MINUTES OF THE 83rd MEETING OF
FORUM OF REGULATORS (FOR)

Venue : Grand Ball Room, Hotel Taj,
Sector 17, Chandigarh

Date / Day: 18th November 2022; Friday

Timings : 9.00 A.M

BUSINESS SESSION – I

SHRI MANOHAR LAL, HON'BLE CHIEF MINISTER OF HARYANA JOINED THE FOR MEETING

1. On arrival of Hon'ble Chief Minister of Haryana, Chairperson, Haryana ERC welcomed Hon'ble Chief Minister (CM) and expressed his gratitude for sparing his invaluable time to grace the event. He also welcomed all Chairpersons / Members of the Forum present in the meeting. (List of participants is at **Appendix).** Chairperson, HERC stated that Hon'ble CM's priority, in thought, word and action, is in consumer interest and for improvement of the efficiency of the utilities, which is also the priority of this Forum. He thereafter updated the Hon'ble CM about the constitution and multifarious functions of the Forum.

2. Thereafter, Presiding Chairperson, FOR / Chairperson, UPERC in his remarks welcomed Hon'ble CM of Haryana and other dignitaries to the 83rd meeting of the Forum of Regulators. He also welcomed Shri Anil Mukim, Chairperson Gujrat SERC and Justice Shri Amitabh Kumar Gupta, Chairperson, Jharkhand SERC, who were attending the FOR meeting for the first time. He highlighted that the present energy crisis has created energy security challenge for both, the Centre as well as the State governments and that besides addition of capacity

to meet the growing power demand of the country, massive reforms are being undertaken for the clean energy transition of the economy. He added that while earlier the grid was served by base load generation plants and peak demands were met through the peak load power plants; now, due to addition of large number of distributed energy resources such as solar & wind etc., the generation as well as demand are highly flexible thereby making forecasting scheduling and balancing the grid more challenging. He highlighted that efficient management of the grid and emerging issues have made the role of regulators more important in terms of regulating power, tariff setting and adjudicating disputes amongst the generation, transmission and distribution entities. The challenges before the regulators are becoming more and more complex with emphasis on green energy and its integration with conventional energy in designing acceptable tariff for category of consumers such as domestic, agricultural or industrial. He stated that recently, the Central Government has also notified Rules especially relating to RPO obligations, Green Energy Open Access, Late payment surcharge, Consumer Forum, change in law, pre-paid metering etc. As the challenge of the Regulators is to protect consumers interest and ensure affordable, reliable and quality energy supply for growth and development, the Forum would be discussing important issues in its agenda. He added that Haryana has always played an important role in power reforms and was one of the first States to introduce power reforms by unbundling the vertical entity into separate distribution company. Concluding his talk, the Presiding Chairperson, FOR expressed his gratitude to the Hon'ble CM, for taking time from his busy schedule to be present in the meeting. He requested the Hon'ble CM to guide the Forum with his vision and share his views on the sector development.

3. Delivering his address, the Hon'ble CM thanked HERC Chairperson and the Forum of Regulators for inviting him to the meeting. He welcomed all the electricity regulators to Chandigarh. He then went on to explain his vision about power sector development in the State of Haryana. He added that about

80% of the villages of Haryana are being provided with 24 hours of electricity supply. He highlighted the stringent steps being taken by the Government to check non-payment of electricity bills and the options given to defaulting consumers to make payment of the principal amount of bills in instalments. He said, he is not in favour of free electricity, as this leads to wastage of not only electricity but also water, and underscored that the steps taken by the State Government has led Haryana to become one of the leading States in energy efficiency. He informed the Forum that there has been no hike in the electricity tariff for the last 8 years and that the Fuel supply Adjustment (FSA) which was approximately 37 paisa, has been abolished. Similarly, the tariff upto 150 units have been brought down from the level of Rs 4.5/ unit and the rate and slab of domestic consumers has been rationalised to Rs 2.5/ unit for electricity for consumption upto 200 units and Rs 2/ unit for monthly consumption upto 50 units. He indicated that the State Government would be discussing with the Commission for possibility of further reduction in tariff for consumers who consume up to 50 units so that the benefits could be provided to poor consumers. Highlighting the steps taken by the State Government to promote solar energy, he indicated that 30,000 solar connections have been given and work for providing 50,000 more solar connections is under way. He also indicated that within the next two years, solar installations will be made available on every Government building and that the Government has established 57 core stations, strengthened 522 substations and 1895 km new line has been laid with a capital expenditure of Rs 3680 crore. In his closing remarks, Hon'ble CM highlighted the importance of sharing and learning from the best practices being followed in the sector for the overall development of the sector and wished the Forum success in its meeting.

4. Delivering the vote of thanks, Member, Haryana ERC extended special thanks to the Hon'ble Chief Minister of Haryana for accepting the request of Haryana ERC to grace the meeting by his presence, for sharing his thoughts and

enlightening the Forum of the steps being taken by the State Government for the benefit of electricity consumers of the State.

BUSINESS SESSION–II

AGENDA 1: CONFIRMATION OF MINUTES OF

(A) 82ND MEETING OF FOR HELD ON 16TH SEPTEMBER, 2022

(B) SPECIAL FOR MEETING HELD ON 28TH OCTOBER, 2022

The Forum was appraised on the action taken on the decisions in the aforesaid meetings upon which the Forum confirmed the minutes of the 82nd FOR meeting and the minutes of the Special FOR meeting. It further directed as under:

Model Regulations on Green Energy Open Access: As POSOCO had shared the final procedure post discussion with the Forum in its special meeting held on 28th October 2022, FOR Secretariat was directed to circulate the procedure received from POSOCO to all the members of FOR.

AGENDA ITEM. 2:

A) RPO TARGET AND COMPLIANCE MECHANISM

B) STUDY ON IMPACT OF RE BANKING & WHEELING ARRANGEMENT FOR SOLAR AND WIND PROJECTS IN KARNATAKA - REFERENCE FROM PRAYAS

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1. The Forum was apprised that Prayas Energy Group had undertaken an analysis on RPO target & compliance analysis as well as a study on banking methodology and charges framework for solar and wind projects in Karnataka.

2. Delivering the presentation on RPO targets and compliance monitoring **(Annexure - I)**, representative of PRAYAS informed the members that they have been tracking RPO targets and its compliance across the country and sharing this data on its public Renewable Energy Data Portal. They stated that there are significant data gaps and variations in current processes across States which include

a) Different regulations in different States (RPO regulations, Business plan regulations, Power Purchase regulations etc.)
b) Net consumption definition (e.g., total consumption, total consumption excluding hydro and total consumption excluding hydro and RE power), makes comparison across States difficult
c) RPO categories vary by States (solar/non-solar; combined RPO; MoP guidelines - wind, HPO, other)
d) Applicability to OA/CPP, carry forward (allowed – yearly or for more, not allowed)
e) Penalty (Regulatory fund, under Sec 142, in terms of Rs. /unit – proposed in E Act, Amendment, 2022) - Status of existing penalties levied (if any), regulatory fund created/used not available in public domain.
f) RPO monitoring and data reporting by obligated entities and Nodal agency- Quarterly reporting required in many States, not available in public domain in most States with few exceptions
g) Compliance reporting in separate suo-motu proceedings, tariff process; or both - Yearly or for 2-4 years/irregular or dated
h) Compliance data reporting varies widely

3. As way forward, it was suggested that:

a) FOR may issue model RPO regulations in two parts
   i) Framework for harmonising definitions, applicability, carry forward, treatment of surplus, fungibility etc.

ii) Standardised Reporting Formats and timelines

b) SERCs may institutionalize fixed timelines with penalties for public data reporting for the obligated entities and the Nodal Agencies along with timelines for suo-motu compliance orders.

4. PRAYAS also expressed its desire to complement FOR's efforts in undertaking the comprehensive exercise for RPO compliance monitoring including document repository for all distribution utilities and OA/CPP consumers across the country.

5. Thereafter, representative of PRAYAS also made a presentation on "Renewable Energy Banking framework: Observations on State-level (Karnataka) experience", **(Annexure – II)** under which it was suggested that:

a) Karnataka may move from annual banking to monthly ToD slot wise banking (similar to FOR Model Regulations) and should increase banking charges to 10% - 12% (or Rs 0.3-0.4/kWh) of wheeled energy.

b) Banking charge levied may be as a Rs/unit on banked energy (as compared to wheeled energy).

c) The State may move to 15-minute accounting of generation and consumption to correctly account banking quantum.

6. It was also highlighted that 50% of the energy utilised for hydrogen production is coming from the grid and hence, the scale of banking has financial implication for the Discoms. Therefore, they suggested that optional banking can be opted rather than concessional banking.

The Forum noted the presentations made by PRAYAS.

AGENDA ITEM 3: FOR WORKING GROUP REPORT ON ENERGY STORAGE AND ELECTRICAL VEHICLES

1. Chief (RA), CERC apprised the Forum that the FOR Working Group Report on ESS and EV had been prepared based on identified key regulatory issues and that the WG had recommended regulatory framework for deployment and management of ESS and EV charging infrastructure. Subsequently, a presentation **(Annexure – III)** was made by Sr Advisor (RE), CERC on the need for energy storage especially in the context of huge target set by the country on RE capacity addition.

2. The Forum deliberated on the recommendations of the Working group and endorsed the report with following modifications:

a) ESS should be encouraged to be charged with renewable energy.
b) Requirement of obtaining consent from Discom for HT EV charging Station should be removed to encourage the HT EV charging station.
c) For domestic connection use for EV charging, additional proviso may be added to specify that charger capacity should not be more than the sanctioned connected load of the domestic consumer.
d) Recommendations for 'green charging station' to procure power from at least 70% of supply from RE sources may be modified to 100% procurement from RE sources to be categorized as 'green charging stations'

3. With the above recommendations, the FOR Working Group Report on ESS and EV was accepted and endorsed by the Forum.

AGENDA NO. 4: FOR WORKING GROUP REPORT ON RE CURTAILMENT

1. The Working Group on RE-curtailment was formed by the Forum in pursuance of the APTEL judgment wherein the need for identifying the criteria which would qualify as 'grid security' reasons for RE curtailment, was reiterated. It was informed that the Working Group held three meetings which had a fruitful discussion on a comprehensive framework for managing the curtailment of variable RE generation for

grid security while keeping the impact of curtailment on RE to the minimum. Thereafter, a presentation **(Annexure – IV)** was made by Sr Advisor (RE), CERC on the salient features of the report

2. The Forum appreciated the report and stated that the guidelines are quite comprehensive and has taken care of all the aspects. The Forum deliberated on the model guidelines for management of RE curtailment and endorsed the report with the following modifications:
   a) On the issue of RE curtailment in view of under-drawal by State at State-periphery, it was recommended that the event of under-drawal by a State at state-periphery by more than 300MW for more than two successive time blocks even when the frequency ranges between 49.90 Hz to 50.05 Hz, should be considered as a grid security reason warranting RE curtailment.
   b) It should be clarified that the compensation in the event of RE curtailment for non-grid-security reasons, will be borne by the distribution companies and that such compensation paid shall not be allowed as a passthrough in tariff. This will act as a true deterrent against curtailment of RE for commercial considerations.
   c) The Forum also highlighted the relaxation provided for Wind and Solar Generating station for estimating the deviation in percentage based on the Available capacity instead of Scheduled Generation. It was stated that as the Wind and Solar sector has matured now, there need not be a special relaxation for calculating the deviation in percentage.

After detailed discussion and recommendations, the Forum approved and endorsed the report.

AGENDA ITEM 5: REFERENCES FROM MINISTRIES

a) UTILIZATION OF APPLICATION PROGRAMING INTERFACE (API) SETU PLATFORM FOR PUBLISHING AND CONSUMPTION OF APIS

FOR ELECTRICITY BILLS – REFERENCE FROM MINISTRY OF ELECTRONICS & IT, GOI

1. Deputy Chief (RA), CERC, apprised the Forum about the reference received from Ministry of Electronics & IT, Government of India requesting regulators to consider publishing APIs over the API Setu (Application Programming Interface) platform which will encourage departments to achieve paperless governance and help the department to reduce overheads for validating and storing the physical copies of documents and thereby resulting in expediting their service deliveries.

2. The members of the Forum noted the same for appropriate action by the respective SERCs/JERCs.

b) IMPLEMENTATION OF APPROPRIATE TARIFF CATEGORY FOR URBAN AND RURAL LOCAL BODIES – REFERENCE FROM MINISTRY OF POWER

1. The Forum was apprised about the reference received from Ministry of Power regarding outstanding electricity dues of Urban Local Bodies (ULBs) and Rural Local Bodies (RLBs) payable to distribution companies. The Ministry of Jal Shakti raised the issue of applicable tariff category for water works connections stating that distribution licensees were charging commercial tariff for such utility connections and suggested that ERCs may consider discounted tariff equivalent to domestic category for water works connections.

2. The members of the Forum noted the same for appropriate action by the respective SERCs/JERCs.

AGENDA ITEM 6: ADOPTION OF RECOMMENDATIONS OF THE 7TH CENTRAL PAY COMMISSION - REFERENCE FROM JERC OF MANIPUR & MIZORAM

1. Deputy Chief (RA), CERC, appraised the Forum about the reference received

from JERC for Manipur and Mizoram, wherein they have informed of non-implementation of the 7th Pay Commission in JERC despite sending multiple requests to MoP seeking approval of the same and despite there being no financial implication on the State Governments of Manipur & Mizoram. In fact, the said Governments had also given their NOC in this aspect.

2. Following discussion, the Forum enquired from Member, JERC Goa & UTs whether they had implemented the 7th Pay Commission, the same was affirmed by Member, JERC Goa & UTs. Hence, the Forum recommended that FOR Secretariat may refer the matter to the Ministry of Power for consideration and appropriate action.

AGENDA NO.7: REQUEST FOR TRAINING PROGRAM FOR THE MEMBERS OF THE COMMISSION - REFERENCE FROM UERC.

1. The Forum was apprised regarding the reference received from Uttarakhand ERC that the Forum may consider organizing programs for the Members of the Commission, in addition to the current programs being conducted for Chairpersons and officers.

2. Deputy Chief (RA), CERC informed the Members that there will be additional fund requirement for conducting the said training programs within the entitled class of travel for both domestic and international components. She added that the Reserves & Surplus of FOR would be Rs.3.35 crore (appox.) by the end of the financial year 2022-2023 and Rs.4.21 crore would be the additional fund requirement.

3. It was informed that the fund issue is basically arising, due to booking of air tickets in Business Class for attending the training programs having the foreign component. Currently the membership fee of FOR has been reduced to Rs.1 lakh from the previous fee of Rs.4 lakh (also reduced from the initial fee of

Rs.6 lakh) and this may need to be increased to Rs.14 lakh.

4. The Forum deliberated on the issue and decided as under:

i) FOR Sectt. will explore with MoP for additional funds for conducting training programs for the Members of the ERCs.

ii) Members will be reimbursed economy class air fare for such programs.

iii) Pending clarity on additional funding from MoP, training programs for the Members and Officers of ERCs will be conducted on alternate basis from the Forum's Fund - that is, for the Members in one year and for the Officers in the subsequent year, on a rolling basis.

AGENDA NO.8: STRENGTHENING FOR

1. Deputy Chief (RA) briefed the Members on the proposal for enhancement in strength of staff for carrying out the additional functions assigned to FOR under the amended Rules of FOR and that the Ministry of Power has sought for a proposal from FOR for strengthening the FOR to carry out the additional tasks.

2. After discussion, the Forum decided as under:

a) FOR Secretariat may engage a Corporate consultant on retainership basis, who will be supervised by the regular staff of CERC (i.e. supervision of routine & non-routine works) for doing base intellectual works. The cost of the same may be borne from funds to be given by Ministry of Power.

b) IIT Kanpur may be approached under the MOU between FOR and IIT Kanpur asking for financial quotes for assisting the FOR in carrying out the tasks under the Rules and the same will be funded from the grant to be received from the Ministry of Power.

c) CERC may explore a proposal for engagement of dedicated officials/staff to manage the affairs of FOR, the FOIR and SAFIR and approach Ministry of Power for the same.

3. The Forum also proposed that a Model staff regulation (in general) can be prepared, suggesting the mode of recruitment, qualifications, etc., considering the practices of other regulators including other sector regulators such as SEBI, PFDRA, etc. The Forum also approved constitution of a Working Group (WG) on this aspect, to be chaired by Chairperson, Rajasthan ERC with Chairpersons of Himachal Pradesh ERC, Delhi ERC, Assam ERC, Karnataka ERC and West Bengal ERC as Members of the WG. The FOR Secretariat will provide assistance to the Working Group.

AGENDA ITEM 9: CLARIFICATION/ RULE BY MINISTRY OF POWER ON ISSUES WHICH ARE NOT CLEAR

1. The Forum was informed in the 82nd FOR meeting that there were many clauses in the Rules which were not in conformity with the Electricity Act 2003 and the Tariff Policy. This issue was also raised in the interaction which the electricity regulators had with the Hon'ble Minister of Power & NRE. It was further discussed that such ambiguities in rules and drafting errors are leading to a large number of litigations before ERCs. During the proceedings, the Ministry of Power had invited the Forum to share details.

2. The Forum, after discussion decided that apart from the Electricity (Promoting Renewable Energy through Green Energy Open Access) Rules, 2022, all other Rules which are not in conformity with the Electricity Act 2003 and the Tariff Policy may be shared by all ERCs to the FOR Secretariat so that the same may be taken up with Ministry of Power.

AGENDA ITEM 10: ANNUAL REPORT OF FOR FOR FY 2021-22

Dy. Chief, (RA) apprised the Forum that, during the 82nd FOR meeting held on 16th September 2022 it was decided that the Annual Report of FOR should also include details of the work done by various Working Groups of FOR and henceforth present Annual Reports of FOR in the FOR meetings for information and suggestions if any for future compliance. Further, it was also decided that the

Annual Report may be approved by Chairperson, FOR and then brought to the Forum for information. Accordingly, a separate section on "Activities of FOR Working Groups during 2021-22" has been included in the Report. The Forum was also informed that as the Annual Report of FOR for 2021-22 is required to be laid in the Parliament in the ensuing winter session, the Annual Report is under print with the approval of Chairperson, UPERC/ Presiding Chairperson, FOR, so that the printed copies of the same may be forwarded to Ministry of Power without delay. The Forum noted the same and adopted the Annual Report of FOR for 2021-22.

AGENDA ITEM 11: FOR MODEL TARIFF REGULATIONS

1. The Forum was apprised that based on a decision of the Forum, the FOR Secretariat had worked on revising the Model Tariff Regulations (evolved by the FOR in 2009). Subsequently, comments received from SERCs have also been incorporated in the draft. The updated Model Tariff Regulations were placed for discussion in the 82nd FOR meeting held on 16.09.2022. During the meeting, it was decided that as the Model Tariff Regulations is an elaborate document which needs detailed discussion. It was decided to take this up in a special meeting of the FOR.

2. Subsequently, the Draft Model Tariff regulations were discussed in the Special FOR meeting held on 28th October 2022 where comments on various clauses were made and modifications incorporated in the revised Model Tariff Regulations. However, due to paucity of time, all the clauses of the said regulation could not be taken up for discussion. Hence, the Forum decided that the remaining clauses will be discussed in the next meeting of the FOR

3. Accordingly, the updated Model Tariff Regulations were placed for discussion. After deliberations, the members decided to have a special

meeting of the FOR, with single point agenda to take up further discussion on the model Tariff Regulations.

CONCLUSION

1. On conclusion of the meeting, Chairperson, Gujarat ERC offered to host the next meeting of FOR in February 2023 and Chairperson, Himachal Pradesh ERC offered to host the meeting thereafter in Himachal Pradesh in April 2023.

2. Secretary, FOR/CERC proposing the vote of thanks expressed gratitude to the Chairperson, officers and staff of Haryana ERC for making elaborate arrangements for the meeting and for making the stay of FOR members comfortable. He also expressed his thanks to the members of FOR who have been very participative during the meeting. He also expressed his appreciation for the FOR Secretariat and its staff who have worked for making this event a success.

The meeting ended with vote of thanks to the Chair

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/ APPENDIX – I /

LIST OF PARTICIPANTS OF THE 83RD FORUM OF REGULATORS ("FOR") MEETING HELD ON FRIDAY, THE 18TH NOVEMBER, 2022. AT HOTEL TAJ, SECTOR-17, CHANDIGARH

S. No.	NAME	ERC
01.	Shri Raj Pratap Singh Chairperson	UPERC – in Chair.
02.	Justice (Shri) C.V. Nagarjuna Reddy Chairperson	APERC
03.	Shri Kumar Sanjay Krishna Chairperson	AERC
04.	Shri Hemant Verma Chairperson	CSERC
05.	Justice (Shri) Shabihul Hasnain 'Shastri' Chairperson	DERC
06.	Shri Anil Mukim Chairperson	GERC
07.	Shri R.K. Pachnanda Chairperson	HERC
08.	Shri D.K. Sharma Chairperson	HPERC
09.	Justice (Shri) Amitav Kumar Gupta Chairperson	JSERC
10.	Shri P. Ravi Kumar Chairperson	KERC
11.	Shri S.P.S. Parihar Chairperson	MPERC
12.	Shri P. W. Ingty Chairperson	MSERC
13.	Shri Viswajeet Khanna Chairperson	PSERC
14.	Dr. B.N. Sharma Chairperson	RERC
15.	Shri K.B. Kunwar Chairperson	SSERC
16.	Shri M. Chandrasekar Chairperson	TNERC
17.	Shri T. Sriranga Rao Chairperson	TSERC

18.	Shri D. Radhakrishna Chairperson	TERC
19.	Dr. M.V. Rao Chairperson	WBERC
20.	Shri D.P. Gairola Member/Chairperson I/c.	UERC
21.	Shri Gajendra Mohapatra Member/Officiating Chairperson	OERC
22.	Shri Ajay Gupta Member	JERC for UTs of J&K & Ladakh
23.	Shri A.J. Wilson Member	KSERC
24.	Ms. Jyoti Prasad Member	JERC for State of Goa & UTs
25.	Shri Harpreet Singh Pruthi Secretary	FOR/CERC
26.	Dr. Sushanta Kumar Chatterjee Chief (Regulatory Affairs)	CERC
SPECIAL INVITEES		
ERC		
27.	Shri I.S. Jha Member	CERC
28.	Shri Arun Goyal Member	CERC
29.	Shri Pravas Kumar Singh Member	CERC
30.	Shri Naresh Sardana Member	HERC
FOR SECRETARIAT		
31.	Ms. Rashmi S. Nair Dy. Chief (RA)	CERC
32.	Shri Ravi Kadam Sr. Advisor (RE)	CERC
OTHERS / GUESTS		
33.	Shri Ashwin Gambhir Fellow	Prayas Energy Group
34.	Ms. Ann Josey Fellow	Prayas Energy Group
35.	Shri Saumendra Aggrawal Research Associate	Prayas Energy Group

Annexure-I

RPO targets and Compliance Monitoring:
A broad overview of current status in states

Ashwin Gambhir, Saumendra Aggrawal, Ann Josey, Shantanu Dixit

Prayas (Energy Group), Pune

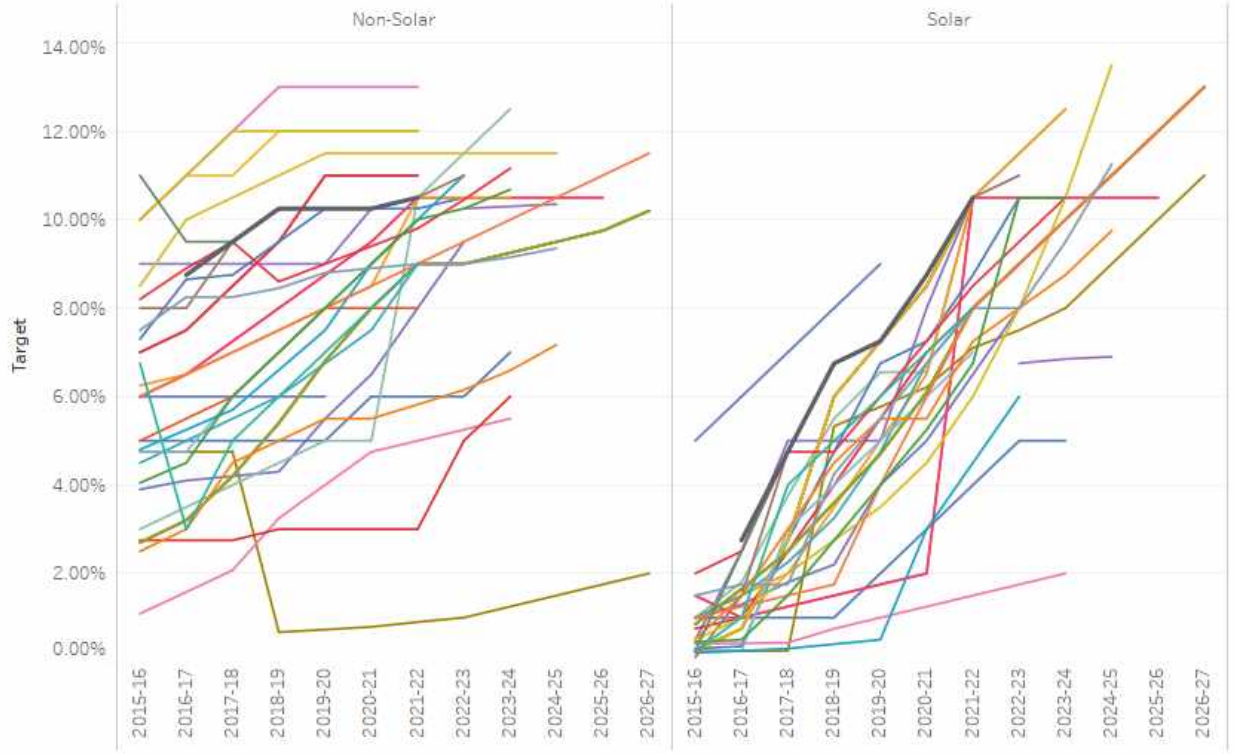
Forum of Regulators, 83rd Meeting,

Chandigarh, 18th November 2022

Current Status with regard to RPO and upcoming requirements

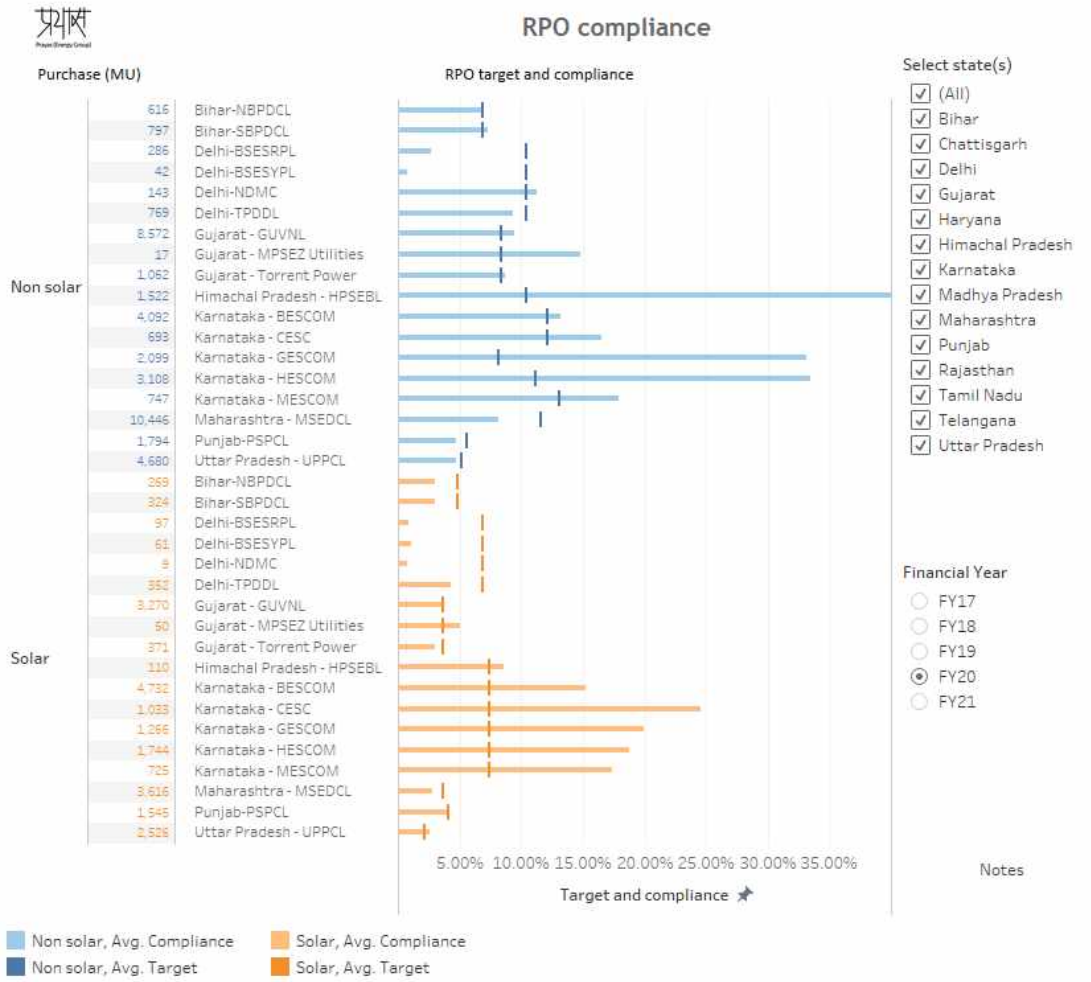
- All States have short-medium term RPO targets in place, mostly with a 3-5 year horizon.
- New MoP guidelines to States: Min RPO of **43.3%** & Storage Purchase Obligation (SPO) of **4% by 2030**.
  - **Assam, Manipur and Mizoram (final); Chhattisgarh, Bihar, Haryana, Punjab** and **Madhya Pradesh** have drafts in line with this so far.
- Recently notified Forum of Regulators (Amendment) Rules, 2022 tasks the FoR with the responsibility for RPO compliance monitoring. Specifically,
  - *(c) Monitoring of renewable purchase compliance- (i) The **compliance of targets**, by each of the distribution licensees, captive consumption and consumers procuring power through open access, for purchase of electricity from renewable sources as determined by the Central Government or by State Commission, **whichever is higher**, in accordance with the provisions of the Act and rules, regulations, guidelines made thereunder. (ii) **An annual report** comprising data and analysis thereof for compliance of the targets for purchase from renewables shall be submitted to the Central Government by **31st May** of next financial year.*
- Existing Compliance Monitoring Initiatives
  - National RPO portal by MNRE, but not updated or maybe behind login (not public)
  - MoP order on RPO dated 29th Jan, 2021 directs POSOCO to maintain RPO compliance data.
  - Idam Infra have developed RPO portals for 7 States (RJ, Guj, AP, Meghalaya, Assam, UT, and Punjab); hosted by respective SNAs/SLDCs; accessible to state entities and obligated entities through registration but not public.
  - Power Minister's Conference – RPO compliance data likely based on RE installed capacity and generation by States and not as per actual contracted capacity and procurement by obligated entities.
- Prayas tracking RPO targets, compliance across the country and sharing this data on our public Renewable Energy Data Portal. Collated RPO targets for **all states and UTs and compliance for ~14 large states** (~90% of total consumption) and adding more soon.

Prayas REDP RPO – targets and compliance (FY 20)



Source: Various Electricity Regulatory Commission orders

Notes: The data is up to date as of 15th November, 2022.



Source: Prayas (Energy Group) analysis of various Electricity Regulatory Commission tariff orders, the Discom ARR filings, and compliance reports

RPO tracking critical but significant data gaps and variations in current processes across states

- Variation in important aspects of RPO
  - **Different regulations** in different states (RPO regs, Business plan regs, Power Purchase regs etc.)
  - **Net consumption definition** (e.g., total consumption, total consumption excluding hydro and total consumption excluding hydro and RE power), makes comparison across states difficult
  - **RPO categories** vary by States (solar/non-solar; combined RPO; MoP guideline - wind, HPO, other)
  - **Applicability** to OA/CPP, **carry forward** (allowed – yearly or for more, not allowed)
  - **Penalty** (Regulatory fund, under Sec 142, in terms of Rs./unit – proposed in E Act, Amendment, 2022)
    - Status of existing penalties levied (if any), regulatory fund created/used not available in public domain.
  - RPO **monitoring and data reporting** by obligated entities and Nodal agency
    - Quarterly reporting required in many states, not available in public domain in most states with few exceptions
  - **Compliance reporting** in separate suo-motu proceedings, tariff process; or both.
    - Yearly or for 2-4 years/irregular or dated, none for some states to the best of our knowledge.
  - Compliance **data reporting varies widely**
    - Reporting formats and details (Break up of RE, next year's procurement plan, RECs, GTAM, GDAM and their costs, rooftop solar, penalties collected and used, adherence to reporting timelines, expected and actual RE generation, excess contracted RE generation sold in PXs, excess RE procured sold as RECs, annual or quarterly data etc.) within them also vary significantly and are missing in most cases.
    - Reporting for OA/ CPP practically non-existent, different eligibility in different states.

Possible options and ways forward

1. FoR to come out with **model RPO regulations made of two parts**
   - Framework harmonising definitions, applicability, carry forward, treatment of surplus, fungibility etc.
   - Standardised Reporting Formats and timelines.

2. SERCs to **institutionalize fixed timelines with penalties for public data reporting** for OEs and Nodal Agencies along with timelines for suo-motu separate compliance orders.
   - Data reporting could be with 3 month lag, while compliance order could be out at most 6 months after FY end.
   - Initiate compliance for OA/CPP (with new 100 kW threshold for Green OA, this is likely to exponentially increase)
   - Separate section on SERC/FoR websites for RPO compliance tracking would be helpful.

3. Prayas can complement FoR's efforts in undertaking this comprehensive exercise for RPO compliance monitoring incl. document repository for all DISCOMs and OA/CPP consumers across the country.

Standardising reporting formats, could include details related to…

- Details of total power procurement/consumption incl. losses which form basis for estimating RE requirement for the year.
- Source wise (solar, wind, biomass, SHP etc.) RE capacity tendered, approved, contracted, commissioned, in pipeline and energy procurement for the year.
- Expected and actual RE generation in the year.
- Next year's expected RE procurement plan (capacity and generation).
- Month wise RECs bought, excess RE generation based RECs sold and their prices.
- Month wise RE bought and sold in markets or exchanges (GTAM, GDAM) and their costs, excess contracted RE generation sold in PXs.
- Rooftop solar, Agri solar pump etc. generation accounted for DISCOM RPO compliance
- RPO compliance penalties levied, paid, collected and used.
- Adherence to data reporting timelines by Nodal Agency and Obligated Entities and adherence to starting and finishing of compliance proceedings.
- Submission of annual, quarterly or monthly data.
- Data related to Green Hydrogen, Green Ammonia, Energy Storage (Technologies used, RE for charging and power supplied by ESS system) etc. in the future.

THANK YOU
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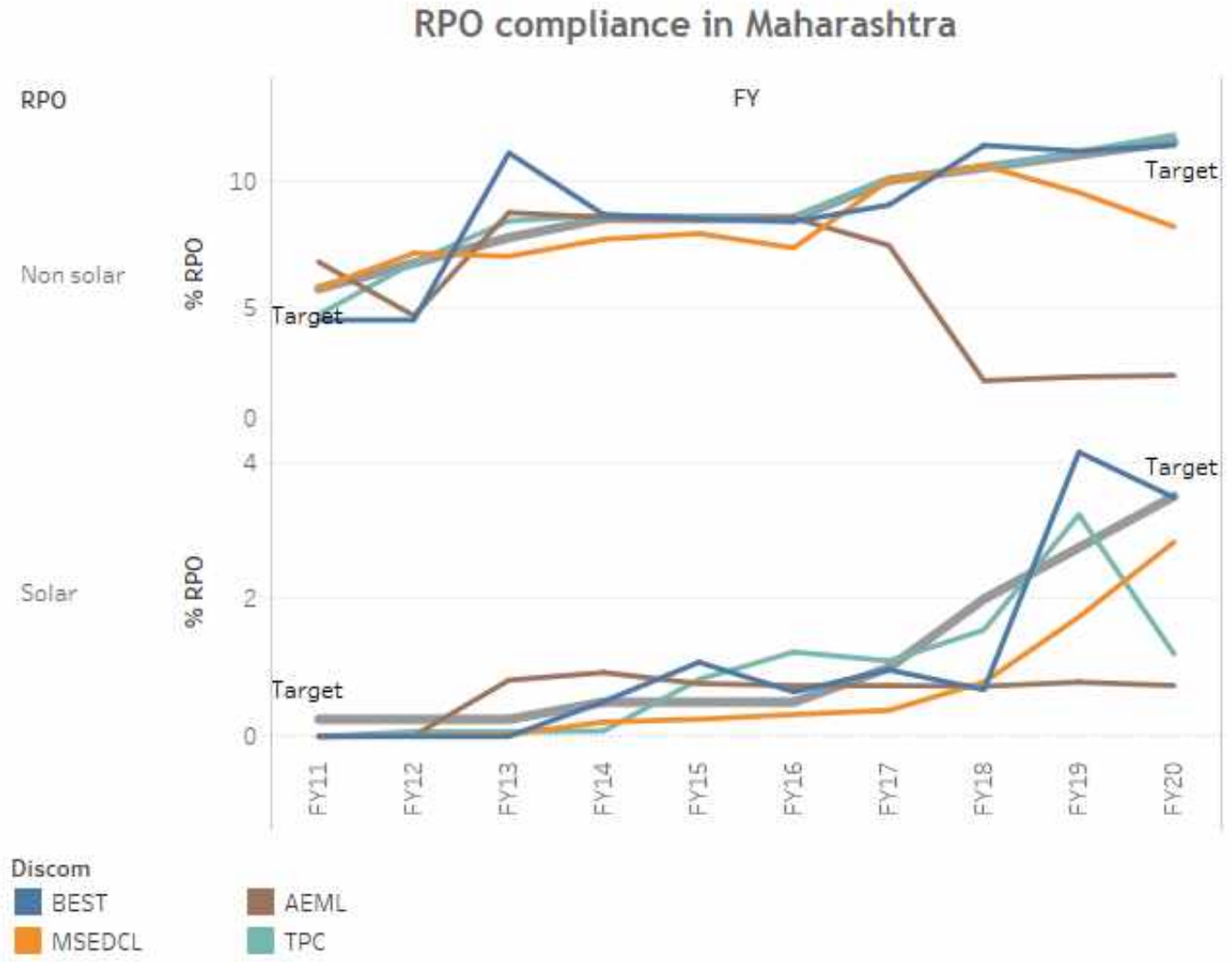
EXTRA SLIDES

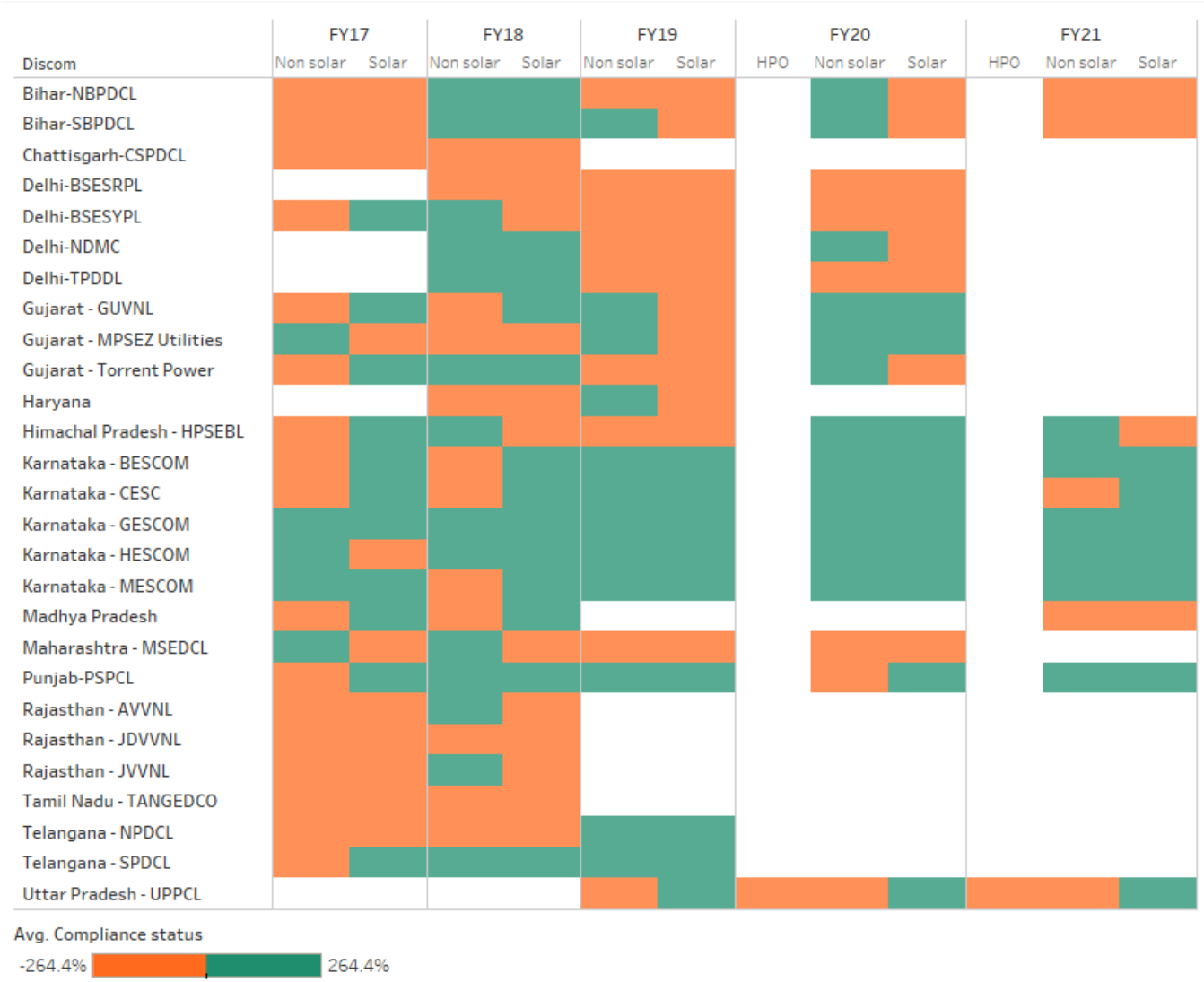
RPO Compliance of DISCOMs in Maharashtra over the years



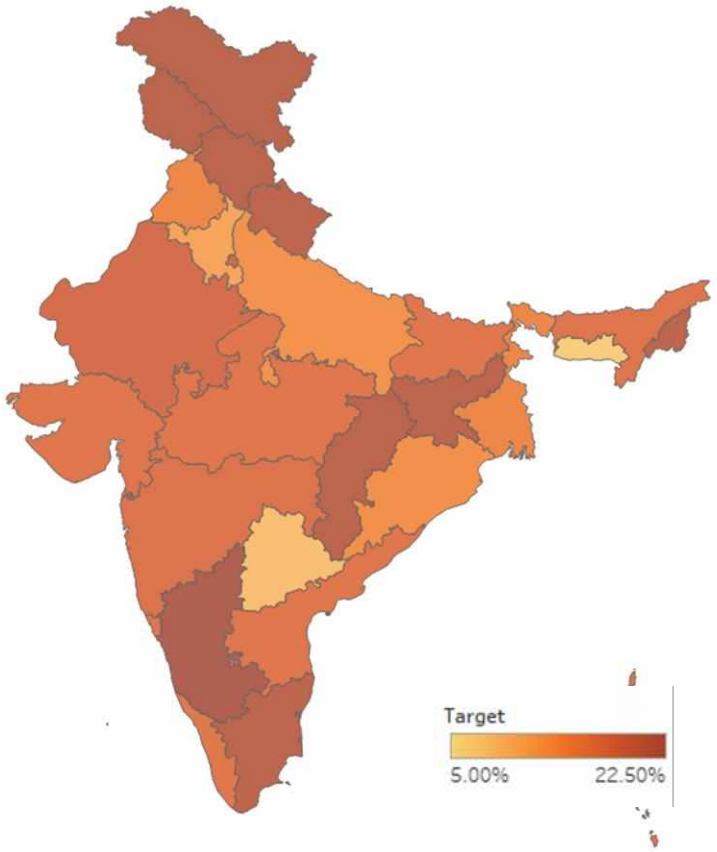
Source: Maharashtra Electricity Regulatory Commission orders for verification of compliance of RPOs by distribution utilities.

Notes

RPO Compliance of DISCOMs over the years (FY 17-21)

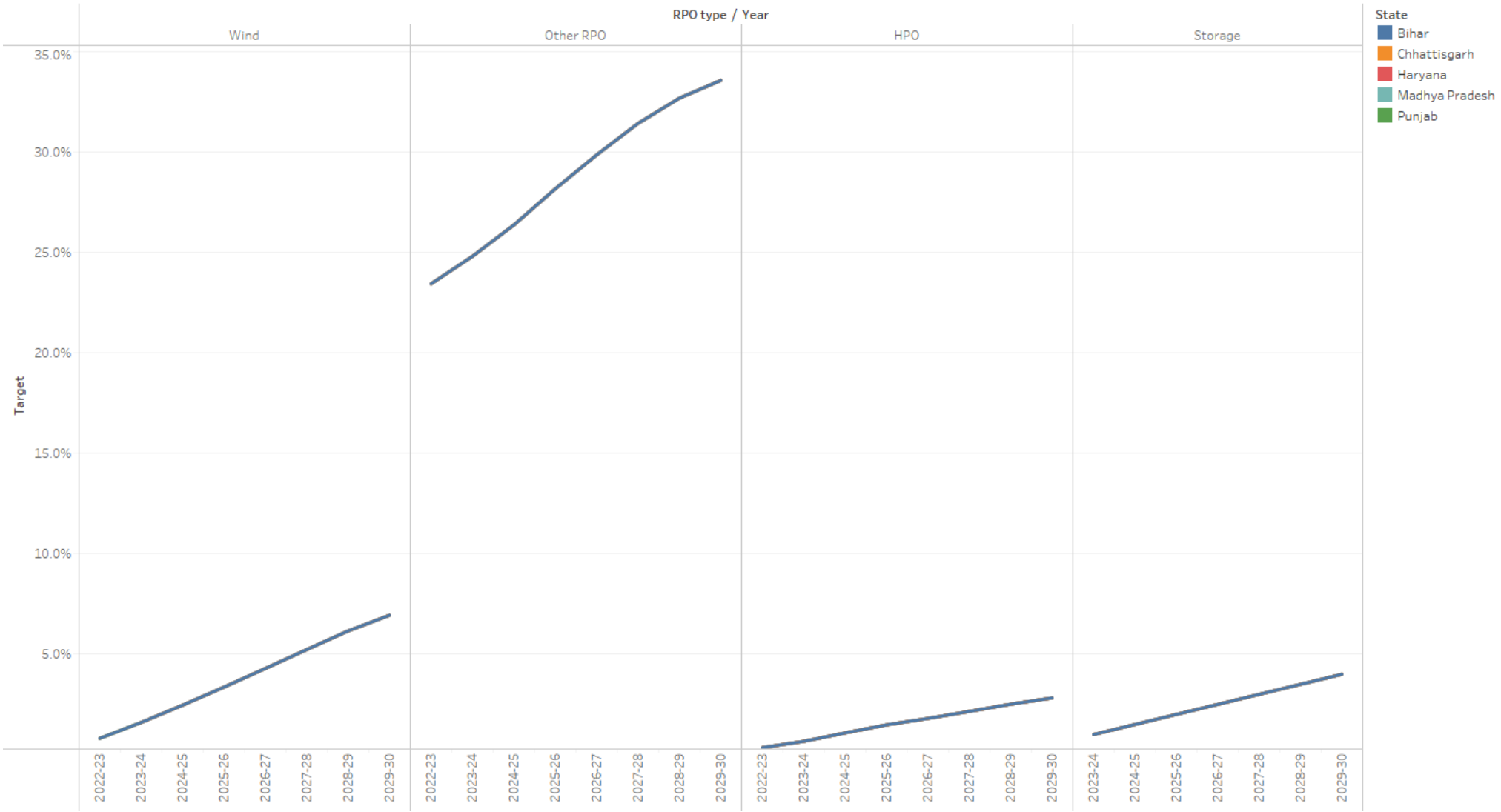


RPO targets across years and within a year (FY 21-22)



State	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
		Year													Target
MOP Targets		11.50%	14.25%	17.00%	17.50%	19.00%	21.18%	24.60%	27.07%	29.91%	33.01%	35.95%	38.81%	41.36%	43.33%
Assam	7.00%	4.00%	9.00%	11.00%	13.00%	15.00%	17.18%	24.60%	27.07%	29.91%	33.01%	35.95%	38.81%	41.36%	43.33%
Mizoram								24.60%	27.07%	29.91%	33.01%	35.95%	38.81%	41.36%	43.33%
Manipur								24.60%	27.07%	29.91%	33.01%	35.95%	38.81%	41.36%	43.33%
Andaman and Nicobar Isla..	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Andhra Pradesh	5.00%	5.00%	9.00%	11.00%	13.00%	15.00%	17.00%	18.00%	19.00%	20.00%	22.00%	24.00%			
Arunachal Pradesh		11.50%	14.25%	17.00%											
BESCOM	10.25%	11.75%	14.75%	18.00%	19.25%	20.50%	22.50%	23.75%	25.25%	26.75%					
Bihar	5.50%	6.50%	7.75%	9.25%	11.50%	14.25%	17.00%								
CESC	10.25%	11.75%	13.75%	18.00%	19.25%	20.50%	22.50%	22.50%	24.00%	25.50%					
Chandigarh	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Chhattisgarh	7.25%	8.00%	9.00%	11.00%	13.00%	15.00%	21.18%	22.35%	23.66%						
Dadra and Nagar Haveli a..	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Delhi	7.60%	9.00%	11.50%	14.25%	17.00%	17.50%	19.18%	21.35%							
GESCOM	5.25%	6.25%	8.75%	13.00%	15.25%	16.50%	18.50%	20.50%	22.00%	23.50%					
Goa	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Gujarat	9.00%	10.00%	10.00%	12.70%	14.30%	15.65%	17.00%	17.00%	18.70%	20.70%					
Haryana	3.50%	3.75%	5.25%	7.00%	8.50%	10.00%	11.00%	14.35%	16.66%						
HESCOM	7.25%	8.25%	11.25%	15.50%	18.25%	19.50%	21.50%	22.50%	24.00%	25.50%					
Himachal Pradesh	11.25%	12.00%	14.25%	17.00%	17.50%	19.00%	21.18%	0.35%	0.66%						
HRECS	7.25%	8.25%	11.25%	15.50%	18.25%	19.50%	21.50%								
Jammu & Kashmir	7.50%	7.50%	8.50%	9.50%	10.50%	11.50%	21.18%	21.35%	21.66%	22.08%	22.48%				
Jharkhand	4.00%	5.30%	7.75%	10.00%	11.55%	11.55%	21.00%	23.00%	25.00%						
Kerala	4.50%	5.00%	7.50%	9.75%	12.00%	14.25%	16.75%	20.75%	21.84%						
Ladakh	7.50%	7.50%	8.50%	9.50%	10.50%	11.50%	21.18%	21.35%	21.66%	22.08%	22.48%				
Lakshadweep	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Madhya Pradesh	7.00%	7.75%	8.50%	9.25%	12.00%	14.50%	17.00%	18.50%	20.00%	21.50%	23.00%	24.50%			
Maharashtra	9.00%	11.00%	12.50%	13.75%	15.00%	16.00%	17.50%	19.50%	22.00%	25.00%					
Meghalaya	1.50%	2.00%	2.50%	4.00%	5.00%	6.00%	6.50%	7.00%	7.50%						
MESCOM	10.25%	11.75%	14.75%	19.00%	20.25%	21.50%	23.50%	25.00%	26.50%	28.00%					
Nagaland		11.50%	14.25%	17.00%	17.50%	19.00%	21.00%								
Odisha	3.00%	4.50%	7.50%	9.50%	11.00%	11.00%	13.25%	14.50%	16.00%	18.00%					
Puducherry	3.55%	4.85%	6.70%	9.00%	11.50%	14.10%	17.00%	18.35%	19.91%	21.58%	23.23%	25.00%			
Punjab	4.90%	5.40%	6.00%	6.50%	9.50%	11.50%	14.50%	17.50%							
Rajasthan	10.20%	11.40%	14.25%	13.35%	15.00%	16.65%	18.48%	20.30%	22.32%						
Sikkim								17.05%	17.25%	17.40%					
Tamil Nadu	9.50%	11.50%	14.00%	14.00%	14.00%	18.25%	21.00%								
Telangana	5.00%	5.00%	5.00%	6.00%	6.50%	7.00%	8.00%	8.50%	9.25%	10.50%	11.75%	13.00%			
Tripura	11.00%	12.00%	13.00%	14.00%	15.00%										
Uttar Pradesh	6.00%	6.00%	6.00%	6.00%	8.00%	11.00%	13.00%	14.00%	15.00%						
Uttarakhand	8.10%	9.50%	14.25%	17.00%	17.50%	19.00%	21.00%	22.00%							
West Bengal	5.00%	5.50%	6.00%	7.00%	8.00%	12.00%	14.50%	17.00%							

Draft long term (2030) RPO targets in few states



THANK YOU
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Annexure-II

Renewable Energy Banking framework: Observations on state-level (Karnataka) experience

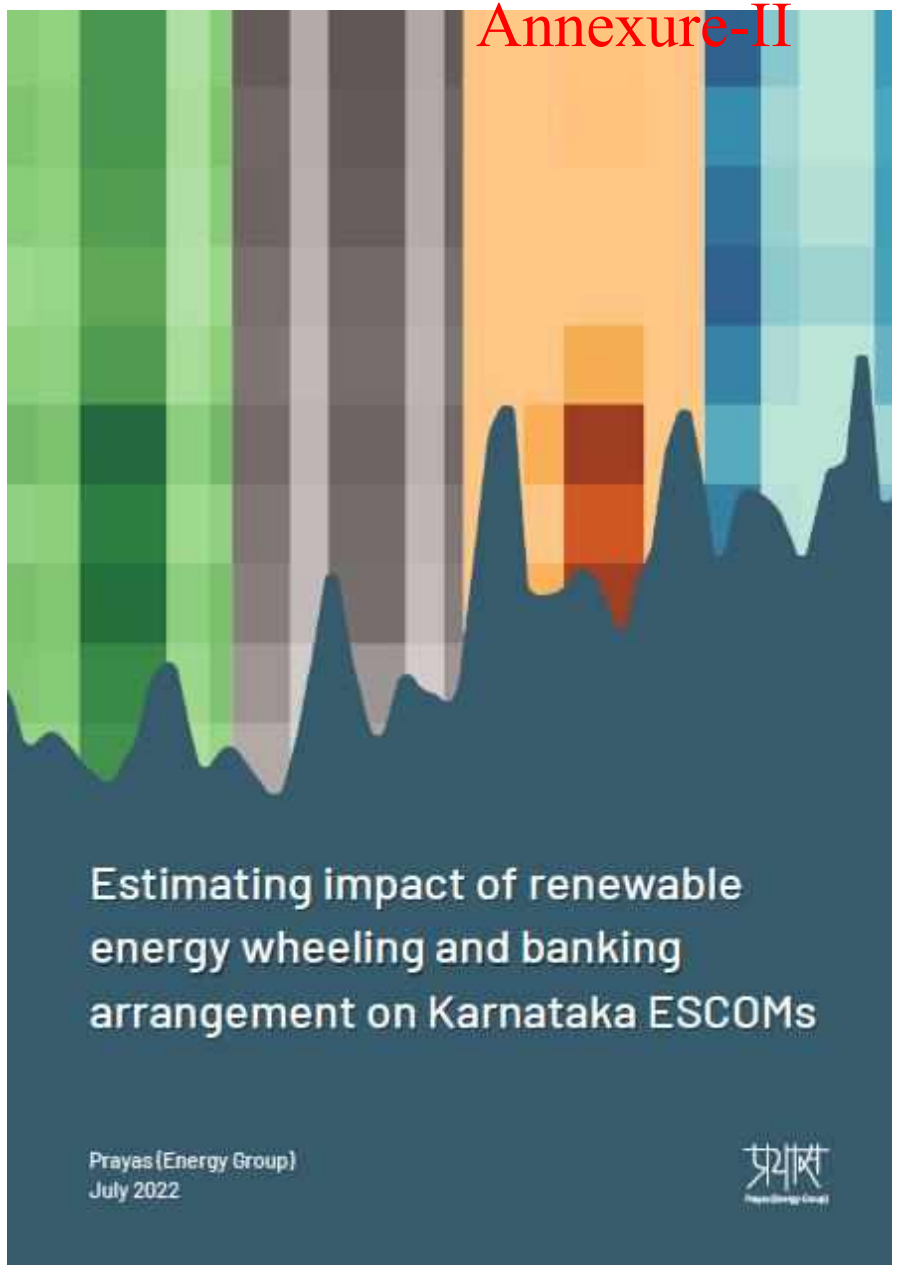
[Report link]

Ashwin Gambhir, Saumendra Aggrawal, Ann Josey, Shantanu Dixit

Prayas (Energy Group), Pune

Forum of Regulators, 83rd Meeting,

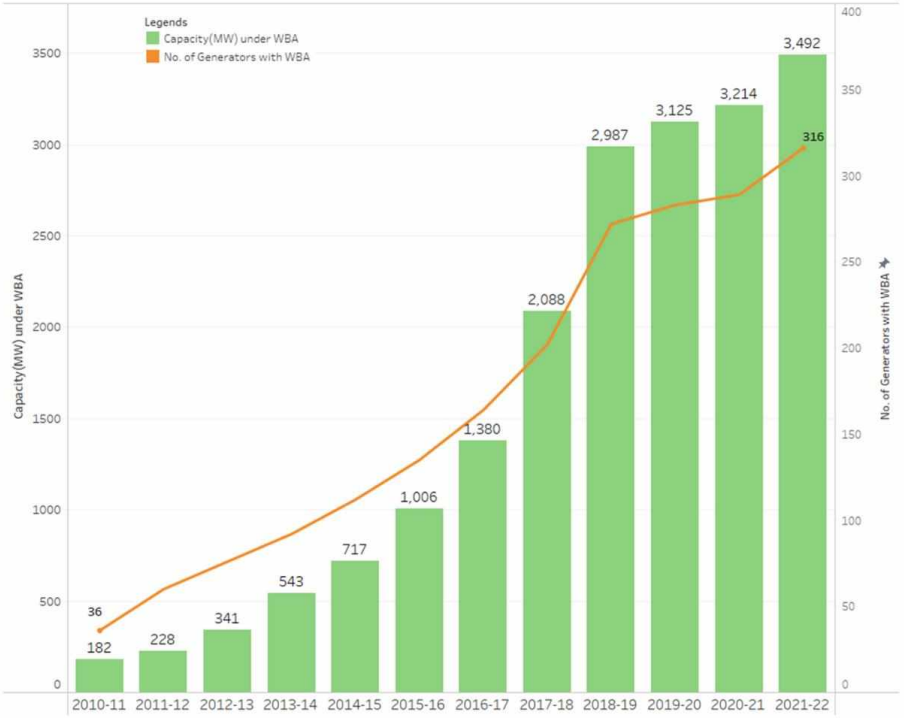
Chandigarh, 18th November 2022



RE Open Access and Captive Status

Parameters	Units	FY 11 Value	FY 22 Value	Increase by factor of
RE Capacity	MW	182	3,492	19
Energy Wheeled (FY 13 - FY 21)	MU	222	5,770	26
No of Generators with WBA	No	36	316	9

- Significant increase in wheeling and banking (WBA) agreements in last decade.
- Substantial support provided in Karnataka
  - Concessional wheeling, transmission, OA, annual banking charges (2% in kind) without ToD restrictions.
  - No revision in electricity duty, banking charges.
- RE penetration in Karnataka ~ 38% of the energy consumption (excl. hydro) (FY 21).



- Significant litigation on banking framework
  - Proceedings before KERC since 2014
  - Challenged before APTEL, HC (2019) and SC

- KERC directed DISCOMs to conduct independent study to assess impact due to concessional wheeling, banking

Banking Service

Time period	Generation	Consumption	Banking (units)		Value to system / Cost to ESCOMs for each time period (Rs./unit)
			Injection	Drawal	
1	200	150	50		4
2	150	200		50	3
3	200	200			2
4	150	125	25		2
5	50	75		25	2

Factors which affect ESCOMs:

- **Time period** → considered for injection and drawal (5 min, 15 min, ToD slot, Month etc)
- **Quantum** → Wheeling and Consumption for each consumer and at the aggregate level
- **Cost and revenue implications** → Of injection and drawal at respective time period

Karnataka Study methodology

Aggregate wheeling considered for 120 consumers, aggregate wind-solar 15-min level from 68 PSS.

Estimation of Slot-wise Banking Quantum

- Estimation of **Slot-wise Wheeling & Consumption**
- 15 min aggregate wind-solar profile used on annual wheeled energy to obtain slot-wise wheeling
- Difference between slot-wise consumption and wheeling→ net surplus injection / drawal

Cases considerations for banking period

- Case A: **Monthly slot-wise**
  - Surplus settled at end of month (i.e. no carry-forward)
- Case B: **Annual slot-wise**
  - Monthly surplus carried-forward to the same slot next month. Net settlement at end of year.
- Case C: **Annual (Current Arrangement)**
  - Any Slot to Any slot

Estimating cost and revenue in each case of banking period

- Compensating surplus at the end of banking period at market rates (cost neutral for DISCOMs)
- **Change in DISCOM revenue due to supply of energy during net-drawal slots**
  - Revenue from sale of power = Energy Charge - CSS – AS
  - Incremental Cost @ market rate or marginal thermal cost.

Managing supply-demand mismatch through market using DISCOM as trader

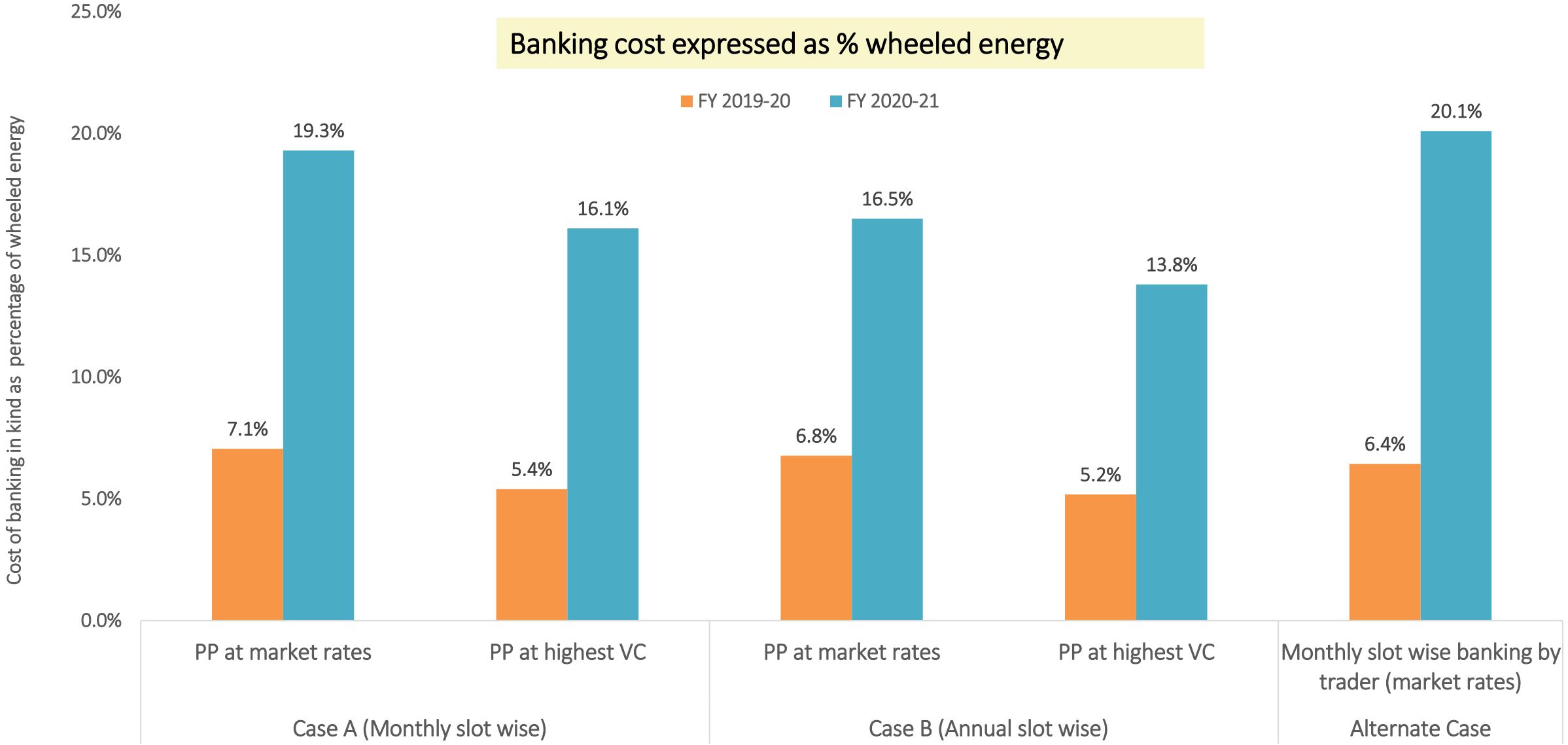
- **Banking availed by consumers through markets**
  - Surplus injection → Sold on power exchange at slot-specific market rate
  - Excess Drawal→ Purchased on slot specific market rate

- **Revenue for surplus injection of power** = $Slotwise\ injection \times Rate\ of\ sale\ of\ power\ in\ market$

- **Cost for excess drawal =** $Slotwise\ drawal \times \left\{ \begin{array}{c} Rate\ for\ market\ purchase + \\ Transmission\ \&\ Wheeling\ charges\ \&\ losses + \\ Cross\ subsidy\ surcharge + \\ Additional\ Surcharge \end{array} \right\}$

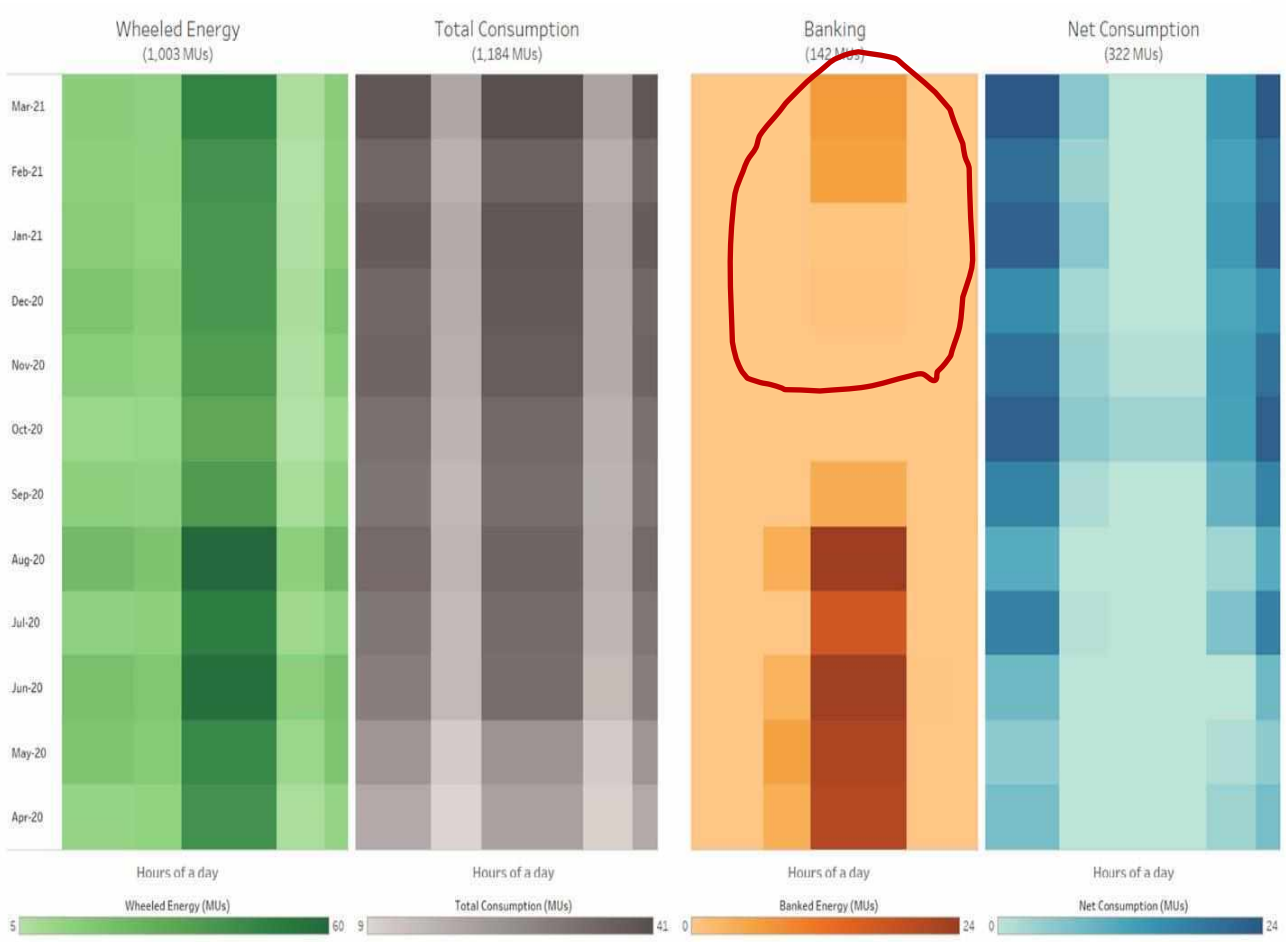
- **Net impact** = $Revenue\ for\ sale\ of\ surplus\ injection - Cost\ incurred\ for\ excess\ drawal$

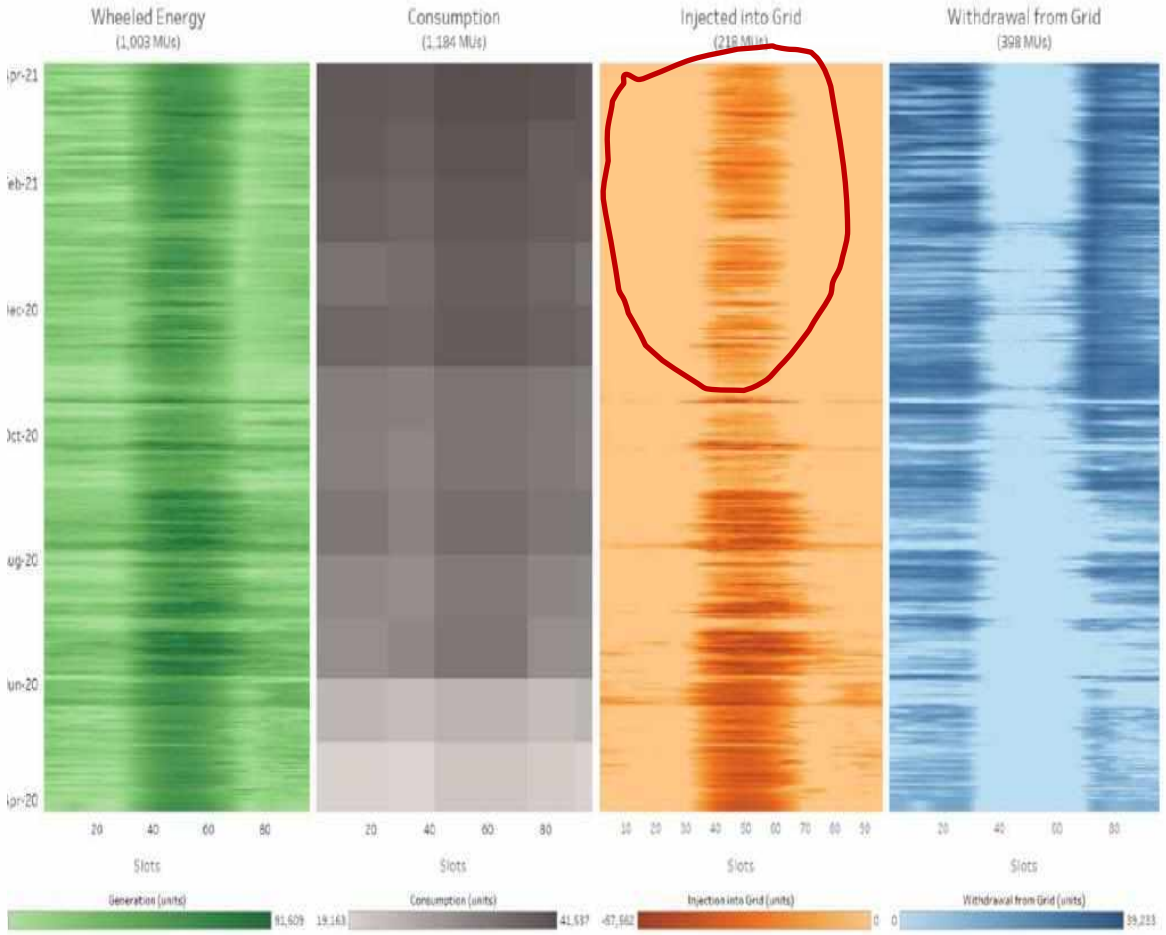
Cost to Karnataka DISCOMs as compared to the current arrangement



Illustrative 15-min block-wise analysis for banking (FY21)

- 15 minute PSS generation profiles and slot-wise consumption estimated at block level used
- Injection or drawal estimated for each time block
- Banking increased by 54% and 80% as compared to Case A and Case B respectively for FY21





Conclusions and Recommendations of Karnataka RE Banking study

Total Cost incurred due to concessional wheeling, transmission and banking for Karnataka

- Rs. 343 - 373 crores for FY2019-20 ; Rs. 530 - 630 crores for FY2020-21

Immediate changes in Banking arrangement to value service appropriately

- Change from annual banking to monthly ToD slot wise banking (similar to FoR model regs)
- Increase banking charges to **10% - 12% (or Rs 0.3-0.4/kWh) of wheeled energy** (as against existing 2%)
  - Draft Model FoR regulations on Green OA charges methodology suggests **8%** in kind

Change in banking framework within 2 years

- Move to 15 minute accounting of generation and consumption to correctly account banking quantum
- Banking charge levied as a Rs/unit on banked energy (as compared to wheeled energy)
  - incentivises consumers to align generation/consumption patterns.

Applicability of changes

- No retrospective applicability

Banking Framework for Green H2 – need for a different approach

- Significant implications for DISCOMs considering scale of RE needed for G H2
  - 20th EPS: 10 MMT of G H2, 50 kWh/kg=500 BU; 50% from co-located RE (~100 GW RE) and 50% from grid.
  - Scale of banked energy - order of magnitude higher. Serious financial, operational implications on DISCOMs, consumers
- Need for graded approach for enabling grid services based on following principles
  - At national level rather than through individual DISCOMs: Diversification of impacts, maximise geographical and temporal diversity
  - Grid services at cost: Better signals to encourage optimal investments and operations
  - Direct Central support with strong sunset clause for early movers to reduce CapEx/OpEx.
- Managing Supply-Demand mismatch via Market → Similar to DISCOM-Trader case in Karnataka study
  - DISCOM provides monthly ToD slot wise banking for initial years but charges at block wise market rates.
  - Liquidity on DAM/TAM set to increase with lower OA eligibility, economic case for sales migration.
  - Sophisticated market linked frameworks for managing demand supply mismatch should evolve as markets and technologies mature.
- Provides appropriate price signals towards increasing efficiencies and reducing costs.
  - Contracts with existing idle capacity towards utilisation of off-peak/night time power.
  - Access diversity of RE resources through some form of pooling.
  - Encourage measures towards enhancing flexibility (DSM, ToD, Storage etc).

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BACK UP SLIDES –
DETAILED RE BANKING PRESENTATION

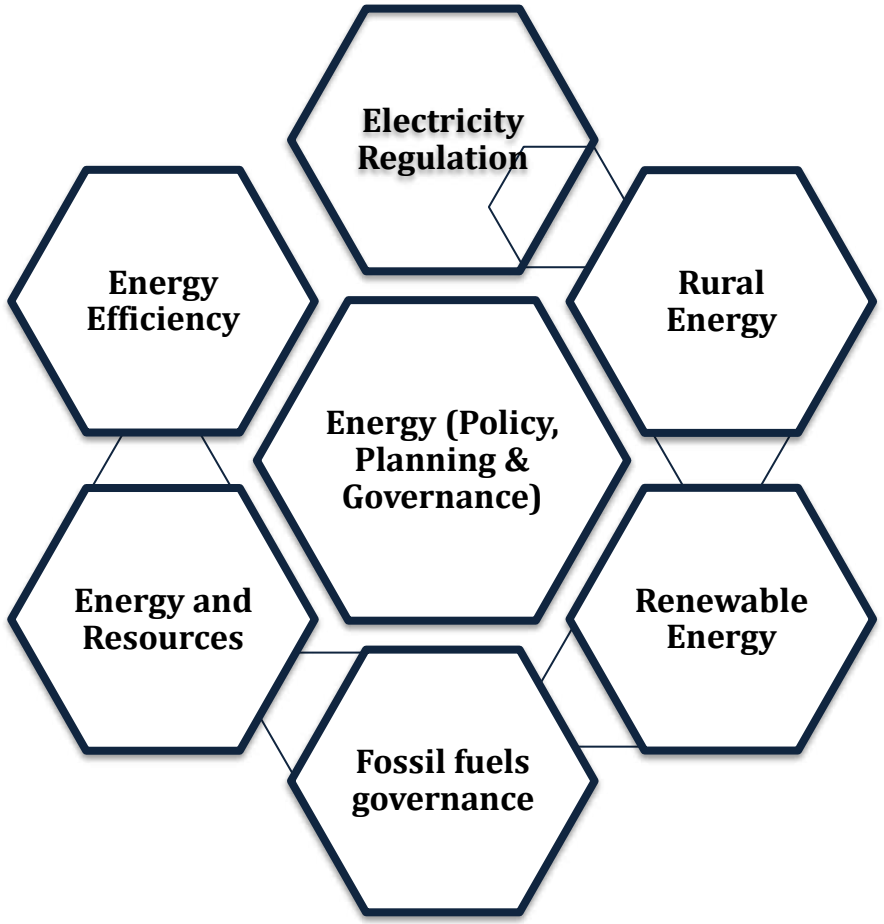
Estimating impact of banking arrangement provided to RE generators and consumers on Karnataka ESCOMs

Prayas (Energy Group), Pune

About Prayas (Energy Group)

- Pune based Not-for-profit with almost 30 years of power sector experience
- Analysis based policy advocacy for promoting public interest
- Focus on governance aspects & policy innovation

- **Part of several high-level Govt. Committees & regulatory processes**
  - **MoP and MNRE**: *RE Law, 12th Plan and Tariff Rationalisation Committee*
  - **Regulatory commissions:** *Consumer Representative before CERC Advisory Committees of CERC several SERCs*
  - **NITI Aayog:** *175 GW Expert Committee, Low Carbon Inclusive Growth, India Energy Security Scenarios, New Integrated Energy Policy; Indo-US energy dialogue.*



Outline

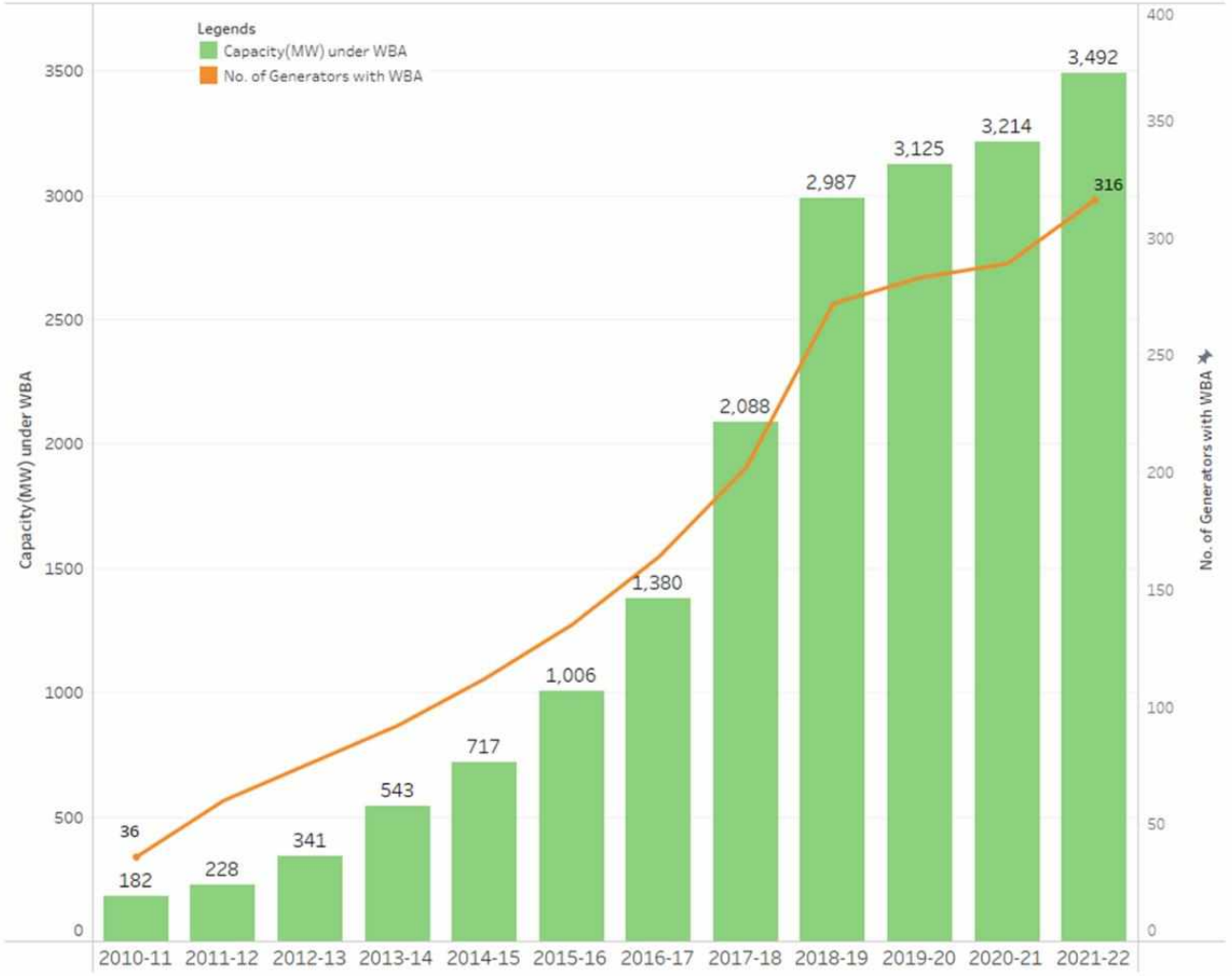
- Background and context
- Current arrangement of banking
- Study methodology and data
- Analysis and results
- Conclusions and recommendations

RE Open Access and Captive Status

- Significant increase in wheeling and banking agreements in past 17 years

- Substantial support provided in Karnataka
  - Concessional wheeling, transmission charges
  - Concessions on sales migration charges
  - Concessional banking charges (2% in kind)
  - No revision in electricity duty

- Renewable energy penetration in Karnataka is among highest in the country as it accounts for 38% of the energy consumption (excl. hydro)



RE: Recent Developments and Questions before policy makers

- **RE, especially wind and solar able to stand on own economic proposition due to reduction in costs**
  - Significant reduction in tariffs in past 17 years, especially for solar
  - Generic Solar tariffs ↓ from Rs. 14.5/unit in FY2010 to Rs. 3.08/ unit in FY21

- **Development of markets and alternate options to manage variability**
  - Recent launch of Green Term Ahead and Integrated Day Ahead contracts provide avenues for exclusive, transparent, flexible trade of green power
  - Green open access rules, 2022 to provide significant impetus and support to open access and captive, especially captive
  - Forecasting and Scheduling Regulations have been in place in Karnataka since 2016, institutionalising week ahead and day ahead scheduling
  - Procedures and processes around metering and billing, especially for open access and captive have been codified for 1 MW and above consumers.

Should existing concessional regime continue?
Can public finance support be repurposed to aid RE integration and address current challenges?

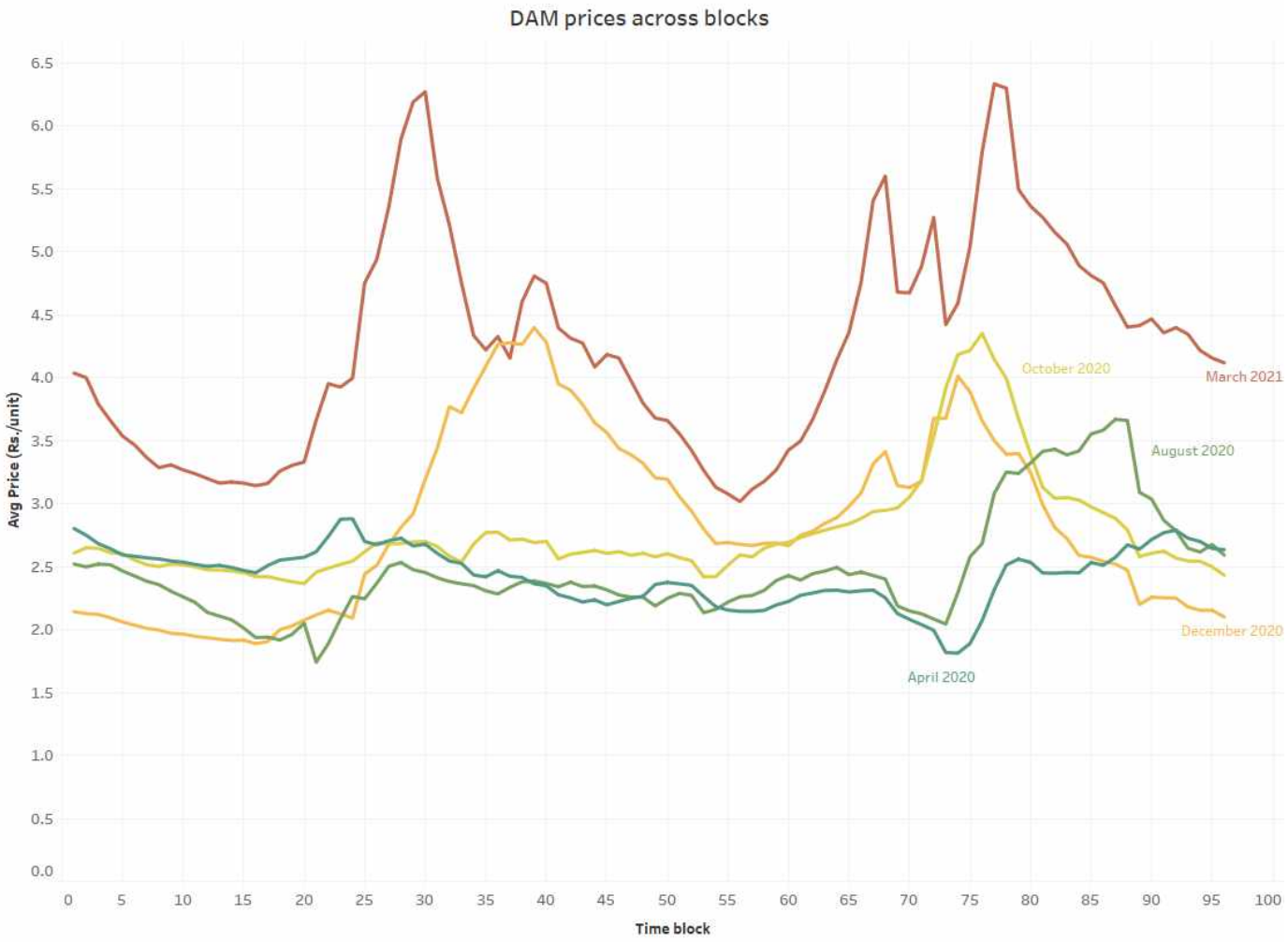
Background and context

- KERC Order dated 9th Jan, 2018: Six monthly banking; restrictive banking during peak hours, set aside by APTEL
- KERC Order dated 14th May, 2018: No concessional transmission, wheeling and banking charges for RE projects completing 10 years as on 31.03.2018. Karnataka High Court quashed order.

- Two important takeaways
  - Changes in concluded WB contracts are not allowed
  - Need for analysis to show impact on ESCOMs to support any proposal to change existing arrangement

- KERC: Need for study to assess financial impact of banking
  - Study undertaken jointly by all ESCOMs to devise formats uniformly
  - At least 2 years data should be provided/ analysed for the report
  - Orders by other SERCs and directions by APTEL/ HC to be considered
  - At request of PCKL, PEG conducted study, report submitted on 30th May 2022.

Price of power changes significantly across time…1



Block wise unconstrained DAM prices for S1 bid area of IEX for 5 months averaged across days

Significant variation in average prices across months and blocks

Banking Service

Time period	Generation	Consumption	Banking (units)		Value to system / Cost to ESCOMs for each time period (Rs./unit)
			Injection	Drawal	
1	200	150	50		4
2	150	200		50	3
3	200	200			2
4	150	125	25		2
5	50	75		25	2

Factors which affect ESCOMs:

- **Time period** → considered for injection and drawal (5 min, 15 min, ToD slot, Month etc)
- **Quantum** → Wheeling and Consumption for each consumer and at the aggregate level
- **Cost and revenue implications** → Of injection and drawal at respective time period

Current arrangement

Time Period	Annual
Quantum	Injection/drawal based on monthly consumption and wheeling, and surplus carried forward month on month for the respective year (financial or water)
Valuation	• Banking charge @ 2% (in-kind) of wheeled energy • Annual purchase of surplus at 85% of generic RE tariff
Settlement	Annual

Limitations of the current arrangement

- Present methodology does not capture quantum of banking at different time periods (evening peak, night time , seasonal variation etc.) within a year
- Does not capture value to the system and loss to the ESCOMs adequately

Data available for the system level study

Consumer level data

- For ~ 120 consumers across 5 ESCOMs (For FY21)
- Monthly ToD Slot wise (12 X 4 = 48 slots) consumption ESCOMS
- Annual wheeled energy

Generation data

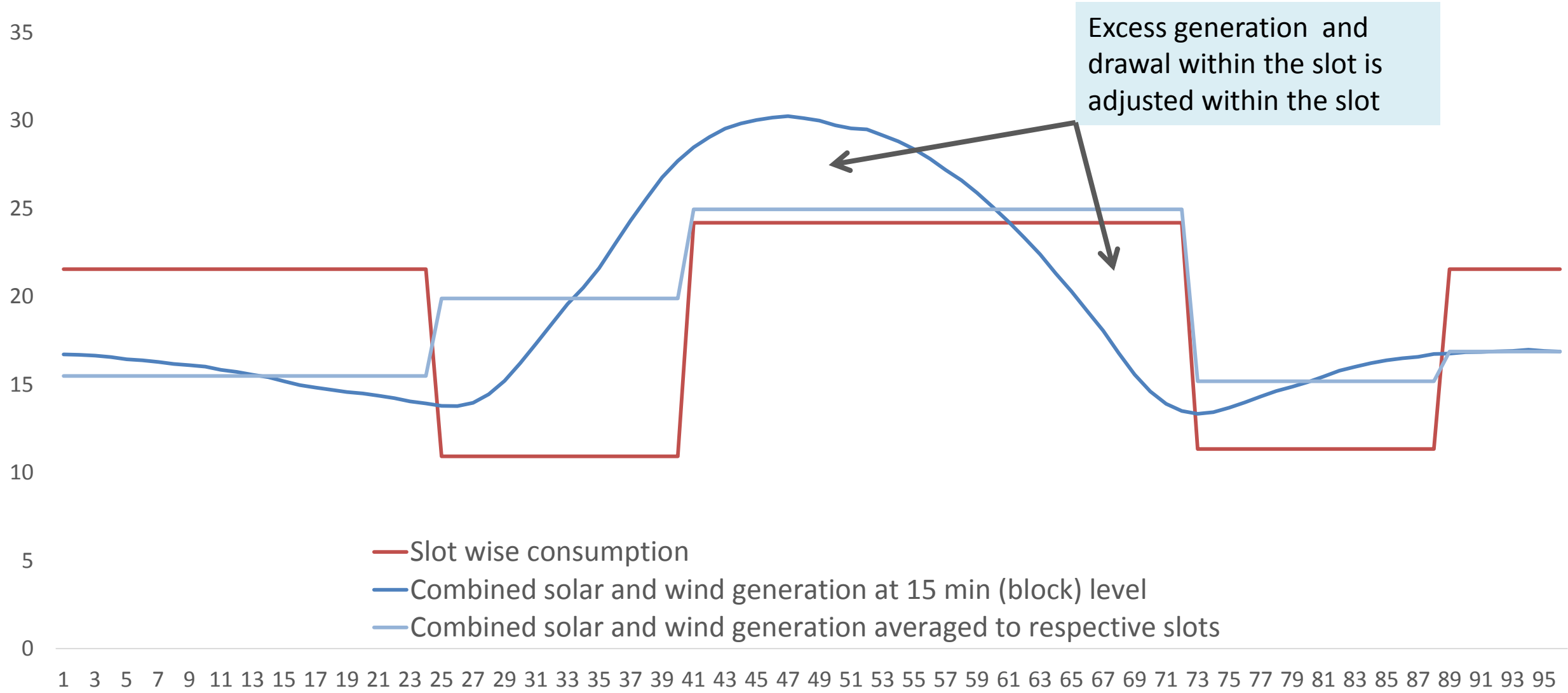
- 15 min wind and solar PSS level data (~ 68 PSS for FY21)

Cost and revenue data

- Month-wise variable cost of contracted capacity
- 15 min block-wise DAM area clearing price in S 1 bid area of IEX
- Applicable tariff and charges as approved by ERC. (Energy charge, CSS, AS, RE generic tariffs)
- Applicable Transmission and Wheeling losses and charge

➔ **Hence, only month wise slot wise analysis is possible.**

ToD slot wise banking underestimates as within slot banking not considered



Study methodology

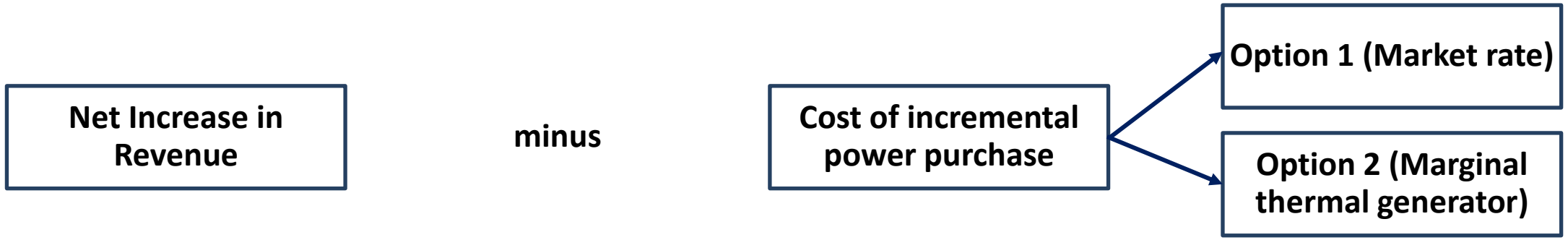
Aggregate generation/wheeling for the year considered for 120 consumers to assess impact on ESCOMs
Analysis at aggregate level as system-level as aggregate impact on all ESCOMs is analysed

Estimation of Slot-wise Banking Quantum	Case considerations for banking period	Estimating cost and revenue in each case of banking period
• Estimation of Slot-wise Generation, Consumption • 15 min block wise data for wind and solar for generation profile • Profile used on annual wheeled energy to obtain slot-wise generation • Difference between slot-wise consumption and wheeling→ net surplus injection / drawal	• **Case A: Monthly slot-wise** • Surplus for month settled at end of month(i.e. no carry-forward across months) • **Case B: Annual slot-wise** • Surplus for month is carried-forward to the same slot next month. Net settlement at end of year. • **Case C: Annual (Current Arrangement)** • Any Slot to Any slot	• Compensating surplus injected in the grid at the end of banking period • Change in ESCOM revenue due to supply of energy during net-drawal slots

Estimating cost and revenue for ESCOMs in each case of banking period

- **Surplus injected at the end of banking period (month or year)**
  - Slot-wise value of power in market → cost and revenue neutral for the DISCOM.

- **Change in DISCOM revenue due to supply of energy during net-drawal slots:**



  - **Net increase in revenue** = $Incremental supply in net drawal slots \times (Energy charge - CSS - AS)$

  - **Cost due to incremental power purchase**
    - **Option 1:** $Incremental power purchase \times (Slotwise average price in IEX)$
    - **Option 2**: $Incremental power purchase \times (Cost of marginal thermal generator as per MoD)$

Alternate Case: Monthly slot-wise banking provided by a trader (market rate)

- **Banking provided by trader**
  - Surplus injection →Sold on power exchange at slot-specific market rate
  - Excess Drawal→ Purchased for consumer on slot specific market rate

- **Net impact** $= Cost\ incurred\ for\ supply\ to\ consumer - Revenue\ for\ sale\ of\ power$

- **Cost incurred for supply to consumer=** $Slot\ wise\ injection \times \left[\begin{array}{c} Rate\ for\ market\ purchase + \\ Transmission\ \&\ Wheeling\ charges\ \&\ losses + \\ Cross\ subsidy\ surcharge + \\ Additional\ Surcharge \end{array}\right]$

- **Revenue for sale of power**= $Slot\ wise\ drawal \times Rate\ of\ sale\ of\ power\ in\ market$

Analysis and Results

Input data and banking quantum calculation

- Analysis period: **FY 2020-21**
- Total Annual Consumption: **1,184 MU**;
- Total Annual Wheeled Energy: **1,003 MU**
- 120 consumers, 5 ESCOMs

ToD Slots	Slot wise consumption	Slot wise wheeling
Slot -1 (6 to 10 Hrs)	190	179
Slot -2 (10 to 18 Hrs)	410	531
Slot -3 (18 to 22 Hrs)	197	98
Slot -4 (22 to 6 Hrs)	387	195
Total	1184	1003

- Analysis period: **FY 2019-20**
- Total Annual Consumption: **1,050 MU**;
- Total Annual Wheeled Energy: **740 MU**
- 95 consumers, 3 ESCOMs

ToD Slots	Slot wise consumption	Slot wise wheeling
Slot -1 (6 to 10 Hrs)	164	133
Slot -2 (10 to 18 Hrs)	373	399
Slot -3 (18 to 22 Hrs)	175	70
Slot -4 (22 to 6 Hrs)	339	138
Total	1050	740

Change in ESCOM revenue across different banking arrangements (FY21)

- Consumer Energy Charge = **7.75 Rs/kWh**; CSS + AS = 1.65 + 0.2 = **1.85 Rs/kWh**
- Slot-wise market rate = slot wise IEX avg DAM price for S1 region in FY 20-21.
- Generic wind & solar tariff for FY 20-21 (Rs **3.17/kWh**)

Allocation of wheeled energy	Units	Formula	Current Arrangement	Monthly slot wise (Case A)	Annual slot wise (Case B)
Energy Drawal From ESCOMs	MU	A	180	322	301
Reduction in Banked Energy / Increase in drawal from DISCOM w.r.t Current Arrangement	MU	B	-	142	121
Energy Charge for consumer	Rs/kWh	C	7.75	7.75	7.75
ESCOM Billed Revenue	Rs crore	D = A X C	140	250	233
Increase in ESCOM revenue in Monthly and Annual Slot-wise cases	Rs crore		N/A	110	93

Estimating cost and revenue for ESCOMs in each case of banking period (FY21)

Particulars	Monthly slot wise (Case A)		Annual slot wise (Case B)	
Increase in ESCOM revenue in Monthly and Annual slot-wise as compared to current arrangement	110		93	
Valuation of cost and revenue	**Option 1 (Market rate)**	**Option 2 (Marginal Thermal Gen)**	**Option 1 (Market rate)**	**Option 2 (Marginal Thermal Gen)**
Incremental power purchase cost	43	53	37	45
Reduction in revenue from OA charges (CSS+AS)	6	6	5	5
Revenue loss to ESCOM due to annual banking in current arrangement as compared to slot-wise banking, monthly and annual	61 *(110-43-6)*	51 *(110-53-6)*	53 *(93-37-5)*	44 *(93-45-5)*
% revenue loss to ESCOM due to annual banking in current arrangement as compared to slot-wise banking, monthly and annual	44% *(61/140)*	37% *(51/140)*	38% *(53/140)*	31% *(44/140)*
Cost of banking per unit of wheeled energy	**0.61**	**0.51**	**0.52**	**0.44**
Cost of banking as % of wheeled energy	**19.3%**	**16.1%**	**16.5%**	**13.8%**

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Alternate Case: Monthly slot-wise banking provided by a trader (market rate) (FY21)

Net impact = *Cost incurred for supply to consumer - Revenue for sale of power*

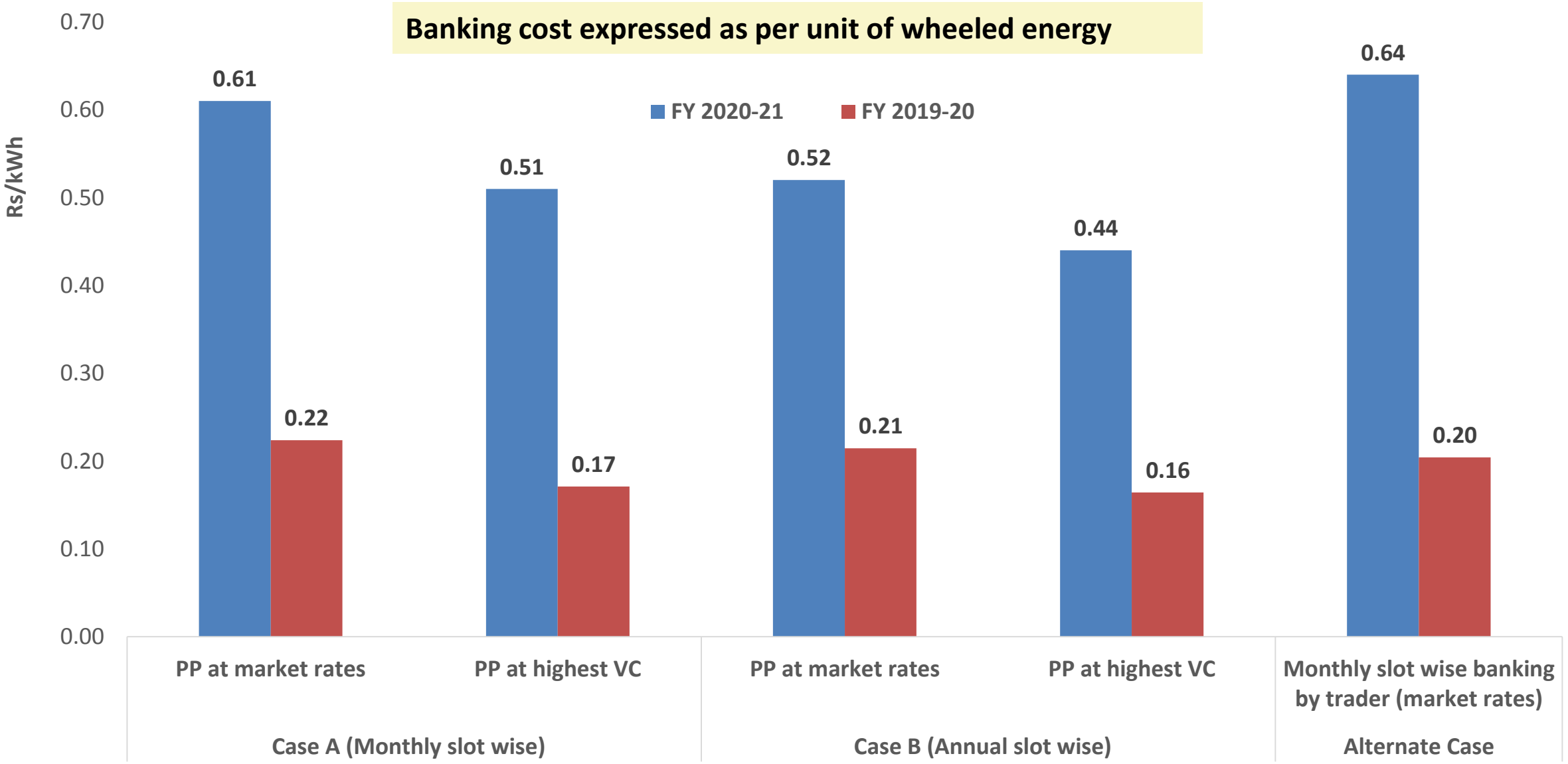
Cost incurred for supply to consumer = *Slotwise injection × (Rate for market purchase + Transmission, Wheeling charges, losses + CSS + AS)*

Revenue for sale of power = *Slotwise drawal x Rate of sale of power from market*

Cost incurred for supply to consumer	=	142 MU	×	Average of Rs.3/kWh	+ T_x charge → Rs 0.40/kWh T_x loss → 5%	+ CSS → Rs.1.79/kWh AS → Rs.1.65/kWh
Revenue for sale of power	=	142 MU	×	Average of Rs.2.49/kWh		

Cost / Revenue Impact on Consumer	Cost: Rs. 99 crore Revenue: Rs 35 crore Net Cost = Rs. 64 crore	Net Cost / Energy Wheeled = Rs. 0.64/kWh	% of wheeled energy = 20%

Loss to DISCOM as compared to the current arrangement…1



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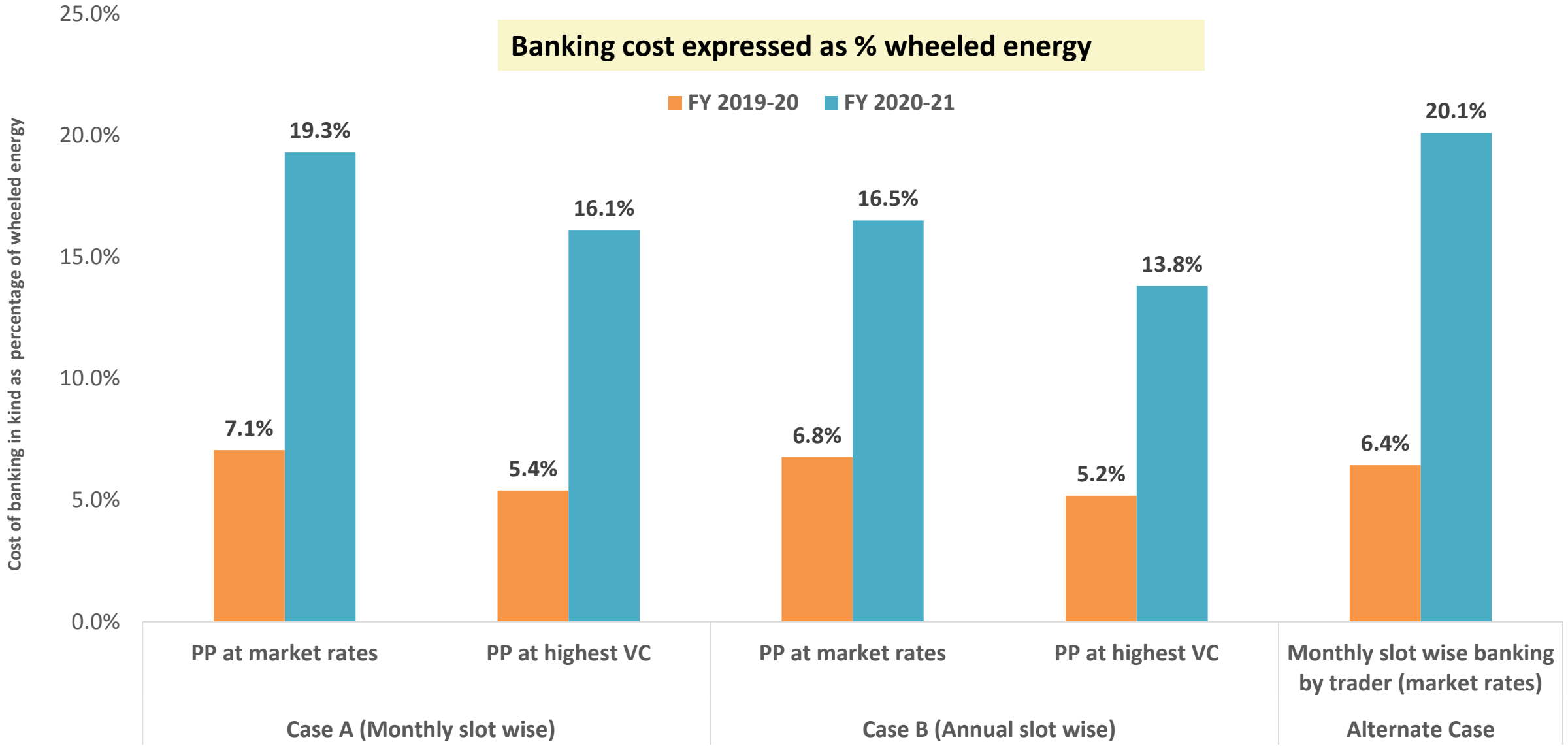
Loss to DISCOM as compared to the current arrangement…2



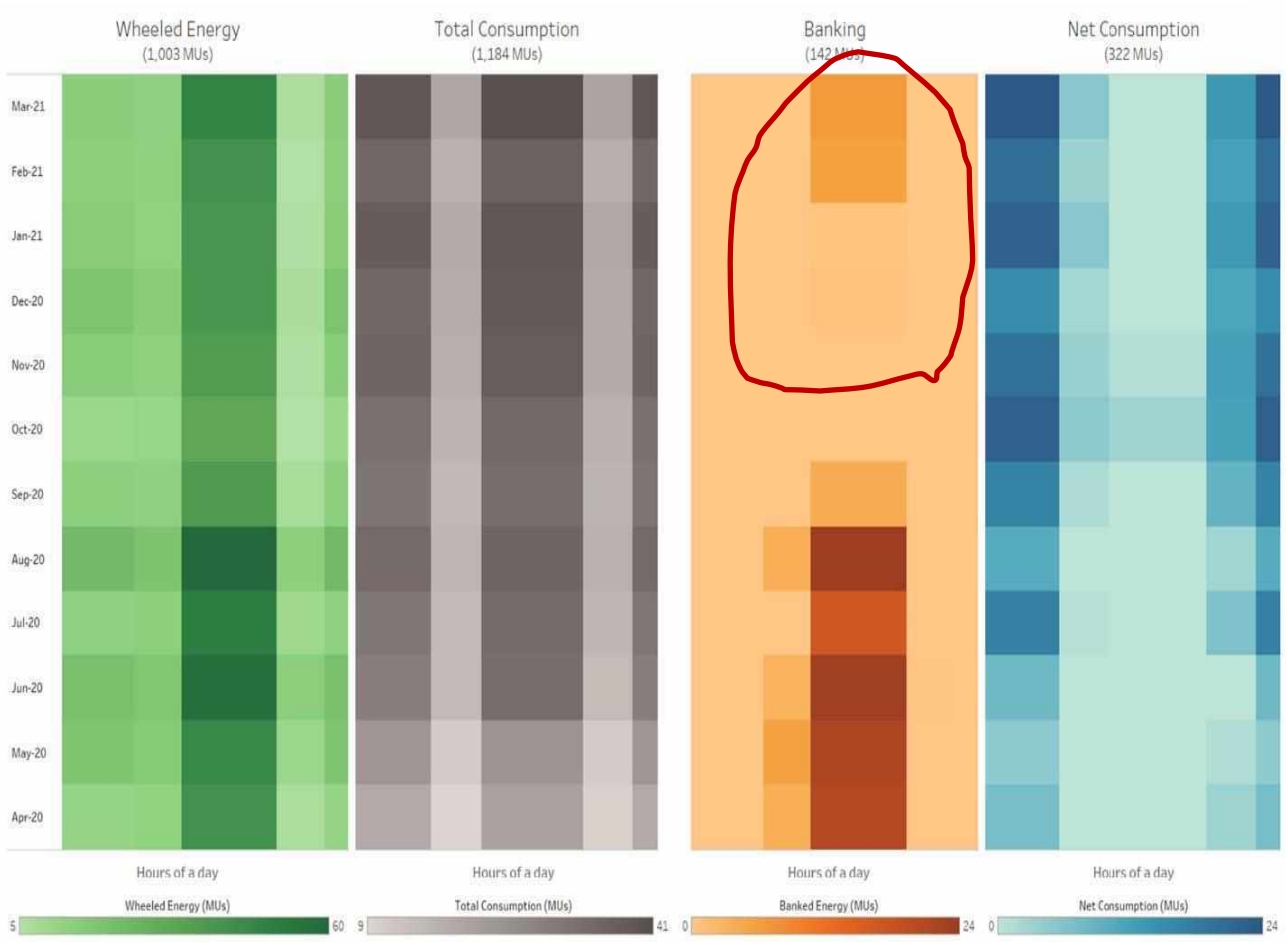
Primary difference between 2019-20 and 2020-21

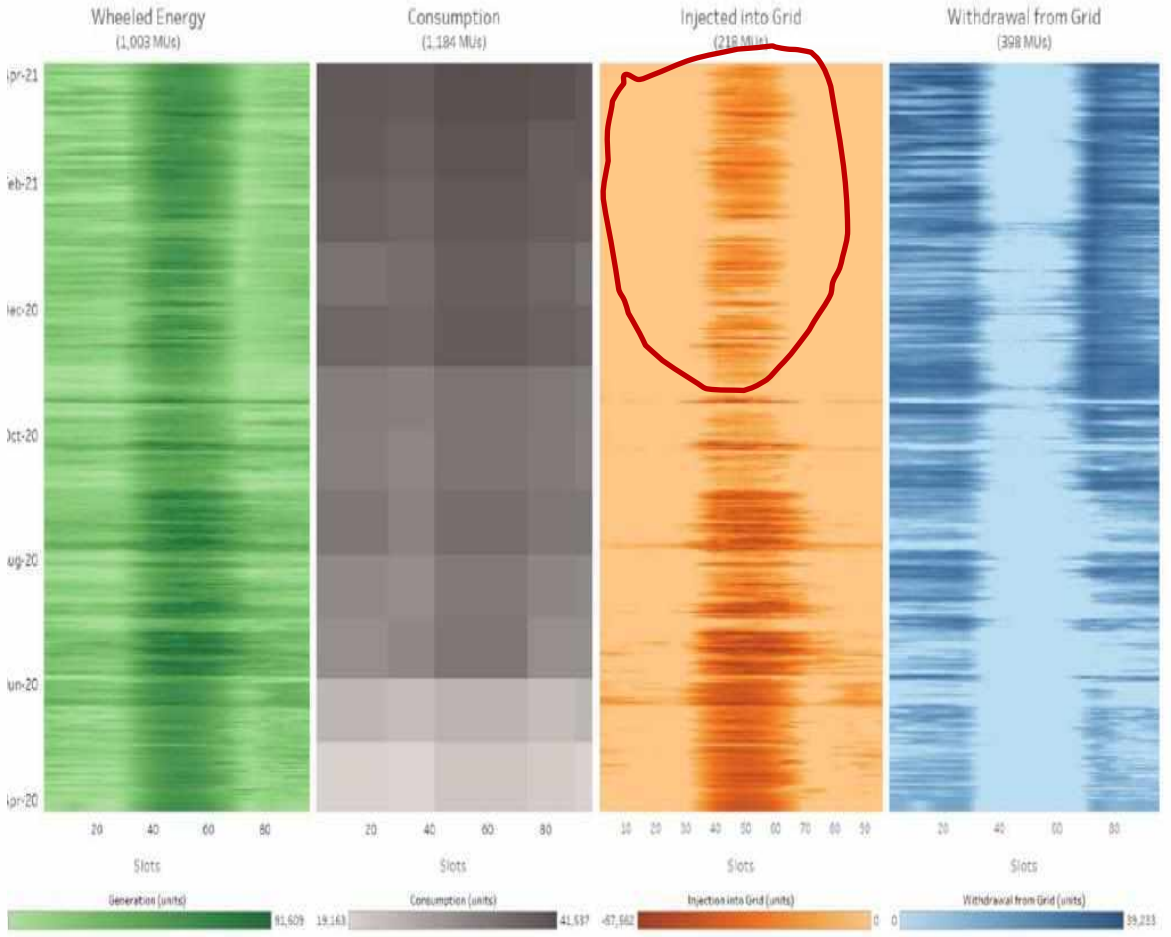
Slot-wise Ratio of Wheeling/Consumption for 2 years		
Year	2019-20	2020-21
Slot -1 (6 to 10 Hrs)	81%	94%
Slot -2 (10 to 18 Hrs)	106%	130%
Slot -3 (18 to 22 Hrs)	41%	50%
Slot -4 (22 to 6 Hrs)	42%	50%
Total	70%	85%

- Impact of banking is closely linked to the quantum of banking
- Annual Ratio of wheeled energy to consumption is 70% for FY20 as compared to 85% in FY21
- Hardly any banking in Slot 2 for FY20 (Day time/ Solar slot)
- Possibility of significant within slot (8 hour slot) banking

Illustrative block-wise analysis for banking (FY21)

- 15 minute PSS generation profiles and slot-wise consumption estimated at block level used
- Injection or drawal estimated for each block





Illustrative block-wise analysis for banking

Allocation of wheeled energy (FY21)	Case A Monthly slot wise	Case B Annual slot wise	Illustrative 15 min block-wise
ESCOM Energy Drawal (MU)	322	301	398
↑ in drawal from Case C (MU)	142	121	218

- Banking increased by 54% as compared to Case A and 80% as compared to Case B in 15 minute Case for FY21
- For FY20, similar analysis shows:
  - 141 to 147% increase as compared to Case A and B
  - Possibility of higher within ToD slot banking in FY20
- As such for both years, cost of banking service will be proportionately higher than that estimated in slot-wise analysis
- Impact can be better ascertained with block-wise consumption data

Transmission and Wheeling Concessions (FY20 and FY21)

- **Weighted average distribution wheeling charge and losses used for ESCOMs**
  - Approved wheeling charge →Rs. 0.24/unit for FY20 and Rs.0.27/unit for FY21
  - Approved wheeling losses →3.86% (Rs. 0.12/unit) for FY20 and 3.57% (Rs.0.11/unit)for FY21
  - Concessional wheeling charge, loss → 5% of wheeled energy → Rs. 0.16/ unit for both years
  - Inter-DISCOM open access wheeling charges would be higher and not considered in analysis

- **Long-term transmission open access charges, losses considered**
  - Approved monthly KPTCL charges at Rs. 1.31 lakhs/MW (FY20) and Rs. 1.55 lakhs/ MW (FY21)
  - RE open access exempt from paying transmission charges, no concessions on losses

- **Significant revenue foregone due to concessions → Rs 243 crores (FY20) and Rs 277 crores (FY21)**
  - Rs. 126 crores in FY20 and Rs. 139 crores for FY21 due to wheeling concessions
  - Rs. 117 crores in FY20 and Rs. 138 crores in FY21 due to transmission concessions

Conclusions and Recommendations…1

Current sector trends and changes require change in existing wheeling and banking concessions

- RE availing wheeling and banking arrangement grown 17 times in last 11 years
- RE prices have fallen dramatically (lower than ESCOM average power cost) in past decade
  - Generic Solar tariffs ↓ from Rs. 14.5/unit in FY2010 to Rs. 3.08/ unit in FY21
- However, wheeling and banking arrangement has remained unchanged for 17 years in Karnataka

Impact of Banking on ESCOM finances significant → revision of banking arrangement imperative

- FY21→ Cost of banking ranges from Rs. 0.44/kWh to Rs. 0.61/kWh of wheeled energy
- This implies a loss of Rs. 253 to 353 crores for ESCOMs in FY21
- In FY20→ Loss due to current banking arrangement was at Rs.100 to Rs. 130 crores.

Impact of banking is an underestimate in slot-wise analysis

- Analysis not at 15 minute block level which is scheduling, balancing requirement as per IEGC
- Within slot banking not captured (2 hours for 4 hours and 2 slots for 8 hours)
- Illustrative analysis shows that banking would increase by 50% to 140% if analysis is block-wise
- Cost impact would therefore increase proportionately.

Conclusions and Recommendations…2

Concessional wheeling, transmission charges → Revenue loss to ESCOMs and KPTCL

- With rise in RE open access and captive, revenue forgone due to concessions is →
  - Rs. 243 and 273 Cr for FY20 and FY21
- KPTCL waiver alone accounts for 50% of the revenue foregone

Total Loss for Utilities from concessions on wheeling, transmission and banking →

- Rs. 343 to 373 crores for FY2019-20
- Rs. 530 to 630 crores for FY2020-21

Losses being borne by entire consumer base of ESCOMs

Conclusions and Recommendations…3

Immediate changes in Banking arrangement

- Immediately shift to monthly slot-wise banking from existing annual banking arrangement
- Increase banking charge to 10% to 12% of wheeled energy (as against existing 2%)
- Alternately, increase charge to Rs.0.3 to 0.4 per unit of wheeled energy

Change in banking framework within 2 years

- Move to 15 minute accounting of generation and consumption to correctly account banking
- Given metering and billing requirements this transition can be completed within 2 years
- Banking charge levied as a Rs/unit changed on banked energy (as compared to wheeled)
- Per unit charge on banked energy → incentivise consumers to align generation/consumption patterns

Discontinue all wheeling, transmission concessions

- Beyond existing applicability, no concessions should be provided on wheeling and transmission charges and losses

Conclusions and Recommendations…4

- **Applicability of changes**
  - Towards regulatory certainty, these recommendations are for new projects and where wheeling and banking agreements are being renewed

- **Changes required to enable data recording / reporting**
  - 15 min. consumption and RE generation should be recorded and stored in standardised format by all ESCOMS
  - All respective agreements and metering arrangements with open access and captive consumers to ensure recording and storage of such data
  - Amendment of open access regulations to institute changes would aid standardised recording and reporting.

- **Suggested framework necessary for future RE development in the state (esp with 10 GW target for RE)**
  - Provides rights price signals and incentives to minimise balancing costs
  - RE consumers and generators will adopt measures such as demand aggregation, energy storage, increased market participation, better F&S etc.

Other actions required for better RE integration by GoK (esp. with 10 GW target for FY27)

- **Redesigning ToD tariffs**
  - to incentivise demand during high RE availability periods
  - to extend such price signals to a large base of consumers
  - Easily possible with existing metering arrangement for most consumers

- **Comprehensive review of existing open access and captive arrangements**
  - Billing arrangements
  - Valuation of standby services
  - Revision of charges and duties
  - Assessment of BTM arrangements

- **Assessment of power procurement strategies with rise in RE**
  - To account for thermal and hydro flexibility
  - Provide evidence to aid decision making regarding capacity expansion/ retirement
  - Build cases for requirement of BESS systems, market procurement by ESCOMs.

THANK YOU

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Annexure-III

83rd meeting of Forum of Regulators (FOR)

FOR Working Group Report
on
REGULATORY FRAMEWORK FOR ENERGY STORAGE SYSTEM (ESS) AND ELECTRIC VEHICLES (EV)

FOR SECRETARIAT

Content

- Background
- Recommendations for ESS
  - Legal Status of ESS
  - Asset Category of ESS (Business Models)
  - Connectivity and Open Access
  - Scheduling of ESS
  - Tariff Determination of ESS
  - Tax Provisions for ESS
- Recommendations for EVs
  - Demand Impact of EV Charging
  - EV Charging Infrastructure
  - Tariff determination for EVs

Background

- FOR, in its 76th meeting held on 01 October 2021, noted the urgent need to assess the value of storage in the wake of large-scale penetration of renewables and decided to form a Working Group for carrying out a detailed examination of all the issues connected to ESS and EVs.
- Working Group Member being Chairperson of West Bengal ERC, Rajasthan ERC, Delhi, ERC, Punjab ERC, Sikim ERC, Chhattisgarh ERC, Tripura ERC and UP ERC.

- **The ToR of the Working Group:**
  - Examine the use cases of ESS in the power system
  - Study the international experience on use of ESS, especially in power systems with high share of RE
  - Assess the value of ESS, with due regards to the need for meeting ramping requirement in the wake of large scale RE penetration
  - Study the likely penetration of electric vehicles in the Indian power system, impact of the increased EV load on the grid and impact on the consumer tariff
  - Suggest suitable regulatory framework for ESS and EVs in the Indian power system
  - Any other matter related and incidental to the above

Recommendations on Energy Storage System (ESS)

Legal Status of ESS

- Provisions in the Act (especially Section 2(50)'Power system') comprehensive enough to cover ESS
- While discharging-
  - ESS acts like a generating station and supplies electricity to the grid.
- Activity of charging
  - can be treated as input to the activity of generating electricity
  - input could be any fuel source of electricity itself.
  - Act does not cast any prohibition or restriction in this regards

- Accordingly, Independent Energy Storage System (IESS) shall be treated at par with a generating station

Back

Asset Category of ESS (Business Models)

- Primary objective of ESS is to promote and integrate large scale RE into India's power System
- Independent Energy Storage System (IESS) may enter into contract with any other entity recognized under the Act to provide storage services.

Business Model 1	Business Model 2	Business Model 3

• For **charging** purposes: IESS can procure input energy from the generation (wind/solar/both) **owned by** it.	• **tolling arrangement** – charging during off-peak period and discharging during peak period after discounting for cycle efficiency
	• **tariff to be mutually agreed** by the ESS and the buyer
		• for charging purposes:-
		  • by entering into an **agreement with any other entity** recognized under the Act.
		  • **from the market** or by entering into a PPA

Asset Category of ESS (Business Models) (cont.)

ESS as a distribution asset

Business Model 4

- owned and operated by the distribution licensee.
- either through Capex or Energy Storage Service Agreement route.
- **Capex route**:
  - through competitive bidding for procurement.
  - ERC approval for cost effectiveness
  - Annual utilisation report to ERC
- Charging and Scheduling of ESS would be responsibility of discoms.
- utilize for compliance towards RPO

ESS as a transmission asset

Business Model 5

- ESS for congestion management, ancillary services, and deferral of new investment but not for trading
- The transmission licensee shall not engage in the business of trading of electricity on exchanges as per Section (41) of the EA, 2003

Connectivity and Open Access for ESS

- CERC Regulations on Connectivity and General Network Access :
  - Treating ESS at par with a generating station
  - Grant of connectivity for ESS:- for a quantum equivalent to its maximum drawal or injection to the system.
- Similar treatment to the ESS at intra-State transmission and distribution system
- No cross-subsidy surcharge or additional surcharge to be levied for OA for ESS

Scheduling of ESS

ESS as an IESS

- Treated as generating station for generation
- Treated as a ‘Storage Load’ for charging aspect
- ESS procuring power through OA: entity should enter into valid contracts of different duration for its charging under organized power market instead of UI/DSM
- ESS combined with variable RE: schedule to be included in VRE generation,

ESS as a distribution asset

- charge during off-peak and discharge during peak hours
- Scheduling decisions taken by the discom to manage its demand variation/ reduce DSM penalty

Tax Provisions for ESS

- Exemption of Electricity Duty at par with RE generation
- Should be considered for custom duty exemption and GST rate reduction for cost component
- No cross-subsidy surcharge or additional surcharge to be levied for OA for ESS

Back

Recommendations on Electric Vehicles (EV)

Demand Impact of EVs

- Stringent technical standards for EV chargers and infrastructure
- Revision of supply code for EV charging connectivity standards
- Studies to assess impact of EV charging on Discom network
- Discom to develop process to account above assessment of impact of EV Charging Infrastructure on its network.
- Discoms to build strong back-end links between the grid and EV charging facilities to achieve necessary grid balance
- Discoms would factor in the impact on demand and proactively consider the same in resource adequacy plans
- Changes to Grid Code so that EV Charging Infrastructure could act as a flexible load
- Encourage EV charging stations with DRE generation and storage systems to manage their own peaks esp. with fast charging facilities

EV Charging Infrastructure

- **Domestic connection** should be used for **slow charging**
- **Society/ community charges**:
  - install charging infrastructure either through ownership or third-party service provider.
  - separate LT connection from the Discom
  - separate category as 'LT EV Charging Station'
- **Large charging stations/ fast chargers/ battery swapping stations**: separate 'HT EV Charging station' as a category.
- HT EV Charging Station shall be established after obtaining consent from Discom after detailed network analysis
- BEE to develop standard specifications for three types of charging infrastructure.
- For commercial charging stations :discoms to direct RE towards charging stations

Back

Tariff Determination for EVs

Domestic	• Prevalent residential tariff
LT EV Charging Station	• Tariff not be more than 110% of the ACoS of DISCOM for that year
HT EV Charging Station	• Tariff not be more than HT Industry Tariff in the State • Consumers encouraged to procure power from RE sources for which OA charges (and not losses) and surcharges should be waived off.

Commercial charging stations procuring at least 70% of supply from renewable energy shall be categorized as “green charging stations”.

Thank You

Annexure-IV

83rd meeting of Forum of Regulators (FOR)

FOR Working Group on

Draft Model Guidelines for Management of RE Curtailment for Wind and Solar Generation

FOR Secretariat

Background

- The FOR, in its 77th meeting held on 17th December 2021 deliberated on the requirements to comply with directions outlined under the APTEL Judgement dated 02-08-2021 for minimizing curtailment of power generated from RE sources and streamlining modalities through guidance framework in the event curtailment is necessary due to grid security considerations.
- Working Group being Chairperson of Andhra Pradesh ERC, Tamil Nadu ERC, Rajasthan ERC, Himachal Pradesh ERC, Chhattisgarh ERC and Member Technical, CERC as special invitee

- After deliberation it was decided to constitute a Working Group (WG) to formulate guidelines with respect to management of RE curtailment. The **Terms of Reference** for the WG are as under:
  - Examine the provisions of IEGC, and State Grid Codes in respect of curtailment of renewable energy generation in different states.
  - Assessment and analysis of guiding factors stipulated in the APTEL judgment for grid security.
  - Assess the consequences of renewable energy curtailment for reasons other than technical and grid security requirement, and the need for compensation thereon.
  - Based on the above, suggest guidelines for curtailment of generation from renewable energy project in the Indian power system.
  - Any other matter related and incidental to the above

Contours of Guiding Framework

Following aspects were considered by WG for devising model guidelines for RE Curtailment

- Grid Security and other conditions
- Defining roles & responsibilities of stakeholders like LDC, Tx licensee, RE Generators and QCAs/Lead Generator)
- Communication framework and modalities (pre & post event) and recording of events
- Curtailment and Restoration protocol
- Curtailment management modalities (inter-se parity and priority)
- Scheduling and Energy Accounting during curtailment period
- Compensation requirement in case of RE back-down
- Treatment for non-compliance of instructions and remedial measures

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Following aspects were considered by WG for devising model guidelines for RE Curtailment

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Summary (1/2)

Parameters	Key aspects of Guidelines
1. Grid security parameters	• System or localized grid issues • 6 No. of parameters to be monitored for Grid safety/security and associated conditions thereof • Grid security (chapter-3)
2. Curtailment implementation modalities	• Curtailment events be distributed uniformly amongst all PSS/generators without any discrimination on pro-rata basis of 'Available Capacity'. • Localized grid issues will impact specific PSS/generators • System grid issues will have impacts on all PSS • Curtailment implementation modalities (chapter-5)
3. Communication framework	• Should be prompt and accurate with both automated and manual mode of communication. • Guidelines cover communication protocol, information requirement/templates. (chapter-5)
4. Roles and responsibilities	• Guidelines has clearly outlined specific responsibility for each stakeholder (viz. RLDC,SLDC, Transmission Licensee, QCA/Lead Generator, RE Generator) • Responsibility to cover - curtailment management, communication, recording/accounting, reporting, certification, and restoration as outlined. • Roles and responsibilities (chapter-6)
5. Curtailment restoration protocol	• Depending upon system conditions. • Relief for restoration to automated, as far as possible and non-discriminatory. • Curtailment restoration protocol (chapter-7)

Summary (2/2)

Parameters	Key aspects of Guidelines
6. Recording of curtailment events	• SLDC shall maintain records of each curtailment event and reason PSS wise, publish on its website regularly and report to Commission thru quarterly report. • QCAs to maintain each curtailment event generator-wise (chapter-8)
7. Scheduling and energy accounting during curtailment event – [assessment of generation loss]	• To track events and quantify Generation loss due to Transmission un-availability and Backing down event, separately. • Distinct provisions for Wind, Solar and Hybrid as per SBD-PPA conditions. (chapter-9) • Options for Generation Loss assessment for cases where no such provision or PPA conditions are silent.
8. Compensation mechanism	• No compensation in case of Grid safety or security issue. • Compensation conditions stipulated under SBD-PPA in case of curtailment (wind, solar, hybrid) • In case, there are no clauses for compensation due to curtailment in PPA, formulation for loss of generation need to be specified, as per ATE guidelines. • Compensation mechanism (chapter-10)
9. Non compliance and remedial measure	• Conditions for non-compliance/shortfall in compliance to be specified. • Provision for remedying default incl. penalty for non-compliance (chapter-11)

Chapter 3 : Specifying the parameters for ascertaining Grid safety /Security

7

Operating Frequency band profile

(*average frequency for two or more time-blocks exceeds 50.05 Hz*)

State under-drawal

(outside range of +/- 250 MW for two time blocks successively)

Available margin under thermal backing down

(all intra-state generators are operating at Tech Min and no scope for backing down any generator further)

Thermal Limit of Transmission lines :

(Permissible maximum Loading limit on transmission line as in CEA (Manual of transmission planning criteria), 2022)

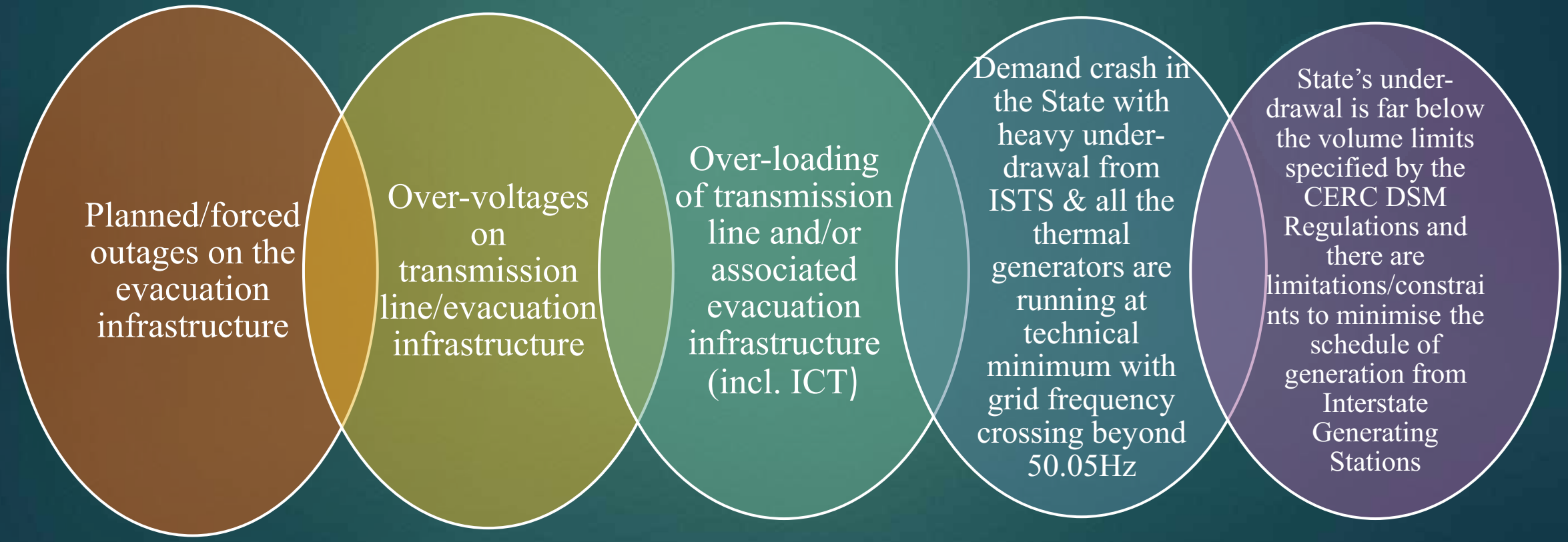
Loading limit for Transformer/ Inter-connecting transformer : (*loading limit shall be its Nameplate Rating as stipulated under CEA (Manual of transmission planning criteria), 2022)*

Operational voltage limits : (*under normal conditions operating range as specified in CEA (Grid Standards) Regulations, 2010)*

Back

Chapter 4 : Protocols for curtailment

Need of RE Curtailment may arise due to



Chapter 4 : Protocol for Curtailment

Back

- In case frequency exceeds the over-frequency limits, RLDC is expected to backing down hydro generation followed by thermal generation.
  - except for constrained hydro generation projects such as run-of-river hydro projects, irrigation linked hydro generation projects or storage hydro factoring spillage considerations
  - Taking into consideration scheduled demand in subsequent time blocks
- SLDC to instruct discoms to reduce their requisition
- SLDC to take measures for backing down hydro generations followed by thermal generation to technical minimum as specified by State Regulators
- Restoring the network elements by distribution or transmission licensees in case of demand crash

➢ Only after implementing all other measures if the necessary relief is not achieved and frequency continues to rise beyond the upper limit of 50.05 Hz for two or more consecutive time-blocks, the system operator may instruct the Wind /Solar Generation to curtail the generation.

Chapter 5 : RE Curtailment implementation Modalities

RE Curtailment Instructions by RLDC/SLDC and its Implementation

- RLDC/SLDC to monitor grid frequency, State periphery under-drawal condition, over-loading of transmission lines, over-voltage/evacuation constraints
- Quantum of required curtailment to be assessed by RLDC/SLDC
- SLDC to issue curtailment instruction to concerned RE generator/ QCA / Lead Generator .
- In case multiple generators connected to a PSS or group of PSSs are concerned, curtailment instructions shall be issued on pro-rata basis of ‘available capacity’ amongst the affected PSS
- The instructions from RLDC/SLDC shall be communicated to the Nodal Officer/Control Room of respective Transmission Licensee, RE Generator & QCA/Lead Generator

Chapter 5 : RE Curtailment implementation Modalities

Pre curtailment communication protocol

- RLDC/SLDC to QCA's/Lead generators/RE generators
- RLDC/SLDC's to communicate about curtailment
- RLDC/SLDC's to use both **automated and manual mode** for **Nodal officer's** (telephonic/email) communications
- SLDC to impose **restrictions on maximum permissible** Schedule & Generation through **SLDC /REMC Scheduling Software (wherever available)** during the curtailment period.
- **Communications** can be by way of any of following:
  - Telecon followed by Email/Message, or
  - SLDC's to develop web portal for curtailment communication.

Post curtailment protocol

- RLDC/SLDC's to maintain records of PSS-wise curtailment events with details of time, duration, quantum, actually relief received, details of restoration instructions and actual restoration of the generation capacity.
- Information to be compiled on monthly basis and published on the website of the concerned RLDC/SLDC.
- RLDC/SLDC to certify the curtailment events, loss of generation, etc.

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Chapter 6 : Defining Roles and responsibilities for key stakeholders

RLDC

- implementing agency
- forecast the daily region-wise RE generation
- monitor the power system
- develop the web-based software

SLDC

- implementing agency
- develop a web-based Software
- Responsible for scheduling, communication and coordination
- monitor congestion situations
- maintain records and accounts of the time block-wise Schedules, actual generation injected and the deviations
- maintain records of curtailment

CTU/ISTS Transmission licensee and STU/Transmission Service Providers

- responsible for evacuating and transmitting the power generated
- responsible for maintaining and monitoring logbook, event recording, installing and maintaining protection systems
- ensuring maximum availability of the transmission lines
- scheduled maintenance activity
- restore the connections during calamities

RE Generators

- submit all the Technical parameters to the SLDC
- appoint the QCA/Lead Generator
- provide real time data for power generation
- the transmission lines
- maintain and provide time block wise generation data during non availability of Real Time Data

QCA/Lead Generators

- establish a Control Centre
- establish protocol for communication with individual generators
- submitting all the technical details to RLDC/SLDC
- submit day ahead RE schedule
- establish a protocol for implementation of the curtailments & restoration instructions

Back

Chapter 7 : Restoration

Situations that would lead to restoration of generation are

- frequency remains below 50.05 Hz continuously for two or more number of consecutive time blocks
- under-drawal at state periphery is within threshold limit (ie. < 250 MW) continuously for two or more number of consecutive time blocks
- any boundary conditions under MRC Guidelines that triggered such curtailment

Restoration done in First Out First In fashion

RLDC/SLDC shall issue restoration instruction via automated signal /web-based portal followed by manual communication.

QCAs/Lead Generator /RE Generators shall follow the restoration instructions issued by RLDC/SLDC within stipulated timelines

Back

Chapter 10 : Compensation in case of Loss of Generation due to Curtailment

- **No Compensation: in case of curtailment for grid operational safety/security conditions**
- **Computation in case of loss of generation due to grid unavailability**
  - No compensation: In case of non-availability of grid or transmission element for duration of less than a period as defined in PPA/EPA
  - In case the PPA has no such definition this period will be 50 hours a year or specified by Appropriate Commission.
- In case of non-availability of grid or transmission element for a duration more than the minimum period
  - the loss will be computed as specified in the PPA/EPA.
  - If there is no specific provision in the PPA/EPA, the generation loss will be computed as below:

Generation loss per hour = Avg. Generation per hour during contract year x no. of un-availability hours of grid or transmission element.

Back

Computation of loss of generation due to curtailment for reasons other than grid security reasons

For computation of loss of generation for Wind, Solar and Wind-Solar Hybrid Projects:

- provisions outlined under PPA will prevail
- If no such provisions are covered in the PPA, the guidelines for Tariff based Competitive bidding will be applicable.

Particulars	Formulation for computation of loss of generation and compensation thereof
Wind Energy projects	Wind Generation Compensation = 50% x (Average Generation during the month corresponding to the capacity backed down) x PPA Tariff
Solar Energy projects	Solar Generation Compensation = 100% of [(Average Solar Generation per hour during the month) X (number of backdown hours during the month)] X PPA tariff
RE Hybrid (Wind-Solar) projects	Minimum Generation Compensation = 100% of [(Average Generation per hour during the month) x (number of back down hours during the month) x PPA Tariff]

Thank You

APTEL Judgment dated 2-8-2021 in Appeal No. 197 of 2019 Chronology

- **Appellant**: National Solar Energy Federation of India (NESFI)
- **Respondents**: TANGEDCO, TNSLDC,TNERC and TANTRANSCO

TNERC Order on Petition M.P. No. 16 of 2016 by NESFI

- Directed SLDC not to resort to backing down instructions without recording the proper reason which are liable for scrutiny at any point of time
- No provision in PPA agreements signed between Utility and solar generators for payment of deemed generation charges.

APTEL directions

- APTEL directions to seek POSOCO inputs for submission of fact-finding report

POSOCO's fact finding report

- Only 5.26% of time blocks were found to be on account of grid security issues were

APTEL's Judgement

- RE curtailment cannot be done except for grid security conditions
- Deemed generation not possible on grounds of Must Run as per PPA provisions.
- However, curtailment of RE for reasons other than grid security, shall be compensated at PPA tariff

Directions of the APTEL vide Judgment 197 of 2019

- **RE shall not be curtailed in the following cases:**
  - ✓ System Frequency is in the band of **49.90Hz-50.05Hz**
  - ✓ Voltages level is between: **380kV to 420kV for 400kV system** & **198kV to 245kV for 220kV** system
  - ✓ **No network over loading issues or transmission constraints**
  - ✓ **Margins are available for backing down** from conventional energy sources
  - ✓ **State is overdrawing from the grid** or State is drawing from grid on short-term basis from Power Exchange or other sources simultaneously backing down power from intrastate conventional or non-conventional sources.
- **Curtailment of RE for reasons other than grid security shall be compensated at PPA tariff in future.**
- SLDC shall submit a monthly report to the SERC with detailed reasons for any backing down instructions issued to solar power plants.
- **Above guiding principle would be applicable till Forum of Regulators or the Central Government formulates guidelines in relation to curtailment of RE.**