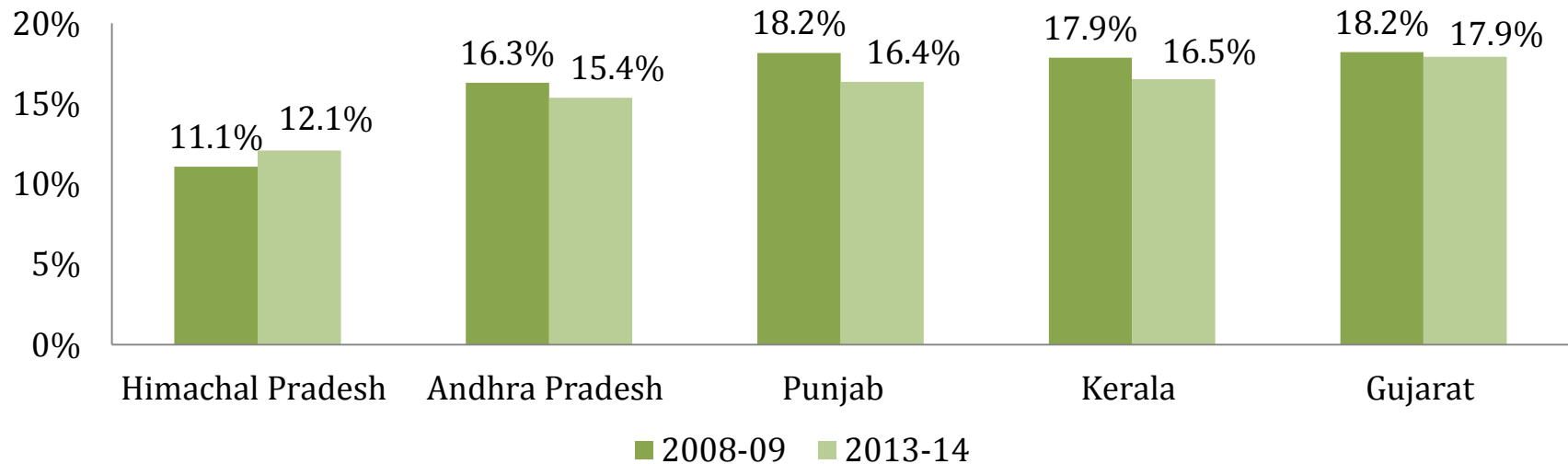
Source: Annual report 2013-14, The working of state power utilities and electricity departments, Planning commission
The Planning commission

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

Top 5 states with high T&D losses in (%)



Bottom 5 states with low T&D losses in (%)



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

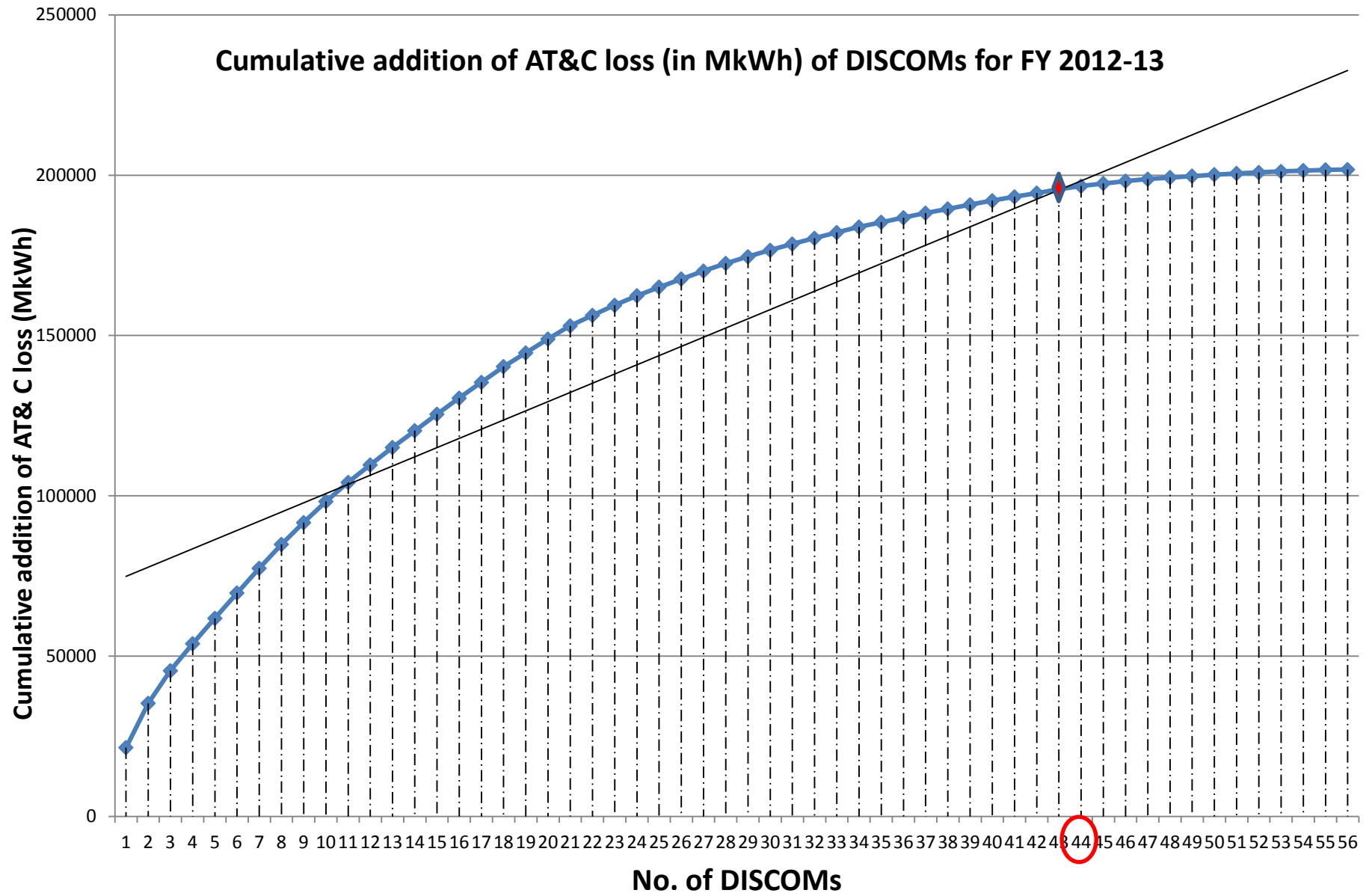
Source; Negawatt makes a Watt, Energy Efficiency Opportunities in India, PGCIL

Threshold limit for AT&C losses

- The Threshold limit of DISCOMs based on the AT&C loss is 1000 MU/ 86,000 TOE
- The cumulative addition of AT&C loss above the threshold limit covers 44 DISCOMs

AT&C losses of DISCOMs

Cumulative addition of AT&C loss (in M kWh) of DISCOMs for FY 2012-13



AT&C losses of DISCOMs

Sl. No.	Utility	AT&C losses (MkWh)
1	MSEDCL	21474
2	TANGEDCO	13845
3	WBSEDCL	10173
4	Poorv VVN	8397
5	DVVN	7918
6	Pash VVN	7904
7	PSPCL	7726
8	PGVCL	7470
9	J&K PDD	6774
10	UHBVNL	6525
11	MVVN	6025
12	APCPDCL	5440
13	BESCOM	5433
14	DHBVNL	5206
15	CSPDCL	5156
16	MP Paschim Kshetra VVCL	5019
17	JSEB	4957
18	MP Purv Kshetra VVCL	4867
19	JVVNL	4311
20	MP Madhya Kshetra VVCL	4308
21	BSEB	4130
22	CESU	3228
23	JDVVNL	3155
24	AVVNL	2975
25	WESCO	2675
26	UGVCL	2548
27	Ut PCL	2501
28	APSPDCL	2347

Sl. No.	Utility	AT&C losses (MkWh)
29	HESCOM	2139
30	NESCO	1998
31	KSEB	1945
32	APDCL	1807
33	CHESCOM	1783
34	BSES Rajdhani	1703
35	APNPDCL	1461
36	SESCO	1446
37	SBPDCL	1411
38	DGVCL	1333
39	GESCOM	1291
40	APEPDCL	1258
41	MGVCL	1206
42	KESCO	1181
43	BSES Yamuna	1136
44	TPDDL	1036
45	HPSEB Ltd.	791
46	NBPDCL	764
47	MESCOM	623
48	Goa PD	477
49	Manipur PD	468
50	MePDCL	424
51	Nagaland PD	377
52	Arunachal PD	335
53	TSECL	317
54	Puducherry PD	260
55	Sikkim PD	199
56	Mizoram PD	111

Status

- First Stakeholder workshop with DISCOMs was conducted on 18th June 2015.
- Small Voluntary Group was formed to identify the various related issues.
- Technical Committee involving members from MoP, CEA, CERC, PFC and selected DISCOMs is formed.
- 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 are held to finalize the metric, data and targets.
- Individual targets for reduction in T&D losses are issued for 44 DISCOMs on 31st March 2016 through notification.

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

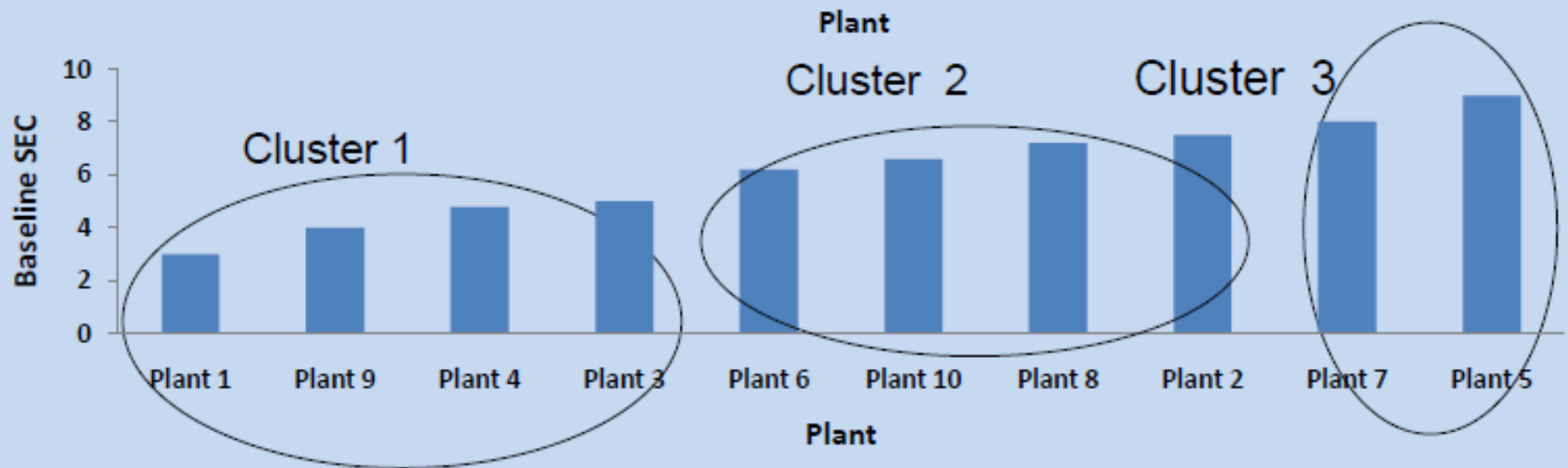
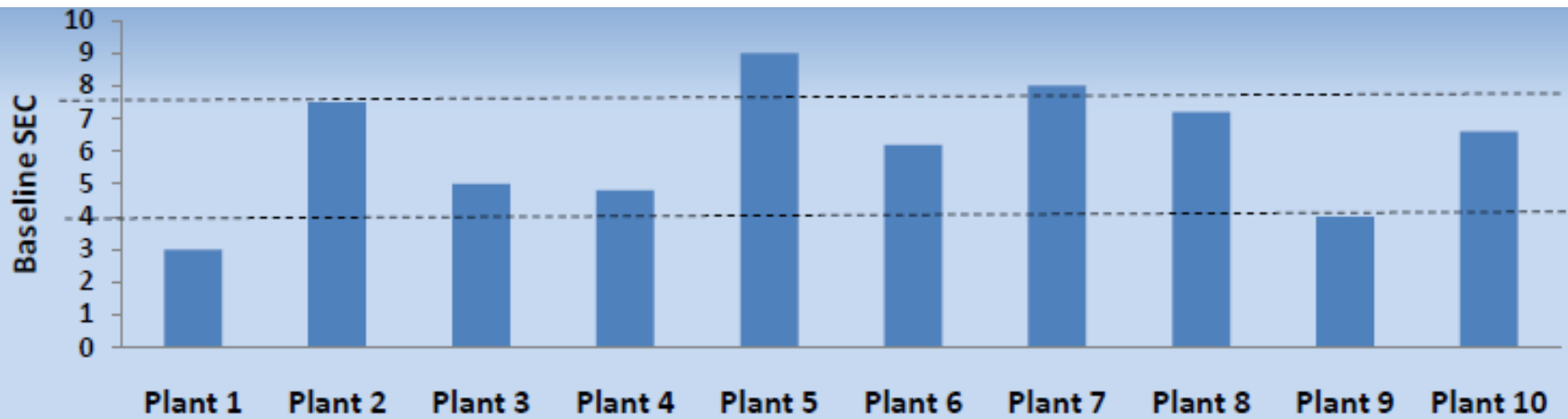


Total Saving	14912.7x	toe
Target Saving	104000	toe
x	6.97	%

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

No. of sub-group depends on bandwidth of baseline SEC

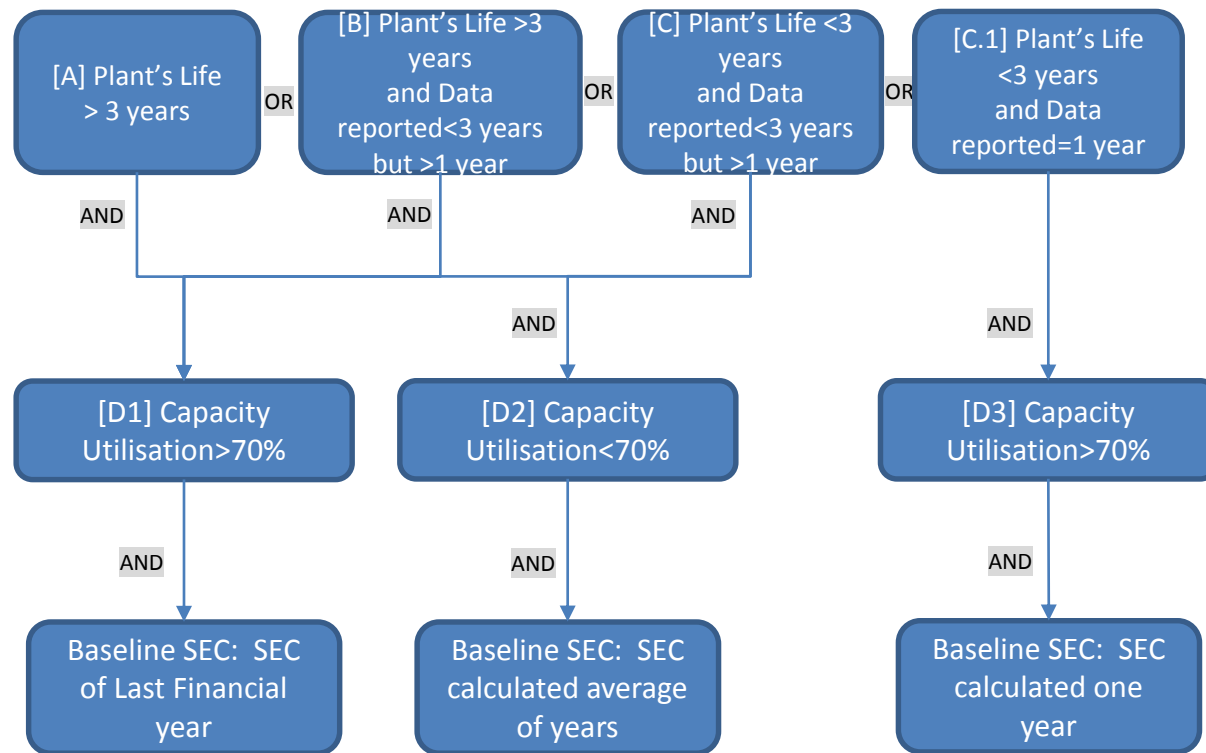


Type of DCs for PAT Cycle II

- Existing DCs in existing 8 sectors
- New DCs in existing 8 sectors
- New DCs in new Sectors

Baseline Fixation-New DCs in existing and new sector

Baseline SEC Calculation- Based on Last financial year data



[E] Baseline SEC Fixation Condition

- Baseline Specific Energy Consumption will be calculated based on the last financial year data, if any conditions mentioned in (A) or (B) or (C) and condition mentioned in (D) are satisfied for the last financial year.
- In case, conditions are not satisfied for the last financial year, average of all those year where above mentioned conditions are satisfied shall be considered for calculating baseline specific energy consumption

Last financial year of three year reported data will be considered as the Baseline year for the new DCs in PAT Cycle II (Majority of the DCs)

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 Setting

- % rate of reduction per year as per policy objective (Energy Conservation)= 2.3% per year
- Net ESCerts available in PAT Cycle II will be over 2 mtoe
- **Total Saving Required: $19.6 + 2 = 21.6$ mtoe**

Global best DC Sector

Differentiation between Global best and other sector

• *The target for the global best sector(s)*

• *The target for other sector*

Sectoral Targets - PAT Cycle – II

S. No	Sector	No of DCs	Energy Consumption (million toe)	Energy Savings (million toe)
1	Thermal Power Plant	154	120.16	3.13
2	Cement	111	21.43	1.12
3	Aluminium	12	10.66	0.57
4	Chlor Alkali	24	1.77	0.101
5	Pulp & Paper	29	2.68	0.15
6	Iron & Steel	71	40.44	2.14
7	Textile	99	1.48	0.087
8	Fertilizer	37	8.25	0.446
9	Electricity Distribution Companies	44	-	-
10	Refinery	18	18.5	1.10
11	Railways	22	1.39	0.033
	Total	621	226.76	8.877

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 will be given 0% reduction target.

DISCOM wise 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 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 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

- **EC Act schedule provides list of 15 energy intensive industries and other establishments to be notified as designated consumers (DC).**
- **DCs to appoint or designate energy managers who shall be in charge of activities for efficient use of energy and its conservation (clause 14(I)).**
- **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**

Thank You