Idam

Idam Infrastructure Advisory Pvt. Ltd.

Maharashtra Power System Transformation Workshop

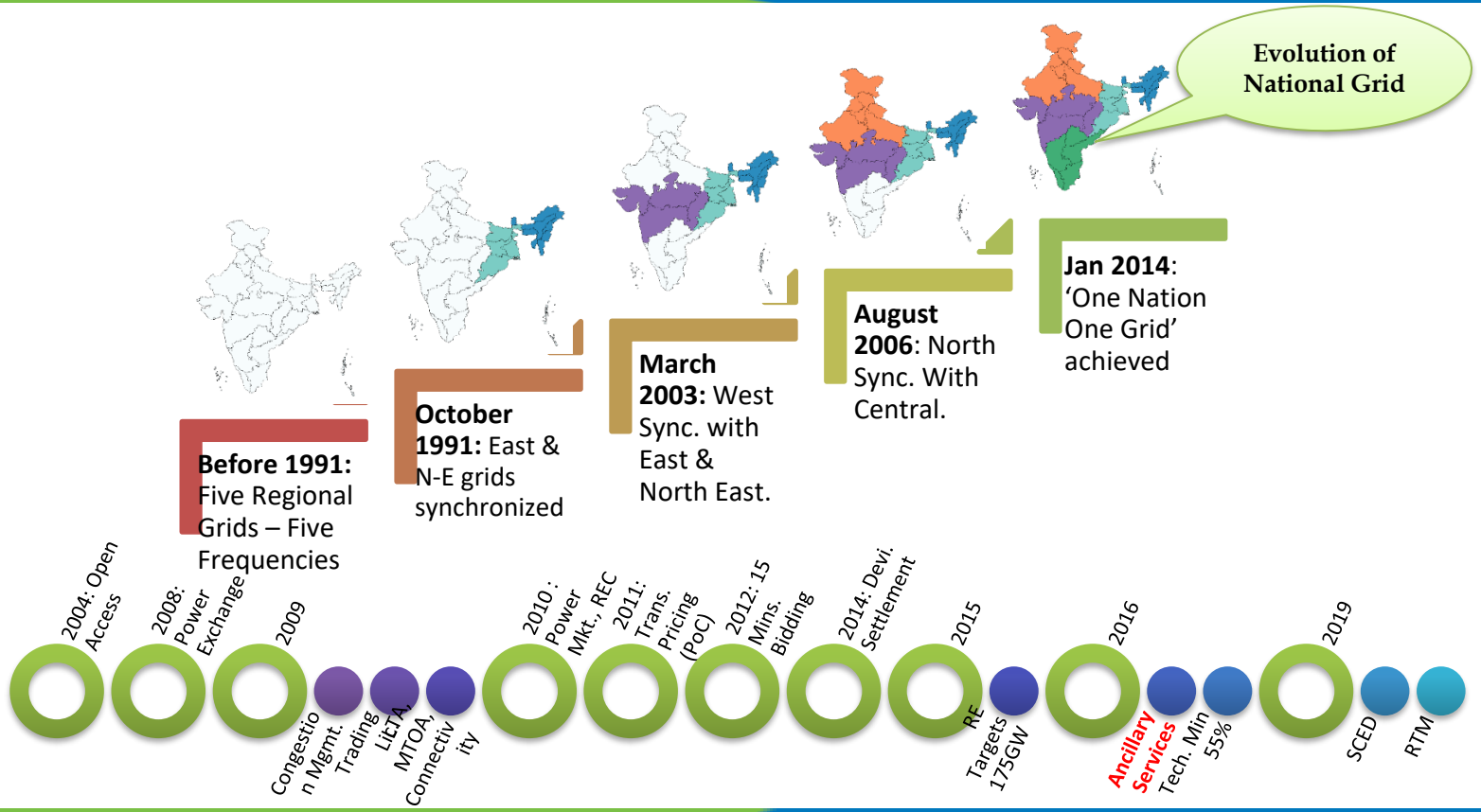
NITI Aayog

iea

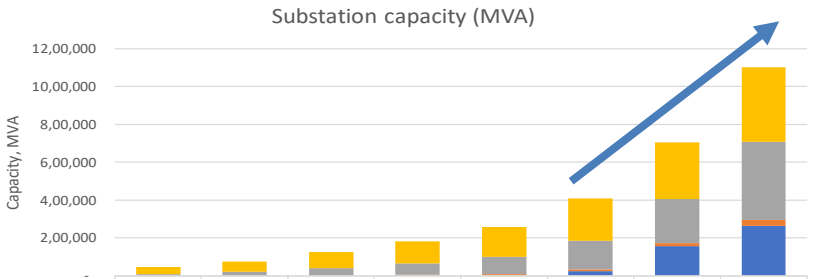
A renewed view on system operation and planning:
Role of Transmission Planning, pricing for high VRE in Maharashtra

18 February 2020

Evolution of Indian Electricity Grid & Market framework

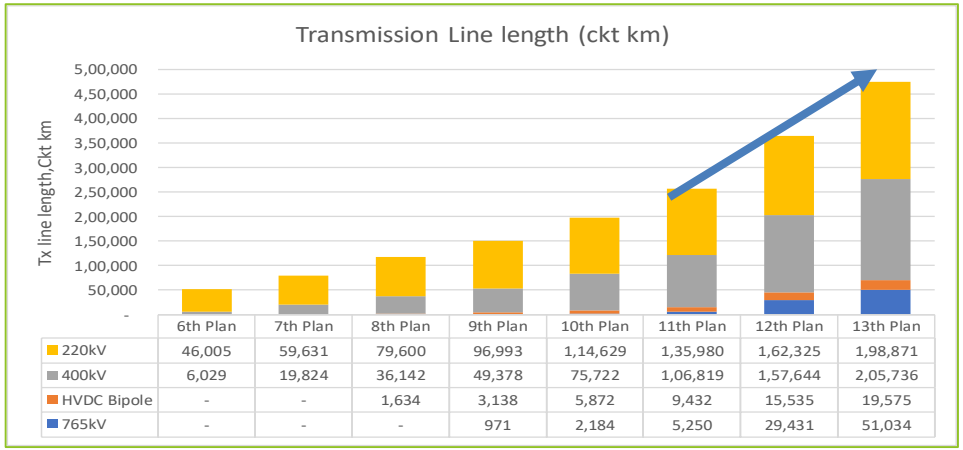


Increase in the Transmission Assets - CEA



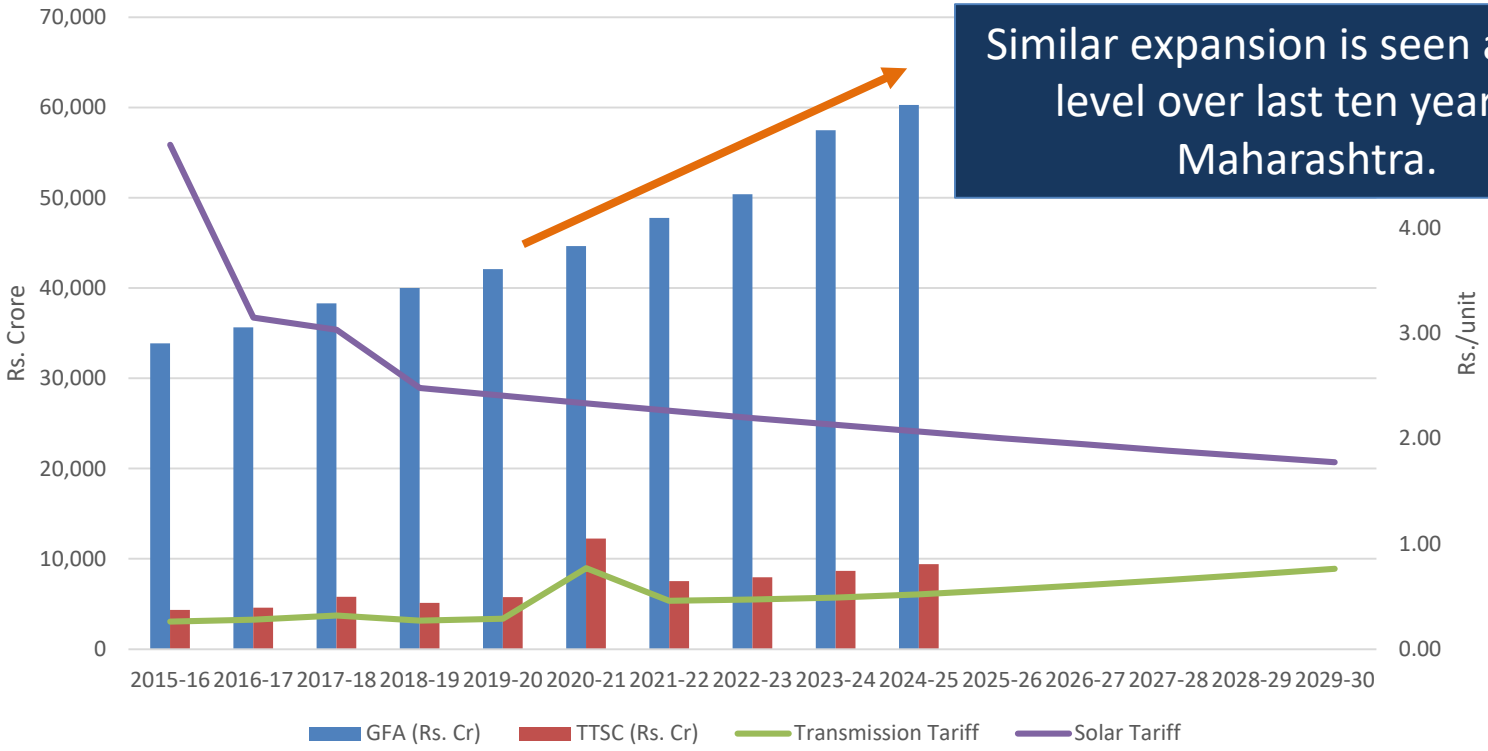
	6th Plan	7th Plan	8th Plan	9th Plan	10th Plan	11th Plan	12th Plan	13th Plan
220kV	37,291	53,742	84,177	1,16,363	1,56,497	2,23,774	2,98,265	3,93,845
400kV	9,330	21,580	40,865	60,380	92,942	1,51,027	2,34,372	4,12,982
HVDC Bipole	-	-	-	5,000	8,000	9,750	16,500	30,500
765kV	-	-	-	-	-	25,000	1,55,000	2,64,500

Over last two decades, transmission assets have expanded at rapid pace at central level.

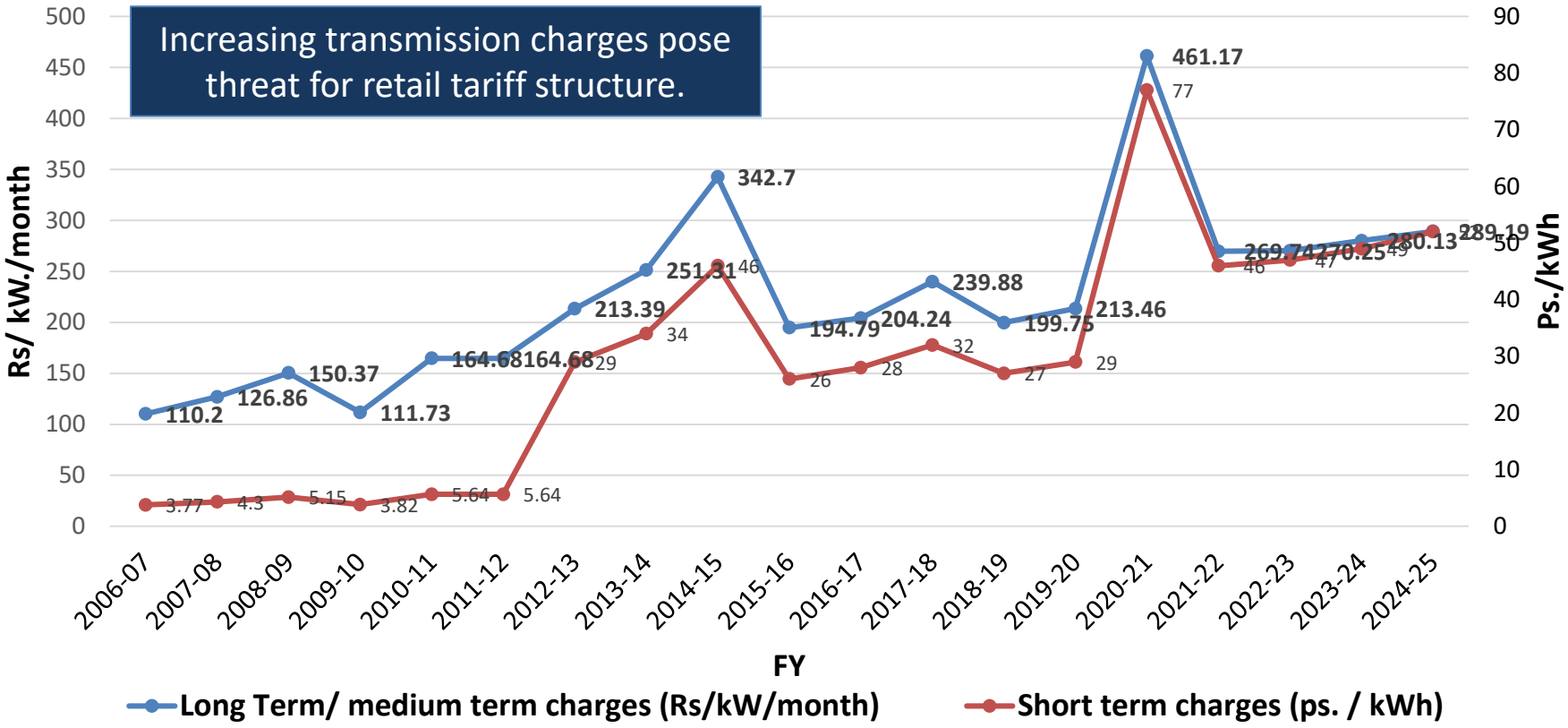


	6th Plan	7th Plan	8th Plan	9th Plan	10th Plan	11th Plan	12th Plan	13th Plan
220kV	46,005	59,631	79,600	96,993	1,14,629	1,35,980	1,62,325	1,98,871
400kV	6,029	19,824	36,142	49,378	75,722	1,06,819	1,57,644	2,05,736
HVDC Bipole	-	-	1,634	3,138	5,872	9,432	15,535	19,575
765kV	-	-	-	971	2,184	5,250	29,431	51,034

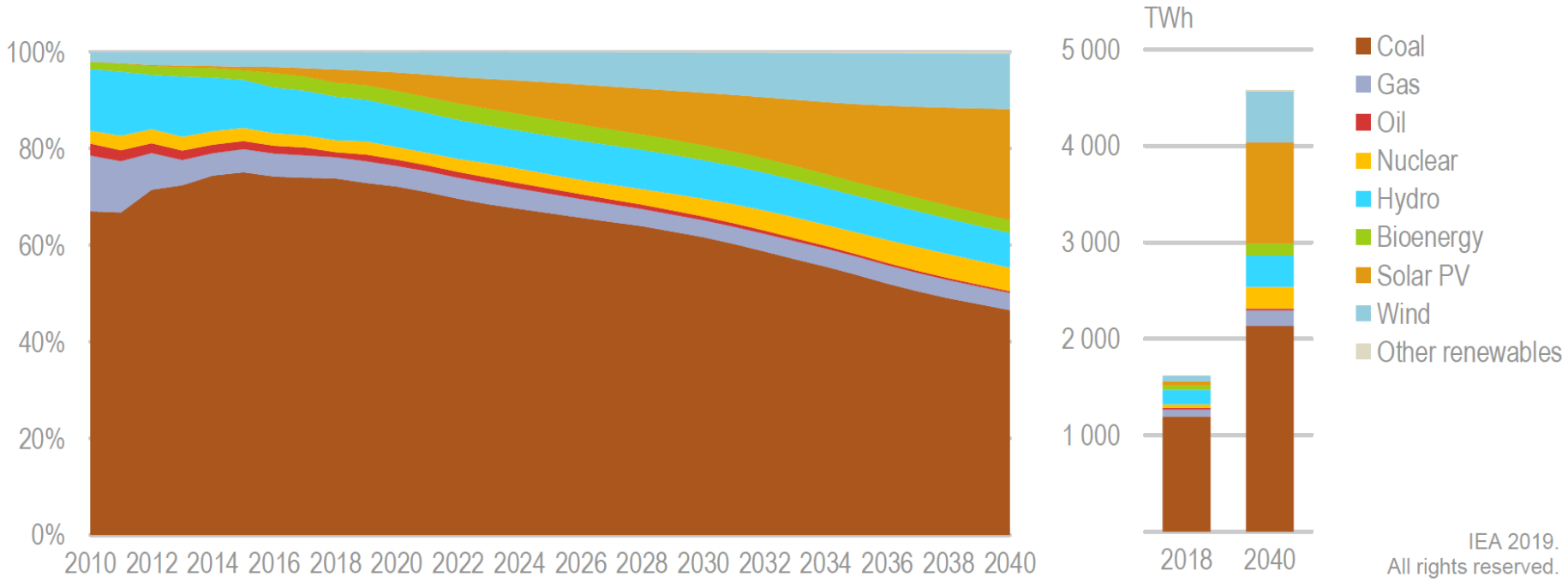
Transmission Assets, Costs, Tariff Vs Solar Tariff



Rapid Increase in Transmission Charges



Fuel Mix in 2030 – Coal would still contribute more than 50%



Ref: https://webstore.iea.org/download/direct/2933?fileName=India_2020-Policy_Energy_Review.pdf

Key Insights

- Rapid transmission asset base expansion at central level has taken place in last two decades
- Transmission expansion is taking place rapidly at state levels
- With increasing RE penetration, further investment in transmission would be required
- Though, generally Tx costs are considered to be insignificant, Maharashtra example shows, Tx costs are no more insignificant
- Total wires costs would soon be more than cost of generation from solar plant
- All efforts need to be made to ensure that total wires costs are under control
- This would require paradigm shift in transmission planning and innovative methods to improve utilization of Tx assets

KEY ISSUES IN TRANSMISSION PLANNING AND PRICING

Emerging issues in Transmission Planning

- **Emergence of Solar Parks/Wind Parks**, RE Growth centres with inter-state wheeling arrangements
  - 25,000MW solar park one each in Gujarat and Rajasthan
  - 7,500 MW solar park in Ladakh
- Need for **alignment of transmission planning with long term vision of planned RE capacity** additions to avoid future bottlenecks/curtailments.
- **Participation of all stakeholders (incl. RE)** in planning process at State, Regional, National level.
- Uniform application of planning criteria and planning standards are lacking, particularly while developing state transmission plans.
- Focus on Non-load related planning – reactive compensation, dynamic response, control/ protection, communications, reliability aspects
- **Coordinated planning and prioritisation framework** between STUs/CTUs for state/regional network
- Transparency, information/data sharing practices/protocol need to be revisited.

Key questions in transmission planning

- What are the key constraints in 'transmission planning' and the implementation of planned transmission schemes in the current context, particularly concerning the RE evacuation and transmission planning?
- What improvements are necessary for long term (perspective) planning practices and and areas for the improvements in co-ordination between STUs, CTU and other stakeholders?
- Have STUs suitably considered planned growth in intra-regional/inter-regional transmission systems and its operational impact on state transmission planning, particularly w.r.t. RE capacity evacuation plans?
- Apart from load related planning, has adequate attention been provided to non-load related planning?
- Need to relook at/formulate Planning Standards/Planning Criteria/Planning Manual/Guidebook With specific considerations for RE evacuation?
- Need for institutional interfaces: Need for RE Planning Authority?
- Review of process aspects for STU planning process.

Emerging issues in Transmission Pricing

- **Long term sustainability** of the socialisation of waiver of ISTS charges for RE capacity.
- Discrimination v/s preference amongst different class of Users (RE OA, RE DISCOM)
- **Treatment of Transmission Loss waiver**
- Parity and feasibility of introduction of **POC methodology for intra-state Tx network**
- Need for introduction of **Financial Transmission Rights** & its pricing.
- Pricing treatment for Surrender – Partial or full capacity, for limited period
- Improvement for dealing with Congestion
- Clarity for Introduction of GNA framework

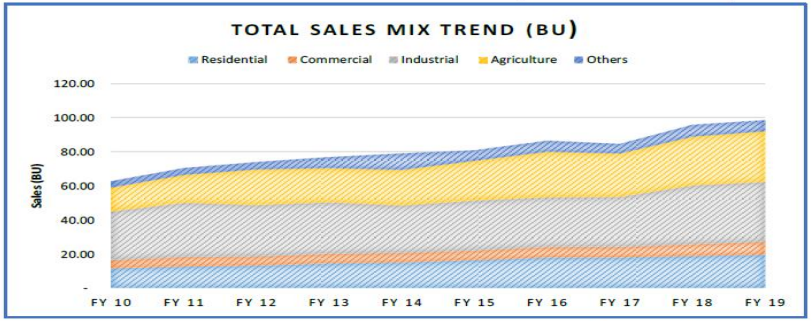
Key questions in transmission pricing

- Whether **POC based pricing** regime (in present form) require **certain modification**? What manner?
- Is **concessional pricing for RE** transactions desirable? If yes, to what extent? Whether distinction in terms of the type of users (conventional, RE users) desirable and for how long? Denomination for such usage?
- Guiding principles/criteria for ascertaining **Usage and Capacity Rights** of different class of transmission system users? and **treatment in case of its tradability/surrender**?
- Whether and how **Financial Transmission Rights** should be implemented in the Indian context?
- What **accounting framework** is required for segregation between **Connection Charge** & Network Usage Charge?
- Addressing the issue of **"Squatting" on development/connection rights** and pricing signal for such situations?
- **Congestion pricing** mechanism/rules for capacity allocation or curtailment?
- Operationalizing **reactive energy pricing and reactive pool** operations at the state level?

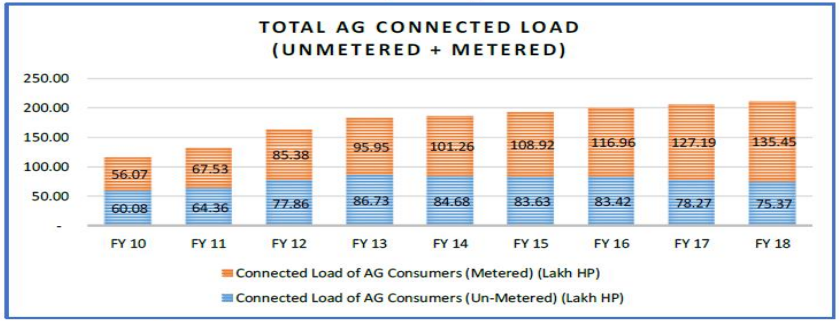
FLEXIBILITY AND TRANSMISSION ASSET UTILISATION

Agriculture consumption – excellent flexibility option

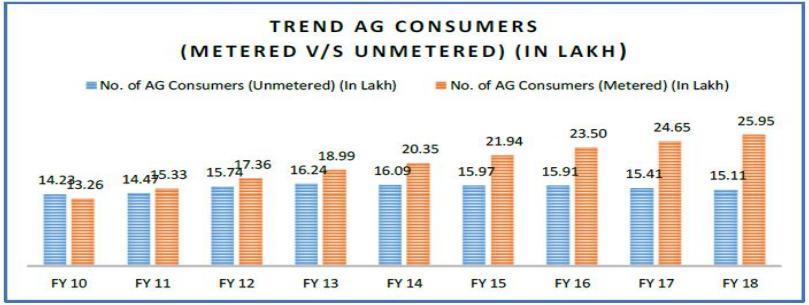
Historical Trend of total sales (Billion Units)



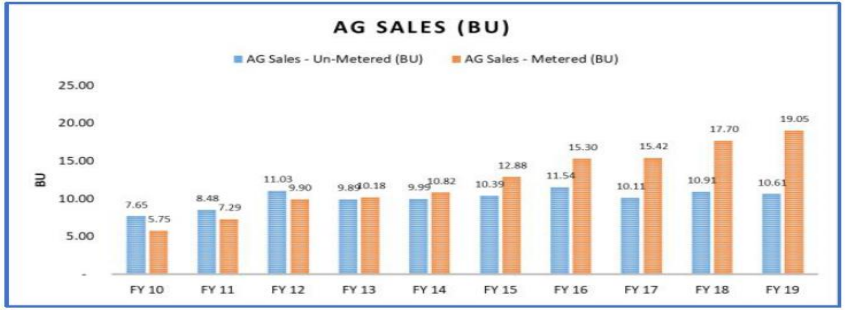
No. of AG Consumers (Lakh)



AG Consumer Connected Load (Lakh HP)



AG Sales (Billion Units)



(Source: MERC ARR/Tariff Orders for respective years)

Source: https://img.saurenergy.com/2020/02/interim-report-ag-survey.pdf MERC ARR/Tariff Orders for respective years

*Note: (figures for FY19 are as per projections under MTR Order (Case 195 of 2017). However, actual CL for FY19 as per MSEDCL MYT Petition is 214.92 Lakh HP)

Flexibility using agriculture consumption shift

- Agriculture consumers are traditionally supplied power during night time.
- However, with solar agriculture feeders, power could be supplied during day time.
- MERC, while giving approval to MSEDCL **for supplying power during day time to Agricultural consumers connected on Agricultural feeders of those substations where Solar Power Projects gets commissioned under "Mukhyamantri Saur Krishi Vahini Yojana".** MERC has highlighted the below effect of **Load Factor on the Transmission System**
  - ***Effect on load factor of the system:***
  - *(c) As and when Solar Power Project connected to a particular distribution sub-station gets commissioned and day time power becomes available from this project, it will be utilized for giving day time three phase power availability to Ag consumers connected on separated Ag feeder (11 kV) of that particular sub-station . Further under "Mukhyamantri Saur Krishi Vahini Yojana" the Solar Power generator is to be connected on the LV side i.e. 11 kV or 22kV of Power Transformers in distribution substations and Ag separated feeder (11kV) will be fed directly using this Solar Power supply. The total load on the power distribution system on 11 kV and below will remain the same and at the same time Power Transformer 33/11 kV or 22kV and* ***upstream system will get load relief****.*

Improved transmission asset utilisation

- Due to lower CUF of renewable energy technologies, overall asset utilisation of transmission assets would go down.
- This would result in higher overall costs. Therefore, innovative methods as mentioned below must be adopted.
  - Renewable energy hybrid projects to increase CUF beyond 50%
  - Storage at strategic locations so as to avoid transmission investments
  - Repowering of old wind farms so to improve CUF
- **It is important that these are factored into transmission planning process.**

Thank You

Contact:

Balawant Joshi +91 98214 21630

Ajit Pandit +91 98211 08222

Email:
contact@idaminfra.com

Mumbai

801, Crystal Plaza,
158, CST Road,
Kalina, Santacruz (E),
Mumbai — 400 098
Phone: +91 22 4057 0200

Delhi

A-31, Second Floor,
Lajpat Nagar II,
Near Lajpat Metro Station,
New Delhi — 110 024
Phone: +91 11 4943 4000

Kolkata

Globsyn Crystal, XI – 11 & 12,
1st Floor, Block – EP, Sector V,
Salt Lake Electronics Complex,
Kolkata — 700 091
Phone: +91 33 4604 8993

Hyderabad

House No. 3-51, Flat No. 201,
Abhishek Towers,
Balanagar,
Hyderabad — 500 042
Phone: +91 91369 20664