

Fiscal/Financial instruments to improve efficiency of demand side management initiatives including Distribution Transformers

Presenter:
Balawant Joshi
Founder & Managing Director

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Contents

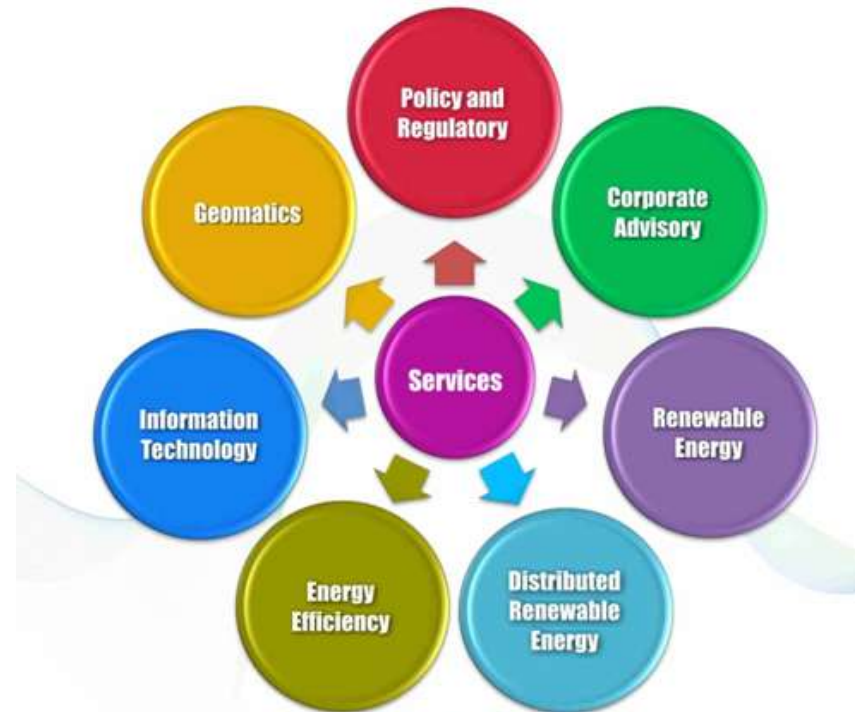
- ❖ About Idam
- ❖ India at a glance
- ❖ Distribution Reforms in India
- ❖ Energy Efficiency Initiatives in India
- ❖ Conclusion

What Is Idam?

इदम् - 'This' *'This Earth at This Time'*



Our Service Offering



Idam Group consists of Idam Infrastructure Advisory Pvt. Ltd. and Enfragy Solutions India Pvt. Ltd.

India at a Glance

Third largest producer and consumer globally

- India is the third largest producer and consumer of electricity in the world with an **installed power capacity reaching 382 GW as of March 31, 2021**.
- The country also has the fifth largest installed capacity in the world.
- India ranks fourth in wind power, fifth in solar power and fifth in renewable power installed capacity as of 2018.

Electrification achievements

- India has been on a path to achieve 100 percent household electrification as envisaged under the Saubhagya scheme. As of March 2019, more than 26.2million households were electrified under the Saubhagya scheme.
- Under Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY), 100 percent villages across the country stands electrified as on April 2018.

Robust growth in renewables

- As on May31, 2020, India had an installed renewable energy capacity of 87.38GW.
- Wind energy is estimated to contribute 60GW, followed by 100GW from solar power and 15GW from biomass and hydropower by 2022 in target of 175GW.
- Government plans to double the share of installed electricity generation capacity of renewable energy to 40 percent/450GW till 2030.

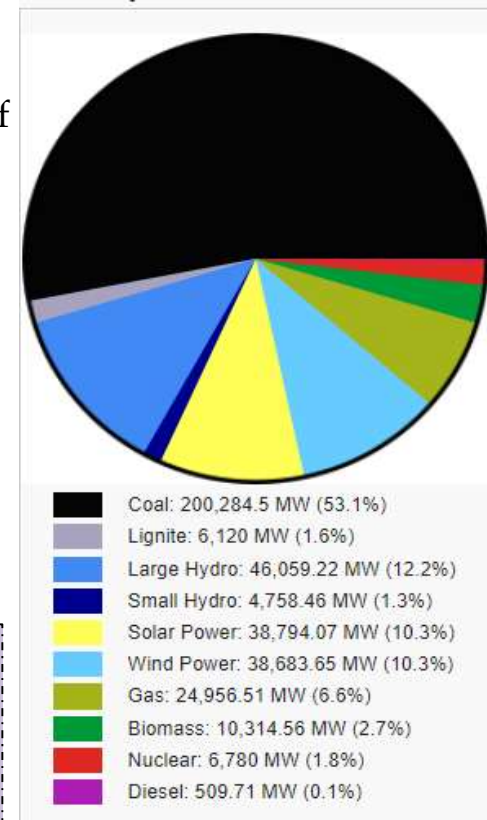
Favourable policy environment

- 100 percent FDI is allowed under the automatic route in the power segment and renewable energy.

Source: Make in India website, Ministry of New and Renewable Energy, IEA, CEA (Central Electricity Authority, Assorted articles

Snapshot India's Energy Scenario

- ❖ With a population of 1.4 billion and one of the world's fastest-growing major economies, India plays a vital role for the future of the global energy markets.
- ❖ Led by Prime Minister Shri Narendra Modi and his ministers, the Government of India has made impressive and outstanding progress in recent years by implementing reforms towards a secure, affordable and sustainable energy system to power a robust economic growth.
- ❖ The country has made huge strides to ensure full access to electricity, bringing power to more than 700 million people since 2000.
- ❖ Looking ahead, the government has laid out an ambitious vision to bring secure, affordable and sustainable energy to all its citizens by setting out a range of reforms in various areas, with a focus on energy system transformation, energy security and energy affordability.
- ❖ India's gross installed electricity capacity is around **3,82,730 MW**.



FY 2020-21	Demand (MU)	Availability (MU)	%Surplus(+) /Deficient (-)	
Energy	12,75,534	12,70,663	-4,871	-0.4%
Peak	1,82,932	1,82,559	-373	-0.2%

The Gap between demand and supply of power both in terms of energy and peak is less than 1%.

Evolution of Indian Power Sector

Before 1956

Introductory Stage

- Electricity (Supply) Act 1948
- Establishment of semi-autonomous State Electricity Boards (SEBs)

1956–1991

Nationalisation Stage

- Industrial Policy Resolution (1956)
- Generation and distribution of power under state ownership
- Power losses, subsidies, infrastructure bottlenecks and resource constraints

1991–2003

Liberalisation Era

- Legislative and policy initiatives (1991)
- Private sector participation in generation
- Fast-track clearing mechanism of private investment proposals
- Electricity Regulatory Commissions Act (1998) for establishing Central and State Electricity Regulatory Commissions and rationalisation of tariffs

2003 onwards

Growth Era

- Electricity Act (2003)
- Amendments made in Electricity Act so as to create competition
- Implementation of Deen Dayal Upadhyay Gram Jyoti Yojana (DDUGJY) and Integrated Power Development Scheme for rural and urban areas, respectively
- Implementation of Ujwal DISCOM Assurance Yojana (UDAY) which would enable electrification to all villages and tracking it using the Grameen VidyutikaranApp
- Amendment in National Tariff Policy (2016) has been made, wherein Government is focusing more on sustainable utilisation of renewable energy resources
- In May 2018, India ranked 4th in the Asia Pacific region out of 25 nations on an index that measures their overall power
- India's rank jumped to 22 in 2019 from 137 in 2014 on World Bank's Ease of Doing Business -"Getting Electricity" ranking

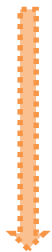


Distribution Reforms in India

High technical and commercial losses

Tariffs not cost-reflective

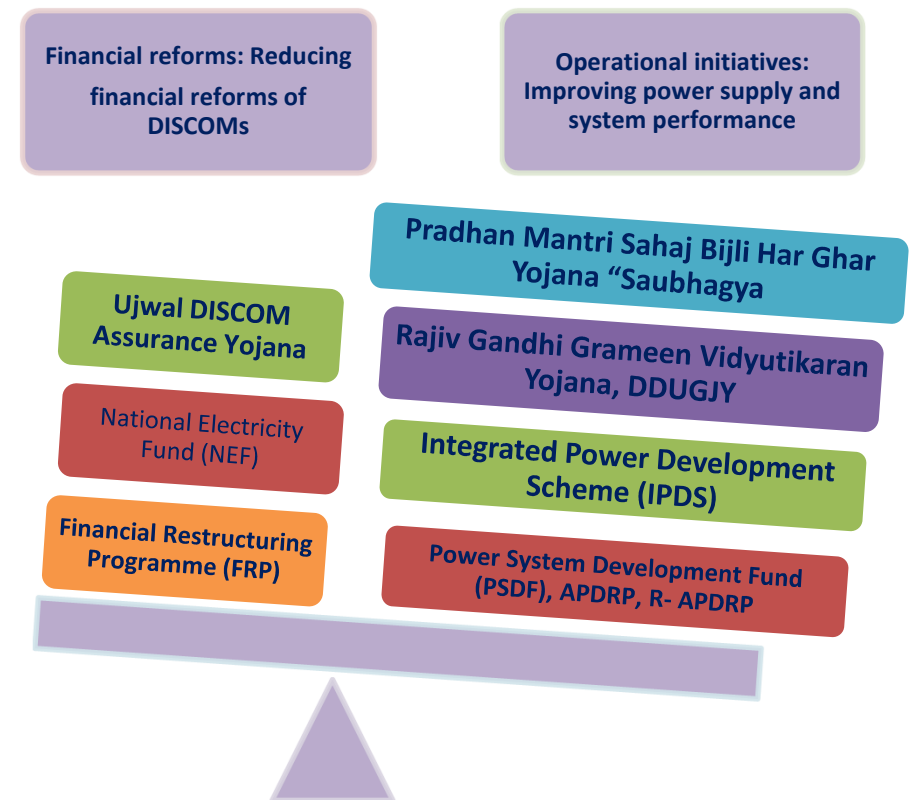
Inability of DISCOMs to buy cheap power



POOR FINANCIAL HEALTH OF DISCOMS

Key reforms in power distribution

- GoI has unveiled various reforms in the distribution sector with the basic objective of access to reliable and affordable power to all citizens.
- These have different objectives such as:
 - Reduction of losses,
 - Rationalisation of tariff and
 - Reducing interest costs in financial packages
- GoI has introduced multiple reforms, including amendments in the Electricity Act, for both financial and operational improvement of the DISCOMs.
- IPDS and UDAY were introduced to improve the operational and financial health of the DISCOMs, while schemes such as SAUBHAGYA and DDUGY have been launched to provide enhanced electricity access across the country.



Important Schemes...1/3

Scheme	Year of approval	Financial outlay (in INR crore)	Objectives	Achievements
Rajiv Gandhi Grameen Vidyutikaran Yojana	2005	~50,000 Or 6.71 Bn USD	<ul style="list-style-type: none"> • Electrification of all villages and Habitations • Providing access to electricity to all rural households • Free access to be provided to BPL families 	Electrification (as on March 2013) <ul style="list-style-type: none"> • Village electrification - 1,06,474 • BPL households - 2,05,15,472
Deendayal Upadhyaya Gram Jyoti Yojana (DDUGJY)	2014	~82,300 Or 11.04 Bn USD	<ul style="list-style-type: none"> • Separation of agricultural and non-agricultural electricity feeders to improve supply for consumers in rural areas • Improving sub-transmission and distribution infrastructure in rural areas • Rural electrification by carrying forward targets specified under the RGGVY 	Electrification <ul style="list-style-type: none"> • Village electrification - 93% • Household connectivity- 100% • Electrification impact analysis - 77% Physical infrastructure <ul style="list-style-type: none"> • 11kV - 640,432 ckt km • LT - 1,168,989 ckt km • DTR (no.) - 15,01,580
Pradhan Mantri Sahaj Bijli Har Ghar Yojana - "Saubhagya"	2017	16,320 Or 2.19 Bn USD	<ul style="list-style-type: none"> • Universal household electrification (in both rural and urban areas) by providing last mile connectivity • Provide electricity to about 3 crore households 	<ul style="list-style-type: none"> • 2.63 crore households have been electrified up to March 2019

Important Schemes...2/3

Scheme	Year of approval	Financial outlay (in INR crore)	Objectives	Achievements
Restructured Accelerated Power Development and Reforms Programme (R-APDRP)	2008	~44,000 Or 5.90 Bn USD	<ul style="list-style-type: none"> Establishment of base line data Reduction of AT&C losses up to 15% level through strengthening and upgrade of sub-transmission and distribution network and adoption of information technology (IT) 	<p>Part A</p> <ul style="list-style-type: none"> 1,363 towns have been declared 'go-live' SCADA control systems have been established in 52 towns 20 out of 21 data centres have been commissioned <p>Part B</p> <ul style="list-style-type: none"> Projects completed in 970 towns
Integrated power Development Schemes (IPDS)	2014	32,612 Or 4.38 Bn USD	<ul style="list-style-type: none"> Strengthening of sub-transmission and distribution network in the urban areas Metering of distribution transformers/ feeders/ consumers in the urban areas IT-enablement of the distribution sector and strengthening of the distribution network 	<p>Sanction of funds under the following heads</p> <ul style="list-style-type: none"> Distribution strengthening: INR27,626 crore in 546 circles IT-enablement: INR 985 crore in 1,931 towns ERP: INR 640 crore Smart metering: INR 754crore

Important schemes...3/3

Scheme	Year of approval	Financial outlay (in INR crore)	Objectives	Achievements
UDAY	2015	<ul style="list-style-type: none"> The states shall take over 75% of DISCOM debt as on 30 September 2015 over two years. 50% of DISCOM debt shall be taken over in 2015-16 and 25% in 2016-17. Balance 25% of the DISCOM debt was to be issued as state-backed DISCOM bonds or repriced by banks. 	<ul style="list-style-type: none"> Financial turnaround Operational improvement Reduction of cost of generation Development of renewable energy Energy efficiency and conservation 	<ul style="list-style-type: none"> Decrease in AT&C losses from 20.7% in FY16 to 18.7% in FY18 Reduced book losses to INR 15,049 crore INR (2.02 Bn USD) in FY18 from INR 51,480 crore (6.91 Bn USD) in FY16 Reduction in average cost of supply (ACS) – aggregate revenue requirement (ARR) gap from INR. 0.58/kWh (in FY16) to INR 0.17/kWh (FY18) Increase in billed energy from 694 BU to 824 BU (FY16 vs FY18)

Energy Efficiency & Demand Side Management : Need and Importance

- India ranks third in the world as far as total energy consumption is concerned.
- In this context, efficient use of energy and conservation are of paramount importance.
- **Nearly, 25,000 MW can be saved by implementing end-use energy efficiency and demand side management measures in India.** An integrated approach to enhance both supply and demand side energy efficiency should be adopted.
- Further, such saving through efficient use of energy can be achieved at less than one-fifth the cost of fresh capacity creation.
- **Further**, DSM program can reduce energy costs for utilities, and in the long term, it can limit the requirement for further generation capacity augmentation and strengthening of transmission and distribution system.
- Government of India introduced **the Energy Conservation (EC) Act in 2001 and created the Bureau of Energy Efficiency (BEE) as a statutory body, in March, 2002.**
- **BEE worked closely with Forum of Regulators to develop regulatory framework for DSM implementation by utilities.**
- BEE provides the technical assistance for establishment of DSM cells in the DISCOMs and capacity building of personnel of DSM cells for enabling them to undertake the DSM strategies and schemes.

Bureau of Energy Efficiency

Energy Conservation (EC) Act 2001

- Norms for Energy Intensive Industries
- **Standard & Labeling**
- Energy Conservation Building Code
- Demand Side Management
- Certification of Energy Professionals



BEE Established on 1st March 2002 under EC Act

- Implement regulatory and promotional functions of EC Act.
- Reduce Energy Intensity of our country
- Has State Designated Agencies in each state for enforcement and awareness

BEE Portfolio

Energy Efficiency

Awareness

- Energy Conservation Awards
- Painting Competition
- State Designated Agencies

Buildings

- Energy Conservation Building Codes
- Retrofit in old buildings
- Residential Building Guidelines



Demand Side Management

- Agriculture DSM
- Municipal DSM
- Energy Efficiency in SMEs
- Capacity Building of DISCOM

Star Rating of Appliances

- 8 Mandatory Labelled Appliances
- 13 Voluntary Labelled Appliances

National Mission for Enhanced Energy Efficiency

- Perform, Achieve & Trade (PAT)
- Market Transformation for Energy Efficiency (MTEE)
- Framework for Energy Efficient Economic Development (FEEED)
- Energy Efficiency Financing Platform (EEFP)

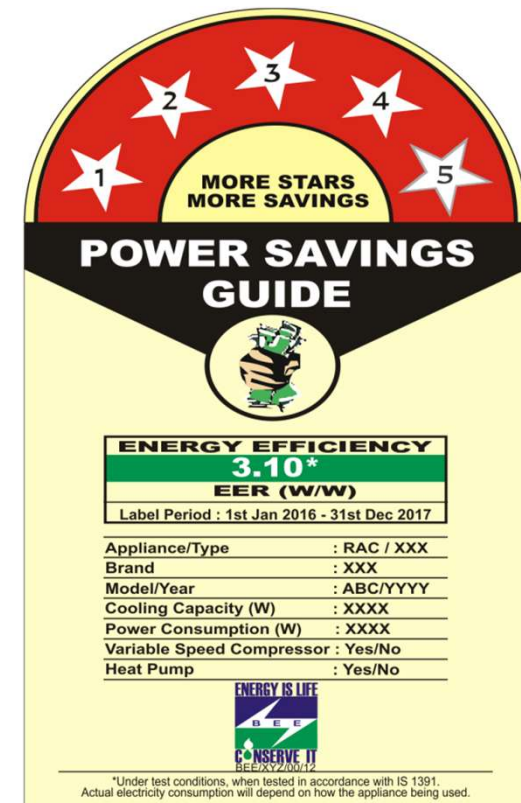
Standard and Labeling Program in India, May 2006

Why Star Labeling?

- Wide variation in energy consumption by products of manufacturers is observed.
- Information on energy consumption is often not easily available, sufficient or easy to understand from the nameplate.
- Lead to continued manufacture and purchase of inefficient equipment and appliances.

History and Success

- Started in Poland way back in 1962
- Worldwide 65 countries implemented including California USA in 1976
- Australia, Canada, China, Brazil, Thailand, Japan, and the United Kingdom (U.K.)



Journey so far

Enactment of EC Act Establishment of BEE	First voluntary star labeling programme for Air conditioners and Refrigerators launched	12 Appliances included in voluntary labeling Programme	4 Appliances covered in Mandatory labeling Room AC Frost Free Ref Tube-lights Distribution Transformer	21 Appliances in labeling program 8 Mandatory appliances	10 Mandatory appliances by 2018
2001-2002	2006	2007-2010	2010	2011-16	2016 onwards

List of Appliances -2021



Mandatory 10 nos.

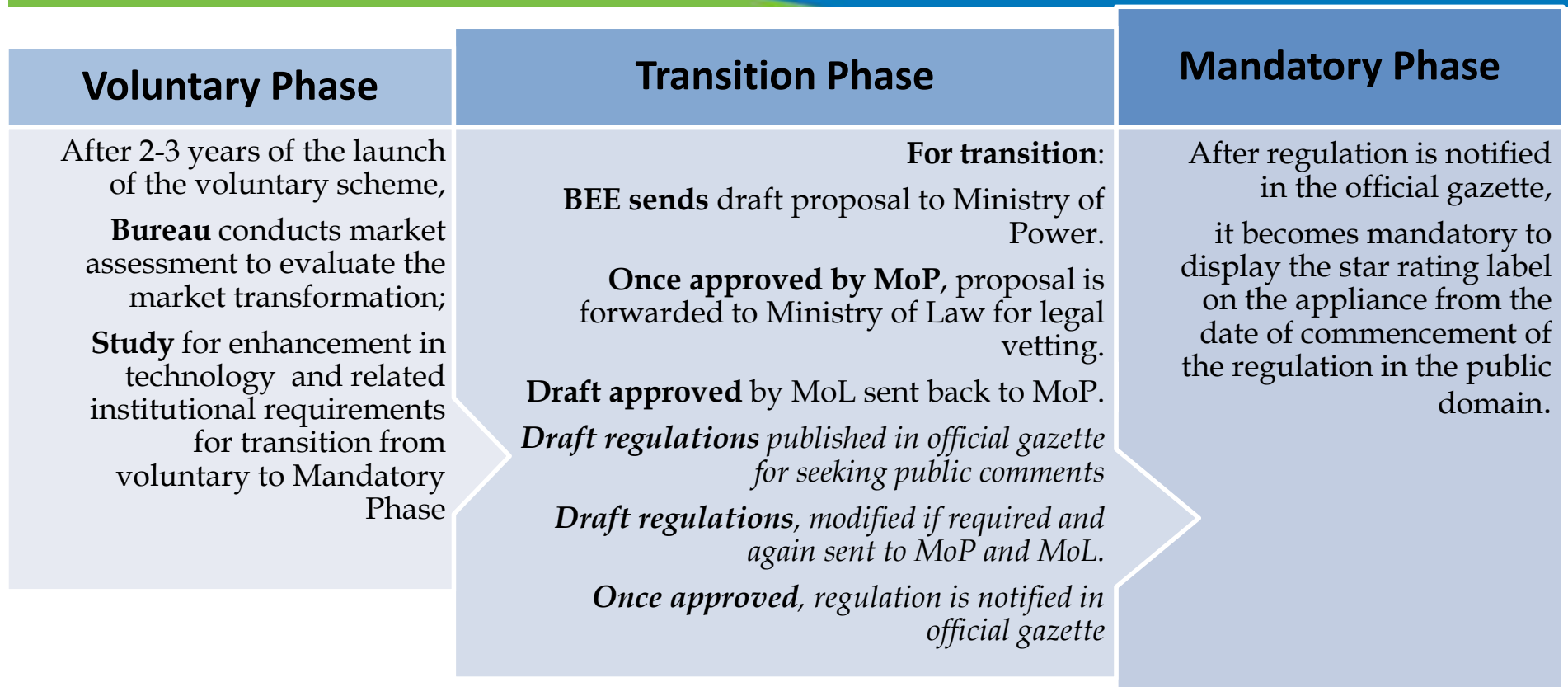
Room Air Conditioners
Frost Free Refrigerator
Tubular Florescent Lamp
Distribution Transformer
Room Air Conditioner (Cassette,
Floor Standing)
Direct Cool Refrigerator
Color TV
Electric Geysers
LED Lamps
Variable Capacity Inverter Air
Conditioners



Voluntary 16 nos.

- Induction Motors
- Pump Sets
- Ceiling Fans
- LPG-Stoves
- Washing Machine
- Computer (Notebook/Laptops)
- Ballast (Electronic/Magnetic)
- Office Equipment's (Printer, Copier, Scanner, MFD's)
- Diesel Engine Driven Mono-set Pumps
- Solid State Inverter
- DG Sets
- Chillers
- MicroWave Oven
- Solar Water Heater
- Light Commercial Air Conditioner
- Deep Freeze

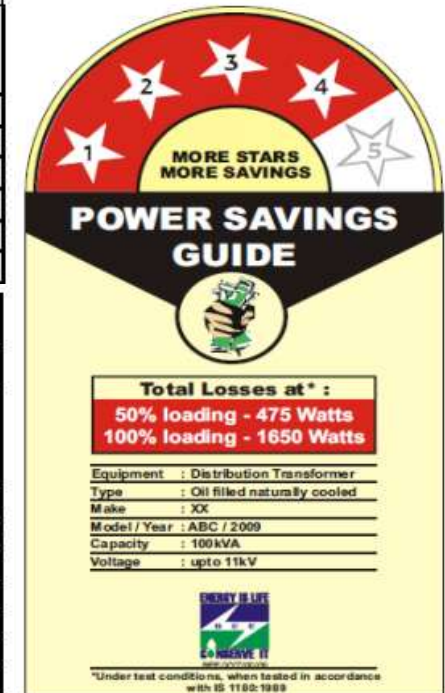
Voluntary to Mandatory Labeling



Norms Effective from 1st January 2017

Standard Losses in watts up to 11 KV Class										
Rating (kVA)	Star 1		Star 2		Star 3		Star 4		Star 5	
	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load	50 Per cent. Load	100 Per cent. Load
16	135	440	120	400	108	364	97	331	87	301
25	190	635	175	595	158	541	142	493	128	448
63	340	1140	300	1050	270	956	243	870	219	791
100	475	1650	435	1500	392	1365	352	1242	317	1130
160	670	1950	570	1700	513	1547	462	1408	416	1281
200	780	2300	670	2100	603	1911	543	1739	488	1582

Standard losses in watts up to 11 KV Class (For ratings above 200 kVA)											
Rating (kVA)	Per Cent. Impedance	Star 1		Star 2		Star 3		Star 4		Star 5	
		50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load	50 Per Cent. Load	100 Per Cent. Load
250	4.5	980	2930	920	2700	864	2488	811	2293	761	2113
315	4.5	1025	3100	955	2750	890	2440	829	2164	772	1920
400	4.5	1225	3450	1150	3330	1080	3214	1013	3102	951	2994
500	4.5	1510	4300	1430	4100	1354	3909	1282	3727	1215	3554
630	4.5	1860	5300	1745	4850	1637	4438	1536	4061	1441	3717
1000	5	2790	7700	2620	7000	2460	6364	2310	5785	2170	5259
1250	5	3300	9200	3220	8400	3142	7670	3066	7003	2991	6394
1600	6.25	4200	11800	3970	11300	3753	10821	3547	10363	3353	9924
2000	6.25	5050	15000	4790	14100	4543	13254	4309	12459	4088	11711
2500	6.25	6150	18500	5900	17500	5660	16554	5430	15659	5209	14813**



Observations and Lessons

- Wide range of interventions have been used by Indian Government to push both Distribution Reforms and Energy Efficiency.
- Separate institution to implement EE and DSM played extremely important role in design, development and implementation.
- Distribution Companies take much longer to implement reforms or DSM/ Energy Efficiency measures.
- Governments need to design programs that would enable large scale/ economy wide measures to achieve tangible results.



Thank You

Contact:

Balawant Joshi

+91 98214 21630

Ajit Pandit

+91 98211 08222

Email:

contact@idaminfra.com

Mumbai

801, Crystal Plaza,
158, CST Road,
Kalina, Santacruz (E),
Mumbai – 400 098
Phone: +91 22 4057 0200

Delhi

A-31, Second Floor,
Lajpat Nagar II,
Near Lajpat Metro Station,
New Delhi – 110 024
Phone: +91 11 4943 4000

Kolkata

Globsyn Crystal, XI – 11 & 12,
1st Floor, Block – EP, Sector V,
Salt Lake Electronics Complex,
Kolkata – 700 091
Phone: +91 33 4604 8993

Hyderabad

House No. 3-51, Flat No. 201,
Abhishek Towers,
Balanagar,
Hyderabad – 500 042
Phone: +91 91369 20664