

CII National Award for Excellence in Energy Management 2021

BSES Rajdhani Power Limited
August 2021

Table of Contents

- Brief Introduction on Company
- Energy Sales/Demand Overview
- AT&C Losses
- T&D Losses
- ACS – ARR GAP
- Energy Savings/DSM projects
- IT Initiatives
- Innovative Projects Implemented
- RE Purchase & RPO Purchase
- Team Work, Employee Involvement & Monitoring
- Other Innovative DSM Projects Implemented
- Competition

BSES Rajdhani Power Limited

BRPL is the largest Discom in Delhi, covering 750 sq. km of area (west and south) with a population density of 3,540 per sq. km. It is a joint venture between Government of Delhi (49%) and Reliance Infrastructure Ltd (51%). It caters to more than 2.65 million customers.

Our vision:

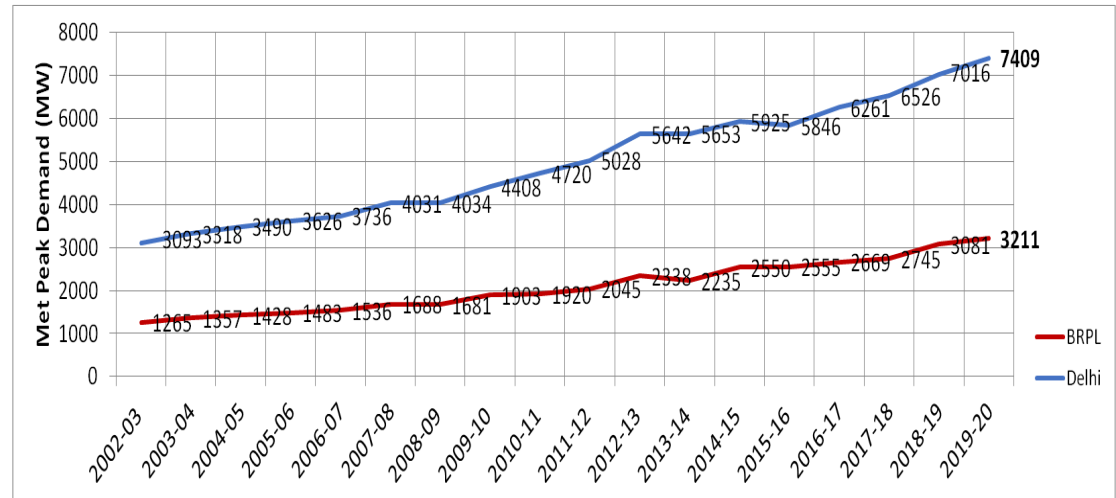
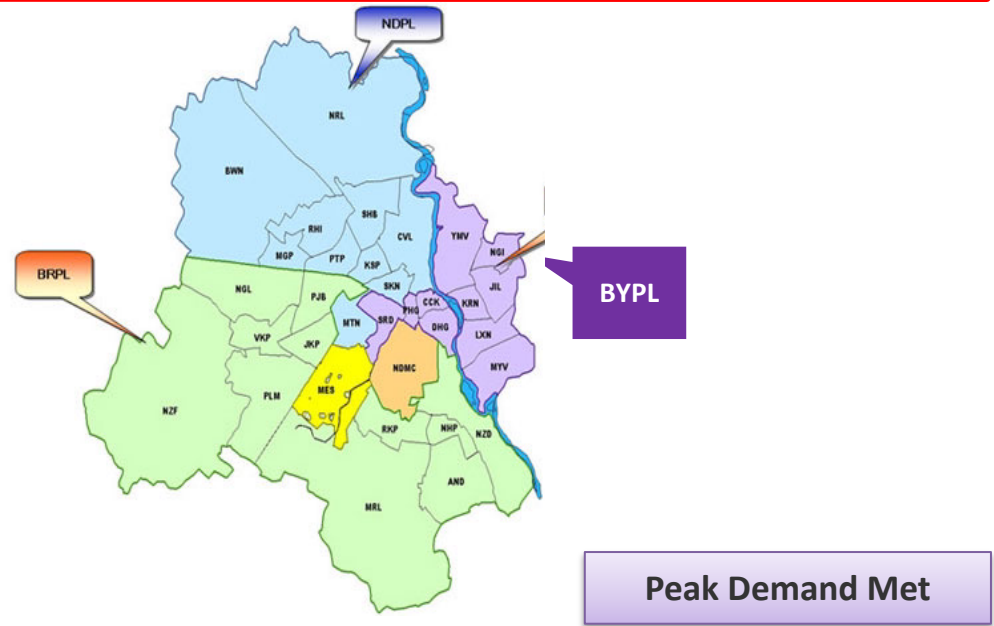
- To be amongst the most admired and most trusted integrated utility companies in the world.
- To deliver reliable and quality products and services to all customers at competitive costs, with international standards of customer care,- thereby creating superior value for all stakeholders.
- To set new benchmarks in: standards of corporate performance and governance, through the pursuit of operational and financial excellence, responsible citizenship, and profitable growth.

Our mission:

- To attain global best practices and become a world-class utility.
- To provide: uninterrupted, affordable, quality, reliable, safe, and clean power to our customers.
- To achieve excellence in: service, quality, reliability, safety, and customer care.
- To earn: trust and confidence of all customers and stakeholders by exceeding their expectations, and make the company a respected household name.
- To work: with vigour, dedication, and innovation keeping total customer satisfaction as the ultimate goal.
- To consistently achieve: high growth with the highest levels of productivity.
- To be: a technology driven, efficient, and financially sound organization.
- To be a responsible corporate citizen nurturing human values and concern for society, the environment and above all, people.
- To contribute: towards community development and nation building.
- To promote a work culture that fosters: individual growth, team spirit, and creativity to overcome challenges and attain goals.
- To encourage: ideas, talent, and value systems.
- To uphold the guiding principles of: trust, integrity, and transparency in all aspects of interactions and dealings.

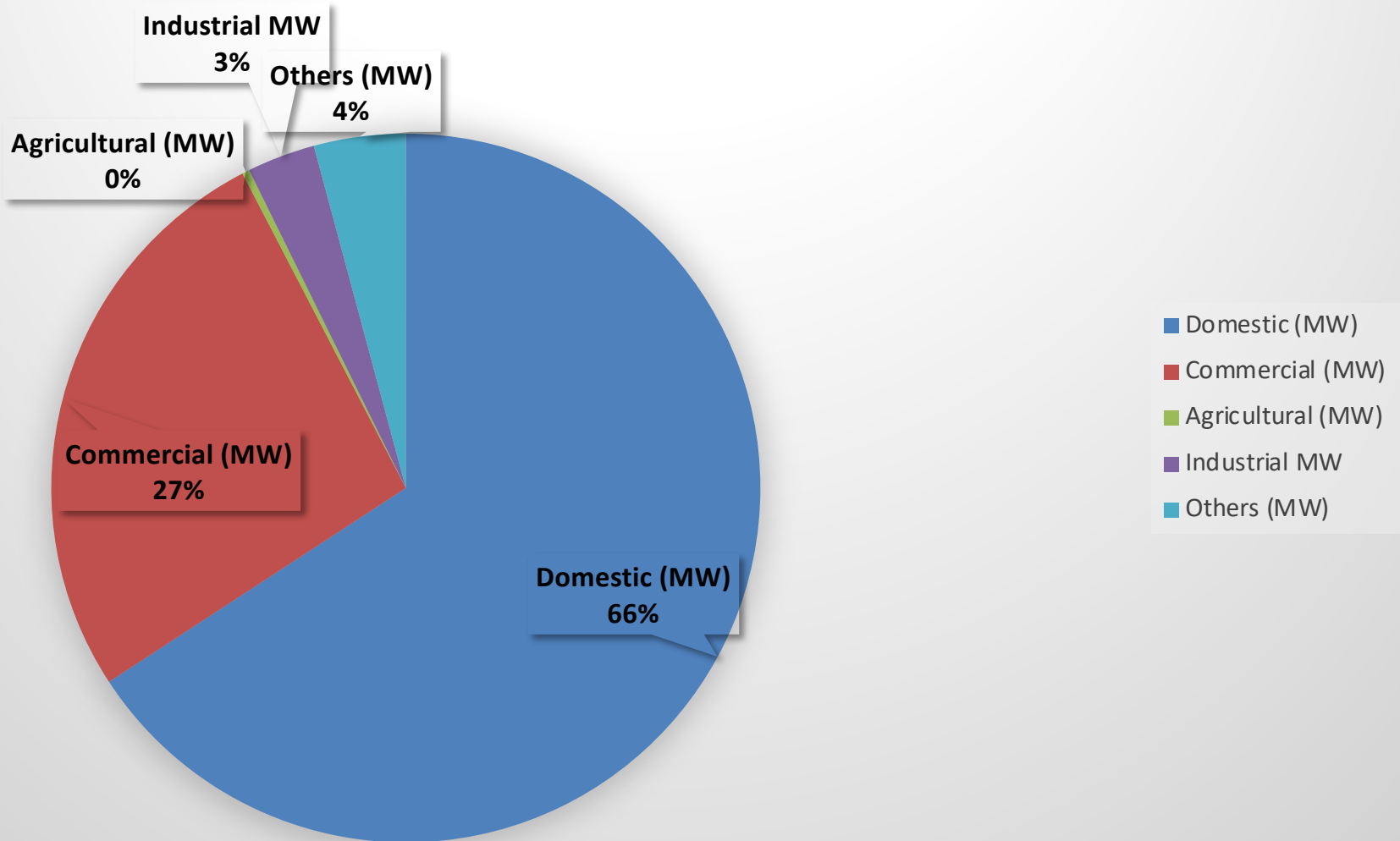
BRPL at a glance – FY 19-20

Circles	17 Nos
Divisions	22 Nos
Distribution Area	750 sq. Km
No. of customers	2.65 Million.
Customer Density	3540 /sq Km
Max Demand met (Till Date)	3211 MW
Annual Billed energy FY19-20	12,549 MU
AT&C Loss FY19-20	8.52 %
Grid Count	42 Nos
Power Transformers	269 Nos
11 KV Substations	9880 Nos
EHV Feeders	253 Nos
HT Feeders	1593 Nos



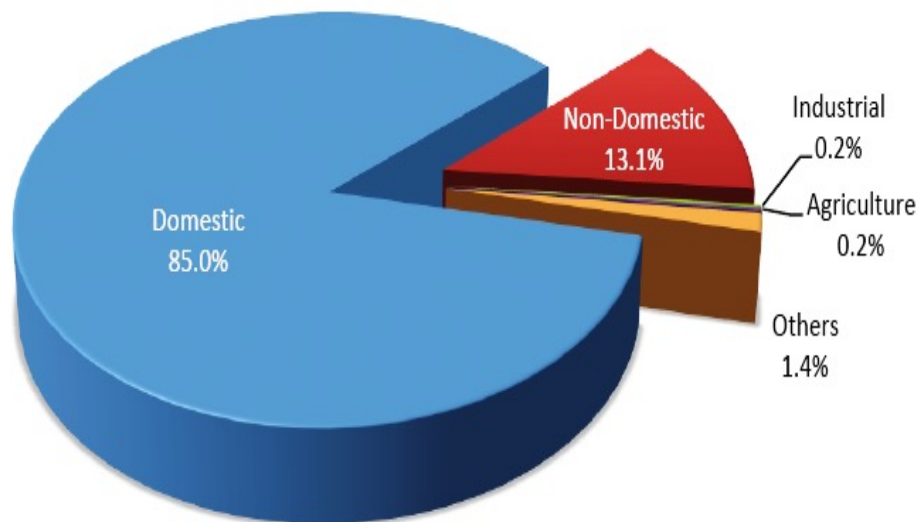
BRPL Consumer Sanction Load

Sanction Load (MW) - 9343 MW



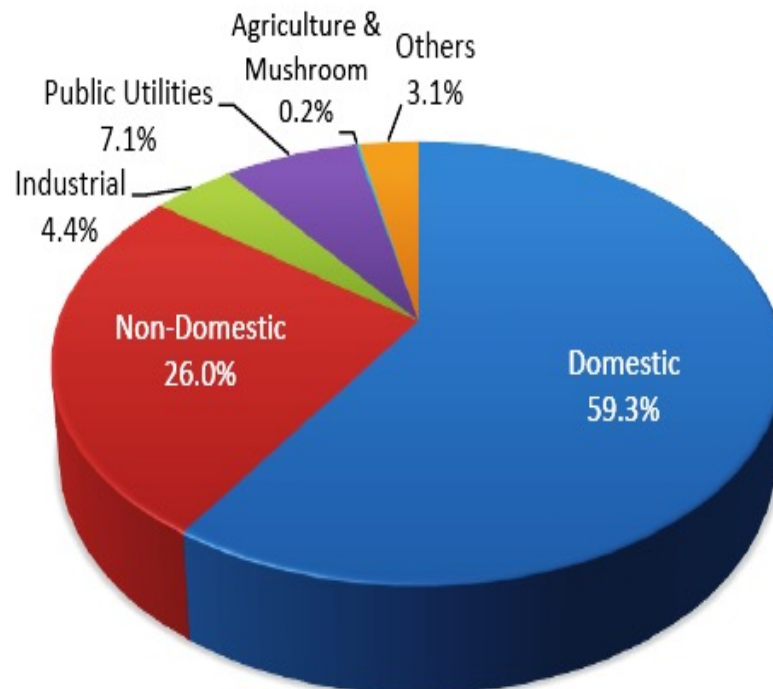
Consumer mix of BRPL – FY 19-20

% by No of Consumers



Source: DERC Tariff Order F.11/DERC/2019-20

% by Energy Sales



Source: DERC Tariff Order F.11/DERC/2020-21

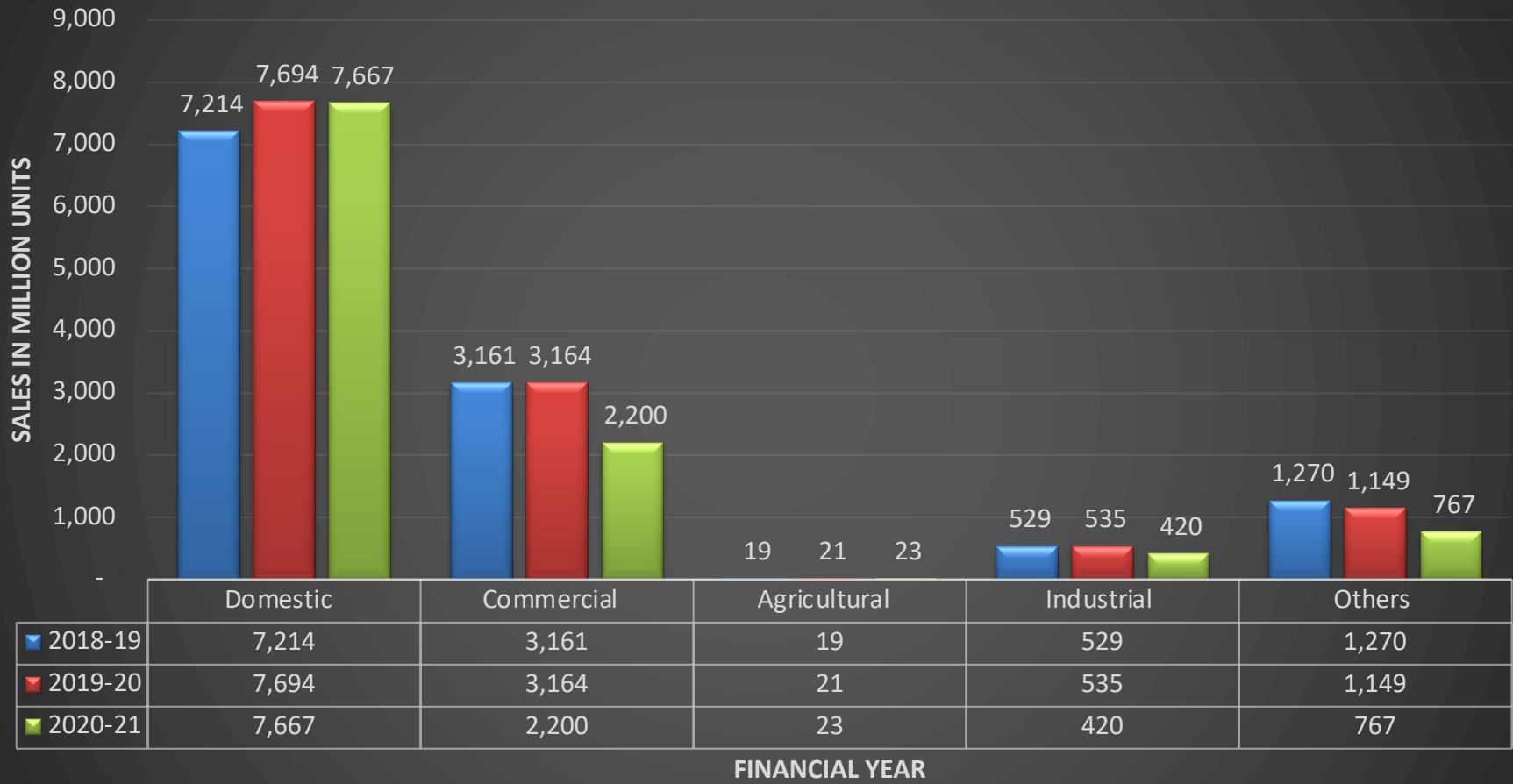
Domestic load contributes 59.3% of consumption

Energy Sales and Demand Overview

PARAMETERS	UOM	2018-19	2019-20	2020-21
Energy purchased	MUS	13238	13488	11933
Annual Energy Sale	MUS	12167	12549	11077
Total Consumer	No.	2555640	2654698	2739360
Total Area	Sq.km	750	750	750
Consumer density	No./ Sq km	3408	3540	3652
Per Capita Consumption	kWh/year	4761	4727	4044
Maximum Peak Load	MW	3081	3211	2815
Minimum Peak Load	MW	449	476	461
Average Peak Load	MW	1557	1586	1415

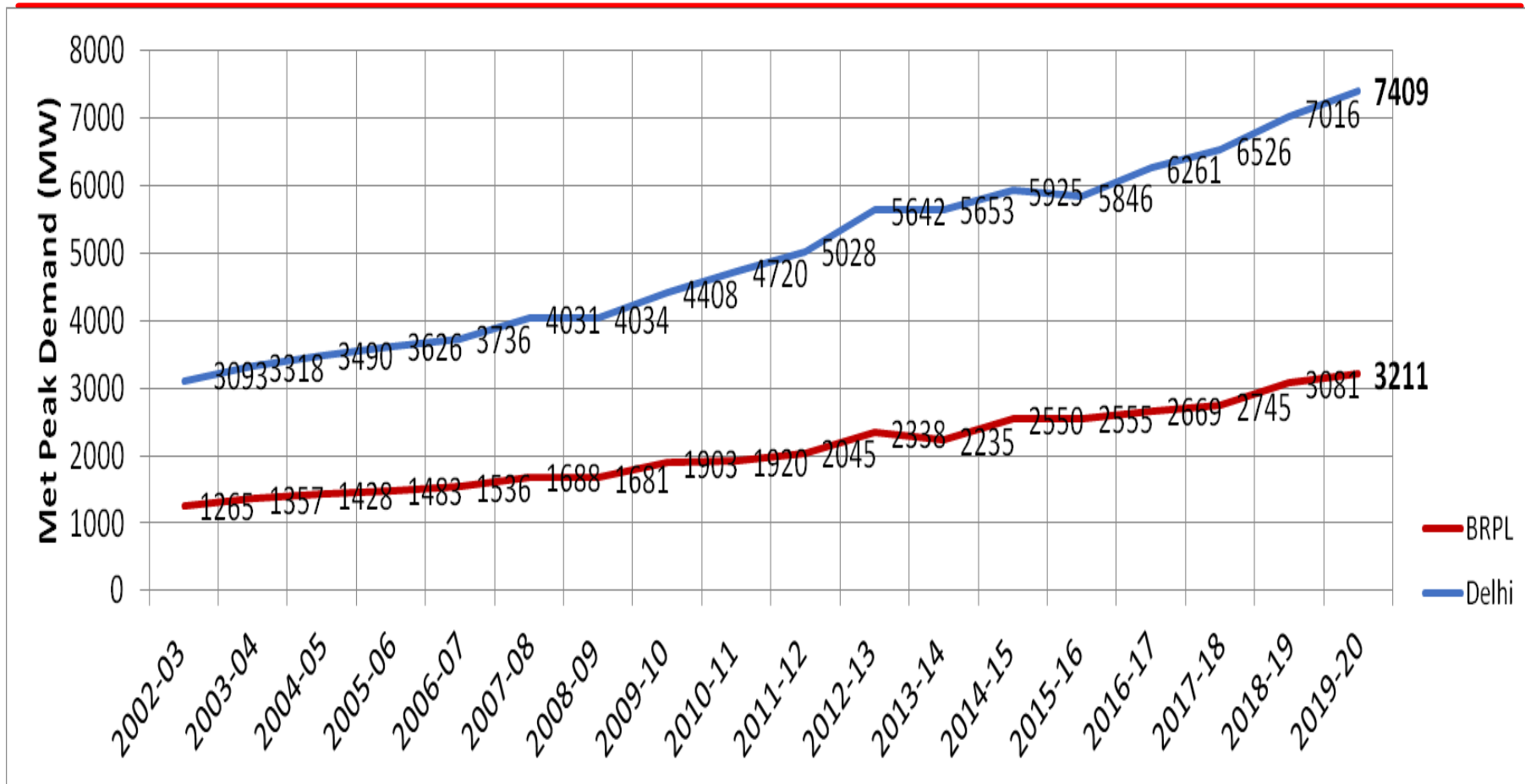
BRPL - Category Wise Sales

Category Wise Sales - BRPL



■ 2018-19
 ■ 2019-20
 ■ 2020-21

Peak Load Demand of Delhi and BRPL:

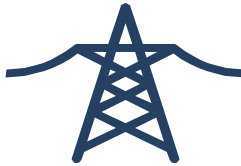


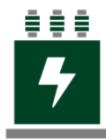


BRPL peak demand touched 3211 MW on Jul 2, 2019 at 22:16:20 hrs

Operational Parameters by BRPL

Parameters	Unit of Measurement	2018-19	2019-20	2020-21
Total no of interruptions	Nos	6722	3189	2444
Interruption Duration	Hrs	8203	2074	1734
Total Consumer	Nos	2555640	2654698	2739360
SAIFI	%	9.03	5.08	4.86
SAIDI	MNS	568.8	196.2	146.4
Reliability Index	MNS	99.89%	99.96%	99.97%

Performance Parameter by BRPL

Parameters	FY 18-19	FY 19-20	FY 20-21	Reasons for Variations
 AT&C Losses	7.90%	8.52%	6.87%	<i>COVID-19 Impact in FY 20 & FY21</i>
 ACS ARR GAP	-0.66 Rs/Unit	-1.25 Rs/Unit	-1.18 Rs/Unit	<i>COVID-19 Impact in FY 20 & FY21</i>
 Collection Efficiency	100.20%	98.33%	100.32%	<i>COVID-19 Impact in FY 20 & FY21</i>
 T&D Losses	8.09%	6.96%	7.17%	<i>COVID-19 Impact in FY 20 & FY21</i>

Energy Savings Projects Implemented FY 2018-19

Title of Project	Annual Electrical Saving (MWh)	Annual Electrical Cost Saving (₹ in million)	Investment Made (₹ in million)	Payback (Months)	Comments
Improvement in metering systems	191697.67	1437.7	6067.2	50 Months (for DISCOM)	Savings due to individual efficiency improvement measures cannot be segregated
System Improvement and automation					
Installation of Smart Meters					
Billing and ERP Systems technical and functional upgradation					
Distribution of LED Bulbs	9358.14	47.35	1.68	1 Month (for Consumer)	Saving is expected in form of reduction of power purchase quantity including T&D loss
Distribution of LED Tube lights	13.95	0.07	0	8.5 Month (for Consumer)	
Distribution of Energy Efficient Fans	86.04	0.44	0	18 Months (for Consumer)	
Replacement of old AC with 5 star rated Energy Efficient AC	2569.77	13.02	0.61	56 Months (for Consumer)	AC Replacement Scheme is started in May 2018 and savings is expected in form of reduction of power purchase quantity including T&D loss

Energy Savings Projects Implemented FY 2019-20

Title of Project	Annual Electrical Saving (MWh)	Annual Electrical Cost Saving (₹ in million)	Investment Made (₹ in million)	Payback (Months)	Comments
Improvement in metering systems	147093.02	1045.8	6700.8	77 months	Savings due to individual efficiency improvement measures cannot be segregated
System Improvement and automation					
Installation of Smart Meters					
Billing and ERP Systems technical and functional upgradation					
Distribution of LED Bulbs	8837.21	44.9	0	1 Month(for Consumer)	Saving is expected in form of reduction of power purchase quantity including T&D loss
Distribution of LED Tube lights	66.28	0.33	0	8.5 Month (for Consumer)	
Distribution of Energy Efficient Fans	44.19	0.23	0	18 Months (for Consumer)	
Replacement of old AC with 5 star rated Energy Efficient AC	2151.16	10.9	12.2	56 Months (for Consumer)	AC Replacement Scheme was available till Sep, 2019 and savings is expected in form of reduction of power purchase quantity including T&D loss

Energy Savings Projects Implemented FY 2020-21

Title of Project	Annual Electrical Saving (MWh)	Annual Electrical Cost Saving (₹ in million)	Investment Made (₹ in million)	Payback (Months)	Comments
Distribution of LED Bulbs	669.35	3.36	0	1 Month(for Consumer)	Saving is expected in form of reduction of power purchase quantity including T&D loss
Distribution of Energy Efficient Fans	489.37	2.46	0	18 Months (for Consumer)	
Replacement of old AC with 5 star rated Energy Efficient AC	1774.65	8.9	12.2	56 Months (for Consumer)	
Improvement in Metering System	126180.5	229	238.1	12.5	

DSM Initiatives Implemented FY 2018-21

DSM Initiative	Impact on DISCOM	Impact on Consumer
<p>Behavioural Energy Efficiency (BEE) Program –</p> <p>BRPL had launched India’s first Behavioral Energy Efficiency (BEE) program in association with Oracle utilities. As part of a pilot project covering 2 Lakhs consumers in South and West Delhi, insights on how energy is used at homes are being analyzed and generation of individual customized Home Energy Reports is being undertaken.</p>	<ul style="list-style-type: none"> • The Annual savings at Discom periphery due to implementation of BEE program is 2.24MUs. • Experience from other HER programmes globally shows that behavior-based energy savings typically take some time to build. • Saving potential at Discom periphery is 8.29 MUs with 2 Lakhs Consumers 	<ul style="list-style-type: none"> • Empower consumers to save money on their energy bills (2.104 MUs annually). • Promote domestic consumer energy literacy and energy efficiency, as well as encourage participation in other DSM programs. • Saving potential at consumer end is 7.7 MUs with 2 Lakhs Consumers.

DSM Initiatives Implemented FY 2018-21

DSM Initiative	Impact on DISCOM	Impact on Consumer
<p>Energy Wise Energy Rise (EWER) Campaign – BSES Rajdhani Power Ltd and The Energy and Resources Institute (TERI), launched a new energy education initiative called “Energy Wise Energy Rise” in collaboration with the Directorate of Education, (DOE) Delhi in March 2018. The program will educate, train and reach out to around 90,000 students across 300 government schools. This program is designed to strengthen informal energy education training and project participation in Delhi government schools.</p> <p>EWER is one of the biggest energy conservation campaigns in India dedicated to promoting energy efficiency and sustainable living in Delhi's government schools.</p>	<ul style="list-style-type: none"> ● This Program emphasizes on promoting energy literacy through education and outreach initiatives through a variety of formal and informal settings. ● The programme ‘Energy Wise Energy Rise’ aims to build competencies and skill sets amongst students, teachers and the general mass on sustainable practices that will help the environment. 	<ul style="list-style-type: none"> ● In two years, EWER has covered 200 schools and reached out to around 60,000 students through distribution of customized project books, and it has also conducted comprehensive energy-awareness classroom workshops for the students; holistic development. ● An energy literate citizen can not only trace energy wastage and think in terms of energy systems, but also knows how much energy they use, for what purpose and where the energy comes from.

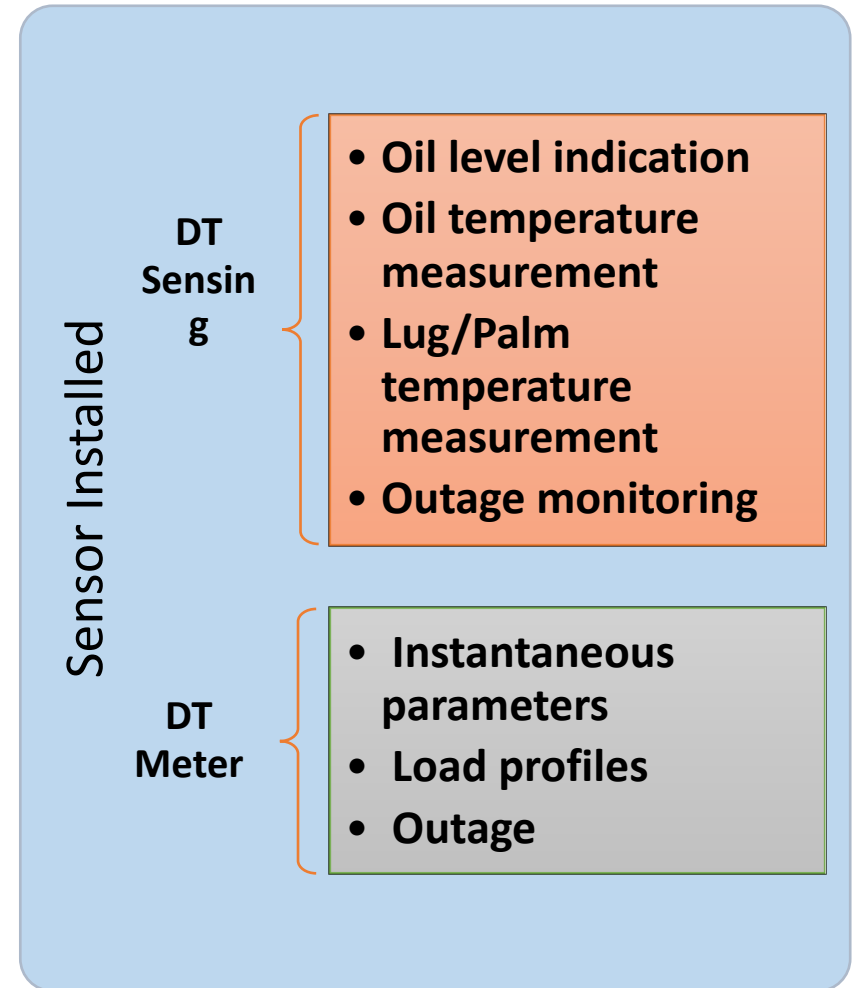
IoT based DT Sub-Station Health Monitoring

Project Overview

- ❑ Deployment of IoT based solution on 104 no. DTs in a confined Project Area of BRPL
- ❑ 24*7 Monitoring of Distribution Sub-stations Assets
- ❑ Risk & condition-based monitoring through Real-time information from a combination of 'On-asset' deployed sensors, advanced meter data infrastructure
- ❑ Web-Dashboard & Field force application deployed

Project Objectives:

- ✓ DT failure reduction through Condition based Maintenance
- ✓ Continuous Asset Monitoring
- ✓ Real-time Info & Alert Notifications
- ✓ Continuous Asset Data Capturing for Relational Analytics
- ✓ Field Staff Awareness of Equipment Condition/Health/Risk
- ✓ Automatic Maintenance Work-Orders triggered by Events



DT Automation Project in Mukherjee Park: Outcome

- **53% Reduction in DT failure:** FY 19-20 (7 nos) wrt FY 18-19 (15 nos). DT failure due to Oil theft reduced to 1 no. for FY 19-20 against 4 nos in FY 18-19. In addition to this, 9 nos DT in FY 19-20 being saved from failure due to proactive actions on alerts.
- **No RMU failure:** Due to real-time alerts of any DT outage, the practice of performing unnecessary RMU operations by field LM team are reduced. As a result of limited and cautious operations of RMU, RMU failure is NIL in FY 19-20 wrt 4 nos in FY 18-19
- **36% Outage reduction:** Reduction of 36% in duration & 22% in Interruption count during FY19-20 wrt FY18-19
- **Attending Oil Leakage events in 24 DTs:** Oil Leakage events attended based on Low / Critical Oil level alerts
- **Periodic Load Unbalancing actions on >25% DT**
- **Action on Hot Spots at LT bushings in 11 DT:** Alerts are generated for High Lug temp events with temperature more than 80 Deg C
- **Load optimization through load shifting to nearby DT/SStn:** Based on the real-time loading of DTs, load shifting is being done to ensure the optimum loading on DT.

System successfully handed over to Sub-Div (O) Mukherjee Park during LY

FY 19-20: Amount saved after Automation ~ Rs 65-70 Lacs (Project Cost: Rs 50 Lacs)

RE Purchase & RPO Purchase

Renewable energy purchase from Wind/Solar PV

	Annual Energy Purchased in millionkWh – 2018-19	% Share	Annual Energy Purchased in millionkWh - 2019-20	% Share	Annual Energy Purchased in million kWh -2020-21	% Share
Non solar (Wind, Waste to Energy & small hydro)	551	5.2	286	2.6	704	7.4
Solar Pho	75	0.7	97	0.9	160	1.7
Others#	10661		10889		9498	

RPO Targets	2018-19	2018-19	2019-20	2019-20	2020-21	2020-21
	Target given (%)	Achieved (%)	Target given (%)	Achieved (%)	Target given (%)	Achieved (%)
Solar	4.75	0.7	6.75	0.9	7.25	1.7
Non Solar	9.50	5.2	10.25	2.6	10.25	7.4

Team Work, Employee Involvement & Monitoring

➤ Roles & Responsibilities of Energy Manager /DSM Cell

- To describe energy auditing and routine data collection and monitoring, and to indicate their benefits.
- Planning DSM Activities, DSM Budget and Monitoring of DSM Activities.
- To introduce the concept of demand-side management for residential, commercial and industrial energy users.
- Submission of Quarterly and Annual DSM Report to Bureau of Energy Efficiency.
- Submission of annual audit reports to Bureau of Energy Efficiency

➤ Schemes / Measures Done for Engaging General Consumers for Demand Reduction / Energy Efficiency

- Consumer awareness sessions are organized on Energy awareness and Energy efficiency initiatives.
- Energy efficiency schemes are circulated along with bills to reach maximum no. of consumers.
- Energy efficiency schemes are promoted through SMS Blasts, Radio jingles to reach masses.
- A dedicated whatsapp helpline is made available only for Energy efficiency schemes to help consumers to address their queries and to help them from time of registration to installation of energy efficient appliances.

Team Work, Employee Involvement & Monitoring

- **Details of Monitoring & Reporting System / Methodology Employed by the Unit for Review of Performance & Consumption**
 - Calculation of T&D loss based on input energy of DISCOM and billed units to the consumers.
 - Submission of PAT Form – 1 to Bureau of Energy Efficiency (BEE) on annual basis.
 - For Energy Efficient schemes like AC Replacement Scheme following methodology is adopted – Annual Energy consumption before installation of 5 star AC and after installation of AC are compared on random basis.(Annexure shared)
 - Submission of Mandatory Energy Audit Report along with Form – 2 to State Designated Agency and Bureau of Energy Efficiency (BEE).
 - Monitoring & Verification Audit by Empanelled Accredited Energy Auditing firm (EmAEA)
- **Frequency of Review of Performance & Consumption**
 - Weekly review meetings of the DSM Department
 - Monthly MIS review of vendors regarding installation of 5 Star AC and Super Energy Efficient AC and distribution of LED bulbs and LED tube lights
- **Measures done for own employees**
 - Internal training programs are organized to explain various energy efficient programs and initiatives taken under the DSM programs.
 - External training programs are organized for employees about new technologies like ECBC Code, EHV line inspection through drones, etc.

Innovative Projects implemented

- **Behavioural Energy Efficiency (BEE) Program**
- **Automated Demand Response (ADR) Pilot Project**

Behavioural Energy Efficiency (BEE) Program

Name of the Project	Brief description on why innovative (within 450 Characters)	Reason To Choose (within 450 Characters)	Annual Energy Savings, Million Units / year	Annual Savings, ₹ Million / year	Investment , ₹ Million / year	% Replication potential in other DISCOMS
Behavioural Energy Efficiency (BEE) Program	BRPL had launched India's first Behavioral Energy Efficiency (BEE) program in association with Oracle Utilities As part of a pilot project covering 2Lakhs customers in South and West Delhi, insights on how energy is used at homes are being analyzed and generation of individual customized Home Energy Reports (HER) is being undertaken.	HERs are customized, personalized behavioural insights which are being sent to each of those households talking about their consumption pattern in comparison with their peers in similar households and ideal households using big data analytics.	2.24	11.37	8.38	BEE program is highly scalable, promotes uplifts of other Energy Efficiency Programs, increase in high customer satisfaction.

India's First Utility Scale Home Energy Report

1 HIGHLIGHTS EFFICIENT HOMES

The concept of an efficient home in South and West Delhi is easy to understand with these simple charts and illustrations.

2 FEATURES OPPORTUNITIES TO SAVE

BRPL promotes the use of a localized Home Energy Analysis tool that helps improve the accuracy of this data and helps their customers identify additional opportunities for energy conservation and cost savings.

3 THE MOST RELEVANT TIPS

Energy efficient tip content is prominently featured and delivered in large visual formats. These tips are relevant to the region, visually appealing, and help drive Delhi's customers to take necessary action.



POWERING DELHI.
EMPOWERING CONSUMERS
BSES Rajdhani Power Limited
BSES Bhawan, Nehru Place
New Delhi - 110 019

Mr ARVINDER SINGH
D-69 S/F
TAGORE GARDEN EXTN
WALKING SEQUENCE: DRND2009A1AB
NEW DELHI 110027

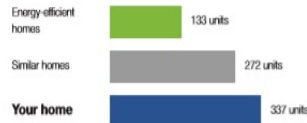
Mr JOHN DOE
D-XX S/F
TAGORE GARDEN EXTN
WALKING SEQUENCE: DRXXXXXXX
NEW DELHI XXXXXX

Home Energy Report
22 January, 2020
CA No. : 150782549

Welcome to your Home Energy Report. Discover how your home is using energy with these personalised reports and exclusive online tools.

Learn more about your use at
www.bs 150XXXXXXX

How you're doing in comparison



You're using more than similar homes.

24% more electricity than similar homes

24 Dec, 2019 - 22 Jan, 2020

This is based on 85 homes like yours. Energy-efficient homes are the 20% who use the least amount of electricity. See back for details.

How are you using electricity?

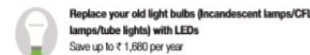
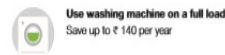


See what uses the most energy in your home

Take a quick online Home Energy Analysis to understand more about how you consume electricity.

Log in to take the survey now at www.bsesdelhi.com/group/brpl/hea

Tips from efficient homes



Turn over →

110/100 BSES-20190000-04 BSES, BSNL, NPL, STC (E&M), BSNL, NPL, BSNL, STC/MSD/01-1-2020

SIMILAR HOMES LANGUAGE

BRPL's customers know how they're doing in comparison to similar homes in their vicinity. This comparison helps motivate BRPL's customers to change their energy-use behaviour.

MEASURES, ESTIMATES & MORE

The back page of the report features additional recommendations including energy conservation measures, and the featured tip savings estimates, use in-country data.

Save on your next bill



Choose BEE star labeled BLDC ceiling fans or super-efficient ceiling fans

Your ceiling fan is likely to be ON for long periods of time during summers and monsoons. Therefore, choose a BEE star labeled ceiling fan to reduce energy usage while staying cool.

Get the installation done by an experienced electrician. When choosing the fan, ask the electrician to consider the room size, maximum number of occupants in the space, ceiling height, blade size and airflow rate.

Save up to ₹ 3,700 per year



Automated Demand Response (ADR) Pilot Project

Name of the Project	Brief description on why innovative (within 450 Characters)	Reason To Choose (within 450 Characters)	Annual Energy Savings, Million Units / year	Annual Savings, ₹ Million / year	Investment, ₹ Million / year	% Replication potential in other DISCOMS
Automated Demand Response (ADR) Pilot Project	This is the first time that automated control of consumer loads / energy assets has been demonstrated in any utility company in India and it is also first project where residential consumer participated in ADR Program. Implemented ADR is "Opt in – Opt Out" that is participating consumers can event switch ON their electrical load during the event. Total 22 consumers participated in pilot	To demonstrate technical and operational feasibility of conducting ADR with residential and C&I consumers using novel GridSync tool to study consumer behaviour during demand response events using data analytics. In the first phase Smart plugs were used to automatically change the temperature set points for AC's, or to switch them off and in second phase where Load Shifting strategy was demonstrated with Geyser loads	702.58 units for 3 months for 22 consumers	0.004 Million for 3 months	3 lakhs	The program is scalable and can be deployed easily in other DISCOMS

Automated Demand Response (ADR) program

- ❑ **Auto Demand Response (ADR) means** customers changing their electricity usage (typically reducing use or shifting use to other times in the day) in response to economic incentives, price signals, or other conditions.
- ❑ Effective Auto demand response programs provide various economic and environmental benefits **on a self-sustainable basis**.
 - ✓ Avoiding the purchase of high-priced energy and network augmentation cost
 - ✓ Providing greater reliability to the grid, which helps prevent blackouts
 - ✓ Avoiding the consumption of fossil fuels which can damage the environment
 - ✓ Help in RE integration and help deal with high load ramp rate due to Duck Curve phenomenon
- ❑ Participating Consumer gets incentive for the load reduction during the DR event

ADR shall serve as one of the viable Non-Wired Alternatives (NWAs) due to unique nature of demand curve

ADR POC Program

- Total Number of Participated Consumers:22
- Automated Demand Response program was successfully demonstrated in summer for peak shaving of AC loads with
 - ❖ Temperature control (by using IR blasters) - by increasing the participating consumers AC set point to 27° C and the AC temperature normalizes to 24° C after the completion of event
 - ❖ Switch Off the appliance (AC) of the participating consumers through Smart Plug .
 - ❖ The participating consumers can exercise the manual '**override**' option to switch ON their AC during the course of an event through smart switch application where they had indicated to participate in the Peak Shaving event or Load shifting of Geyser loads using smart plugs
- ADR program is demonstrated in winter by shifting the water heating loads (geyser loads) to early morning hours using smart plugs without affecting the consumer comfort as water heating loads are main contributors for peak load.
- Industrial consumers are participated in only peak shaving events.

❖ **Relief Offered**

Upon completion of the Automated Demand Response (ADR) POC, we have analysed the DR event data for summer (August & September) and winter (December & January) months.

- Number of Events :5169
- Actual Relief (KW):1005.63
- Energy Savings (KWh): 652

Competition

We are leading discom at Single digit Loss level as compared to all discoms where loss levels is more than 15 % with 100 % collection efficiency.

Diverse pool of resources from NTPC, Power Grid, CESC ,Tata power ,Infosys, Adani Power Discom for sustainability of business. etc

Thank You...

Website : www.bsesdelhi.com