Linking Electric Vehicles to Renewable Energy

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BSES Rajdhani Power Ltd, New Delhi , India

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BSES Rajdhani Power Limited

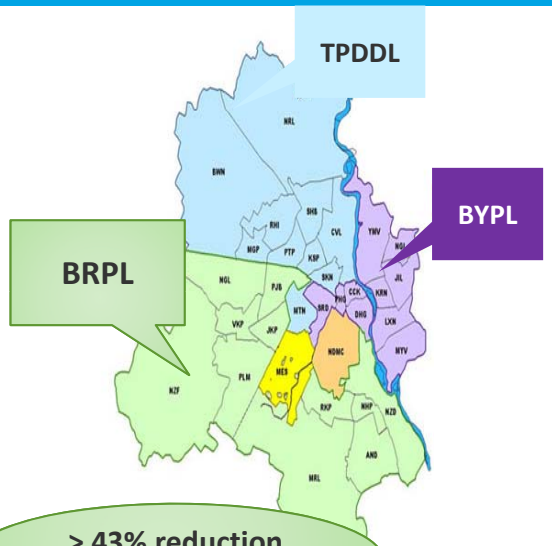
BSES is a JV of Reliance Infrastructure (51%) and Govt. of Delhi (49%)

Agenda

- BRPL – Brief Profile
- EVs at BSES Rajdhani
- Utility’s role in RE and EV integration
- Summary

BSES Rajdhani Power Ltd. – A Profile

Distribution Area	750 sq. Km
No. of customers	2.55 Mln.
Customer Density	3400 /sq Km
Max Demand met (Till Date)	3211 MW
Annual Billed energy FY19	12,194 MU
AT&C Loss FY19	8.06 %

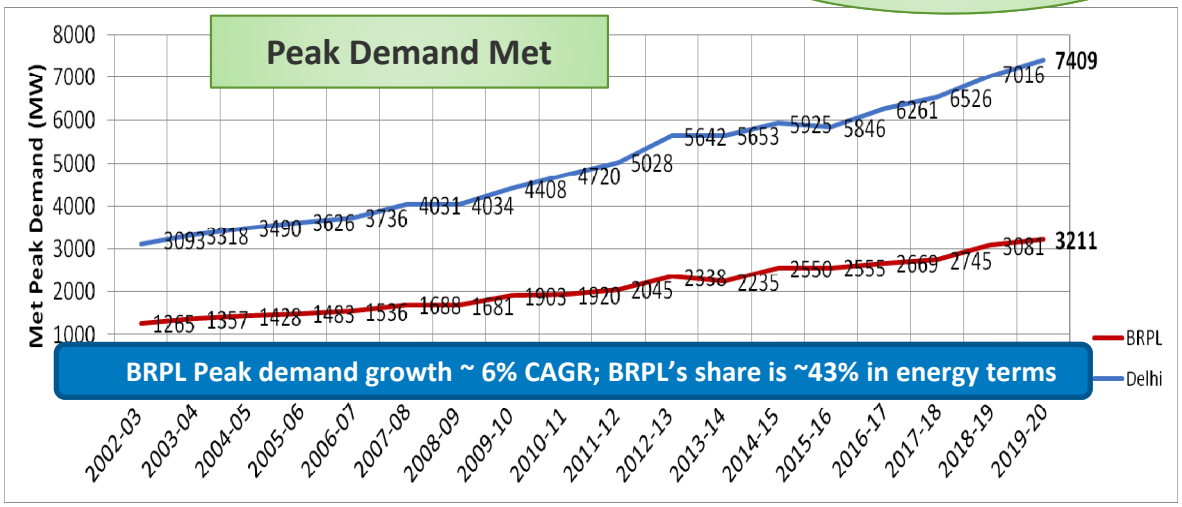


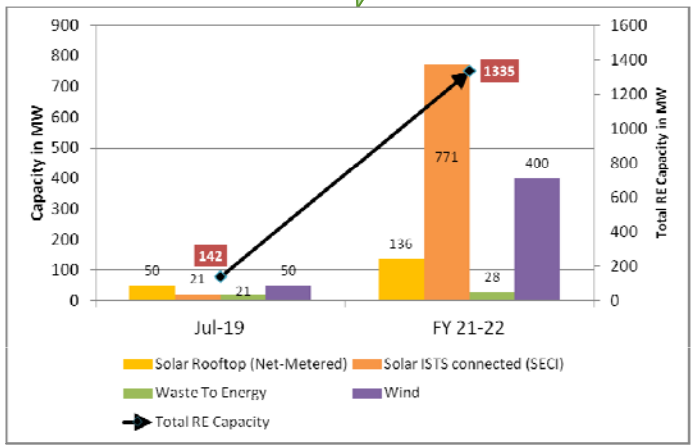
> 43% reduction since Year '02

Consumer Mix

About 86% residential contributing to ~70% consumption

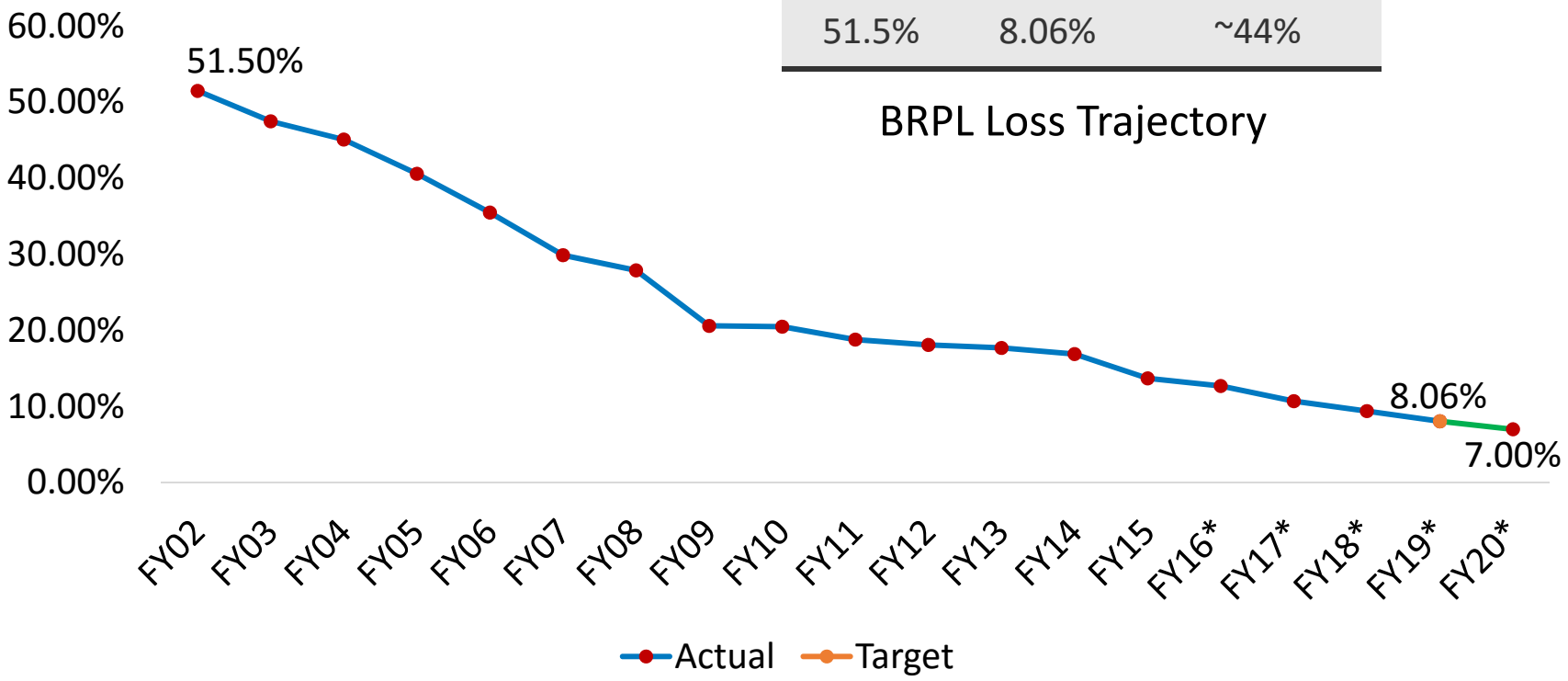
RE ~ 29% of portfolio (1300MW+) by '21-22





Steep Loss reduction post- privatization

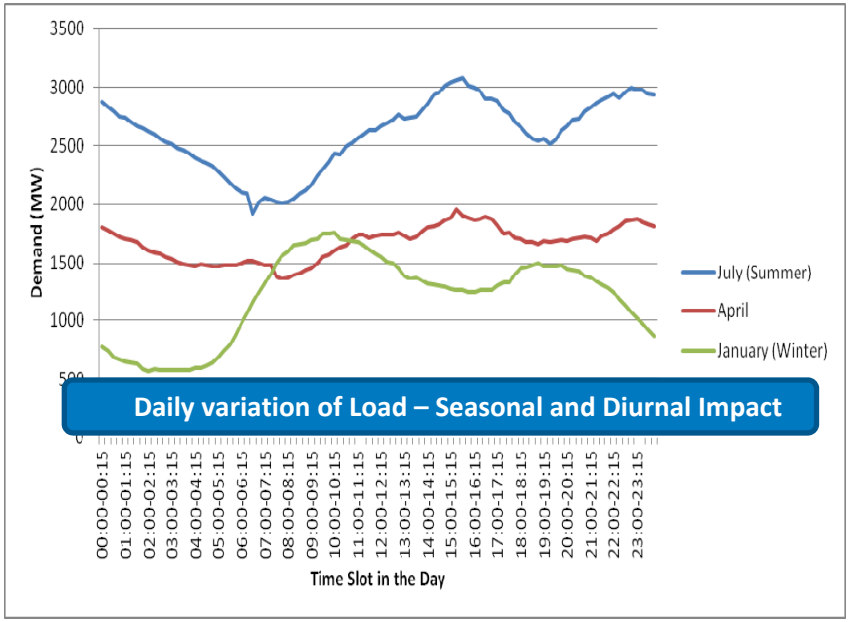
FY02	FY19*	Reduction
51.5%	8.06%	~44%



~44% reduction in losses post takeover against 20% rise in a decade up-to privatization

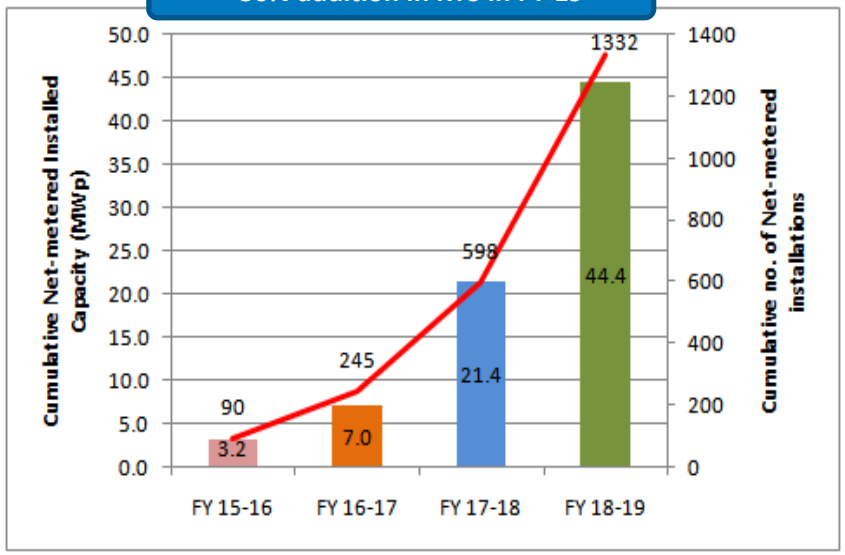
Power Portfolio & Network Landscape (1/2)

- Large seasonal and diurnal variation in demand and hence loading of assets
- High RE share including robust growth in Roof Top Solar



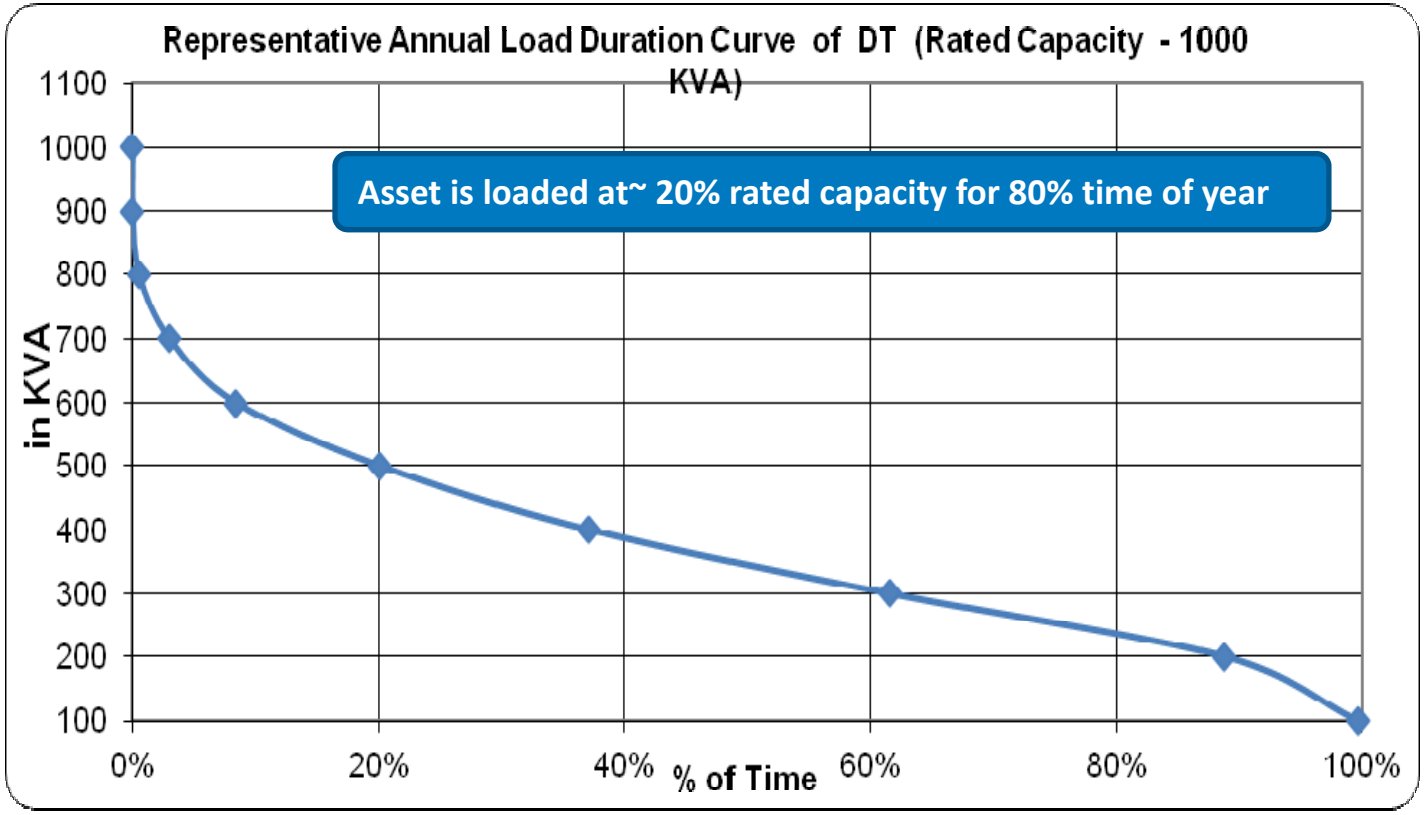
Daily variation of Load – Seasonal and Diurnal Impact

> 50% addition in RTS in FY'19



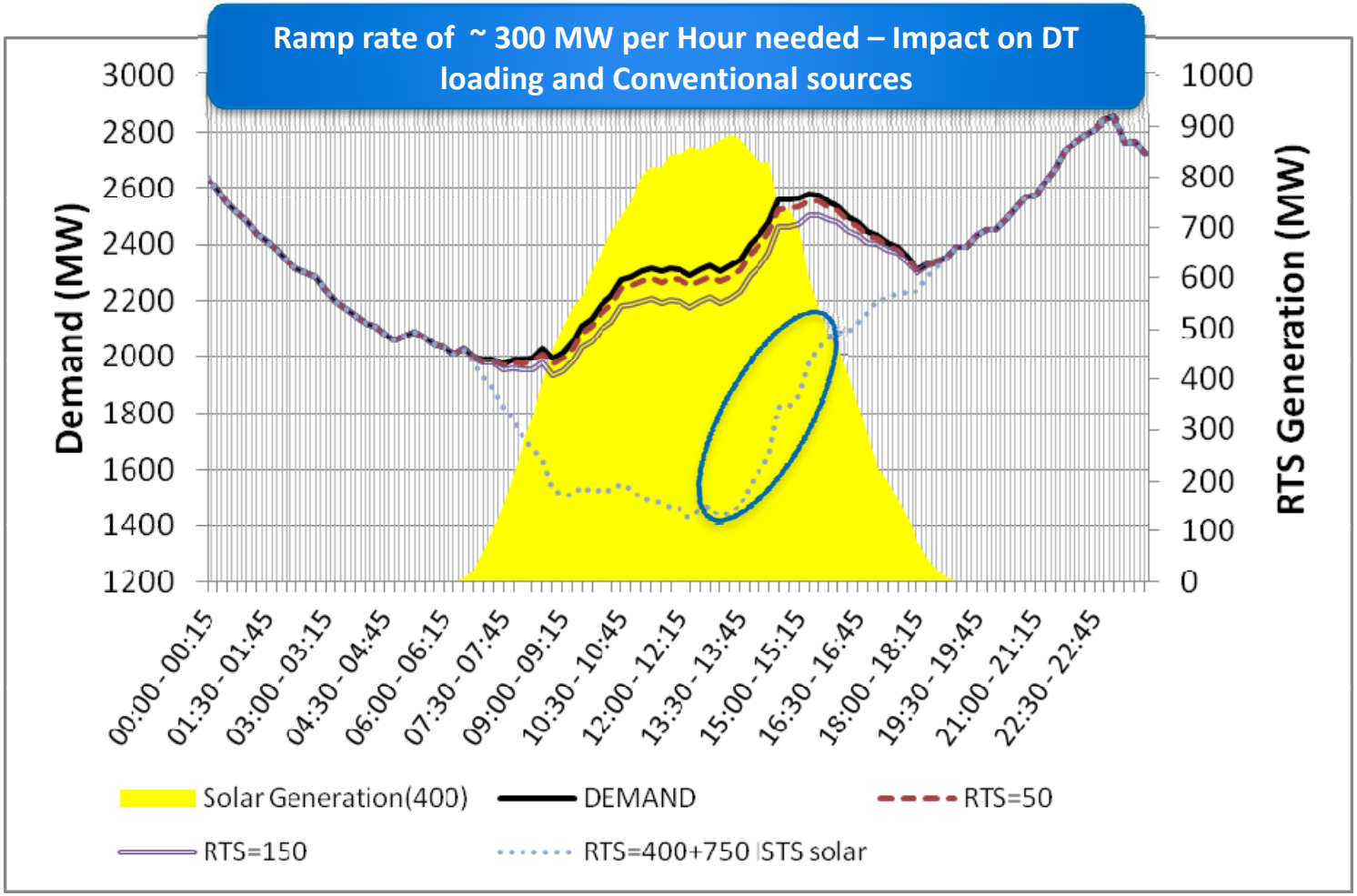
Daily variation in load	
Summer (Jul)	~1160 MW
Winter (Jan)	~1200 MW
Fall/Spring (Oct/ Apr)	~600 MW

Power Portfolio & Network Landscape (2/2)



- Space constraints for network upgradation
- Overall lower utilization of assets
- Rooftop Solar can help reduce day peak loading of assets

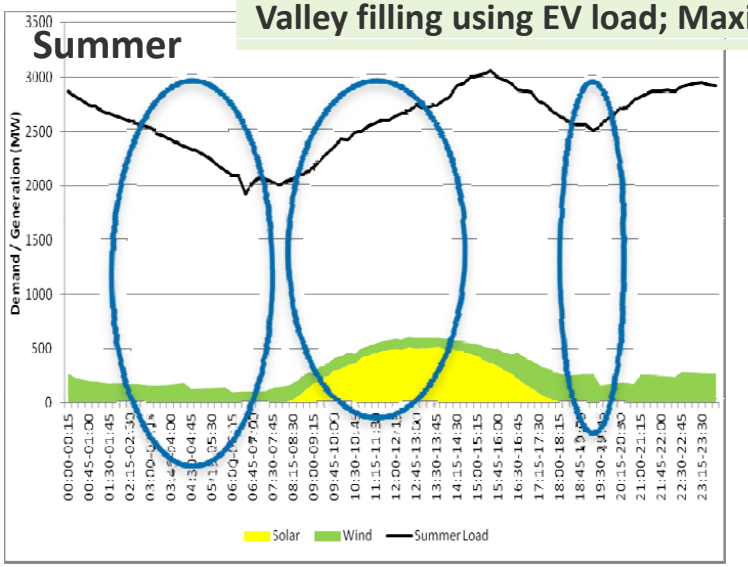
Impact of RTS and ISTS Solar on Demand

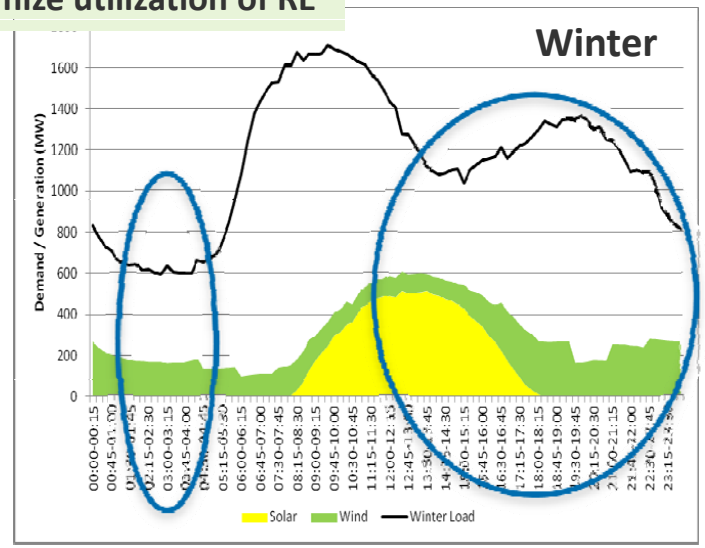


EV charging during High RE share slots

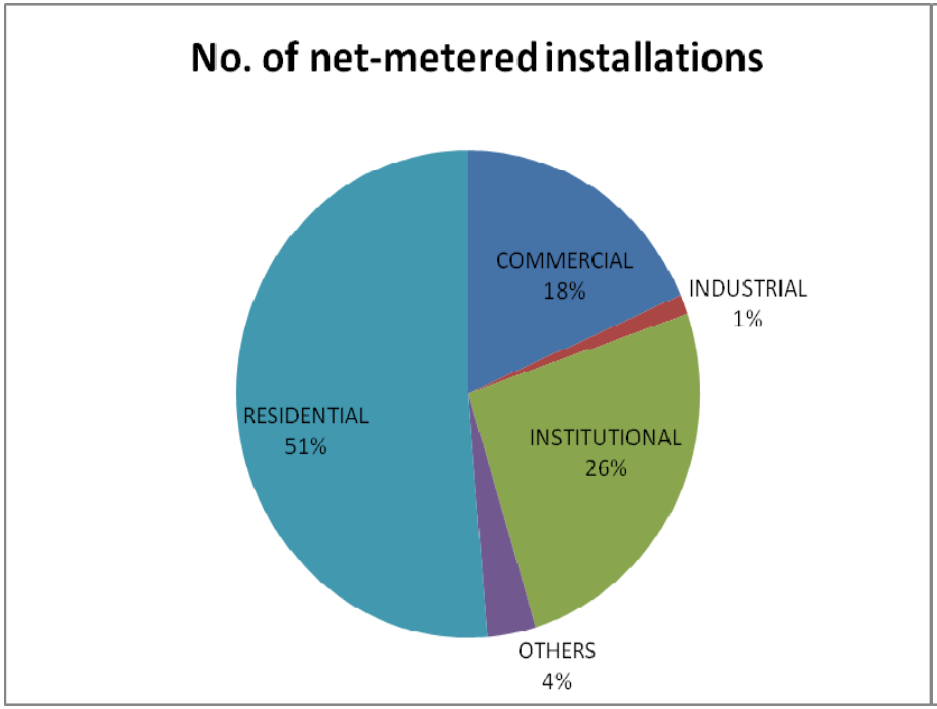
- EV TOU tariff could align with high RE (Wind + Solar) slots for EV charging
- Overnight EV charging to promote Wind power absorption
- Similarly day charging (barring peak hours) to promote Solar power absorption
- EV charging coupled / synchronized with Rooftop solar to promote RTS penetration in Grid

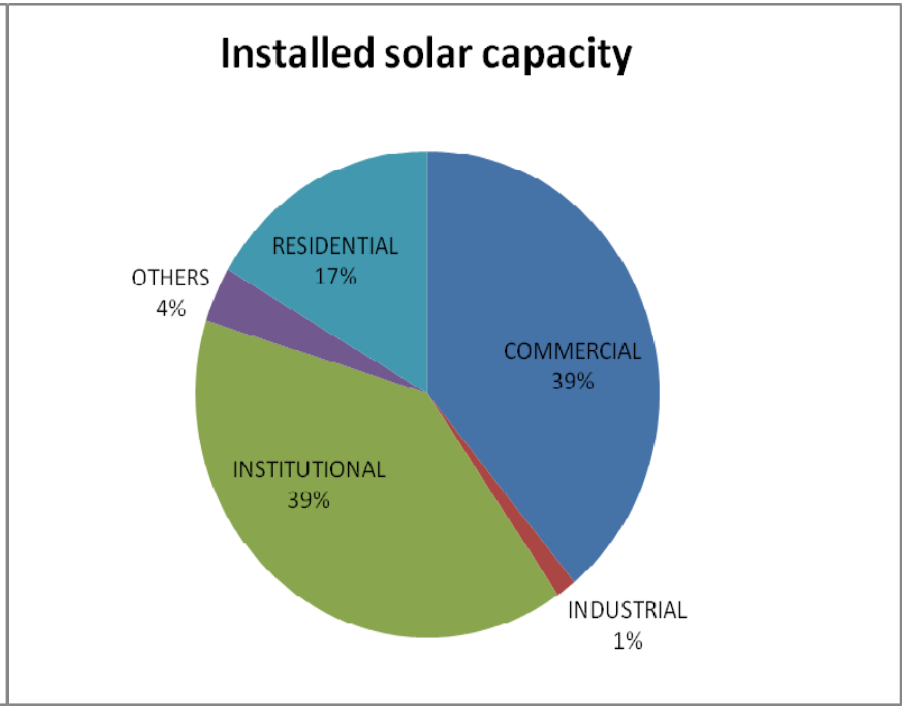
Valley filling using EV load; Maximize utilization of RE





BRPL's Rooftop Journey till YTM Jun19

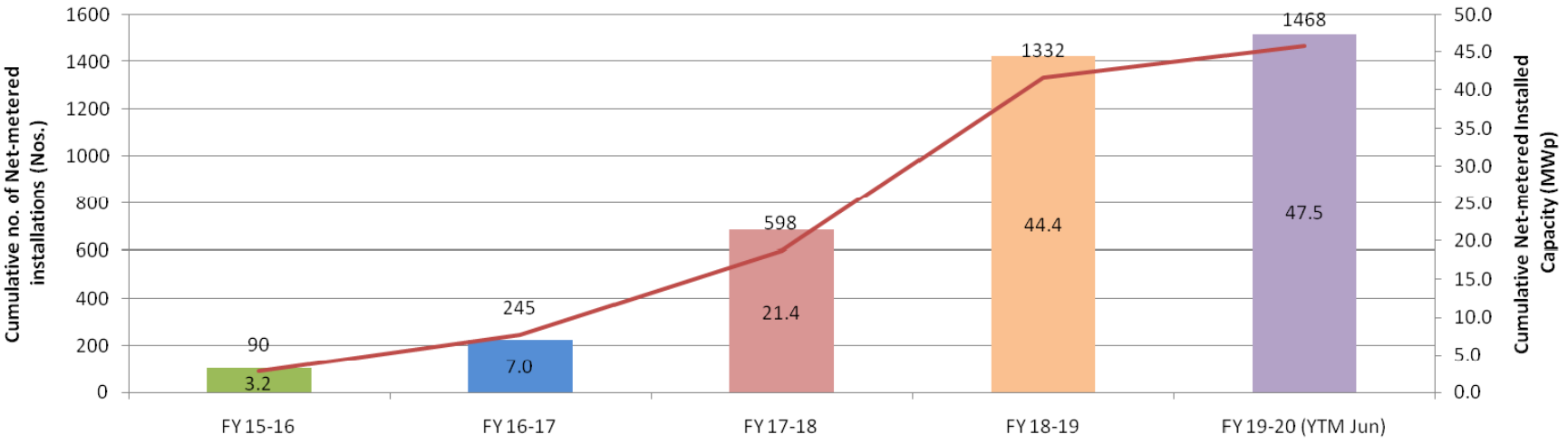




- 1468 Installations completed, 47.47 MWp ; Another 18.30 MWp in Progress
  - Y1: 90 Nos, 3.1 MWp, Y2: 155 Nos., 3.8 MWp , Y3: 353 Nos., 14.4 MWp, Y4: 734 Nos., 23.0 MW
- Capacity of Solar 47.47 MWp against sanctioned load of 155.1 MW (~31%)

BRPL's Rooftop Journey till YTM Jun19

RTS installations capacity crossed 50 MWp in Aug '19



No. of net-meter installations in FY18-19 is higher than cumulative no. of installations in last 3 FYs

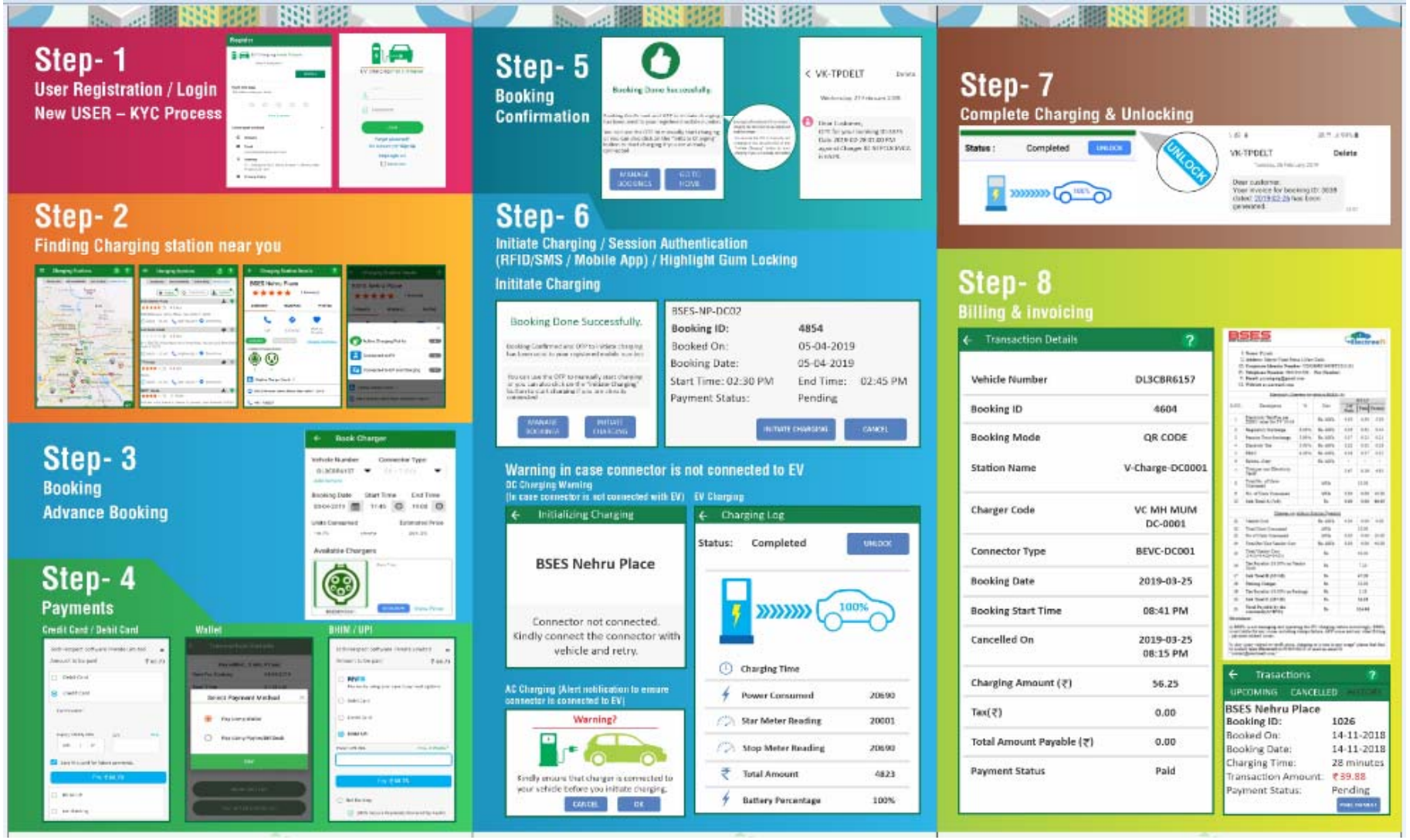
Waste-to-Energy , Hybrid Solar, Wind Plants in Pipeline

EVs at BSES Rajdhani

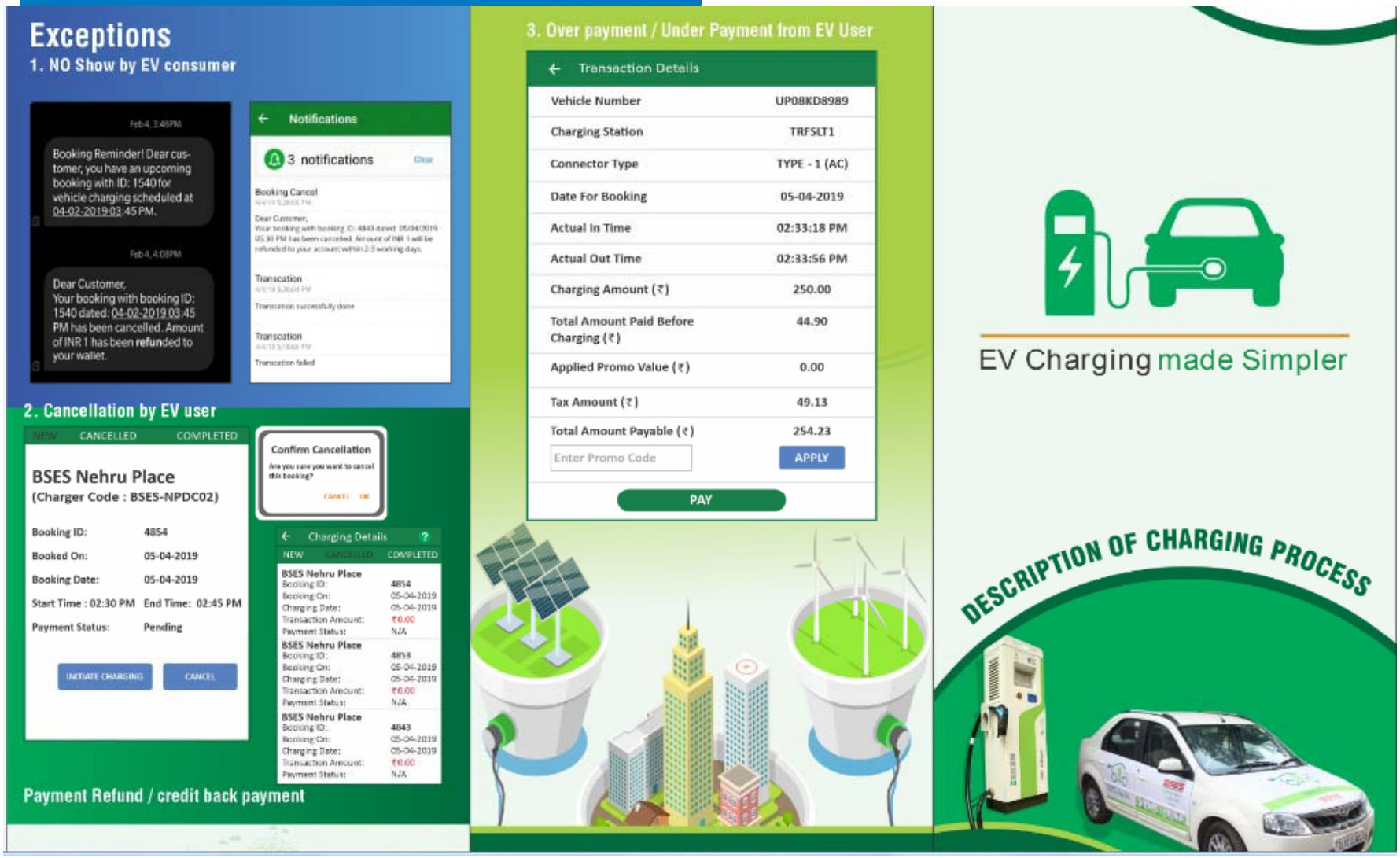
- Member of EV100
- Phased transition of corporate fleet
- Roll-out of Public EV CI in collaboration with Land owning agencies
- EODB for EV charging connection support
- Participating in Freight pilot in Delhi
- Facilitating legal charging and battery swapping infra for 3W / e-Rickshaws
- App based booking and EV charging
- Managed charging of EVs – Integration with Distribution systems control

EVs at BSES Rajdhani

Process for EV charging (1/2)

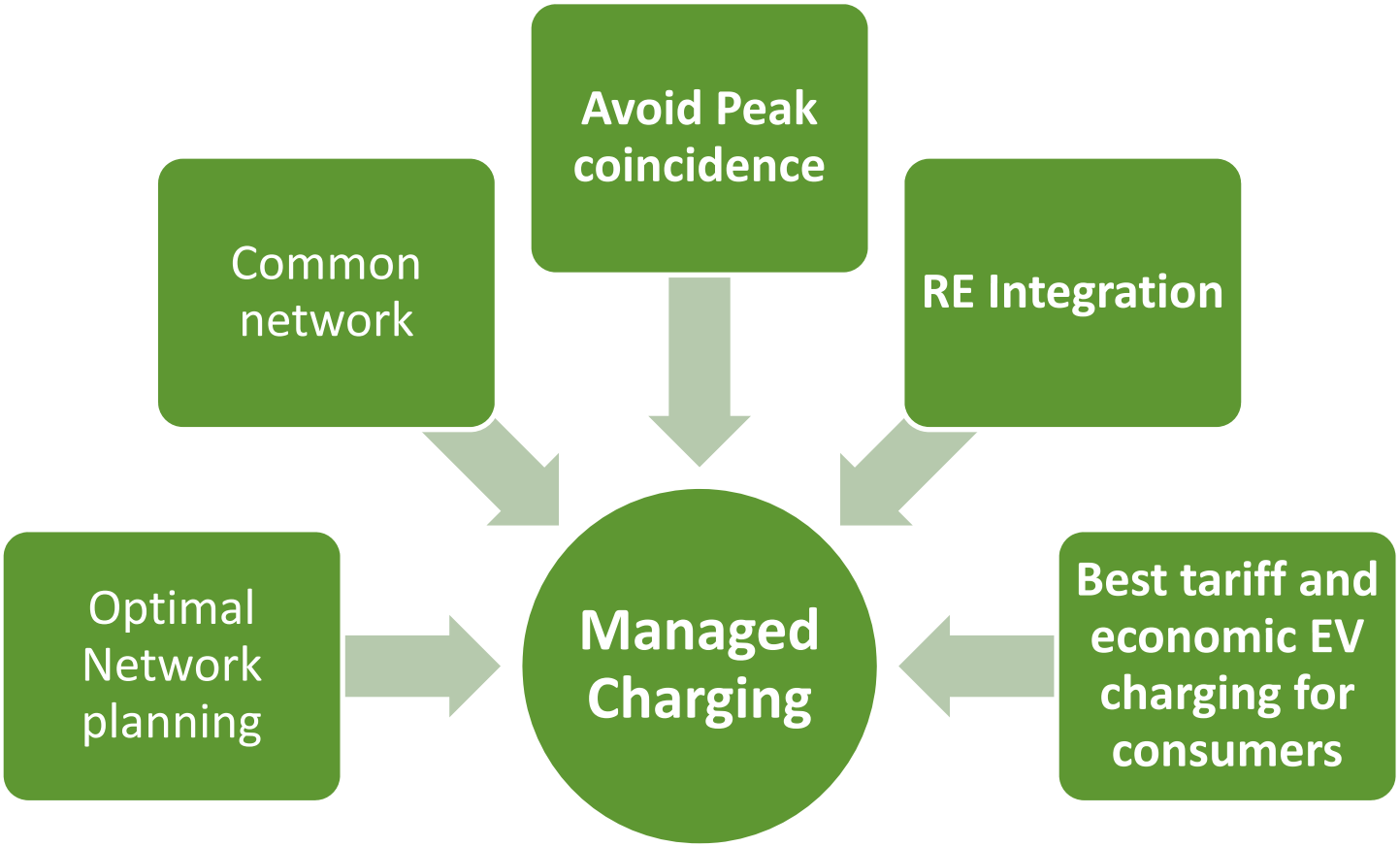


Process for EV charging ...(2/2)



Managed Charging - Drivers

- Key Drivers for Managed Charging:



Forms of Managed Charging

Passive managed charging relies on customer behavior to affect charging patterns.

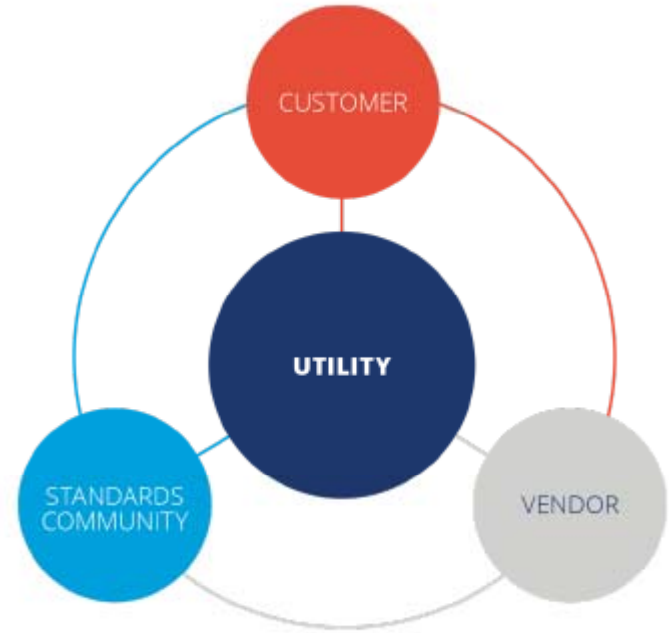
Active managed charging relies on communication (i.e., "dispatch") signals originating from a utility or aggregator to be sent to a vehicle or charger to control charging in a predetermined specific way.

Passive	Active
EV time-varying rates, including time-of-use rates and hourly dynamic rates	Direct load control via the charging device
Communication to customer to voluntarily reduce charging load (e.g., behavioral demand response event)	Direct load control via automaker telematics
Incentive programs rewarding off-peak charging	Direct load control via a smart circuit breaker or panel

Source: Smart Electric Power Alliance, 2019.

Role of Utility

- Provide EV education and awareness to their consumers
- Participate in the managed charging communication standards development process
- Engage vendors to share utility needs and learnings from other comparable DER efforts
- Provide a test bed or pilot effort for new solutions
- Develop solutions to integrate EV charging into demand response systems
- Continue to evolve rate structures matched with active load management strategies
- Encourage greater deployment of managed charging-capable infrastructure among customers



Source: Smart Electric Power Alliance, 2019

Proposed EV TOD tariff - Delhi

S.No	Period	Applicable Off Peak Rebate during identified off peak time slots	Applicable Peak Surcharge during identified peak time slots
1	May – September (Other categories of consumers)	05:00 – 09:00 (30%)	00:00 – 02:00 (40%) 14:00 – 18:00 18:00 – 24:00
2	April – November & February - March (For EV charging)	02:00 – 10:00 (45%) 18:00 – 22:00	22:00 – 24:00 (46%)
3	December – January (EV Charging)	00:00 – 05:00 (32%) 18:00 – 24:00	05:00 – 10:00 (44%)

TOD Tariff for EVs along with Active Managed Charging expected to promote stable distribution, RE integration and cost economics for EVs

Summary

- Distributed Public EV charging Infrastructure across city (near to Electric sub-stations) to enable optimal network requirements, optimal costs and space use
- Active and Passive managed charging to play key role in grid integration of EV and RE
- EV specific rate plans to induce better network utilization and optimal costing of backend infrastructure
- Integration of EV charging with DERMS shall be key
- Discoms in partnerships with land owning agencies can be new “fuel provider” for electrified mobility

Thank You

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