



Agility
Care
Excellence
Integrity
Trust
Collaboration
Respect



Demand Side Management

DSM Cell
Tata Power- Mumbai

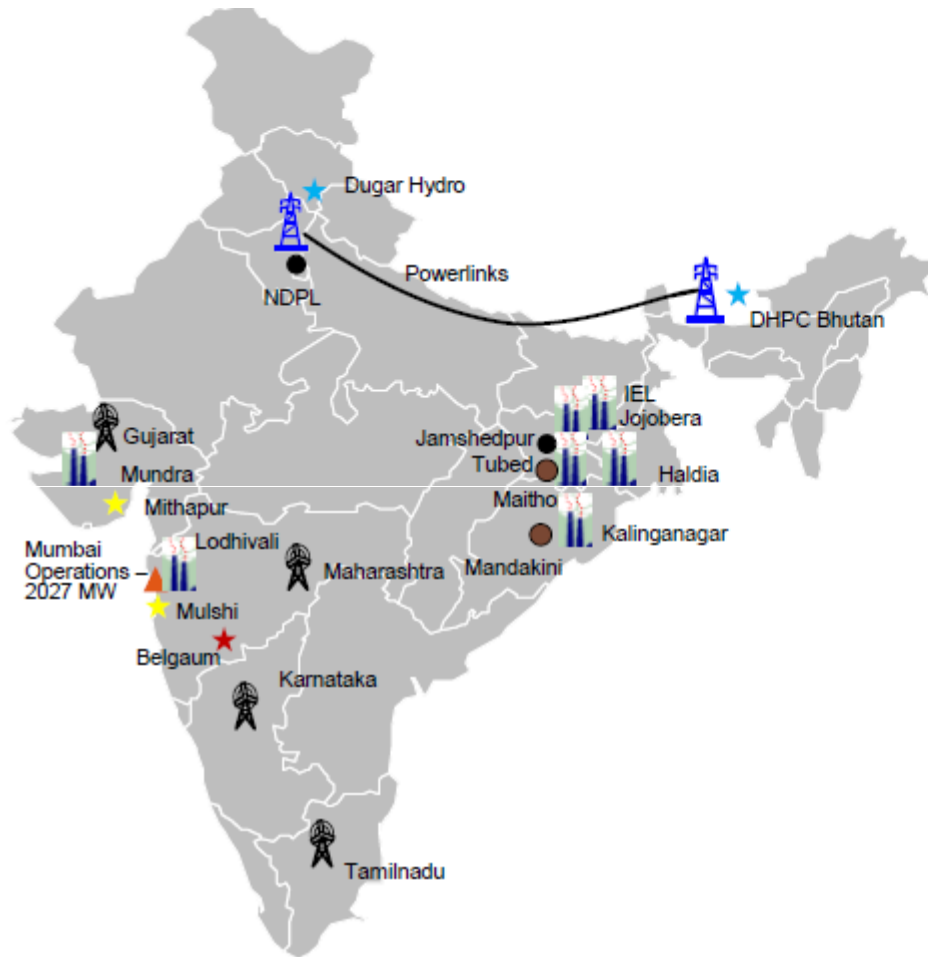


VISION OF THE FOUNDER MR. J N TATA



"Cheap and abundant electric power is one of the basic ingredients for the economic progress of a city, a state or a country"

Tata Power G,T & D



Power generation capacity (MW)

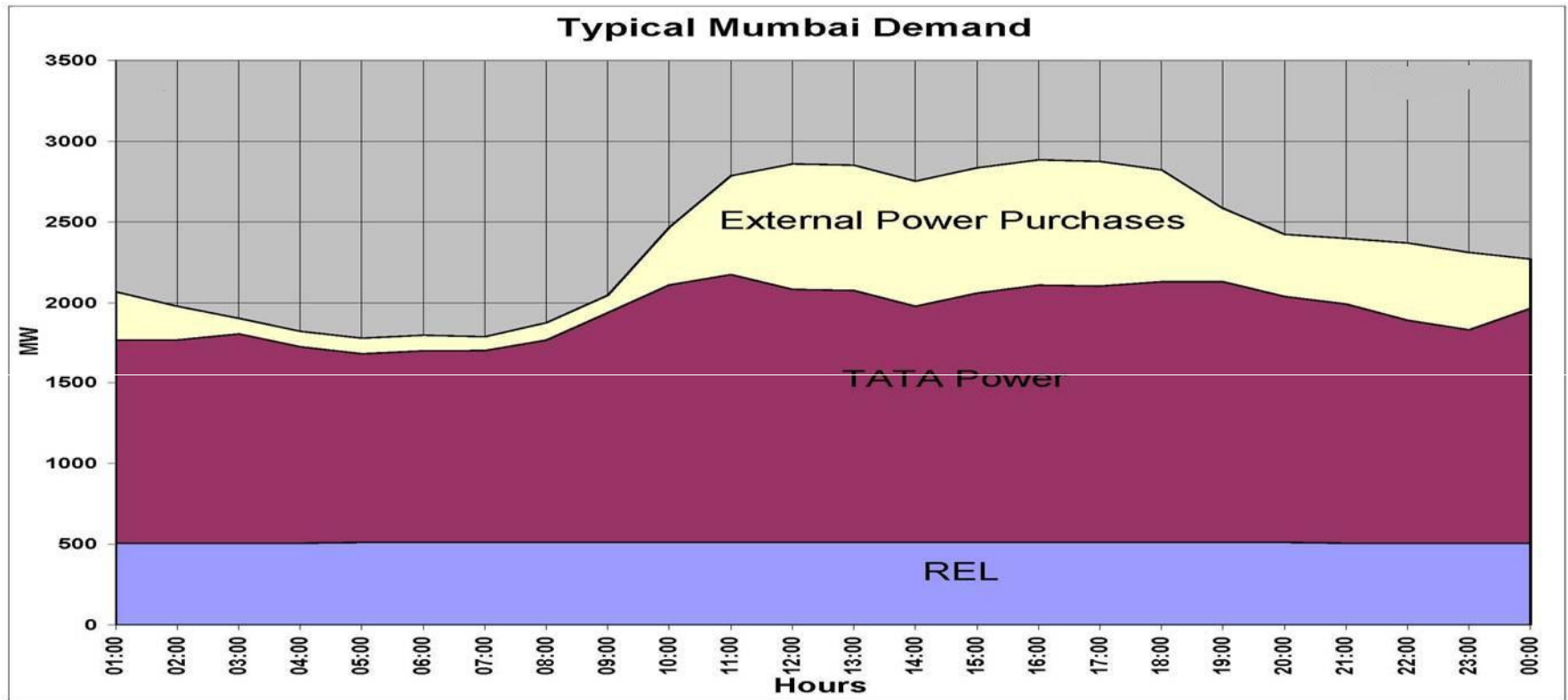
Installed

	Thermal	7647 MW
	Hydro	447 MW
	Wind	398 MW
	Solar	28 MW
	Transmission	
	Distribution	

Under Execution

	Thermal	202 MW
	Hydro	126 MW
	Solar	10 MW
	Coal mines	13.5 MT

The typical Mumbai load management



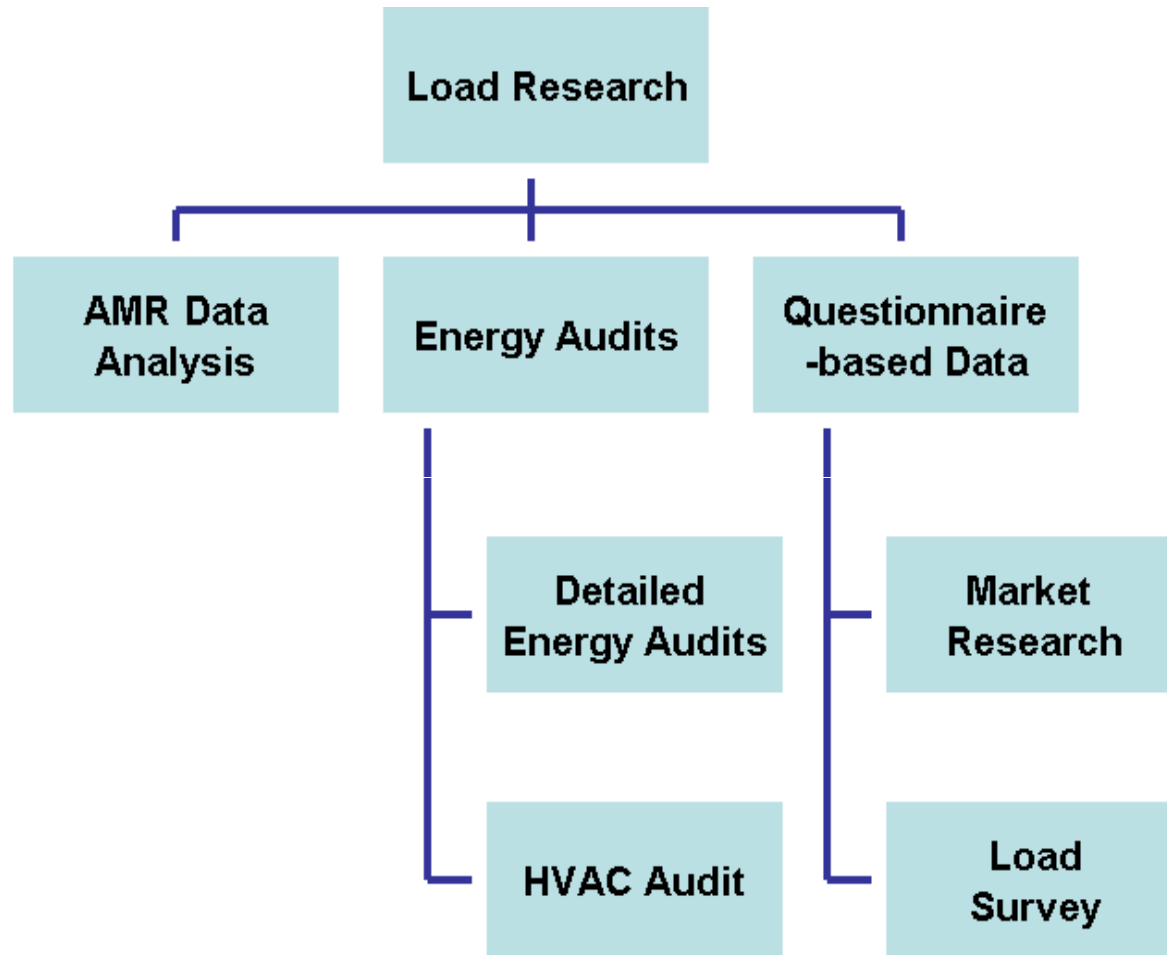
- Mumbai needs to procure of around 800 MW power in day time peak
- large distortion in peak and off peak power requirement.

Support by MERC for DSM in Maharashtra Regulatory Support

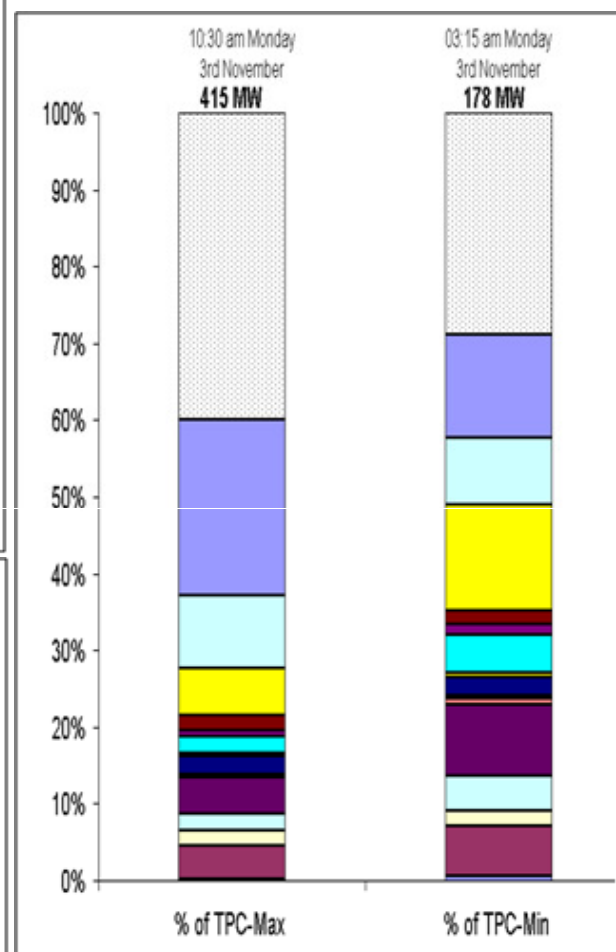
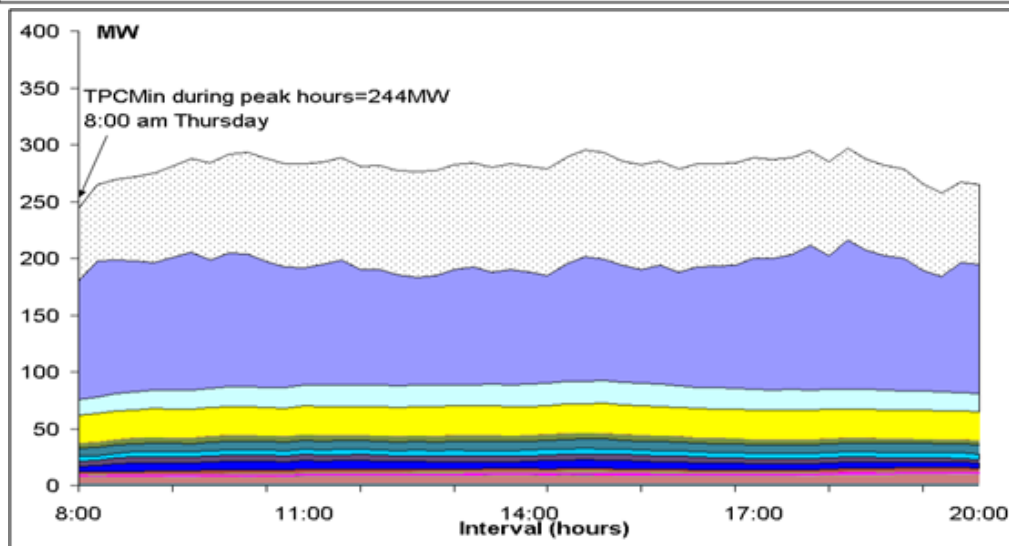
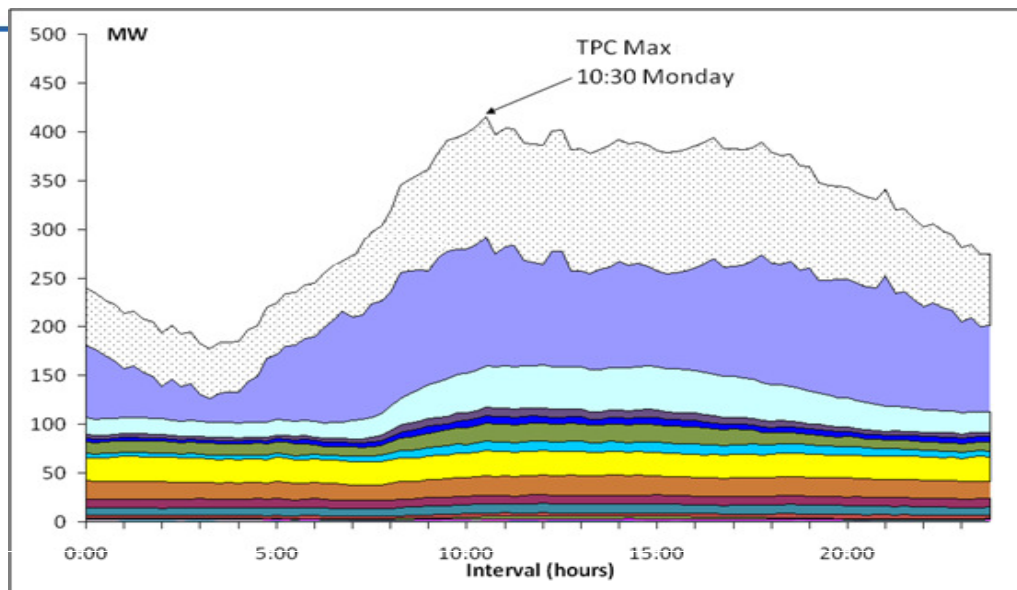


- Time of The Day TOD tariff is applicable for Industrial & Commercial Consumers
- Expenditures regarding DSM is allowed with prudence check.
- Annual budget is cleared 'in principle' by MERC for each utility
- Each project is required to be submitted to MERC for approval
- Expenditure can be made only after approval by MERC
- The expenditure is charged to ARR
- Program should achieve either energy saving and load shifting.
- Cost benefit tests are clearly defined.
- DSM Regulations are in place, DSM CC is formed.
- Measurement and verification guidelines are drafted
- Pilot/ Large scale programs for utilities are approved.

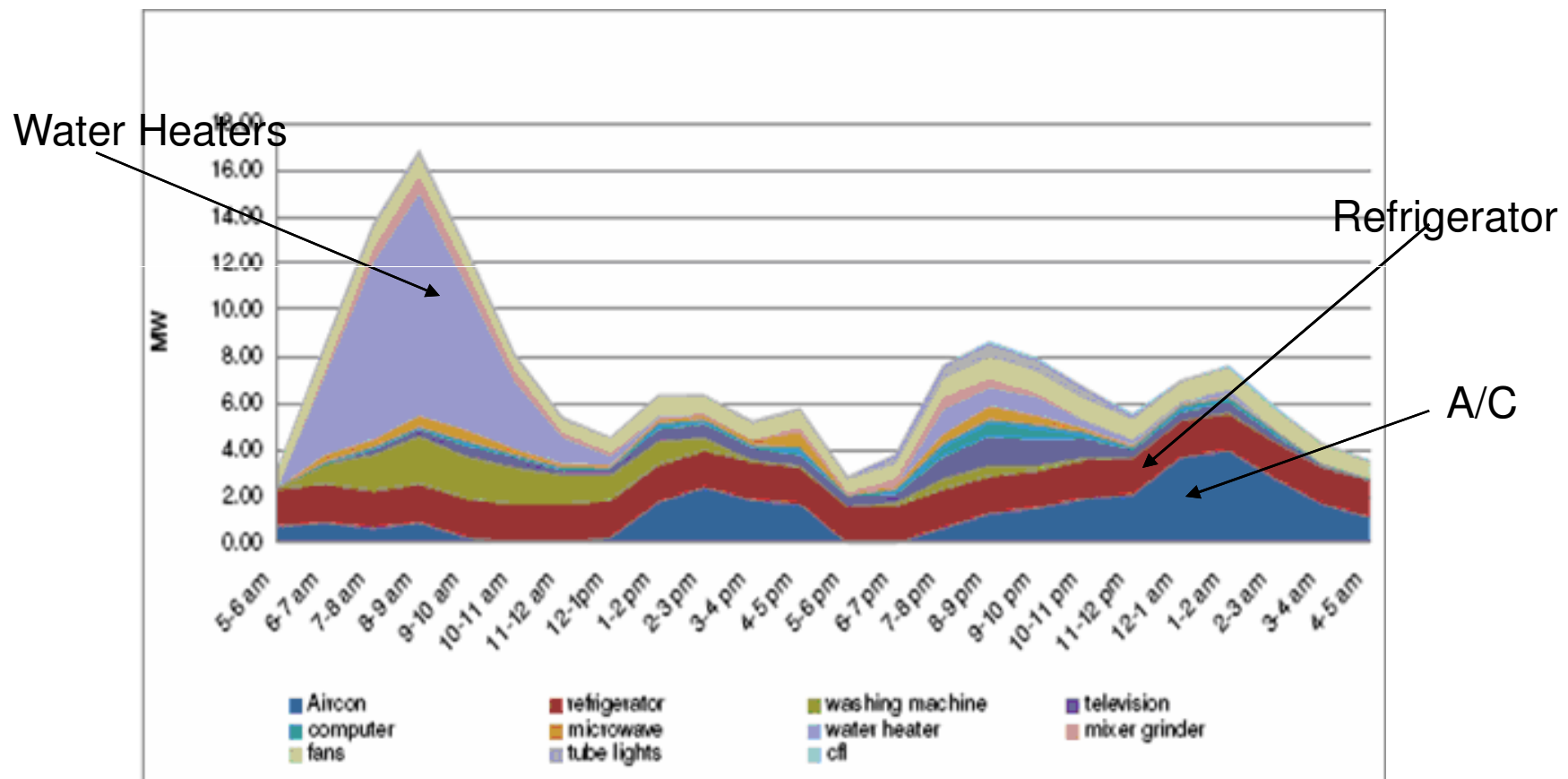
Tata Power Load Research Strategy



Load Curves – of Various Bulk Load Consumers



Residential Consumers load profile based on Market Survey



Source: UCC Market Survey

Load Research Conclusions



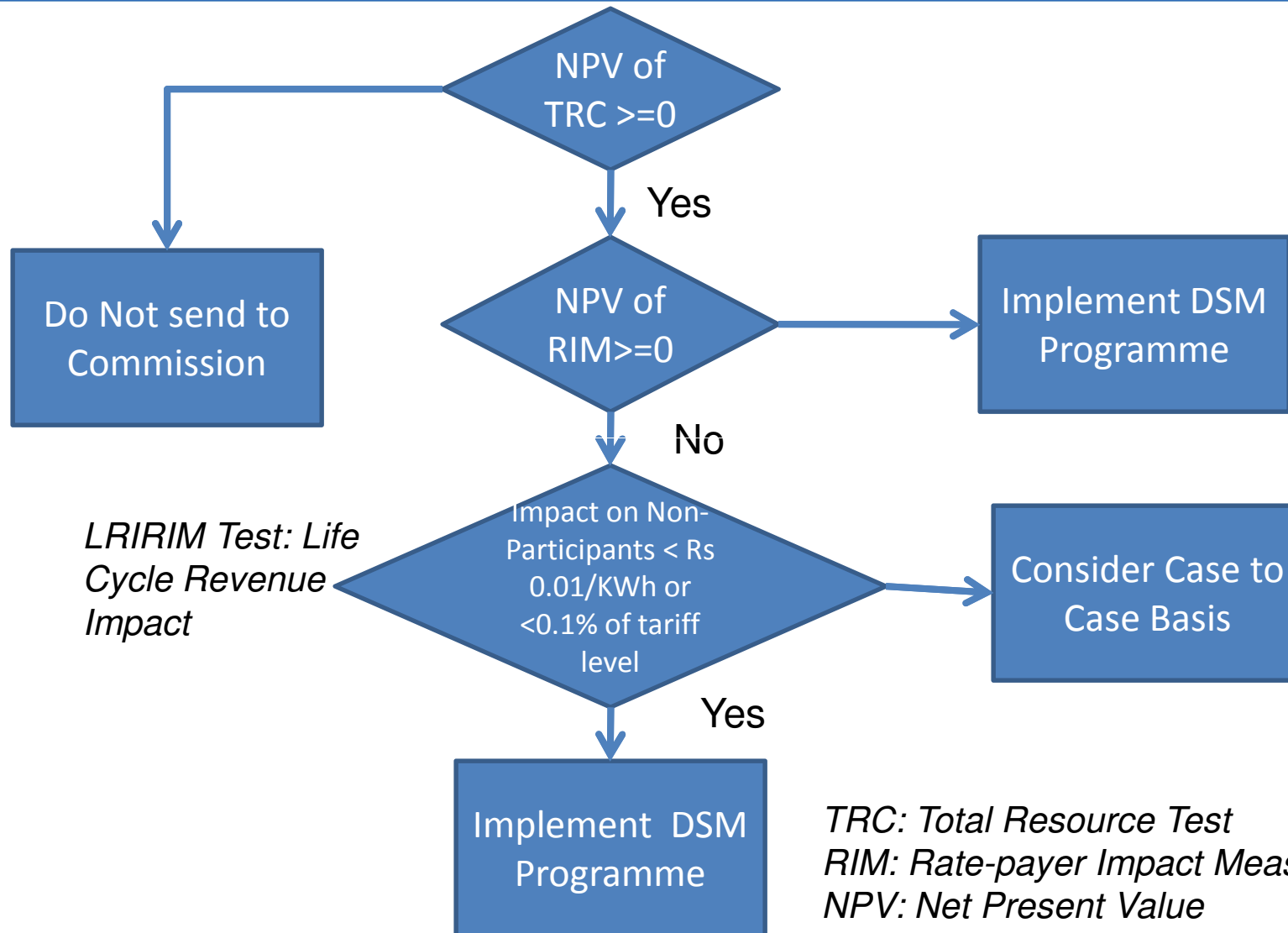
- ✓ Industrial load is shifting out and commercial premises are taking over.
- ✓ Fully air conditioned AC complexes are rapidly growing.
- ✓ Addition of load is only in day time peak.
- ✓ A/C load is more than 40% of the total load.
- ✓ Most of the central ACs are mismanaged and has a large potential for improvement
- ✓ Residential is consuming more on AC and refrigeration.
- ✓ Industrial estates have large no of old inefficient window ACs.
- ✓ People are willing to invest in energy efficient devices.
- ✓ Individual industrial and commercial unit is unique in nature and needs separate study.
- ✓ SME sector is reluctant to invest in energy audits and need for support for the same.

Programs Designed based on LR



- ❖ Energy Audit Program
- ❖ T5 tube light program
- ❖ 5 star ceiling fan program
- ❖ 5 star Refrigerator program
- ❖ 5 star Air Conditioner program
- ❖ Thermal Energy Storage program
- ❖ Demand Response Program
- ❖ School Children awareness program
- ❖ Public awareness program
- ❖ Standard Offer
- ❖ Energy Efficiency Power Plant (EPP)

MERC DSM Programme Cost Effectiveness Assessment



Appliance exchange DSM programme



T5 HELIOS CONNECT 28W

T5 HELIOS PRO 28W

SEE THE WORLD IN A NEW LIGHT **OSRAM** OSRAM



HAVELLS

Non Decorative	Decorative
 ES-5★	 FUSION-5★ Energy Saving Fan
 Brown	 Beigy Brown
 White	 Pearl Ivory
 Ivory	
MRP - Rs.1960 Offer Price - Rs.924	MRP - Rs.2385 Offer Price - Rs.1284

Case Study : Ceiling Fan program



India's first 5 star rated Energy Saving Fan



MERC Approval

Bidding

Selection of vendor and product

Product testing

Designing a marketing campaign

Designing customer registration portal

Delivery and installation management

Complaint management

Measurement and Verification

Case Study : Ceiling Fan exchange program



Product/vendor Selection criteria

S.No.	Parameters	Requirements
1	Product Market Sales	>10%
2	Sweep	1200 MM
3	BEE Approval Star Rating	5 Star
4	Rated Speed	350 RPM
5	Air Delivery- CMM (Mtr3 / Minutes)	215 CMM
6	Service Value CMM/W	4.3
8	Warranty Offered (Years)	3
9	Vendor Scope Agreed As Per RFP	YES
10	VAT @ 12.5%	Included
11	Delivery , Installation & Removal of old fan	Included
12	Environmental friendly scrapping of old fan	Included

Thermal Storage program

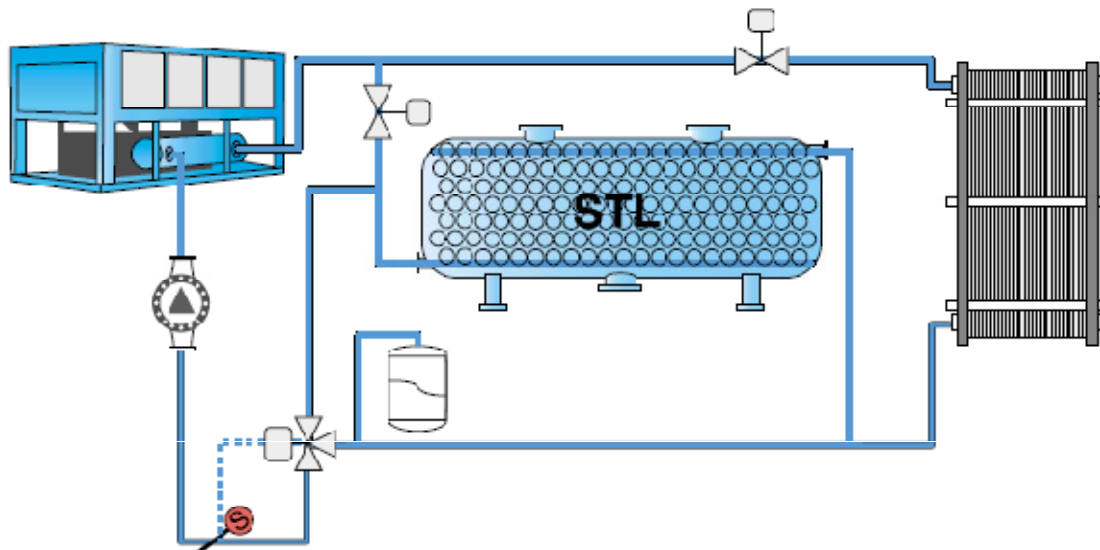
- 40% of Mumbai load is of Central Air Conditioning
- Thermal Storage system runs Chillers in night and stores energy in ice tanks.
- Customers shifts load to night and gets benefit of TOD tariff.
- Saves on Maximum Demand Charges
- Tata Power motivates customers with rebate for using thermal storage



Thermal Storage System

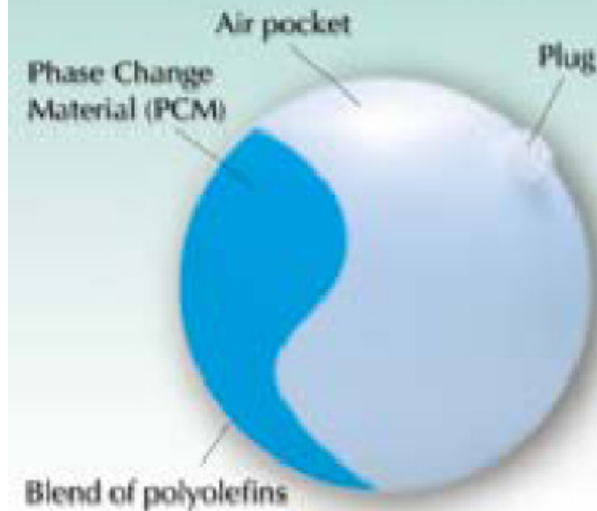


SERIES UPSTREAM

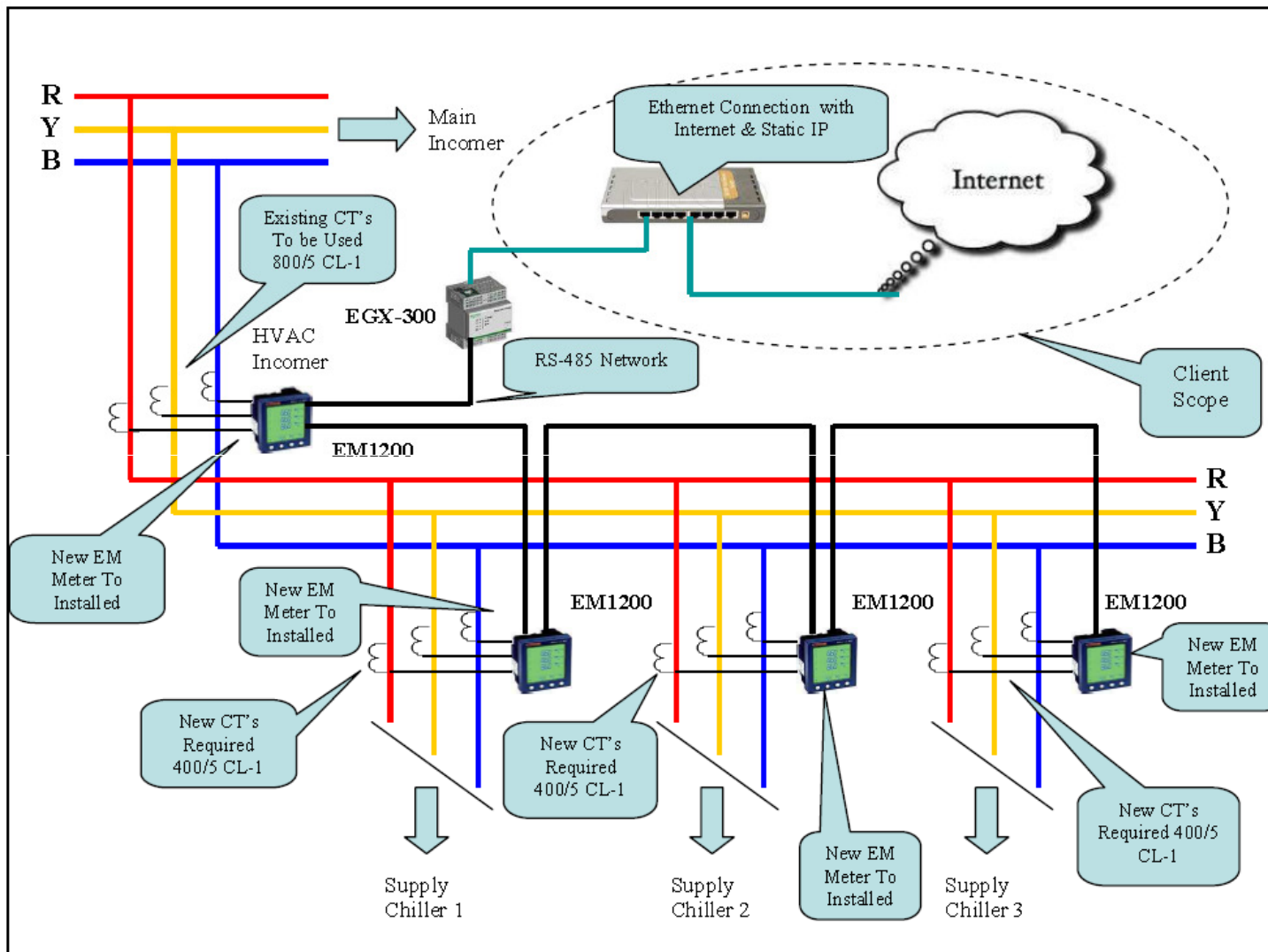


NODULE CHARACTERISTICS

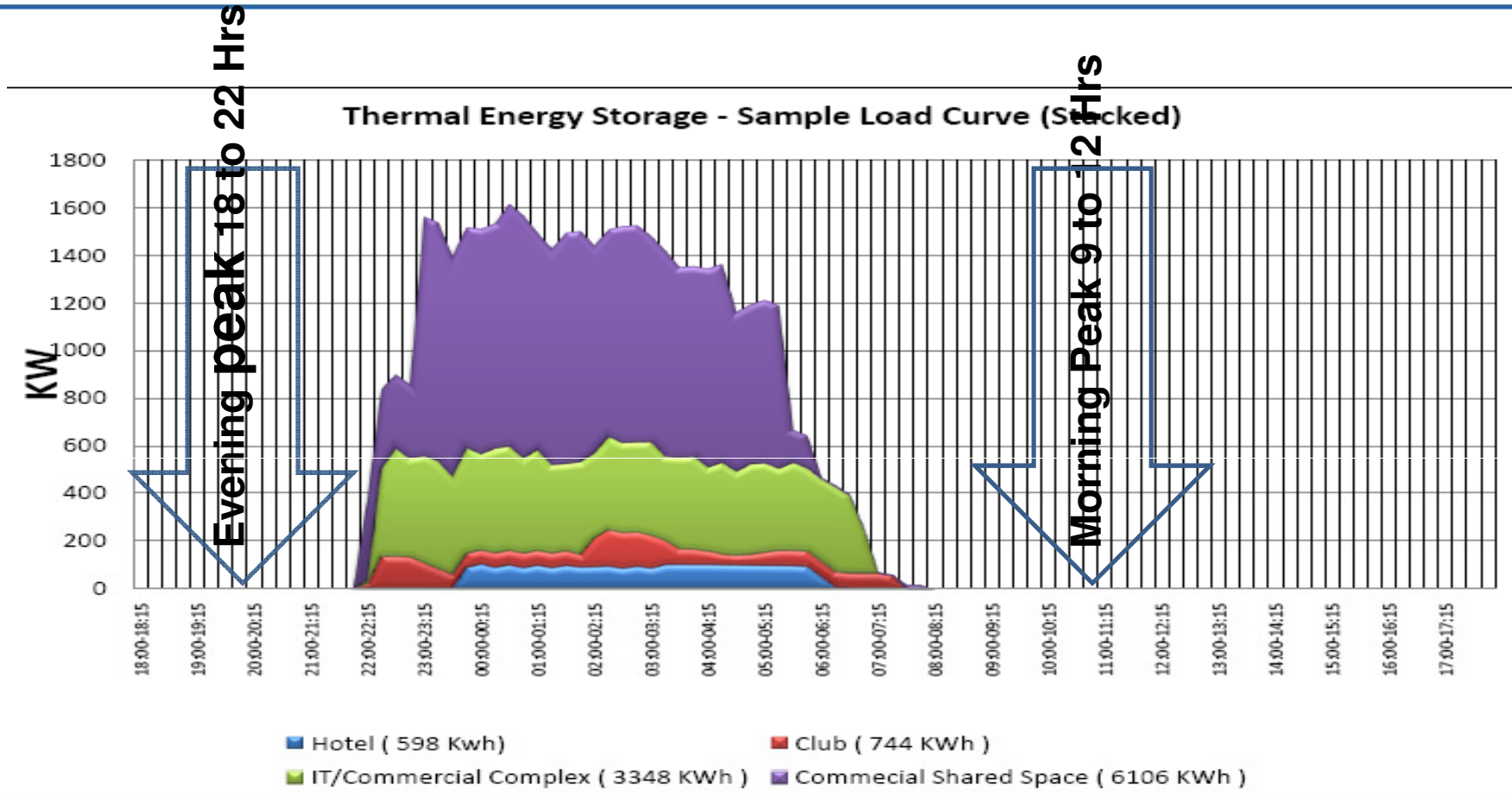
Material: blend of polyolefins.
Chemically neutral towards eutectics and heat transfer fluid.
1.0 mm thickness: no migration of the heat transfer fluid.
Sphere obtained by blow moulding: no leakage.
Sealing of the cap by ultrasonic welding.
Air pocket for expansion: low stress on the nodule shell.



Real time measurement of load shift by Tata Power



Tata Power Consumers : Shifting Load.



Demand Response

An Innovative DSM program & Smart Grid solution



- Demand Response' (DR) is voluntary load curtailments by large Commercial and industrial consumers during peak hours when requested by Utility in order to create a curtail able capacity during high demand months.
- It is a primary demand side resource for *smart grid solution*
- Creates opportunity to use demand side assets.
- Financial incentives are offered to consumers participating in load curtailment when demanded.

Emergency Load management with DR



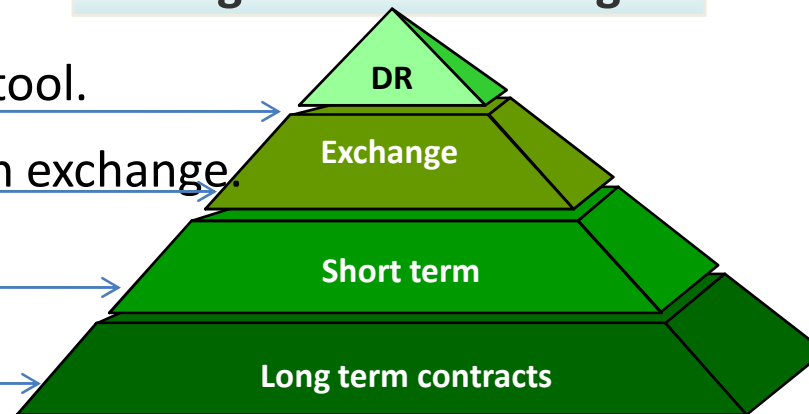
Scheduling and Load Management

DR is additional emergency tool.

Daily deficits are met through exchange.

Short term through trader

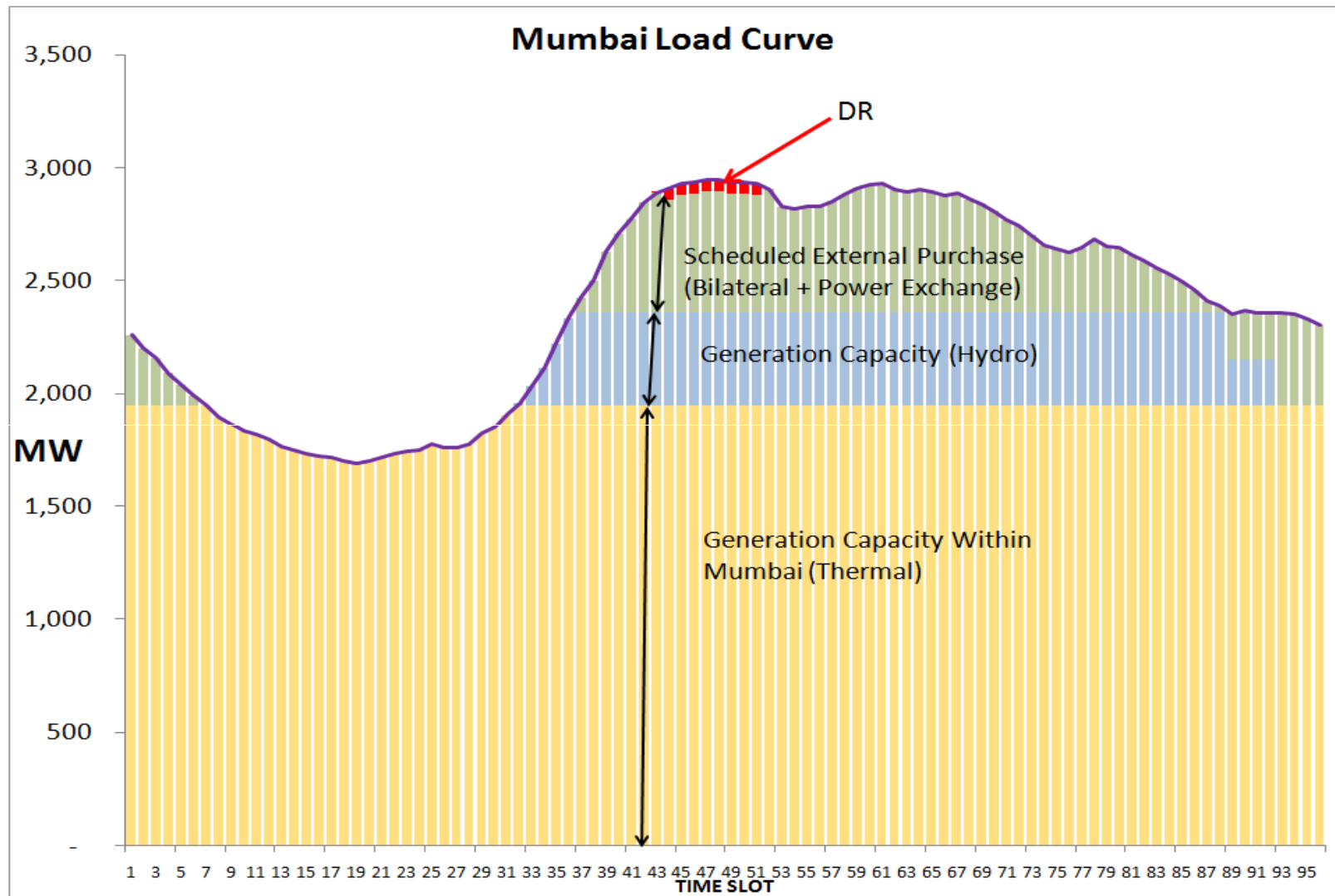
Normal power requirement



Demand Response in Action at the Facility Level



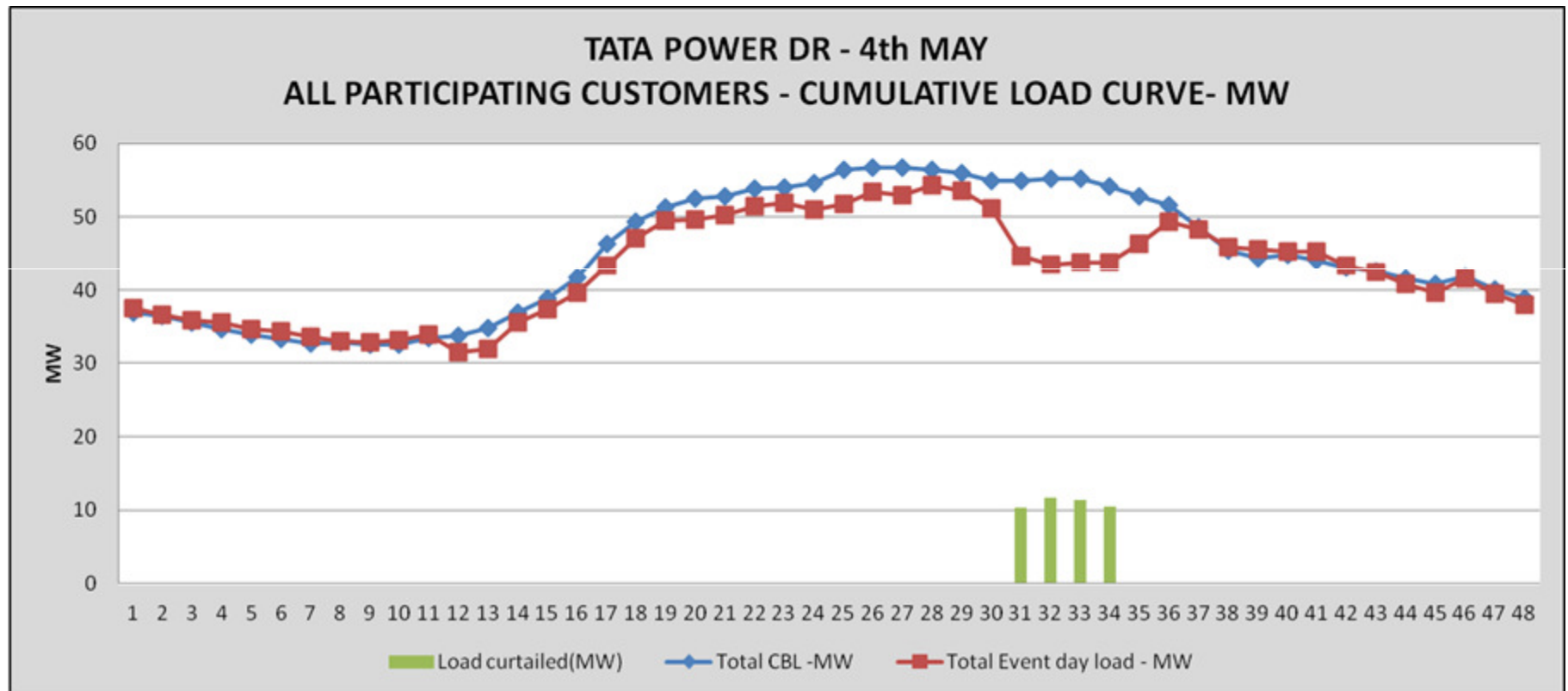
Load management by DISCOM



Demand Response : load curve



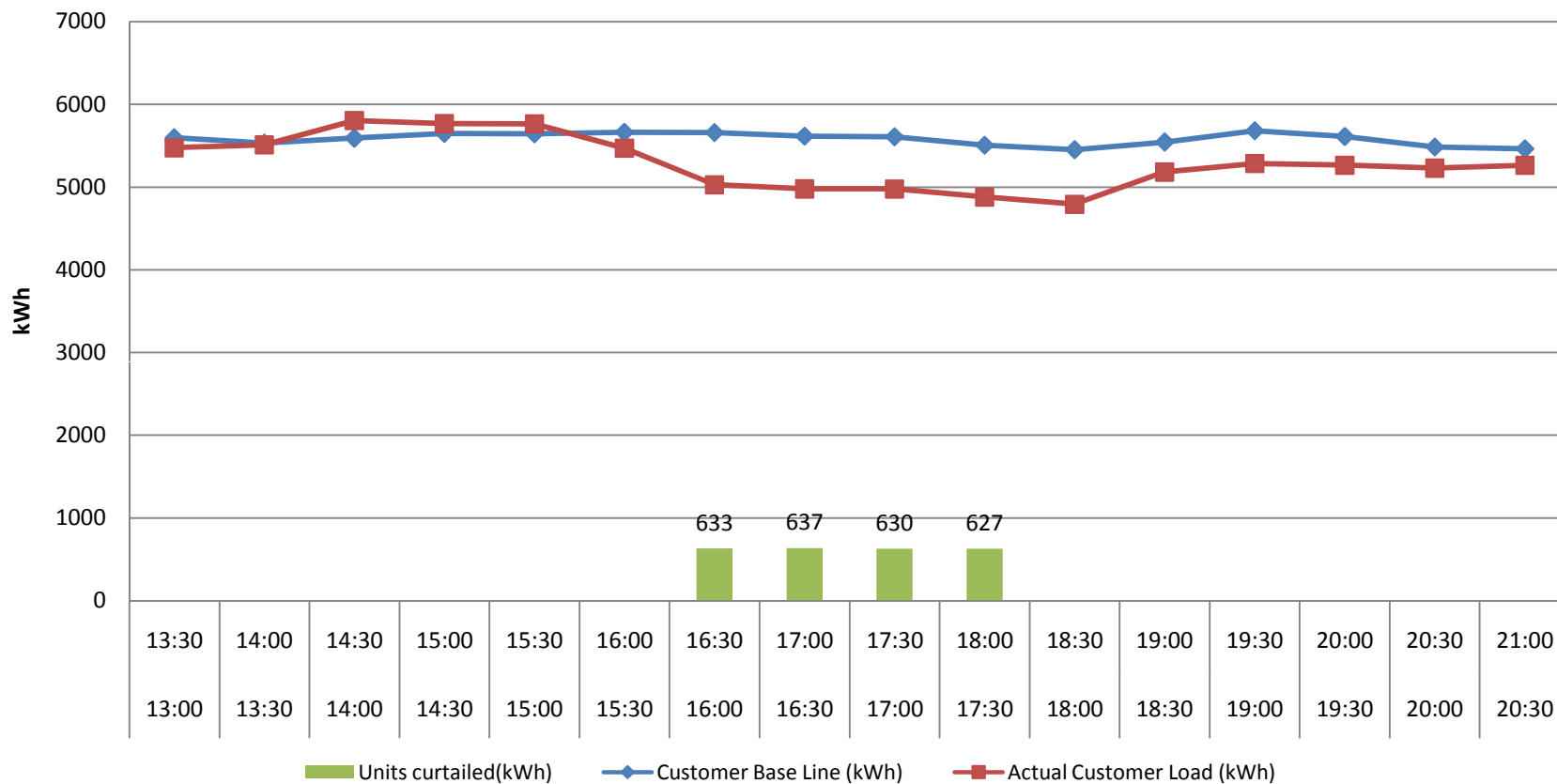
- Achieved Capacity of 15 MW with Tata Power Direct consumers
- 18 Events of 2 Hours each called in FY 13



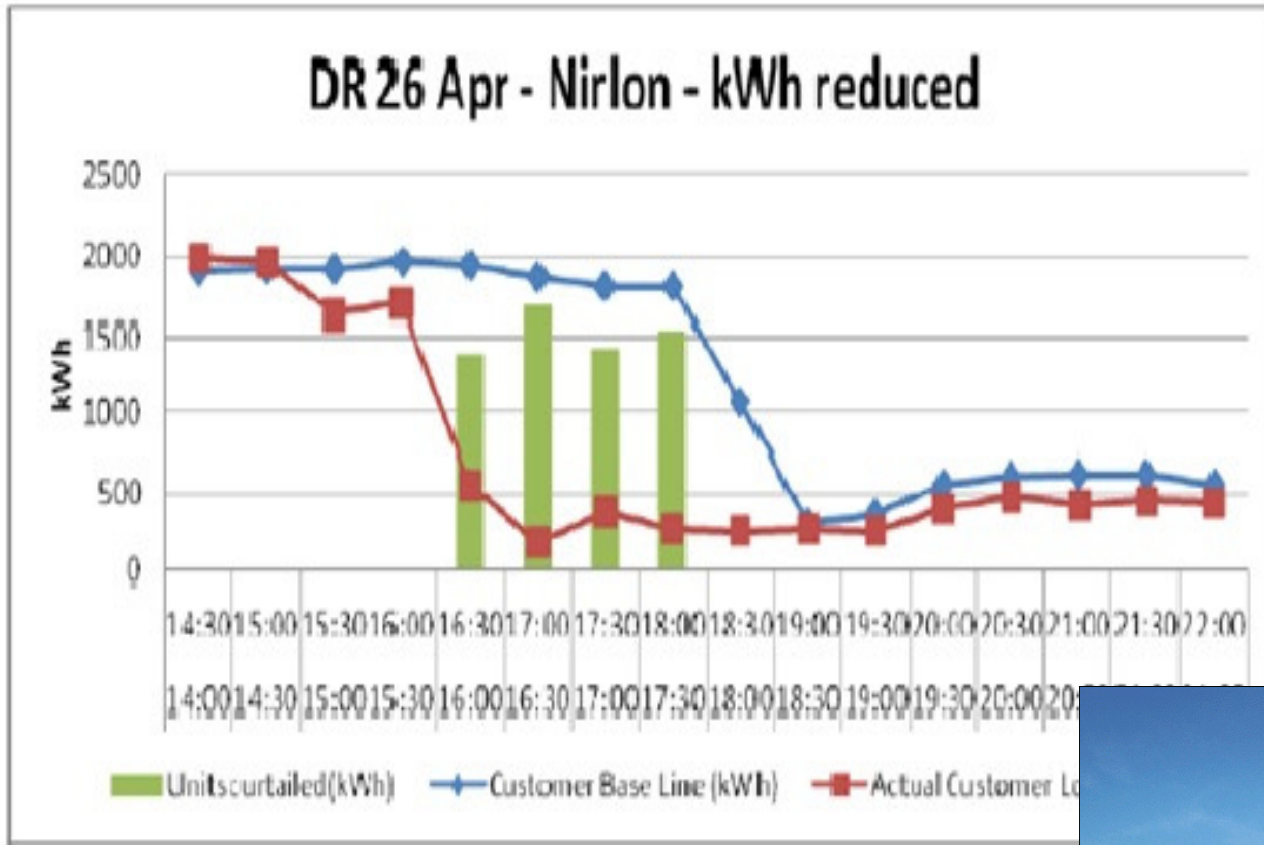
DR Event : 26 the April Mumbai International Airport



DR 26 April MIAL- kWh curtailed



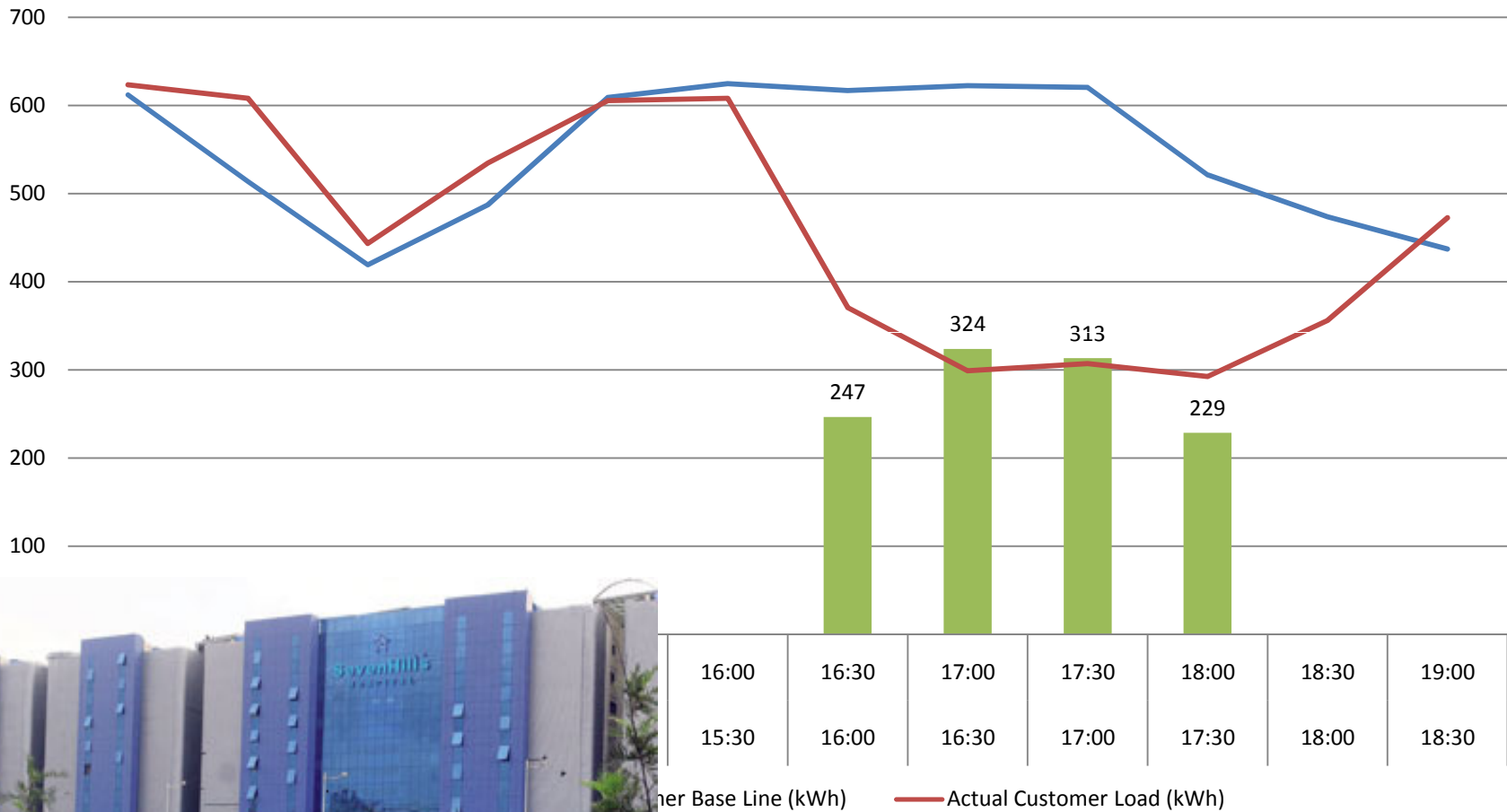
DR Event 26 th April Nirlon Corporate Park



DR Event 26th April Seven Hills Hospital



DR - 26 Apr - 4 Out of 5 - Seven Hills - Units curtailed(kWh)



Load curtailment through Demand esponse



	Customer name	Location	DR - MW	kWH
			1 Hr	2 Hrs
1	Tata Consultancy Services	Powai	1.4	1527
2	Supreme Properties	Powai	0.1	237
3	Lake View Developers	Powai	0.5	833
4	National Stock Exchange	BKC	0.0	0
5	Sahara Hospitality Limited	Andheri	0.0	0
6	Seven Hills Hospitals	Andheri	0.7	1112
7	Bharat Diamond Bourse	BKC	0.2	352
8	Godrej & Boyce	Vikhroli	1.6	3012
9	Graur & Weil	Kandivali	0.2	355
10	BMC pumping station	Bhandup	0.3	545
11	Accenture	Vikhroli	0.3	459
12	Intelenet Global	Malad	0.3	355
13	Technopolis Knowledge Park	Andheri	0.1	188
14	JP Morgan	Various sites	Data to be received	
15	Zenta	Powai	0.1	149
16	Ambassador's Sky Chef	Andheri	0.2	227
17	L&T, Powai (E)	Powai	0.2	130
18	BMC Pumping	Ghatkopar	0.5	1042
19	Infiniti Mall	Malad	0.0	0
20	Crisil Ltd	Powai	0.2	432
21	Air India- Engineering Division	Andheri	Data to be received	
22	Nirlon Ltd.	Goregaon	2.5	4101
23	Ordnance factory	Ambernath	0.4	575
24	Mumbai International Airport Ltd.	Andheri	1.3	2526
25	Taj Sat Air Caterers	Andheri	0.0	0
26	Hotel Holiday Inn	Andheri	0.0	0
27	IL & FS	BKC	0.0	0
			11.1	18157.00

Standard Offer : Special incentive scheme for proven energy saving by consumer during peak hours where utility shall carry out scientific Measurement and Verification of savings through third party.

EPP : It is the concept of allowing the utility to capitalize the investment in DSM and earn a return on that investment, thereby treating the DSM investment in a manner analogous to power plant investment and thus creating a DSM power plant.

Agility Care
Excellence Integrity
Trust Collaboration Respect

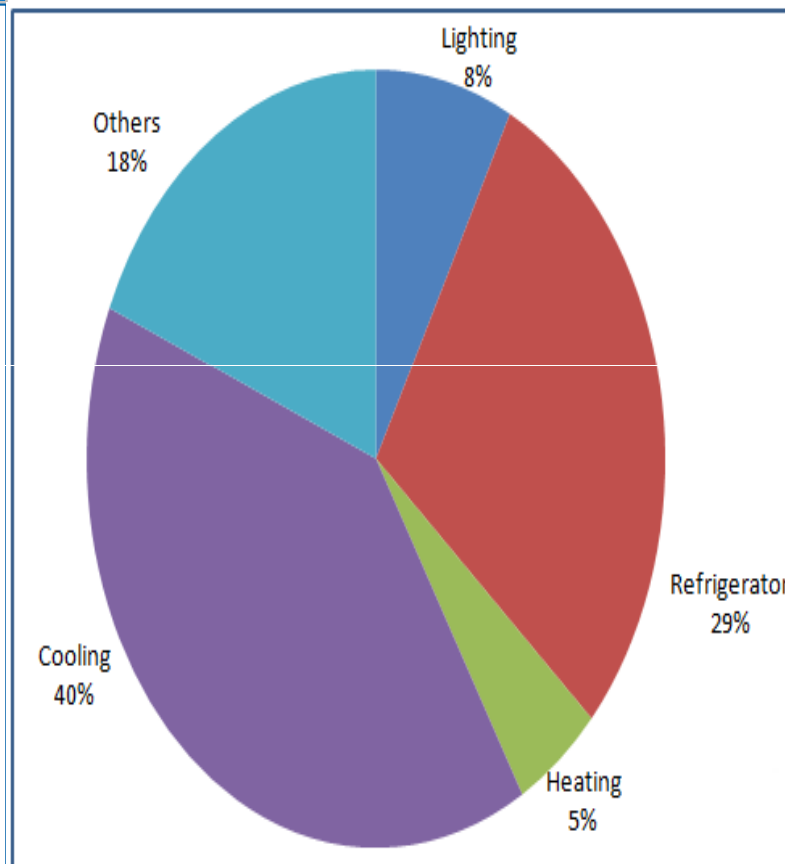
DSM Initiatives at TATA Power Delhi Distribution Ltd.



DSM & EE Initiatives

Load Research

- Load research carried out for residential consumers (10,000)
- Objective: To understand the end energy use & penetration of various brands, appliances among consumers
- Based on the findings, identified following DSM programs :-
 - ✓ Policy advocacy of Gas water Heaters
 - ✓ Appliance Replacement Program for Refrigerators & Air Conditioners
 - ✓ Awareness on Star Rated appliances
 - ✓ Energy Efficient Lighting Programme



Share of End Uses in Annual Consumption for Residential Consumers

DSM & EE Initiatives

Appliance Replacement Programme

- TPDDL in association with BEE and ICF (consultant) developed an Appliance Replacement program for Refrigerators and Air conditioners
- Programme launched in August '12
- Under the scheme, star rated refrigerators and ACs were offered at the discounted rates (against the prevailing Market Operating Prices) & existing appliances were bought back for the safe disposal
- 2 major activities conducted under the project:-
 - ✓ Conduct of Focused Load survey for 1500 Residential, I & C consumers
 - ✓ 12.5 lakhs Pamphlets designed, printed & distributed for consumer sensitization about the Star Rated ACs & Refrigerators

Be wise. Energy wise.

Switch to BEE 4 & 5-star labeled appliances and save money on electricity bills

SPECIAL EXCHANGE OFFER FOR TATA POWER DELHI DISTRIBUTION LIMITED CONSUMERS

Exchange your old* AC and Fridge with new 4 & 5-star labeled ones and start saving money from day one

Old appliances would be disposed off in an environment friendly manner

Scheme valid till : 15 July 2012

Why should I replace?

- After 7 years efficiency of fridge/AC reduces. This means it consumes more electricity to give you same cooling effect.
- A 1.5T 5-star labeled AC consumes about 40% less electricity than your old AC, and saves you about **Rs. 7500¹** in electricity bills annually
- A 230 litres 5-star labeled fridge consumes about 30% less electricity than your old fridge and saves you about **Rs. 2280²** in electricity bills annually

*More than 5 years old non star labeled in working condition

¹Assuming an AC runs for 8 hours a day 7 months in a year.

²Assuming a fridge runs for 365 days a year with compressor cycling of 12 hours.

TATA POWER DELHI DISTRIBUTION LIMITED
(A Tata Power and Delhi Government Joint Venture)

Godrej | **Panasonic**

NAME AND ADDRESS OF THE AUTHORIZED OUTLETS:-

GODREJ :- Harisharan & Sons: KAMLA NAGAR, 14-A, Kamla Nagar, Opp. Birla Mills-110005, 989199444, atul.harisharan@gmail.com • Sargam Electronics: AVANTIKA, Shop no. 3&4, Shopping Centre-1, Sec-1, Avantika, Rohini-110085, 9990049412, rohini@sargam.in • Sargam Electronics: PITAMPURA, 498, Kohat Enclave, Pitampura, Metro Pillar no. 344, 9891415208, pitampura@sargam.in • Sargam Electronics: NARELA, 1981, Railway Road, Near Aggarwal Sweets, Narela-110040, 9891727295 • Sargam Electronics: MODEL TOWN, B-8, Model Town 2-110009, 9540043293 • Dabas Electronics: BAWANA, Main road stand, Bawana-110039, 9212711264 • Vijay Sales: PITAMPURA, HD-2, Near Pitampura Metro stn, Pitampura-110034, 9582221721, rohithalia@vijaysales.com • Vijay Sales: MODEL TOWN, H2, Model Town 3, Near ICICI Bank-11009, 9582221769, rohithalia@vijaysales.com Naveen Electronics: MODEL TOWN, H4/4, Model Town-110007, 9810955577, naveenelectronics@hotmail.com • RS Unique: NARELA, 1, Arya Samaj Road, Narela-110040, 9911011144, parasharelectronics@hotmail.com Vardhman Electronics: ROHINI, Sector-3, Avantika, Opposite Water Tank, Rohini-110085, 9873110850

PANASONIC:- Dolly Electronics: PITAMPURA, 8, Kapil Vihar, Pitampura, opp: metro Pillar 348, Sandeep Rathi-9810155200 • Dolly Electronics: ASHOK VIHAR, C-2/11 PHS- II, Ashok Vihar, Next to Kotak Mahindra Bank, Sandeep Rathi -9810155200 • K Square Network: DWARKA, Plot No-38 Patam Extension Part -1, Rampal Chowk Road Sector- 7 Dwarka, Romy Malhotra-9650566886 • Varindra Refrigeration: ASHOK VIHAR, Deep Market, Ashoka Complex, Ashok Vihar, Varindra Dogra-9310545959 • Shrishti Enterprises: ROHINI, D-17/166, Sec-3, Rohini, Hitesh Juneja-9311302003

DSM & EE Initiatives

Sun Reflect Paints

- TPDDL in association with Dulux launched a discount based scheme for its sun reflect paint range (Weathershield) for TPDDL consumers and employees under which the product was offered at 20% discount through the selected dealer outlets
- Over 12,600 Litres of paint sold under the scheme

THIS SUMMER, REFLECT THE SUN TO SAVE 15% ON POWER!

Encourages the usage of sun reflective paints to save electricity by reducing the temperature of walls by up to 5 degrees*

20% DISCOUNT
ON DULUX WEATHERSHIELD SUNREFLECT RANGE OF PRODUCTS

25% DISCOUNT
ON DULUX EXPERT PAINTING SERVICE

REDEMPTION PROCEDURE

- Applicable for all TATA Power-DDL consumers in Delhi
- Avail these offers by presenting any electricity bill for the year 2012, before August 2012
- Scheme is applicable on MRP only
- This consumer offer on paint products is valid up to a maximum of 200 litres of product only

*As tested by SGS Singapore. *WeatherShield can reflect infrared rays by up to 90% higher as compared to regular exterior paints & has been certified by the Centre For Energy Studies and Research (CESRI).

AUTHORIZED DULUX DEALERS

Address: 10001, 10002, 10003, 10004, 10005, 10006, 10007, 10008, 10009, 10010, 10011, 10012, 10013, 10014, 10015, 10016, 10017, 10018, 10019, 10020, 10021, 10022, 10023, 10024, 10025, 10026, 10027, 10028, 10029, 10030, 10031, 10032, 10033, 10034, 10035, 10036, 10037, 10038, 10039, 10040, 10041, 10042, 10043, 10044, 10045, 10046, 10047, 10048, 10049, 10050, 10051, 10052, 10053, 10054, 10055, 10056, 10057, 10058, 10059, 10060, 10061, 10062, 10063, 10064, 10065, 10066, 10067, 10068, 10069, 10070, 10071, 10072, 10073, 10074, 10075, 10076, 10077, 10078, 10079, 10080, 10081, 10082, 10083, 10084, 10085, 10086, 10087, 10088, 10089, 10090, 10091, 10092, 10093, 10094, 10095, 10096, 10097, 10098, 10099, 10100

LED Bulbs for TPDDL consumers

- TPDDL in association with 2 LED manufacturers launched a discount based scheme where 7 W LED bulbs would be offered at Rs. 349 (MRP:Rs.450) with 3 years warranty
- Over 3500 Bulbs sold under the scheme

DSM & EE Initiatives

LED- Outdoor & Indoor applications

Initiative	Description	Savings
<ul style="list-style-type: none"> Advertising hoardings 	Replacement of Metal Halide Lamps with LED fixtures	Over 60 % reduction achieved in Energy Load
<ul style="list-style-type: none"> Street light fixtures 	Replacement of HPSV Lamps with LED fixtures(18 nos)	
<ul style="list-style-type: none"> T12/T8 tube lights 	Replacement of conventional T12/T8 tube lights with LED tube lights at corporate office (351 nos)	



DSM & EE Initiatives

Launch of DSM Portal on TPDDL website

- Online DSM portal has been developed and uploaded on the TPDDL website in order to create an updated and user friendly knowledge database on the Demand Side Management related activities.
- Over 4000 hits have been registered so far (Launched in last week of November,2012)



Financial Environment -DSM

- DERC as per the tariff order FY(2009-10)directed Discoms to create dedicated DSM & EE cell; DSM & EE cell formed in April 2009
- Since 2009,no scheme/budget has been approved by DERC under DSM head; Budgetary support is required to develop and launch incentive based large scale DSM Programmes

AMI based Auto Demand Response project

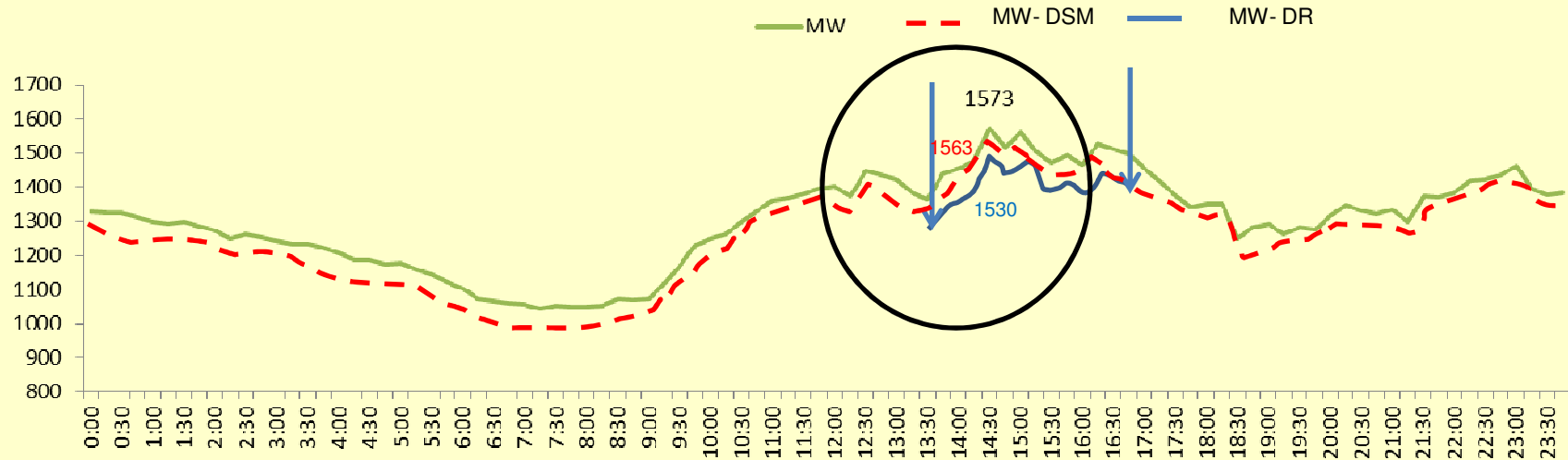
- First Utility initiated AMI based ADR program in the country
- Project approved by DERC
- Project Objectives:
 - To manage peak demand
 - To manage Grid Stress situations
- Project Components include :
 - Automated Demand Response infrastructure including DR server and site controllers
 - Smart Meters
 - RF Mesh based Communication
 - MDMS and its integration with other OT & IT systems like OMS, SAP, ADR.
- Collaborative partnership with selected vendors
- Project being undertaken to demonstrate:
 - technological capability
 - understand customer behavior
 - Case study for regulator to work on differential tariffs and financial incentives.
 - Processes required for scaling up



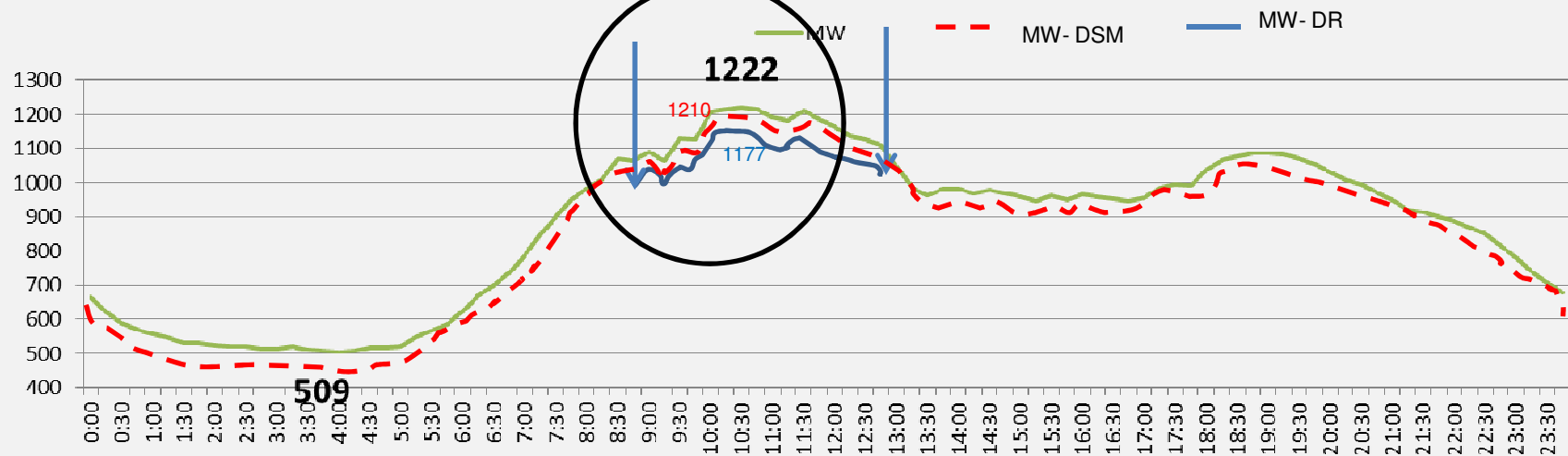
Peak Load Management through DSM & Demand Response



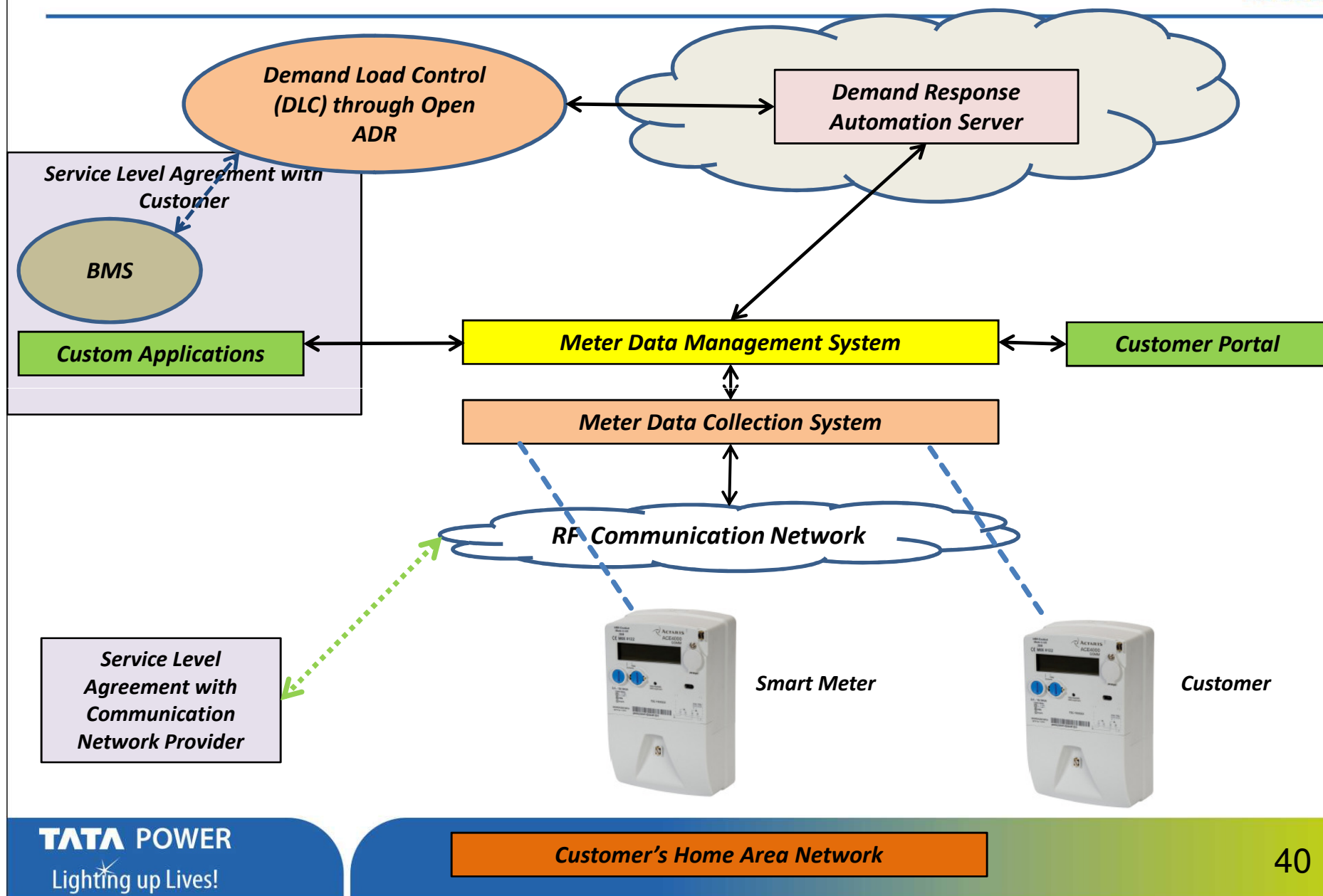
Typical Summer Peak Load Curve-TPDDL 02-Jul-2012



Typical Winter Peak Load Curve-TPDDL 08-Jan-2013



AMI based ADR- Integrated Architecture



**“Journey Continues..
We value your inputs, suggestions and
critique.”**

We take pride in Lighting up Lives!

Website: www.tatapower.com

Email ID: sdkhadilkar@tatapower.com