CER-FSR Symposium

Future of Utilities: International and Indian Perspectives
10-11 Oct. 2018

Future of Utilities: Challenges and Solutions for the Indian Electricity Sector

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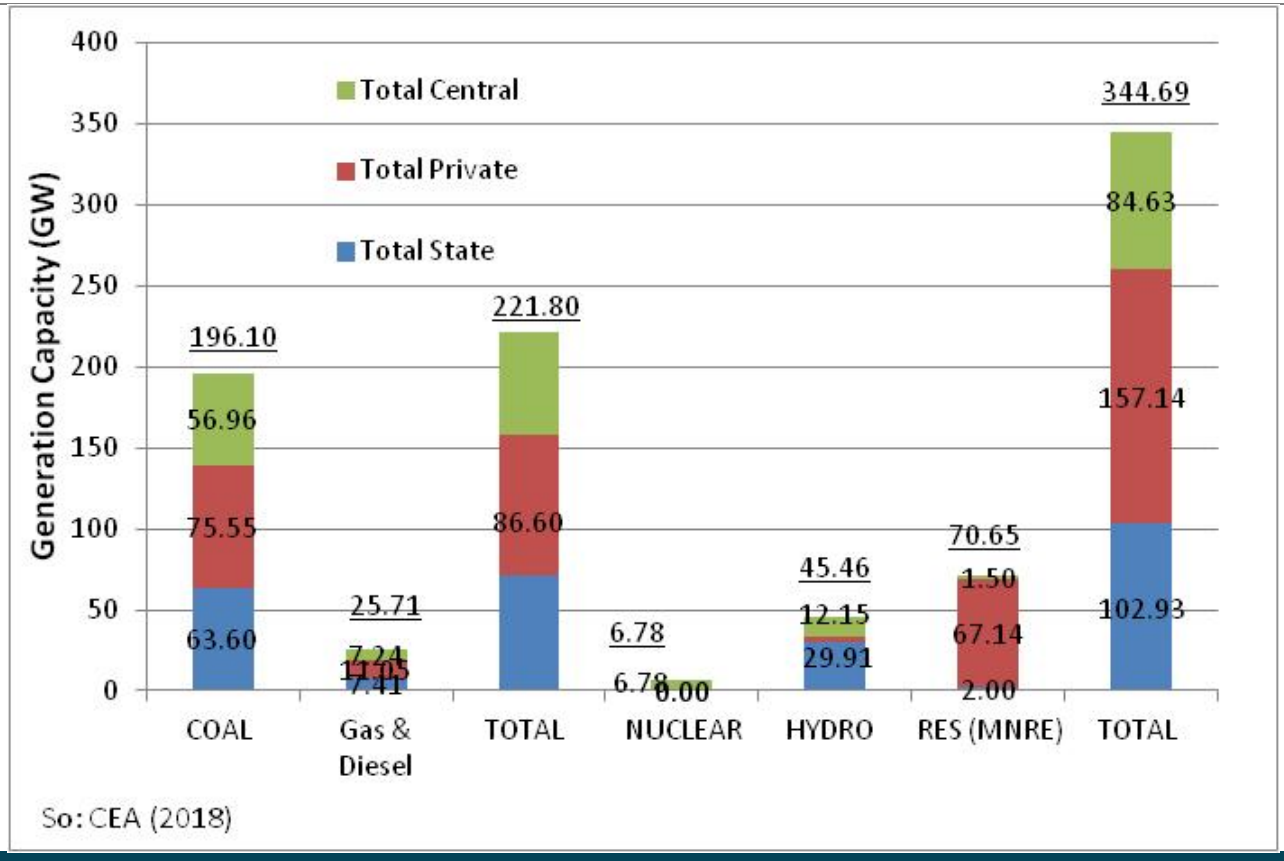
IIT KANPUR

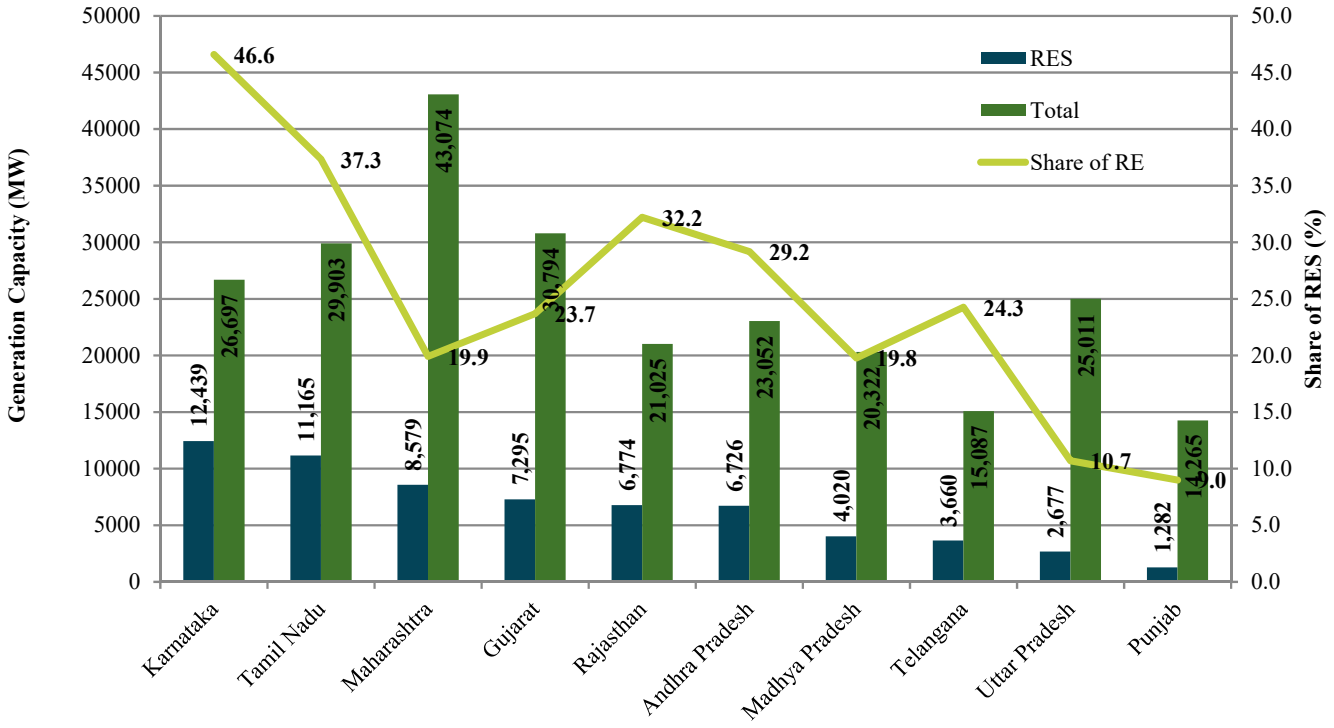
Emerging Challenges for Electric Utilities in India – Regulatory and Policy

- Open Access with gradual reduction in OA Surcharge
- Rooftop Solar – lucrative for cross-subsidising consumers
- RPO Compliance – Feed-in Tariff & REC Market
- Excess PPAs with some state utilities
- Carriage and Content Separation – Retail Competition
- Impact of EVs

All India Generation Capacity (GW) (As on 31 Aug 2018)



Top 10 States - Renewable Energy Capacity (2018)

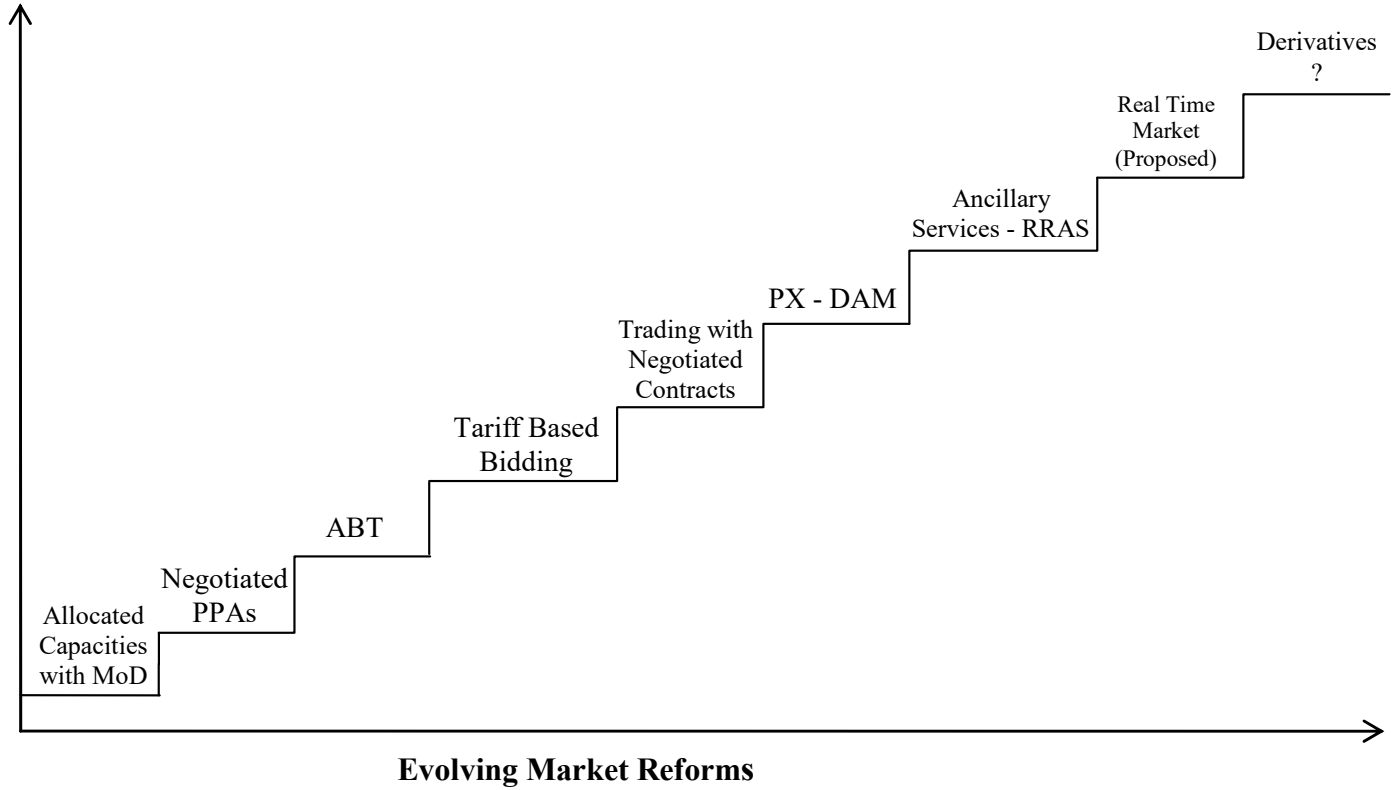


Emergence of Competition and Impact on Electric Utilities

Indian Power Sector Reform Timeline

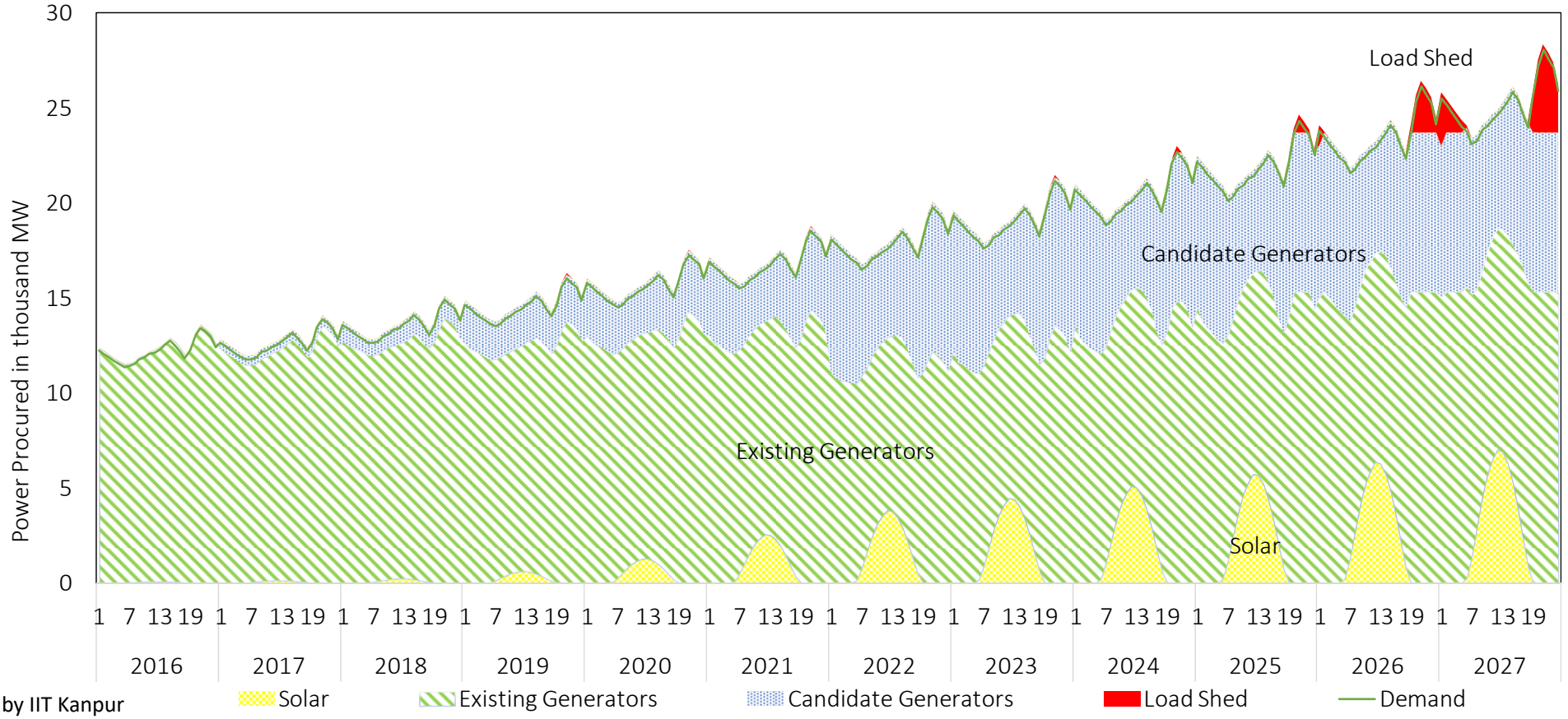
- 1991- Opening up of Power Sector for IPPs (Private Power Policy & Mega Power Policy)
- 1995-97 - Unbundling, regulatory reforms beginning with Orissa, Haryana & AP + +
- 1998 – Electricity Reform Act; setting up of CERC & SERCs
- 2001 - Electricity Bill Introduced
- 2002 - Privatisation of DVB (Delhi)
- 2003 – Electricity Act 2003
- 2005 – National Electricity Policy and Amendments
- 2006 – National Tariff Policy and Amendments
- 2014 – Electricity (Amendment) Bill
- 2018 – Proposed Amendment to Electricity Act

Market Reforms – Quest for a Competitive Order



Re-emphasising Role of the Market

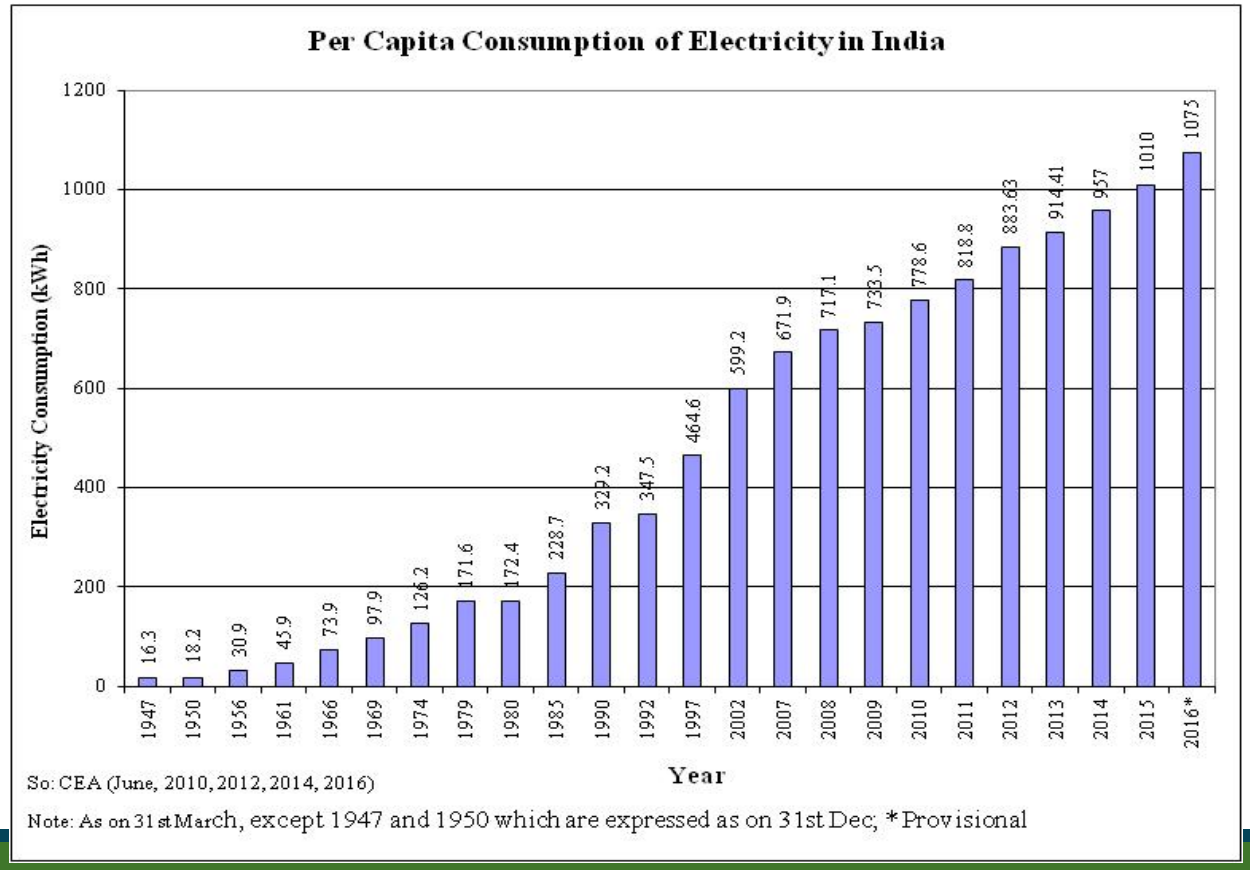
Demand & Gen. Curve for LT Realistic Growth Scenario – Uttar Pradesh



So: Study by IIT Kanpur

From a Darker Past to a ‘Bright’ Future

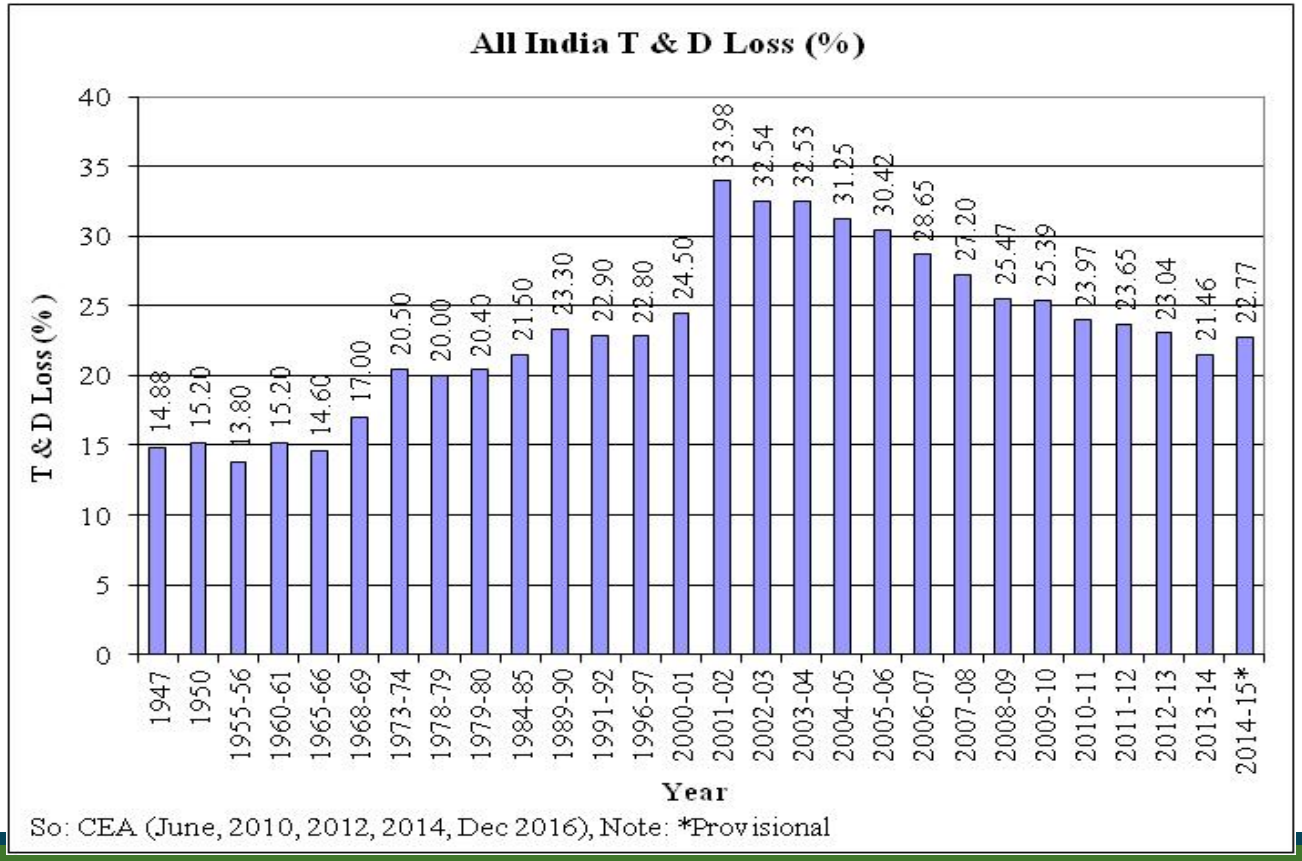
The Past of Indian Utilities…….
Access and Availability



So: CEA (June, 2010, 2012, 2014, 2016)

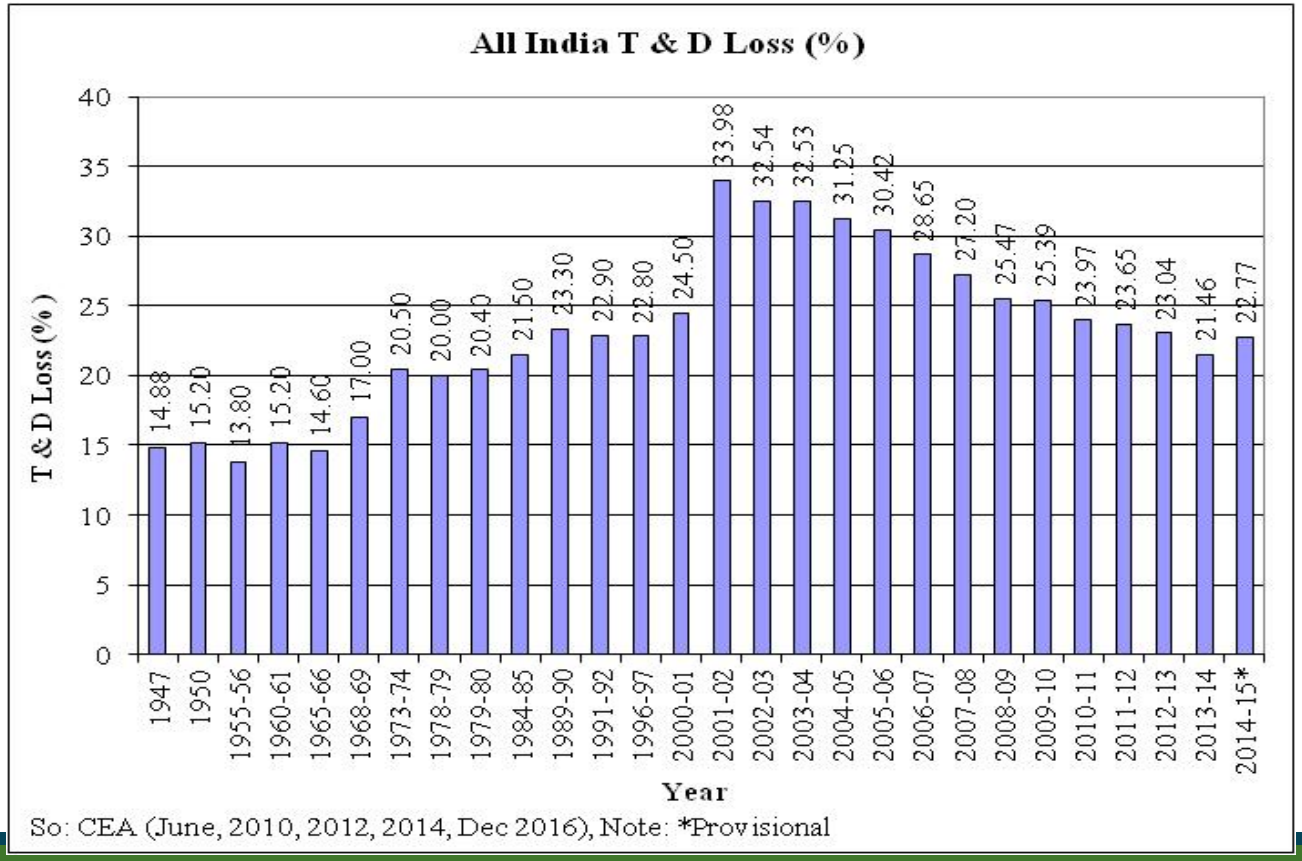
Note: As on 31st March, except 1947 and 1950 which are expressed as on 31st Dec; *Provisional

The Past of Indian Utilities…….
Operational Performance



So: CEA (June, 2010, 2012, 2014, Dec 2016), Note: *Provisional

The Past of Indian Utilities…….
Financial Performance



So: CEA (June, 2010, 2012, 2014, Dec 2016), Note: *Provisional

Financial Turnaround or turning around….

Financial Concerns in the Power Sector

Average revenue realization < average cost of production and supply.

- Accumulated losses: Rs. 3.8 trillion (As on March 2015).
- Outstanding debt: Rs. 4.3 trillion (As on March 2015).

UP Discoms in distress

Rs. 138.02 billion

- Revenue deficit during 2013-14

Rs. 707.38 billion

- Accumulated losses at the end of September 2015.

Rs. 532.11 billion

- Outstanding debt level at the end of September 2015.

UDAY Scheme

- UDAY- Ujwal Discom Assurance Yojana.
- Launched in November 2015 by Ministry of Power to revive financially stressed Discoms.

Four initiatives of UDAY scheme:

- Improving operational efficiencies of Discoms.
- Reduction of cost of power.
- Reduction in interest cost of Discoms.
- Enforcing financial discipline on Discoms through alignment with state finances.

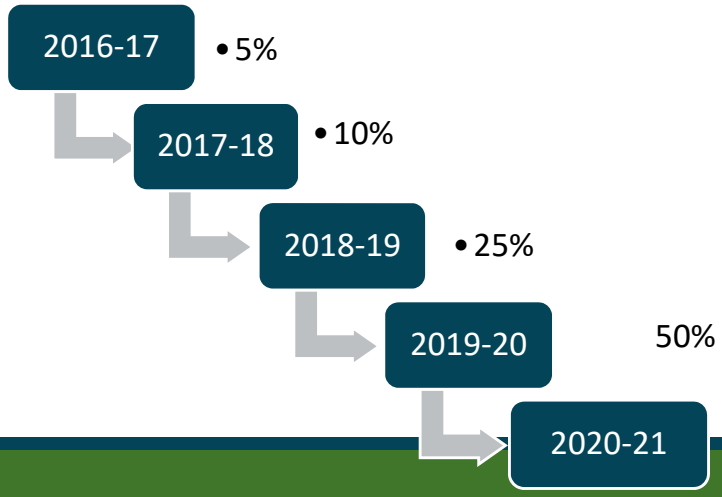
UP's UDAY Scheme - salient features

States shall take over 75% of DISCOM debt as on September 30, 2015 over two years:

- 50% in 2015-16.
- 25% in 2016-17.

GoI will not include this debt in calculating fiscal deficit of states.

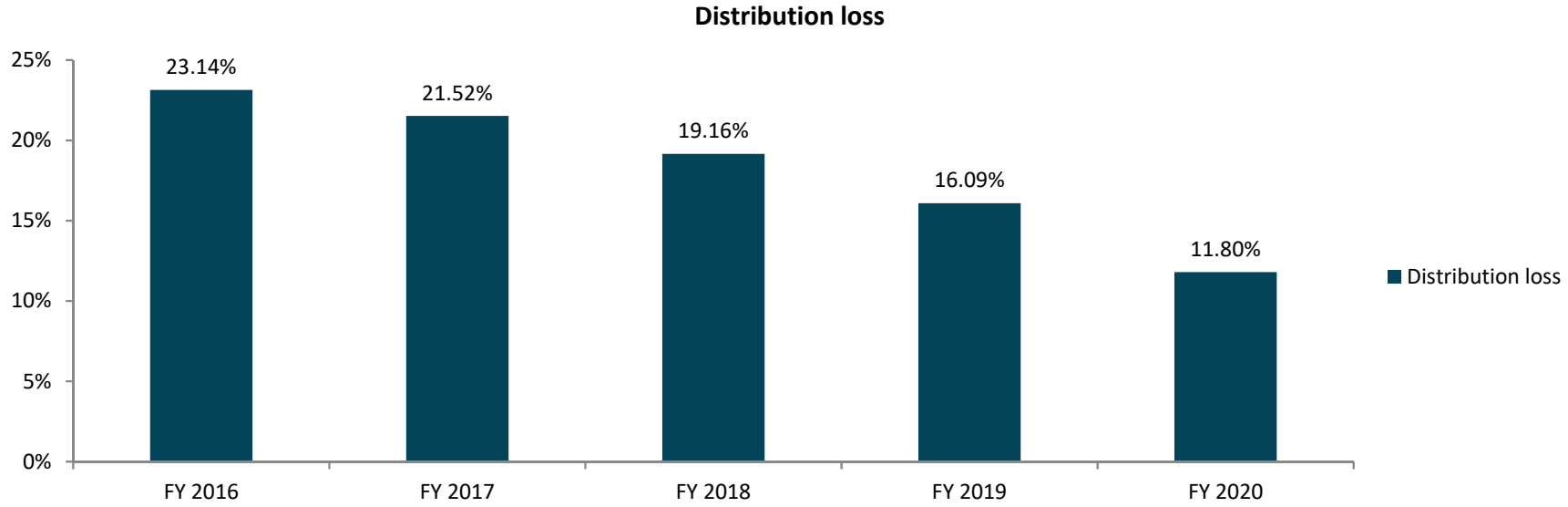
States shall take over the future losses of DISCOM in a graded manner:



UP Discoms vis-à-vis UDAY

As per MoU for UP, Discoms of UP shall fulfill RPO obligation 3 years after the DISCOMs reach break even ,i.e. the financial year 2019-20.

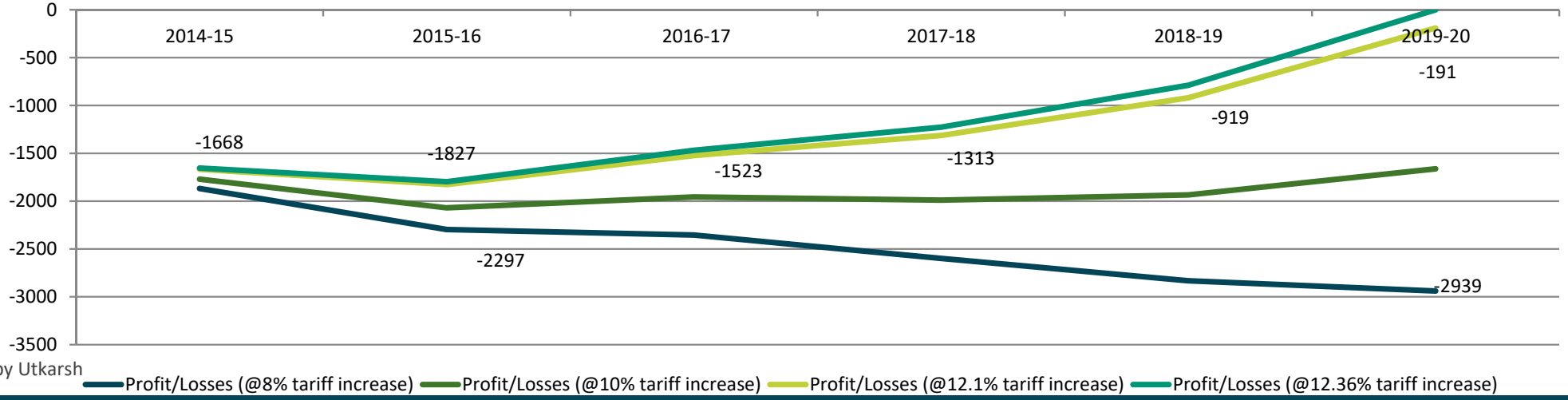
Target distribution loss trajectory of MVVNL:



UDAY Vs Political Will – Required Tariff increase in Uttar Pradesh (MVVNL)

Projected Loss with Distribution losses as per UDAY scheme, without state takeover of losses

Profit/loss (in Rs. Crore)	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
8% tariff increase	-1868	-2297	-2354	-2598	-2832	-2939
10% tariff increase	-1770	-2070	-1956	-1989	-1935	-1662
12.1% tariff increase	-1668	-1827	-1523	-1313	-919	-191
12.36% tariff increase	-1655	-1797	-1468	-1227	-788	0

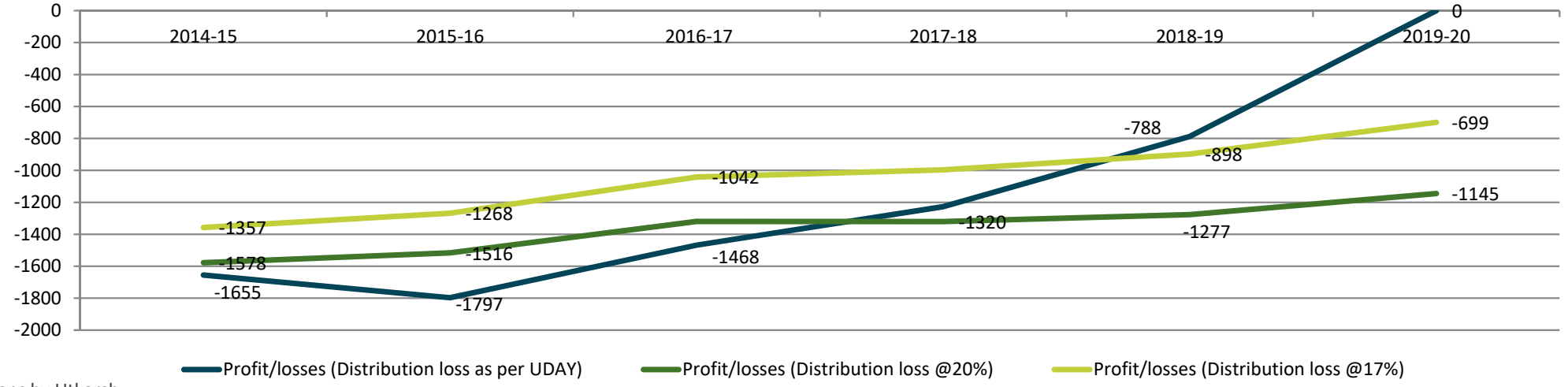


Calculations by Utkarsh

UDAY Vs Political Will – Required Tariff increase in Uttar Pradesh

Profit/ loss prediction-Annual tariff increase :12.36% at different levels of distribution losses, without state takeover of losses:

Profit/ Loss (in Rs. Crore)	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Distribution loss as per UDAY	-1655	-1797	-1468	-1227	-788	0
Distribution loss @20%	-1578	-1516	-1319	-1320	-1277	-1145
Distribution loss @17%	-1357	-1268	-1042	-996	-898	-699



Calculations by Utkarsh

UP (MVVNL) – Loss Trajectory with Rooftop PV Growth

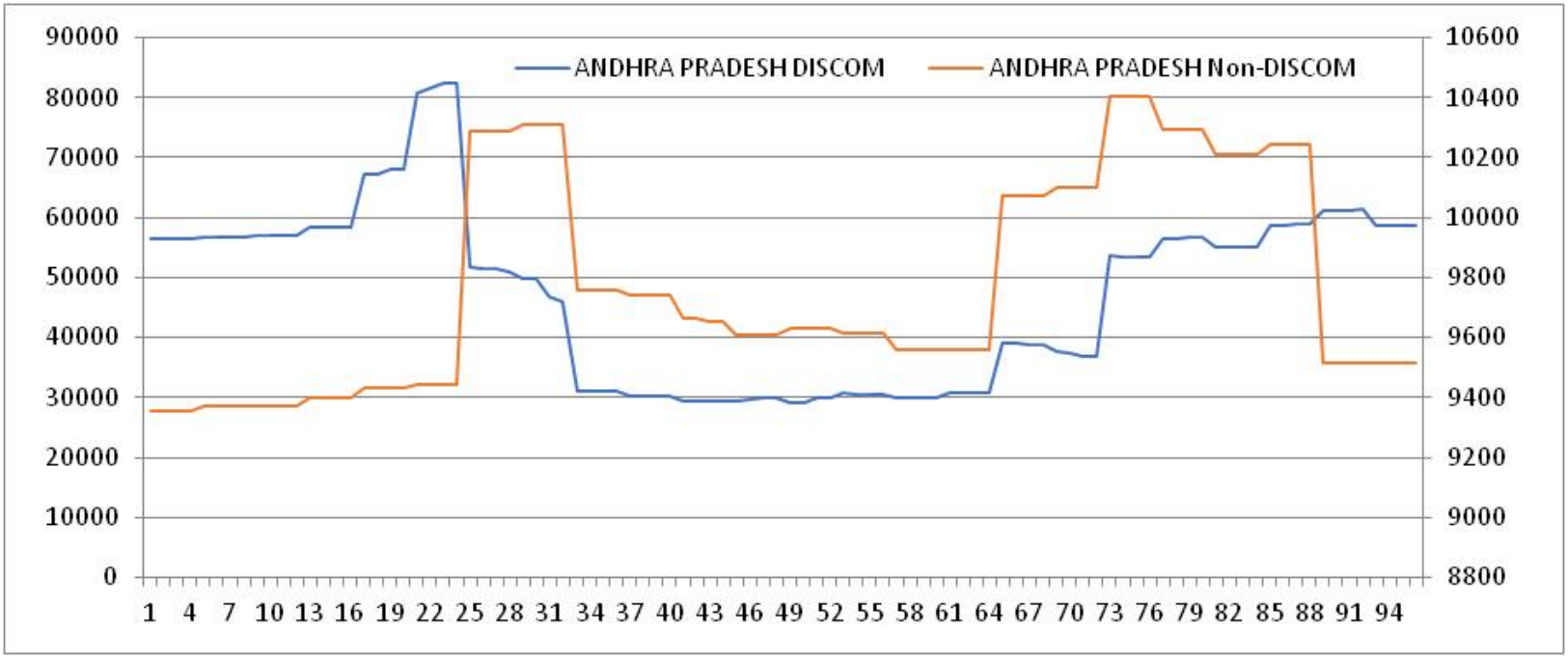
Total losses including losses due to solar rooftop PV systems

Loss (in Rs. Crore)	2017-18	2018-19	2019-20	2017-18	2018-19	2019-20
Distribution loss	19.16% (UDAY)	16.09% (UDAY)	11.8% (UDAY)	20%	19%	18%
Simulation Set (Type A)	-1310.66	-947.83	-202.11	-1404.53	-1303.27	-976.79
Simulation Set (Type B)	-1316.69	-962.85	-228.45	-1410.63	-1318.72	-1004.39
Simulation Set (Type C)	-1322.73	-977.87	-254.80	-1416.73	-1334.16	-1031.99
Simulation Set (Type D)	-1334.80	-1007.92	-307.49	-1428.92	-1365.05	-1087.20

Calculations by Utkarsh

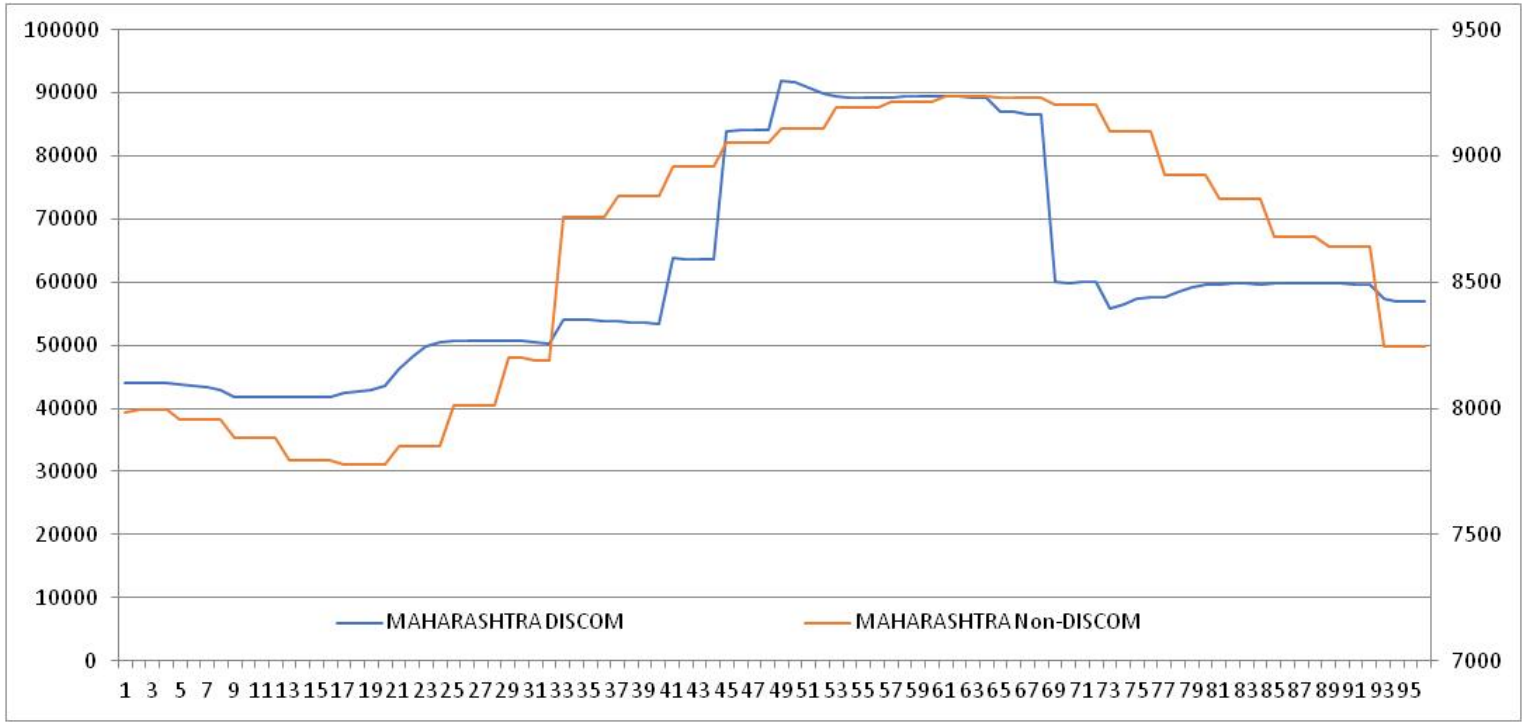
Distribution Utilities –
Resisting Open Access, but harnessing market for procurement

Open Access Energy Trade – Andhra Pradesh – Utility Vs Non-Utility (MWh)



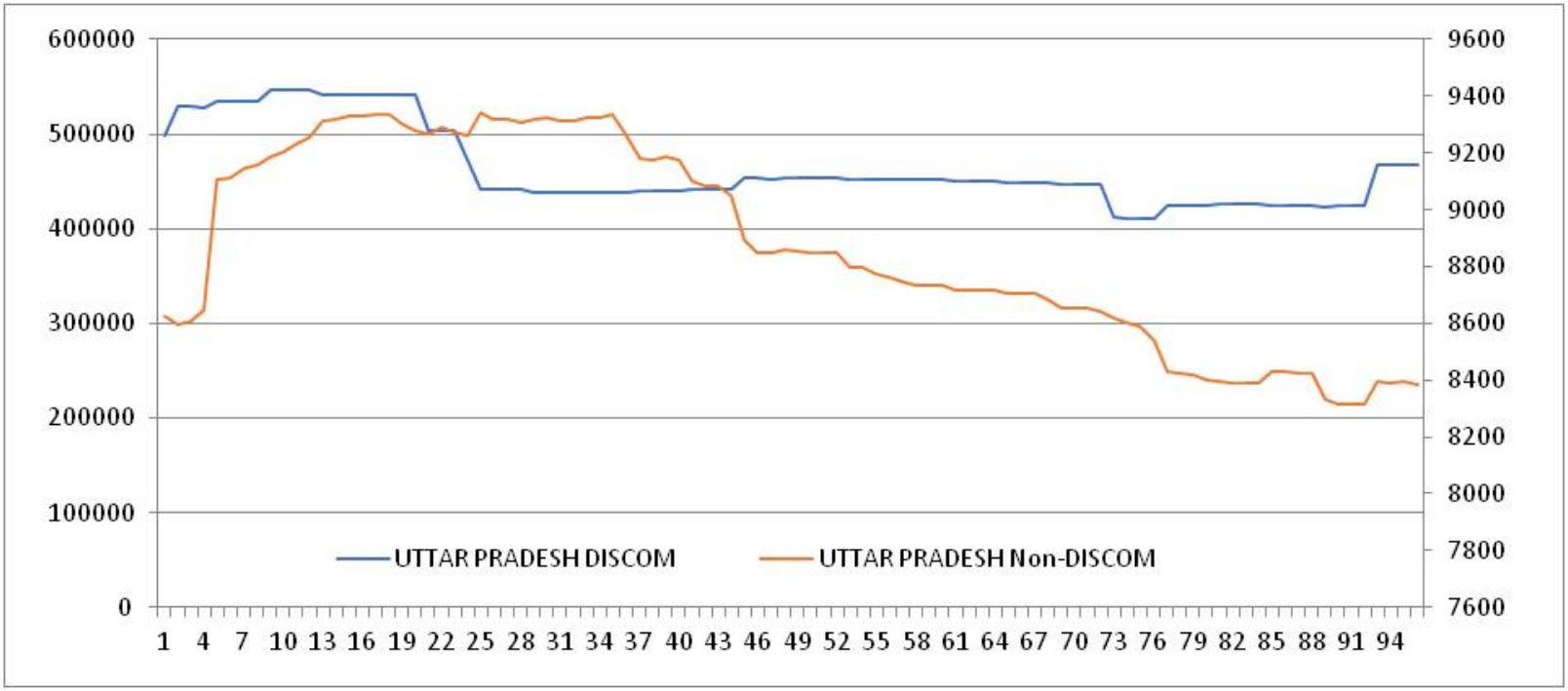
So: Analysis by EAL, IIT Kanpur

Open Access Energy Trade – Maharashtra – Utility Vs Non-Utility (MWh)



So: Analysis by EAL, IIT Kanpur

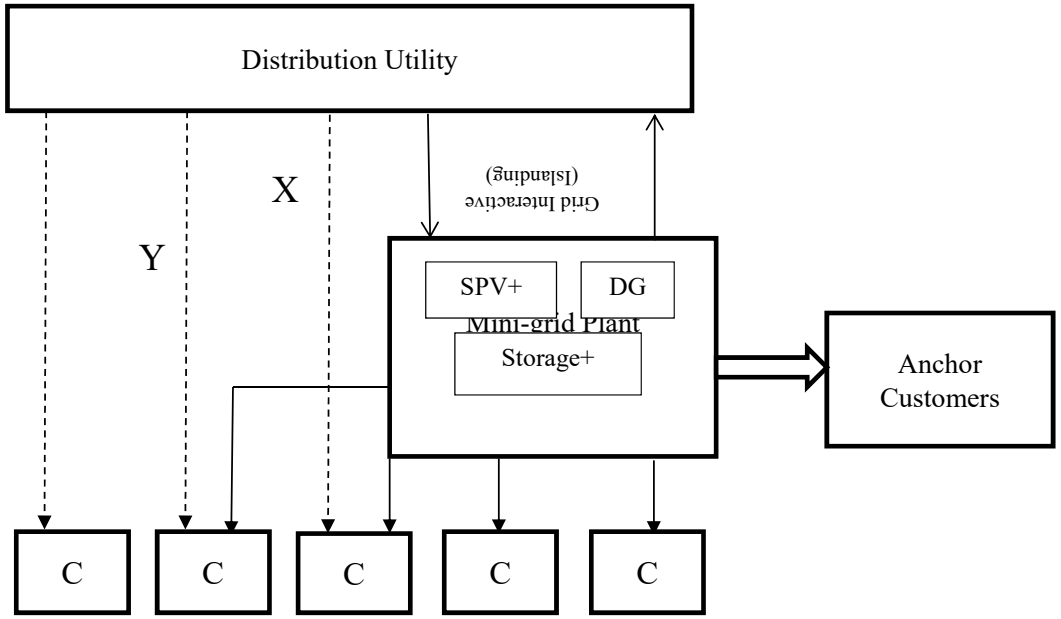
Open Access Energy Trade – Uttar Pradesh - Utility Vs Non-Utility (MWh)



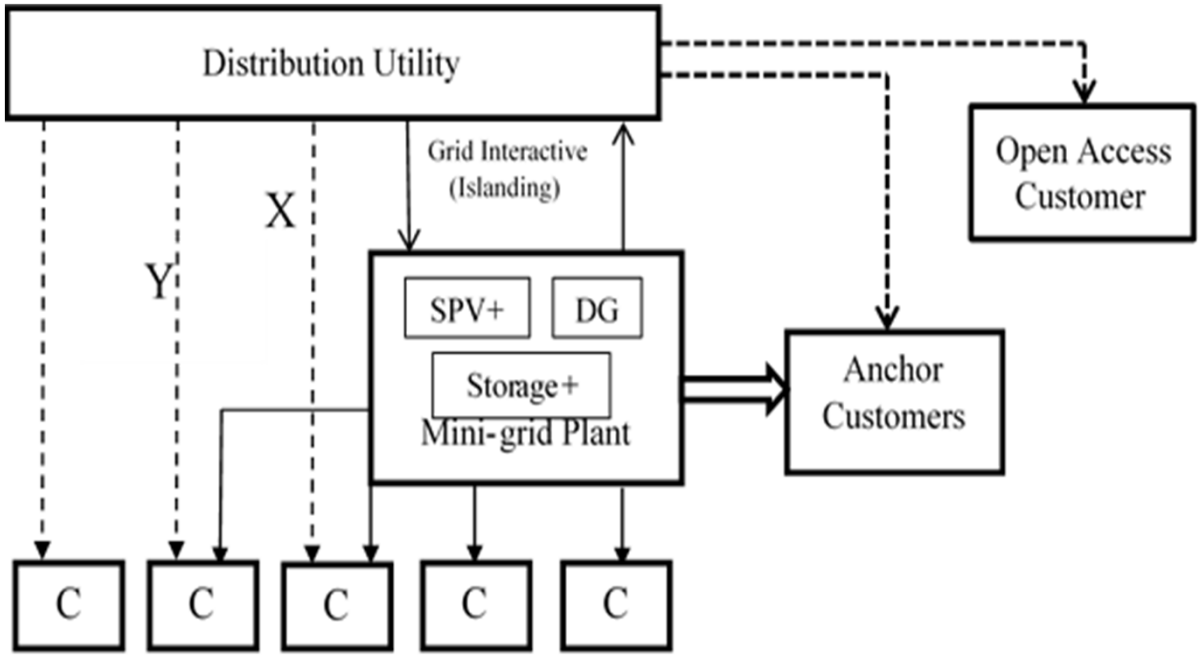
So: Analysis by EAL, IIT Kanpur

Are mini-grids a Challenge or part of the solution?

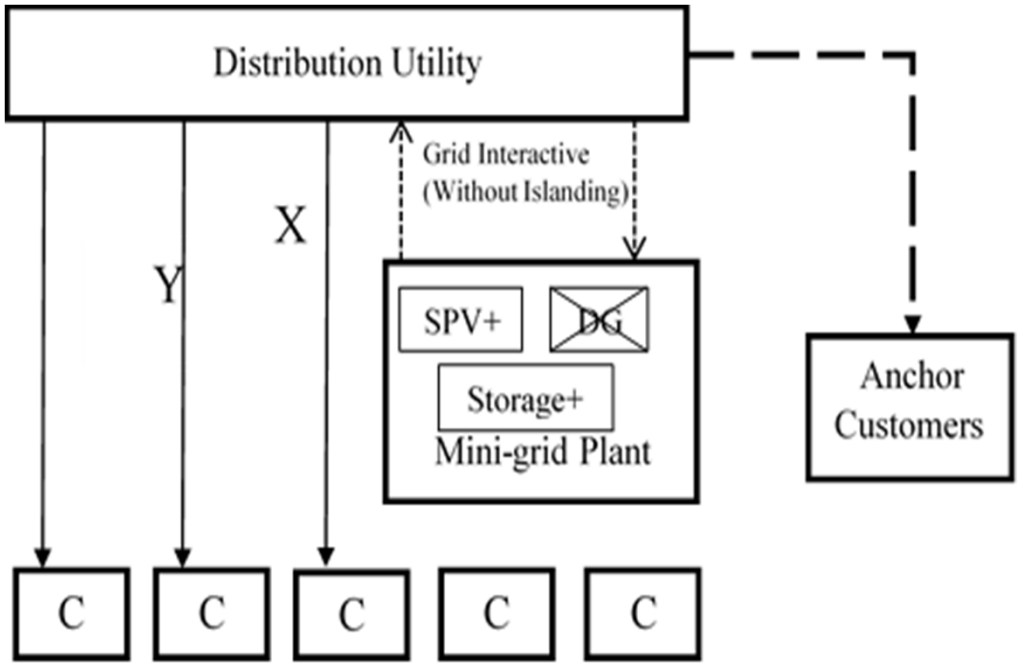
Mini-grids - Existing Business Model



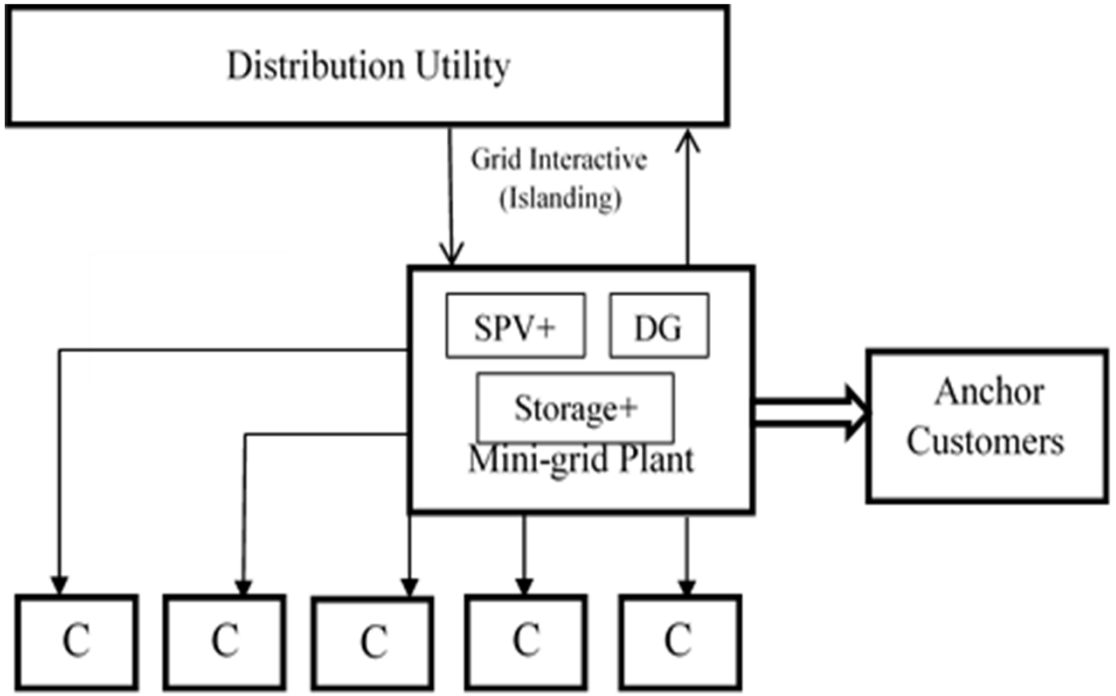
Mini-grids as grid interactive RE plant



Distribution Ancillary Service Model?

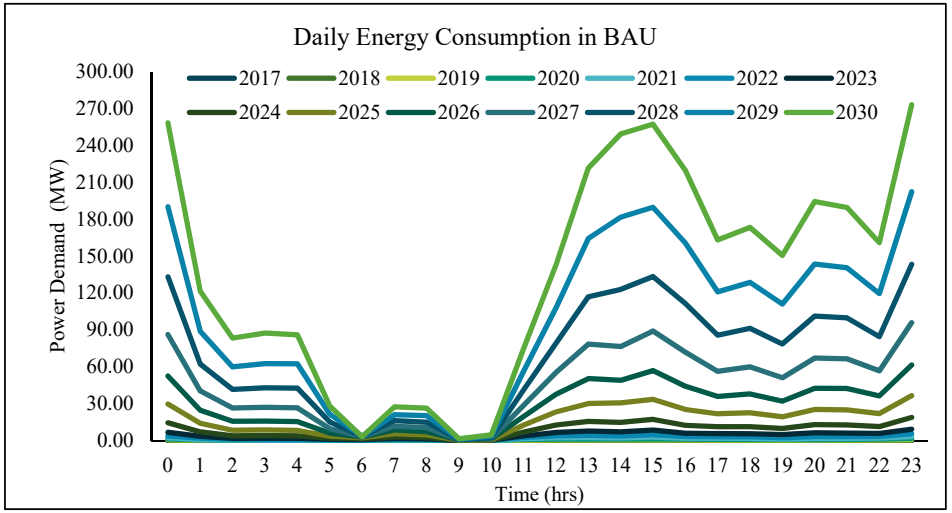


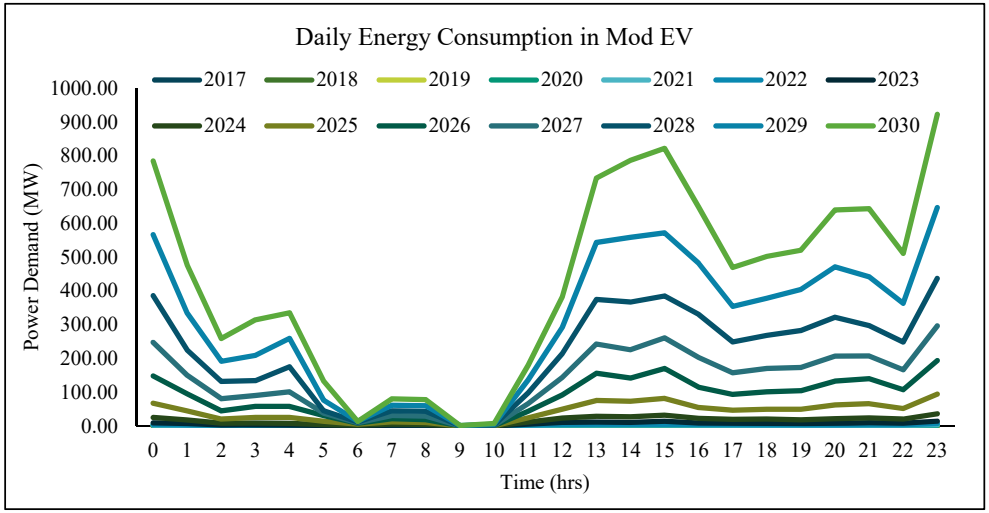
Mini-grids as Distribution Franchisee or ‘Peer-to-Peer’ Market?

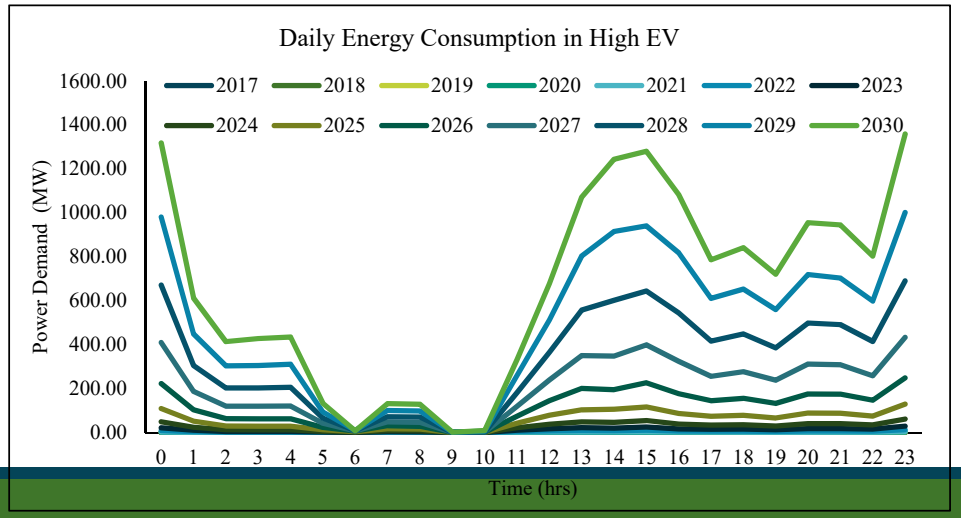


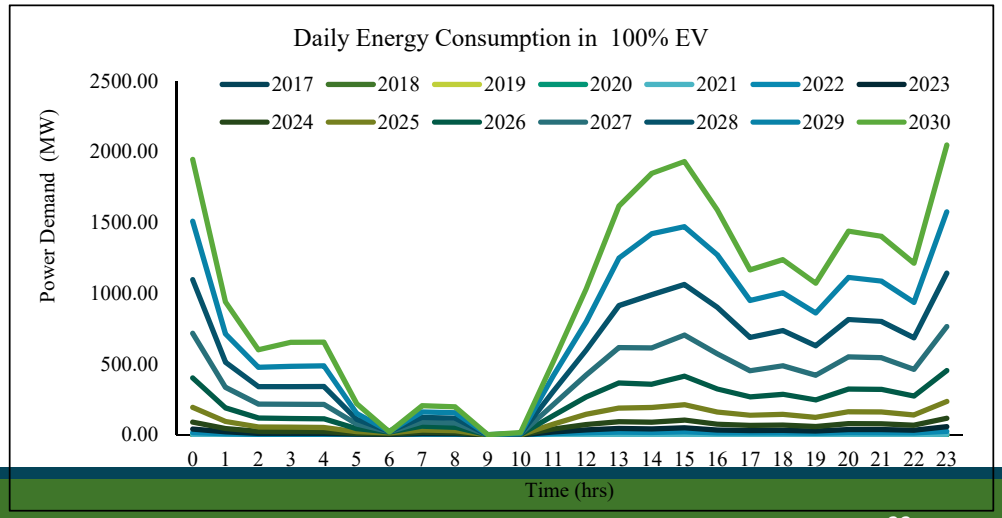
Are EV’s Disruptive?

Electricity Demand for EV Charging – Case of Delhi



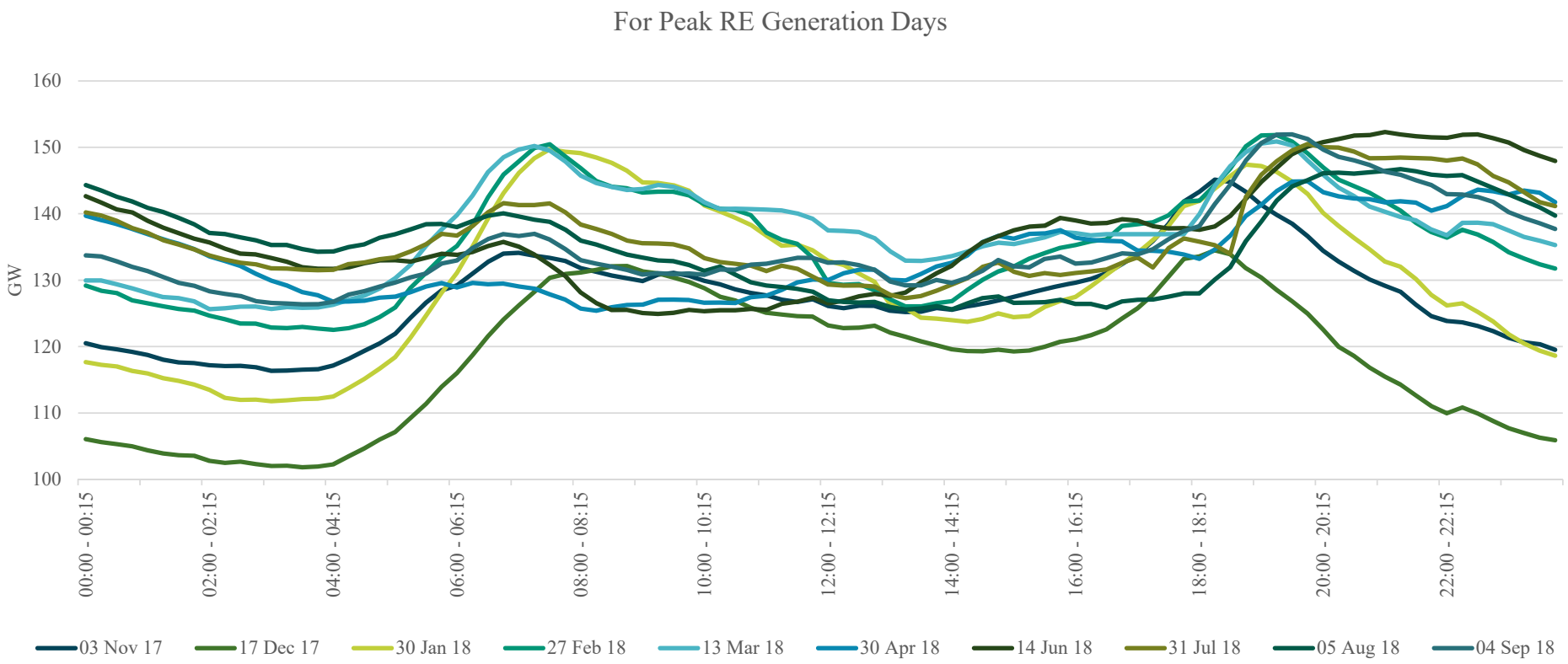






Is RE Disruptive – seems to be

Emerging Duck Curve with growing RE



* Solar, wind, Small hydro and bio-mass has maximum generation load

Are Regulators and Policymakers Demanding?

Recent Developments

- Amendments to the Tariff Policy
- Real Time Market
- (Fast Response Ancillary Services?)
- Proposed Amendments to the Electricity Act 2003

Proposed Amendments to Electricity Act 2003 (2018)

- Separation of Carriage and Content: Distribution and supply are defined explicitly and to be segregated [1]. ➔ Retail Competition
- Renewable Generation Obligation and Renewable Energy Service Company introduced, along with the existing Renewable Purchase Obligation[1].
- Distribution/supply licensees to be obligated to supply 24×7 power [42]
- Mandatory metering of electricity consumption, and Direct Benefit Transfer (DBT) [45];
- Regulatory Scrutiny/control over Power Purchase [42, 49]

Proposed Amendments to Electricity Act 2003 - Impact on Utilities

Proposed Amendments	Impact	How to Address
Separation of Carriage and Content: Distribution and supply are defined explicitly and to be segregated [1].	- 'Legacy' Network losses? - Cherry Picking of Consumers	- Metering of all supplies, DTs/Feeders for energy accounting - Freedom to offer 'menu of tariffs'
Renewable Generation Obligation (RGO)	- RGO already present in some form (e.g. RE bundling by NTPC)	- Presence of RGO and RPO may have operational challenges - Strengthen REC Market for compliance
Distribution/supply licensees to be obligated to supply 24×7 power [42]	- How to ensure this with C & C separation? - Who would be penalised for 'network' issues rather than supply issue?	- Strengthening and automation of distribution system with effective monitoring - Should provide for Reliability based (curtailable) tariff
Mandatory metering of electricity consumption, and Direct Benefit Transfer (DBT) [45];	- Improved estimation of distribution loss	- Need to be further strengthened by mandating electricity supply only based on metered consumption
Closure Regulatory Scrutiny/control over Power Purchase [42, 49]	- Return of intrusive regulatory regime	- Better SoP Compliance mechanism with incentive/ disincentives

Full Retail Competition – Story of developed world

Context of retail competition

- Private Utilities
- Commercially operated
- Strong metering infrastructure
- Consumers aware supported with vibrant consumer organisations
- Consumer end generation (PV) and storage yet to emerge

New realities

- Significant inroads by Solar PV and Storage
- Growth of Electric Vehicles
- Distributed Microgrids

Full Retail Competition – The Emerging India Story

Access of electricity to all yet to be achieved

Large consumption remains unmetered

High Distribution losses (theft)

Lopsided tariffs – leading to cherry picking

Subsidy and Cross-subsidy

Success of telecom

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