MINUTES OF THE 55TH MEETING

OF THE

FORUM OF REGULATORS (FOR) HELD AT NEW DELHI

VENUE	**:**	**"CONFERENCE" HALL UPPER GROUND FLOOR (FRONT SIDE) C.E.R.C. CHANDERLOK BUILDING 36, JANPATH, NEW DELHI.**
DAY / DATE	**:**	**FRIDAY, THE 22ND JULY, 2016**
LIST OF PARTICIPANTS	**:**	**AT ANNEXURE-I (ENCLOSED)**

The meeting was chaired by Shri Gireesh B. Pradhan, Chairperson, Central Electricity Regulatory Commission (CERC) and Forum of Regulators (FOR). The Chairperson, CERC / FOR welcomed the Members of the Forum to the Meeting. He formally welcomed Shri R.P. Singh, who attended the FOR meeting for the first time after assuming the charge of Chairperson, APSERC.

Thereafter, the Forum took up agenda items for consideration.

AGENDA ITEM NO. 1: CONFIRMATION OF THE MINUTES OF THE 54TH MEETING OF THE FORUM OF REGULATORS (FOR) HELD ON 8.4.2016 AT VARANASI (U.P.).

The Forum noted and endorsed the minutes of the 54rd Meeting of "FOR", held on 8th April, 2016 at Varanasi (U.P.).

AGENDA ITEM NO. 2 : CONSIDERATION AND APPROVAL OF BALANCE SHEET AND AUDITED ACCOUNTS OF "FOR" FOR FY 2015-16 AND APPOINTMENT OF AUDITORS OF "FOR" FOR THE FY 2016-17.

The Forum considered and approved the Balance Sheet and Audited Accounts of "FOR" for FY 2015-16. The Forum has also approved the proposal to re-appoint M/s MBR & Co., Chartered Accountants, New Delhi as Auditors for FY 2016-17 at a fee of Rs.22,000/- (plus applicable taxes).

AGENDA ITEM NO. 3 : PRESENTATION & DISCUSSION ON "IMPACT OF THE REVISED ENVIRONMENTAL PROTECTION NORMS IN RESPECT OF COAL BASED THERMAL POWER PLANTS AS SPECIFIED BY THE MINISTRY OF ENVIRONMENT, FOREST & CLIMATE CHANGE THROUGH THE ENVIRONMENT (PROTECTION) AMENDMENT RULES, 2015".

The Forum, in its 54th meeting held on 8th April, 2016 at Varanasi (U.P.), discussed the issue emerging out of the notification of the Government of India (Ministry of Environment), i.e., Environment (Protection) Amendment Rules, 2015 dated 7th December, 2015. During the meeting, it was decided that the Forum would examine the matter in detail before finalizing the recommendations for consideration of the Government of India.

In the light of the above decision, the staff of CERC carried out a detailed examination of the issues contained in the Environment (Protection) Amendment Rules, 2015 and Chief (Engg.), CERC made a detailed presentation before the Forum on the impact of the provisions contained in the amended rules (copy of presentation is **provided** as **Annexure-II).**

The revised standards as contained in the Environment (Protection) Amendment Rules, 2015 dated 7th December, 2015 are primarily aimed at minimizing pollution of the coal-based Thermal Power Plants in the country. The new norms are expected to impact 200 GW installed capacity which includes plants under advanced stage of commissioning as these plants would need to install new technologies. The other challenges include, *inter alia* lack of space and land availability (in case of existing plants), insufficient time period (2 years time is given for implementation of new norms), limited availability of domestic suppliers to provide the new technologies and contractual issues such as guarantees, price etc. in case of plants under constructions.

It is estimated that the plants would require additional capital Cost of about Rs.1.15 - 2.50 Crore per MW (as per industry estimates) for deploying the new technologies, thereby resulting in an impact on tariff in the range of 40 - 90 Paise/kWh.

***Consensus* :**

The Forum appreciated the presentation. In the light of the revised norms specified by MoEF & CC and the impact of the same on the coal based thermal generation, the Forum decided to communicate the following recommendations to the Government of India :-

- The plants "having residual life of 10 years or less after R&M and life extension" / "Commissioned prior to 1.1.2004" / "having space constraint for implementation of new technologies", be exempted from the purview of the revised emission norms.
- The plants which are either under construction or in the advanced stage of commissioning in the next 3 - 4 years should be allowed for retrofits subsequent to commissioning and the revised norms for the new stations be made applicable with effect from 1.1.2020.
- The entire revised norms of emission may be implemented in a phased manner, i.e., spreading over the next 5 – 10 years
- Specific water consumption norm of 2.5 CuM/MWh may be increased to 3.0 Cu M/MWh for plants with Flue Gas Desulfurisation (FGD) technology.
- Coastal based plants may be exempted from installing closed cycle cooling systems.

- The estimated investment requirement (Rs.1.15 - 2.50 Crore per MW) and resultant impact on tariff being high (45 - 90 paise/kWh), a part of the financial requirement may be funded through Central Financial Assistance.
- Appropriate measures be taken for enhancing the capability of domestic equipment suppliers by facilitating them in technology transfer etc.

AGENDA ITEM NO. 4 : PRESENTATION & DISCUSSION ON "SCHEME OF 24X7 POWER SUPPLY".

The Government of India conceived the "Scheme of 24x7 power supply" with the objective of providing 24x7 quality, reliable and affordable power for all by the Ministry of Power in association with various States in the country.

The Joint Secretary (R&R), Ministry of Power, in her opening remarks stated that the Government of India, in order to supplement the efforts of State Governments decided to take a joint initiative with the States to provide 24X 7 power to all households, commercial & industrial consumers and adequate supply to agriculture consumers. This initiative is aimed at ensuring uninterrupted supply of quality power to existing consumers by the end of 12th plan besides providing access to electricity to all unconnected households by 2019. The exercise was carried out to assess the energy requirement for various consumer categories,

availability of power from various sources, requirement of transmission capacity etc. was carried out in consultation with States. Based on the assessment, State-specific action plans were drawn and Power For All (PFA) documents were prepared, while providing for monitoring of developments by Central and State Governments at regular intervals. 28 States have already entered into PFA agreement with Central Government and agreement, with the seven States are being finalized / under process. She urged the Regulators to take these documents into consideration while deciding on the Annual Revenue Requirement (ARR) of the distribution companies.

A presentation on "Scheme of 24x7 Power supply" was made by the representative of CEA (copy of presentation is **provided** as **Annexure-III)**.

The action plan included analysis of current power supply scenario, demand estimation, plans for generation / transmission / distribution / renewable energy / Energy Efficiency, monitoring mechanism, requirement of funds, capacity building etc. It is estimated that by 2018-19, at pan-India level, a total of 15,34,206 MU of energy is required with a peak load of 2,26,833 MW.

It is estimated that the transmission and distribution segments would require financial investment to the tune of ₹1,58,926.08 Cr. and ₹3,03,772 Cr.

respectively. The requirement of funds would be met by State Governments and by Central Government through its various Central Assistance Schemes.

***Consensus* :**

The Forum appreciated the presentation. The Forum observed that prior consultation with SERCs would have enriched all stakeholders.

The Chairperson, CERC / FOR pointed that the Forum of Regulators (FOR) is sensitive to the issue of "24x7 power for all" and had carried out a detailed study during 2015. Significant and actionable recommendations have been made in the study along with the estimates for requisite investments in generation / transmission / distribution segments of the sector. The recommendations of the study were approved by the Forum. The Forum advised Ministry of Power to factor in the recommendations of the study, in the PFA agreement.

The Members of the Forum also consented to suitably consider the relevant components of expenditure requirement for "24x7 power for all" as part of Annual Revenue Requirement for the respective utilities.

AGENDA ITEM NO. 5 : PRESENTATION & DISCUSSION ON "DISTRIBUTION / RETAIL SALE OF ELECTRICITY – FACTORS IMPACTING TARIFF".

A presentation on "Distribution / Retail sale of electricity – Factors impacting tariff" was made by Shri R.N. Sen, Chairperson, WBERC, which *inter alia* included various aspects pertaining to supply and quality of fuel, impact on tariff owing compliance of environmental standards and other statutory requirements and other commercial / financial issues (copy of presentation is **provided** as **Annexure-IV)**.

The suggested measures towards minimizing the impact of these factor on retail tariff *inter alia* include, using clean energy cess for subsidizing RE power, third party sampling of coal at plant location to ensure quality, determination of coal price on deemed export basis, determination of railway other charges like over / under loading, demurrage charges for coal transportation through time and motion study, large scale implementation of HVDS, providing a span of 10 - 15 years for compliance of new environment norms, appointment of Regulator for Coal & Railways etc.

***Consensus* :**

The Forum noted the presentation. The Forum observed that proactive measures are also required to be taken to ensure compliance of efficiency norms by the utilities.

AGENDA ITEM NO. 6 : PRESENTATION & DISCUSSION ON ISSUES AND WAY FORWARD FOR OPEN ACCES.

The Electricity Act, 2003 provides for Open Access as the the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission. The Forum of Regulators, CERC and SERCs have taken several proactive initiatives to facilitate Open Access thereby promoting competition, developing the market structure and enabling optimum resource utilization.

A detailed presentation was made by the representatives of M/s. PricewaterhouseCoopers (PwC) on the issues pertaining to implementation of Open Access and the way forward (copy of presentation is **provided** as **Annexure-V)**.

In the process of implementing Open Access, some State utilities reportedly observed misuse of the provisions of captive generation to avoid

payment of cross-subsidy sur-charge and other charges by some of the Open Access consumers. Instances of revenue loss due to migration of high end consumers from discom fold to the Open Access route have been reported by the DISCOMs. On the other hand, OA consumers often complain about various tariff and non-tariff barriers which *inter alia* include denial of open access by SLDCs citing non-availability of transmission corridor, administrative reasons, high cross-subsidy sur-charges etc.

Discussion:

The discussion was joined by the Joint Secretary (R&R), Ministry of Power, GoI, Principal Secretary (Energy), Government of Madhya Pradesh, Additional Chief Secretary (EPD), Government of Gujarat, Principal Secretary (Energy), Government of Maharashtra, Director (Distribution), Punjab State Power Corporation Limited (PSPCL) etc.

The representatives of State Governments of Madhya Pradesh, Gujarat and Maharashtra as well as Punjab Discom stated that,

- Some of the captive generation users have been misusing the provisions of the Electricity Act and willfully subverting payment of necessary open access charges, cross-subsidy sur-charges etc.

- Some Open Access consumers are structuring their power drawl schedules between OA route and discom route in such a way as to create operational and financial constraints for DISCOMs.
- The disoms are required to adhere to universal service obligation, which includes supply to all such categories.
- Discoms have entered into long term PPAs (i.e., 25 years period) considering the future growth in demand for power. The tariff structures do not provide for adequate demand charges to meet the fixed charges payable to the generators.

***Consensus* :**

The Forum, after detailed deliberations, recommended that,

- In the light misuse of provisions of captive generation the relevant rules framed by the Ministry of Power need be amended to remove any ambiguity.
- The retail tariff structures often do not provide for adequate demand charges to meet the fixed charges payable to the generators, necessitating revisit of tariff structures. Further, the issues related to possible standby charges and current cross-subsidy sur-charge need careful examination in order to ensure level playing field for all stakeholders.

- Many of the State distribution utilities are power surplus, at least for a period of 4 – 5 years, owing to the long term PPAs entered into by them for a period of 25 years. This issue needs examination especially with reference to the duration of PPAs.
- Crucial issues including issuance of exchange neutral NoC by SLDCs, frequent switching by OA consumers between the Open Access route and Discom route, etc. need be further examined.
- In the light of the recommendations of the GB Pradhan Committee on "Manpower, Certification and Incentives for System Operation and Ring Fencing Load Despatch Centres", measures to address manpower requirement of SLDCs and ring-fencing of SLDCs need to be identified and suggested.

The Forum, considering the complexity and scope of the above issues, decided that a Working Group may be constituted by the Chairperson, CERC / FOR to examine / analyse the matters involved in the context of open access and submit its report to the Forum for further discussion.

AGENDA ITEM NO. 7 : PRESENTATION & DISCUSSION ON THE FIRST REPORT OF THE "FOR" TECHNICAL COMMITTEE FOR IMPLEMENTATION OF FRAMEWORK ON RENEWABLES AT THE STATE LEVEL.

The Forum brought out its Model Regulations for Forecasting, Scheduling and Deviation Settlement of Wind & Solar generating stations at the State level, while agreeing for deployment of the State Framework. Subsequently, a Technical Committee under the chairmanship of Shri A.S. Bakshi, Member, CERC was constituted to study the possible variations in technical and commercial frameworks between States, and to suggest measures for ensuring a strong foundation of Deviation Settlement Mechanism (DSM) and Ancillary Services at the State level. The Committee also comprised Members of SERCs of renewable rich States, viz. Tamil Nadu, Gujarat, Rajasthan, Maharashtra, Andhra Pradesh, Karnataka and Madhya Pradesh. The Technical Committee constituted a Sub-Committee under the chairmanship of CEO, POSOCO. The Sub-Committee visited the SLDCs of Maharashtra, Tamil Nadu, Karnataka and Delhi besides interacting with several other SLDCs and carried out a survey to benchmark the nature and scale of energy metering, scheduling, accounting and settlement system at the intra-State level.

After detailed deliberation, the Sub-Committee has evolved a Model System on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) which delineates the building blocks of power system operation involving metering, energy accounting and deviation settlement. The report of the Sub-Committee was accepted by the Technical Committee. Shri S.K. Soonee, CEO, POSOCO and Chairman of the Sub-Committee made a presentation before

the Forum on Model System on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST) (copy of presentation is **provided** as **Annexure-VI)**.

He highlighted the major recommendations which *inter alia* include, the following :-

- Demarcation of interface boundaries and identification of Pool Members.
- Installation of adequate Interface Energy Meters (5-min) along with AMR infrastructure and ensuring sacrosanct Ex-Ante Scheduling.
- Uniform Energy Book keeping in line with the basic accounting principles.
- Establishing Short term Open Access Registry and Clearing Agency similar to depositories in capital market.
- Pricing of reactive energy at inter utility level while linking to voltage instead of power factor.
- Strengthening of Human Resources to meet growing role of SLDCs.
- IT Infrastructure, in terms of Hardware and Software, besides maintenance and periodic upgradation.

- Constitution of State Power Committees (SPC) to take care of State Energy Accounts.

- Identification of marginal cost of generation, separate peak / off-peak tariff, two part tariff for reservoir / pondage based hydro stations, determination of two part tariff for RES etc.

***Consensus* :**

The Forum appreciated the efforts made by the Technical Committee in bringing out report on Model System on Scheduling, Accounting, Metering and Settlement of Transactions in Electricity (SAMAST), which also provided for design of workflow, infrastructure and human resource requirement for implementation of SAMAST at the State level. The Forum approved the recommendations made by the Committee along with the roadmap for implementation. The Forum advised the STUs / SLDCs to take up the matter for implementation of SAMAST by submitting a detailed project report for necessary funding.

AGENDA ITEM NO. 8 : LETTER DATED 30.6.2016 RECEIVED FROM THE CHAIRMAN, PARLIAMENTARY STANDING COMMITTEE ON ENERGY.

The Forum noted the communication received from Chairman, Parliamentary Standing Committee on Energy, on impact of price of coal imported from Indonesia on power tariffs and report of Directorate of Revenue Intelligence (DRI), for suitable action by the Appropriate Commissions.

AGENDA ITEM NO. 9 : ANY OTHER ITEM WITH THE PERMISSION OF THE CHAIR.

(i) Communication received from the Bureau of Energy Efficiency (BEE).

The Forum noted the communication received from the Bureau of Energy Efficiency (BEE) regarding revision of distribution loss targets under Perform, Achieve and Trade Scheme (PAT) for FY 2018-19.

(ii) Communication received from the Ministry of Power on providing quality power at affordable cost to the consumers.

The Forum considered the communication received from the Ministry of Power seeking intervention of SERCs in respect of issues viz. access to energy and quality of supply, while hearing the tariff petitions for determination of tariff.

The Forum observed that SERCs are sensitive to the issues of access to energy and quality of supply. As regards "Access to Energy", the Forum has

carried out a detailed study during 2015. Significant and actionable recommendations were made in the study along with the estimates for requisite investments in generation / transmission / distribution segments of the sector.

As regards "Quality of Power", the Forum has constituted a Working Group and the recommendations of the Working Group would be forwarded to the Ministry of Power.

Chairperson, CERC / FOR on his behalf and on behalf of the Members of the Forum conveyed deep gratitude to Shri S.K. Chaturvedi, Chairperson, Joint Electricity Regulatory Commission (JERC – Goa & UTs), who was due to retire on 05th August, 2016, for his outstanding contribution to the Forum.

On conclusion of the meeting, Chairperson, CERC / FOR thanked all the dignitaries present in the meeting. He conveyed the Members of Forum that the next FOR Meeting will be held during the month of September, 2016 in New Delhi. Secretary, CERC / FOR thanked the staff of "FOR" Secretariat for their arduous efforts in organizing the meeting.

The meeting ended with a vote of thanks to the Chair.

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/ ANNEXURE – I /

LIST OF PARTICIPANTS ATTENDED THE 55TH MEETING OF

FORUM OF REGULATORS (FOR)

HELD ON 22ND JULY, 2016 AT NEW DELHI.

S. No.	NAME	ERC
01.	Shri Gireesh B. Pradhan Chairperson	CERC – in Chair.
02.	Shri R.P. Singh Chairperson	APSERC
03.	Shri Naba Kumar Das Chairperson	AERC
04.	Shri S.K. Negi Chairperson	BERC
05.	Shri Narayan Singh Chairperson	CSERC
06.	Shri Krishna Saini Chairperson	DERC
07.	Shri Anand Kumar Chairperson	GERC
08.	Shri Jageet Singh Chairperson	HERC
09.	Shri S.K.B.S. Negi Chairperson	HPERC
10.	Justice (Retd.) Shri N.N. Tiwari Chairperson	JSERC
11.	Shri S.K. Chaturvedi Chairperson	JERC for Goa & All UTs except Delhi
12.	Shri R.K. Kishore Singh Chairperson	JERC for Mizoram and Manipur
13.	Shri M.K. Shankaralinge Gowda Chairperson	KERC
14.	Shri T.M. Manoharan Chairperson	KSERC
15.	Shri Imlikumzuk Ao Chairperson-cum-Member	NERC

16.	Shri Satya Prakash Nanda Chairperson	OERC
17.	Shri D.S. Bains Chairperson	PSERC
18.	Shri Vishwanath Hiremath Chairperson	RERC
19.	Shri S. Akshayakumar Chairperson	TNERC
20.	Shri Ismail Ali Khan Chairperson	TSERC
21.	Shri Niharendu Chakraborty Chairperson	TERC
22.	Shri Subhash Kumar Chairperson	UERC
23.	Shri Desh Deepak Verma Chairperson	UPERC
24.	Shri R.N. Sen Chairperson	WBERC
25.	Shri A.B. Bajpai Member	MPERC
26.	Ms. Shubha Sarma Secretary	CERC
27.	Dr. Sushanta K. Chatterjee Joint Chief (RA)	CERC
SPECIAL INVITEES		
28.	Shri A.K. Singhal Member	CERC
29.	Shri A.S. Bakshi Member	CERC
30.	Dr. M.K. Iyer Member	CERC
31.	Smt. Jyoti Arora Joint Secretary (R&R)	MOP
32.	Shri Sujit Gulati Addl. Chief Secretary	Gujarat
33.	Shri Bipin Shrimali Principal Secretary (Energy)	Maharashtra
34.	Shri I.C.P. Keshari Principal Secretary (Energy)	Madhya Pradesh

35.	Shri K.L. Sharma Director (Distribution)	PSPCL, Punjab
36.	Shri R.K. Verma Chief Engr.	CEA
37.	Shri S.K.Soonee CEO	POSOCO/NLDC
38.	Shri M.K. Anand Chief (Fin.)	CERC
39.	Shri T. Rout Chief (Legal)	CERC
40.	Smt. Geetu Joshi Chief (Eco.)	CERC
41.	Shri S.C. Shrivastava Chief (Engg.)	CERC

INTRODUCTION OF NEW ENVIRONMENT STANDARDS FOR COAL BASED THERMAL POWER PLANTS

Impact on Thermal Power Plants

22nd July 2016

NEW ENVIRONMENT STANDARDS (Announced on 7th Dec 2015)

(in mg/ Nm^3)	OLD NORMS	NEW NORMS				
		Installed before 31.12.2003		Installed after 01.01.2004 & upto 31.12.2016		To be installed from 01.01.2017
Unit Size (in MW)	All	**< 500**	**≥ 500**	**< 500**	**≥ 500**	**All**
SO_2 (mg/Nm^3)	Dispersion through Chimney	**600**	**200**	**600**	**200**	**100**
Nox (mg/Nm^3)	No Standard	**600**		**300**		**100**
SPM (mg/Nm^3)	100	**100**		**50**		**30**
Mercury(Hg) (mg/Nm^3)	No Standard	**X**	**0.03**	**0.03**		**0.03**

NEW ENVIRONMENT STANDARDS (Announced on 7th Dec 2015)

(in mg/ Nm^3)	OLD NORMS	NEW NORMS				
		Installed before 31.12.2003		Installed after 01.01.2004 & up to 31.12.2016		To be installed from 01.01.2017
Unit Size (in MW)	All	< 500	≥ 500	< 500	≥ 500	**All**
Water Consumption	No standard	• **All existing plants with once through cooling to be converted to closed cycle stations cooling by installation of Cooling Towers.** • **All existing plants to achieve Specific water consumption up to maximum of 3.5 Cu Meter/ MWh within two years** • **New plants to be installed after 1.1.2017 to meet Specific water consumption up to maximum of 2.5 Cu Meter/ MWh and to achieve zero waste water discharge**				

An implementation period of two years from date of publication is provided

INSTALLED CAPACITY (IN MW)

AS ON 30.6.2016

Type	Capacity	Share
Coal	186212.88	61.43%
Gas	24508.63	8.09%
Diesel	918.89	0.30%
Thermal	**211640.40**	**69.82%**
Hydro	42848.43	14.14%
Nuclear	5780.00	1.91%
RES	42849.38	14.13%
Total	**303118.21**	**100.00%**

THERMAL GENERATION – 80% OF TOTAL GENERATION

UNIT SIZE IN INDIA (IN MW)

AS ON 28.2.2016

Unit Size	Installed before 31.12.2003		Installed after 31.12.2003	
	No of Units	Total Capacity	No of Units	Total Capacity
Upto 250 MW	313	47628	110	19014
From 250-500 MW	27	13500	49	15220
More than 500 MW	0	0	137	80495

Source:CEA

IMPACT ON COAL BASED THERMAL PLANTS

- **200000 MW** installed capacity is to be affected including plants under advanced stage of commissioning
- About **80000** MW of total installed capacity of less than 500 MW

OVERVIEW OF TECHNOLOGY

TECHNOLOGY FOR SO_X AND NO_X CONTROL

New Environment Standards requires implementation of new technologies at existing thermal power plants:

De-SOX /Flue Gas desulfurization (FGD)

- **WET LIME STONE PROCESS**
- SPRAY DRY SCRUBBER
- SEA WATER SCRUBBING (Coastal Plants)

Preferred Technology

De-NOX

- COMBUSTION CONTROL
- **SELECTRIVE CATALYST REDUCTION (SCR)**
- SELECTRIVE NON CATALYST REDUCTION (NSCR)

TECHNOLOGY FOR SPM, MERCURY REMOVAL AND WATER CONSUMPTION CONTROL

New Environment Standards requires implementation of new technologies at existing thermal power plants:

SPM Control

- MODIFICATION/RENOVATION OF ESP
- ADDITION OF ESP
- UPGRADATION OF CONTROL SYSTEM

Mercury Control

- HIGH OXIDATION CATALYST WITH NH4CL INJECTION

Water Consumption Control

- Change of cooling tower design

IMPLEMENTATION CHALLENGES

- Requirement of Funds to the extent of 3,50,000 Crores
- Implementation difficulties
  - Lack of space and land availability in case of existing plants
  - 2 years insufficient time period for implementation
    - Implementation to be in phased manner
  - Limited availability of Domestic supplier
  - Contractual issues such as guarantees, price etc in case of plants under constructions
- Impact on tariff ranging from 40 to 90 Paise/kWh as it has to be made pass through under change in law

COMMERCIAL IMPACT OF ENVIRONMENT STANDARDS

COMMERCIAL IMPACT

- Increase in the capital cost and resultant tariffs.
- Increase in additional O&M and consumable expenditure.
- Increase in APC.
- Additional shutdown period
- Relaxation in Availability Norm during implementation period
- Servicing of additional expenditure over the balance useful life

COMMERCIAL IMPACT

Parameters	De-SOx System	De-NOx System	SPM Control System	Cooling Tower Design (CT)
Cap Cost (Rs Cr/MW)	0.5 – 1.2	0.5 – 0.7	0.13	0.25-0.6
APC (%)	1.1% - 1.25% (increase)	0.3% - 0.4% (increase)	0.05% (increase)	0.5% (increase)
O&M Expenses	Will increase due to Limestone	Will increase due to Ammonia/ Catalyst	Equipment maintenanc e	

Impact on Capital Cost is about 1.15 - 2.50 Crore per MW as per industry estimates (about 45-90 Paise/unit).

COMMERCIAL IMPACT

- Petitions before CERC seeking capitalization of expenditure on account of implementation of New Environment norms

  - By MPL for Rs 2065.21 Crore (Rs 1.97 Crore/MW)- For De-Sox and De-Nox
  - By CGPL for its Mundra UMPP Rs. 11021 Crore (Rs. 2.675 Crore/MW)- De-Sox, De-Nox and for conversion to closed cycle cooling
  - By NTPC for its Vindhyachal V (500 MW) Rs 259.57 Crore only for FGD (Rs. 0.52 Crore/MW)

COMMERCIAL IMPACT

Estimated Capital Expenditure for Abstract Schemes proposed as per Amendment Rules 2015 in Petition No 72/MP/2016 (By Maithon Power Ltd for its 1050 MW plant)

Sr. No.	Particulars	UoM	Station			
			Base Cost	Insurance and Transportation Cost	Taxes and Duties	Total Cost
1	Limestone FGD Plant	Rs Crores	760.00	53.20	195.17	1008.37
2	Selective Catalytic Reduction (SCR) System	Rs Crores	540.00	37.80	138.67	716.47
3	Electrical System Modification	Rs Crores	16.00	1.12	4.11	21.23
4	Civil Works for FGD Plant	Rs Crores	65.70	4.60	16.87	87.17
5	Civil Works for SCR System	Rs Crores	34.30	2.40	8.81	45.51
6	Initial Spares (at 4% of Plant & Machinery Cost)	Rs Crores	52.64	3.68	13.52	69.84
Total Capex (excluding IDC)		Rs Crores	1468.64	102.80	377.15	1948.59
7	IDC	Rs Crores	116.62			
Total Capex		Rs Crores	2065.21 (Rs. 1.97 Crore/MW)			

Issues to be taken up with Govt on behalf of FOR

- To exempt plants having residual life of 10 years or less after R&M and life extension/ Exempt all plants Commissioned prior to 1.1.2004
- The plants may be exempted to the extent of space constraint
- Plants under construction or advanced stage of commissioning in next 3-4 years should be allowed retrofits after commissioning. New norms for new stations should be made applicable from 1.1.2020.
- Phased implementation in next 5- 10 years
- Specific water consumption norms of 2.5 Cu M/MWh should be increased to 3.0 Cu M/MWh with FGD
- To exempt coastal plants from installing closed cycle cooling system
- Estimated investment requirement (Rs 2 Cr/MW) and resultant impact on tariff being high (45-90 paise/kWh), Central Financial Assistance need to be provided (Part funding).
- Need to enhance domestic capability of equipment supply by way of technology transfer

Thank You

ISSUES IN IMPLEMENTION OF DE-SO_X TECHNOLOGY

ISSUES IN IMPLEMENTION OF DE-SO_X TECHNOLOGY

- **Investment**
  - Industry estimates of DeSOx system will be in the range of Rs. 0.5 to 1.2 Cr./MW.
- **Implementation Period**
  - Retrofitting of DeSOx system in existing plants, after placement of order may take about 2.5 to 3 years time. For stations with more than one unit the time required for implementation will increased as shutdown of whole station is not possible
  - Shut down period required for retrofitting is around 4 to 6 months.
  - **Increase in Aux. Power Consumption (APC)**

ISSUES IN IMPLEMENTION OF DE-SO_X TECHNOLOGY

- **Increase in O&M Cost**
  - O&M cost will increase due to additional equipment maintenance and various consumables like Lime stone/lime etc
- **Space Requirement**
  - Space for DeSOx installation may not be available in all the units.
- **Disposal of by-product**
  - The by-product is gypsum. Disposal of by-product will be a challenge due to quality & quantity. By-product may required to be disposed in a dyke for which additional land will be required .

ISSUES IN IMPLEMENTION OF DE-NO_X TECHNOLOGY

ISSUES IN IMPLEMENTION OF DE-NO_X TECHNOLOGY

- **Investment**
  - **Industry estimates** of De-NOx system (SCR) will be in the range of Rs. 0.5 to 0.70 Cr/MW.
- **Implementation Period**
  - Installation of SCR system in existing plants, after placement of order may take about 2 to 3 years time. For stations with more than one unit the time required for implementation will increased as shutdown whole station is not possible
  - Shut down period required for retrofitting is around 4 to 6 months.
- **Increase in Aux. Power Consumption (APC)**

ISSUES IN IMPLEMENTION OF DE-NO_X TECHNOLOGY

- **Increase in O&M Cost**
  - O&M cost will increase due to additional equipment maintenance and various consumables like Lime ammonia which may vary depending on ash content in coal.
- **Space Requirement**
  - Space for DeNOx installation may not be available in all the existing units.
- **Availability of DeNOx technology for high ash Indian coal**
  - The SCR technology not proven and is yet to be established for high ash & high abrasive Indian coal

ISSUES IN IMPLEMENTION OF SPM CONTROL TECHNOLOGY

ISSUES IN IMPLEMENTION OF SPM CONTROL SYSTEM

- **Investment**
  - Industry estimates of SPM control system will be in the range of Rs. 0.13 Cr/MW.
- **Implementation Period**
  - Installation of augmentation of ESP in existing plants, after placement of order may take about 30-36 months.
  - Shut down period required for one unit retrofitting is around 45 days (2 months).
- **Increase in Aux. Power Consumption (APC) –** Industry estimates is about 0.05%.
- **Increase in O&M Cost**
  - O&M cost will increase due to additional equipment maintenance.

ISSUES IN IMPLEMENTION OF WATER CONSUMPTION CONTROL SYSTEM

ISSUES IN IMPLEMENTION OF CONTROLLING WATER CONSUMPTION

- **Investment**
  - Industry estimates for installation of close cycle cooling tower will be about Rs. 0.25 to 0.6 Cr/MW.
- **Implementation Period**
  - Total time for implementation to convert cooling tower system in one unit is around 30 month based on the technology.
  - Shut down period required for conversion is 3 to 6 months.
- **Increase in Aux. Power Consumption (APC) –** Industry estimates is about 0.5%.
- **Increase in O&M Cost**
  - O&M cost will increase due to additional equipment maintenance.

ISSUES IN IMPLEMENTION OF WATER CONSUMPTION CONTROL SYSTEM

- **Increase in Water Requirement**
  - Make up water requirement will increase due to increase in evaporation loss.

- **Additional Space Requirement**
  - Large space will be required for installation of cooling towers.

IMPLEMENTION OF MERCURY CONTROL SYSTEM

IMPLEMENTION OF MERCURY CONTROL SYSTEM

❖ This may be integrated with part of De-Sox technology

Form of vapor phase mercury (Speciation)

Elemental Mercury - Hg^0

Oxidized Mercury - Hg^{++}

The form of mercury in the flue gas is critical to performance of emissions control systems.

- **Elemental Mercury: Hard to remove from flue gas**
- **Oxidized Mercury: Easier to remove from flue gas (downstream ESP, FGD)**

BASIC PRINCIPLE - FGD

FGD process typically involve SOx scrubbing with a alkali solid or solution

$CaCO_3 + SO_2 \rightarrow CaSO_3 + H_2O$

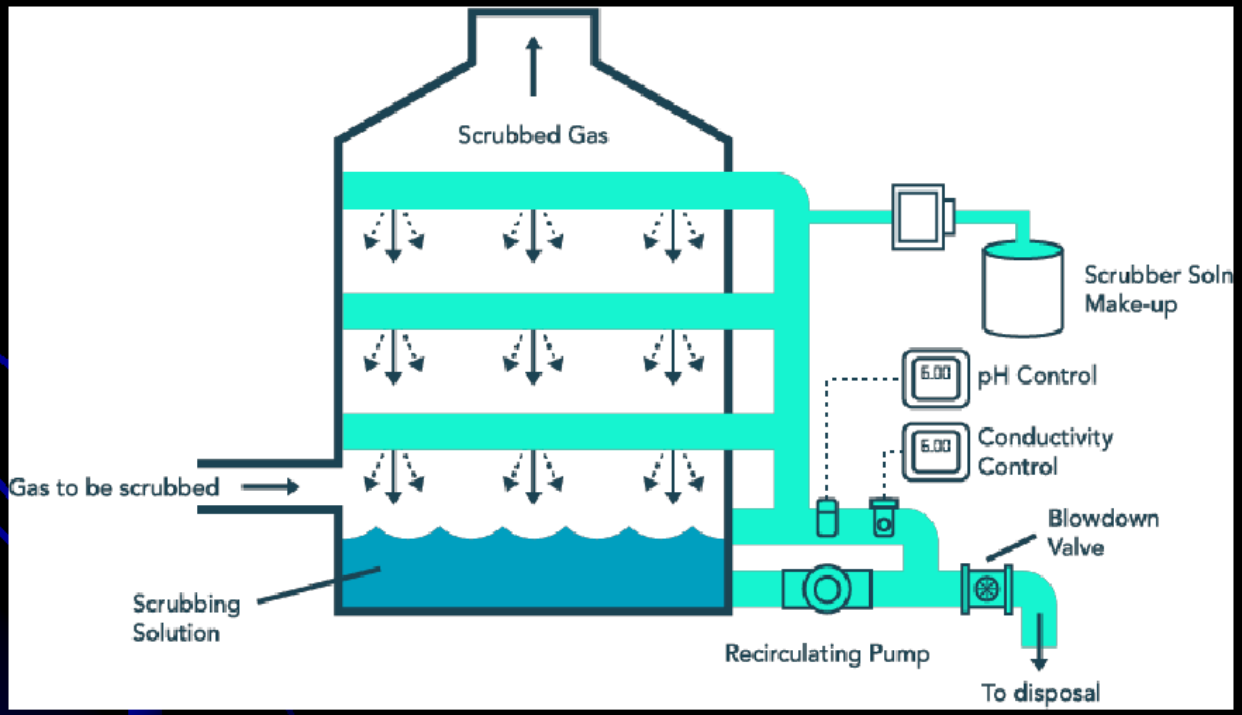
$Ca(OH)_2 + SO_2 \rightarrow CaSO_3 + H_2O$

$Mg(OH)_2 + SO_2 \rightarrow MgSO_3 + H_2O$

$2NaOH + SO_2 \rightarrow Na_2SO_3 + H_2O$

A natural alkaline usable to absorb SO_2 is seawater.

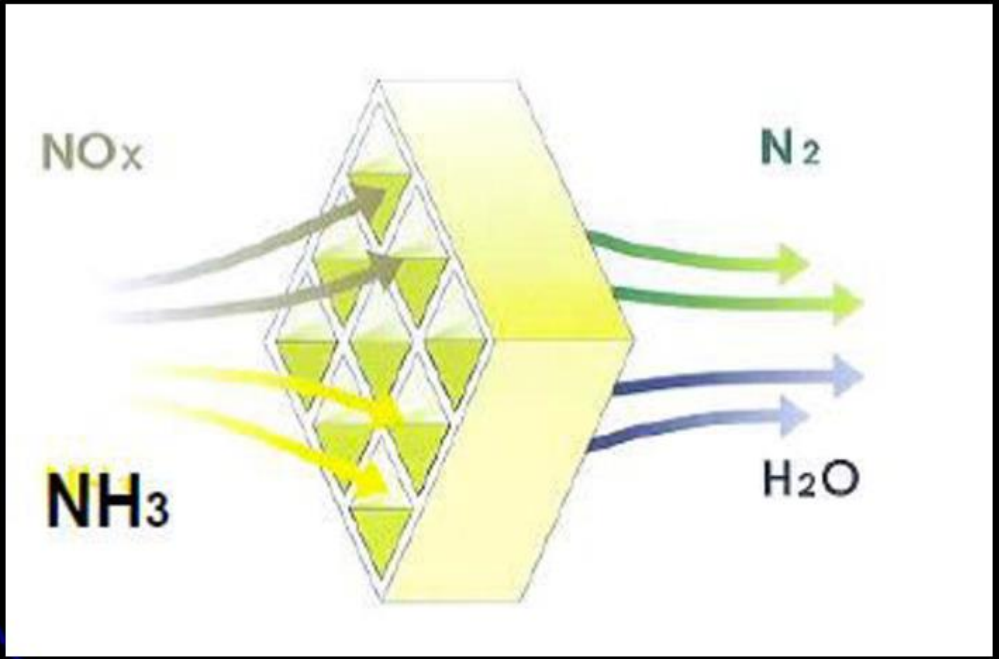
Generally Calcium based alkali are used in the form of lime or limestone.
Seawater is also used wherever feasible in coastal regions.



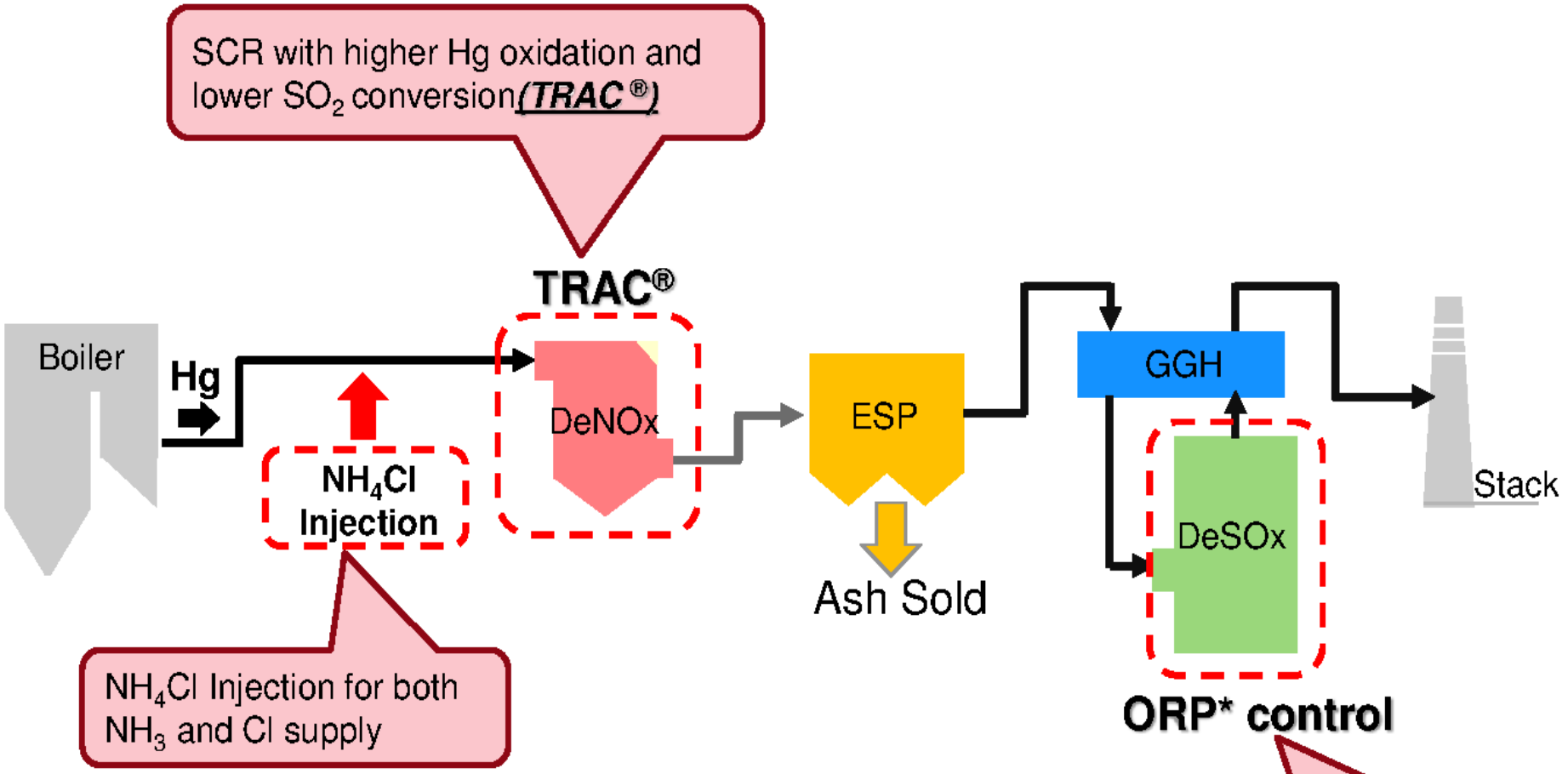
BASIC PRINCIPLE-DeNOx

DE-NOx process typically involve reaction of NOx with ammonia

$$4\,NO + 4\,NH_3 + O_2 \rightarrow 4\,N_2 + 6\,H_2O$$
$$2\,NO_2 + 4\,NH_3 + O_2 \rightarrow 3\,N_2 + 6\,H_2O$$



Mercury Removal Technology
~ Hg removal in TRAC® with NH_4Cl Injection~



***ORP: Oxidation-Reduction Potential**

Ministry of Power
Government of India

24x7 Power For All

A Joint Initiative by Government of India and State Governments

Regulatory interventions required

AIM OF JOINT INITIATIVE

- Electricity is a concurrent subject and distribution of electricity falls under the purview of respective State Governments. It is the responsibility of distribution companies to provide reliable & quality power to all the consumers in their area of operation.

- To supplement the efforts of State Govts, Government of India has decided to take a joint initiative with the states to provide 24X 7 power to all households/houses, commercial & industrial consumers and adequate supply to agriculture consumers as per state policy. The hours of supply to agriculture consumers will be decided by the State Government.

- The joint initiatives aims at –
  - ensuring uninterrupted supply of quality power to existing consumers by the end of 12th plan
  - providing access to electricity to all unconnected households by 2019.
  - to enhance the satisfaction levels of the consumers, improve the quality of life of people, and increase the economic activities resulting into inclusive development of the States.

METHODOLOGY

- State specific exercise has been carried out to assess the energy requirement of the state upto 2018-19 for providing 24x7 power supply to all households (including electrification of un-electrified HHs) and other than domestic consumers including industrial, commercial & Agriculture consumers in the state.
- An assessment of the adequacy of availability of power to the states from various sources i.e. owned by the state, central sector, common projects, private sector and PPAs made etc. has been made.
- The adequacy of Inter State Transmission System (ISTS), Intra state Transmission System and distribution infrastructure has been reviewed to ensure their adequacy for providing 24x7 power in the states.
- Renewable energy & energy efficiency potential in the state along with other measures like capacity building has also been examined in the document.

ACTION PLAN

- Based on the requirement, an action plan including year wise roll out plan, has been drawn which is being executed by the State Govt. with the support of Govt. of India, wherever necessary, as per the approved plans, schemes and policies.
- The intervention required at Central Govt level and State Govt level has also been included in the PFA document.

- The central and state governments meet regularly to review the progress of the program and strive to achieve the objectives of the program by taking the necessary steps as envisaged in the PFA document.

STATUS

- 24x7- Power For All (PFA) Documents for 28 states have already been prepared and signed and these documents are available on the website of MOP.
- Approval in respect of the documents already finalized for the 3 states/UTs (West Bengal, Tripura and UT of Chandigarh) have been received and these are awaiting for signing by respective states/UTs.
- Approval of documents in respect of other 4 states/UTs (Manipur, Tamil Nadu, Puducherry and A&N Islands) are awaiting the approval from respective states/UTs
- The Document in respect of the state of Uttar Pradesh is at initial stage of Preparation.
- To prepare these documents, the country has been divided in to 3 packages and 3 consultants M/s Crisil, M/s Mecon and M/s Deloitte have been appointed.

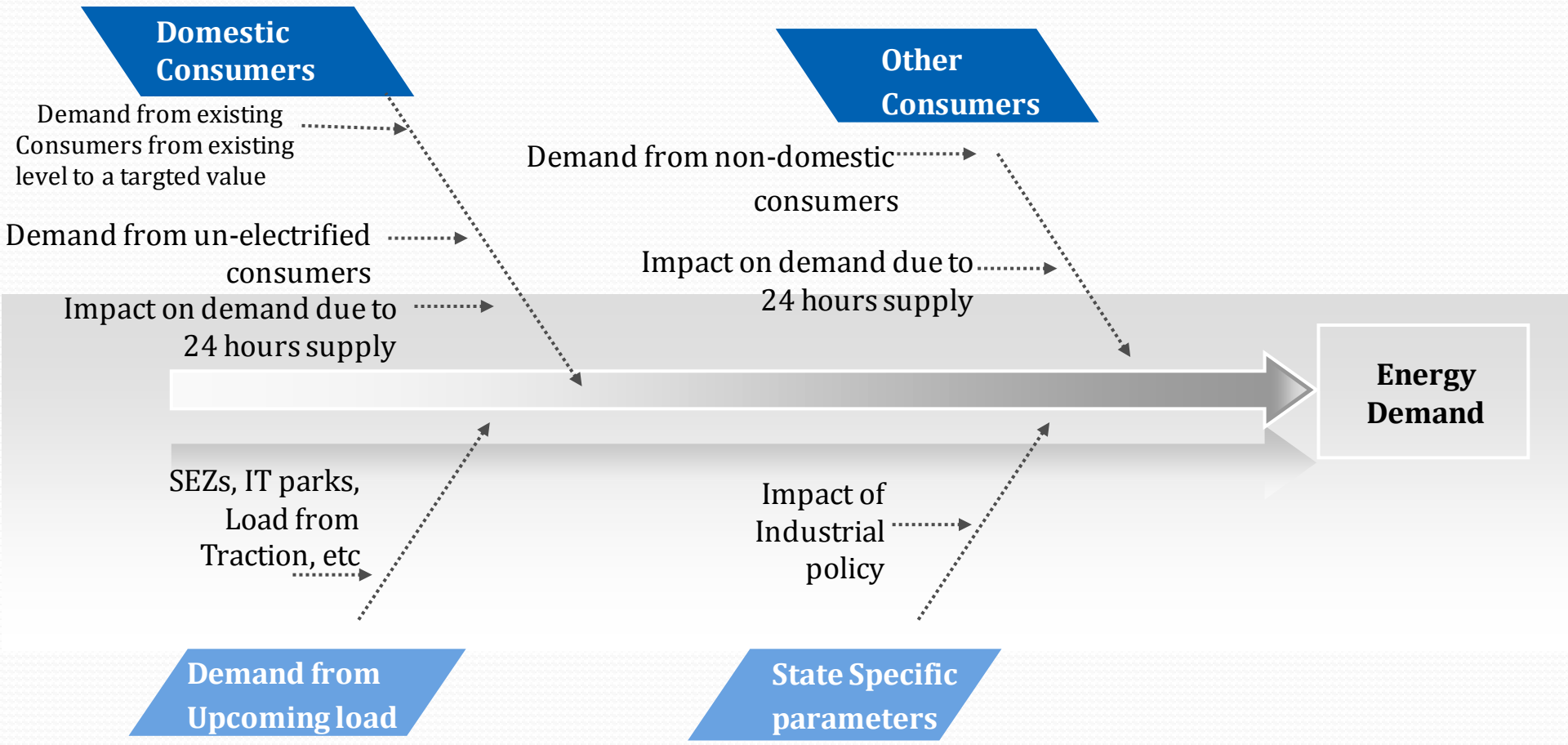
Roadmap for providing 24 X 7, Power for All (PFA)

- To prepare state specific Roadmap for providing 24 X 7, Power for All (PFA) in various states & UTs of India, the detailed document would include the following :

1. Power Supply Scenerio and Demand Estimation
2. Generation Plan
3. Transmission Plan
4. Distribution Plan
5. Renewable Energy and Energy Efficiency Plan
6. Financial Sustainability
7. New Initiatives, Monitoring Mechanism & Capacity Building
8. Road Map and Fund Requirement

Demand Estimation

Approach towards demand estimation



- **All India Requirement- MU & MW**

Consumption/HH/Day

	2014-15		2018-19	
	Minimum	Maximum	Minimum	Maximum
Rural	0.7 (Ar. Pradesh)	4.69 (Goa)	1.5 (Sikkim)	5.89 (Punjab)
Urban	2.42 (Karnataka)	7.08 (Chattisgarh)	3.5 (Karnataka)	9 (Haryana)

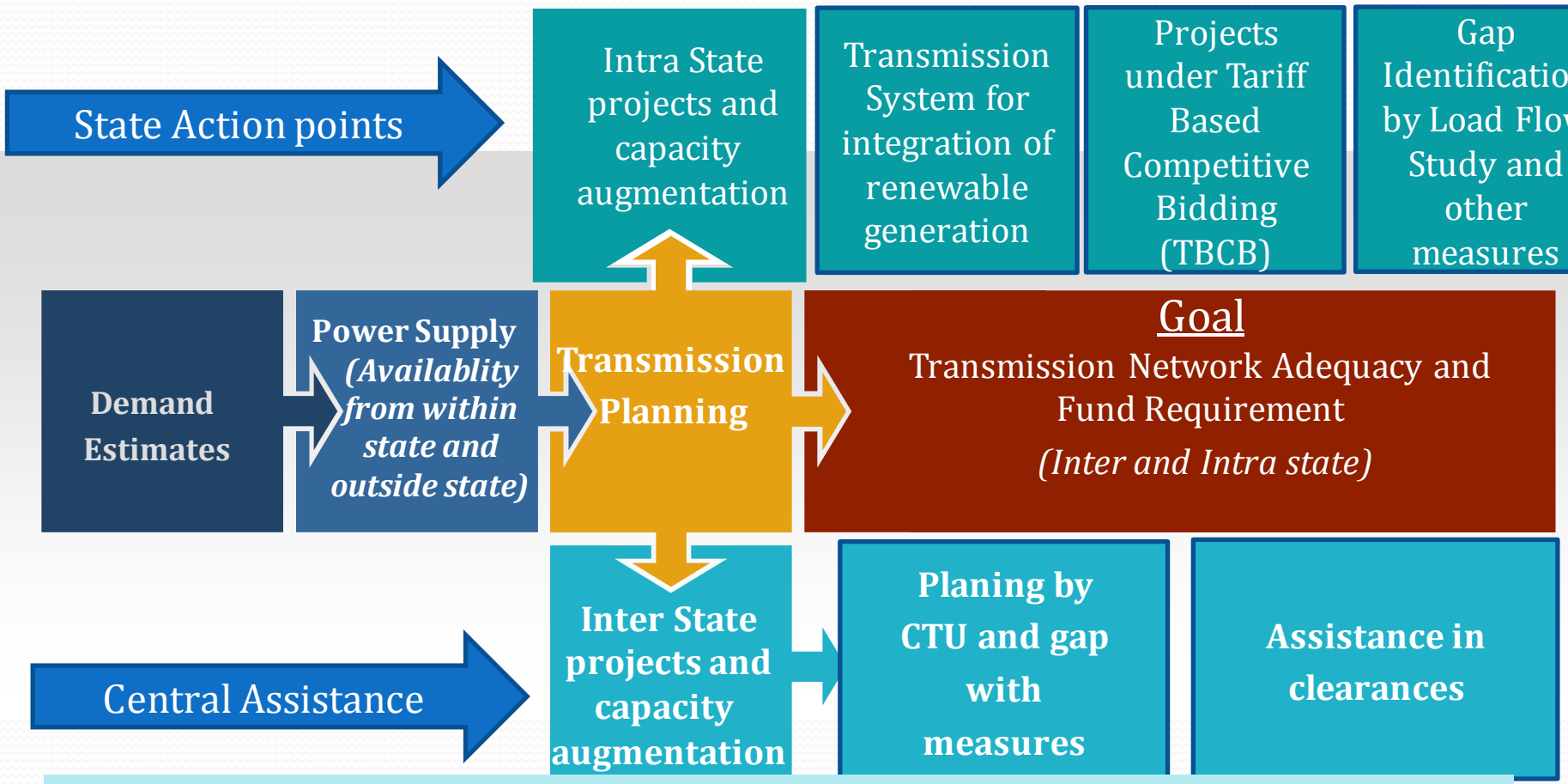
Generation Plan

Supply plan to be designed considering estimated demand

Existing Supply *(In state and outside state)*	1	▪ Availability to the state from existing plants and future plants (Conventional and un-conventional)
Future Capacity Available *(In state and outside state)*	2	▪ Availability from plants to be commissioned in future (Conventional and un-conventional) ▪ Gap in power requirement and availability
Gap in Existing Plan	3	▪ Gap in demand and supply based on existing planning ▪ Plan to bridge the existing gap
Central Assistance	4	▪ Fuel required to meet the gap (Coal or Gas) ▪ Fund requirement if any ▪ Intervention required from GoI
Road Map	5	▪ Action plan Yearly/Quarterly targets for state intervention to bridge the gap

Transmission Plan

To meet the expected demand as per "24 x 7 Power For All" target, a robust & reliable transmission network is required both at Inter-state & Intra state level



- **Total Fund Requirement for Transmission sector is expected to be Rs. 158926.08 Cr.**

Distribution Plan

The existing distribution infrastructure would be required to be strengthened and augmented to meet the demand estimated for 24 x 7 Power For All

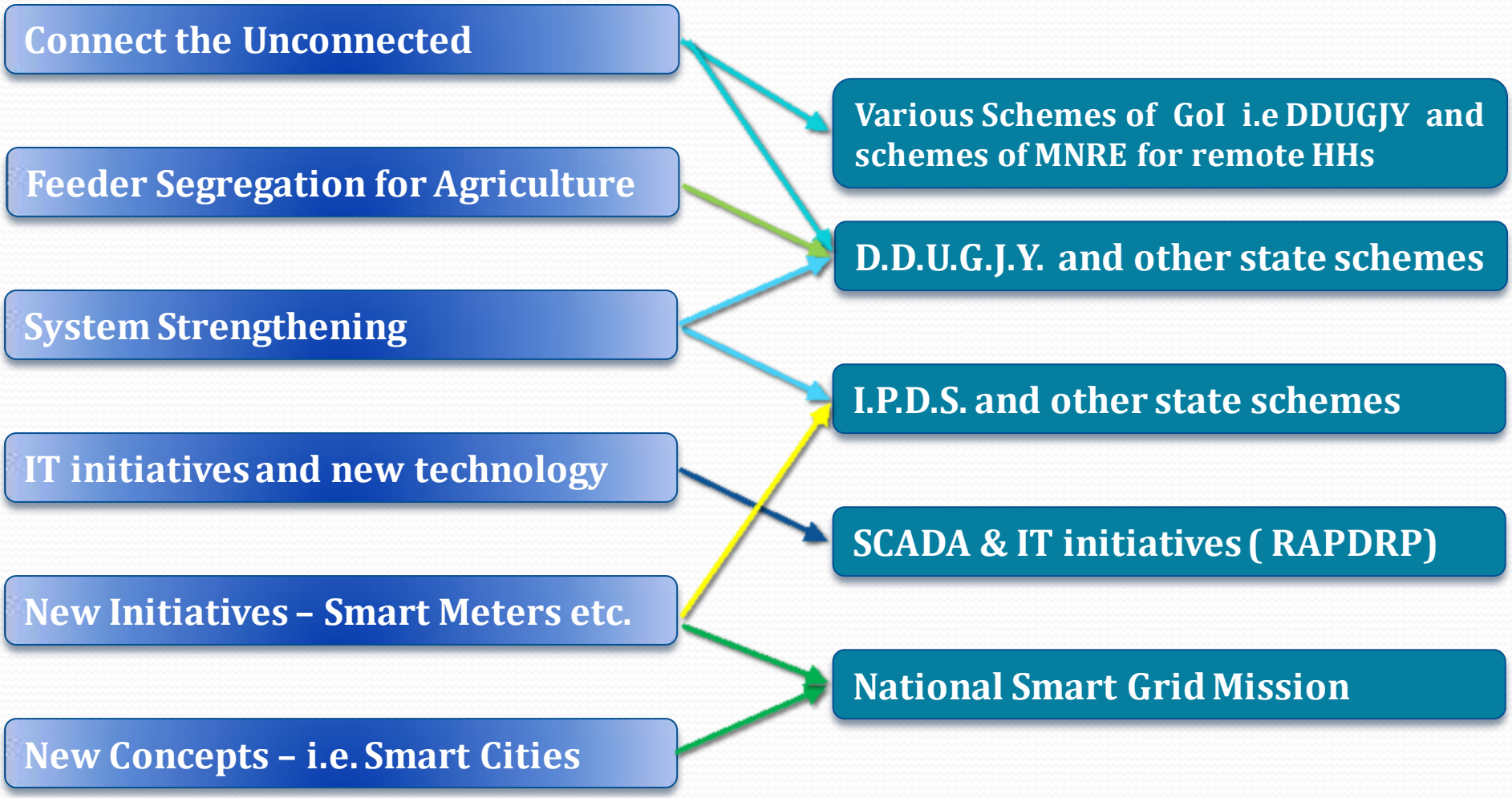
Review of Existing Network	Review of Schemes under progress	Identification of gaps	Action Points

▪ Capacity at 33/11 kV and loading
▪ DT transformer capacity and loading
▪ Agriculture consumption
▪ Number of un-metered and un connected consumers
▪ Losses division wise/ circle wise
	▪ Capacity Addition / Augmentation
	▪ Target Status of the scheme
	  ▪ Metering
	  ▪ DT addition
	  ▪ Electrification etc.
	▪ Energy efficiency plans under implementation
		▪ Gap in connecting the unconnected, 100% metering and feeder segregation
		▪ Deficit in network adequacy by FY 19
		▪ Measures for reduction of AT&C losses
		▪ Measures for energy efficiency
			• Identification of schemes to bridge the gap
			• Quarterly targets to meet 24 x 7 power for all
			• Target of AT&C losses
			• IT initiatives targets
			• Regulatory compliance and KPIs

- **Total Fund Requirement for Distribution sector is expected to be Rs. 303772 Cr.**

Distribution Plan

Schemes Available to Bridge the Funding Gap



RENEWABLE ENERGY PLAN

The Govt. is keen to tap renewable power potential of the state particularly solar energy and wind power to meet the growing demand for power in an environmentally sustainable manner. Renewable energy is now becoming an important source of the energy mix. The area of studies are:

- Renewable energy plan
- Grid connected and off grid Roof Top Solar scheme
- Solar water pumping scheme particularly for agricultural consumers
- Action plan of the state
- Fund Requirements
- GoI/ State Govt Interventions

ENERGY EFFICIENCY

With increasing importance being given to low carbon growth these days, the cheapest and more affordable option to overcome the energy deficit is Demand Side Management and implementation of energy efficiency measures. The area of studies are:

- Savings potential & Investment
- Usage of energy efficiency electrical equipment
- Action plan of the state
- Fund Requirements
- GoI / State Govt Interventions

Financial Sustainability

Impact on financial condition of distribution utilities in the state has to be assessed for meeting the target of 24 x 7 Power For All based on below parameters:

- Financial Position of Distribution Utilities
- Effectiveness of FRP of GoI and participation in UDAY scheme
- Sector Wise Investment Plan and Fund Requirement
- Loss Reduction, Energy Management & Energy Accounting
- GoI Schemes already Sanctioned and under implementation
- Projected Financial Statement including cash Flow projections
- Gap between ACS & ARR
- Timely preparation and finalization of annual accounts
- Release of subsidy to the Discoms
- Impact on tariff for meeting the additional energy required for 24x7
- Filing of tariff petitions and Tariff order
- Action plan of the state for Financial Turnaround.

Financial Sustainability

Impact on Financial Sustainability under different scenarios

Scenario A

As per Road Map

- No subsidy and tariff hike
- Escalation of O&M at WPI
- Loss trajectory as planned by MOP

Scenario B

As per Road Map with Financial turnaround

- Nominal tariff hike + Scenario A

Scenario C

Pessimistic Scenario

- Higher T&D losses than targeted
- Higher tariff required for meeting the financial gap

New Initiatives

To be planned by the state

Information Technology (IT) Initiatives

- ERP (Enterprise Resource Planning)
- SCADA
- DSM (Demand Side Management)
- OMS (Outage Management System)
- Regional Distribution Control Centres (RDCC)
- Renewable Energy Management centres
- Power procurement optimization tools
- Interactive Voice Response System (IVRS)

Initiative towards reform process

- Consumer Grievance Cell, Improving Consumer Convenience, Mobile alerts through SMS, capacity building initiatives, Smart Cities, etc.

Private sector participation

- PPP initiatives in the state

Project Monitoring at Center and State Level

- Monitoring of "24 x 7 Power For All" project at all levels including Project Management Agency (PMA)

Capacity Building

- Present capacity building program of Genco/ Transco/Discoms
- No of technical & non technical employees in these utilities (trained / untrained)
- Existing training institutes in the state / proposed institutes
- Details of requirement of training of the employees (Tech & Non Technical)
- Requirement of funds for establishment of requisite institutes in the state
- Details reg capacity building being done presently including RAPDRP

Road Map

Planning in terms of yearly targets:

Sl.No.	Category	Base year scenario (Year 2015)	Rollout Plan					Total expected capacity as on March'19
			FY 16	FY 17	FY 18	FY 19	Total	
1	Capacity Addition (MW)							
2	Renewable Energy Plan (MW)							
3	Transmission Plan (lines & sub-stations)							
4	Distribution Plan (Lines & Sub-station)							
5	AT&C losses (%)							
6	Village & HH electrification Plan							
7	Financial Position							
8	Energy Efficiency Plan							

Funding Source:

Parameters	State Government	Central Government	Through PPP initiatives	Domestic/ External borrowing
Generation				
Transmission				
Distribution				
Renewable and EE projects				

Monitoring mechanism

Project Management Unit proposed

Communication Objective	Responsibility	Frequency
" Power for all" - Roll Out Plan	Secretary(Power) GOI	Quarterly
"Power for all" - Roll Out Plan	Joint Secretary, MOP	Monthly
Status update on Deliverables	Secretary, Energy- State	Quarterly
Generation Projects Physical Progress, Achievements and Other Relates Issues	Managing Director, GENCO	Quarterly
Inter-State Transmission Projects Physical Progress, Achievements and Other Relates Issues	Director (Projects), PGCIL	Monthly
Intra-State Transmission Projects Physical Progress, Achievements and Other Relates Issues	Managing Director, STU	Monthly
Distribution Progress, Achievements, Losses, Consumer Initiatives etc.	Managing Director, Discom	Monthly
Renewable Power/EE Plan	MD, RE/EE agency	Quarterly

MONITORING OF THE IMPLEMENTATION OF 24X7 PFA

- The implementation is being monitored as per the institutional arrangement given in the document.
- MOP is monitoring the implementation of PFA on regular basis every month.
- A website (www.powerforall.co.in) has already been launched by MOP and the progress of the works is being entered on-line by the states.
- For this purpose, login Id and passwords have been issued to the authorized persons of States to fill up the progress data online.

State Action Plan as per PFA document require support of SERCs

Areas of regulatory interactions

Capital Investment plan	State Action Plan for 24x7 PFA	AT&C loss reduction trajectory	Enforcing Performance of Standards
Capital investment plan envisaged in the PFA roadmaps need to be approved by SERCs	The State Action Plan envisaged in 24x7 PFA need to be supported and Monitored by SERCs	AT&C loss reduction trajectory as agreed by States with MOP need to be enforced and monitored by SERCs	Enforcing and Monitoring the Performance Standards notified by SERCs and place the performance indices on website of SERCs.

Regulatory interventions

SERCs intervention for Financial sustainability of Discoms

Problem

Most of the Discoms are presently not financially sustainable

Intervention

Result oriented steps required for financial turn around of Discoms

AT&C losses reduction trajectory may be enforced as agreed by States with MOP

Discom wise Detailed action plan for achieving 100% metering and energy auditing upto Distribution Transformer level need to be enforced and monitored

As on date 11 States Governments have signed Ujwal Discom Assuranace Youjna (UDAY) MoU with GoI to revive the State Discoms and to implement Smart metering and to Reduce AT&C losses as per the agreed trajectory.

THANK YOU

सत्यमेव जयते

POWER SECTOR REFORM

सत्यमेव जयते

Issues……Fuel

- Imposition of service tax on Railway freight
- Grade slippage in coal
- Demurrage due to Boulders/Sticky coal
- Transit loss in Railway System
- Imposition of clean energy cess
- Increase in coal cost

Issues……Environment

- Mandatory Power purchase from Municipality solid waste
- Renewable energy commitment
- Impact of new Environment norms
- Use of Sewerage Water Treatment Plant
- Relaxed operating norms for coal plant to accommodate RE power

Issues……Financial

- Change in consumer mix due to massive Rural Electrification
- Flight of high value consumer through open access/captive generation
- Reduction in consumption of power at higher slab due to Net metering in RE power
- Increase in Service Tax from 12% to 15% & subsequently to 18% in GST and widening the Service Tax net

Way forward

- GOI to subsidize RE power through state by diverting the clean energy cess to respective state fund
- Railway to deliver coal at plant based on weighing at plant end
- Coal companies to accept sampling at power house end
- Coal companies to ensure sized & crushed coal of ash content below 34%. They should wash coal, if required.

Way forward

- **Coal price to be fixed on deemed export basis i.e. Coal India to charge pit head price matching export price of similar grade coal outside India**
- **Railway freight class is to be shifted to 100 from present 145 as power is essential item & originally it was at 100 class.**
- **Railway other charges like over/under weighing, demurrage etc. are to be decided through time & motion study**
- Implementation of High Voltage Distribution System (HVDS) through IPDS for reduction of AT & T Losses, etc

सत्यमेव जयते

Way forward

- Service tax / GST for all power related contract and supply to be capped at 10%
- New Environment norms to be modified in line with other developed countries by giving 10/15 years time
- Appointment of Regulator for Coal & Railways. Till then CERC & other State Regulators can work for them
- GOI to support make cheap power available to domestic household below 100kWh/month in compliance with Lifeline consumer consumer as per Tariff Policy.

Initiative taken by West Bengal

- **Target AT&C Loss below 10% from present 30% through aggressive implementation of HVDS along with AB Cable, smart / prepaid meter etc.GOI to support through IPDS.**
- **Introducing voltage wise tariff & Ensure common tariff for similar category of consumers in the same voltage level**
- **Building up of fiber optical connectivity at consumer end along with ABC/UG cable for smart metering and other network friendly services viz. TV, Internet etc. for earning additional revenue**

Initiative taken by West Bengal

- **GIS mapping, building up consumer wise data base including DTr. related to the distribution network and integrating them for improving customer service, billing & collection efficiency**
- **Compulsory metering of DTrs, all consumers & energy audit for identifying the loss making areas & action being taken**
- **Reach out to consumer through NGO & local people's representative to educate on their rights & duties, energy efficiency, renewable energy, quality power and elimination of power theft .**


Thank you

Business Unit

FOR
Open access including captive

Strictly Private and Confidential
Draft

22 July 2016

pwc

Section 1
Background

Open Access – Legislative and regulatory framework

- **Open Access Definition:-**

  As per the Electricity Act 2003, section (2) (47), Open Access means,

  *"the **non-discriminatory** provision for the use of **transmission lines** or **distribution system** or associated facilities with such lines or system by **any licensee or consumer or a person engaged in generation** in accordance with the **regulations** specified by the Appropriate Commission"*

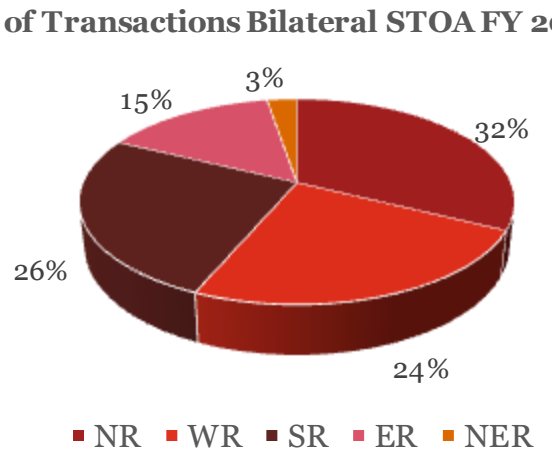
- ***Policy Provisions***

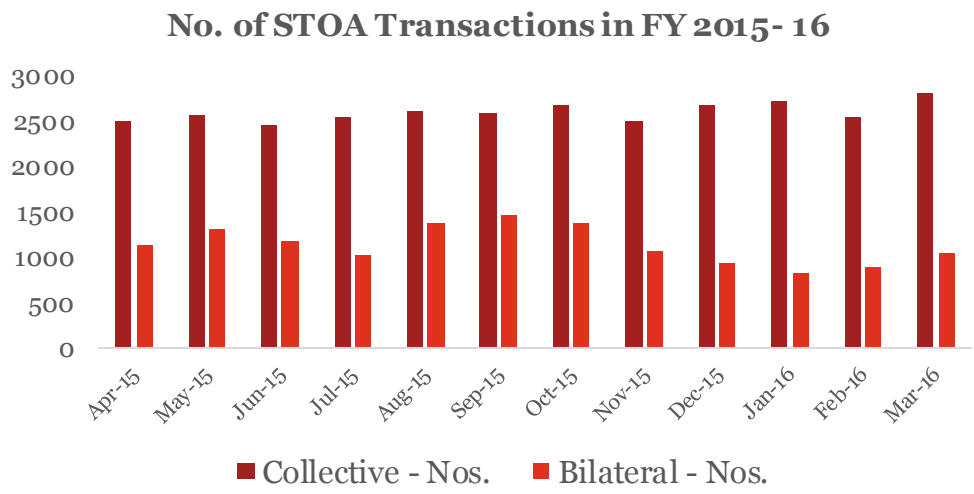
  As per the National Tariff Policy 2016, Paragraph 5.13

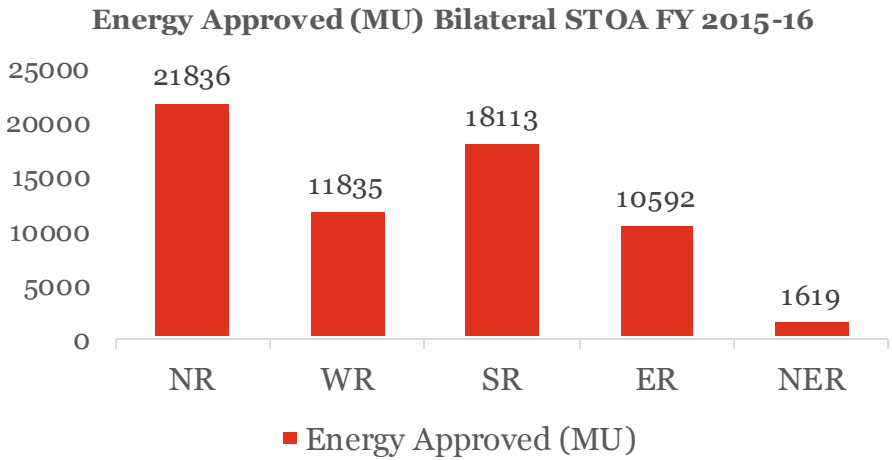
  "The Act provides for introduction of open access for consumers of one megawatt and above in a time bound manner. The Regulatory Commissions shall introduce open access for different categories of consumers as per the provisions of the Act"

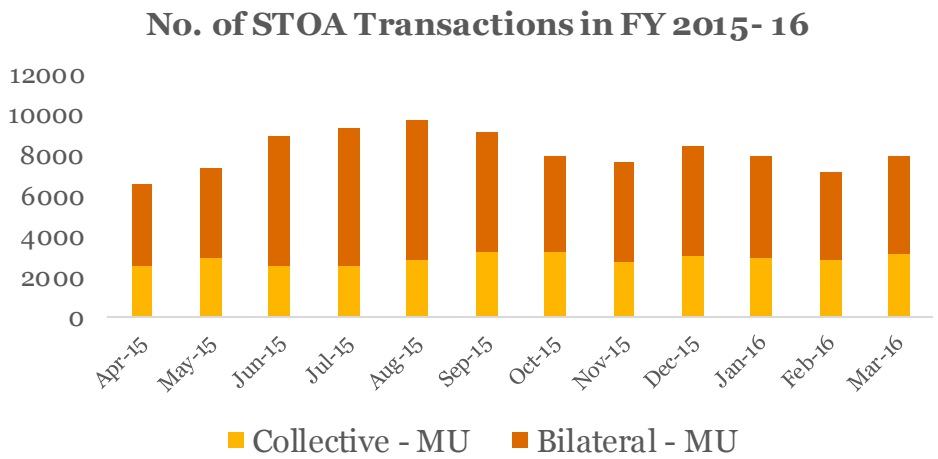
- ***Regulatory Framework – Evolution***
  - ***CERC Regulations***
    - CERC (Open Access in Inter State Transmission) Regulations 2008 & Amendments
    - CERC (Grant of Connectivity, Long-term Access and Medium-term Open Access in inter-State Transmission and related matters) Regulations 2009 & Amendments
  - ***SERC Regulations***
    - SERC (Intra-State Grant of Connectivity & Open Access) Regulations
    - SERC (Distribution Tariff) Regulations

Scenario of open access









Source -NLDC

Specific issues
Maharashtra & Gujarat

Maharashtra

- MSEDCL losing revenues on account of industrial customers opting for open access
  - Reduced load by Indian railways (Deemed licensees – zero CSS)
  - Open access from conventional and renewable sources (lower CSS, wheeling and transmission charges)
  - Shift to captive sources (conventional/renewable) – No recovery of CSS
  - Resultant revenue impact of INR 2050 Crs (FY14), INR 2060 Crs (FY15) and INR 3200 Crs (FY16)
- HT industrial sales witnessed decline of 2% since 2010-11; including OA industrial growth was of 2.5%
- Truing up issues – Impact of ACOS

Gujarat

- Industries going Group Captive route by misusing the ownership definition of captive generation

Issues raised by Consumer Association

- Denial of Open Access citing administrative reasons
- Reasons for denial vague - include citing 'non-availability' of transmission corridor
- Cross Subsidy surcharges – calculations, high, consistency
- Denial of OA leading to purchase of power at higher cost and in turn increase in cost of production
- Industries are unable to absorb higher power purchase costs - shifting to other states or closing down.

Trends & developments

- Contextual change happening in Indian power sector
  - Utilities are power surplus and ability to serve power to all consumer categories
  - Utilities are provider of last resort and have universal service obligations – power procurement planning is undertaken based on this premise
  - Retail tariff structure, design and levels
    - Too many to administer – confusing price signals (inputs from Economic Survey 2016)
    - Flight of industrial consumers due to level of cross subsidies
  - Captive power which was envisaged to be set up by the users primarily for their own use has changed to "business" of setting up and operating captive power plants
- Outcomes
  - Utilities incurring financial losses on account of consumers switching without adequate compensation moving out from distribution and entering into a captive structure under open access route
  - Limited visibility and control over the performance of captive power plants

Section 2
Issues for deliberation

Issues for deliberation ...1/2

Discom Perspective:

- Issue 1: CPP proliferation and loss of surcharge
  - Misuse of captive ownership status and resultant loss of surcharge
- Issue 2: Tariff design in recovery of costs
  - Demand charges not structured to recover most of fixed costs
  - Inappropriate pricing of support services like stand by charges/ cross subsidy surcharge
- Issue 3: Demand – supply scenario; and long term PPAs
  - 98% of power procurement is long term; surplus situation likely to stay over next 5 years
  - Additional surcharge to recover stranded capacity charges
- Issue 4: Open access process – Switching issues

Issues for deliberation ...2/2

Consumer perspective:

- Issue 5: Relatively higher level of cross subsidy (Illustration)
  - Makes open access a viable option for customers (Sample case)
  - Inconsistency in calculation of cross subsidy surcharge (CSS)
- Issue 6: Non tariff barriers
  - Resistance of Discoms
  - SLDC/STU – Technical studies for justification
  - Denial by SLDC

Section 3
Road ahead

Proposed action plan

- Addressing issues related to CPP status - Proposed modifications in CPP Rules
- Issues related to tariff and other charges
  - Open access regulations
    - Frequency of switching – Clear provision in Open Access Regulations
    - Cross subsidy surcharge design (20% cap on the retail tariff (NTP))
    - Additional surcharge design
    - Standby charges design (125% of respective consumer tariff – NTP)
    - RPO obligations for open access consumers
  - Retail tariff structure design
    - Cross subsidy reduction road map, fixed/variable charge recovery, categories, & slabs
- Ring fencing of SLDCs
- SLDC to give exchange neutral NOC (CERC Order)
- Analysis of existing captives – vintage, fuel, performance, environmental impact, application of PAT scheme, etc
  - Evaluate avenues for bringing captive consumers to grid

Thank you

Section 4
Appendix 1: Linked up slides

Open access – Legislative provision

Defn (47) " open access" means the non-discriminatory provision for the use of transmission lines or distribution system or associated facilities with such lines or system by any licensee or consumer or a person engaged in generation in accordance with the regulations specified by the Appropriate Commission;

Clause 42 (2) The State Commission shall introduce open access in such phases and subject to such conditions, (including the cross subsidies, and other operational constraints) as may be specified within one year of the appointed date by it and in specifying the extent of open access in successive phases and in determining the charges for wheeling, it shall have due regard to all relevant factors including such cross subsidies, and other operational constraints:

- Provided that such open access may be allowed before the cross subsidies are eliminated on payment of a surcharge in addition to the charges for wheeling as may be determined by the State Commission :
- Provided further that such surcharge shall be utilised to meet the requirements of current level of cross subsidy within the area of supply of the distribution licensee :
- Provided also that such surcharge and cross subsidies shall be progressively reduced and eliminated in the manner as may be specified by the State Commission:
- Provided also that such surcharge shall not be leviable in case open access is provided to a person who has established a captive generating plant for carrying the electricity to the destination of his own use.

3[Provided also that the State Commission shall, not later than five years from the date of commencement of the Electricity (Amendment) Act, 2003, by regulations, provide such open access to all consumers who require a supply of electricity where the maximum power to be made available at any time exceeds one megawatt.]

Open access – Tariff Policy Provisions ...1/3

5.13 The Act provides for introduction of open access for consumers of one megawatt and above in a time bound manner. The Regulatory Commissions shall introduce open access for different categories of consumers as per the provisions of the Act

6.3 Grid connected captive plants could also supply power to non-captive users connected to the grid through available transmission facilities based on negotiated tariffs. Such sale of electricity would be subject to relevant regulations for open access including compliance of relevant provisions of rule 3 of the Electricity Rules, 2005.

8.5 Cross-subsidy surcharge and additional surcharge for open access

8.5.1 National Electricity Policy lays down that the amount of cross-subsidy surcharge and the additional surcharge to be levied from consumers who are permitted open access should not be so onerous that it eliminates competition which is intended to be fostered in generation and supply of power directly to the consumers through open access.

A consumer who is permitted open access will have to make payment to the generator, the transmission licensee whose transmission systems are used, distribution utility for the wheeling charges and, in addition, the cross subsidy surcharge. The computation of cross subsidy surcharge, therefore, needs to be done in a manner that while it compensates the distribution licensee, it does not constrain introduction of competition through open access. A consumer would avail of open access only if the payment of all the charges leads to a benefit to him.

While the interest of distribution licensee needs to be protected it would be essential that this provision of the Act, which requires the open access to be introduced in a time-bound manner, is used to bring about competition in the larger interest of consumers.

SERCs may calculate the cost of supply of electricity by the distribution licensee to consumers of the applicable class as aggregate of

(a) per unit weighted average cost of power purchase including meeting the Renewable Purchase Obligation;
(b) transmission and distribution losses applicable to the relevant voltage level and commercial losses allowed by the SERC;
(c) transmission, distribution and wheeling charges up to the relevant voltage level; and
(d) per unit cost of carrying regulatory assets, if applicable.

Open access – Tariff Policy Provisions ...2/3

Surcharge formula:

S= T – [C/ (1-L/100) + D+ R]

Where
S is the surcharge
T is the tariff payable by the relevant category of consumers, including reflecting the Renewable Purchase Obligation
C is the per unit weighted average cost of power purchase by the Licensee, including meeting the Renewable Purchase Obligation
D is the aggregate of transmission, distribution and wheeling charge applicable to the relevant voltage level
L is the aggregate of transmission, distribution and commercial losses, expressed as a percentage applicable to the relevant voltage level
R is the per unit cost of carrying regulatory assets.

8.5.2 No surcharge would be required to be paid in terms of sub-section (2) of Section 42 of the Act on the electricity being sold by the generating companies with consent of the competent government under Section 43(A)(1)(c) of the Electricity Act, 1948 (now repealed) and on the electricity being supplied by the distribution licensee on the authorisation by the State Government under Section 27 of the Indian Electricity Act, 1910 (now repealed), till the current validity of such consent or authorisation.

8.5.3 The surcharge may be collected either by the distribution licensee, the transmission licensee, the STU or the CTU, depending on whose facilities are used by the consumer for availing electricity supplies. In all cases the amounts collected from a particular consumer should be given to the distribution licensee in whose area the consumer is located. In case of two licensees supplying in the same area, the licensee from whom the consumer was availing supply shall be paid the amounts collected.

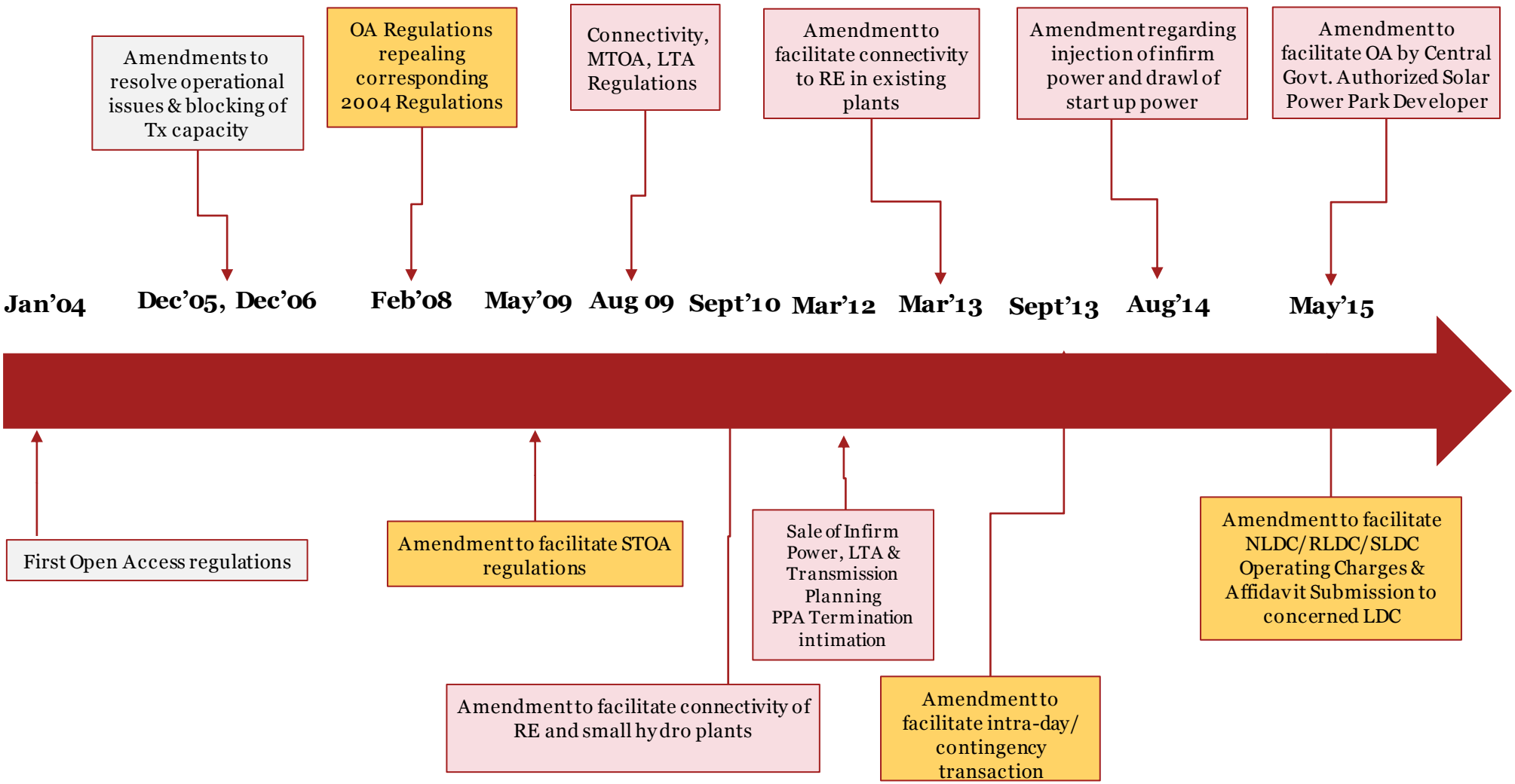
Open access – Tariff Policy Provisions ...3/3

8.5.4 The **additional surcharge** for obligation to supply as per section 42(4) of the Act should become applicable only if it is conclusively demonstrated that the obligation of a licensee, in terms of existing power purchase commitments, has been and continues to be stranded, or there is an unavoidable obligation and incidence to bear fixed costs consequent to such a contract. The fixed costs related to network assets would be recovered through wheeling charges.

8.5.5 Wheeling charges should be determined on the basis of same principles as laid down for intra-state transmission charges and in addition would include average loss compensation of the relevant voltage level.

8.5.6 In case of outages of generator supplying to a consumer on open access, **standby arrangements** should be provided by the licensee on the payment of tariff for temporary connection to that consumer category as specified by the Appropriate Commission. Provided that such charges **shall not be more than 125 percent of the normal tariff** of that category.

Open access: Evolution of regulations - CERC



Captive power – Legislation and rules ...1/3

Definition from E Act 2003

- (8) " Captive generating plant" means a power plant set up by any person to generate electricity primarily for his own use and includes a power plant set up by any co-operative society or association of persons for generating electricity primarily for use of members of such cooperative society or association;

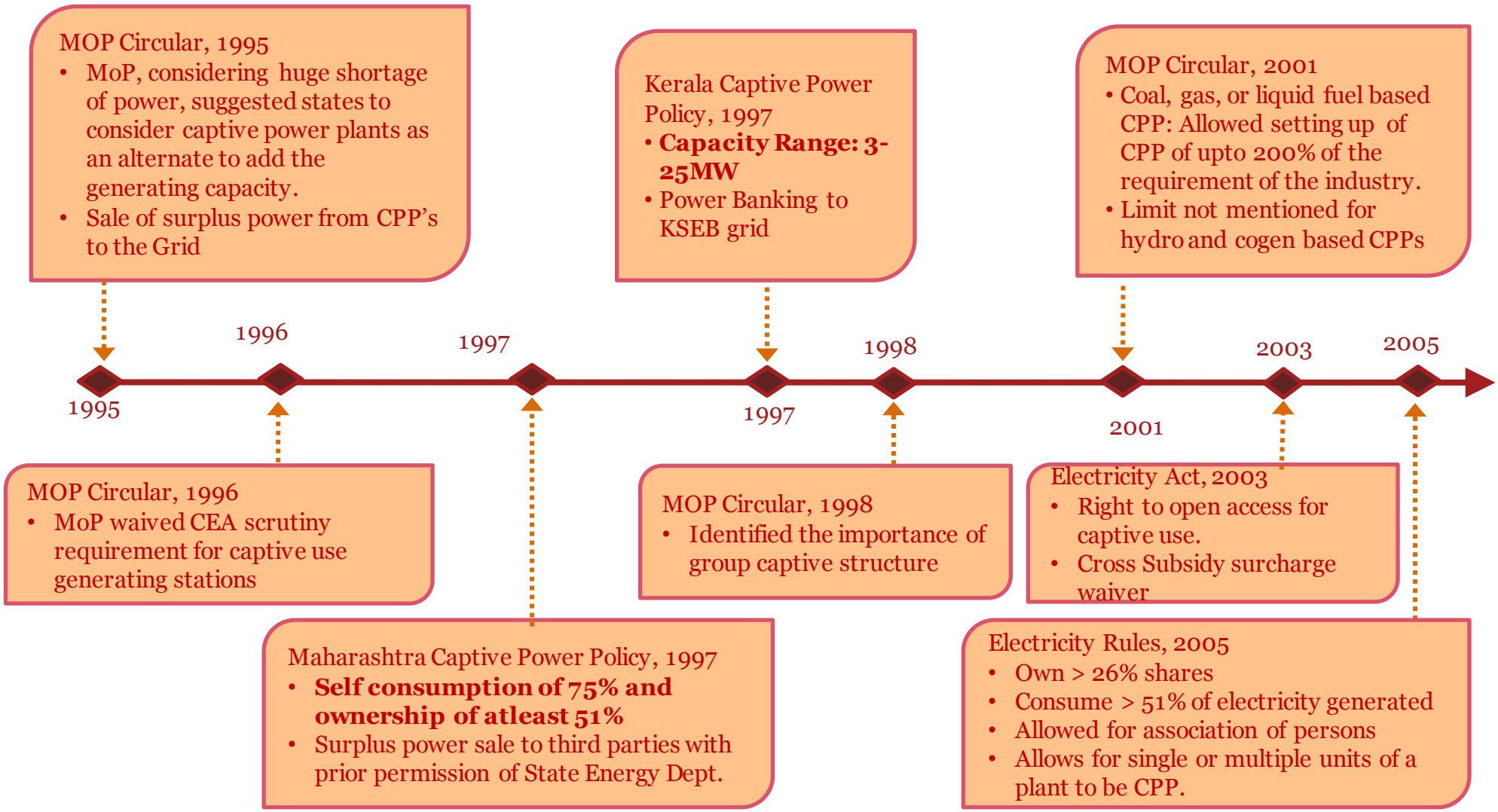
Rule 3 of Electricity Rules 2005:

- "No power plant shall qualify as a Captive Generating Plant unless:

(I) not less than twenty six percent of the ownership is held by the captive user(s), and

(II) not less than fifty one percent of the aggregate electricity generated in such plant, determined on an annual basis, is consumed for the captive use"

Captive power - Journey ...2/3



Captive power – Issues to be dealt with ...3/3

- Small consumers can associate with one or two large consumers to qualify the consumption criteria (> 51%)
- Group CPPs can change the shareholding pattern based on their consumption requirement on year on year basis
- Group CPPs have flexibility to structure the transaction to ensure a lower cash outflow on account of equity investment
- The Companies Act allows for multiple categories of shares- equity share capital. Hence, equity investment by the group CPPs can be minimised by using several categories of shares
- Captive consumers are getting them isolated from the operational risk by signing a shareholding agreement
- Cost of capital incurred by the group CPPs for arranging equity being reimbursed as discount in power purchase cost
- The flexibility has been provided in the Captive Rules to a SPV to identify a unit/ units as a captive plant
- Provides a comfort to the captive consumers in case captive power is not available. The additional amount paid as a stand by charges are also recovered by the captive consumers from the generators through the agreement signed between them.
- There is no appropriate mechanism for declaration of a captive power plant. It is being decided on the basis of the data submitted with electric inspector.

Revenue loss on account of open access

Sl. No	Particulars	FY14	FY15	FY16
1	Open access (MUs) along with captive	4466	4535	6378
2	Tariff of eligible consumers	7.71	7.71	7.71
3	Revenue loss (in Crs)	3440	3470	4920
4	Savings on account of avoided power purchase cost @ INR 2.32/ kwh (in Crs)	1030	1040	1480
5	Open access charges received (in Crs)	360	370	500
6	Net revenue loss	2050	2060	2920
7	Revenue loss due to railways			280
8	Total revenue loss due to OA (in Crs)	2050	2060	3200

Source: MoP

Regulator responsible for balancing costs and revenues for the utility – any under recovery from OA customers results in retail tariff increase across non OA customers

Key issues in open access in Gujarat

- In April 2014, STU/SLDC rejected significant number of open access applications citing constrain in upstream network due to rise in demand – Inter state impacted
- Aggrieved consumers approached GERC and some of them approached Hon'ble Gujarat HC
- In May 2014, GERC appointed Shri V. J. Talwar, Retd. Technical Member of APTEL as independent technical expert
  - Study report supported the contention of open access consumers. GERC vide its order dated January 2015 directed SLDC to grant open access to consumers
- Hon'ble Gujarat High Court appointed CEA in May 2014 to investigate
  - CEA study supported the contention of STU/SLDC and observed that the STU/SLDC is allowing short-term open access based on spare capacity after considering estimated peak loading on the network, which is appropriate approach (Consumers contested that average loading approach should be used by STU/SLDC - which would result in to more spare capacity for STOA)
  - Issue is sub-judice in the Hon'ble Gujarat high court
- As per GERC directive, GETCO/SLDC is now putting load flow study results apart from list of open access applications and its status (approved / rejected)

Discom Perspective
Issue 2:Tariff recovery – Demand charges

Consumer Category	J&K		Maharashtra		Rajasthan	
	Energy Charges (% of total Revenue)	Demand Charges (% of total Revenue)	Energy Charges (% of total Revenue)	Demand Charges (% of total Revenue)	Energy Charges (% of total Revenue)	Demand Charges (% of total Revenue)
Domestic	99%	1%	85%	15%	77%	23%
Commercial	91%	9%	86%	14%	93%	7%
Industrial (LT & HT)	84%	16%	87%	13%	85%	15%
Railways	0	0	100%	0%	81%	19%
Agriculture	93%	7%	52%	48%	83%	17%
Others	95%	5%	95%	5%	99%	1%
TOTAL	**93%**	**7%**	**84%**	**16%**	**88%**	**12%**

Consumer Category	Variable Power Purchase Cost as % of ARR		
	J&K	Maharashtra	Rajasthan
TOTAL	**33%**	**46%**	**48%**

Issue 3: Discom perspective
Managing surplus power – 98% long term PPAs

Parameter	FY15	FY16	FY17	FY18	FY19
Energy requirement (MUs)	112,986	124,689	136,038	148,144	161,321
Energy availability (MUs)	114,447	136,153	164,524	179,038	187,525
Surplus/(Shortage) (MUs)	1,461	11,463	28,486	30,894	26,204
Peak demand (MW)	17,694	19,052	20,442	22,047	23,785
Peak availability incl renewables (MW)	16,976	19,869	22,345	23,182	24,037
Surplus/(Shortage) (MW)	(718)	817	1,902	1,134	251

Source: MoP – 24*7 report for Maharashtra

No additional surcharge currently to recover the stranded costs of generation in case of customers opting for open access

Consumer perspective

Issue 5: Levels of cross subsidy

MSEDCL AcoS coverage reduction trajectory vs actual figures

	FY13	FY14	FY15	FY16		Actual FY16
LT Category	Trajectory for cross subsidies in the Roadmap					
Domestic	76%	83%	90%	98%		96%
Non Domestic	135%	120%	118%	118%		171%
Agriculture unmetered	61%	66%	72%	78%		58%
Agriculture metered	43%	47%	51%	55%		46%
Industrial	117%	117%	110%	110%		118%
HT Category						
Industrial	120%	119%	116%	111%		133%
Commercial	145%	131%	120%	120%		201%
Agriculture	63%	69%	75%	82%		60%

Industrial Tariff Vs ACoS comparison

	FY15	FY14	FY13
Himachal Pradesh	105%	106%	104%
Punjab	115%	117%	114%
Delhi	122%	129%	121%
Maharashtra	145%	131%	135%
Madhya Pradesh	124%	120%	121%
Andhra Pradesh	130%	128%	122%

- FY16: Average cost of service – INR 6.03 per unit
- FY16: Average billing rate – INR 6.15 per unit
- Cross subsidies in MSEDCL dipped in FY16 from FY15 as ACoS has dipped

Consumer perspective
Issue 5: Sample case for Express Feeder Industries

Sr. No.	Particulars	Rate (in Rs. / kWh) in 2015		
		At 11 kV & 22 kV	At 33 kV	66 kV & above
1	IEX Price	2.49	2.49	2.49
2	Regional Losses (2.04%)	0.06	0.06	0.06
3	Mah Trans Losses (3.89%)	0.1	0.1	0.1
4	Wheeling Losses (9% and 6%)	0.24	0.16	0.00
5	Regional Transmission Charges	0.25	0.25	0.25
6	Mah Trans Charges	0.26	0.26	0.26
7	Wheeling Charges	0.83	0.15	0.00
8	IEX Transaction Fees	0.02	0.02	0.02
9	Operating Charges (SLDC, NLDC)	0.15	0.15	0.15
10	Cross Subsidy Charges	1.49	1.49	1.49
11	Trading Margin	0.02	0.02	0.02
	Total Cost	**5.91**	**5.15**	**4.84**

Source: IEX PPT May 2016

Note: For FY 2015-16 Average MCP Rate is 2.49 Rs. / Unit

Consumer perspective
Issue 5: Economic benefit demonstration

Sr. No.	Particulars	Cost benefit analysis for Express feeder industries		
		At 11 kV & 22 kV	At 33 kV	66 kV & above
1	Power (in MW)	1	1	1
2	Hours	24	24	24
3	Units Consumed	24000	24000	24000
4	Discom Tariff	7.21	7.21	7.21
5	Landed IEX Price	5.91	5.15	4.84
6	Discom bill (Rs.)	173040	173040	173040
7	Net payable as per IEX (Rs)	141840	123600	116160
8	**Savings(Rs.)**	**31200**	**49440**	**56880**
9	**Savings / month**	**9.36 Lakh**	**14.83 Lakh**	**17.06 Lakh**
10	**Savings / year**	**1.12 Cr**	**1.69 Cr**	**1.96 Cr**

Consumer perspective
Issue 5: Sample case for Non-Express Feeder Industries

Sr. No.	Particulars	Rate (in Rs. / kWh) in 2015		
		At 11 kV & 22 kV	At 33 kV	66 kV & above
1	IEX Price	2.49	2.49	2.49
2	Regional Losses (2.04%)	0.06	0.06	0.06
3	Mah Trans Losses (3.89%)	0.10	0.10	0.10
4	Wheeling Losses (9% and 6%)	0.24	0.16	0.00
5	Regional Transmission Charges	0.25	0.25	0.25
6	Mah Trans Charges	0.26	0.26	0.26
7	Wheeling Charges	0.83	0.15	0.00
8	IEX Transaction Fees	0.02	0.02	0.02
9	Operating Charges (SLDC, NLDC)	0.15	0.15	0.15
10	Cross Subsidy Charges	1.09	1.09	1.09
11	Trading Margin	0.02	0.02	0.02
	Total Cost	**5.51**	**4.75**	**4.44**

Source: IEX PPT May 2016

Consumer perspective
Issue 5: Offer price from captive source

Particular	INR / kWh		
	At 11 kV & 22 kV	At 33 kV	66 kV & above
DISCOM Tariff	7.21	7.21	7.21
Less: Open Access Charges (including all charges)	1.93	1.17	0.86
Max offer price from captive sources	**5.28**	**6.04**	**6.35**

Consumer perspective
Issue 5: Cross subsidy surcharge calculation

Cross Subsidy Surcharge effective from 2012-13 to 2014-15

Consumer Category	ABR (Rs/unit)	C (Rs/unit)	WL (%)	TL (%)	L (%)	D (Rs/u)	CSS (Approved)
HT industry (Express Feeder)	7.68	5.81	0.00%	4.24%	4.24%	-	1.63
Commercial (Express Feeder)	11.59	5.81	0.00%	4.24%	4.24%	-	5.53
Railways	7.81	5.81	0.00%	4.24%	4.24%	-	1.76
LT Industrial (Above 20 kW load)	8.51	5.81	12.50%	4.24%	16.21%	1.03	0.73

Cross Subsidy Surcharge formula

Surcharge = T – [C(1+L/100) + D]

Where T is tariff of respective category, C is weighted average power purchase cost of top 5% power, D is wheeling charge and L is system loss

Cross Subsidy Surcharge effective from 2015-16

Consumer Category	ABR (Rs/unit)	ACoS (Rs/unit)	ABR-AcoS (Rs/unit)	CSS Approved @ 75%	CSS (As per formula)	Difference (Rs/unit)
HT industry (Express Feeder)	8.02	6.03	1.99	1.49	3.73	-2.24
Commercial (Express Feeder)	12.78	6.03	6.75	5.07	8.49	-3.42
Railways	8.46	6.03	2.43	1.83	4.17	-2.34
LT Industrial (Above 20 kW load)	8.47	6.03	2.44	1.83	2.28	-0.45

Cross Subsidy Surcharge formula

Surcharge = (ABR – ACoS)*0.75

The commission noted that the CSS obtained on using the previous formula yielded abnormally high values, therefore to promote OA commission adopted the above mentioned formula

...Provided that the surcharge shall not exceed 20% of the tariff applicable to the category of the consumers seeking open access...

Proposed Amendments in the Electricity Rules, 2005

Existing	Proposed
Second Proviso of Rule 3 (1) (a): In Case of plant owned by association of person, the captive user(s) shall hold not less than twenty six percent of the ownership of the plant in aggregate and such captive user(s) shall consume not less than fifty one percent of the electricity generated, in proportion to their shares in ownership of the power plant within a variation not exceeding ten percent;	Provided further - that in case of a person, association of persons, company, Special Purpose Vehicle, Partnership Firm, Body of Individuals or Body Corporate, the captive user(s) shall hold not less than twenty six percent of the ownership of the plant in aggregate and such captive user(s) shall consume not less than fifty one percent of the electricity generated, determined on an annual basis, in proportion to their shares in ownership of the power plant within a variation not exceeding ten percent;

Proposed Amendments in the Electricity Rules, 2005

Existing	Proposed
New Proviso to Rule 3(1) (a)	Provided also that the electricity consumed by the Captive consumer from the captive generating units, over and above, 51% shall also be determined on annual basis in proportion to their share in ownership of the power plant within variation not exceeding ten percent.
Definition of **Ownership** Ownership" in relation to a generating station or power plant set up by a company or any other body corporate shall mean the equity share capital with voting rights. In other cases ownership shall mean proprietary interest and control over the generating station or power plant;	Definition of **Ownership**" Ownership" in relation to a generating station or power plant set up by a company or any other body corporate shall mean the paid up equity share capital with full right such as, value of shares, sharing of profit/dividends, capital appreciation, voting rights, transfer of shares etc. In other cases ownership shall mean proprietary interest and control over the generating station or power plant;

Tariff categories & slabs

Sr. No	State	Categories (Nos.)	Sub Categories/ Slabs (Nos.)							BPL Threshold (Units)
			Domestic	Commercial / NDS	Industrial (LT+HT)^	Railways	Agriculture	Others*	**Total**	
1	Jharkhand	9	10	5	8	1	4	5	**33**	100
2	J&K	11	14	9	6	0	6	10	**45**	30
3	Rajasthan	14	8	9	7	1	4	10	**39**	50
4	Maharashtra	21	6	6	7	1	7	28	**55**	30
5	Himachal Pradesh	8	4	5	6	1	4	6	**26**	60
6	Uttarakhand	9	9	10	6	1	2	7	**35**	30
7	Delhi	12	16	4	5	1	2	18	**46**	-
8	Karnataka (BESCOM)	12	4	4	4	0	6	12	**30**	
9	Tamil Nadu	11	13	2	9	1	2	11	**38**	100
10	Chhattisgarh	18	5	4	19	1	4	4	**37**	
11	Gujarat	8	12	8	11	2	3	6	**42**	30

The no. of broad categories is varying for the sample states from 8 to 21. While the total no. of sub-categories is varying from 26 to 55

**Others includes Street Lighting, Public Water Works, Educational Institutes, Places of Worship, Temporary etc.*

^LT<11 kV and HT >= 11 kV (Note: For Jharkhand, HT also includes 6.6 kV)

Cross Subsidy Surcharge

State	Formula used	CSS* (Rs/kWh)	Remarks
Gujarat	S = T – [C / (1 - L/100) + D + R]	1.45	• NTP 2016 formula is applicable
Punjab	CSS = T – ACoS	0.89	
Haryana	CSS = VCoS - ABR of each category	0.93	• For computation of VCoS, voltage losses worked out by discom have been used and has considered only 2 categories i.e HT and LT instead of all voltage levels
Maharashtra	Surcharge = (ABR – ACoS)*0.75	1.49	• Regulations provide for CSS determination as per NTP 2005 formula but MERC has applied different formula due to high CSS as per NTP formula
Rajasthan	S = T - [C /(1 - (L/ 100)) + D]	0.13	• RERC denied revision of CSS due to unavailability of voltage wise losses and cost of supply
Karnataka	S = T - [C (1+ L / 100) + D]	0.86	• NTP 2005 formula is applicable • CSS capped at 80% of cross subsidy
Andhra Pradesh	S = T - [C (1+ L / 100) + D]	2.07	• NTP 2005 formula used for calculation of CSS • APERC has directed DISCOMs to file petitions for CSS using NTP 2016 formula
Orissa	CSS = T – Category CoS	0.95	• Regulations provide methodology for calculation of category wise cost of supply • Calculation not provide in CSS Order

*HT Industry Category 33KV

S – Cross Subsidy Surcharge
T is the tariff payable by the relevant category of consumers, including reflecting the Renewable Purchase Obligation
C - is the Weighted average cost of power purchase of top 5% at the margin excluding liquid fuel based generation and renewable power+
D is the wheeling charge+
L is the aggregate of transmission, distribution and commercial losses, expressed as a percentage applicable to the relevant voltage level
R is the per unit cost of carrying regulatory assets.
+ Definition has been changed in formula specified in NTP 2016

Review of cross subsidies ...1/2

State	FY	ABR Domestic	ABR Agri	ABR Ind	ABR Comm	ACoS	ACoS coverage Domestic	ACoS coverage Agri	ACoS coverage Ind	ACoS coverage Comm
North										
J&K	FY15	2.13	2.57	3.87	3.54	5.69	37%	45%	68%	62%
HP	FY15	4.28	5.11	5.50	5.62	5.22	82%	98%	105%	108%
Uttarakhand	FY15	3.06	1.19	4.54	4.80	4.16	74%	29%	109%	115%
Punjab	FY15	5.60	4.71	6.76	6.82	5.88	95%	80%	115%	116%
Delhi	FY15	5.44	3.15	9.02	9.98	7.38	74%	43%	122%	135%
Rajasthan	FY15	6.21	4.70	7.31	7.83	6.61	94%	67%	112%	118%
Uttar Pradesh	FY15	3.87	2.45	7.28	6.55	6.11	63%	40%	119%	107%
West										
Gujarat	FY15	3.69	1.32	5.57	4.10	5.27	70%	25%	106%	78%
Goa	FY15	1.93	1.88	4.34	3.78	3.78	51%	50%	115%	100%
Maharashtra	FY15	5.69	3.32	8.75	10.05	6.37	89%	52%	137%	158%
Madhya Pradesh	FY15	4.87	3.75	6.02	6.59	4.84	101%	78%	124%	136%
Chhattisgarh	FY15	2.99	2.54	5.42	6.27	4.40	68%	58%	123%	143%

Review of cross subsidies ...2/2

State	FY	ABR				ACoS	ACoS coverage			
		Domestic	Agri	Ind	Comm		Domestic	Agri	Ind	Comm
East										
Jharkhand	FY13	2.36	0.74	6.33	5.95	5.69	41%	13%	111%	105%
Bihar	FY15	4.50	5.96	6.39	6.95	6.46	70%	92%	99%	107%
Meghalaya	FY15	4.16	2.98	6.03	6.33	5.38	77%	55%	112%	118%
Arunachal	FY15	4.00	-	3.77	5.00	13.26	30%	-	28%	38%
Assam	FY14	5.41	5.61	6.02	7.06	6.01	90%	93%	100%	117%
Manipur	FY15	3.82	2.70	3.76	4.66	6.36	60%	42%	59%	73%
Nagaland	FY15	4.05	2.70	4.55	5.73	6.76	60%	40%	67%	85%
Mizoram	FY15	3.26	2.10	6.22	4.83	9.02	36%	23%	69%	54%
South										
Tamil Nadu	FY14	3.46	2.62	6.83	7.78	5.24	66%	50%	130%	148%
Andhra Pradesh	FY14	4.59	2.69	6.83	8.90	5.25	87%	51%	130%	169%
Kerala	FY15	3.76	2.47	6.09	9.21	5.28	71%	47%	115%	174%

Standby charges ...1/3

Scenario across States

State	Standby Charges
Gujarat	• Temporary rate of charge for that category of consumer in the prevailing rate schedule. • In cases where temporary rate of charge is not available for that consumer category, the standby arrangements shall be provided by the distribution licensee for a maximum of 42 days in a year and on payment of fixed charges of 42 days and energy charges for that category of consumer in the prevailing rate schedule
Punjab	• A CPP seeking Standby and Startup Power will pay @ Rs 20/- per KVA per month as commitment charges to be adjusted against the bill for electricity drawal. • The tariff for Standby and Startup Power will be as is applicable to LS (General Industry) consumers.
Haryana	• Distribution Licensee shall provide standby power to such open access consumer subject to availability of requisite quantum of power subject to the load shedding as applicable to other consumers of his area of supply. • For providing standby power, the distribution licensee shall be entitled to charge **applicable temporary supply tariff and other applicable charges besides PLEC**, if applicable, as determined by the Commission
Maharashtra	• Demand Charge - Additional INR 20 per kVA • Energy Charge - a) for planned outage - Retail tariff of respective category b) for unplanned – Applicable temporary Tariff
Rajasthan	• Energy Charge: 1.5 times of tariff applicable to that category • Fixed Charge: Fixed charges applicable to relevant category for minimum 42 days in a year
Karnataka	• Charges for arranging backup supply from the grid shall be payable by the open access customer in the event of failure of contracted supply to cover the risk. • The amount of back up charges shall be mutually agreed between the parties.

Standby charges ...2/3

Scenario across States

State	Standby Charges
TN	• Standby support shall not be available for the open access consumer who is not a consumer of the Distribution Licensee (a) In case of actual energy/demand drawl by the OA consumer in a billing cycle is equal to or less than the permitted energy/demand (based on contracted demand and energy or quota demand and energy as applicable), the OA consumer **shall pay at the applicable tariff rates of that category of consumer** as determined by the Commission from time to time; (b) In case of actual energy drawl/demand by OA consumer in a billing cycle is more than the permitted energy/demand (based on contracted demand and energy or quota demand and energy as applicable), payment for the energy/demand over and above the permitted energy/demand shall have to be made at **the excess energy/demand charges as specified** by the Commission for such categories of consumers in the regulation/order issued from time to time. * Stand-by charges to be as per Intra-State ABT Regulations once the same are notified by TNERC
Assam/Delhi /AP/Odisha	-
WB	• To be finalized as per PPA between the Distribution Licensee and the OA customer as per The West Bengal Electricity Regulatory Commission(Open Access) Regulations 2007
HP	• Open access consumers may get such standby power from the distribution licensee at mutually agreed terms and conditions • In case of supply of the standby power by the distribution licensee, the rate (inclusive of wheeling charges, cross subsidy surcharge, additional surcharge and energy losses) for supply of such power at consumer's premises shall not exceed 125% of the overall average rate, worked out by adopting load factor of 60%, under temporary supply tariff approved by the Commission for supply of power to the other HT consumers in the area.

Standby charges ...3/3

Scenario across States

State	Standby Charges
U.P	• The payment for mismatch between the schedule and the actual drawal shall be governed by the pricing mechanism as specified under Availability Based Tariff
Uttarakhand	• *Consumer of Licensee*: Licensee shall be entitled to collect **tariff under rate of charge** for that category of consumer in the prevailing rate schedule • *Others:* Licensee shall be entitled to collect **tariff under temporary rate of charge** for that category of consumer in the prevailing rate schedule
Madhya Pradesh	• The payment for mismatch between the scheduled and the actual drawal at drawal points shall be governed by the Balancing and Settlement Code applicable to the intra-state transactions (These are imbalance chargess, no provision for standby charges has been provided)
C.G	• Standby arrangements should be provided by the distribution licensee on the payment of charges as specified by the Commission *As per Tariff Order FY16-17* • The standby charges for consumers availing open access (using transmission and/or distribution system of Licensee) and who draw power from the grid up to the contracted capacity of open access during the outage of generating plant/CPP shall be **1.5 times** of the per kWh weighted average tariff of HV consumers, which is Rs 11.27 per kWh (1.5 times of the average billing rate of Rs.7.51 per kWh). • For drawal of power in excess of the contracted capacity of open access, the tariff for availing standby support from the grid shall be **two times** of the per unit weighted average tariff of HV consumers, which is Rs 15.02 per kWh (2 times of the average billing rate of Rs. 7.51 per kWh).

Provisions for Additional Surcharge

Legislative Provisions

Section 42 (4) of the Electricity Act, 2003 provides for the levy of Additional Surcharge and it reads as under:

"Section 42. (Duties of distribution licensee and open access):

.....

(4) Where the State Commission permits a consumer or class of consumers to receive supply of electricity from a person other than the distribution licensee of his area of supply, such consumer shall be liable to pay an additional surcharge on the charges of wheeling, as may be specified by the State Commission, to meet the fixed cost of such distribution licensee arising out of his obligation to supply."

Policy Provisions

Para 8.5.4 of NTP, 2016 discusses the applicability of Additional Surcharge and it reads as under:

"8.5.4 The additional surcharge for obligation to supply as per section 42(4) of the Act should become applicable only if it is conclusively demonstrated that the obligation of a licensee, in terms of existing power purchase commitments, has been and continues to be stranded, or there is an unavoidable obligation and incidence to bear fixed costs consequent to such a contract. The fixed costs related to network assets would be recovered through wheeling charges."

Regulatory Provision - Rajasthan

RERC Open Access Regulations, 2016 also discusses additional surcharge

"17. Additional Surcharge

(1) A consumer availing open access and receiving supply of electricity from a person other than the Distribution Licensee of his area of supply shall pay to the Distribution Licensee an additional surcharge, in addition to wheeling charges and cross subsidy surcharge, to meet the fixed cost of such Distribution Licensee arising out of his obligation to supply as provided under sub-section (4) of section 42 of the Act."

Additional Surcharge

State	AS (Rs/kWh)	Comments/ Methodology
Gujarat	Rs. 0.49/kWh	• **Step 1:** Stranded power purchase cost is calculated based on generation backed down (MW) and fixed cost per (MW) • **Step 2:** Demand charges (retail tariff) less transmission & wheeling charges are calculated • **Step 3:** Additional Surcharge is determined as difference between Stranded power purchase cost (as per Step 1) and Proportionate Demand Charges (As per Step 2) • **Step 4:** Additional surcharge per unit (of Open Access) is calculated
Haryana	Rs. 0.50/kWh	• Block wise generator wise surrender power vis-à-vis open access quantum has been considered for 8-9 days of each month • Average back down per time block per month has been considered
Maharashtra	Nil	• MSEDCL claimed additional surcharge of Rs 1.60/kWh in its Petition • MSEDCL calculation basis – Generation backed down (MU) x Per Unit power purchase cost (Rs/kWh) • MERC denied Add. Surcharge stating the need for conclusive evidence that stranded power can be attributed to OA consumers
Rajasthan	Rs. 1/kWh	• Quantum of stranded power determined on the basis of aggregated daily minimum of backed down power and open access power • Average monthly billed per unit fixed cost is applied to quantum of stranded power
Karnataka	-	• To be determined on case to case basis
Punjab, AP, Odisha	Nil	-

Case study 1: Rajasthan ...1/3

Methodology for Computation - Additional Surcharge

Step 1: Compute Quantum of Stranded Power for each time block each day = A

- Calculate power surrendered, including box-up and back-down, from individual generators for each of the 96 time blocks for each day
- Unavailability of stations due to reasons attributable to generator (breakdown/shutdown) are not to been considered
- If any station was boxed up and replaced with short term RTC power to take advantage of lower prices available in short term market, such box up should not been considered as stranded power

Step 2: Compute Net OA Quantum = B

- Compute net quantum of power procured through Open Access for each of the 96 time blocks for each day
- Net Open Access = Total Open Access – Open Access drawl of Discom

Step 3: Compute Power Stranded due to Open Access = Min (A,B) = C

- Minimum of power surrendered and net open access for each of the 96 time blocks for each day is computed
- Total of such minimum be considered as power stranded due to OA over the period in consideration (1 year)

Minimum of Quantum of Stranded Power and Open Access has been considered as stranded power due to open access as:

- *if stranded power > net open access quantum, atleast power equivalent to OA demand would have not been stranded if consumers would have taken supply from Discom,*
- *If stranded power < open access quantum, then Discom would have been able to fulfil demand upto stranded power only*

Case study 1: Rajasthan ...2/3

Methodology for Computation - Additional Surcharge

Step 4: Compute Effective Fixed Cost per unit of Stranded Power = D

- Weighted average fixed cost per unit based on the actual charges paid to generating station against fixed charges and the quantum of energy drawn from each station is computed

  Since, the quantum of power surrendered every day is not from a specific power plant, and fixed cost associated with every power plant is different, effective fixed cost per unit has been calculated

Step 5: Additional Surcharge Recoverable C x D = E

- Effective per unit fixed cost multiplied with power surrender attributable to open access
- Based on projections of sales through open access for the period of levy of additional surcharge, per unit additional surcharge to be recovered is computed

Case study 1: Rajasthan ...3/3

Computation of Additional Surcharge

1st April	A = Total Backdown (MW)	B = Open Access (MW)	C = Backdown due to Open Access Min (A,B)
00:15	999	661	661
00:30	999	661	661
00:45	500	671	500
For all other time block			
Total MU	Sum (Above) / 4000	Sum (Above) / 4000	Sum (Above) / 4000

Daily details to be consolidated for each month to arrive at Additional Surcharge

Month	D* = Total Backdown (MU)	E** = Open Access (MU)	F^ = Backdown due to Open Access	G = Effective Fixed Cost (Rs./kWh)	H = F x G = Additional Surcharge (Rs. Cr.)
April	496	461	313	2.69	84.12
May	419	545	321	1.97	63.39
June	446	377	242	1.56	37.63
July	679	394	299	2.49	74.70
August	686	472	346	2.17	75.06
September	384	347	213	1.38	29.42
October	508	445	309	1.46	45.00
November	407	410	255	1.65	42.06
December	425	485	300	1.81	54.27
January	376	428	253	1.32	33.54
Total	4826	4363	2852		539

D* = Total of A over 96 blocks for each day in a month
E** = Total of B over 96 blocks for each day in a month
F^ = Total of C over 96 blocks for each day in a month

All Details for Illustration purpose only

Petition No. 279/RC/2015 Date of Order : 10.3.2016

Power Exchange India Limited, has filed a petition seeking direction to SLDC to issue Exchange Neutral No Objection Certificate/Prior Standing Clearance in accordance with Regulation 8(2) of the CERC (Open Access in inter-State Transmission) Regulations, 2008 and Format-PX-I of the Detailed Procedure.

The Commission held that

- The intent of the regulation is clear that SLDCs are required to grant Exchange neutral NOC / Prior Standing Clearance to State Utility or an intra-State entity intending to participate in trading through Power Exchange(s). Since No Objection Certificate/Prior Standing Clearance is required for trading in the Power Exchanges
- As regards the practice of issuing Exchange neutral NOCs with a covering letter specifying trading on a particular Exchange, we are of the view that such practice is in contravention of the 2008 Open Access Regulations and should be discontinued forthwith.
- SLDCs are statutory bodies discharging statutory functions vested under the Act and the Regulations issued by the Central Commission and respective State Commission. They should be impartial, neutral and fair in their dealings.
- Accordingly, directed all SLDCs to ensure that Exchange Neutral NOCs are issued for trading in the Power Exchanges in terms of the Regulation 8 (2) of the 2008 Open Access Regulations, and Format PX (1) of the Detailed Procedure in letter and spirit while granting No Objection Certificate or Prior Standing Clearance for participating in the Power Exchange.

CERC Order – Open access matters ...1/4

Order Dated 2.11.2015 in petition No. 74/MP/2014

The petitioner, Bhushan Steel and Power Limited has filed this petition under section 79(1)(f) of the Electricity Act, 2003 read with Regulation 32 of the Connectivity Regulations, 2009 seeking directions to WBSLDC and WESETCL to grant concurrence for the long term access in terms of its application dated 30.4.20013.

The Commission after hearing the parties held that since the dispute has arisen on account of non-response of WBSETCL/WBSLDC to the application of the petitioner for inter-State long term access, the dispute falls under the jurisdiction of the Commission and the petitioner has rightly invoked the jurisdiction of this Commission.

Further, the Commission observed that WBSLDC/WBSETCL/WBSEDCL is required to discharge their statutory duties in compliance with the Connectivity Regulations and WBERC OA Regulations. However, they have not communicated their decisions on the application of the petitioner as per the aforesaid regulation which is a clear violation of the statutory requirements and their attempts to justify their non-compliance with the statutory regulations needs to be viewed seriously. The statutory authorities and regulated entities are under statutory obligations to act strictly in accordance with the regulations, in this case the Connectivity Regulations and WBERC OA Regulations.

The Commission further observed that considering the status of the petitioner as a consumer of WBSEDCL with a sanctioned load of 14.9 MVA, the petitioner's application for open access for 14.9 MVA power cannot be rejected by the respondents on the ground of transmission constraints as the petitioner's requirement is accommodated within the existing transmission and distribution system.

The petitioner is entitled to grant of concurrence subject to fulfilment of the other requirements of Regulation 10(2) of Connectivity Regulations namely. Accordingly, the Commission directed the respondents to grant concurrence to the petitioner for 14.9 MVA after satisfying themselves regarding fulfilment of the requirements to enable the petitioner to apply for LTA.

The Commission further directed that this order shall be complied with within a period of 15 days from the date of issue of this order.

CERC Order – Open access matters ...2/4

Order dated 10.6.2016 in petition no. 163/MP/2012:

- The petitioner, Bhushan Steel and Power Ltd., has filed the present petition under clause (f) of sub-section (1) of Section 79 of the Electricity act, 2003 (hereafter „the Electricity Act"), with the following prayers: "(a) Direct Respondents Gridco & OPTCL to release the payment of `5,75,76,584 along with interest @ 18% per annum calculated from the due date of pending UI bills and up till the actual payment thereof; and (b) Pass such other and further order(s) as this Hon'ble Commission may deem appropriate under the facts and circumstances of the present case."

Whether the petitioner is entitled for UI charges for over-injection during the period 28.8.2005 to 31.12.2006?

- GRIDCO was under statutory obligations to segregate the UI charges among the various embedded customers in the State who have participated in the transactions involving inter-State short term open access. ... The Short Term Open Access Commercial Agreement between the petitioner and GRIDCO contained a framework dealing with the commercial and operational aspects of the transactions of the petitioner as an embedded customer. ... the petitioner is entitled to receive and GRIDCO is under an obligation to pay the UI charges for the over-injection of power by the petitioner during the period 28.8.2005 to 31.12.2006.

Whether any case of gaming is made out against the petitioner?

- ... merit in the petitioner"s contention, as over-injection during non-peak hours (low UI rates) is more than twice the petitioner"s over injection during peak hours (high UI rates). ... of the view that the charge of gaming is **not established** against the petitioner.

Relief to be granted to the petitioner

- In the absence of gaming, the petitioner is entitled to receive the UI amount of `2,94,27,375 as determined by ERPC in its report dated 16.9.2014. The petitioner shall also be entitled to 9% simple interest per annum on the said amount from the date of filing of the petition before the Commission i.e. 23.7.2012 till the date of payment.

CERC Order – Open access matters ...3/4

Order dated 13.6.2016 in petition no. 121/MP/2015:

The petitioner, ITC Limited, has filed the present petition challenging denial of short term inter-State open access for the months of September 2014 and April to July 2015 and raising several issues arising out of denial of open access and relating to grant of open access.

Whether a specific format or procedure is required for applications for short term inter-State open access for energy transfer from a captive generating plant for captive consumption in an industrial unit of the very same owner of the captive generating plant?

... the formats applicable for bilateral transactions shall be used for grant of short term inter-State open access for transfer of power from captive generating plant for captive consumption by the captive users. The petitioner had applied on these formats and the petitioner"s applications had been processed by AP-SLDC and TS-SLDC on the basis of these formats.

Whether concurrence of SLDC is required for grant of open access for captive generation and captive consumption?

It is clarified that captive generator would also be required to seek open access in terms of the provisions of 2008 Open Access Regulations as applicable to other generating companies.

Whether the petitioner, a Wind Generator, seeking inter-State Open Access is required to submit UI undertaking as required by AP-SLDC and TSSLDC?

Since, the State Commissions have not specified charges for deviation from schedule in respect of short term transactions, therefore, the provisions of 2008 Open Access Regulations shall be applicable in the present case. We direct AP-SLDC and SLDC, Telangana to correctly implement the Open Access Regulations of this Commission as well as the respective State Commissions for facilitating nondiscriminatory open access as enshrined in the Electricity Act, 2003.

CERC Order – Open access matters ...4/4

Order dated 13.6.2016 in petition no. 121/MP/2015: (continued)

Whether the respondents have dealt with the applications of the petitioner in accordance with the provisions of the Act and applicable Regulations? We are of the view that SRLDC should have acted in accordance with the provisions of the 2008 Open Access Regulations considering the lack of response by AP-SLDC as deemed concurrence. In our opinion, SRLDC has failed to comply with the provisions of provisions of 2008 Open Access Regulations in letter and spirit.

Whether the rejection of concurrence for inter-State Open Access by APSLDC for the months of April and May, 2015 on grounds of compliance with 5.2(j) of Grid Code is in accordance with law? As per the above provisions, no user shall suddenly reduce his generating unit output by more than one hundred (100) MW (20 MW in case of NER) without prior intimation to and consent of the RLDC. Since, the installed capacity of the petitioner"s plant is 46 MW, provisions of Regulation 5.2(j) of the Grid Code is not applicable to it. Therefore, the rejection of concurrence for inter-State Open Access for the months of April and May, 2015 by AP-SLDC on grounds of non-compliance with the provisions of Regulation 5.2(j) of the Grid Code is contrary to the Grid Code.

Whether the petitioner is required to separate Wind Turbine Generators (WTGs) for intra-State and inter-State Open Access? Therefore, the petitioner"s power is to be allocated from 33/132/220 kV sub-station of APTRANSCO for the purpose of intra-State and inter-State open access. We are of the view that AP-SLDC should allocate capacities but not WTGs for inter-State and intra-State open access and necessary accounting scheme should be finalized in consultation with SLDC in this regard.

Whether the petitioner is required to do scheduling and forecasting of power from wind power projects? The State Electricity Regulatory Commissions are requested to implement these regulations to ensure grid integration of huge renewable resources to be connected to grid in next 5 to 7 years. Keeping in view the above, we direct all wind generators to carry out forecasting/scheduling as per applicable Regulations. We further direct SLDC/RLDC to seek forecast/schedule for wind generation as per applicable Regulations.

Relief to be granted to the petitioner by way of compensation for the loss sustained on account of the stranded energy under distress sale to APDISCOMs of the period from 1.9.2014 to 19.4.2015 and further for the period thereafter till such open access is made available?

... the petitioner should approach the State Commission for appropriate direction in this regard.

Report

on

Scheduling, Accounting, Metering

and

Settlement

of

Transactions in Electricity

(SAMAST)

July 2016

SAMAST

as adopted by the

Technical Committee of the

Forum of Regulators

on 15 July 2016

Terms of Reference of the Sub-committee

- Evolve detailed action plan with time lines for implementation of ABT/DSM at State level
- Suggest modification of all technical and accounting procedures as may be necessary for rolling out ABT/DSM framework
- Assist in drafting of requisite State regulations, or amendments to existing regulations, as the case may be
- Submit report on the progress of the sub-group to the Technical Committee of States every two months

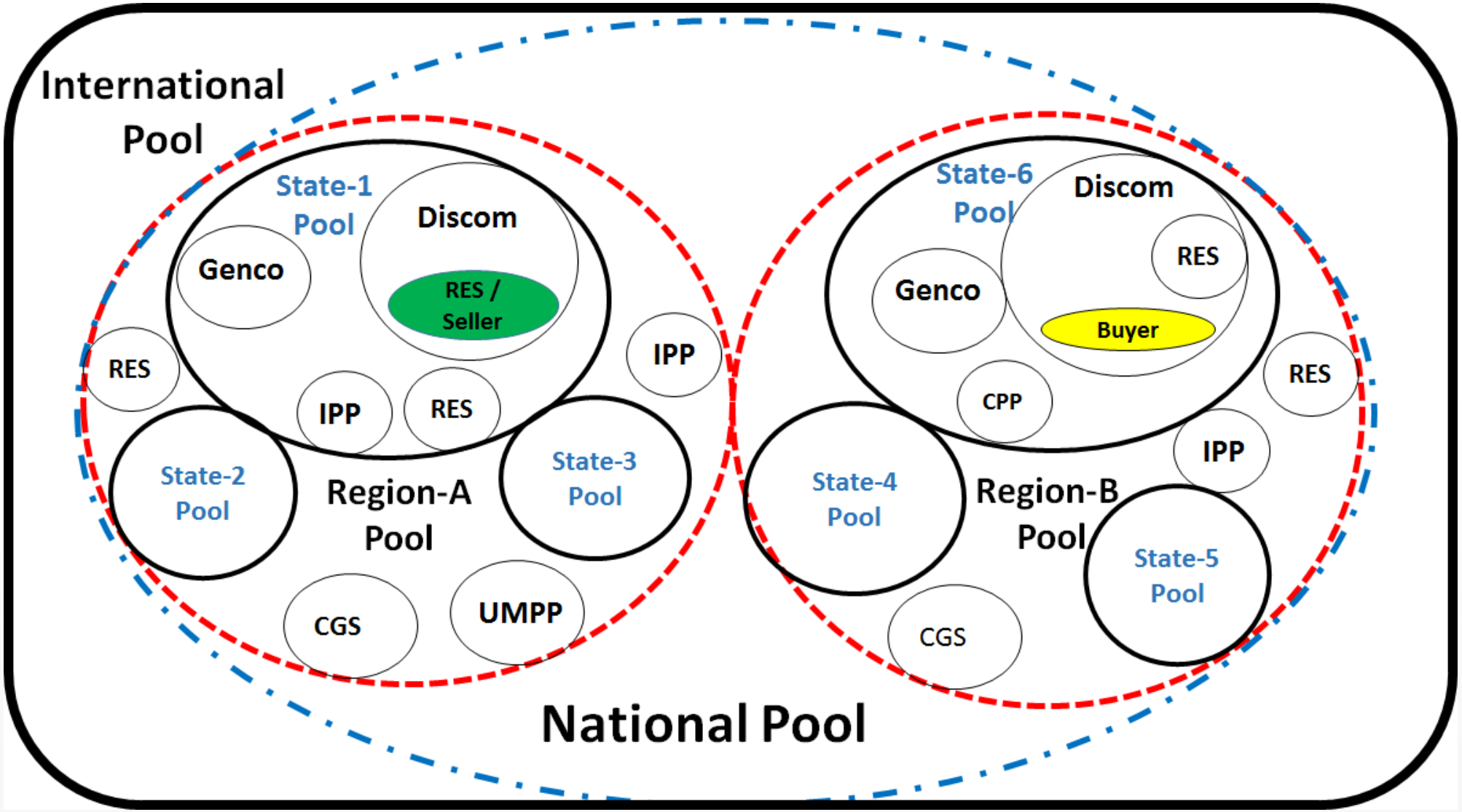
Chronology

- 18-Nov-2015: Constitution of the Technical Committee
- 16-Dec-2015: 1st meeting of the Technical Committee
- 08-Jan-2016: 2nd meeting of the Technical Committee
- **20-Jan-2016 : Constitution of the sub-committee**
- 23-Jan-2016: Interaction with SLDC Maharashtra
- 30-Jan-2016: Interaction with SLDC Tamil Nadu
- **10-Feb-2016: Presentation of the preliminary findings during the 3rd meeting of the Technical Committee**
- 15-Feb-2016: Interaction with SLDC Karnataka
- **02-Mar-2016: Presentation in 16th FOLD meeting**
- 10-Mar-2016: Interaction with SLDC Delhi
- 10-May-2016: Interaction with SLDC Gujarat
- 12-May-2016: Interaction with SLDC Madhya Pradesh
- 27-May-2016: Interaction with SLDC Telangana
- 27-May-2016: Interaction with SLDC Andhra Pradesh
- **01-Jun-2016: Presentation of Interim Draft Report during 4th meeting of the Technical Committee**
- 09-Jun-2016: Interaction with SLDC West Bengal
- 10-Jun-2016: Interaction with SLDC Rajasthan
- 20-Jun-2016: Interaction with SLDC Meghalaya
- 20-Jun-2016: Interaction with SLDC Assam
- **22-Jun-2016: Presentation of Interim Draft Report in 17th meeting of FOLD**
- 23-Jun-2016: Interaction with SLDC BBMB
- **15-Jul-2016: Presentation of the Final Report during 5th meeting of the Technical Committee**
- 22-Jul-2016: Presentation of the Report in FOR meeting

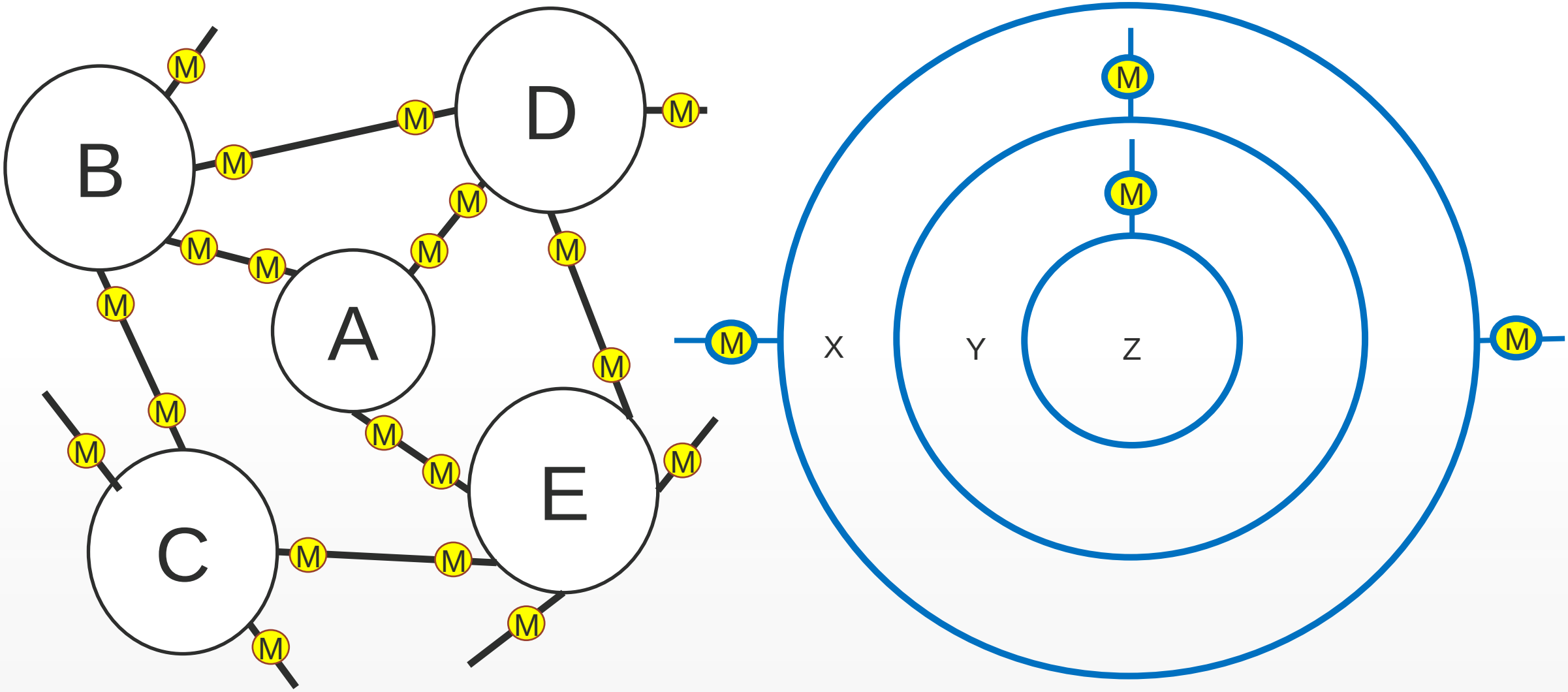
Consultations

- Guidance from the Technical Committee
- One to one interaction with SLDC of 13 States : 6-Renewable-rich, 7-Others
- All Regions covered in one-to-one interactions with SLDCs
  - SR: 4 , WR : 3, NR : 3, ER : 1, NER: 2
- Electronic Survey: 28 Responses
- Discussions in FOLD : 16th & 17th meeting
- Discussion with RLDCs and NLDC through Webgroup- “EMASS of India”
- Sounding board: Expert Audit Groups
  - Metering and Settlement, Interchange Scheduling
- Guidance from published literature : 42 references

Emerging Challenge

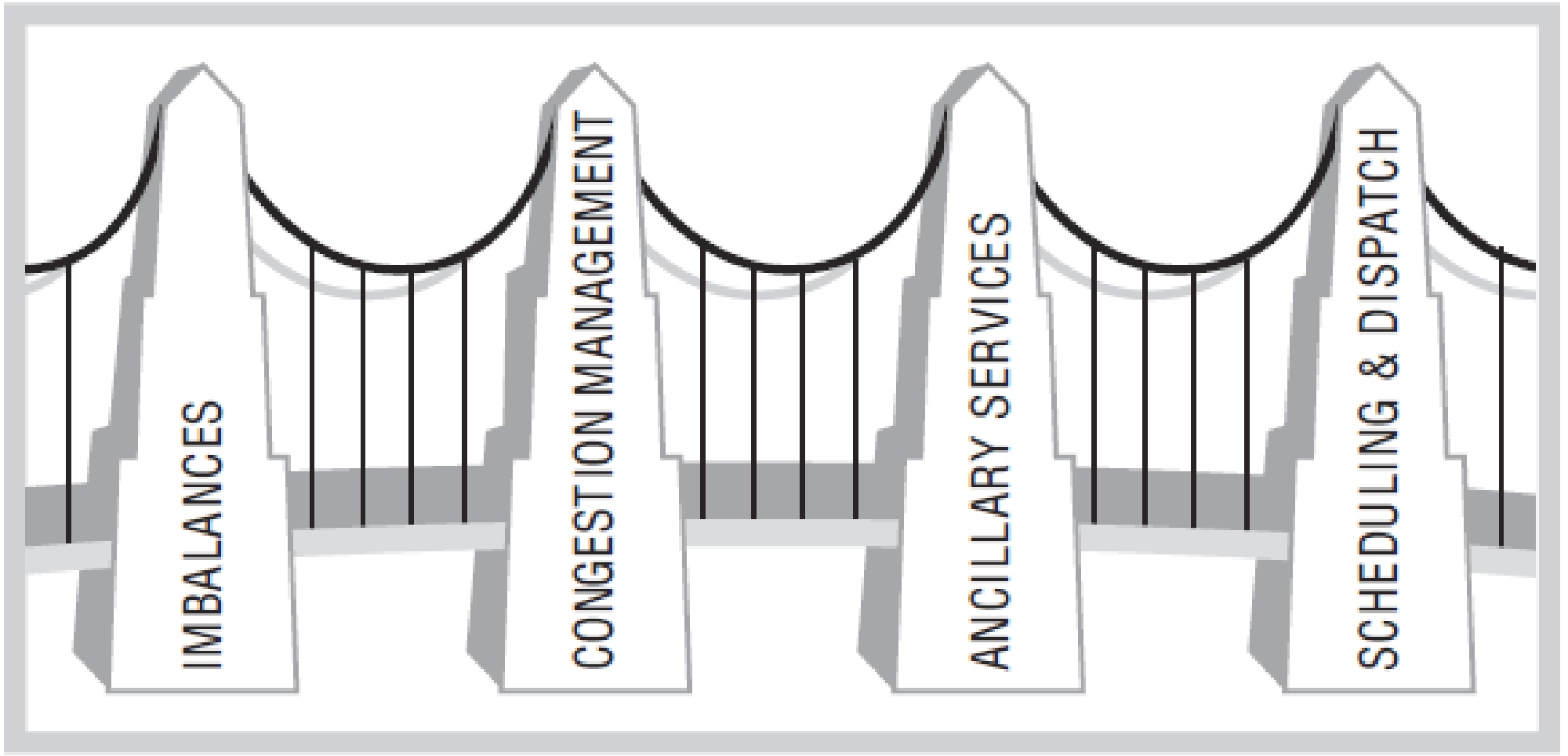


Control Area Demarcation for RES and STOA Customers



Source : “Control Area Trends: Principles and response”, Larry R. Day

Four Pillars of any Electricity Market

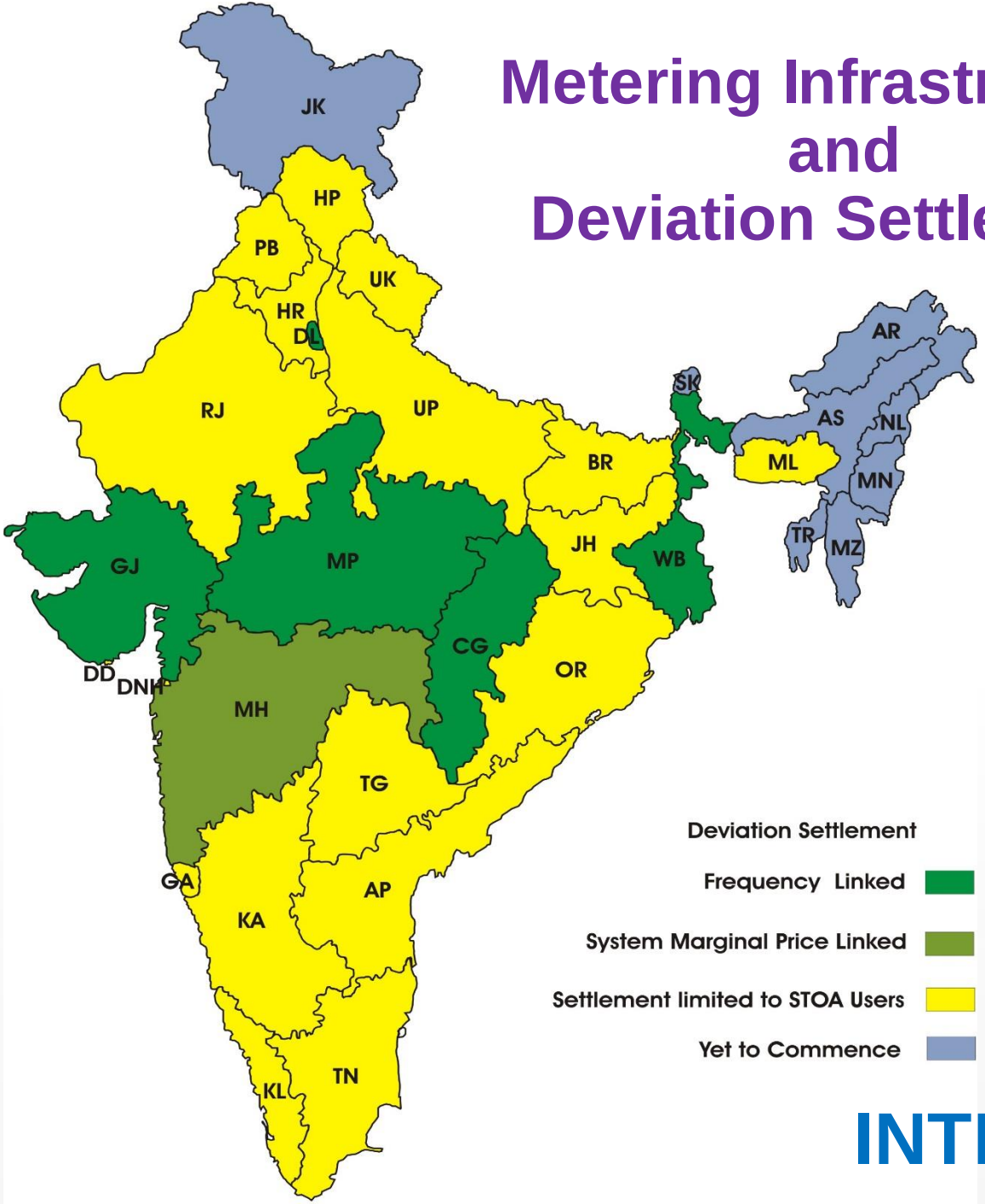


Source: "Competition and Choice in Electricity" by Sally Hunt

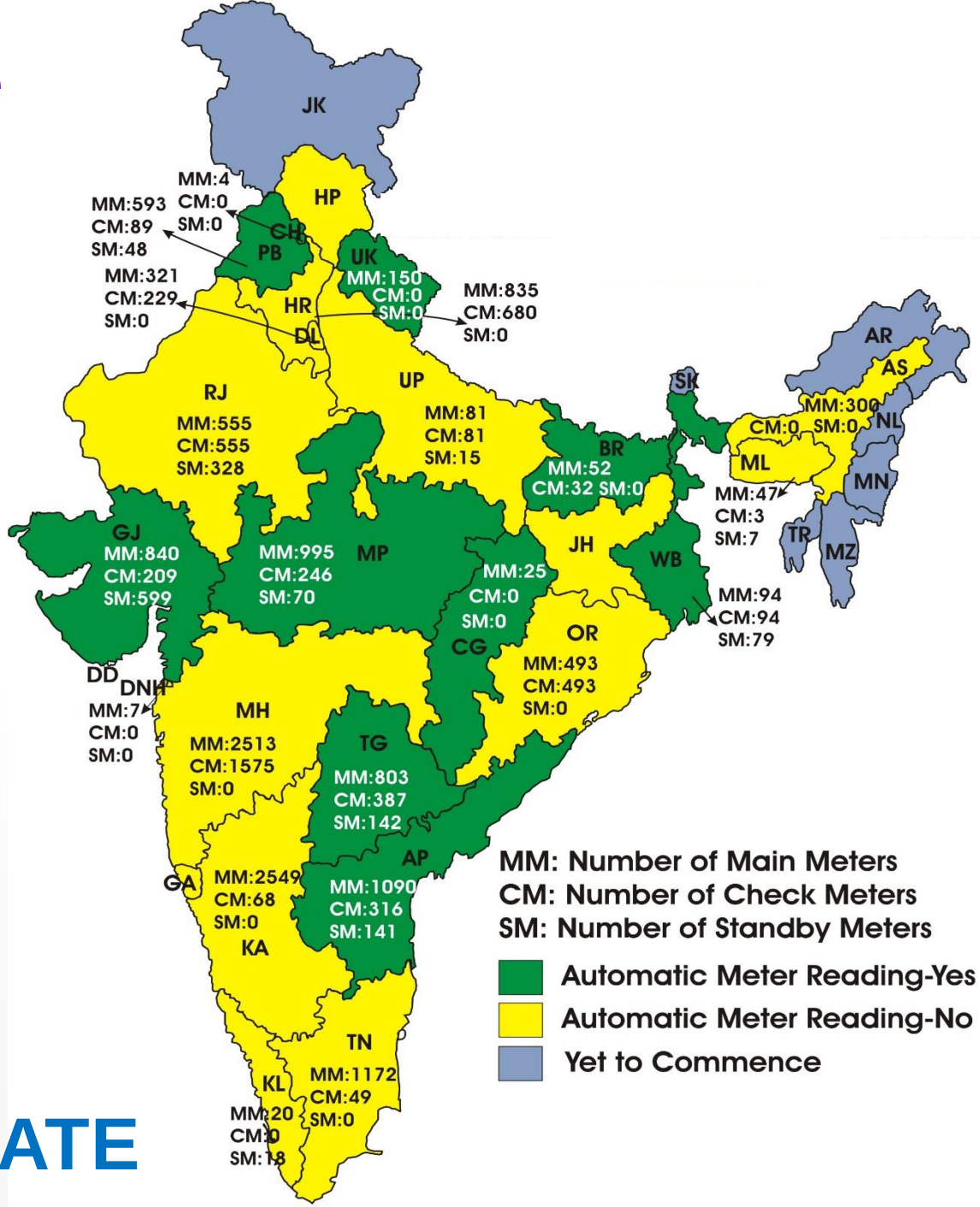
Mandate for Intra State SAMAST

- Section 28 and 32 of Electricity Act 2003
- Section 5.7.1 (b) of National Electricity Policy 2005
- Section 6.2 (1) of Tariff Policy 2006 & 2016
- Recommendations of the Forum of Regulators – June 2006 and 2008
- Regulation 6.4.1 of Indian Electricity Grid Code 2010
- Recommendations of Niti Ayog for Renewable Integration – Feb 2015, Dec-2015
- Para 2.3.2 of the Pradhan Committee – 2008
- CERC Order on Roadmap for Reserves – Oct 2015
- CERC Framework for Forecasting, Scheduling & Imbalance Handling for RES- Aug 15

Metering Infrastructure and Deviation Settlement



*Map not to scale



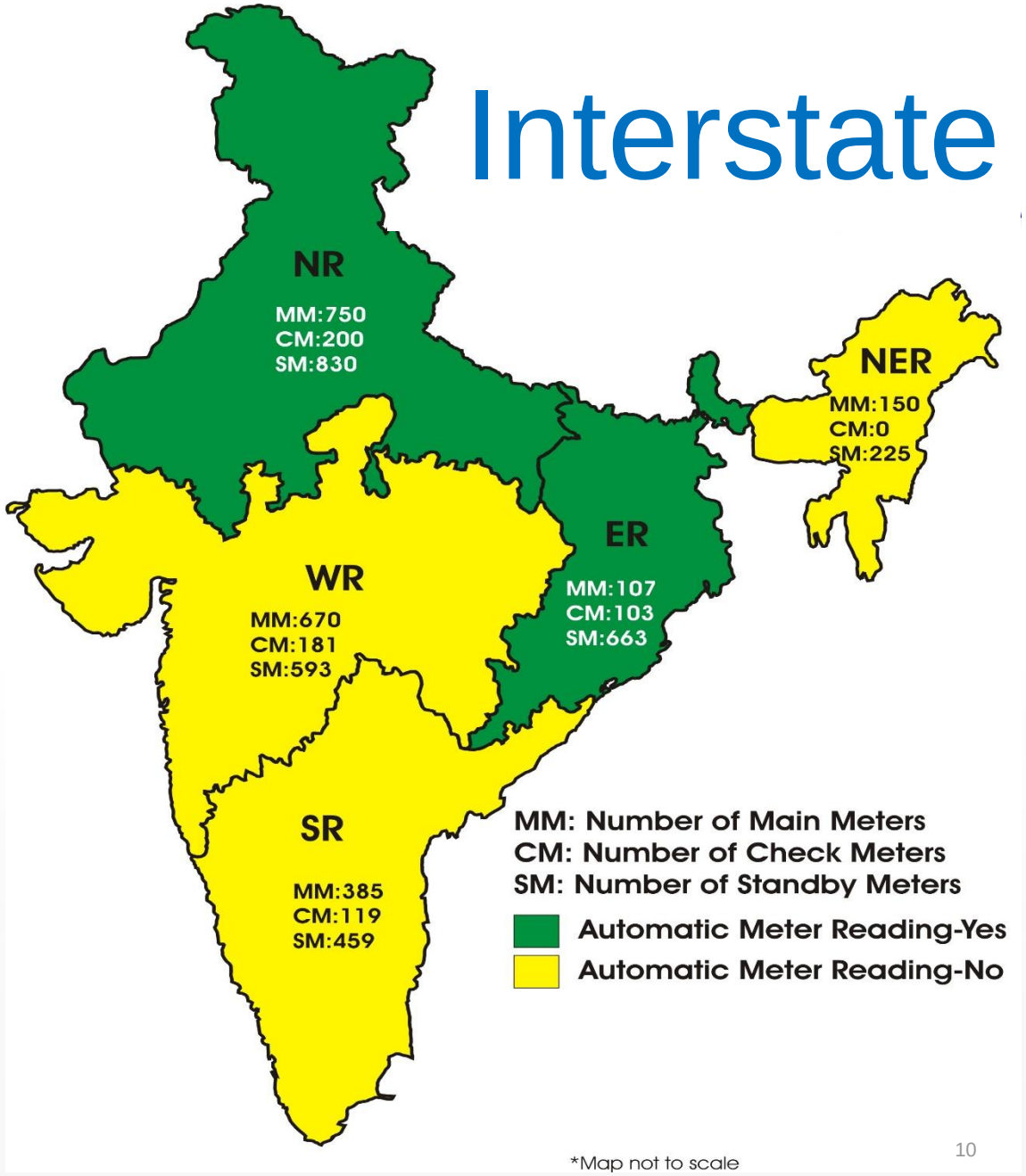
*Map not to scale

INTRA STATE

Interstate Metering and Deviation Settlement

3261 : Interface points
5435 : Interface Energy Meters
0.2s : Accuracy Meters
189 : Active Pool members
Accounts Settled in 21 days
~ Rs.200 Crore settled weekly

STOA and Ancillary Services functioning on
- Two-part ABT
- Multi-part settlement
- Maker-Checker
- Transparency



Summary - Survey Response from 8 SLDCs

States / UT / Area

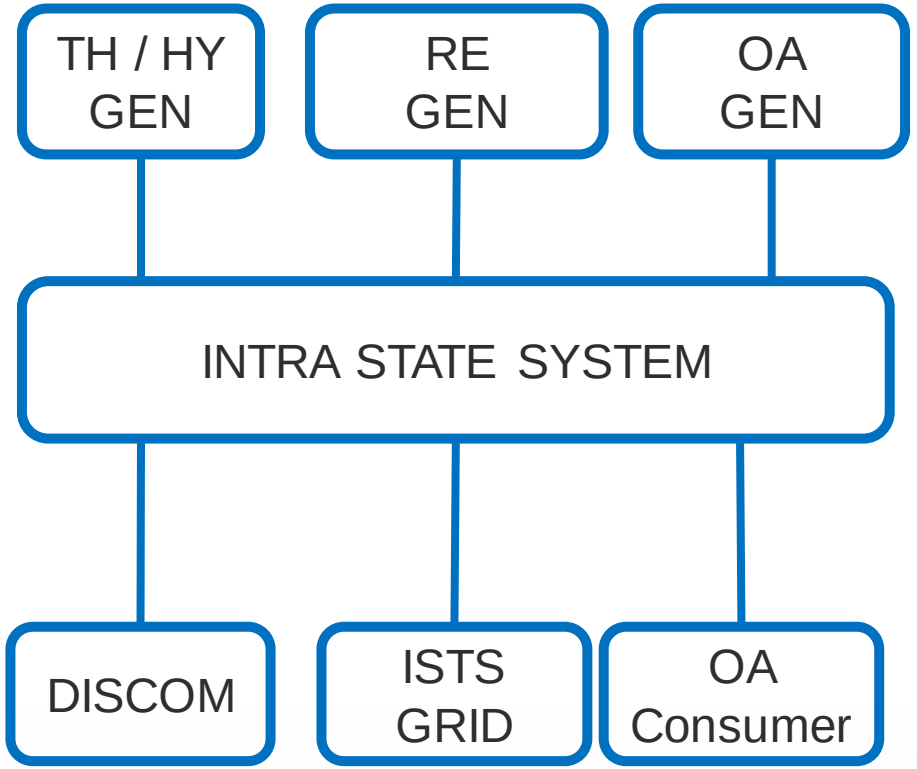
- Group-A : Deviation Settlement for all Intra State Entities
- Group-B : Settlement only for IPPs or STOA customers having interstate trade
- Group-C : Draft regulations notified, actions initiated
- Group-D : To commence from scratch

Common Challenges

- Control Area demarcation for RES / STOA customers, Accountability of Entities
- Load and RE Forecasting, Scheduling of RES / Conventional generators
- Inadequate Metering, Meter data collection / management / Utilization
- Legacy systems and procedures for energy accounting
- Inadequate IT infrastructure – Software and Hardware
- Inadequate Human Resource

Recommendations-1

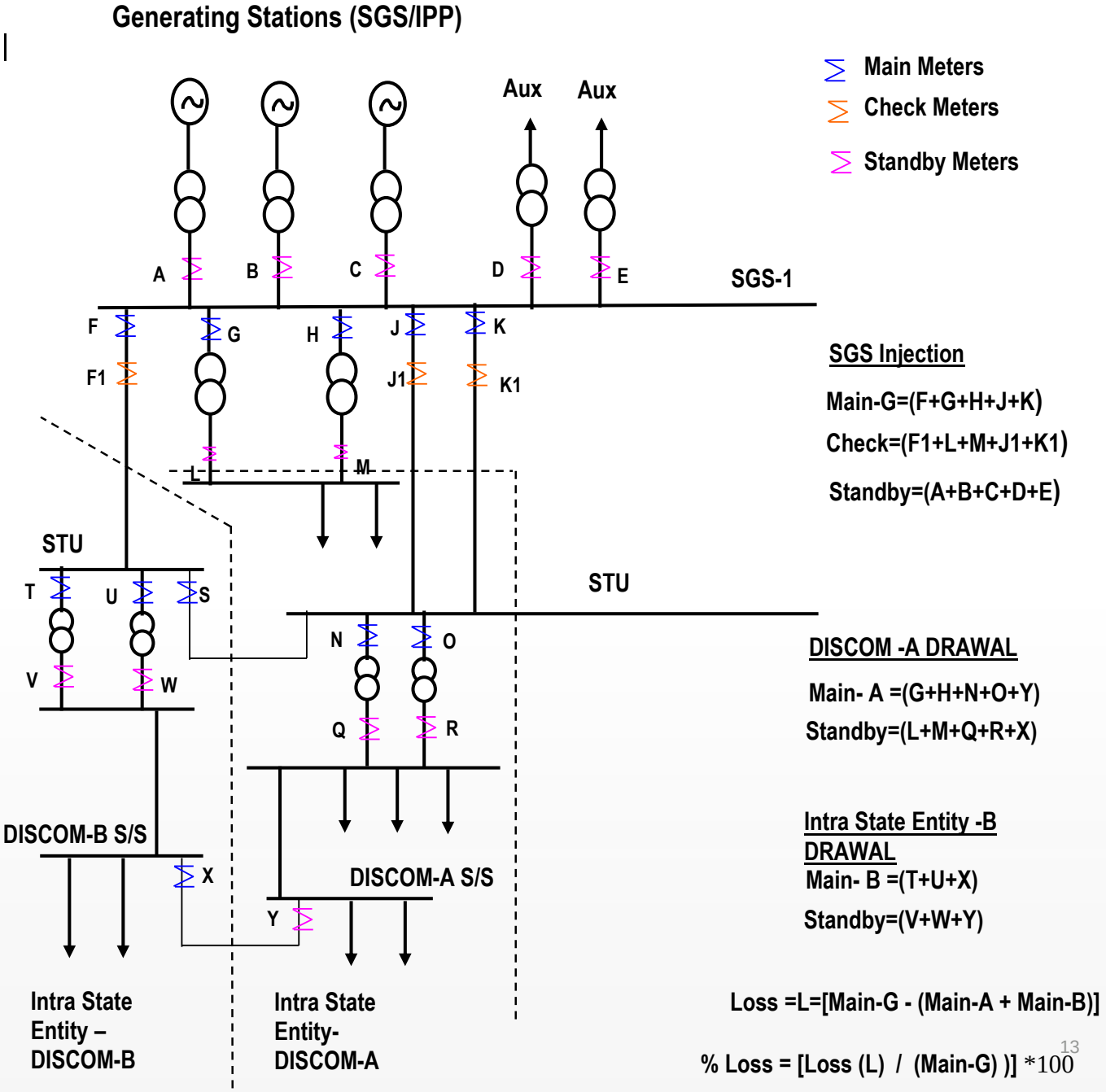
- Demarcation of Interface boundary & identification of Pool Members
- Adequate Interface Energy Meters (5-min) with AMR infrastructure
- Sacrosanct Ex-Ante Schedule
- Energy Book keeping in line with the basic accounting principles
- Each intra State Entity separately accountable for deviation
- Simple, robust, scalable but dispute-free Settlement System
- Administration of transmission losses
- Reactive Energy Pricing
- Transparency, Integrity and Probity of Accounts



% Transmission Loss =

(Total Injection Minus Total Drawal) x 100

Total Injection



Recommendations-2

- Governance Structure
- Adequate Human Resource at SLDC
  - 30 exclusively for Market Operation
  - 7 for SLDC IT team
- Adequate IT Infrastructure – Hardware and Software at SLDC

- Centre for Power Information Technology Services
- STOA Registry and Clearing Agency
- Distribution System Operators

Roadmap

S No.	Days from Zero date	Activity / Milestone
1	90	Detailed Project Report, Stakeholder Workshop
2	120	Approval of State specific SAMAST scheme by SERC
3	120	Forecasting and Scheduling, Formation of State Power Committee, State Pool Account
4	150	Application for funding from PSDF
5	210	Placement of Award and Deployment of adequate HR at SLDC
6	225	Implementation of IT –hardware infrastructure
7	240	Complete Boundary Metering with AMR system
8	300	Implementation of IT –software infrastructure
9	345	Preparation of Energy Account and Stakeholder workshop
10	365	Quarterly Reconciliation and Peer Review of Accounts

Way Forward

- The Technical Committee adopted the report on ‘SAMAST’ in its 5th meeting on 15th of July 2016 and endorsed it to the Forum of Regulators for acceptance
- STU / SLDC to prepare Detailed Project Report and request for funding from PSDF for roll out of ‘SAMAST’ at the State level under the direction of the State Electricity Regulatory Commission

Thank you !

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