



# TATA POWER DELHI DISTRIBUTION LIMITED



(A JOINT VENTURE OF TATA POWER AND GOVT. OF  
NCT DELHI)

## 2017 ESMAP KNOWLEDGE EXCHANGE FORUM

“Transition from traditional Discom to Smart Utility.”

**Praveer Sinha,**  
CEO & MD  
Tata Power Delhi Distribution Ltd.

# Perceptible Change

*Then*



# Perceptible Change



TATAPOWER-DDL

Then



# Perceptible Change



TATAPOWER-DDL

*Then*





***Installation of Latest Substations, Circuit Breaker etc. along with Network Revamping***

## Metering, Billing & Collection System



Mobile App



Instant Connection



Video Conference



SMS based pull services



Automatic Payment Machines ~6700 pyt avenues



Spot Billing



Integrated Web Services



Smart Revenue Recovery Device

## Integrated GIS-OMS-SCADA-CRM



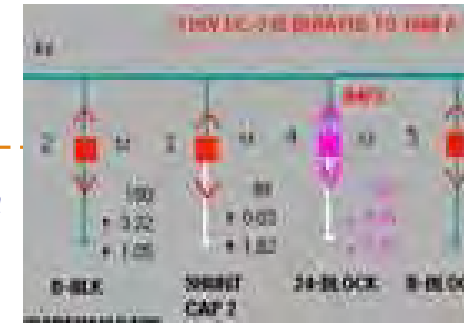
*Details of the customer & Customer Count*

**GIS**



*Information of an Outage*

**OMS**



**SCADA**

*Details like repair history, Crew comments, ETR also visible at SAP-CRM*



*Outage status updated on TPDDL website with estimated time of restoration*



**SAP - CRM**



*Interactive Voice Response(IVR) system*

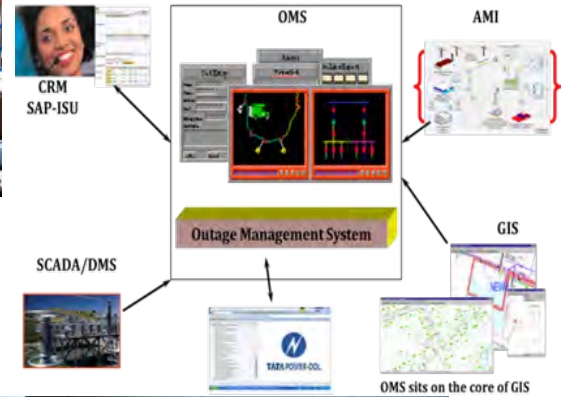
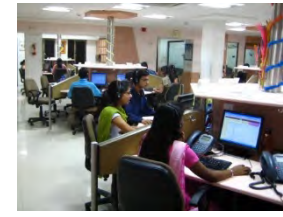
# Initiatives @ Tata Power-DDL

Our Leverage....



TATA POWER-DDL

- Information Technology (IT)
- Operation Technology (OT)
- Supervisory Control and Data Acquisition (SCADA)
- Outage Management System (OMS)
- Demand Side Management (DSM)
- Geographic Information System (GIS) *Winner of Edison Award 2008*
- Automatic Meter Reading (AMR)
- SAP's Industry Specific Solution for Utilities Industry (SAP-ISU)
- 24\*7\*365 Centralized Call Center
- Automated Demand Response (ADR)
- Mobility Services
- Solar Rooftop PV Projects
- Project Management Consultancy
- Capacity Building

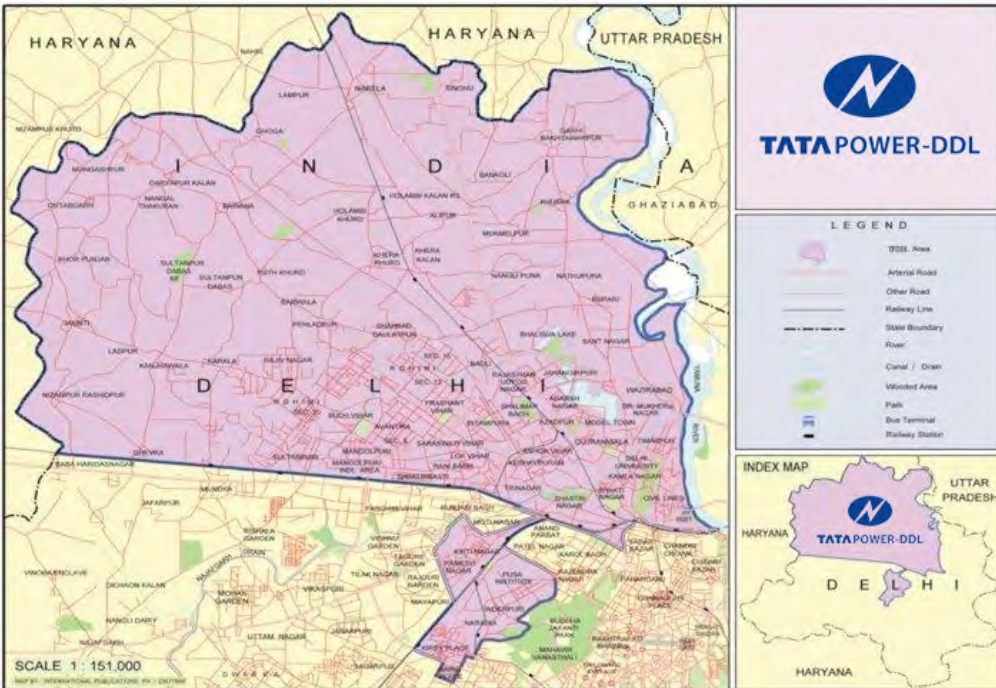




# Transformation at Glance

we believe in .....

## MAKING A DIFFERENCE



**One of the Most Successful Private Power Distribution Utility**

License Area: North and North West Delhi (510 sq. km)

License Period : 25 years

Parameter	Unit	July '02	March'17	% change
<b>OPERATIONAL PERFORMANCE</b>				
AT&C Losses	%	53.1	8.59	85%
System Reliability – ASAI -Availability Index	%	70	99.51	41%
Transformer Failure Rate	%	11	0.84	90%
Peak Load	MW	930	1791	85%
Length of Network	Ckt. Km	6750	15378	128%
Street Light Functionality	%	40	99.41	150%
<b>CONSUMER RELATED PERFORMANCE</b>				
New Connection Energization Time	Days	51.8	5	90%
Meter Replacement Time	Days	25	5	80%
Provisional Billing	%	15	0.86	94%
Defective Bills	%	6	0.13	98%
Bill Complaint Resolution	Days	45	4	91%
Mean Time to Repair Faults	Hours	11	1.50	87%
Call Center Performance - Service Level	%	-	95	
Payment Collection Avenues	Nos.	20	6725	33525%
Consumer Satisfaction Index	%	-	90	
<b>OTHERS</b>				
Capex (Cumm)	Mn USD	187	984	428%
Consumers	Count Mn	0.7	1.58	126%
Employees	Count	5600	3537	37%

# Benefits to Government : Savings

*A Share of Equity of TPC and GoNCTD is in the ratio of 51:49*

*Government Savings*



**Initial investment of USD 57 Mn By TPC Rs. USD 29 Mn and USD 28 Mn by GONCTD)**

**Issued bonus shares worth USD 28 Mn in 1:2 ratio**

**Equity of TPC stands at USD 43 Mn and USD 42 Mn of GONCTD**

**Payout out of cumulative dividend of USD 107 Mn (out which USD 55 Mn to TPC & USD 53 Mn to GONCTD)**

**Tariff is 50% less than that of BAU Scenerio**

**The cumulative savings to Delhi Government has been nearly Mn USD 8923 due to Delhi Discoms and Mn USD 3385 on account of Tata Power-DDL. This has allowed the Government to utilize funds in other infrastructural development activities such as Metro rails, building elevated roads, flyovers, education support and social support**

# Managing Transition – Public Perception & Political Implications

*A holistic approach from all five quarters is essential for delivering sustainable stakeholder value*



# A Revamped Distribution Business Model Post Pvt. Sector Participation

- Asset valuation - Business Valuation Method
- License-based Regulated business for 25 years.
- Guaranteed 16% RoE on meeting AT&C Targets.
- Tariff set by regulator on cost plus RoE basis.

## Financial Prudence

- Pragmatic Valuation – Business Valuation or Asset Valuation Concept
- Transfer of Clean Balance Sheet
- Accurate Base Line Data determination
- Equitable Risk Allocation

## Government Support & Conducive Regulatory Environment

- Financial Endowment
- Progressive & Clear-cut Policy Directions
- Robust Governance Structure
- Stern Legislations for improving revenue realization
- Establishment of Regulatory Framework
- Concurrence on Performance Targets
- Progressive Policy Directions
- Rational & Opportune Tariff Determination

## Change Management & Mitigating Employee & Union Issues

- Skill development
- Progressive Policy Directions
- Tripartite Agreement for employee security
- Creation of Govt. run Trust for Retiral benefits
- Better growth avenues and facilities for the continuing employees
- Fair treatment to all by deployment of transparent HR policies & practices
- Stern & prompt action on violation of ethics

## Implementation of world class technology and network upgradation

- Deployment of Technology Road Map
- Replacement of old network
- Auto monitoring
- Implement innovative solutions to improve power quality and reliability

# Tata Power-DDL: Future Proof

Tata Power-DDL has collaborated with 78 partners

## Technology Partners



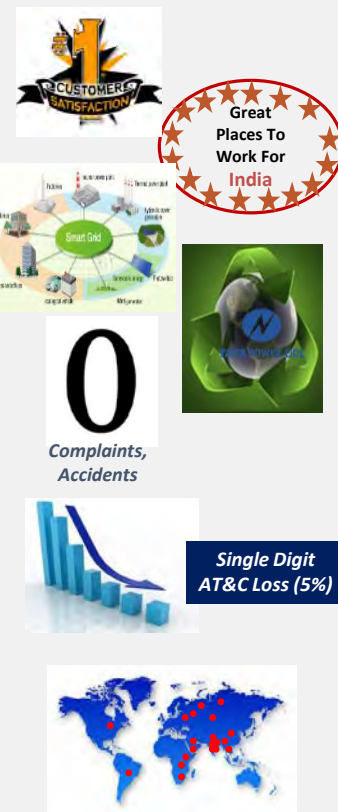
## Research Partners/ Institutes



## Catalysts/ Funding Partners



Enabling  
Vision  
2025



Key  
Projects

### Value Added Services and Products

- Home Automation
- Smart Meters
- Roof Top Generation
- ESCO
- E Vehicle Charging
- Demand Side Management

### R&D at TPDDL

- Smart Grid Lab
- Energy Storage
- Automated Demand Response
- Network Planning with DER
- Data Analytics
- Asset Utilization
- Loss Reduction
- Power Quality & Reliability

### Societal Empowerment

- Micro Grid
- LVDC
- Energy Efficient Appliances (Utility-in-a-box)

# Ease of Doing Business – A National Level Agenda



Country	DB 2015 Rank
Namibia	66
Sri Lanka	100
Argentina	104
Iran	107
Israel	109
<b>India</b>	<b>137</b>
Cambodia	139
Afganistan	141
Kenya	151
Angola	157
Bangladesh	188

Country	DB 2016 Rank
Luxembourg	28
New Zealand	31
Australia	39
United States	44
Greece	47
<b>India</b>	<b>70</b>
Namibia	76
Sri Lanka	81
Argentina	85
Iran	88
Israel	91

Country	DB 2017 rank
Germany	5
Singapore	10
Japan	15
United Kingdom	17
France	25
<b>India</b>	<b>26</b>
Luxembourg	32
New Zealand	34
United States	36
Australia	41
Greece	52

Appearing among Underdeveloped Countries

Appearing among developing Countries

Appearing among developed Countries



# Social Innovation@ Tata Power-DDL *Joy of Giving...*



TATA POWER-DDL



**223 JJ Clusters across North and North-West Delhi**



**TATA POWER-DDL**



“Scenario @ Indian Power  
Sector”

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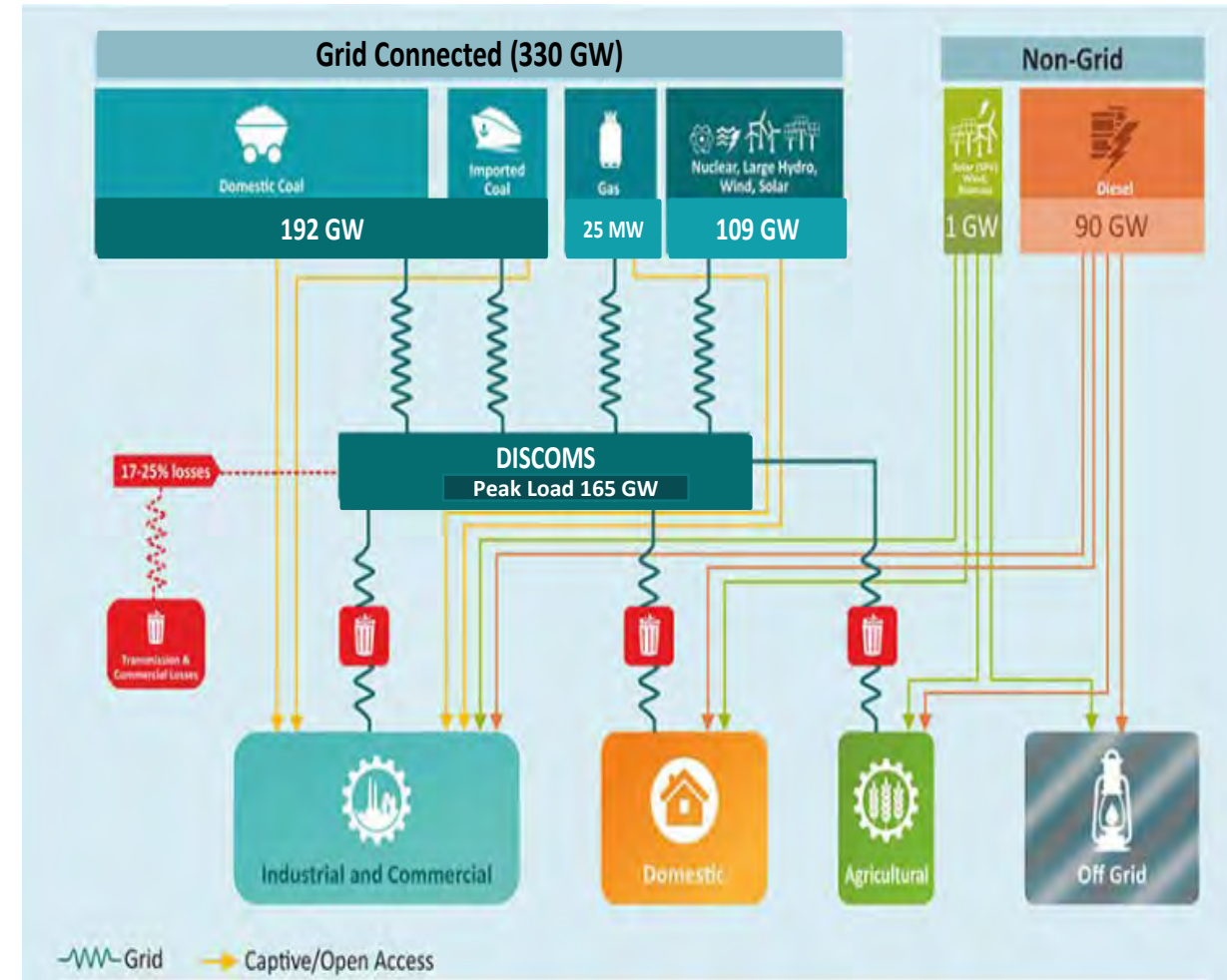
# Indian Power Sector– A Glance

<b>Total Consumers</b>	<b>Millions</b>	<b>250</b>
Peak Load	MW	1,65,253
Input Energy	MUs	12,14,642
Annual Revenue	In Rs. Crs.	5,83,028
61% of total revenue is from 7.96% consumers		
Average AT&C	%	22% - 25%

Balance 50% capacity is stranded or not being put to use even during the peak load regime

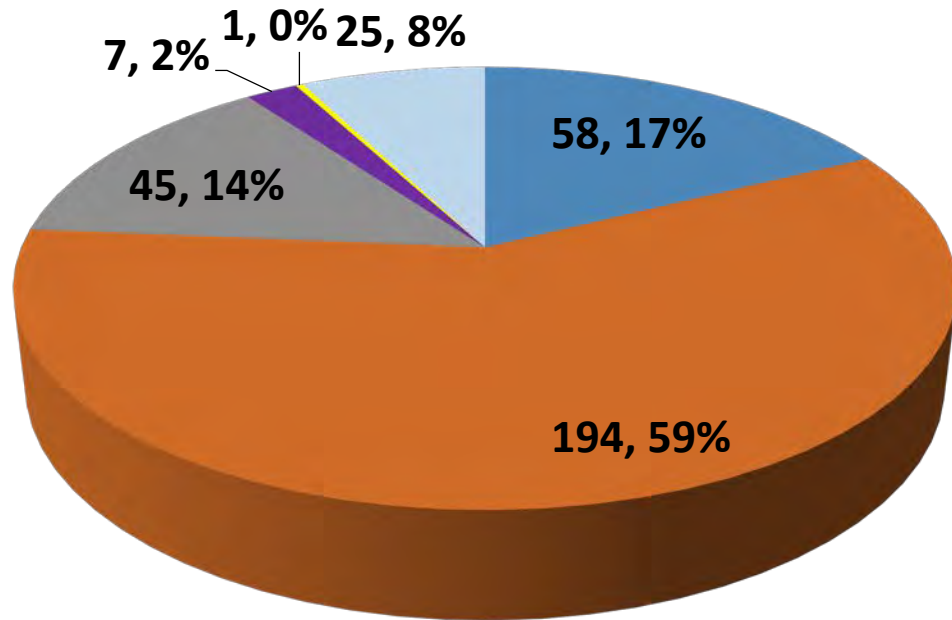
From FY07 to FY17 National peak demand grown by 59%, whereas Generation Capacity addition took place by 146%

Nearly 19000 MW of new thermal capacity is not being scheduled as there is no demand of power by State Commission

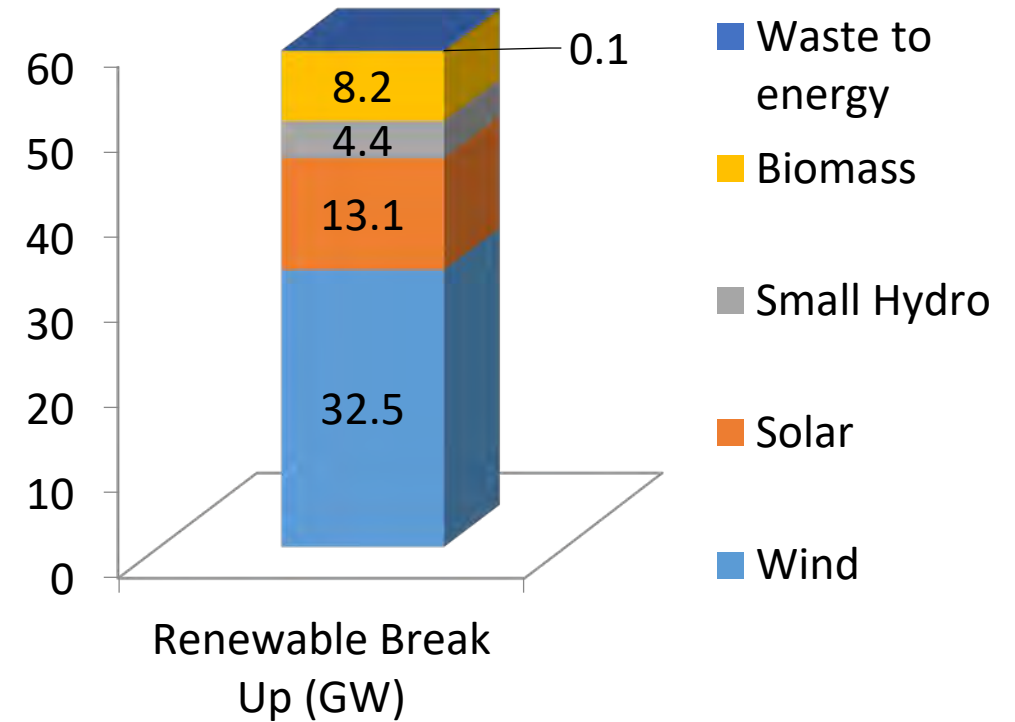


# Indian Power Sector– A Glance (Generation)

Source Wise Installed Capacity (GW)



- Renewable   ■ Coal   ■ Hydro
- Nuclear   ■ Diesel   ■ Gas



Renewable Energy emerged as second largest contributor in 2016-17

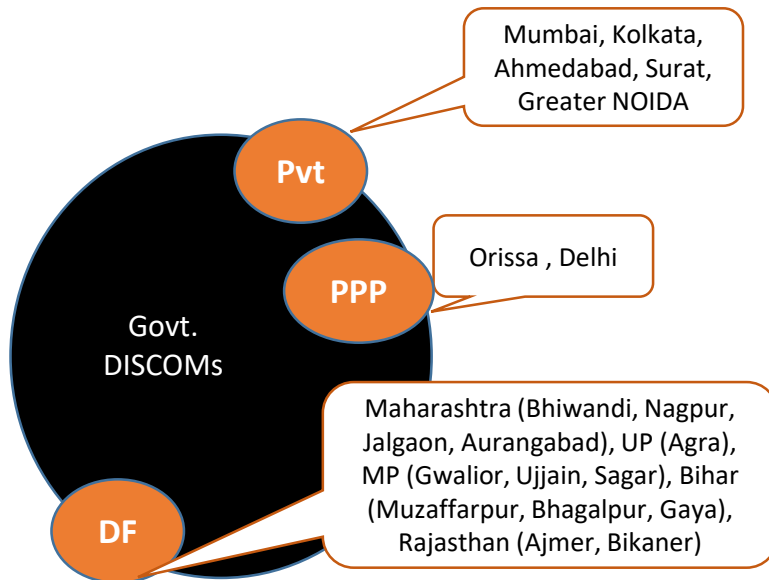
# Indian Power Sector– A Glance (Generation)

- The Government of India is now looking to transform India's electricity sector
  - A tenfold increase in solar installation rates to 100GW by 2022 (40 GW of rooftop solar)
  - 60GW of new wind farms, 10GW of biomass
  - 5GW of small scale, run-of-river hydro.
  - US\$200bn investments planned
  - Target of 175 GW of Renewable Energy by 2022
  - COP 21 Paris Commitment of 40% Renewable Capacity by 2030

S. No.	Year	Yearly Solar Target (in MW)	Cumulative Solar Target (in MW)
1	2015-16	2000	5000
2	2016-17	12000	17000
3	2017-18	15000	32000
4	2018-19	16000	48000
5	2019-20	17000	65000
6	2020-21	17500	82500
7	2021-22	17500	100000

Source: [powermin.nic.in](http://powermin.nic.in)

# Indian Power Sector– A Glance (Distribution)



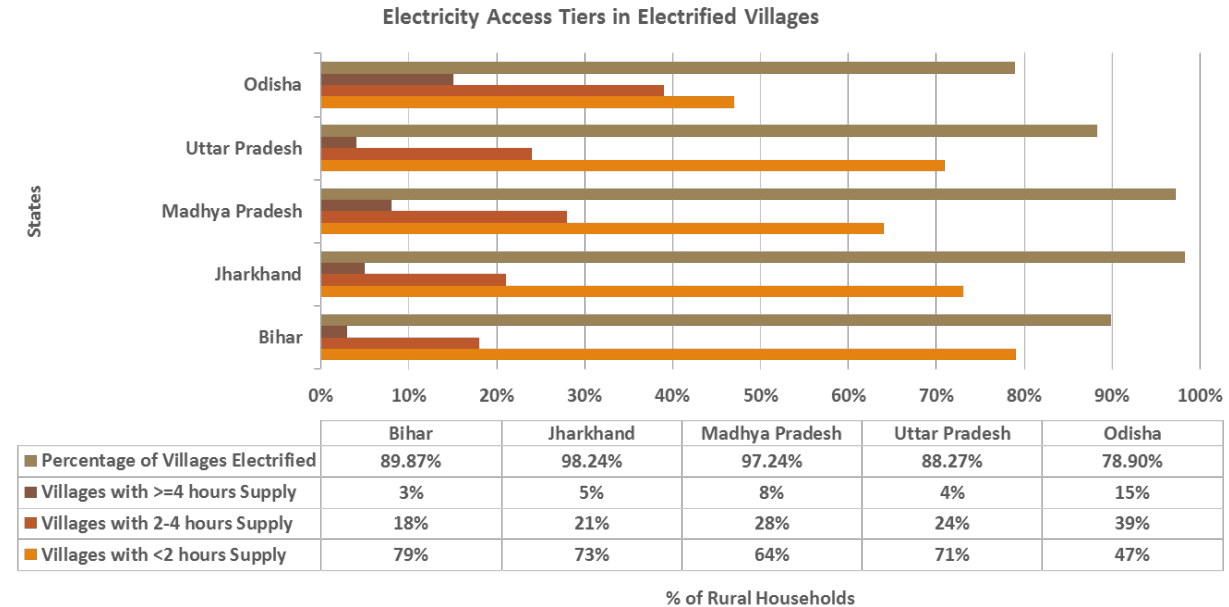
DF- Distribution Franchisee;  
PPP- Public Pvt Partnership

- Distribution is a licensed activity under the EA 2003.
- SERCs award distribution license.
- 85% of Distribution sector largely dominated by State Owned Electricity Boards.
- ACS-ARR Gap (Without Subsidy) 2017 – **47 P/unit\***
- High AT&C Losses : National at 26% , with most of the utilities are still hovering at around 35-40%
- Bonds of USD 34650 Mn issued under UDAY Scheme and Budgetary support of USD 6750 Mn under IPDS.
- Direct costs of downtime in India are in the tune of Rs. 20,0000 Million per annum.
- Only 8% of the total villages in Rural India has 100% Household Connectivity
- Tata Power-DDL (Distribution) is Regulated by **Delhi Electricity Regulatory Commission (DERC)** who is responsible for determination of tariffs chargeable to consumers.

# Electrification in Villages of India

A village is declared to be electrified, if:

- Basic infrastructure such as Distribution Transformer and Distribution lines are provided in the inhabited locality as well as the Dalit Basti hamlet where it exists.
- Electricity is provided to public places like Schools, Panchayat Office, Health Centers, Dispensaries, Community centers etc.
- The number of households electrified should be at least 10% of the total number of household in the village.
- Intensive electrification of villages involves providing access to electricity to left out un-electrified household in an electrified village.

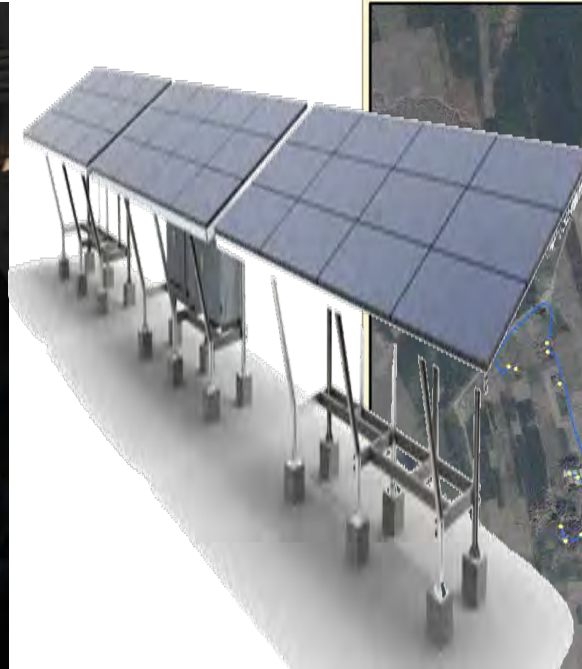


Only 8% of the total villages in Rural India has 100% Household connectivity

Only 10% of off – grid Rural villages have been connected to the Grid

As per GARV app 12,036 villages electrified, 754 uninhabited, 5662 yet to be electrified

# Electrification through Micro Grid




**Legend**

- Behlolpur\_Hutments - 225
- ▲ Solar Panels
- LV\_Network - 5 kms (approx.)

0 50 100 200 300 400 Meters

**BEHLOLPUR - Ward- 8 & 9**



22

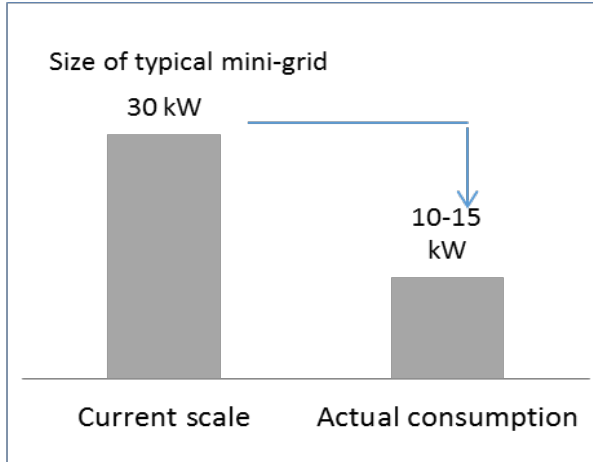
# Electrification through Micro Grid



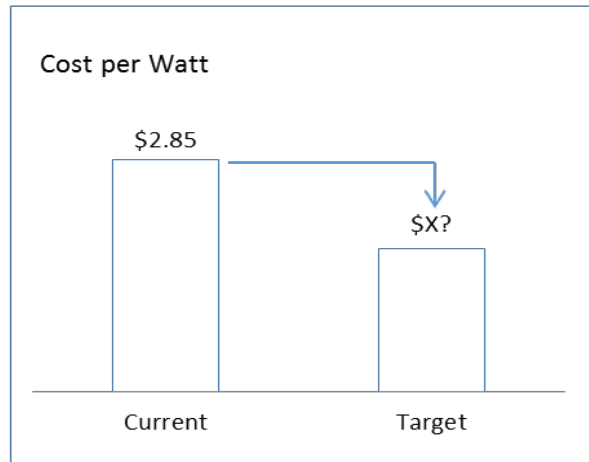
TATAPOWER-DDL

## Challenges in Grid Extension for Rural Areas

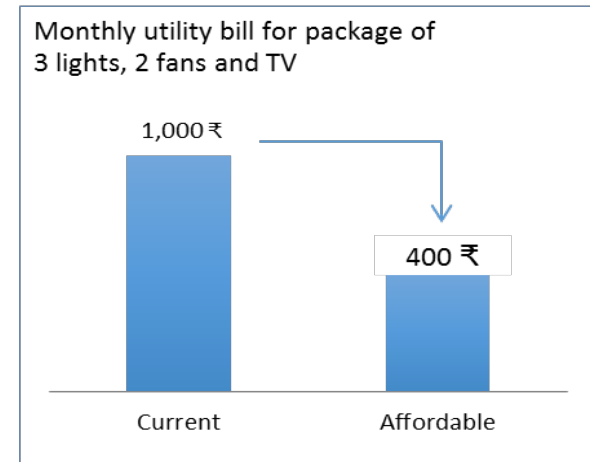
### 1. Minimum efficient scale is too high



### 2. CapEx of mini-grid is too high



### 3. Tariffs are too high



- High cost of grid extension and low recovery due to highly subsidized tariff, low level of tariff collection resulting in negative return
- Supply rationing due to non-availability of power
- High operation and maintenance costs

37.5 cents/unit (Rs. 23.94/unit)



23.76 cents/unit (Rs. 15.15/unit)



10.06 cents/unit (Rs. 6.41/unit)



#### Efficiency Improvement Areas

1. Improve Solar Panel CUF to 21%
2. Improve Battery Life Cycle
3. Improve Inverter Efficiency
4. Modular Design

#### Cost Reduction Areas

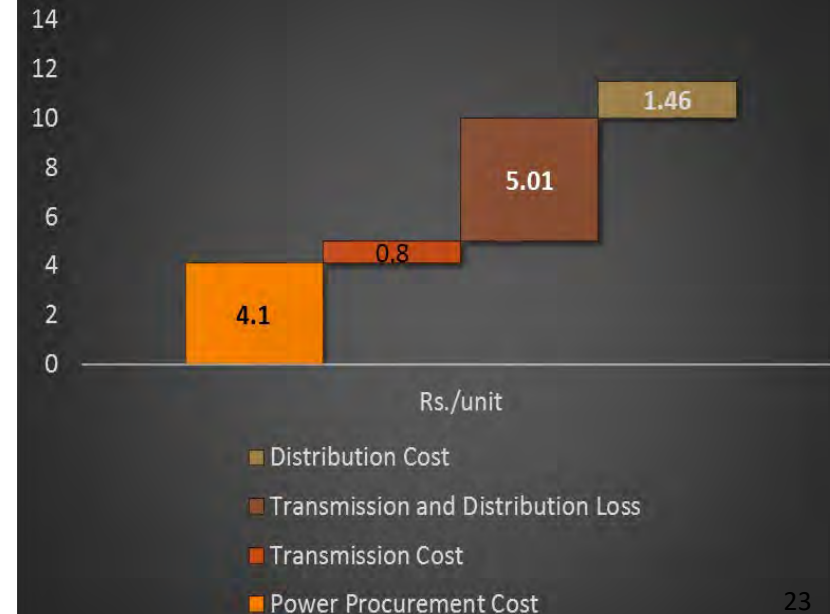
1. DG elimination
2. 20% cost reduction through R&D (panels, BoS, Battery)

#### Efficiency Improvement Areas

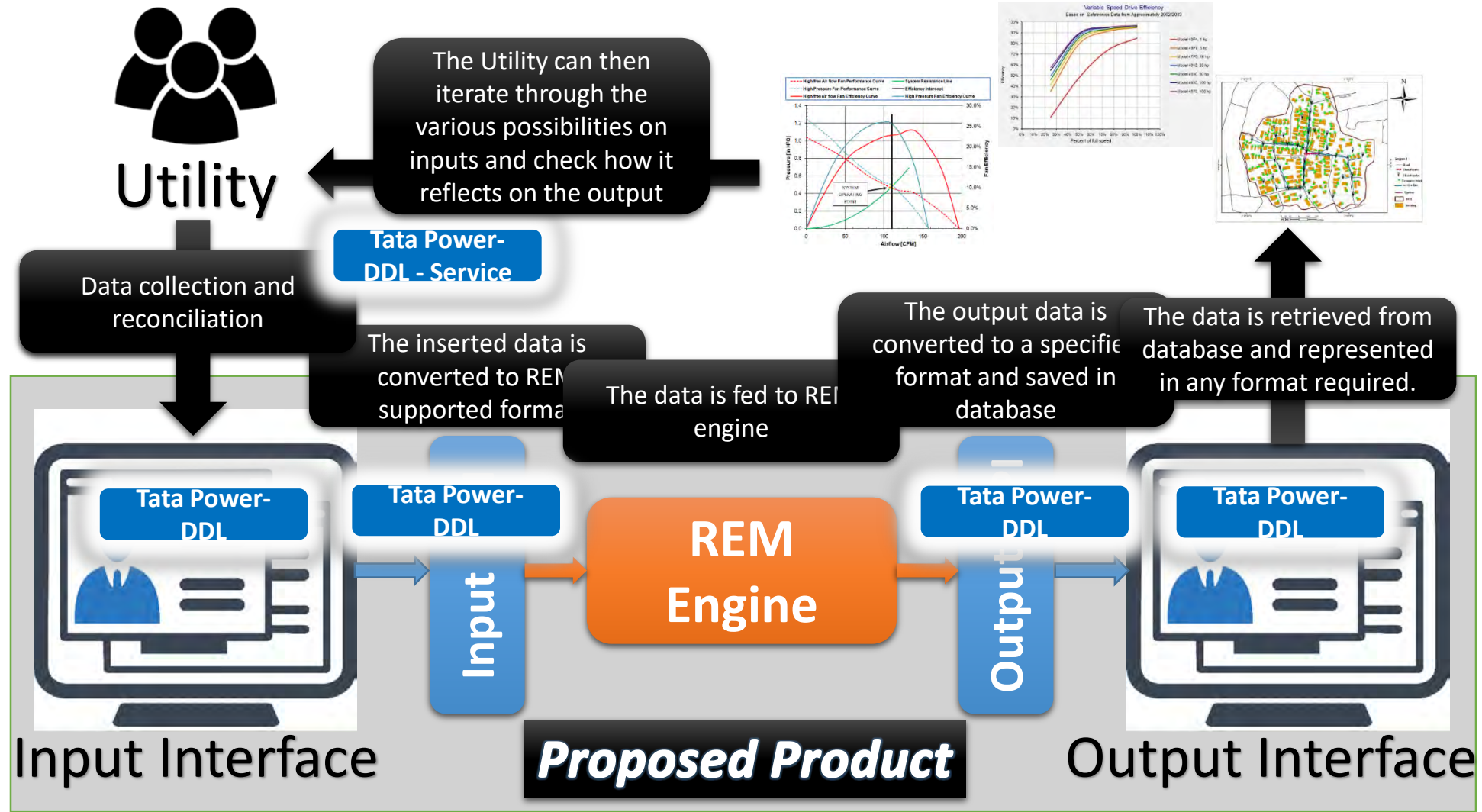
1. Improve Solar Panel CUF to 24%
2. Improved Battery Life Cycle
3. Improve Inverter Efficiency

#### Cost Reduction Areas

1. 50-60% cost reduction through R&D (panels, BoS, Battery, Inverter)

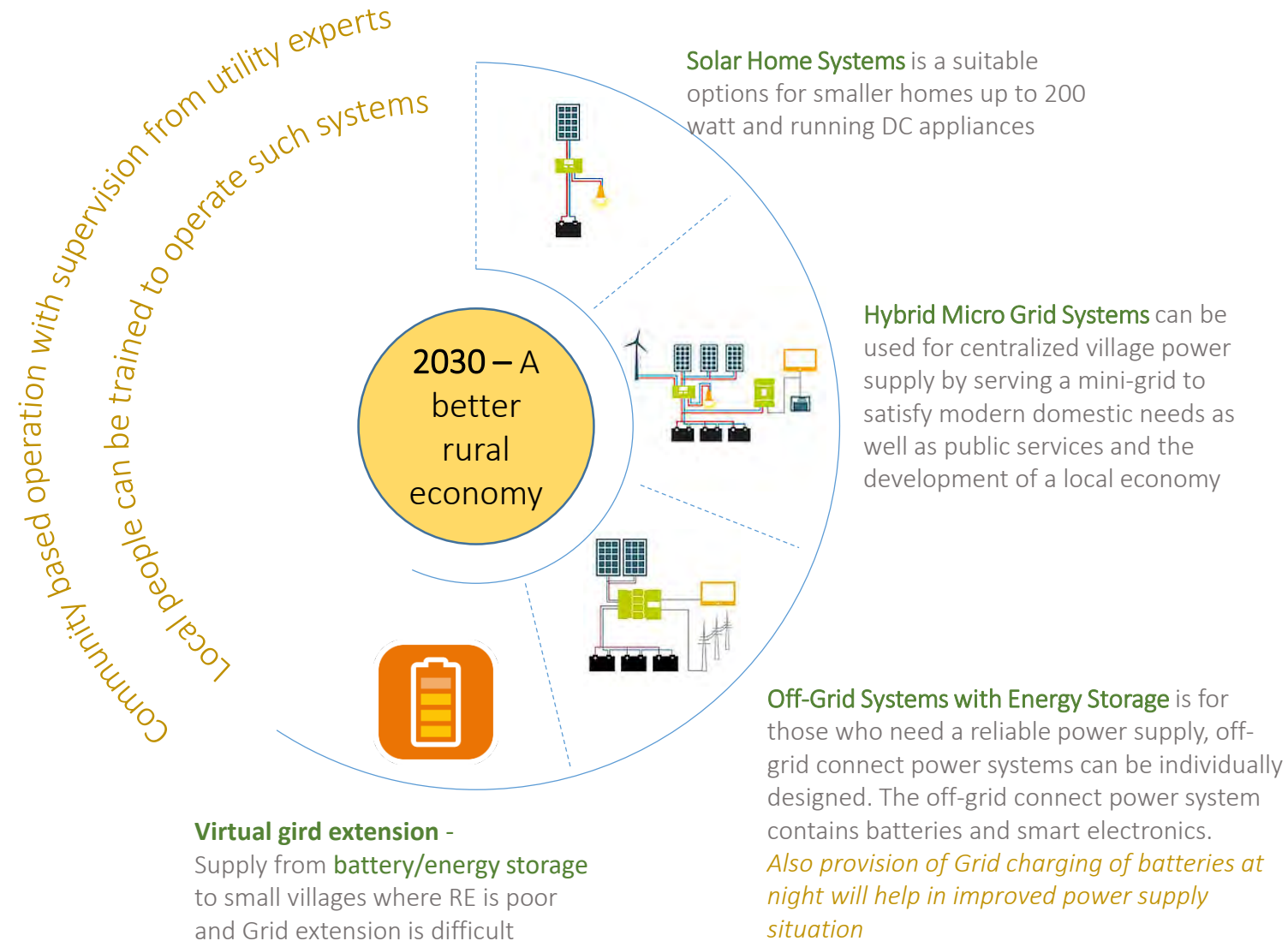


# Optimized Cost Electrification Model





# Future From Rural Perspective



# Future From Urban Perspective



National and regional coordination of scheduling and dispatch eases **RE grid integration** and results in cost savings by smoothing the variability in RE generation and broadening the supply of system flexibility.

**Optimization:** sophisticated modelling and simulation tools to increase performance

**Power Management & Weather Forecasting:** High Tech & accurate weather forecasting system with refined algorithm for calculation of discom power need

**Smart Meter Communication Technologies** Allow devices across the grid to communicate and provide data useful

**Intelligent Substation:** shares all information on control, protection measurement and monitoring equipment through one bus by applying both "digital technology" and "IT-related technology."

**Energy Efficiency** Combination of Product innovation and energy efficiency programmes shall make energy consumption dramatically more efficient

The peak system-wide 1-hour up-ramp increases by 27% compared to a system with no new RE, to almost 32 GW, up from 25 GW.

**Power system balancing** with 100 GW of solar and 60 GW of wind is achievable at 15-minute operational timescales with minimal renewable energy (RE) curtailment

**Advanced DMS:** Integrated electrical system designed to manage and real-time power distribution management system and grid optimization

160 GW of solar and wind may generate 370 TWh of energy annually shall meet 22% of India's electricity demand in 2022 and reduce 21% of power sector carbon dioxide emissions compared to those in case no new RE capacity is built until 2022.

**Distributed Energy storage** shall boost the transport sector, RE and advanced grid projects and can store energy locally

**Distributed Generation** Rooftop solar photovoltaic technologies shall prove to be extremely effective for consumers

**Digitization** with power and speed of computers shall accompany reduction in cost

**Data analytics** will lead to improved infrastructure management and operational efficiency

Fast microprocessor systems designed enabling safe and reliable operations

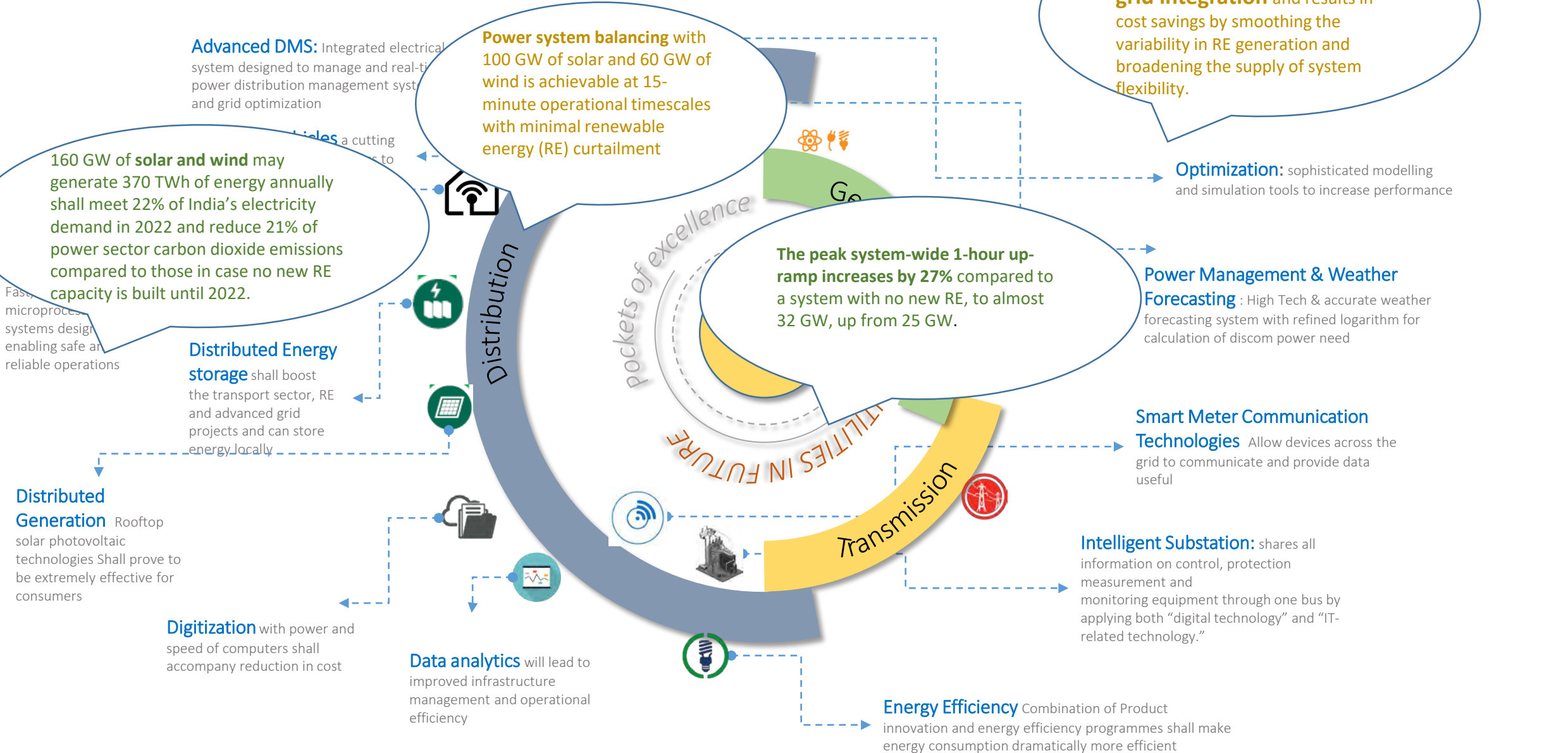
... a cutting edge to

Distribution

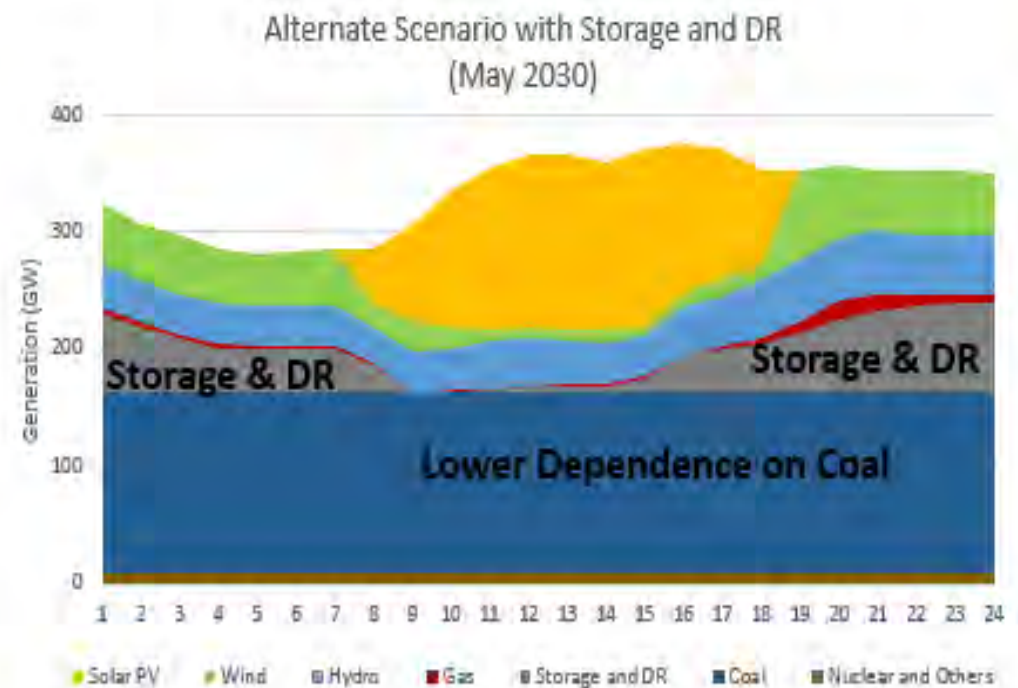
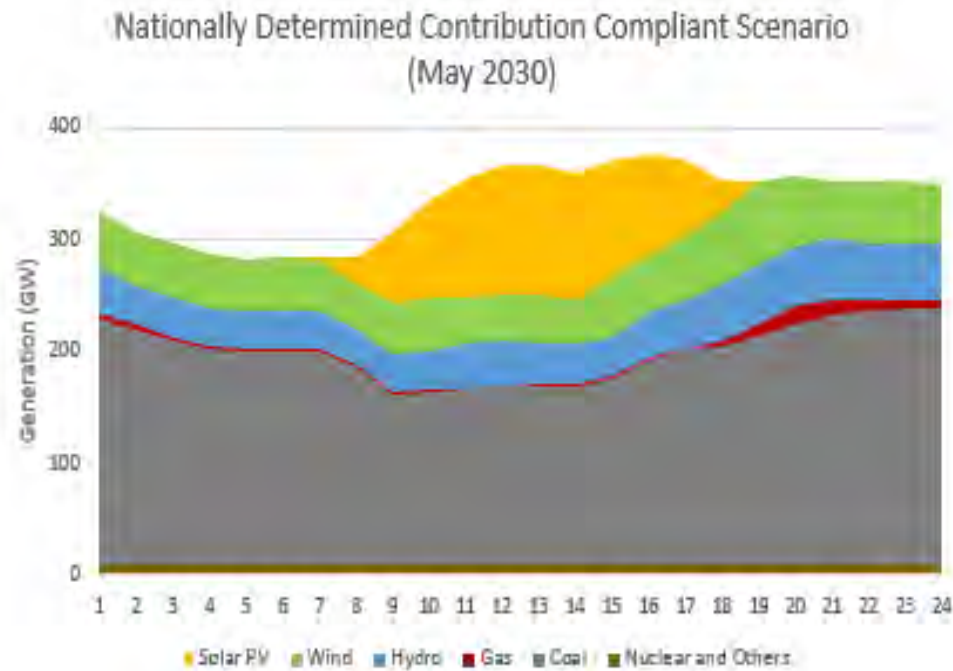
Transmission

pockets of excellence

UTILITIES IN FUTURE



# Impact of DER



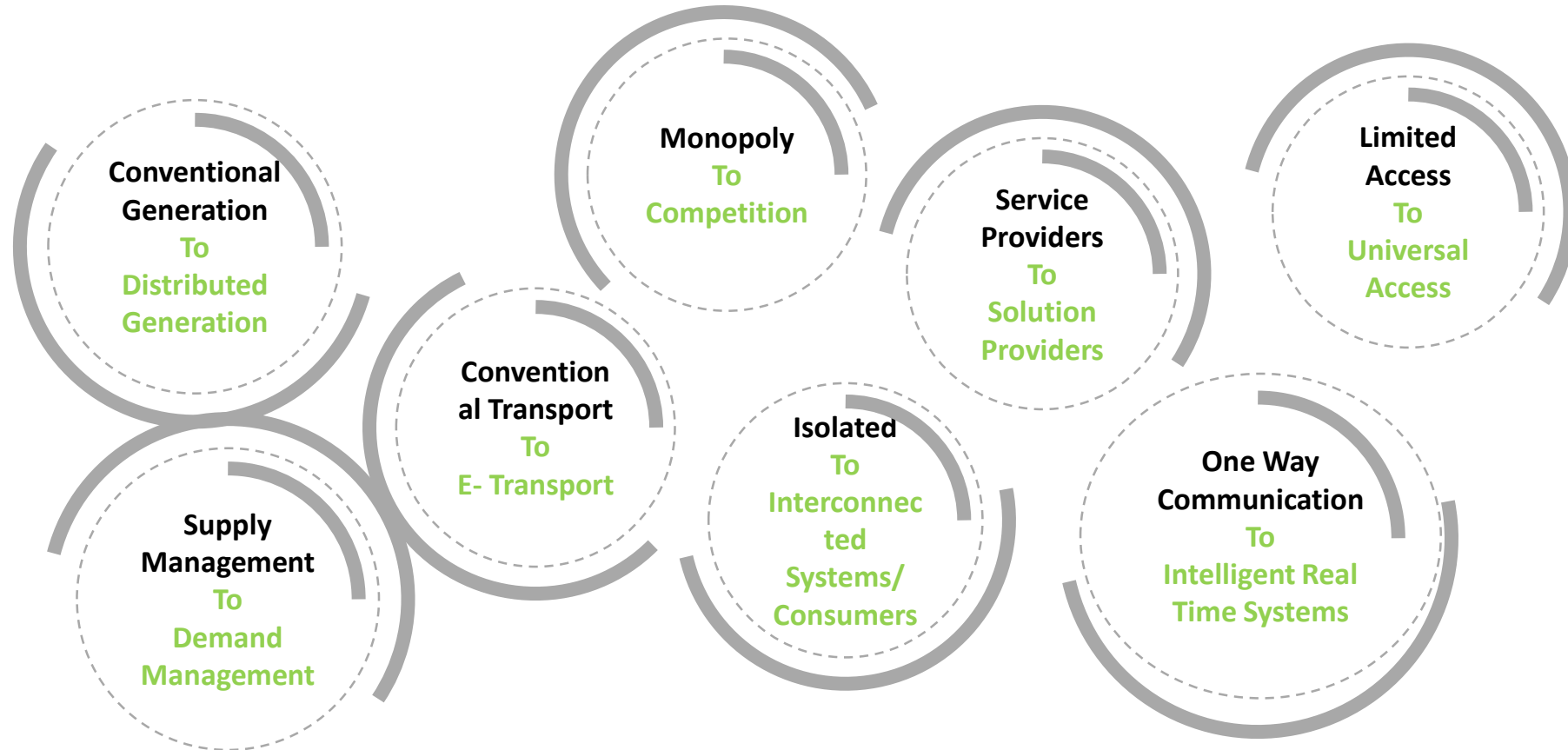
An illustrative dispatch curve for May 2030 is shown in the figure after incorporating judicious mix of Renewable, Storage and Demand Response to meet the demand requirements of the country by 2030.

Source: Lawrence Berkeley National Laboratory report 2017

Considering 175 GW Renewable Energy by 2022 and extrapolated thereafter  
Non fossil Capacity = 50%, RE provides ~ 24% energy

COP 21 Commitment – 40% Renewable Capacity by 2030

# Future From Urban Perspective : Key Insights



*All Utilities have to adapt to this Changing Utility of the Future*

***Thank You***