



Promotion of Net-Metering in SAARC Member States

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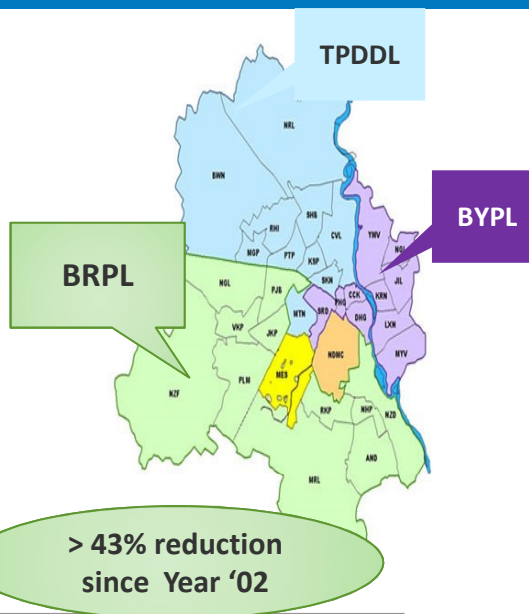
BSES is a JV of Reliance Infrastructure (51%) and Govt. of Delhi (49%)

Agenda

- BRPL – Brief Profile
- Solar Rooftop Initiatives at BRPL
- Net Metering in Solar Rooftop PV
- Perspective with respect to Solar rooftop
- Group Net Metering & Virtual Net metering
- Utility facilitated RTS model for Residential
- Summary

BSES Rajdhani Power Ltd. – A Profile

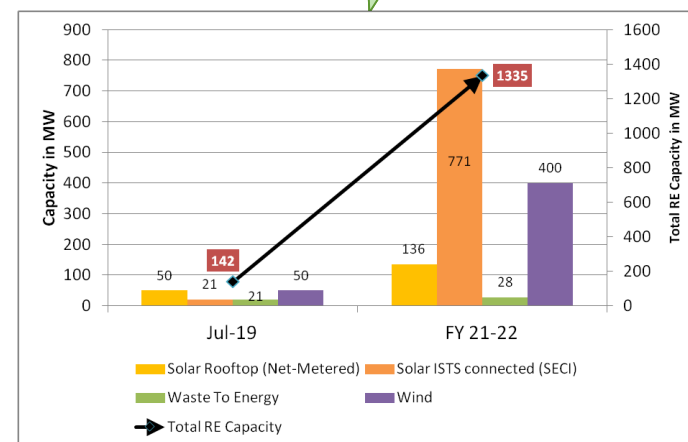
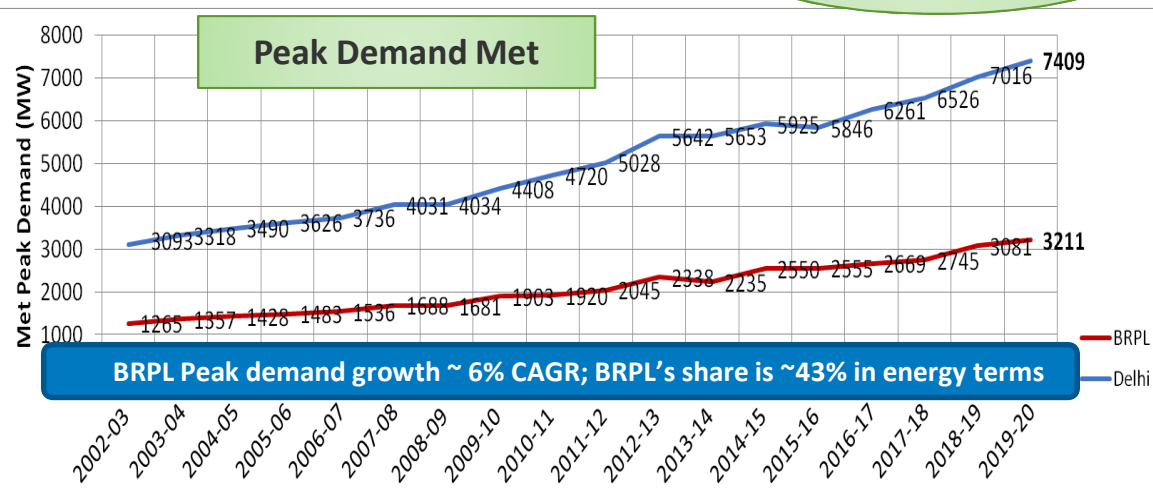
Distribution Area	750 sq. Km
No. of customers	2.55 Mln.
Customer Density	3400 /sq Km
Max Demand met (Till Date)	3211 MW
Annual Billed energy FY19	12,194 MU
AT&C Loss FY19	8.06 %



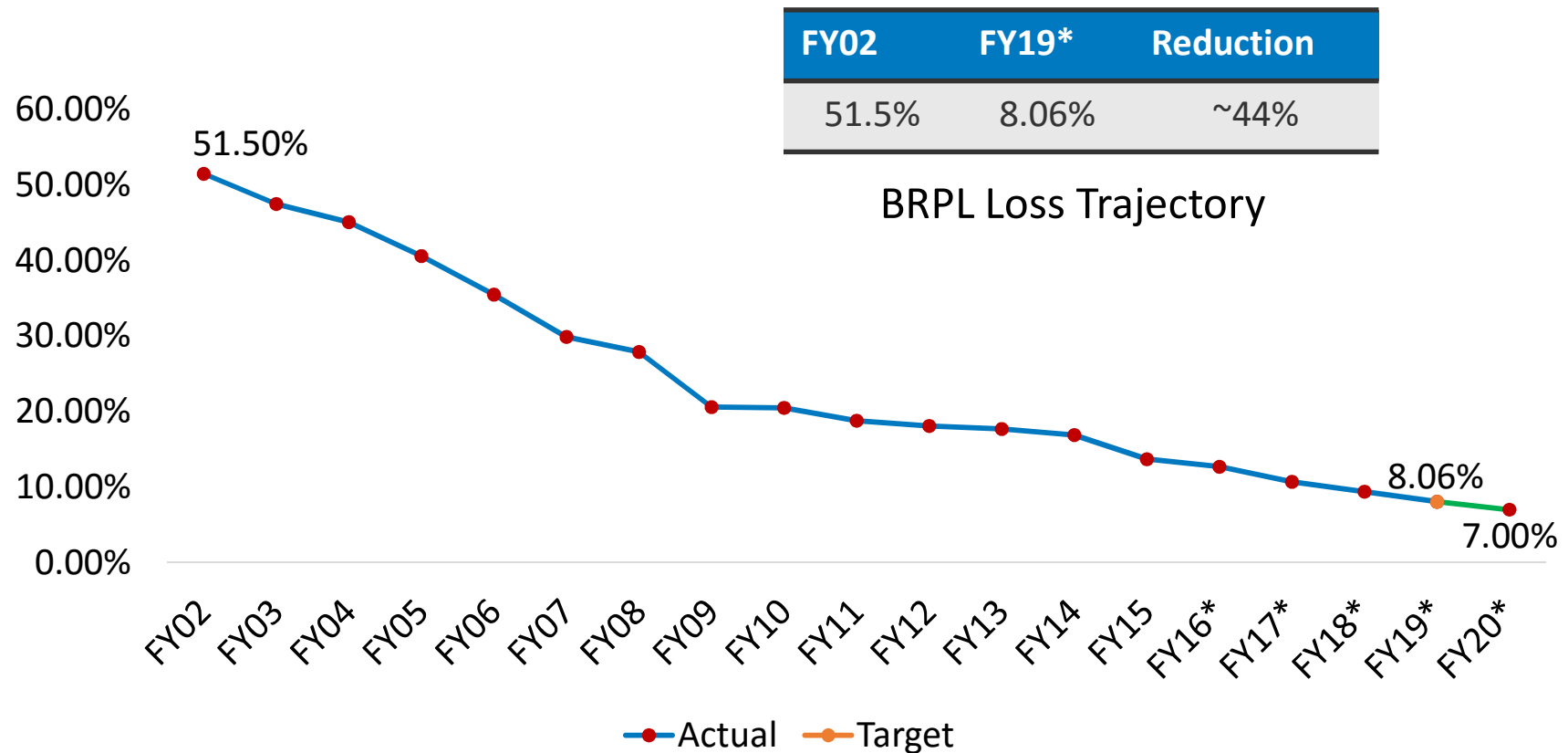
Consumer Mix

About 86% residential contributing to ~70% consumption

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



Steep Loss reduction post- privatization



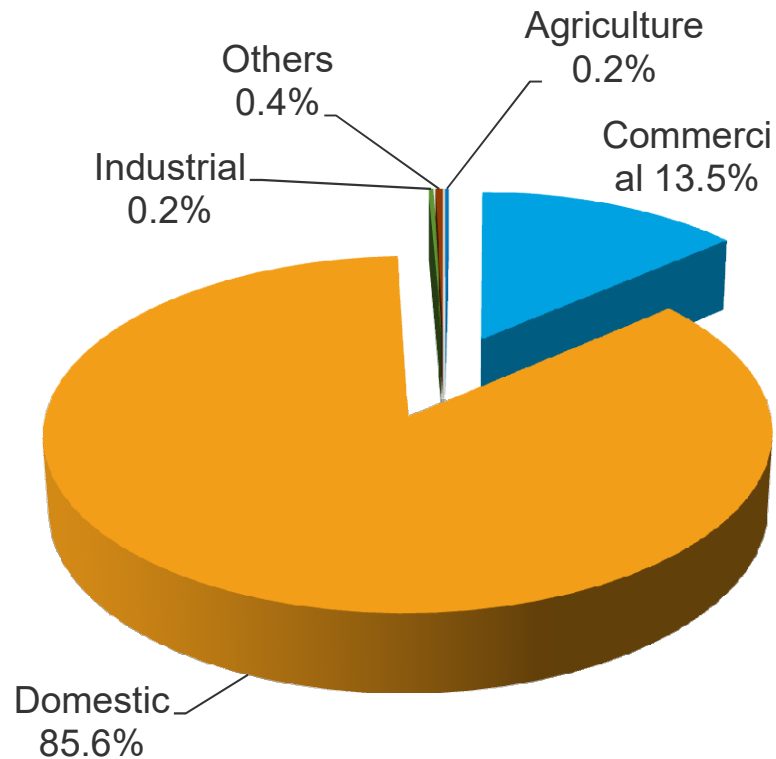
~44% reduction in losses post takeover against 20% rise in a decade up-to privatization

Current Scenario

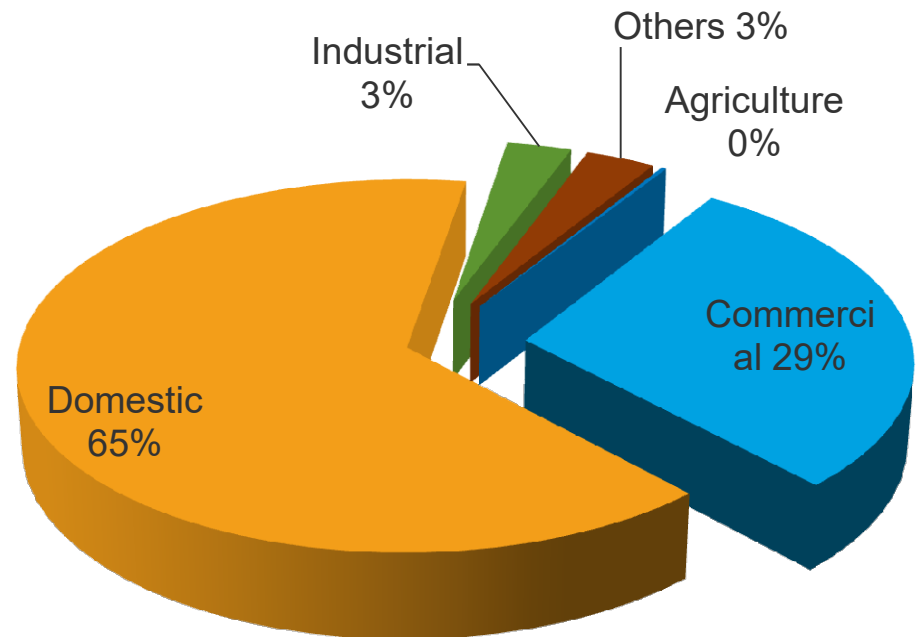
- General Overview:
 - Supply Mix
 - Coal – 68%; Gas – 14%; Hydro – 13%; RE – 3%; Nuclear – 2%
 - Consumer mix – Next slide
- Solar rooftop :
 - Potential in BRPL area – About 500 MWp
 - Installed net-metered capacity – ~52 MWp as on 31st Oct '19
 - Plans/trajectory for future – Expect to Add ~27 MWp more till Mar'19.

Consumer Mix

% of No. of consumer

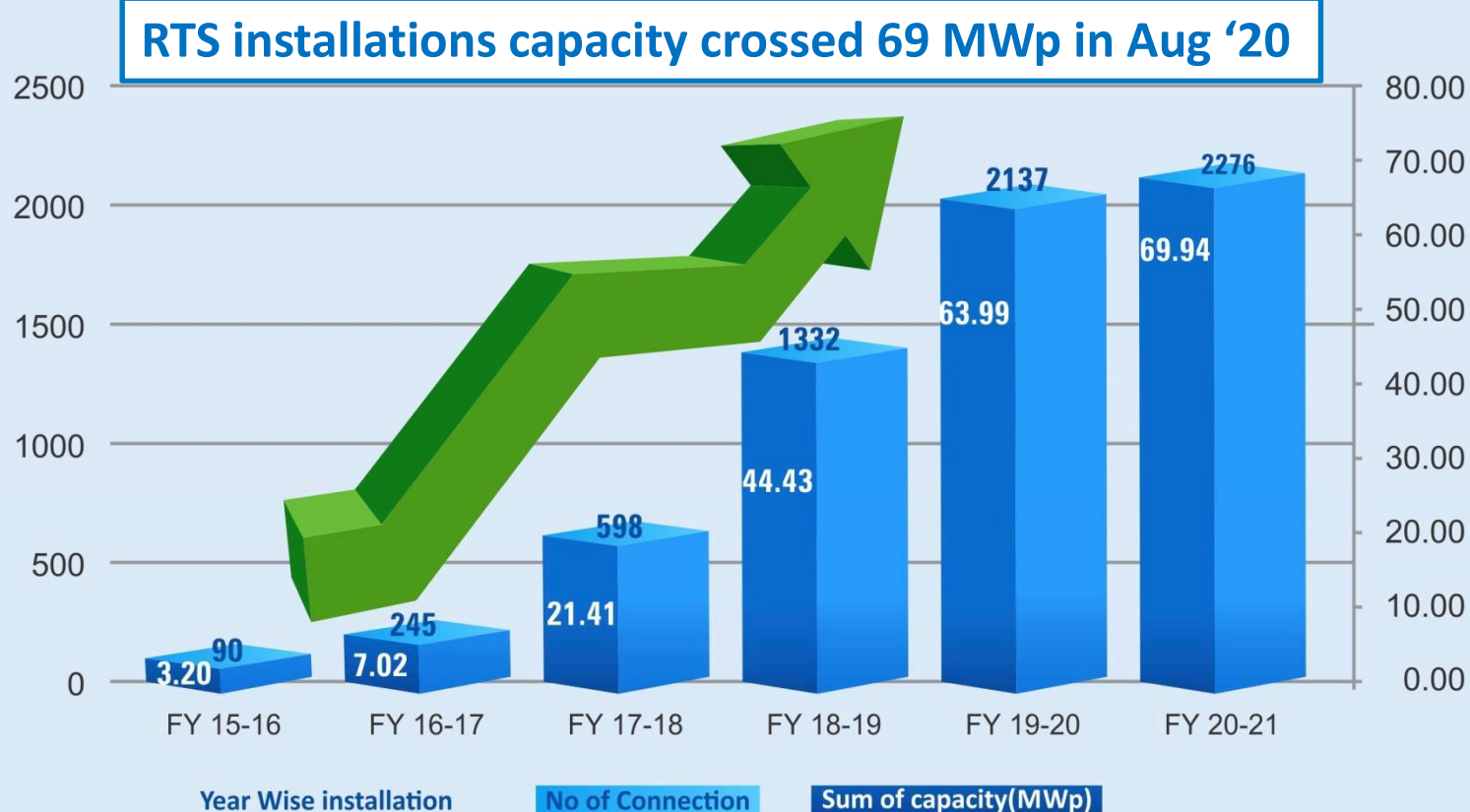


% by Connected load



Domestic load contributes 65% of consumption

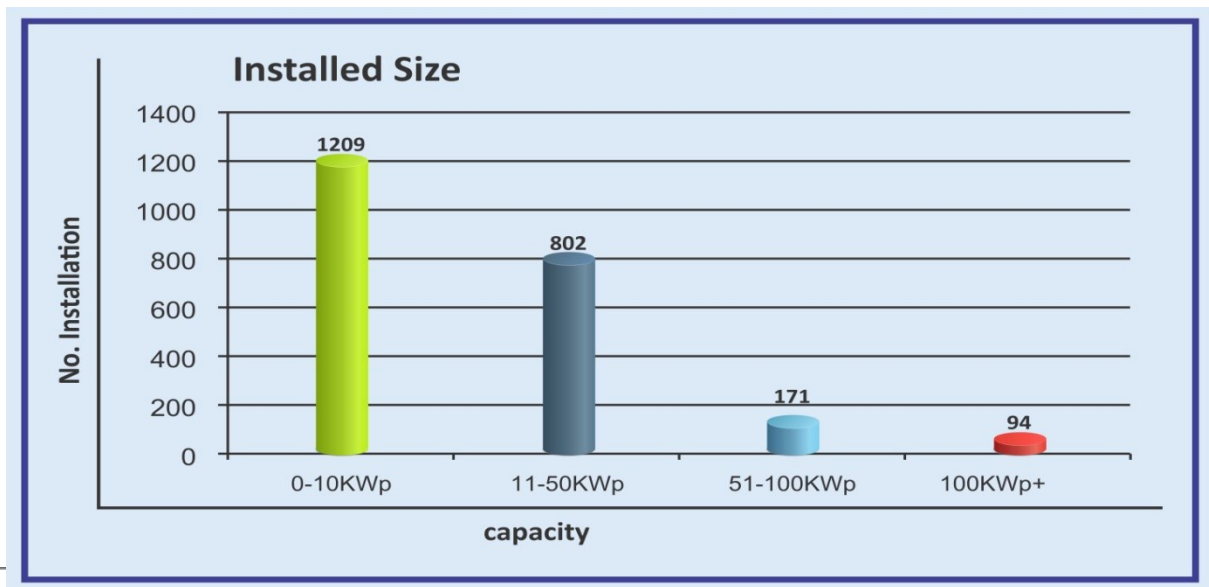
BRPL's Rooftop Journey till YTM Aug 20



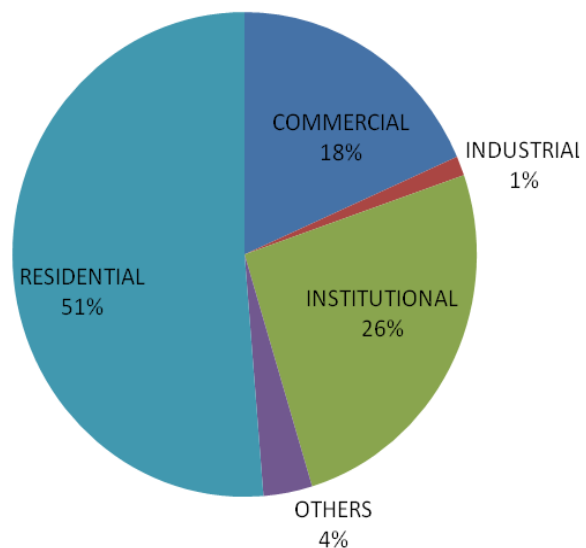
No. of net-meter installations in FY18-19 is higher than cumulative no. of installations in last 3 FYs

Solar tenders supported by WB Suprabha Program

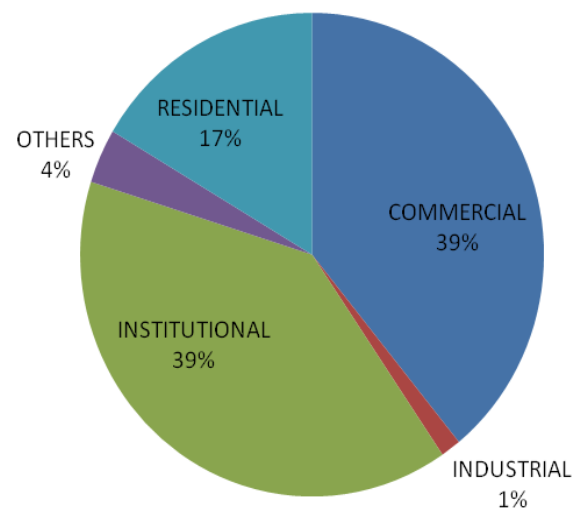
BRPL's Rooftop Journey till YTM Aug 20



No. of net-metered installations



Installed solar capacity



Renewable Energy in Delhi

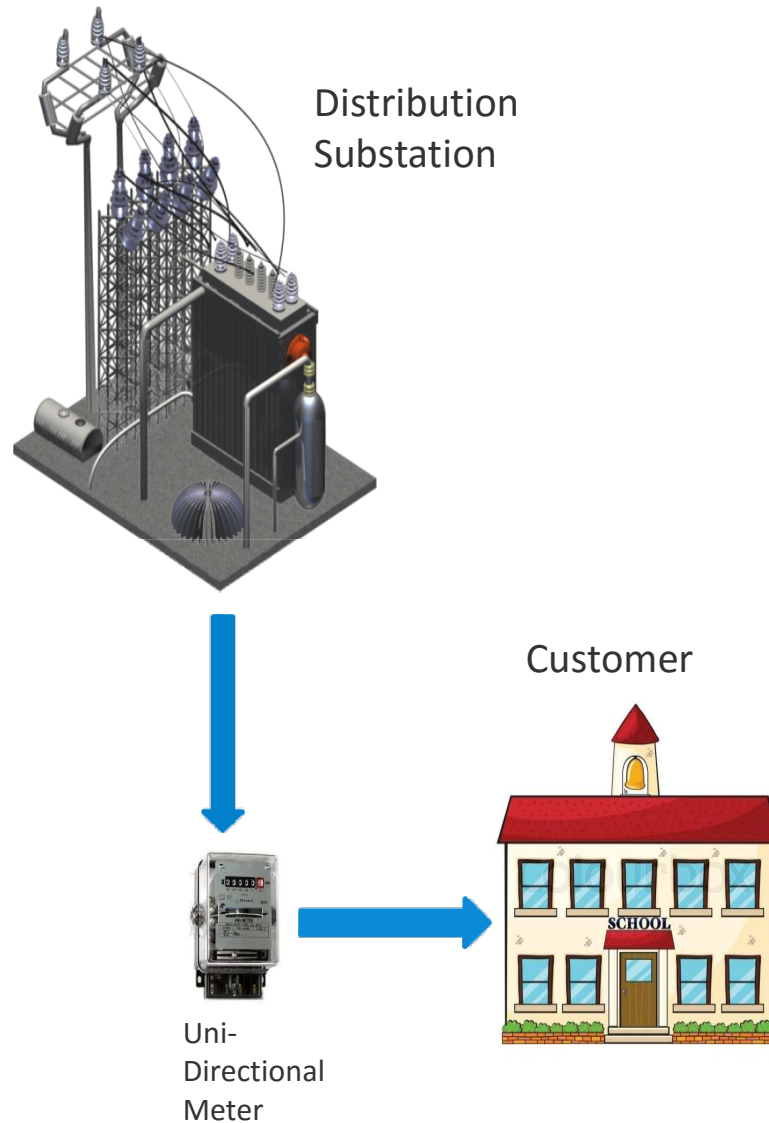
- **Power Demand:** Touched 7400 MW in July '19
 - *65% more than Mumbai, 3 x of Kolkata, 4 x of Chennai*
 - Doubled in past decade ; Increasing by over 6% each year
- **Limited Generation** in Delhi Grid dependent for over 80% of requirement
- **Solar and Waste to Energy** are the two RE sources in Delhi
- **Estimated Solar rooftop potential: ~2000 MW ***
- **Day time peak in Summer** that can be complemented by **Generation from Rooftop Solar PV**
- **Net Metering Regulations** notified by DERC in Dec 2014
- **Delhi Solar Policy** notified in Aug 2016, target of 1503MW by 2022 & 1995MW by 2025, Generation Based Incentive for Residential/Domestic Consumers @ Rs. 2/- per unit

Delhi, with high per capita consumption & income along with horizontal growth offers a unique opportunity to be the Rooftop Solar Capital

** Source: Rooftop Revolution : Unleashing Delhi's Solar Potential, Bridge to India, Greenpeace Report , 2013*

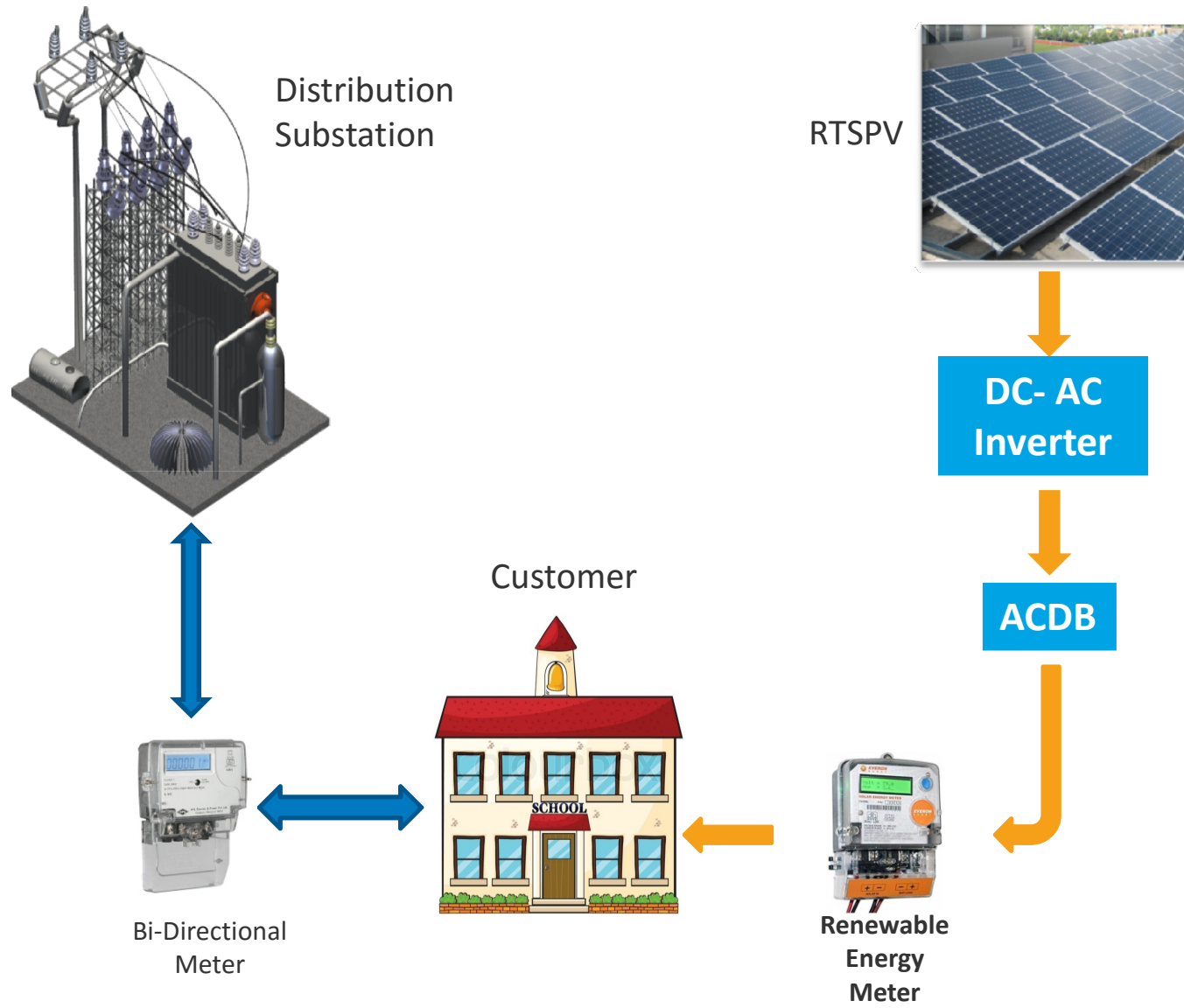
Net Metering and its Benefit for Grid-connected Rooftop Solar for Domestic Consumers in Delhi

Energy Flow Diagram under Net- Metering



Source: <http://solarbses.com/>

Energy Flow Diagram under Net- Metering



Source: <http://solarbses.com/>

Project Economics for a rooftop solar plant at Independent House / Kothi

Installation at Independent House/ Kothi with Slab rate tariff

Average monthly savings per kWp of Solar Capacity

No. of units saved for Billing due to Solar installation and GNCTD subsidy	140	unit (kWh)
Weighted Avg. Electricity Tariff incl. Surcharges, Taxes & Duties*	₹6.19	per unit (kWh)
Savings in Fixed Charges due to GNCTD subsidy**	₹168	
Average monthly savings in Electricity Bill	₹1,034	
Payback period:	2.03	year

Assumptions:

Sanctioned Load: 7 kW

Avg. Monthly Consumption, kWh: 100 units per kW of Sanctioned Load

Solar plant capacity: 5 kWp

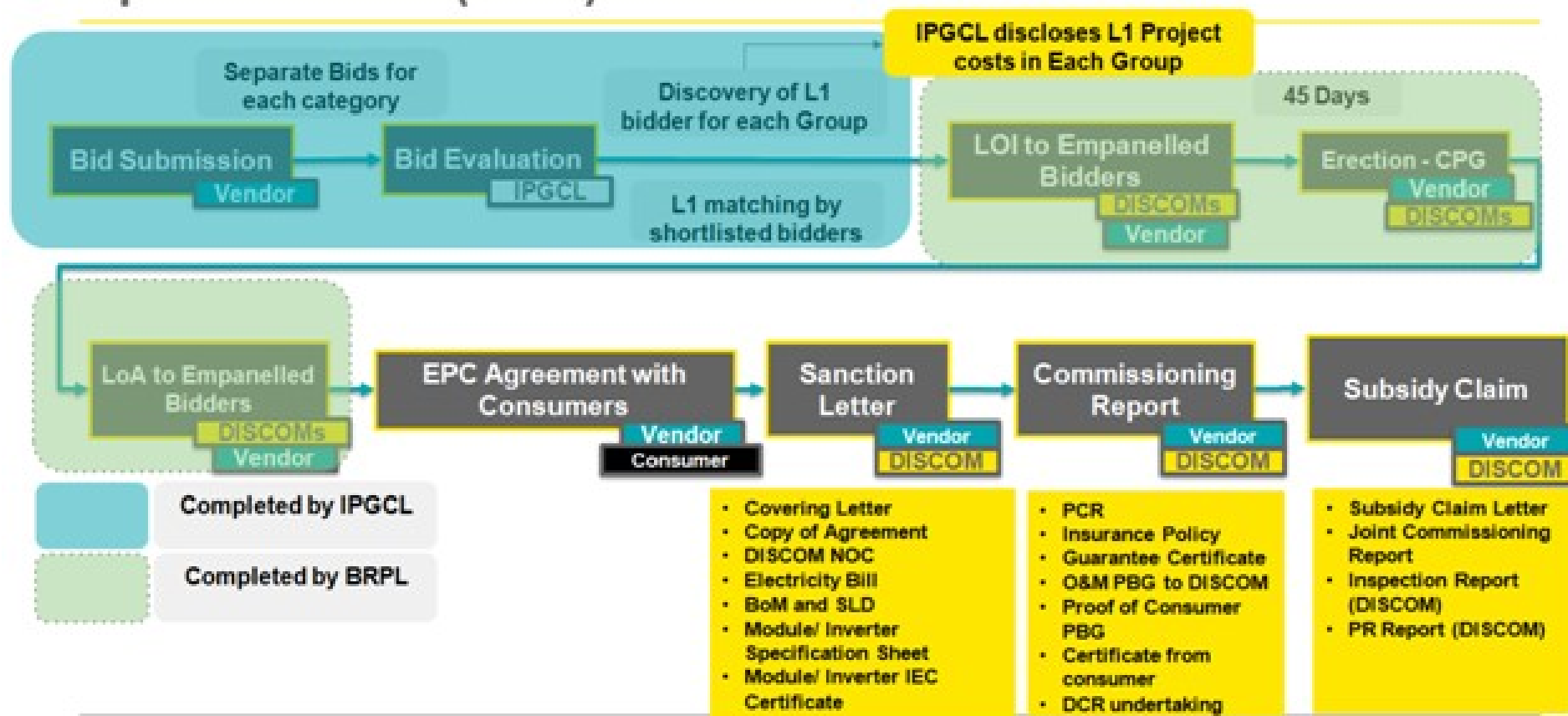
Average monthly solar generation, kWh: 109.5 units per kWp of Solar plant capacity

Self-funded with zero loan

* considered with Weighted Avg Tariff = ₹4.93/ - per unit excl. Surcharges, Taxes & Duties with monthly consumption of 700 units

** As per GNCTD subsidy order, entire bill amount waived off for consumers utilizing upto 200 units per month and subsidy of ₹800/- upto consumption of 400 units per month

Solar Vendor Empanelment & Subsidy



Source: E&Y, WB

Over 22 solar PV integrators empanelled by Discoms under the scheme

Subsidy Disbursement Process

Price of the Project in
CAPEX Part A and E

'Cost to be paid
by Consumer'

'Subsidy'

Total Cost Paid

0.6 X

0.4 X

1

The Vendor shall charge the consumer net of the subsidy amount.

2

The Vendor shall approach the
DISCOM for Subsidy Sanction

3

The Vendor shall install and commissions the
System

4

The Vendor shall submit all the
documents required for release
of subsidy

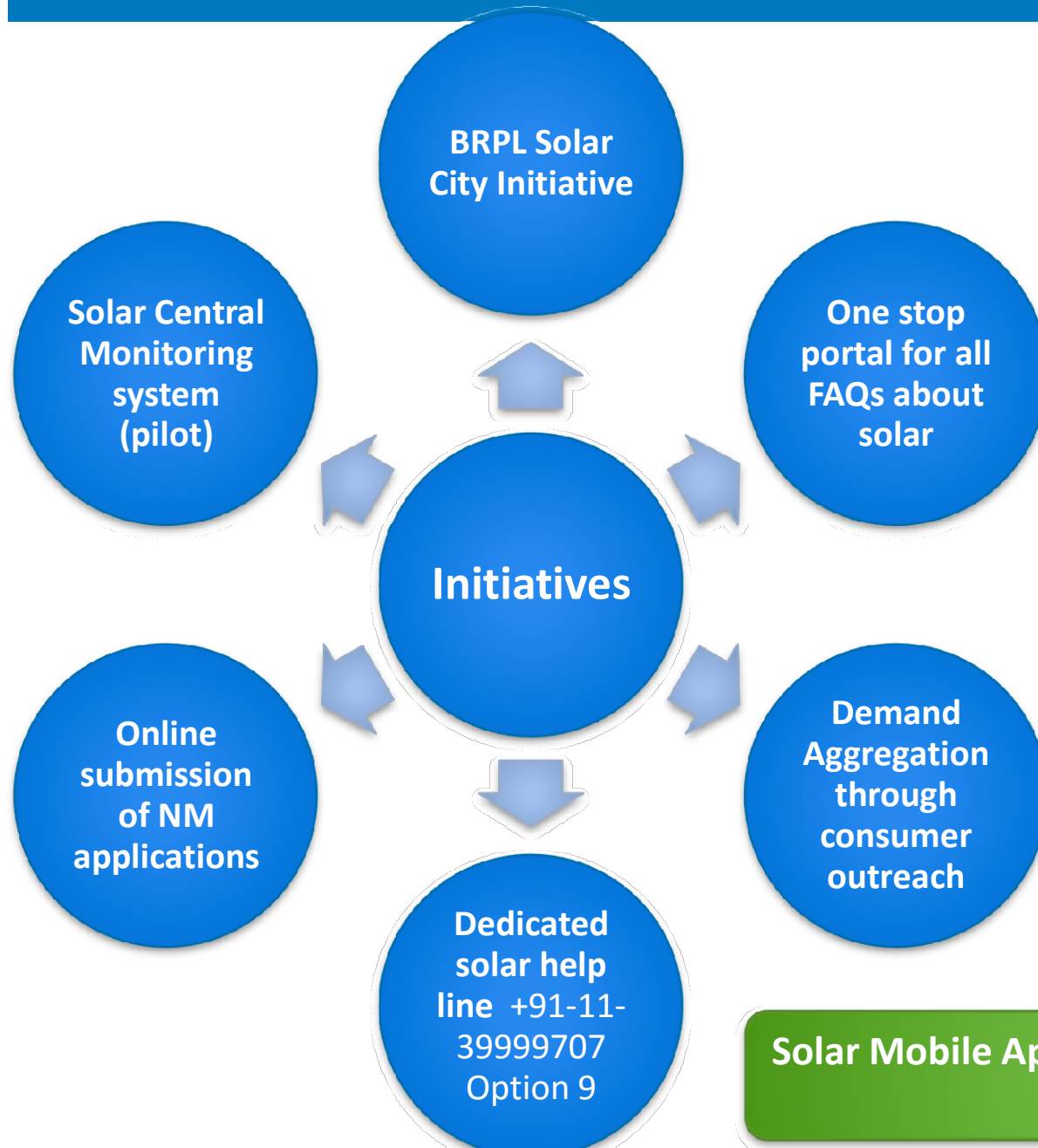
BRPL will submit PCR to
MNRE on a regular basis to
ensure timely release of
subsidy

Post Receipt of CFA amount
from MNRE, BRPL shall
disburse the CFA to the vendors
within 2 weeks (RfP IFB 12.7)

Solar Capacity (kWp)	Subsidy (%)
1 – 3	40%
> 3 – 10	20%

Source: E&Y, WB

Key Initiatives/Recommendation



• Recommendation:

- Utility facilitated Hybrid Model to tap smaller size rooftop installations in residential sector

Solar Mobile App developed under EU-India collaboration

Solar Rooftop Portal - BRPL

Browser window showing the Solar Rooftop Portal - BRPL website.

URL: <https://www.solarbses.com/#>

Navigation menu: Home, About, Solar Rooftop, Apply, Help, Important Links

Logos: BRPL Solar City Initiative, BSES (BSES Rajdhani Power Limited), Solar City Initiative (Solarise Dwarka), giz (Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH), teri (The Energy and Resources Institute)

Main banner text: **BRPL SOLAR CITY INITIATIVE PROMOTING INSTALLATION OF GRID CONNECTED ROOFTOP SOLAR PV UNDER ITS LICENSEE AREA IN DELHI**

Image: Map of Delhi showing the BRPL licensee area in green.

Image: Rooftop solar PV installation.

Text: Avail Central Financial Assistance of 30%* from Ministry of New and Renewable Energy, Govt. of India

Footer: Only secure content is displayed. What's the risk? Show all content

System tray: 11:26 PM, 11/12/2019

Consumer Outreach Activities




BRPL' SOLAR CITY INITIATIVE

India's 1st utility anchored solar rooftop consumer aggregation program

Information booklet



GO SOLAR
for ₹ **22,200/-** per kWp!
(upto a 3 kWp connection)



Sample Calculation									
Plants Installed under CAPEX	Unit Prices discovered in tender (₹ per kWp)	MNRE Benchmark Prices (₹ per kWp)	Applicable Subsidy *	System Size (kWp)	Total Cost of Installation (₹ Lakhs)	MNRE Subsidy** (₹ Lakhs)	Net Cost to Consumer # (₹ Lakhs)	Net Unit Price to Consumer (₹ per kWp)	Remarks
Part-A (1-3 kWp)	37000	54000	40%	3	1.11	0.44	0.67	22200	No raised Structure
Part-B (above 3-10 kWp)	37000	54000	40% up to 3 kWp Plus 20% for system above 3 kW and up to 10 kWp	10	3.70	0.96	2.74	27380	No raised Structure
Part-C (above 10-100 kWp)	37000	48000	40% up to 3 kWp Plus 20% for system above 3 kWp and up to 10 kWp	50	18.90	0.98	17.92	35825	No raised Structure
Part-D (above 100-500 kWp)	33931	45000	40% up to 3 kWp Plus 20% for system above 3 kWp and up to 10 kWp	110	37.32	0.88	34.44	33129	No raised Structure

Webinars with Resident Welfare Associations on weekly basis

Perspective with respect to Solar rooftop

Benefits of Solar Rooftop

- Peak Shaving and Power Purchase cost optimization
- Network congestion relief
- Network upgrade capex deferral
- Reactive Power and Voltage control opportunities
- Avoidance of POC and STU losses in serving load
- RPO benefits

Challenges

- Integration with Grid (DT penetration)
- Lack of viable funding options (CAPEX mode)
- Lack of payment security mechanism, lack of trust, performance (OPEX)

Opportunities perceived

- Solarize roofs in congested network areas
- Introduce battery storage combined with solar PV
- Synchronize with EV charging

Group Net Metering

- Delhi Electricity Regulatory Commission has recently notified (Group Net Metering and Virtual Net Metering for Renewable Energy) Guidelines, 2019
- **Group Net Metering:**
 - Applicable for all consumers of NCT of Delhi
 - Surplus energy generated from RES or BESS charged thru' RES is exported to Grid
 - Exported energy is adjusted in more than one service connections of the **same** consumer **within same Discom** area
 - Surplus units injected into the grid shall be adjusted against the energy consumed in the monthly bill of service connection(s) in a **sequence indicated in the priority list provided by the consumer**
 - **Sequence begins with the connection where RES is located**

Under Phase 2 of RTS, CFA shall be available only if the RES is located on Residential metered connection premise

Virtual Net Metering

- **Virtual Net Metering:**

- Applicable for residential consumers, Group housing societies, offices of Government /Local Authorities and Renewable Energy Generators registered under Mukhya Mantri Kisaan Aay Badhotari Yojna.
- Entire energy generated/injected from a RES or BESS charged through RES is exported to the grid from renewable energy meter/ gross meter
- The energy exported is adjusted in more than one electricity service connection(s) of **participating consumers** located within **the same distribution licensee's area of supply**
- The energy generated from RES shall be credited in the monthly electricity bill of each participating consumer(s) **as per the ratio of procurement from RES indicated under the agreement/ MoU** entered by the consumer(s)

Under Phase 2 of RTS, CFA shall be available only if the RES is located on Residential metered connection premise

GNM and VNM – Key Points

- Annual Generation of RES (with or without BESS) may be capped at a CUF from time to time (Payment of GBI)
- The Discom shall bear SLD and network augmentation cost for Res registered under Mukhyamantri Kisan Aay Badhotri Yojna and same is pass-through in ARR (COD upto 31-Mar-22)
- RES capacity under GNM and VNM – 5 kWp to 5000 kWp
- The solar generation under Net-metering regulation shall qualify for RPO of Discom, if RES is not an obligated entity

Blockchain in Rooftop Solar

- Wonderful Technology for democratization of electricity
- Technology is mature – Multiple players in the market
- Proven in Financial sector; Multiple applications in energy sector
- Key questions to be clarified:
 - Legal provisions for such transaction under the EA
 - Taxation provisions
 - Metering infra and communication backbone
 - Retail Energy Market related regulations
 - As a tool to further GNM and VNM in Delhi



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BSES
BSES Rajdhani Power Limited

Go Solar

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