

**MINUTES OF THE TWENTY SIXTH MEETING**  
**OF**  
**FORUM OF REGULATORS (FOR)**

**Venue : "Conference Hall"**  
**The Destination Resort, Chandigarh-Shimla Highway**  
**Kandaghat, Dist. Solan (Himachal Pradesh).**

**Dates : 09<sup>th</sup> – 10<sup>th</sup> October, 2011**

The meeting was chaired by Dr. Pramod Deo, Chairperson, CERC/FOR.  
The list of participants is at **Annexure-I**.

Shri Rajiv Bansal, Secretary, Central Electricity Regulatory Commission (CERC) and Forum of Regulators (FOR) extended a warm welcome to all members of Forum. Dr. Pramod Deo, Chairperson, welcomed Shri Anand Kumar, Chairperson, Meghalaya State Electricity Regulatory Commission (MSERC), who attended the FOR meeting for the first time after assuming charge of his office.

The FOR thereafter took agenda items for consideration.

**Agenda Item No. 1: Confirmation of the Minutes of the 25th Meeting of “FOR” held on 29<sup>th</sup> July, 2011 at Surajkund, Delhi-NCR, Faridabad (Haryana).**

Shri Rajiv Bansal, Secretary, CERC/FOR briefed the Members about the action taken on the decisions of the last meeting. The Forum noted and endorsed the minutes of the 25<sup>th</sup> Meeting of FOR held at Surajkund, Delhi-NCR, Faridabad (Haryana) on 29<sup>th</sup> July, 2011 as circulated. The Forum also noted the Action Taken Report as contained in Appendix-II of the Agenda Note. After discussion, the minutes were confirmed.

Chairperson, CERC/FOR informed that a presentation was made before the Shunglu Committee on the "Model Tariff Regulations" evolved by the Forum of Regulators (FOR). Shri V.K. Shunglu and some of the Members of the Committee were present. The efforts of FOR in evolving consensus on such an important issue were appreciated. The need for allowing the costs incurred by the distribution company was reiterated by Shri Shunglu. The concept of circle-wise distribution loss surcharge was also endorsed. It is understood that the banks have been advised informally not to lend to the distribution companies to meet their operating loss. It is expected that these measures will bring about the desired discipline in all stakeholders including the State Governments and in the long run ensure financial viability of the distribution companies.

**Agenda Item No. 2 :                      National Transmission Pricing Framework.**

Chairperson, CERC briefed the Forum about the objectives behind the National Transmission Pricing Framework which has been introduced by the Central Electricity Regulatory Commission (CERC) from 01<sup>st</sup> July, 2011. He informed that New Transmission Pricing Framework has been designed keeping in view the mandate of the National Electricity Policy and Tariff Policy and the requirement of emerging issues around the mandate of the Commission to develop Power Market. As is obvious in introduction of any new concept, implementation of New Transmission Pricing mechanism has also thrown up certain issues.

Necessary clarifications have already been issued by the National Load Despatch Centre (NLDC) which is the Implementing Agency. He mentioned that the problems around wide variation in the incidence of charges have already been addressed through 50% uniform charge method and also through slabbing. The idea of detailed discussion on this issue is to apprise the State Regulators about the progressive features of the new methodology. This is important as the Tariff Policy mandates State Regulators to implement similar pricing methodology at State level as well.

Two presentations were made - One by Shri Sushanta K. Chatterjee, Deputy Chief (RA), CERC highlighting the overarching philosophy behind the new Transmission Pricing and the other by Shri S.K. Soonee, CEO, POSOCO (the Implementing Agency). Shri Chatterjee explained the underline need for the New Transmission Pricing Framework. The pre-existing Regional Postage Stamp method, he argued is no longer adequate to meet the future challenges arising out of the developments like setting up of UMPPs, need for sharing of high capacity corridor charges, competitive bidding requirements, evolution of concept of National Grid and Open Access. New Transmission Pricing is thus a necessity rather than a choice. It also, in true spirit of the Act and Policy corrects the infirmity caused by cross subsidization of the earlier method and renounces the myths that addition of new line/inter regional link does not benefit a particular stakeholder. In the emerging context of National Grid, addition of line/inter regional link benefits every grid constituent by way of reliability and prospect for trade. A copy of the presentation made by Shri Chatterjee is **enclosed** at **Annexure – II.**

A detailed presentation was made by Shri S.K. Soonee, CEO, POSOCO the Implementing Agency) for the National Transmission Pricing. He took the Forum through the various phases of evolution of the Transmission system Planning and consequent Transmission Pricing and also apprised them about the drivers of change leading to the present Point of Connection (PoC) Transmission Pricing Methodology. He explained in detail how the New Transmission Pricing Framework is sensitive to distance, direction and quantum of flow as per the requirement of the National Electricity Policy and Tariff Policy. He underscored that distance in this context is electrical distance and not necessarily the physical distance as electricity flows by laws of physics and not by contract path. Direction sensitivity is captured by separate PoC rates for withdrawal and injection. As regards quantum sensitivity, the quantum of transmission 'usage' is reflected in 'PoC rates' and the quantum of transmission 'access' is reflected in the 'PoC charges' payable. He underscored that the PoC mechanism is scientific and elegant way of handling complexity. It accommodates multiple transmission licensee regime. It is market friendly and gives certainty in terms of transmission rates ex-ante. It facilitates competitive bidding and does away with the pan caking of charges and losses. A copy of the presentation made by Shri S.K. Soonee is **enclosed (Annexure – III)**.

After the presentation, certain clarifications were sought by the Members which were explained. On the concern regarding the increase in incidence of charges, it was clarified that there has been an overall increase in the transmission charges as a result of issuance of Tariff Order based on 2009-14 Regulations. On the specific issue raised by Bihar and Punjab, it was clarified that the net increase as a result of New Transmission Pricing methodology for the month of July, 2011 for Bihar was only Rs.5.68 crore and for Punjab Rs.5.054 crore. It was further

clarified that New Transmission Pricing mechanism is only a method of allocating the total charges towards usage of Inter-State Transmission System (ISTS). It is not a method of computation of Transmission charges payable to the ISTS owners. Thus, introduction of New Pricing methodology does not affect the total amount due to any ISTS owner.

HPERC Chairperson mentioned that transmission facilities are being created in the State primarily for evacuation of power outside the State. He wanted to know as to whether such line could be treated as part of the ISTS and whether investment approval for such lines being constructed by STU should be given by CTU. It was clarified that in the PoC mechanism, there is a provision for inclusion of non-ISTS line also as part of the transmission charge pool if more than 50% of the power flow in such line is for inter-State transaction and is so certified by Regional Power Committees (RPCs). It was also clarified that if it can be established that any transmission line is incidental to inter-State transmission, such line can be treated as inter-State transmission as per the Electricity Act, 2003. Shri K.C. Badu, Member, OERC informed that over 32 IPPs and 2 to 3 UMPPS are coming up in Orissa. He mentioned that as per the terms of the MoU, Orissa is likely to get 8000 to 9000 MW towards its share. If such power is injected at CTU's pooling station, Orissa would have to pay CTU charges also. The STU (OPTCL) may explore possibility of constructing some Pooling Stations in addition to the one's being constructed by CTU so that there is no redundancy or over lapping. All are to be done through Open Competitive Bidding Process. It was clarified that optimal planning is essential for grid security and transmission charges liability should not vitiate the planning process.

After discussion, the following emerged :-

- For greater clarity, a comparative statement indicating the quantum/percentage of increase in charges as a result of issuance of Tariff Order for 2009-14 and the increase/decrease as a result of PoC Pricing methodology may be indicated for each State. As decided, the comparative statement is being **annexed** as **Appendix-I and II**.
- While appreciating the New Transmission Pricing Framework, it was decided to initiate action to implement the framework at the State level in line with the provisions of the Tariff Policy. It was also decided that a study be commissioned under the guidance of CERC as FOR Secretariat for evolving the framework for States keeping in view their general and specific requirement.

**Agenda Item No. 3 :**                      **Report on “Policy and Regulatory Interventions for Promotion of Community level Off-Grid Projects”.**

Shri Rajiv Bansal, Secretary, CERC/FOR explained the background of the study on “Policy and Regulatory Interventions for Promotion of Community level Off-Grid Projects”. The study has been conducted by M/s. ABPS Infrastructure Advisory Private Limited with the support of Shakti Sustainable Energy Foundation, under the guidance of FOR Secretariat. Shri Balwant Joshi, Managing Director, M/s. ABPS made a presentation (**enclosed** at **Annexure – IV**) highlighting the recommendations and findings of the study. It was emphasized that in areas remote from the grid and low population density, off-grid energy solutions seem most practical and economical. The objective behind the study was to explore the viable business models for development of off-grid renewable energy generation projects. Based on the detailed analysis of various parameters,

the study has recommended the following two models for promotion of community level off-grid projects :-

- (i) **Off Grid Distributed Generation Based Distribution Franchisee (ODGBDF)** : In this model, a project developer can set up an off-grid project and supply power to the consumers in the locality and recover SERC determined tariff for such consumer category. The project developer can act as a franchisee of the distribution company and the agreement between the distribution licensee and the off-grid project developer should guarantee recovery to the extent of feed in tariff by the project developer. Such generation and consumption of power from off-grid project should qualify towards renewable purchase obligation of the distribution licensee.
- (ii) **REC for Off-Grid Generation** : Under this model, a project developer can set up off-grid project, distribute electricity to the consumer in the locality and recover from them charges as mutually agreed between the project developer and the consumer. In order to ensure recovery of cost for the project developer, RECs should be issued to such developer.

After discussion, the following emerged :-

- ❖ The findings of the study were endorsed.
- ❖ It was decided that necessary Model Regulations/Guidelines be formulated for implementation of the recommended options and suggestion(s) for refinement/change in the REC mechanism may also be made.

**Other Issues :**

Chairperson, CSERC offered to host the next meeting of Forum at Raipur (Chhatisgarh) in the month of December, 2011. Subsequently, Forum could meet at Bodh Gaya (Bihar) in February, 2012.

The Forum appreciated the efforts of HPERC for the arrangements made for the meeting.

A vote of thanks was extended by Shri Rajiv Bansal, Secretary, CERC/FOR. He conveyed his sincere thanks to all the dignitaries present in the meeting. He also thanked the staff of “FOR” Secretariat for their arduous efforts at organizing the meeting.

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

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**LIST OF PARTICIPANTS ATTENDED THE TWENTY SIXTH MEETING**

**OF**

**FORUM OF REGULATORS ( FOR )**

**HELD DURING 09<sup>TH</sup> – 10<sup>TH</sup> OCTOBER, 2011**

**AT “CONFERENCE HALL”, THE DESTINATION RESORT,  
KANDAGHAT, DIST. SOLAN (HIMACHAL PRADESH).**

S. No.	NAME	ERC
01.	Dr. Pramod Deo Chairperson	CERC – in Chair.
02.	Shri A. Raghotham Rao Chairperson	APERC
03.	Shri Digvijai Nath Chairperson	APSERC
04.	Shri Umesh Narayan Panjiar Chairperson	BERC
05.	Shri Manoj Dey Chairperson	CSERC
06.	Dr. P.K. Mishra Chairperson	GERC
07.	Shri Subhash Chander Negi Chairperson	HPERC
08.	Shri S. Maria Desalphine Chairperson	J&KSERC
09.	Dr. V.K. Garg Chairperson	JERC for Goa & All UTs
10.	Shri C. Hmingthanzuala Chairperson	JERC for Manipur & Mizoram
11.	Shri Mukhtiar Singh Chairperson	JSERC
12.	Shri K.J. Mathew Chairperson	KSERC
13.	Shri Anand Kumar Chairperson	MSERC

14.	Ms. Romila Dubey Chairperson	PSERC
15.	Shri S. Kabilan Chairperson	TNERC
16.	Shri Jag Mohan Lal Chairperson	UERC
17.	Shri Prasad Ranjan Ray Chairperson	WBERC
18.	Shri Shyam Wadhera Member	DERC
19.	Shri Rohtash Dahiya Member	HERC
20.	Shri K.C. Badu Member	OERC
21.	Shri Rajiv Bansal Secretary	CERC/FOR
22.	Shri Sushanta K. Chatterjee Deputy Chief (RA)	CERC
23.	Ms. Neerja Verma Assistant Secretary	FOR

# New Transmission Pricing: Overarching Philosophy

Central Electricity Regulatory Commission

# Evolution of Transmission Pricing

## 1/3

- Implicit transmission pricing model
  - Transmission charges were clubbed with generation tariff

### *Unbundling of generation and transmission*

- Transmission pricing model changed from implicit to explicit
  - Transmission charges were apportioned on the basis of net energy drawn

# Evolution of Transmission Pricing 2/3

- Late 1970's: Regional generation projects by CPSUs
  - Development of associated regional transmission schemes
    - to enable drawal of respective shares by regional beneficiaries
  - Regional Postage Stamp method to suit above arrangement
    - Pooling of Transmission Charges of associated transmission schemes and sharing on the basis of allocation
    - Neutral to distance and direction
      - Did not recognize the fact that power flows by displacement and not by necessarily by contact path (pancaking)

# Evolution of Transmission Pricing 3/3

- Regional Postage Stamp Method: Interregional allocation
  - Pan caking of regional transmission charges and losses
    - Beneficiary states were to pay
      - transmission charges of other region in which generation source located
      - Transmission charges of intermediate regions involved in case generation source located which is not adjacent
  - Simple but not adequate to address complexities of emerging market model

# Regional Postage Stamp – Inadequate to meet future challenges

- Not applicable to UMPPs and IPPs :
  - having trans- regional beneficiaries/ unidentified beneficiaries
  - Merchant Capacity: (part short term & part long term contracts)
- Difficult to build consensus on sharing of transmission charges for such projects
  - Creation of sub pools (30 sub pools at present)

# Regional Postage Stamp...

Not able to address requirements of

- Sharing of high capacity corridor charges
- Competitive bidding requirements (especially case 1)
- National grid integration
- Open Access



# Regional Postage Stamp method

- Perpetuated cross sub-susidisation
  - Argument that addition of new line / inter regional link dose not benefit a particular beneficiary is nor correct
  - Benefits accrue by way of reliability and also in terms of opportunity for trade

**New Transmission Pricing : A necessity rather than a choice**

# National Transmission Pricing Framework

- As per mandate of NEP/ TP
- Sensitivity to distance and direction
- Avoids pan- caking of charges
- Addresses multiple transmission licensee regime
- Provides economic signal for locating generation and load

**Evolved after prolonged stakeholder consultation**

# Policy Mandate

- Provisions of National Electricity Policy

## Section 5.3.2

*“Network expansion should be planned and implemented keeping in view the anticipated transmission needs that would be incident on the system in the open access regime. **Prior agreement with the beneficiaries would not be a pre-condition for network expansion.** CTU/STU should undertake **network expansion** after identifying the requirements in consultation with stakeholders and taking up the execution after due **regulatory approvals.**”*

# Policy Mandate

## Section 5.3.5

*“To facilitate orderly growth and development of the power sector and also for secure and reliable operation of the grid, adequate margins in transmission system should be created. The transmission capacity would be planned and built to cater to both the redundancy levels and margins keeping in view international standards and practices.”*

*“To facilitate cost effective transmission of power across the region, a **national transmission tariff framework** needs to be implemented by CERC. **The tariff mechanism would be sensitive to distance, direction and related to quantum of flow.**”*

# Policy Mandate

- Provisions of Tariff Policy

## **Section 7.1(2)**

*“The National Electricity Policy mandates that the **national tariff framework implemented should be sensitive to distance, direction and related to quantum of power flow**. This would be developed by CERC taking into consideration the advice of the CEA. Such tariff mechanism should be implemented by 1st April 2006”*

# Policy Mandate

- **Section 7.1(2)**
- *“Transmission charges, under this framework, can be determined on MW per circuit kilometer basis, zonal postage stamp basis, or some other pragmatic variant, the ultimate objective being to get the **transmission system users to share the total transmission cost in proportion to their respective utilization of the transmission system**. The overall tariff framework should be such as not to inhibit planned development / augmentation of the transmission system, but should discourage non-optimal transmission investment.”*

# Policy Mandate

- **Section 7.1(4)**

*“In view of the approach laid down by the NEP, **prior agreement with the beneficiaries would not be a pre-condition for network expansion.** CTU/STU should undertake network expansion after identifying the requirements in consonance with the National Electricity Plan and in consultation with stakeholders, and taking up the execution after due regulatory approvals.”*

# Policy Mandate

- **Section 7.1(7)**

*“After coming into effect the CERC regulation on the framework for the inter-state transmission, a **similar approach should be implemented by SERCs in next two years for the intra state transmission, duly considering factors like voltage, distance, direction and quantum of flow.**”*



# Policy Mandate

- **Section 7.2**

## **Transmission Losses**

*“Transactions should be charged on the basis of average losses arrived at after appropriately considering the **distance and directional sensitivity, as applicable to relevant voltage level, on the transmission system**. Based on the methodology laid down by the CERC in this regard for inter- state transmission, the Forum of Regulators may evolve a similar approach for intra-state transmission.”*

# PoC Mechanism

- Distance Sensitivity
  - **Electrical Distance**  
or
  - Physical Distance  
or
  - Contract Distance

Mapping from other sectors : Money Transfer,  
Goods Transport

# PoC Mechanism

- Direction Sensitivity
  - Separate Rates for Injection and Withdrawal
    - Injection Rate : 100000 Rs/MW/Month
    - Withdrawal Rate: 70000 Rs/MW/Month
- Quantum Sensitivity
  - Access vs Usage
  - Usage Captured in PoC
  - Charges based on access

Thank You

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# Implementation of Point of Connection Mechanism In India

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Implementing Agency  
National Load Despatch Centre

## Outline

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- **Background**
  - **Drivers for Change**
  - **Regulatory Initiatives**
  - **Point of Connection Mechanism**
  - **Salient Features**
  - **Implementation Process**
  - **Concerns of Stakeholders**
  - **Way Forward**
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# BACKGROUND

# Distinctive Features of Transmission

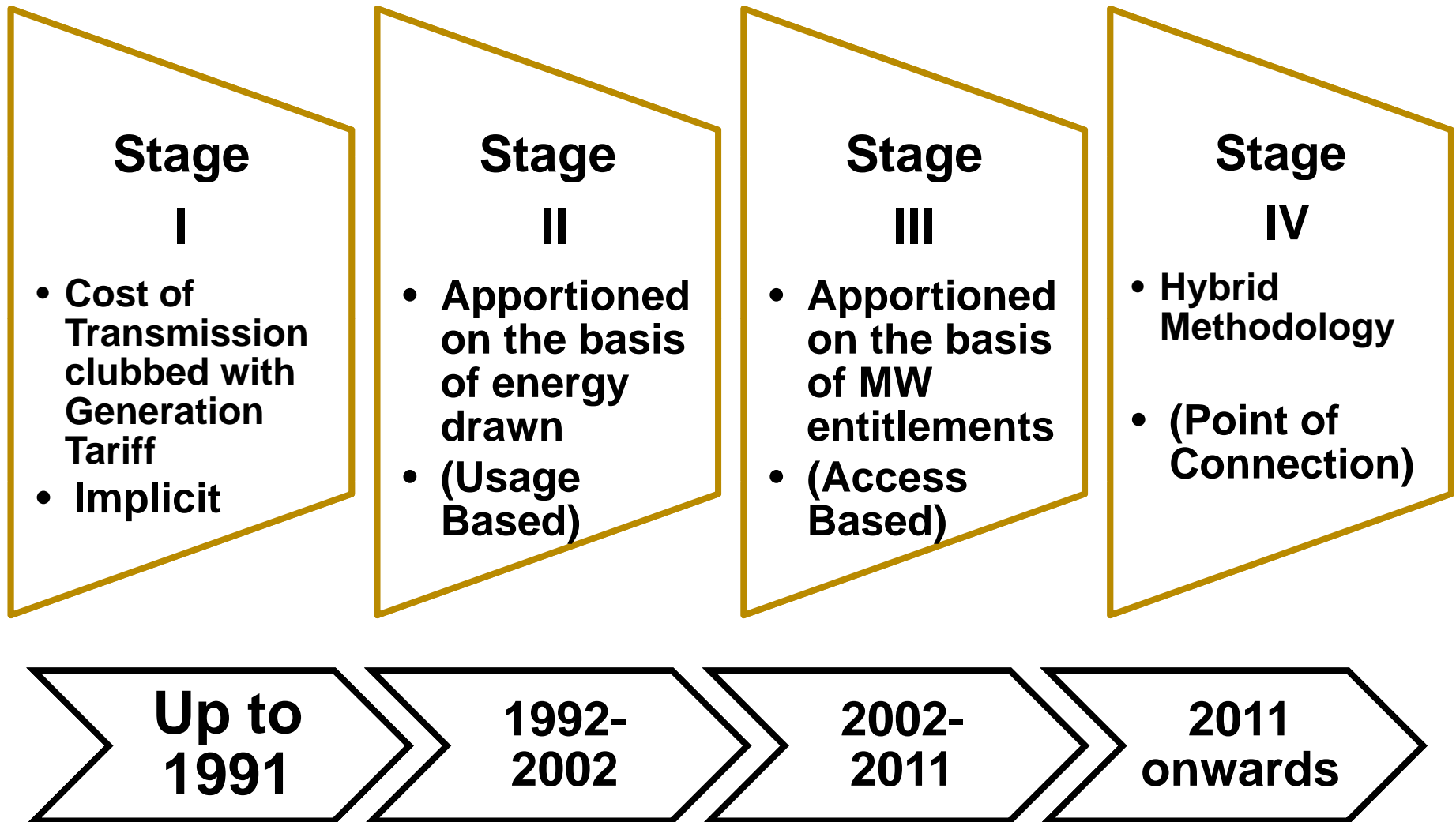
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- **Public Service**
  - **Sunk Investment**
  - **Natural Monopoly**
  - **Common Carrier**
  - **Vital Infrastructure**
  - **Regulated Business**
  - **Non-Divisible**
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# Historical Background

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## Policy Mandate

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***Electricity Act  
2003***

***National Electricity  
Policy***

***Tariff Policy***

***“Distance, Direction and Quantum Sensitive Tariff”***

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# Coexistence of different methods

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**Regional Postage Stamp  
Method in  
Long Term Market**

**Contract Path Tariff in  
Short Term Bilateral  
Market**

**Point of Connection Tariff  
in Power Exchanges**

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# DRIVERS FOR CHANGE

## Drivers for Change

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Synchronous Integration of Regions

Increasing complexities in Transmission

Open Access in Transmission

Rapid Growth of Competitive Power Markets and Pricing Inefficiencies

Changing Network utilization scenario

National Grid / Trans-regional ISGS (UMPPs)

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## Other Complexities

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### ■ Consensus in building transmission system

- ❑ Creation of Sub-Pools (35 Sub Pools at present)
  - Non Scientific
  - Dispute Prone
- ❑ 60000 MW Generation coming in Pvt. Sector

### ■ Transmission Charge Sharing

- ❑ High Capacity Corridors?
- ❑ *Biswanath Chariali* – Agra HVDC Link ?
  - Benefits gained by Eastern Region as well

### ■ Addition of Inter Regional Capacity

- ❑ 60000 MW in 12<sup>th</sup> Plan

### ■ Future Share Allocations of generating stations?

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## 765 KV RING MAIN SYSTEM

# THE POWER 'HIGHWAY'

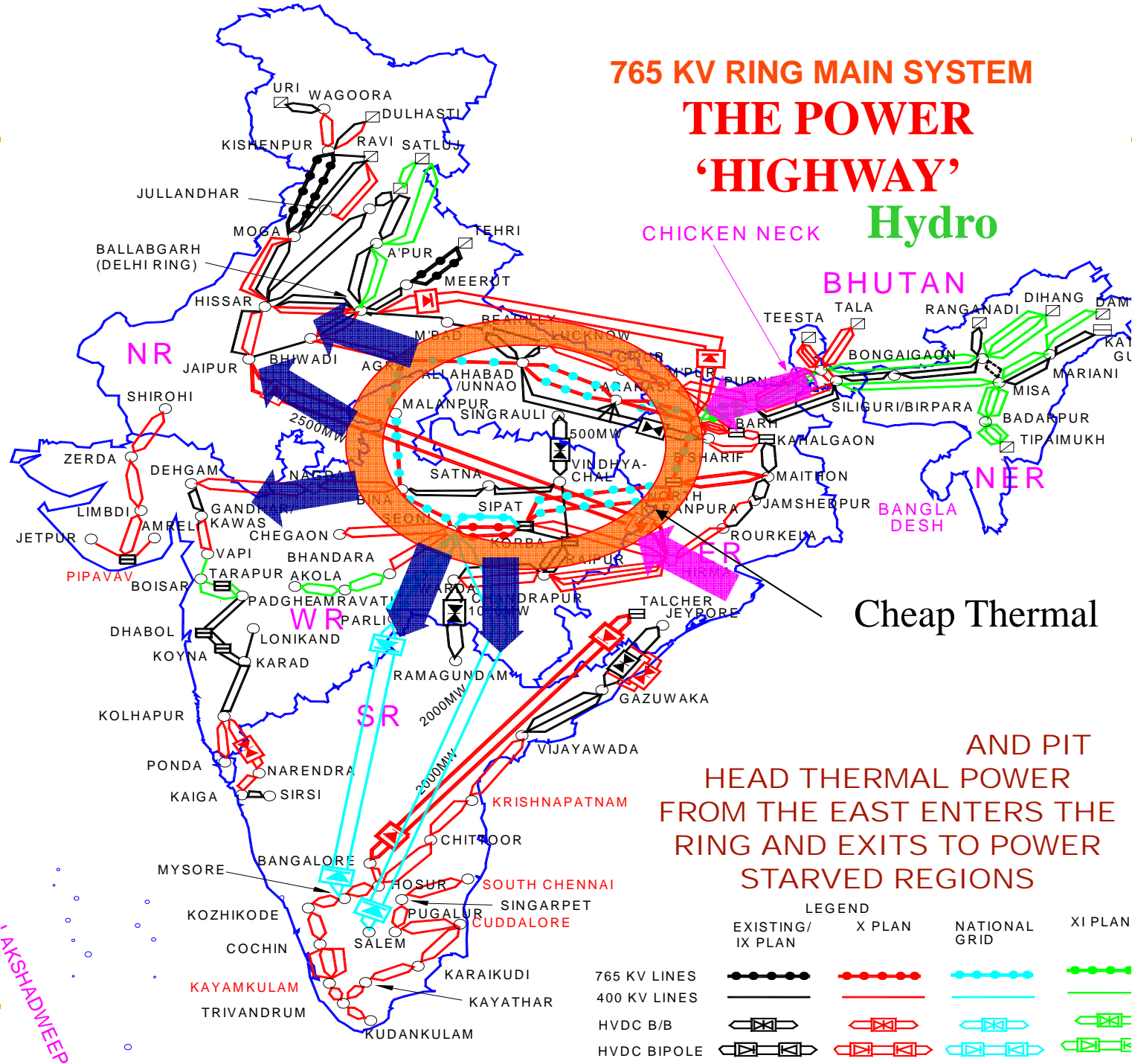
Hydro

CHICKEN NECK

BHUTAN

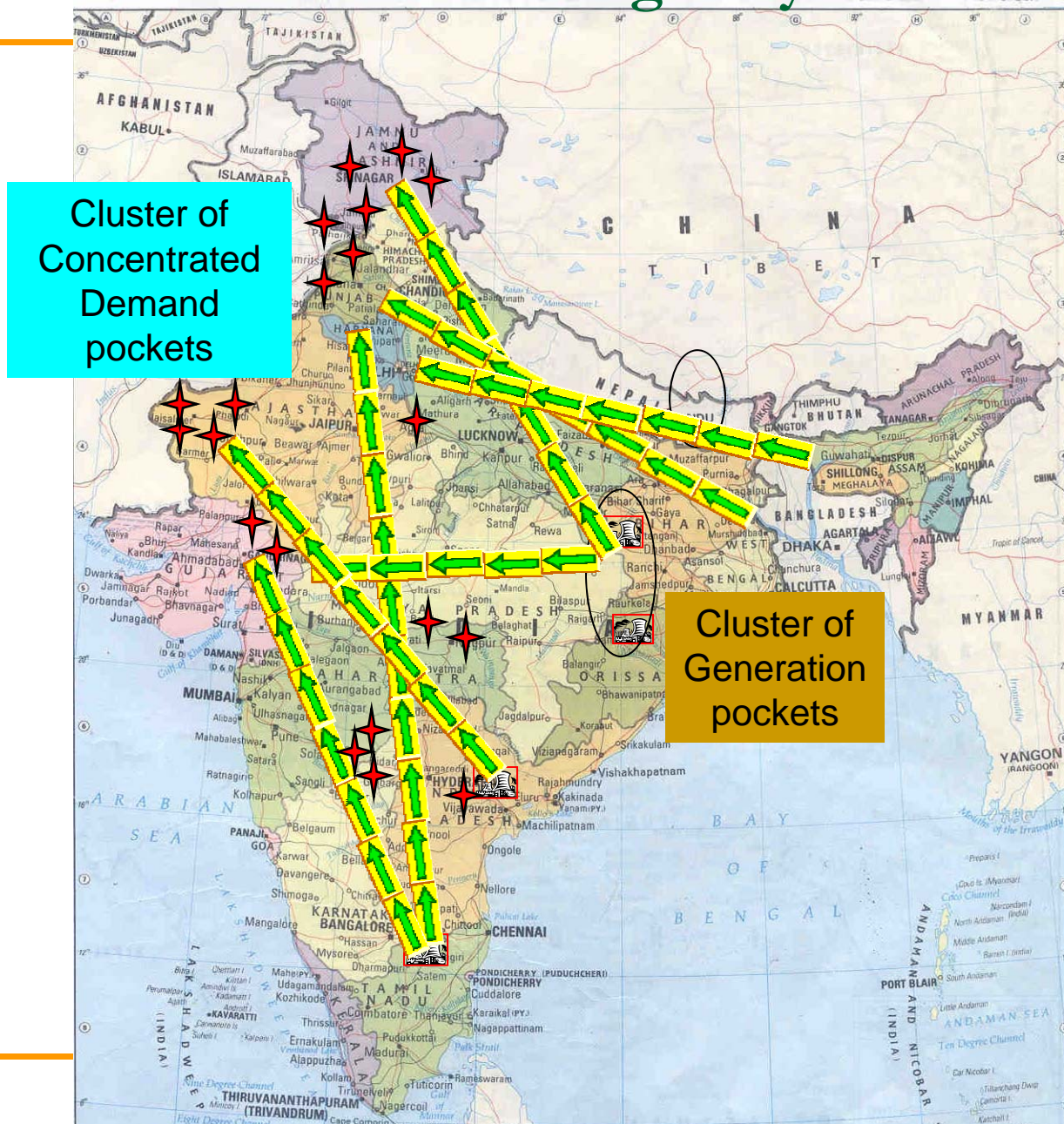
Cheap Thermal

AND PIT  
HEAD THERMAL POWER  
FROM THE EAST ENTERS THE  
RING AND EXITS TO POWER  
STARVED REGIONS



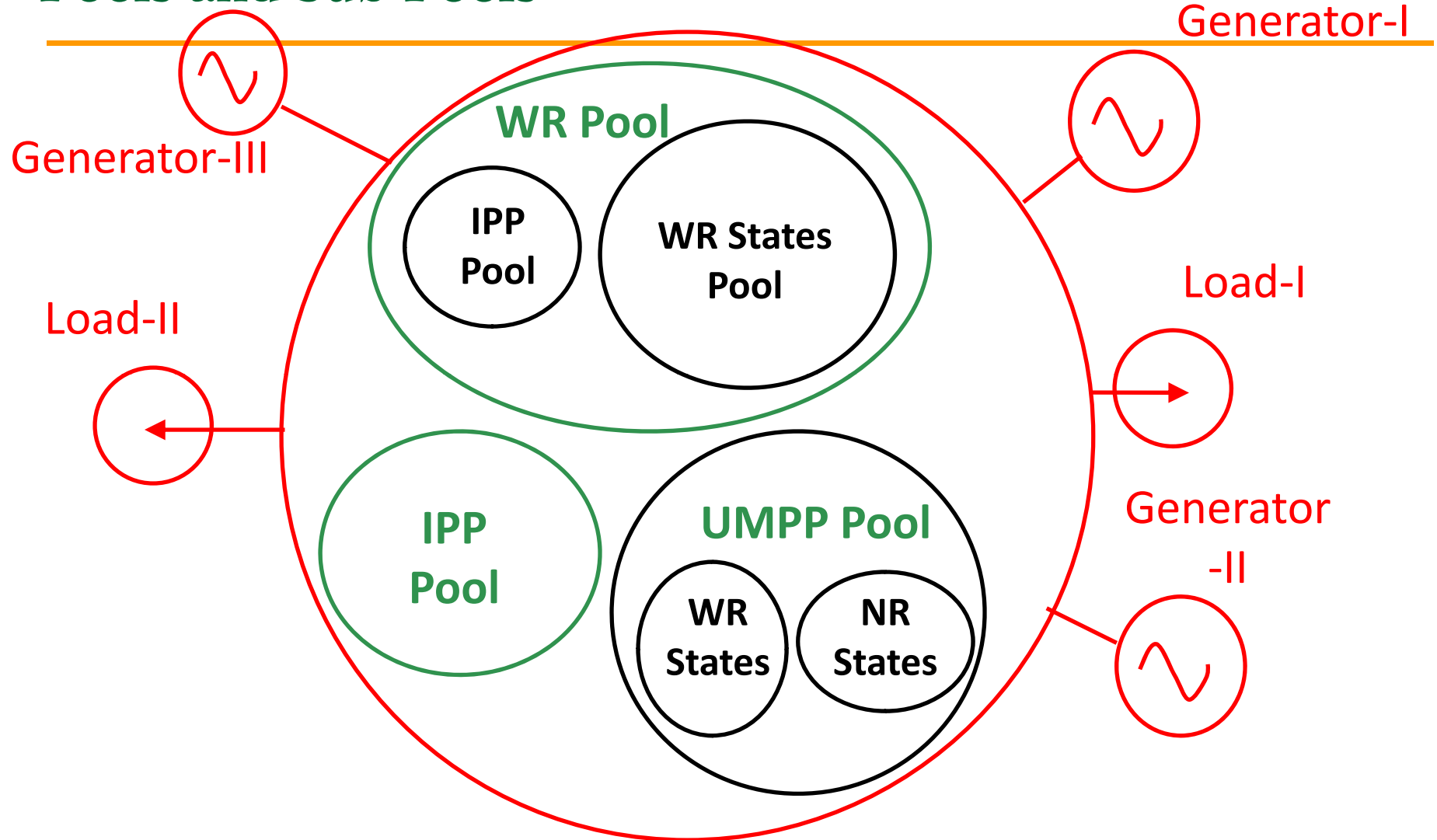


# Creation of Transmission Highways





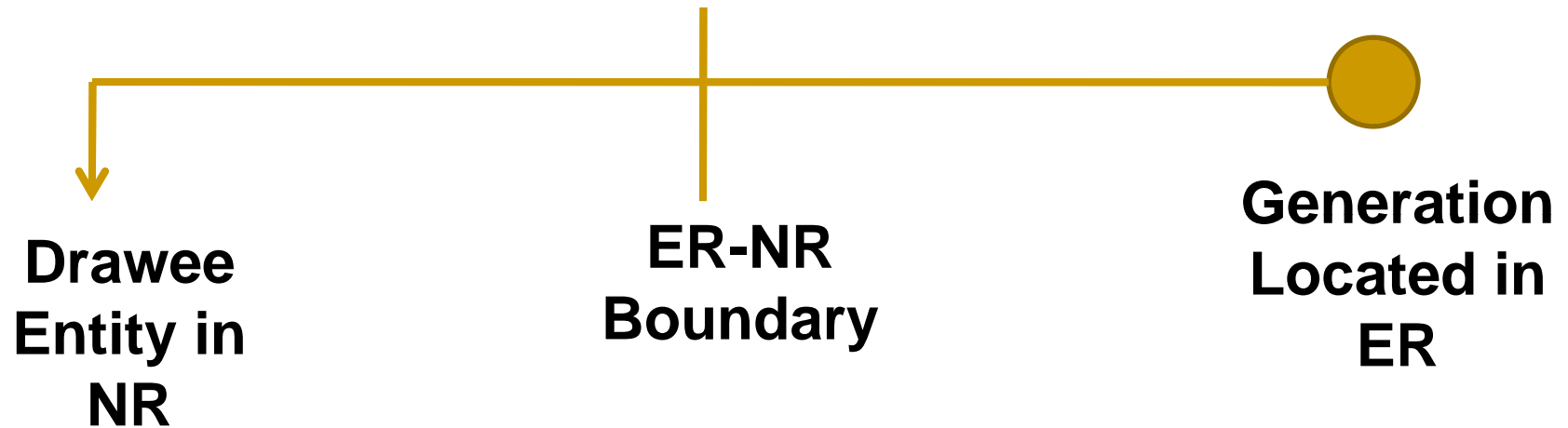
## Pools and Sub Pools



**Inappropriate Transmission Charge and Loss Sharing Mechanism leads to Sub-optimal Transmission Planning**

## Pancaking in Long Term Transactions (Without Sub Pool)

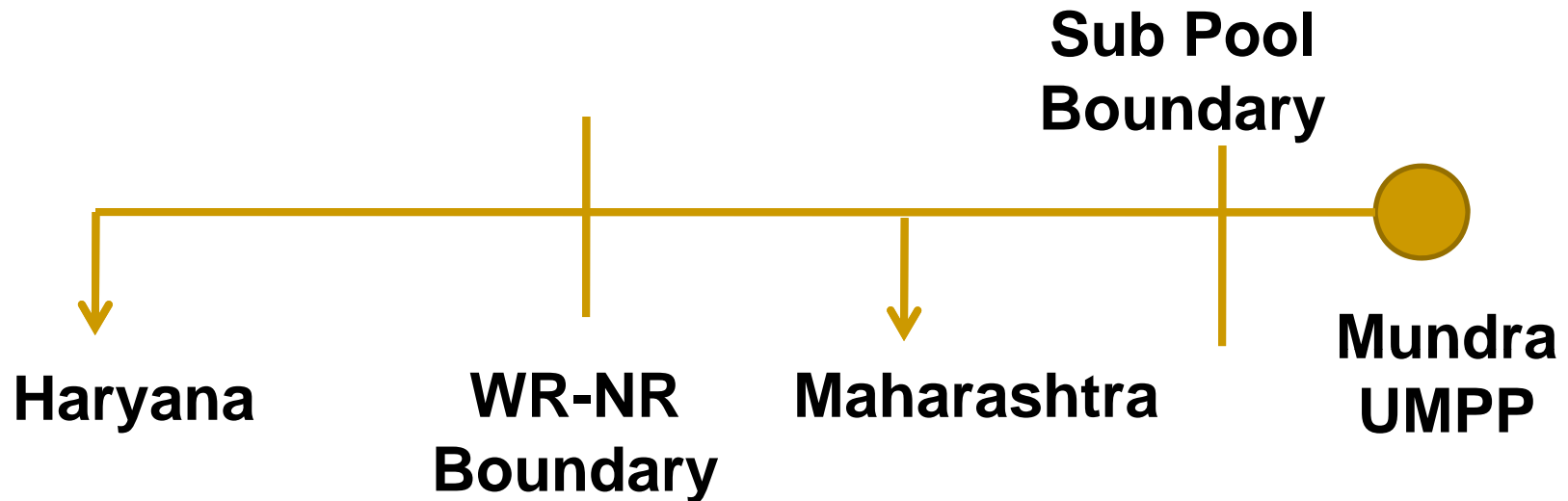
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- Sharing of Charges of Eastern Region Transmission System by other regions
  - Cross Subsidization
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## Pancaking in Long Term Transactions (With Sub Pool)

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Transmission Charges:

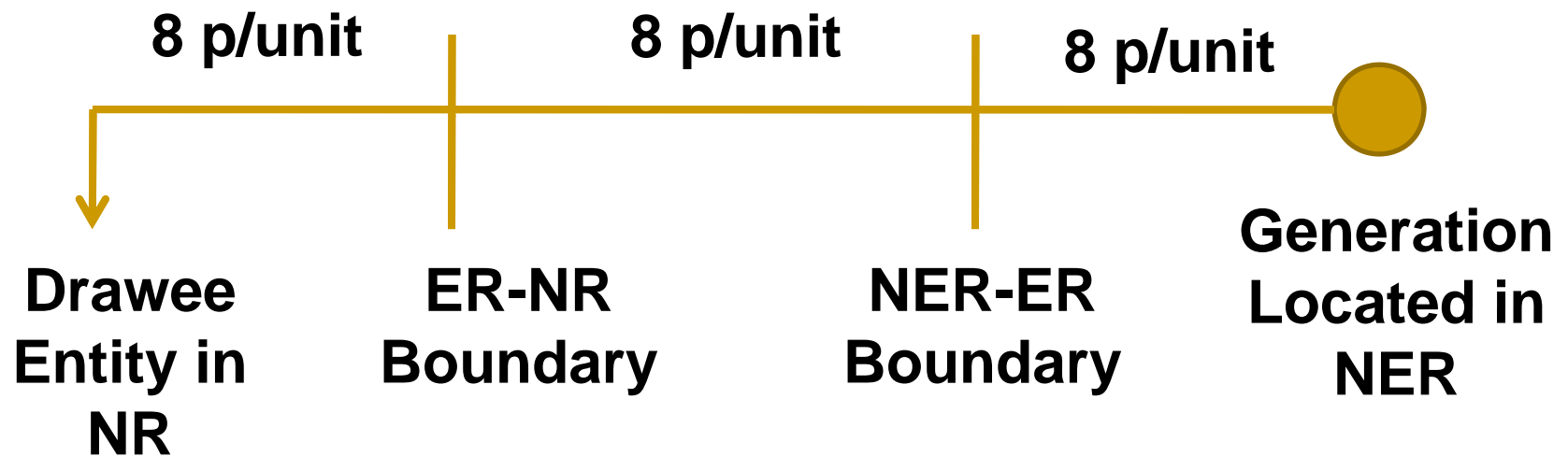
Maharashtra : Sub pool Rate + WR Rate

Haryana : Sub pool Rate + WR Rate+ NR Rate

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## Pancaking in Short Term Transactions

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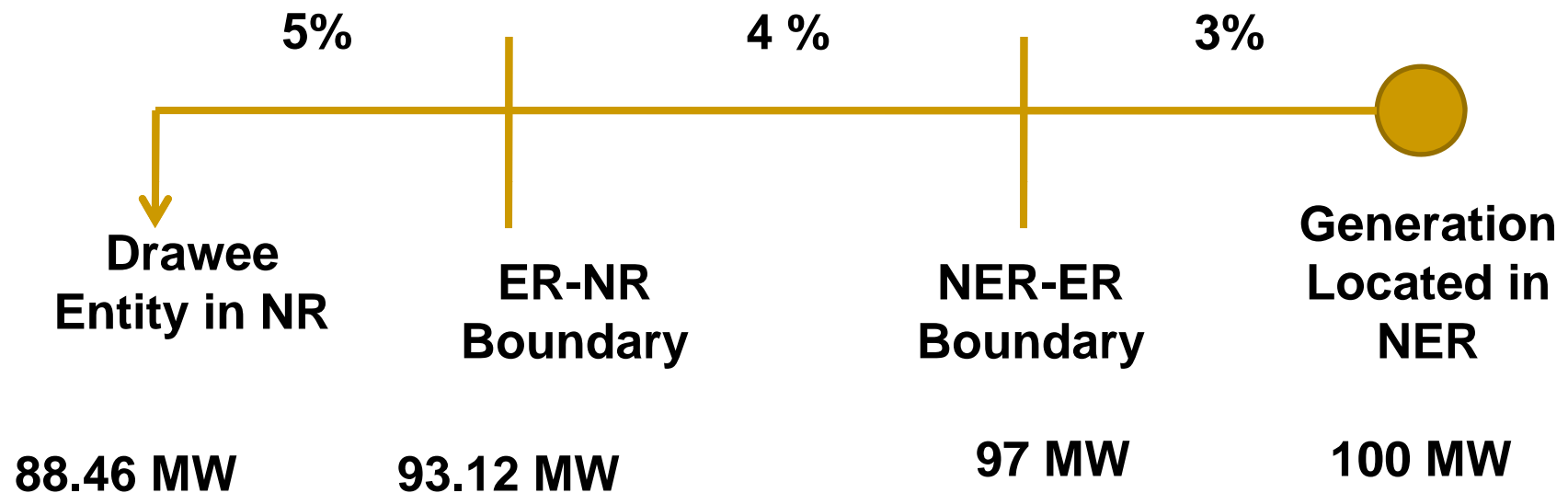


Transmission Rate : 24 p/unit

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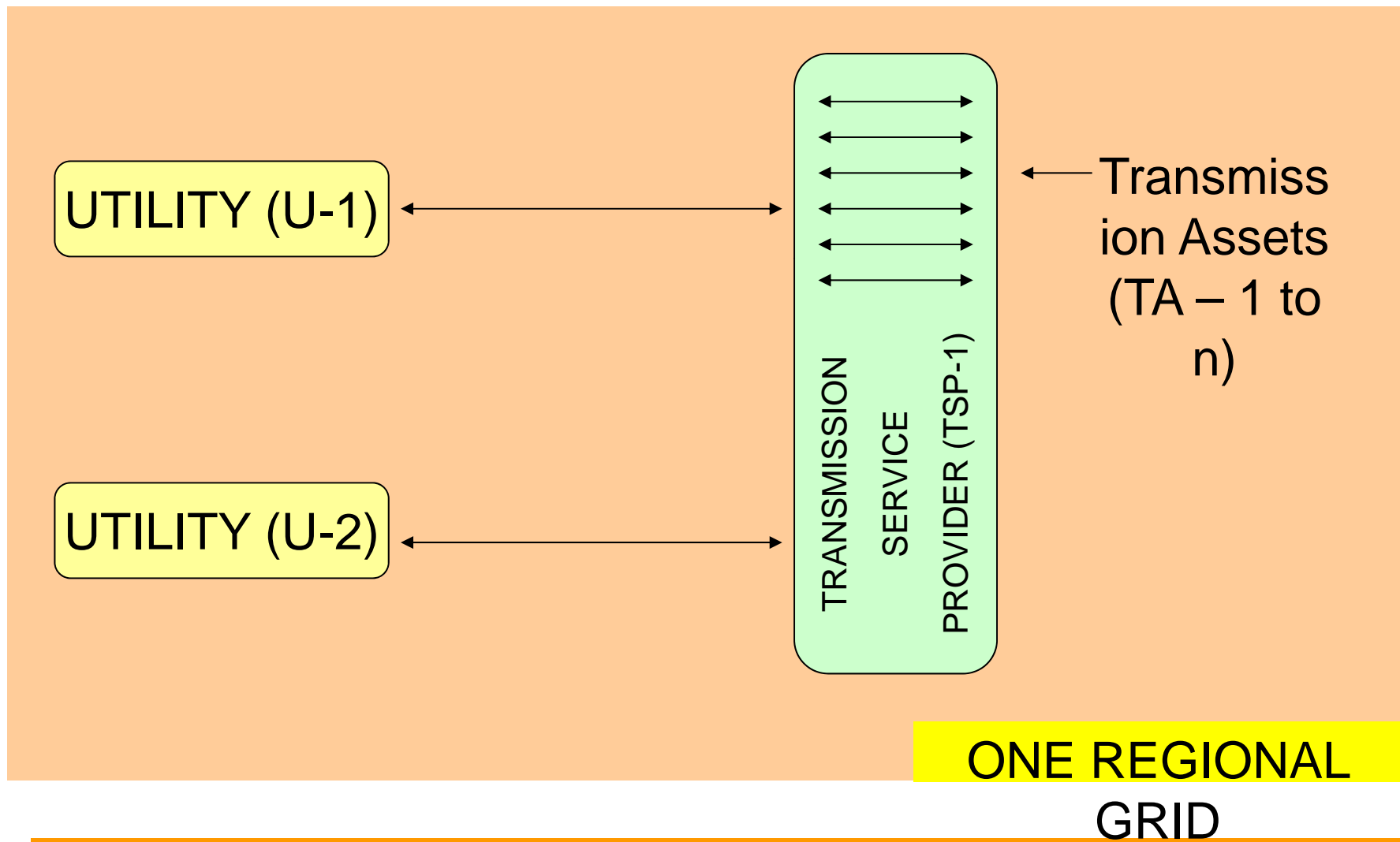
## Pancaking in Losses

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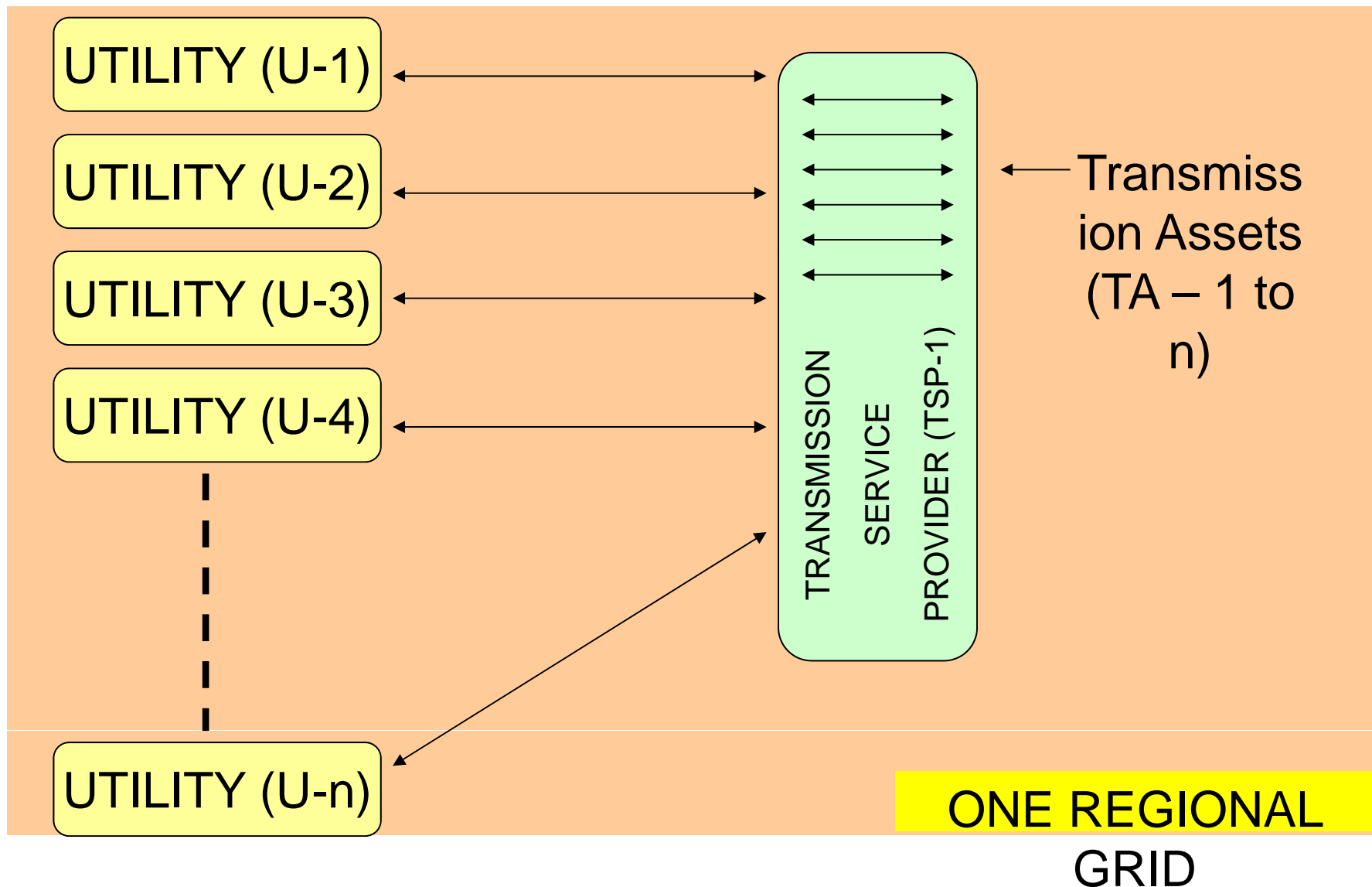
## Two Utilities With One Transmission Service Provider (TSP-1)

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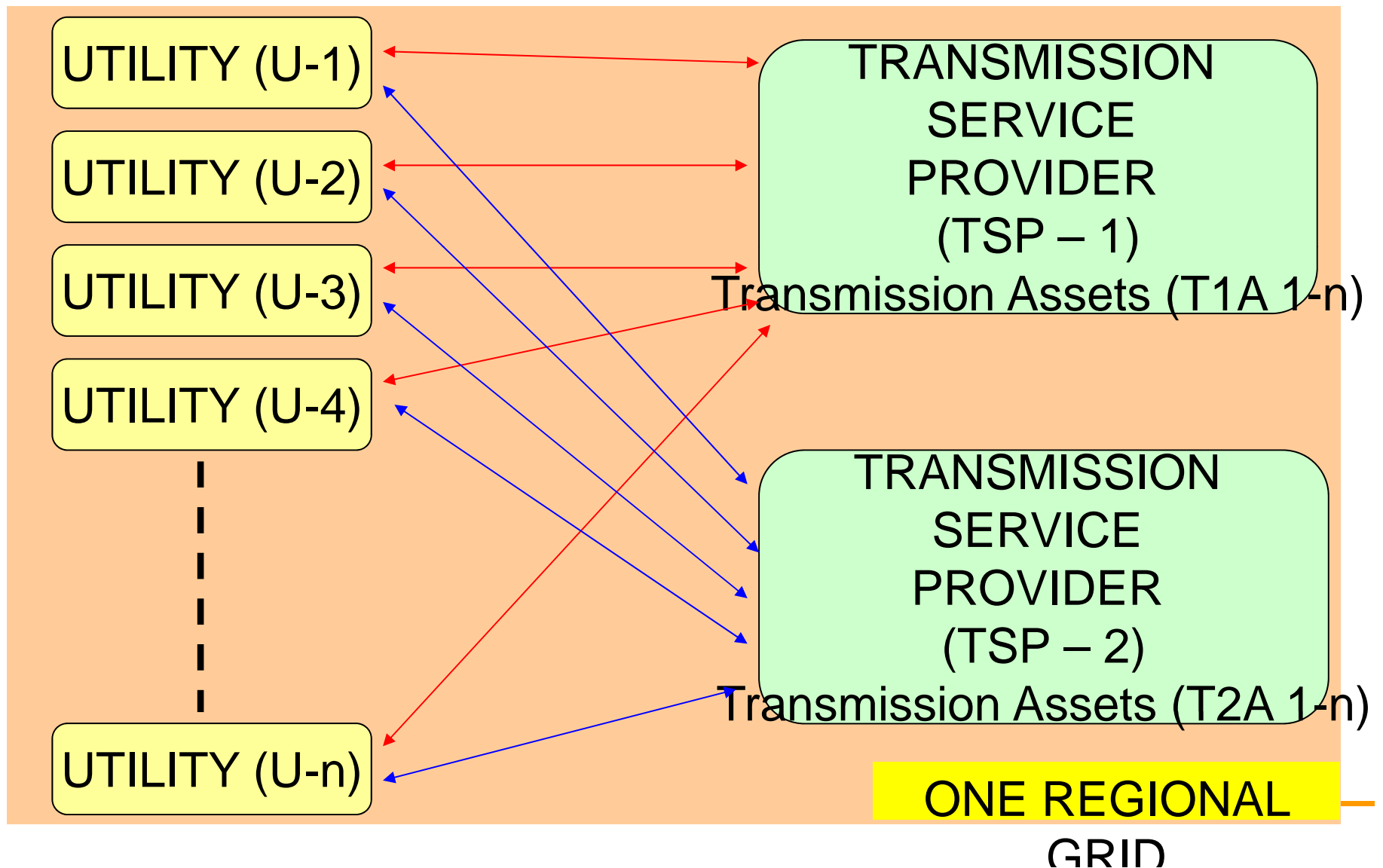
# Multiple Utilities With One Transmission Service Provider (TSP-1)

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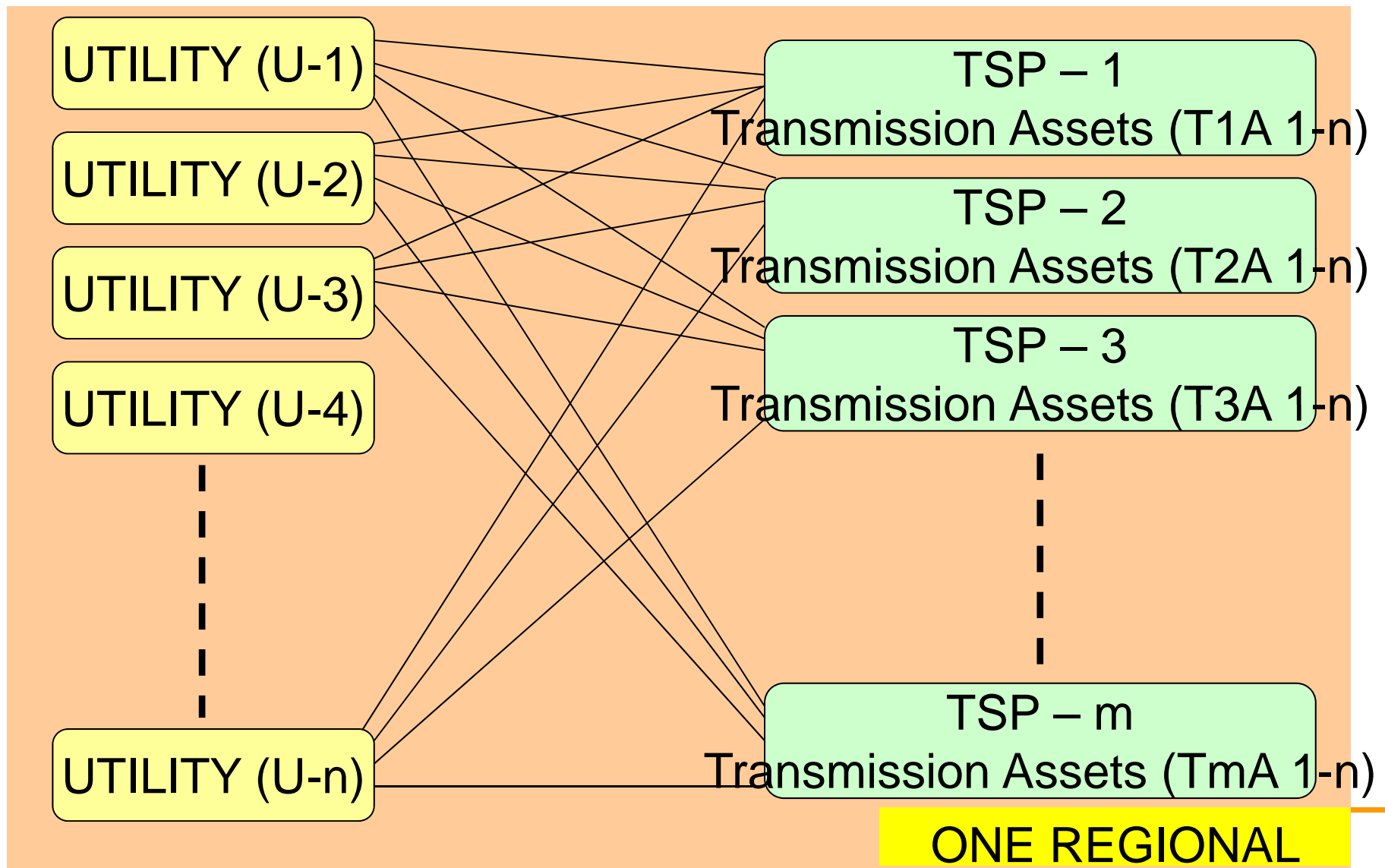
# Multiple Utilities With Two Transmission Service Providers

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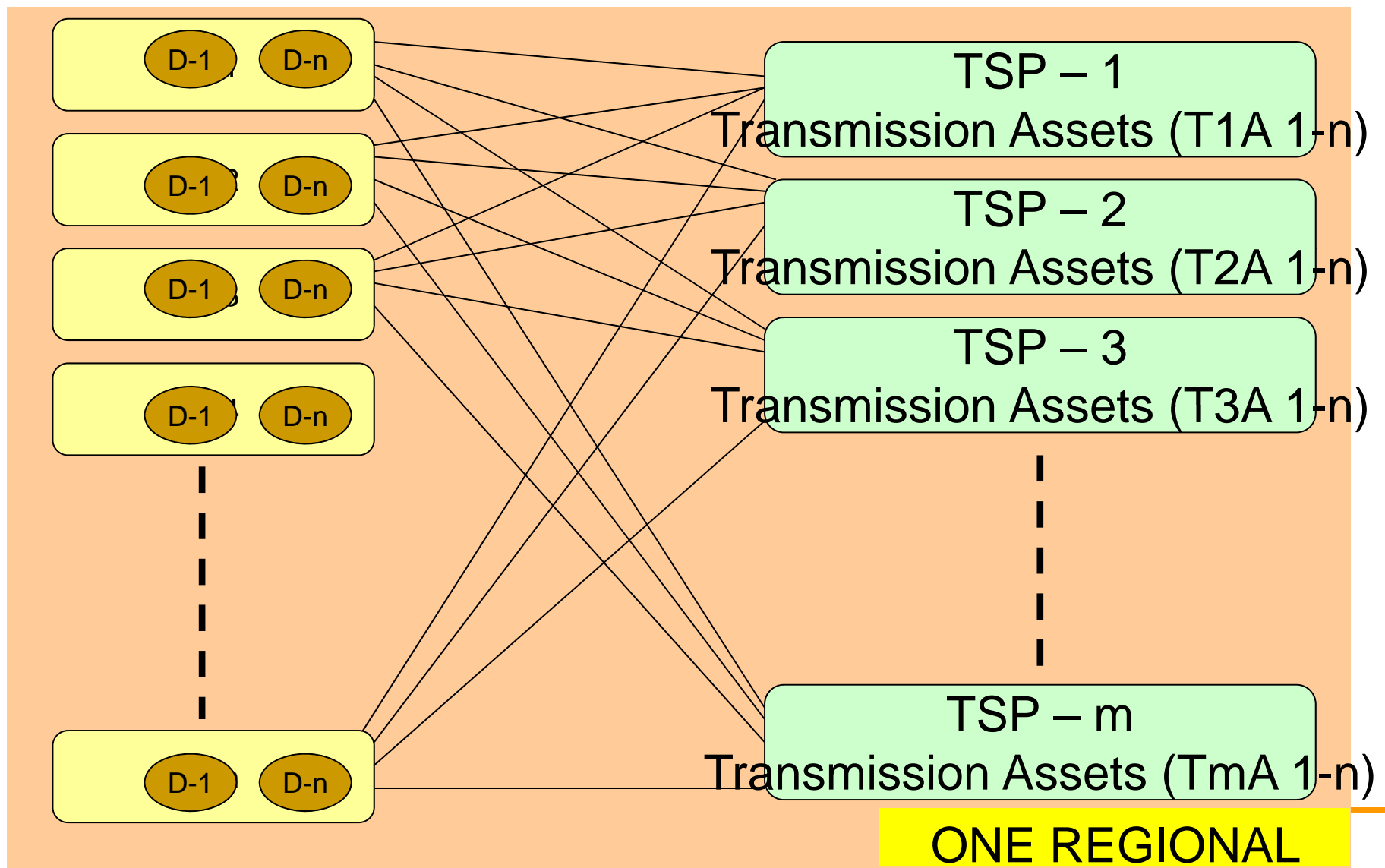


# Multiple Utilities With Multiple Transmission Service Providers

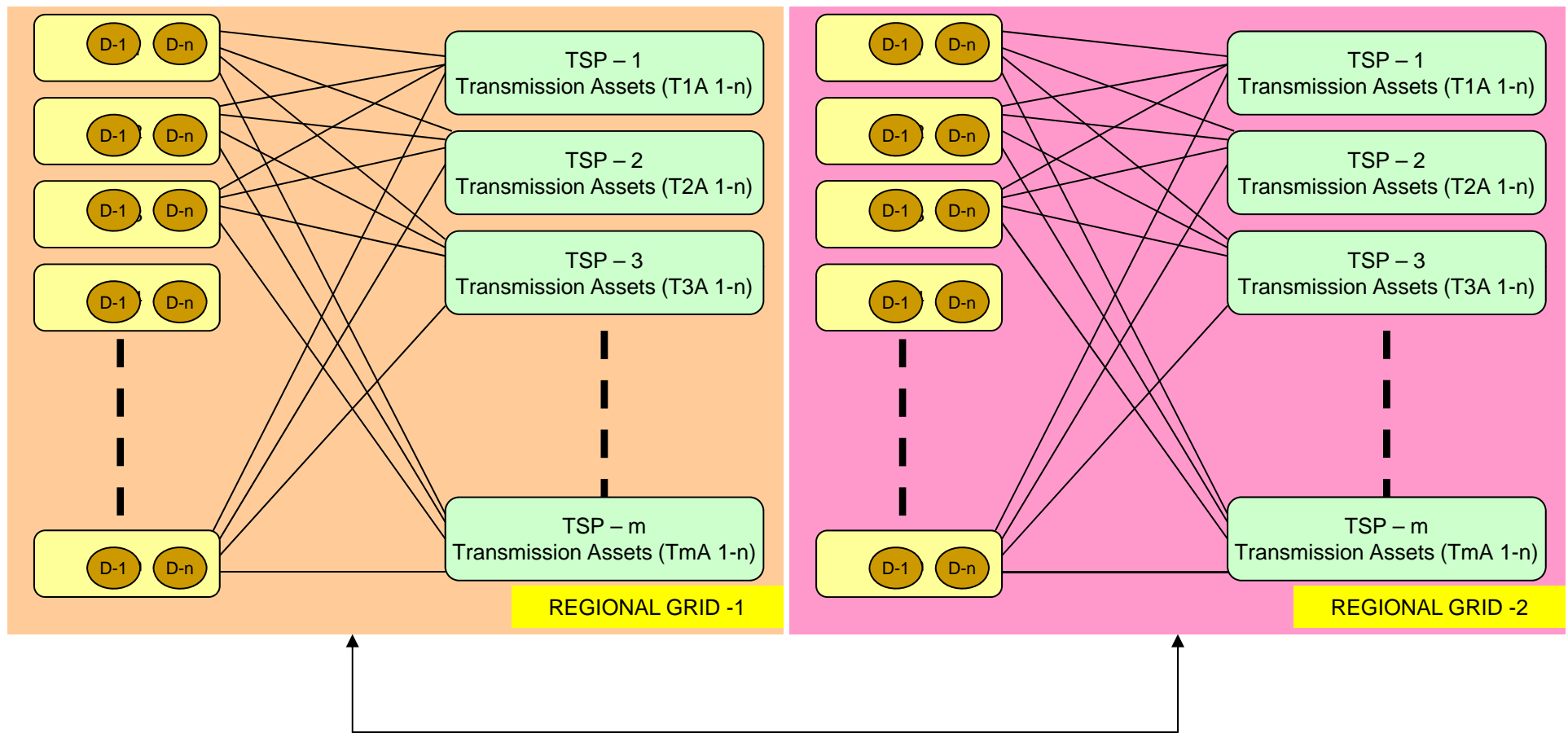


# DISCOMS: Complexity Increased Further

## (D-1 to D-n): DISCOMS Pay Directly to TSPs



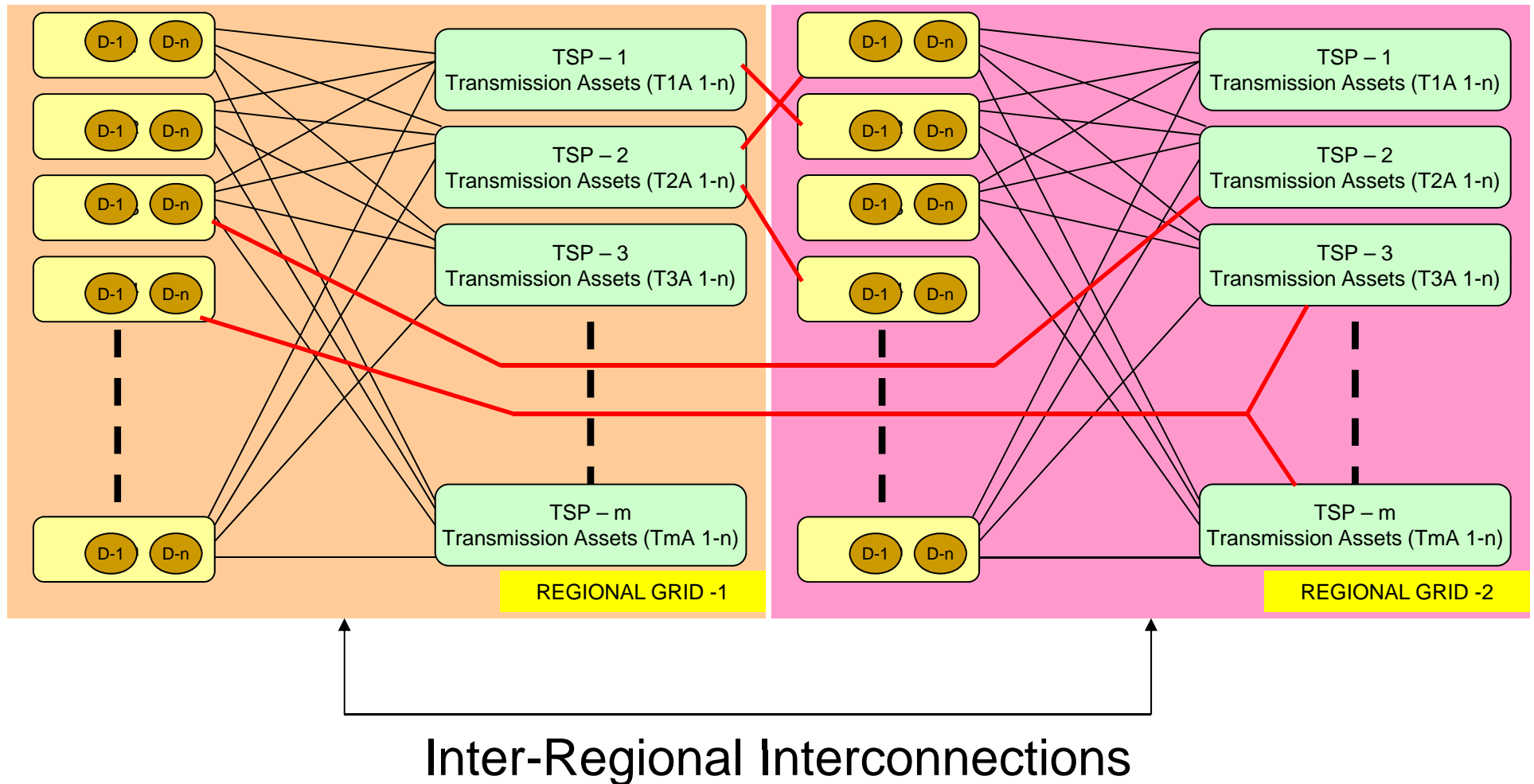
# Multiple Regions



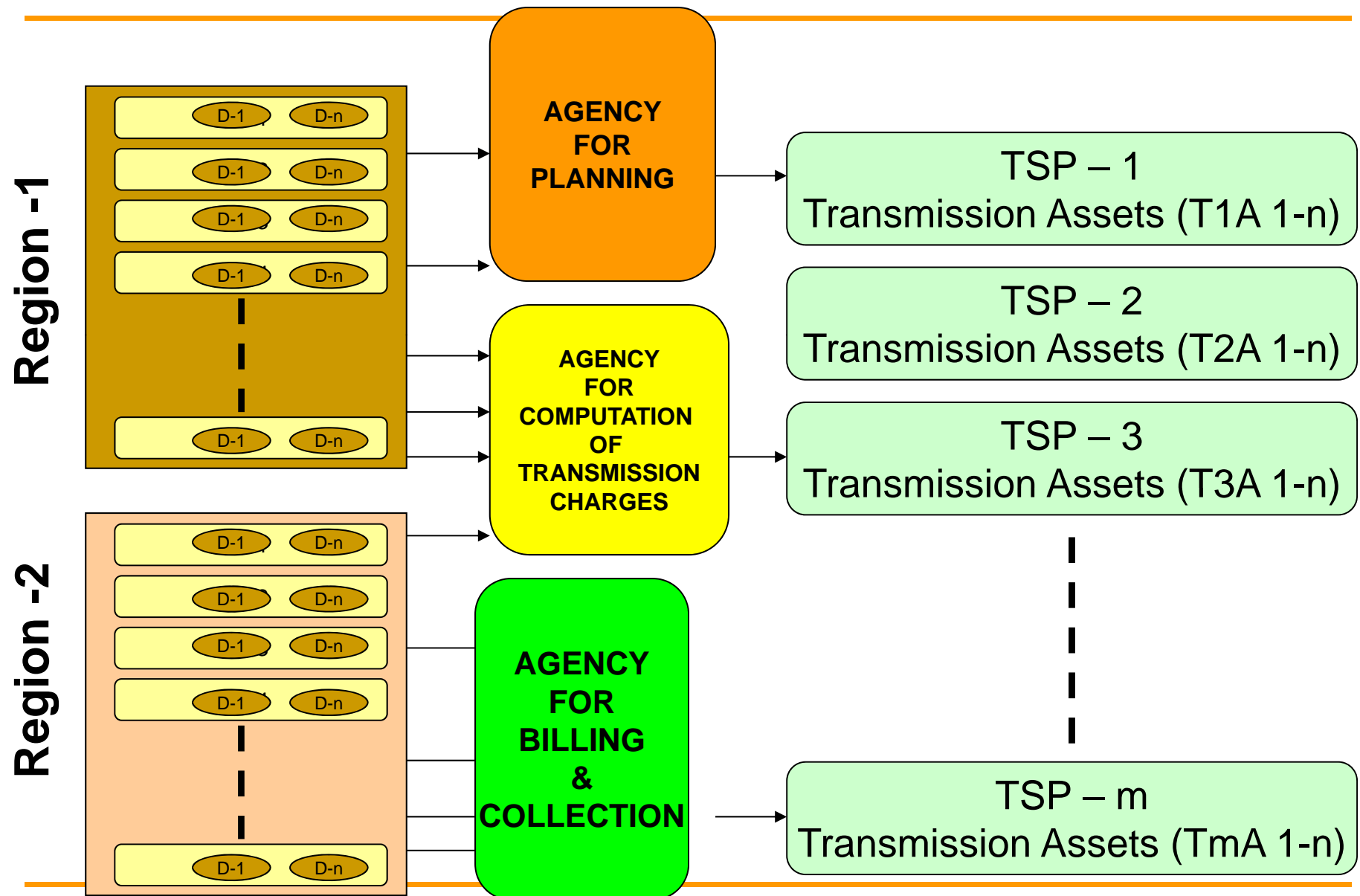
Inter-Regional  
Interconnections

# Future Scenario : More Complexities

## TSPs in One Region Having Customers in Another Region



# Elegant Model





## Holding Pattern: Risk Mitigation

[illegible]

# Network Size Complexities

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<b>Buses</b>		<b>4830</b>
<b>Generating Stations</b>		<b>557</b>
<b>Generating Units</b>		<b>1148</b>
<b>Loads</b>		<b>2672</b>
<b>Branches</b>	<b>DC Lines</b>	<b>7</b>
	<b>765 kV</b>	<b>2</b>
	<b>400 kV</b>	<b>622</b>
	<b>220 kV</b>	<b>3034</b>
	<b>132 kV</b>	<b>5130</b>
	<b>Total</b>	<b>8795</b>
<b>Transformers</b>		<b>2031</b>

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# REGULATORY INITIATIVES



## Regulatory Initiatives

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- **National Electricity Policy : Jan 2005**
  - **Tariff Policy : Feb 2006**
  - **Discussion Paper on Sharing of Inter State Transmission Charges and Losses : Feb 2007**
  - **Order of the Commission : March 2008**
    - Sharing of Charges of Inter regional link and downstream transformers
  - **Approach Paper on Sharing of Inter State Transmission Charges and Losses : May 2009**
  - **CERC (Sharing of Inter State Transmission Charges and Losses), Regulations 2010, June 2010**
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# POINT OF CONNECTION MECHANISM

# Point of Connection Mechanism

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## **Point of Connection (PoC) Charges**

- In Rs. per MW per month
- Nodal / Zonal Charges
- Separate Injection & Withdrawal Charges
- To be made known upfront
- To be applied on Long Term, Medium Term and Short Term Trades

## **Usage Based Methodology**

- Based on Load Flow Studies
- Hybrid of Average Participation and Marginal Participation methods

## **Handling Transition**

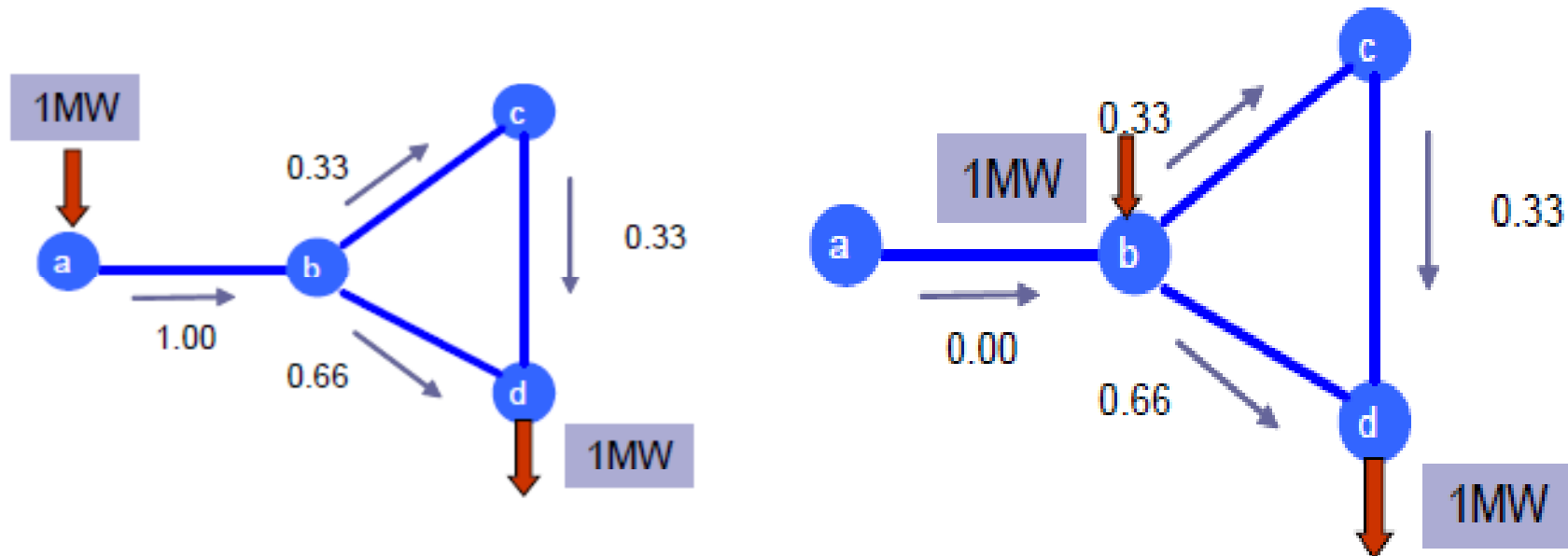
- To begin with 50% Uniform Charges and 50% PoC Charges
  - Introduction of Slabs
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# Marginal Participation

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## ■ Marginal Participation

- The charges are based on incremental utilization of network assessed through load flows.

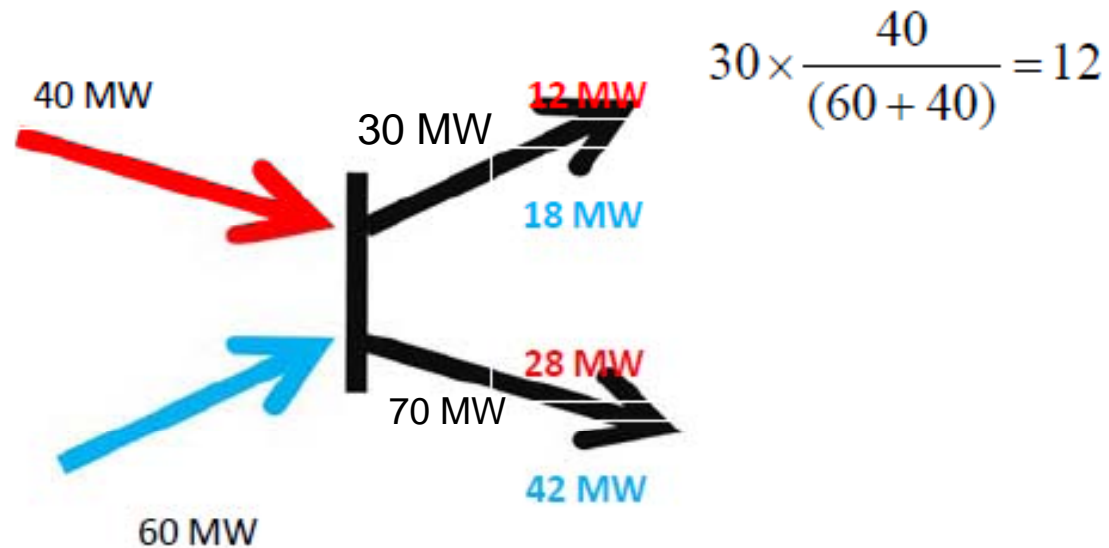


# Average Participation

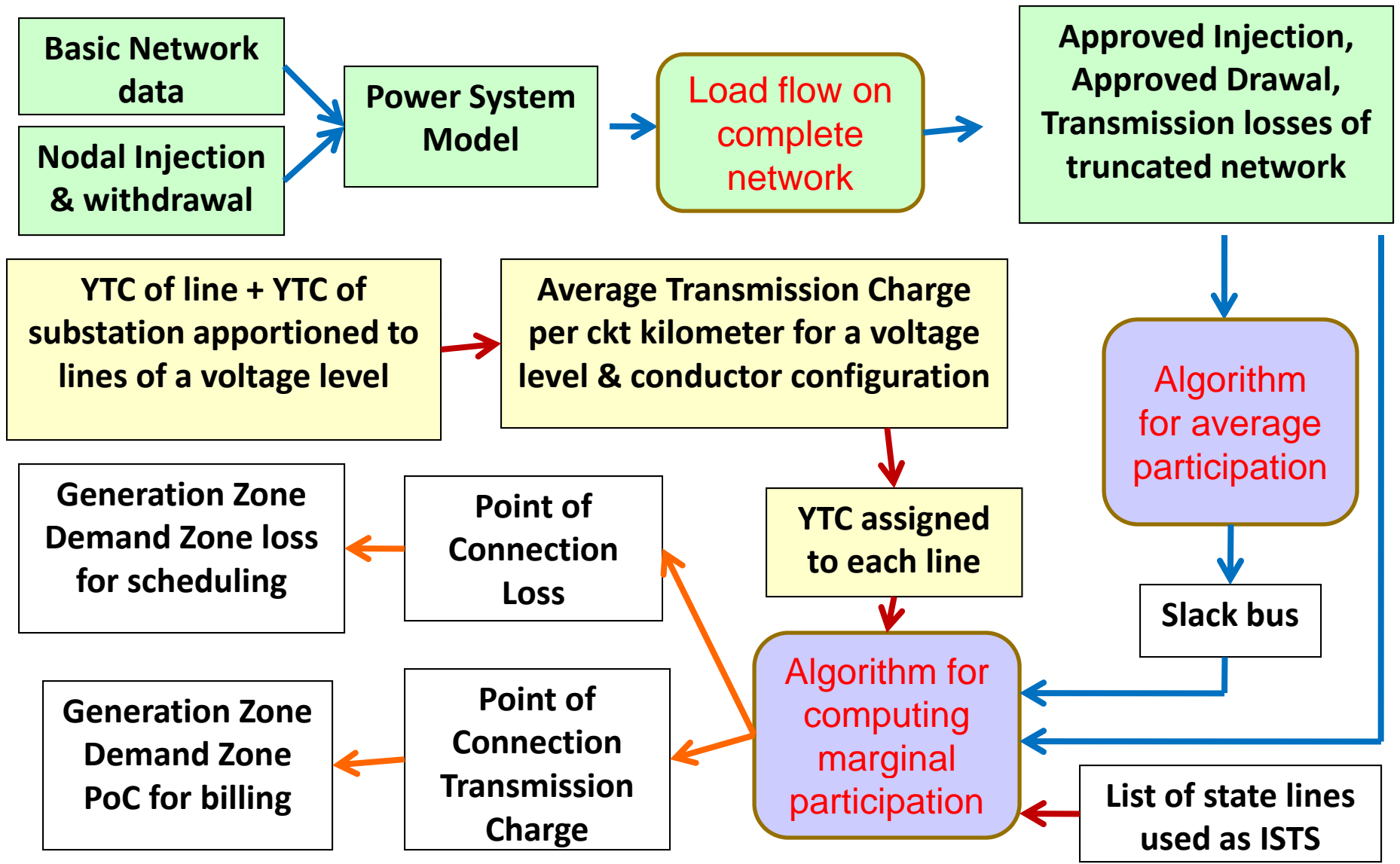
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## ■ Tracing of Power

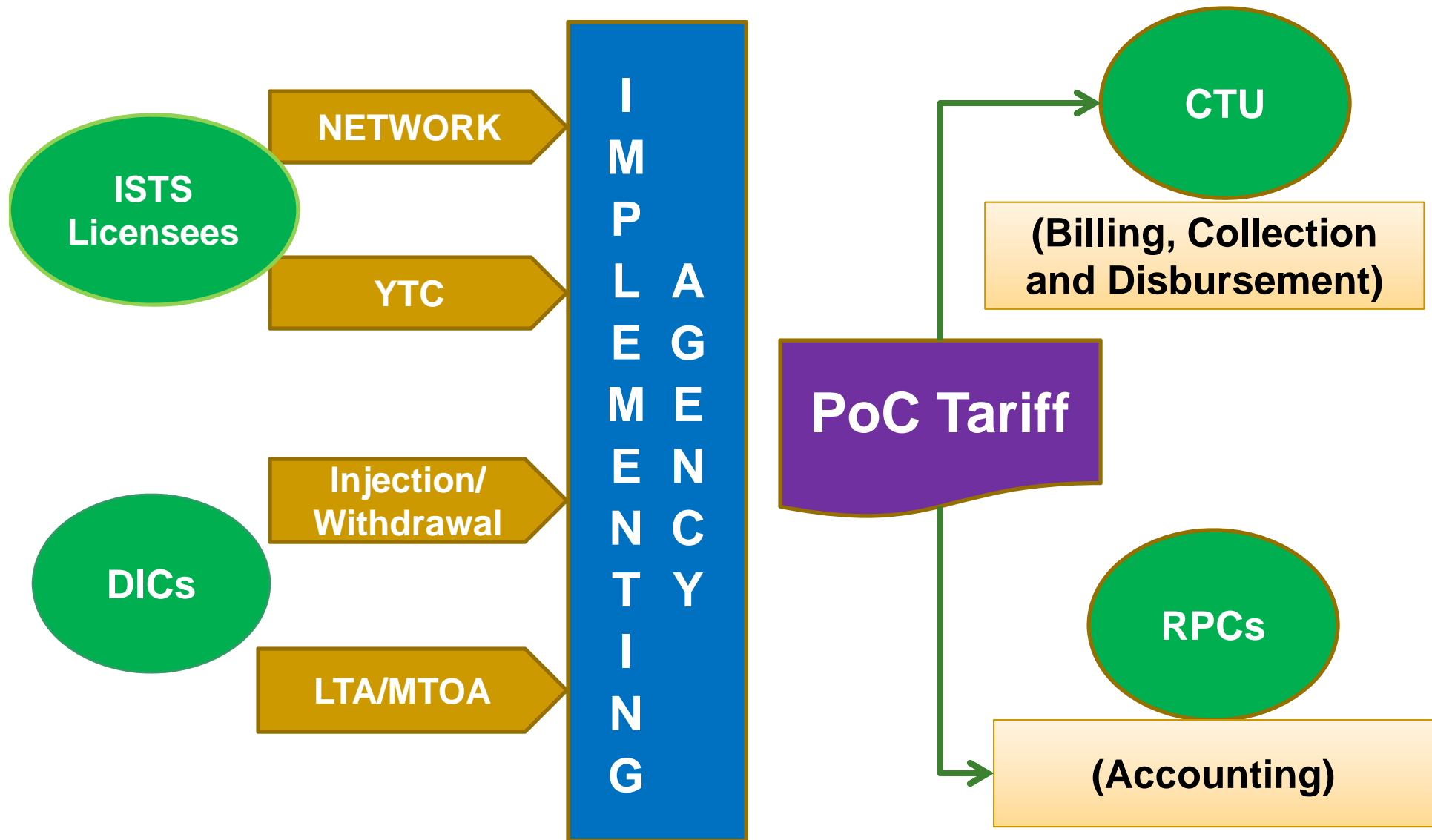
- ❑ Load Tracing
- ❑ Generator Tracing



# Information flow chart



# PoC Framework



# Distance Sensitivity

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- **Flow of electricity**

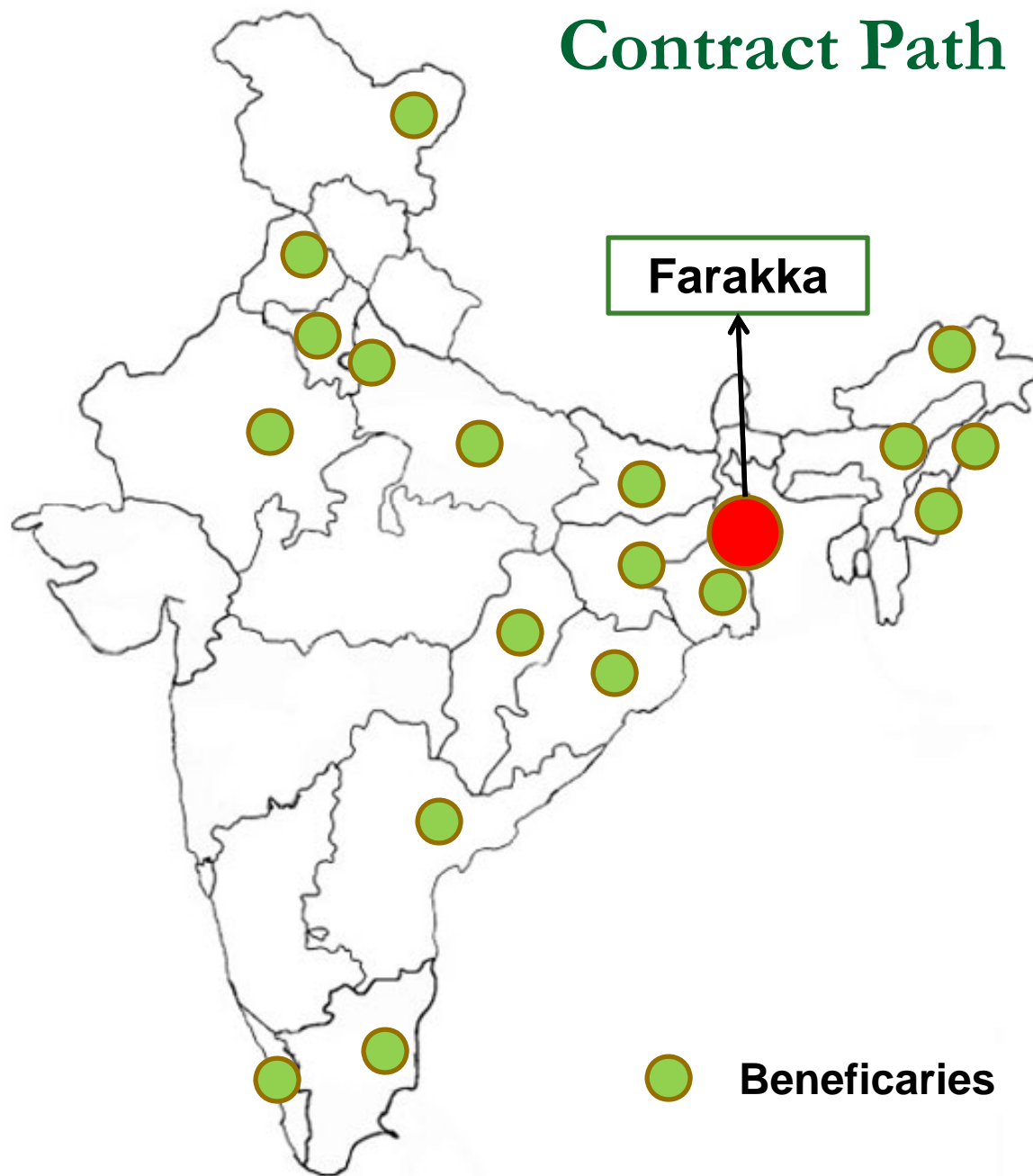
- Based on Laws of Physics
- Independent of Contract Path

- **Electrical Distance is captured in PoC Mechanism**

- Conductor Impedance
  - Charges of Transmission Lines
-

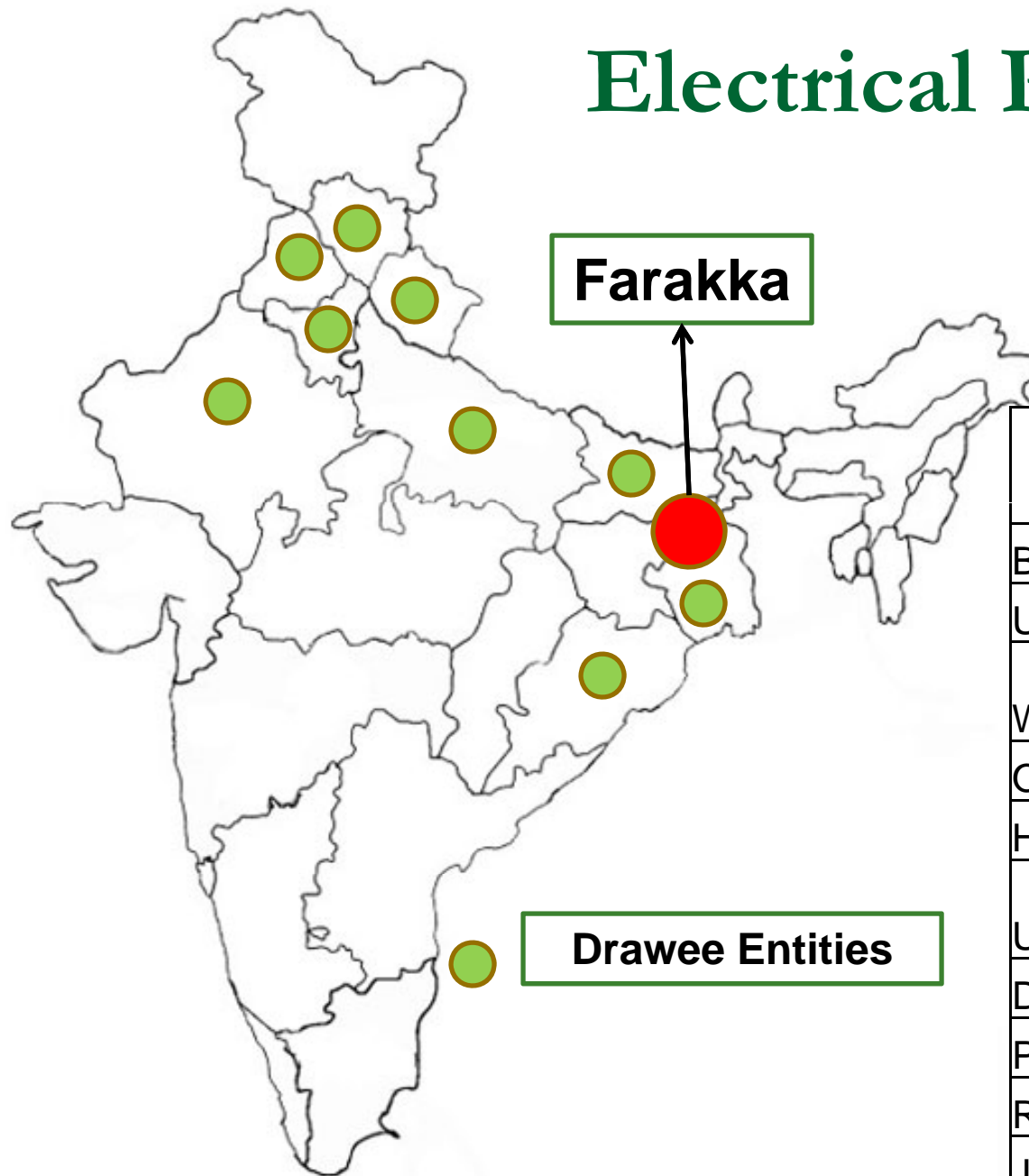


## Contract Path



State	Contract (%)
Bihar	28.74
Jharkhand	9.82
Orissa	13.63
West Bengal	30.54
Sikkim	1.63
Andhra Pradesh	1.31
Tamilnadu	1.84
Kerala	0.79
UP	2.08
Haryana	0.69
Rajasthan	0.69
J&K	0.85
Delhi	1.39
Punjab	1.39
Assam	2.68
Meghalaya	0.65
Nagaland	0.70
Arunachal	0.36
Mizoram	0.21

# Electrical Path



State	Actual Consumption*
Bihar	32.40%
UP	26.84%
West Bengal	11.15%
Orissa	8.91%
Haryana	8.34%
Uttrakhand	3.62%
Delhi	3.12%
Punjab	3.05%
Rajasthan	2.43%
Jharkhand	0.14%

\* Based on the PoC Results for 2011-2012

## Mapping from Financial Sector

---



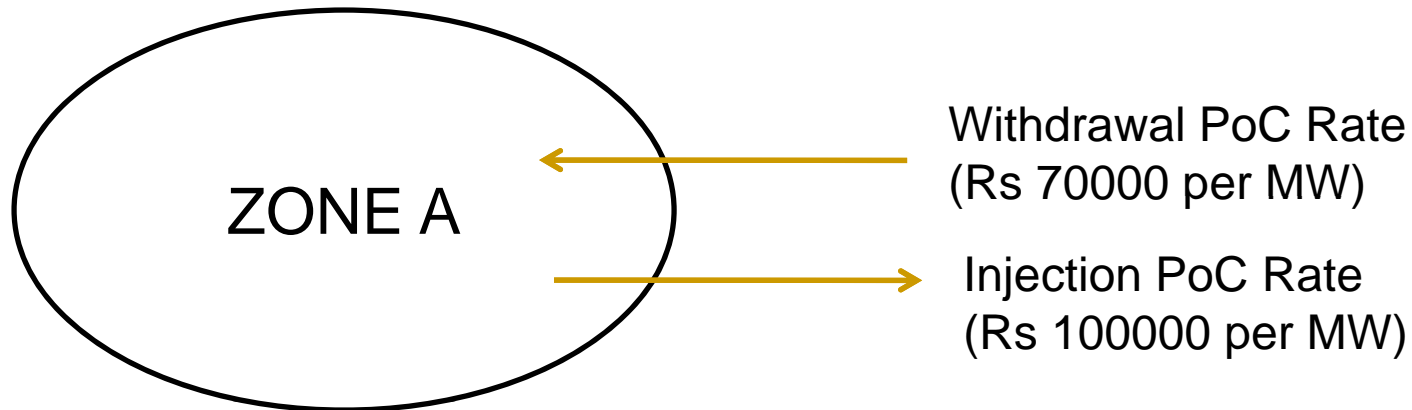
### Cournot's Behaviour Fungible

- Money may be deposited at any location
- Withdrawal from nearest source of money

Similarly, contract may be with any generator, power flow by displacement

## Direction Sensitivity

---



- Separate PoC Rates for Withdrawal and Injection
  - Generation Hub
    - High Injection PoC Rate
  - Demand Met from Local Generation
    - Low Withdrawal PoC Rate
-

# Mapping from Financial Sector

---



Deposit



Withdrawal

No Mutual adjustment even if the withdrawal and deposit quantum is same

Separate transaction charges for both

# Quantum Sensitivity

---

- **Access vs Usage**
  - **Planning based on Access**
  - **Usage reflected in PoC Rates**
  - **Access is reflected in charges payable**
-

## Certainty in Transmission Rate

---

- **Transmission Rate in Postage Stamp Method**  
**= Total Regional ISTS Charges**  
**(Total LTA of all states of a region)+ (Export LTA)**
  
  - **Variation in Total Regional ISTS Charges**
    - Approval of tariff of new assets by the Commission
  - **Variation in Total LTA**
    - Commissioning of new generators
  - **PoC Mechanism**
    - Single PoC Rate
    - Year Ahead Declaration
-

# Citing Signals

---

## ■ Hydro Generation Location

- Depend upon availability of water head
- Fixed

## ■ Liquid Fuel or Coal Fired generation

- Freight Charges vs Electron Carriage Charges

## ■ Postage Stamp method

- Signal for investment near buyer

## ■ PoC Method

- Signal for investment at efficient locations



## PoC Charges Slab Rates.....(1)

---

- **Envy Free Allocation**
  - **Min-Max Theory**
  - **Principle of Minimum Regret**
  - **Tariff Structure of other cybernetics**
  - **Learning from History**
    - Slab Rates for STOA Transmission Charges
-

## PoC Charges Slab Rates.....(2)

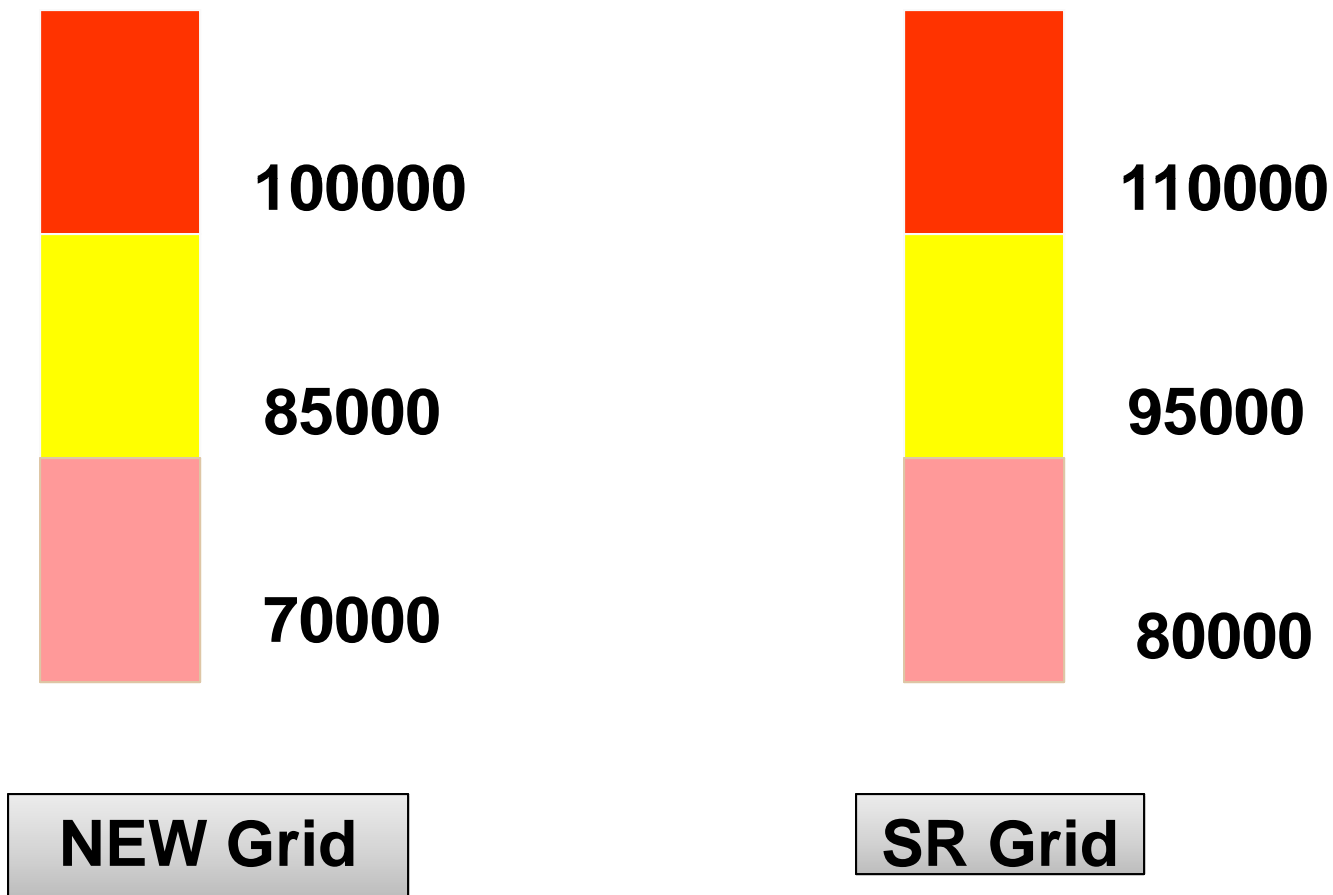
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- **Market Friendly**
- **More Stability / Certainty**
- **More Rational**
- **Lesser chances of dispute**
- **Easily comprehensible**
- **Futuristic**

## Approved Slab Rates

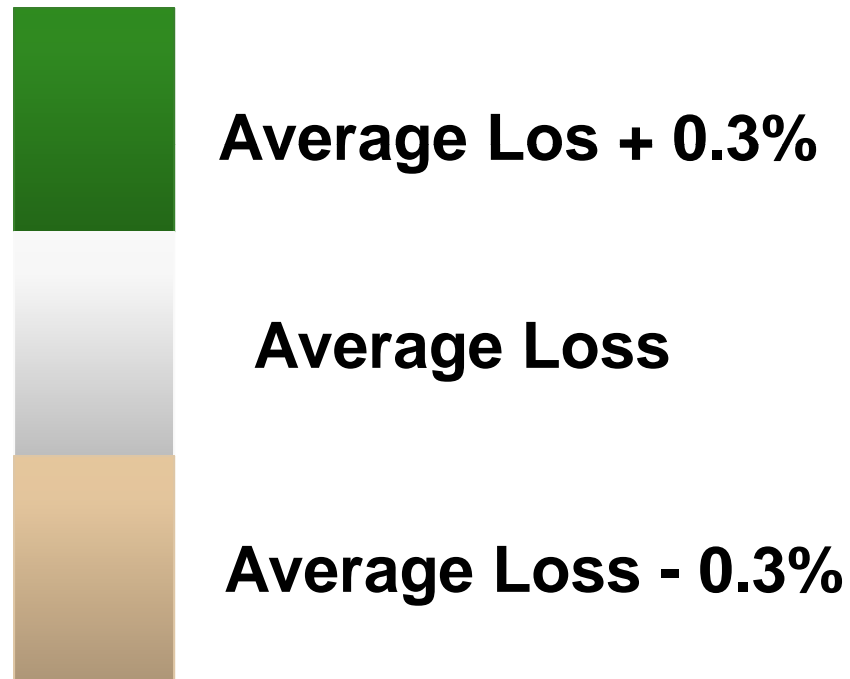
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### ■ Slab for PoC rates approved by CERC



## Slab rates for PoC Losses approved by CERC

---



## Advantages of PoC Mechanism

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- **National Integration**
  - **Fulfills Policy Mandate**
  - **Scientific and elegant way of handling complexities**
  - **Accommodates Multiple Transmission Licensee Regime**
  - **Necessary for large capacity corridors**
  - **Certainty in Transmission Rates**
  - **Market Friendly**
  - **Facilitates Competitive Bidding**
  - **No Pan caking of charges and losses**
-

## Important Numbers

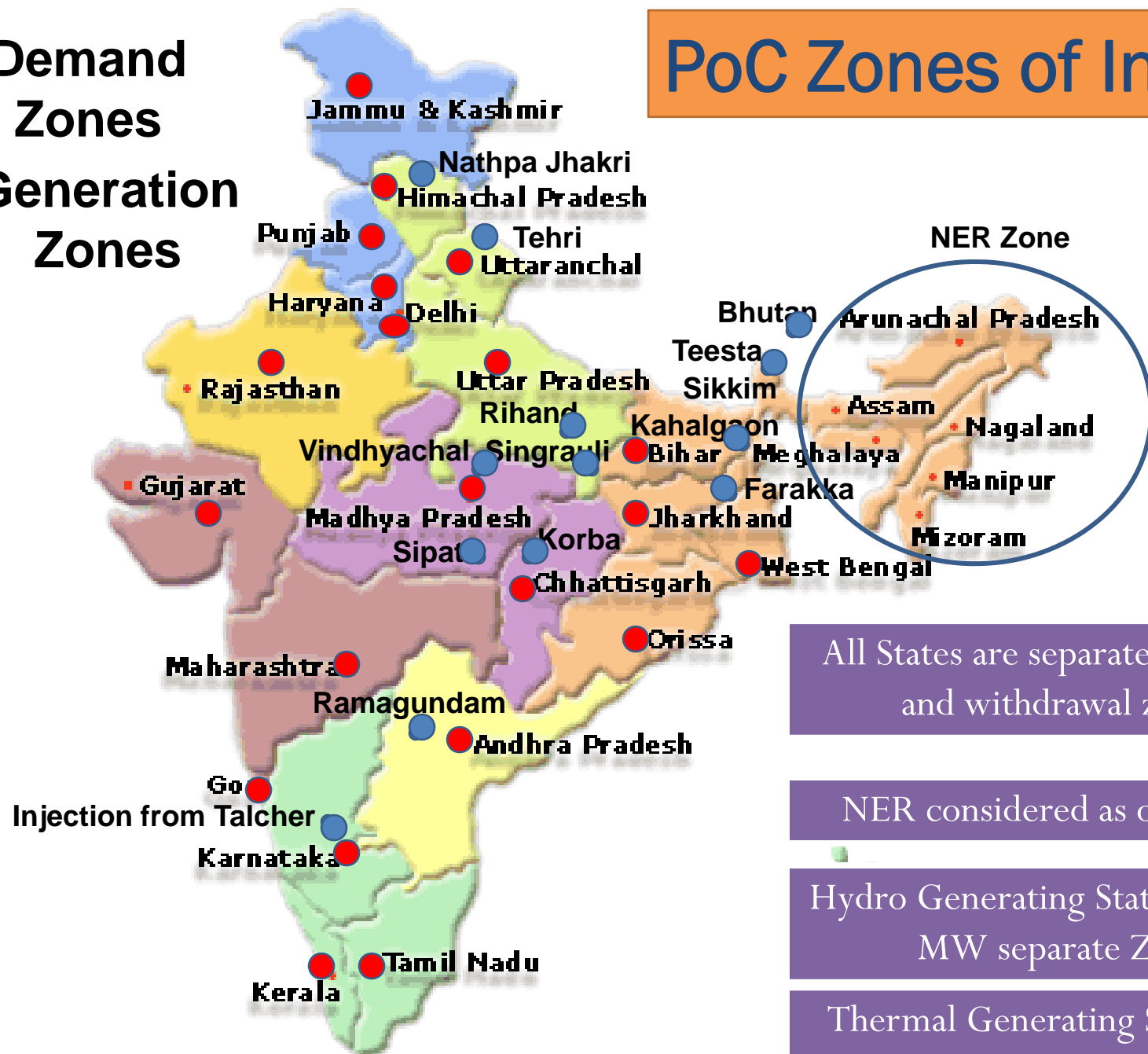
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- **Total Yearly Transmission Charges : 8700 Cr (approx)**
- **Total LTA : 47000 MW (approx)**
- **Total Zones : 74**
- **Uniform Rate**
  - NEW Grid : 80000 Rs/MW/Month
  - SR Grid : 90000 Rs/MW/Month

# PoC Zones of India

● Demand Zones

● Generation Zones



All States are separate injection and withdrawal zone

NER considered as one zone

Hydro Generating Stations > 500 MW separate Zone

Thermal Generating Stations > 1500 MW separate Zone

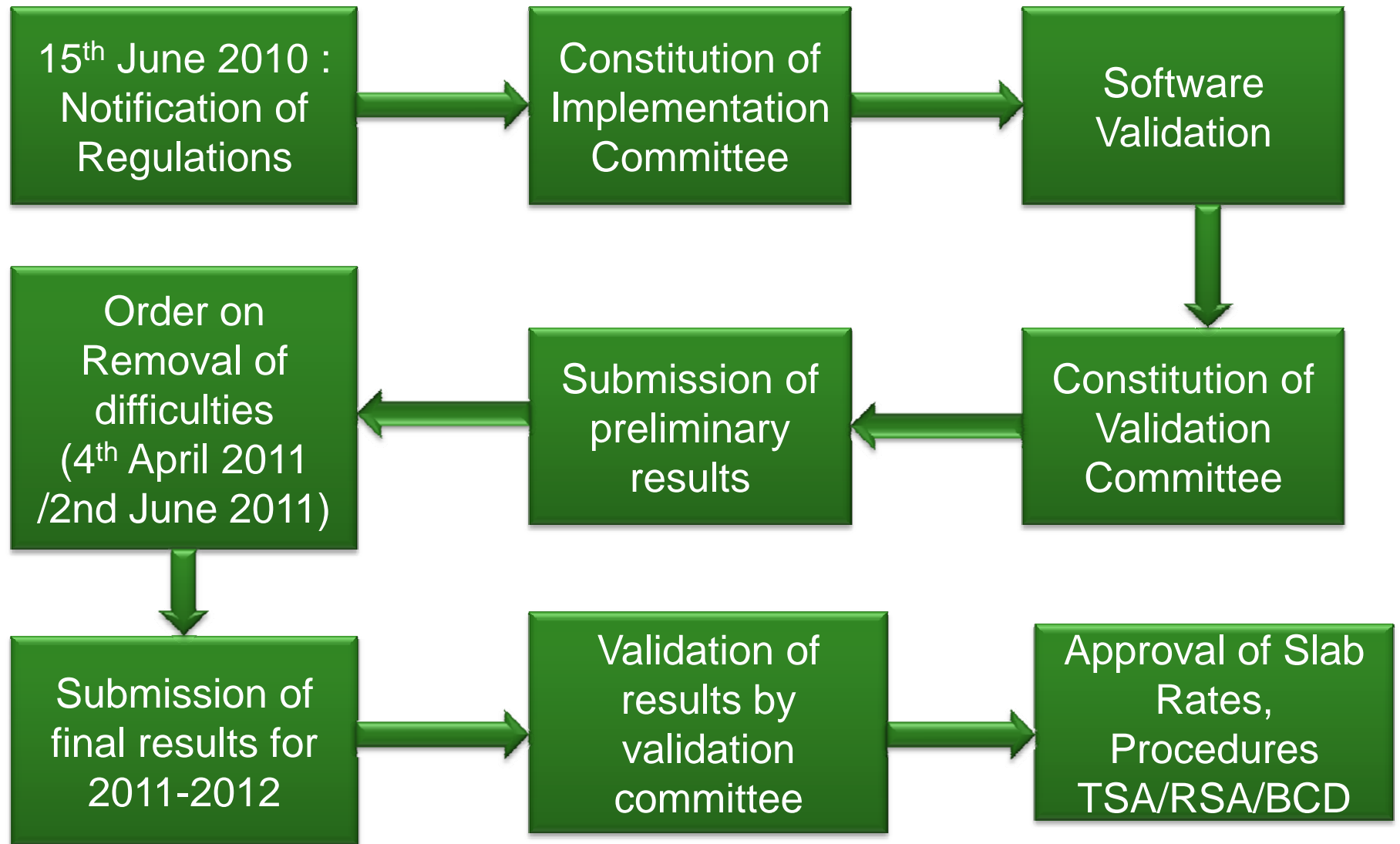
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# IMPLEMENTATION PROCESS



# Implementation Process

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Implementation w.e.f. 1<sup>st</sup> July 2011

---

# Implementation Committee.....(1)

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## ■ **Constitution of Implementation Committee**

- ❑ 6<sup>th</sup> July 2010

## ■ **Functions of the Committee**

- ❑ Undertake capacity building workshops
- ❑ Other necessary activities for ensuring timely implementation

## ■ **Members**

- ❑ Headed by CEO, POSOCO
  - ❑ Representative of CERC
  - ❑ Representative of CEA and CTU
  - ❑ Member Secretary RPCs
  - ❑ Heads of RLDCs & NLDC
  - ❑ State Representatives
    - UP, West Bengal, Maharashtra, Andhra Pradesh, Assam
-

# Implementation Committee.....(2)

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## ■ Meetings of the implementation committee

- ❑ 1<sup>st</sup> Meeting : 27<sup>th</sup> July 2010
- ❑ 2<sup>nd</sup> Meeting : 21<sup>st</sup> September 2010
- ❑ 3<sup>rd</sup> Meeting : 12<sup>th</sup> October 2010
- ❑ 4<sup>th</sup> Meeting : 16<sup>th</sup> November 2010
- ❑ 5<sup>th</sup> Meeting : 14<sup>th</sup> December 2010
- ❑ 6<sup>th</sup> Meeting : 03<sup>rd</sup> March 2011

# Software for Computation of PoC Charges

---

## ■ **Software Validation Committee**

- ❑ Constituted 6th July 2010
- ❑ Members from CERC, CEA, CTU, IA, IISc (Bangalore)
- ❑ Meetings of Software Validation Committee
  - First Meeting: 4th August 2010 at CERC
  - Second Meeting: 23rd August 2010 at CERC
  - Third Meeting :7th September 2010 at CERC
  - Fourth Meeting: 13th September 2010 at CERC
- ❑ Visit of the committee to PAL, IITB on 13<sup>th</sup> – 14<sup>th</sup> August 2010
- ❑ Users of the Software: CERC, IA

## ■ **Training onSoftware**

- ❑ 21st -22nd October 2010 (for CERC, RPC, CEA, CTU and States)
  - ❑ 3rd-4th November 2010 (for IA i.e. NLDC/RLDCs)
-

# Validation Committee

---

## ■ Constitution of Validation Committee

- ❑ 28<sup>th</sup> Sep 2010

## ■ Functions

- ❑ Validation of Basic Network and Load Flow Results
- ❑ Resolve disputes between IA and DICs

## ■ Members

- ❑ Chairman: Chief (Engg.), CERC
- ❑ Member Secretary RPCs
- ❑ GM NLDC, GM NRLDC, GM SRLDC, GM ERLDC
- ❑ Representatives from CEA
- ❑ State Representatives

## ■ Meetings

- ❑ First Meeting : 6th December 2010
  - ❑ Second Meeting: 13th December 2010
  - ❑ Third Meeting: 18th March 2011
  - ❑ Fourth Meeting: 3<sup>rd</sup> June 2011
-

# Capacity Building of Stakeholders

---

- **Two Phase Capacity Building Workshops**
- **1000 participants**

	<b>First Phase</b>	<b>Second Phase</b>
<b>Northern Region</b>	12th August 2010	15 <sup>th</sup> December 2010
<b>Southern Region</b>	17th August 2010	08th November 2010
<b>Eastern Region</b>	18th August 2010	07th December 2010
<b>North Eastern Region</b>	3rd September 2010	08th December 2010
<b>Western Region</b>	15th September 2010	24 <sup>th</sup> December 2010
<b>For Traders/PX/ISTS Licensees</b>	30 <sup>th</sup> December 2010	

# Submission of Results and Procedures

---

- **Submission of Results**
    - 22nd December 2010,
    - 20th January 2011,
    - 29th March 2011 and
    - 27th May 2011
  - **Submission of Revised Procedures : 18th March 2011**
  - **Approval of TSA/RSA/BCD : 29th April 2011**
  - **CERC Orders on Removal of Difficulties**
    - 4<sup>th</sup> April 2011
    - 2<sup>nd</sup> June 2011
    - 22<sup>nd</sup> June 2011
    - 28<sup>th</sup> June 2011
  - **Approval of Procedures : 30th June 2011**
-

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# CONCERNS OF STAKEHOLDERS

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# Increase in Transmission Charges

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- **Change in CERC norms**
    - Tariff based on 2009-14 norms
    - Provisional Tariff approved by the Commission
    - Tariff Approved In June 2011 : 2000 Cr/Annum (approx.)
  - **Inclusion of tariff of transmission system expected to be commissioned up to 30th September 2011.**
  - **Higher Withdrawal Rates**
  - **Contract with High Injection Rate Generators**
  - **Apportioning of inter regional transmission charges based on usage**
  - **Avoidance of Pancaking**
-

# Transmission Line Vintage

---

## ■ **Transmission is a service**

- ❑ Same service offered by old and new lines
- ❑ Power flow independent of vintage

## ■ **Comparison with other cybernetics**

- ❑ Same tariff in rail, road and air transport irrespective of vintage of carrier.

## ■ **Transmission Line Vintage : Distorted Price signals**

## ■ **Regional Postage Stamp**

- ❑ Independent of Vintage
-

# Uniform Charge Component

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- **Regulation provides**

- 50% Uniform Charge in total PoC Rate

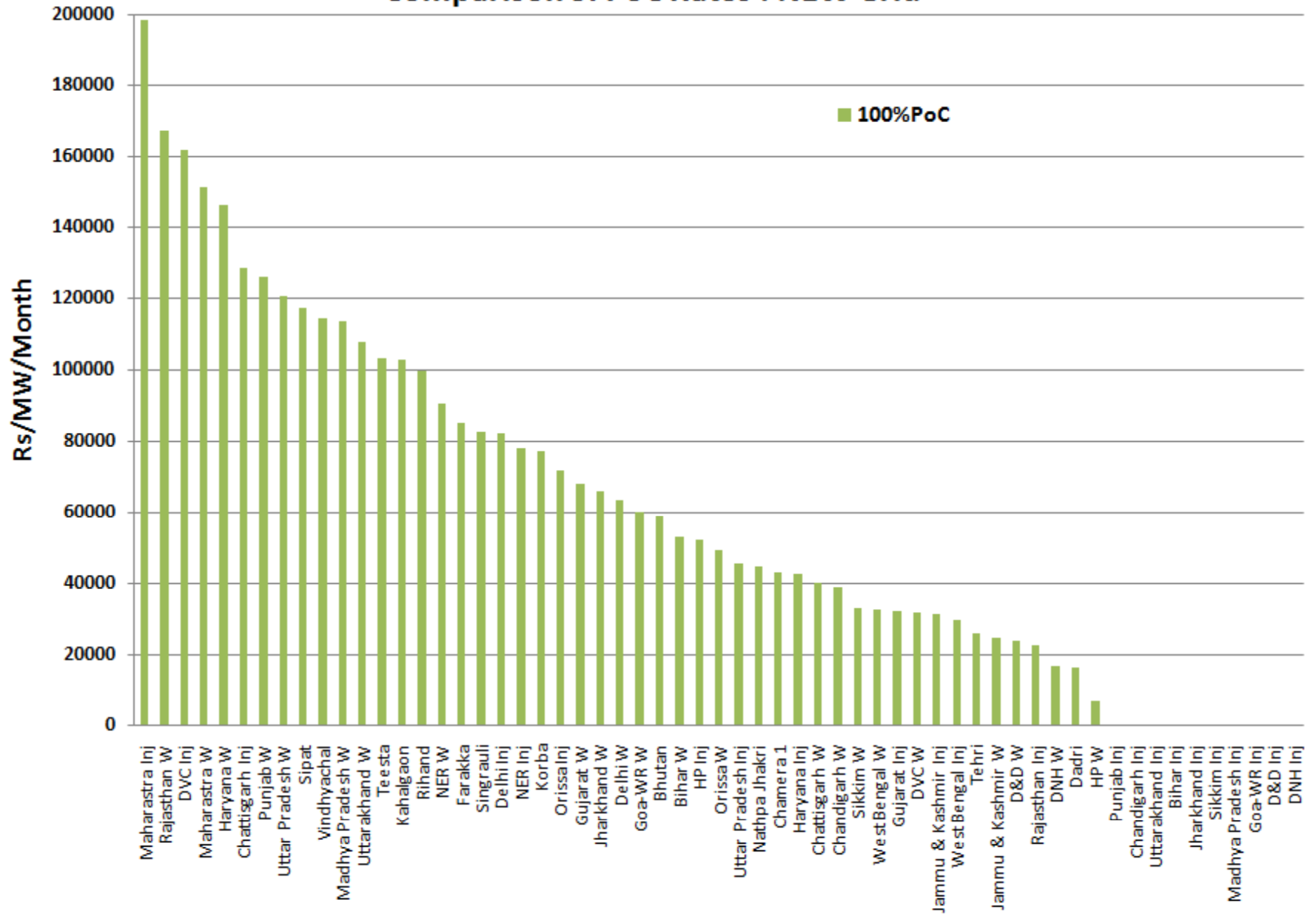
- **Discussed in SOR**

- “3.3.62 : This is a transition mechanism adopted to avoid tariff shock to any beneficiary. This may be reconsidered by the Commission after two years”*

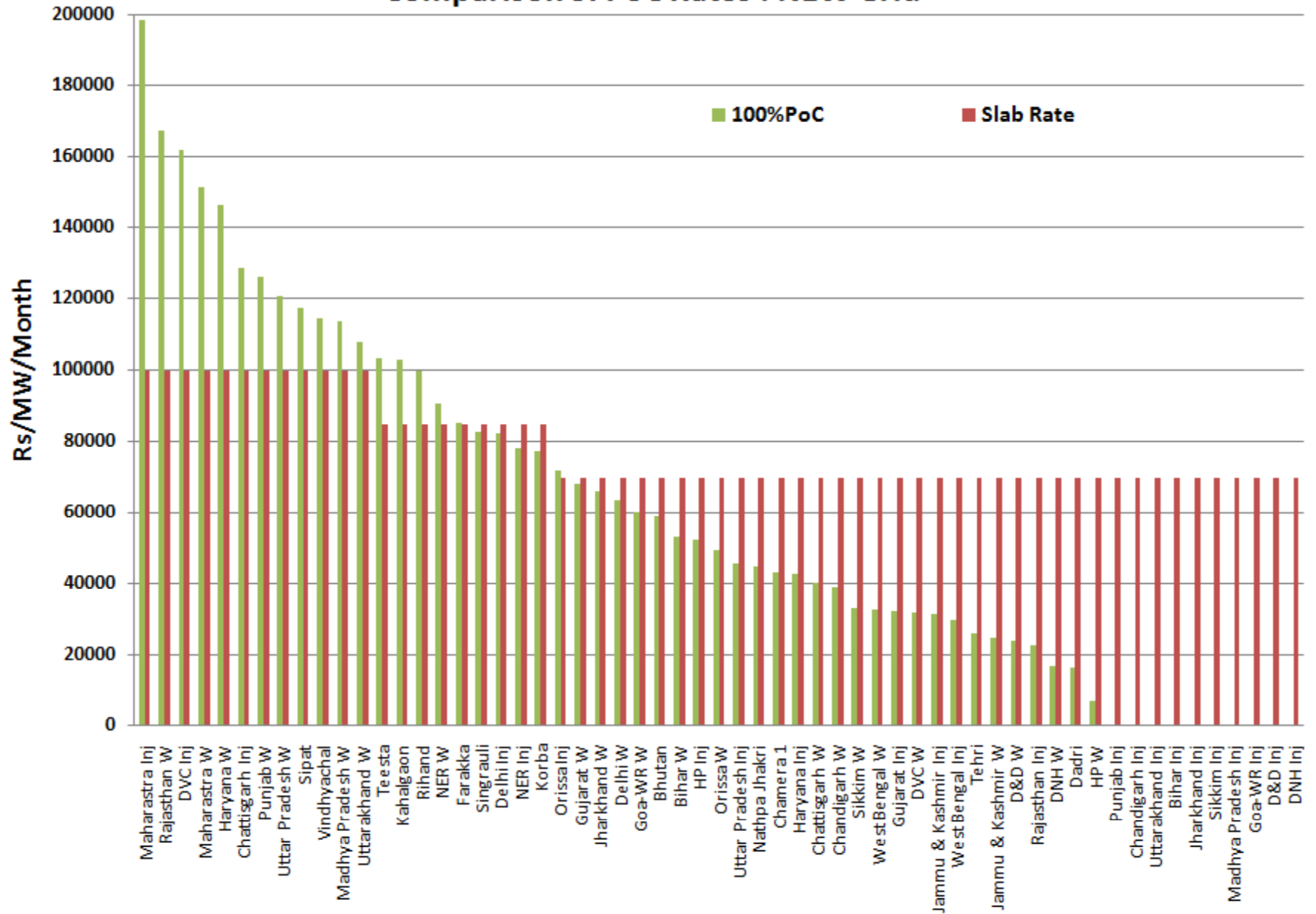
- **Fallout of 100 % PoC**

- Wide variation in PoC Rates
    - Shock during transition
-

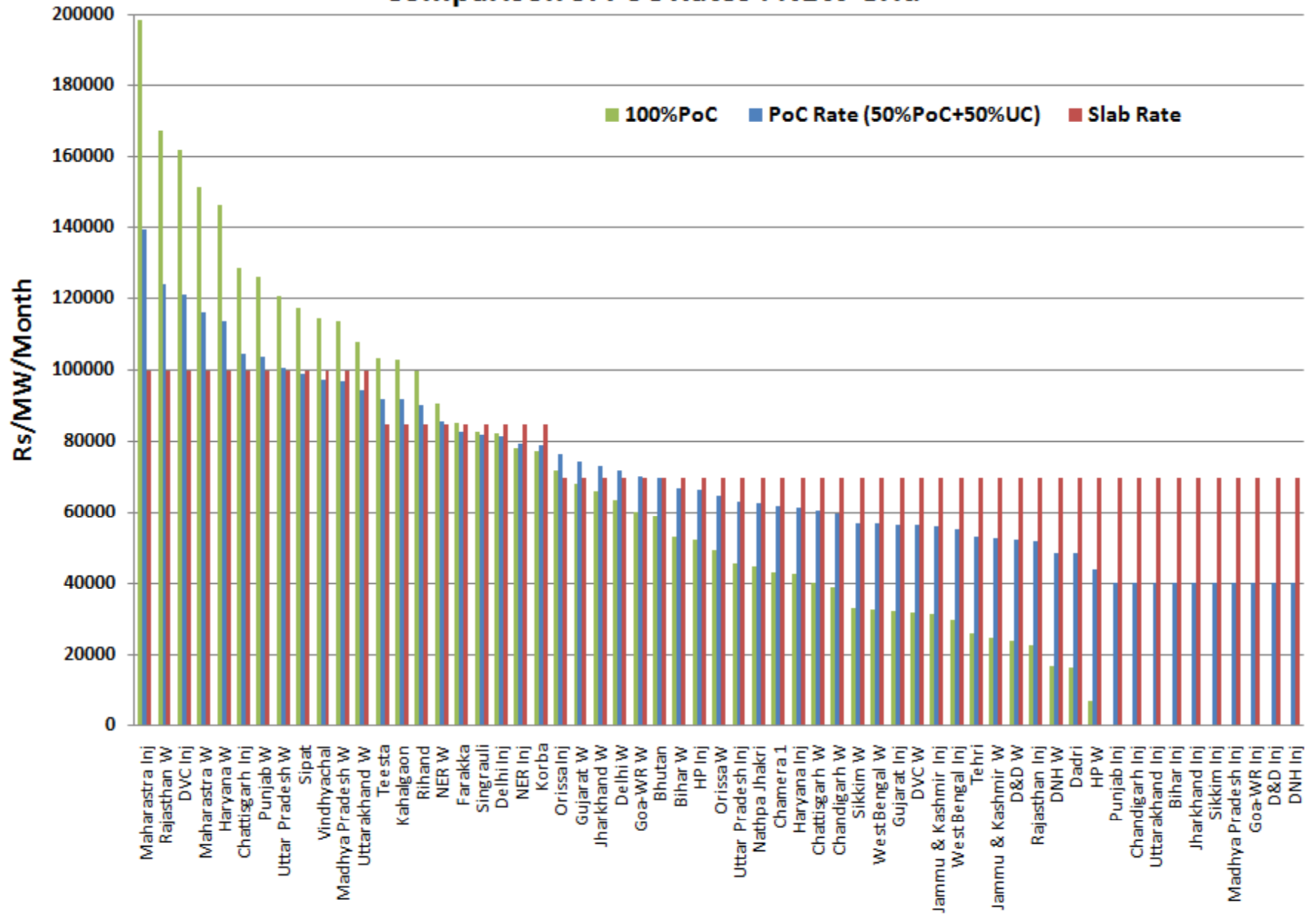
### Comparison of PoC Rates : NEW Grid

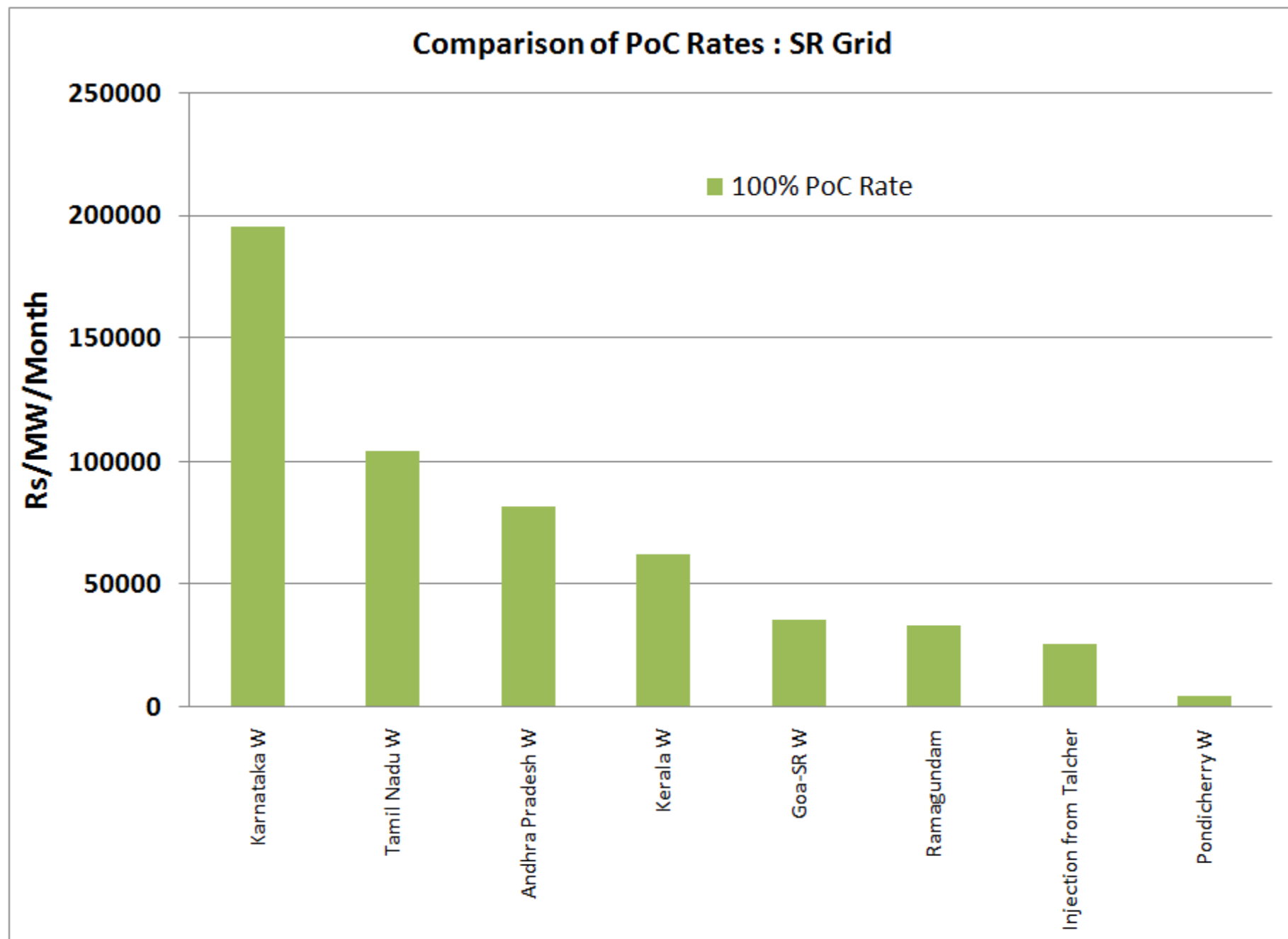


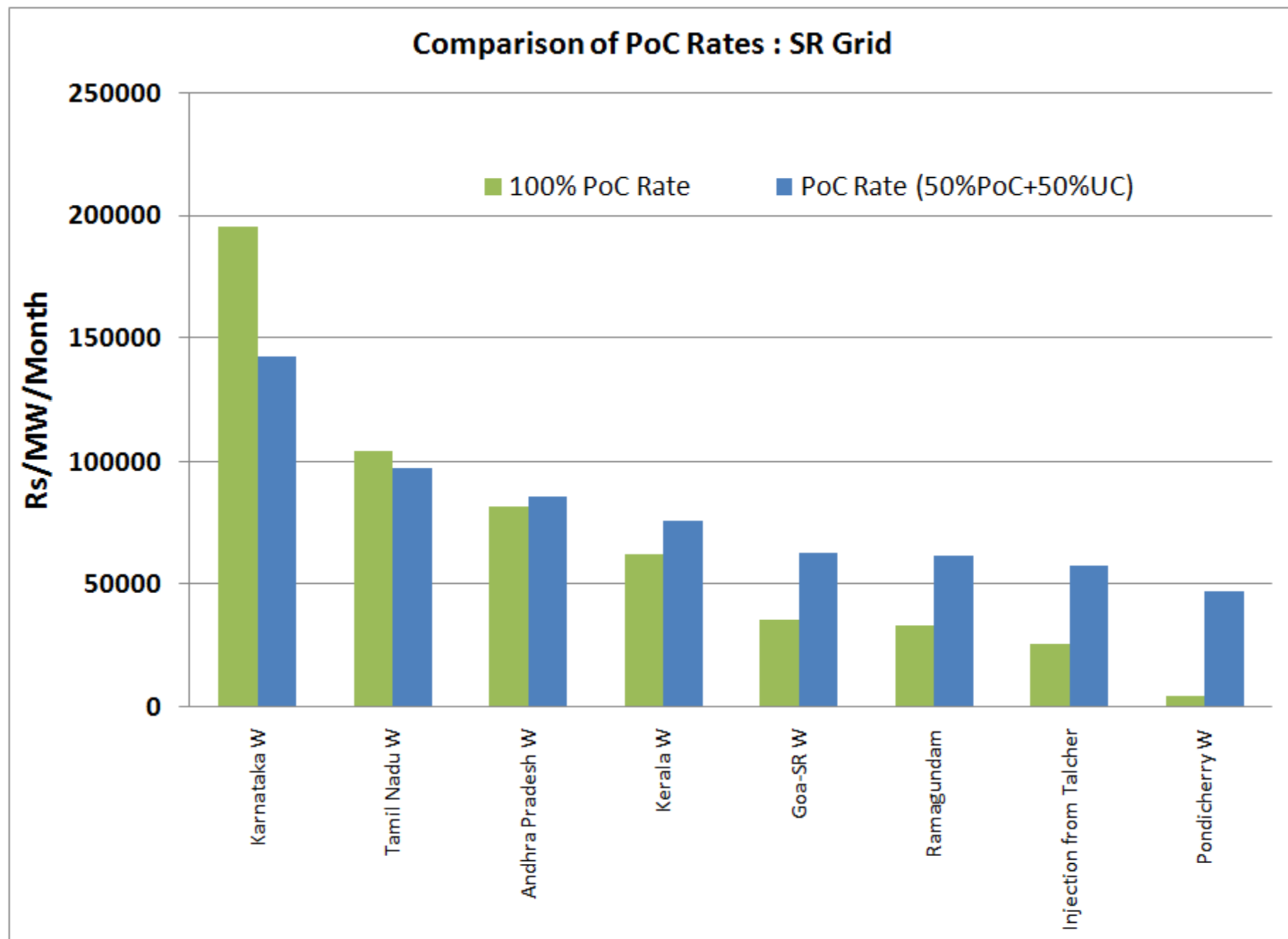
## Comparison of PoC Rates : NEW Grid



## Comparison of PoC Rates : NEW Grid

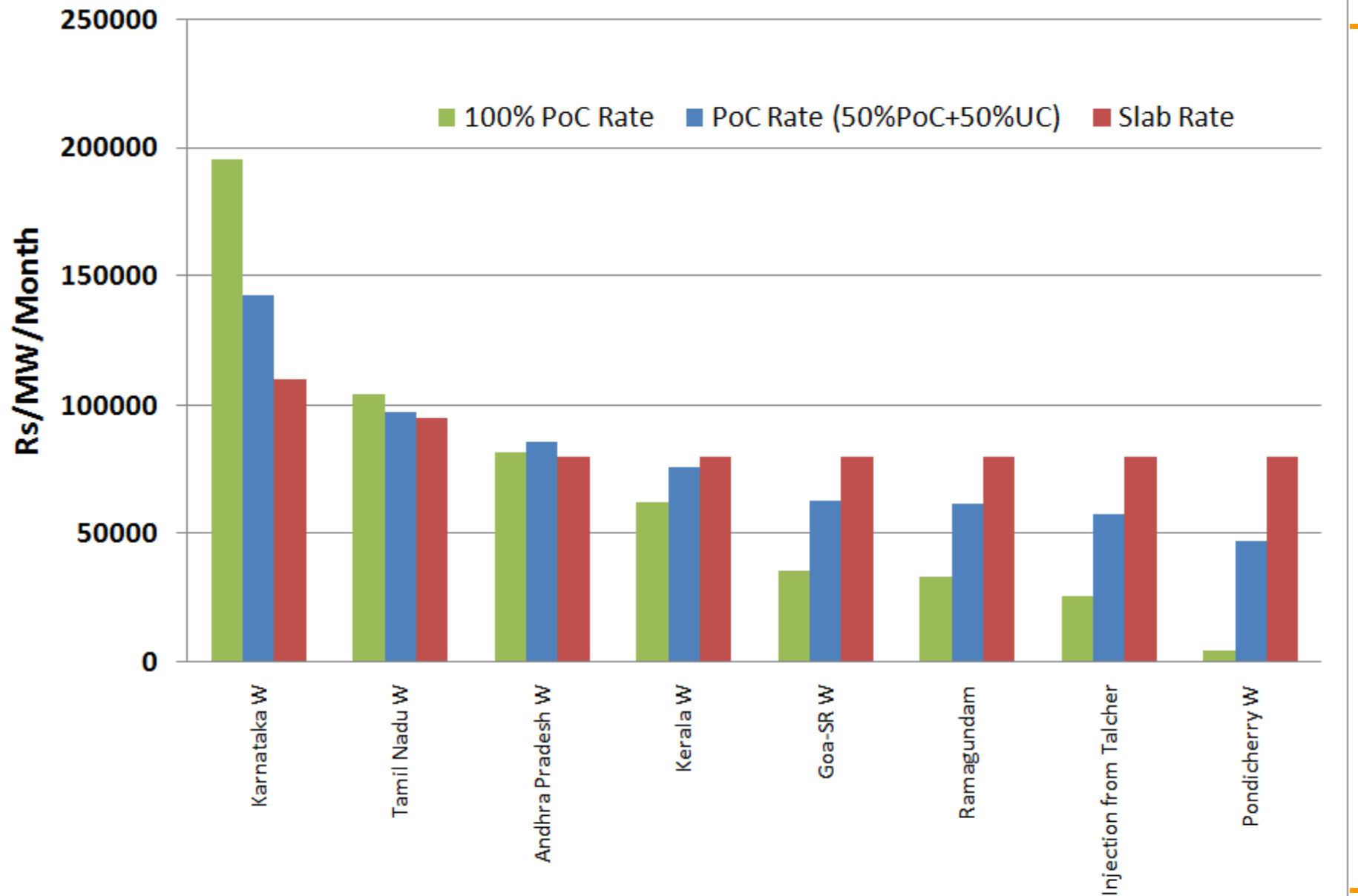








### Comparison of PoC Rates : SR Grid



## National Pool vs Regional Pool

---

- **Uniform Charge Computed separately for NEW and SR Grid**
  - **Regional boundaries losing significance**
    - Trans Regional ISGS
    - Increasing Inter Regional Flows
    - Meshed Network
  - **Regional Pool**
    - Distorted signal for planning
  - **NEP 2005 and Tariff Policy 2006**
    - National transmission tariff framework
-

## Single Scenario

---

- **Unavailability of Data**
  - **Adjustment Prone/Gaming/Disputes**
  - **Authentic Data Published by CEA**
  - **Single PoC Rate**
    - ❑ Easy to Comprehend
    - ❑ Stable Signal
    - ❑ Market Friendly
-

# High Capacity Corridors

---

## ■ **Sharing of transmission Charges**

- ❑ High Capacity transmission corridors
- ❑ Transmitting power from surplus to deficit regions

## ■ **Benefits for surplus region:**

- ❑ Increasing Reliability for surplus region
  - ❑ Risk Mitigation
  - ❑ Inherent margins allow trade in short term
-

## RPC Certified Lines

---

- **Charges of RPC Certified Lines**

- ☐ Charges shared before 15.6.2010 considered

- **Criteria for certifying new lines**

- ☐ 50% or more inter state power flow

- **Unavailability of approved Tariff**

- **RPC Certified lines charges**

- ☐ Should be excluded from ARR of STUs
-

## Way Forward

---

- **“Implement, Gain Experience & Ramp Up”**
  - **Improvements in PoC mechanism based on the experience gained**
  - **Similar Mechanism to be replicated in states.**
  - **Section 7.1(7) of the amended Tariff Policy:**  
*“After coming into effect of the CERC Regulation on the framework for inter-State transmission, a similar approach should be implemented by the SERCs in next two years for the intra-State transmission, duly considering factors like voltage, distance, direction and quantum of flow.”*
-

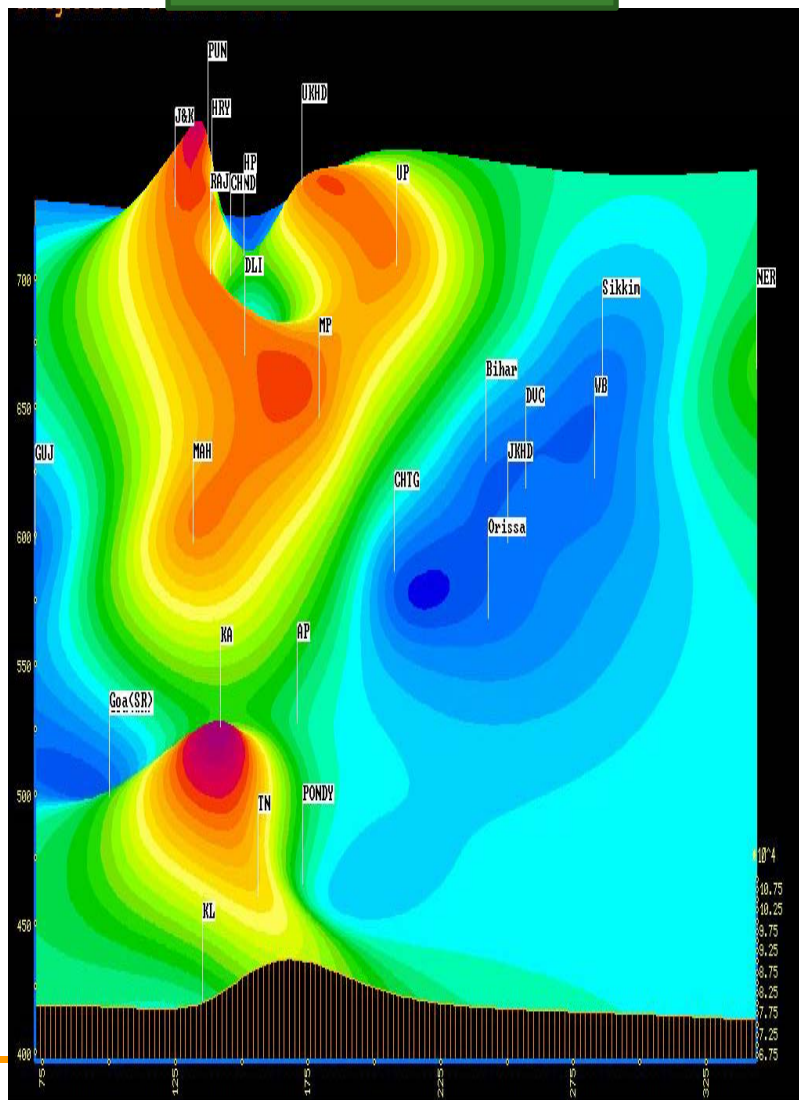
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# Thank You!

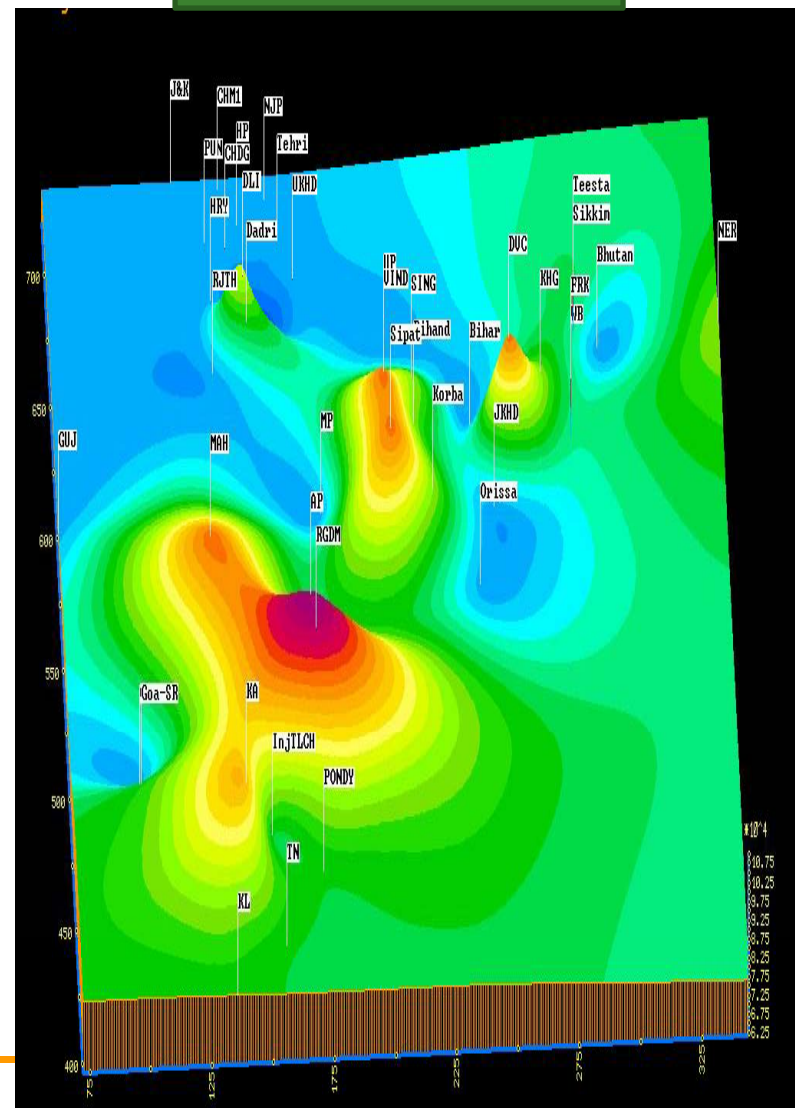
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# Slab PoC Rate (Rs/MW/Month)

## Generation PoC



## Demand PoC





## List of Sub Pools (1)

---

Sl.No	Name
1	<u>Tr. System of Sasan Ultra Mega Power Project (4000 MW)</u>
2	<u>Tr. System of Mundra Ultra Mega Power Project (4000 MW)</u>
3	<u>Tr. System associated with IPP generation projects in Raigarh and Champa Generation complex in Chhattisgarh</u>
4	<u>Tr. system associated with IPPs in M.P. and Chhattisgarh (Bilaspur)</u>
5	<u>Transmission System for Moser Baer (MP) Power Ltd.</u>
6	<u>Transmission System for Chitrangi Power Private Limited (CPPL)</u>
7	<u>Transmission System for Essar Power Gujarat Limited (EPGL)</u>

## List of Sub Pools (2)

---

Sl.No	Name
8	<u>Transmission System Associated with Krishnapatnam UMPP</u>
9	<u>Common System Associated with Coastal Energen Private Limited and Ind-Barath Power (Madras) Limited LTOA generation projects in Tuticorin area</u>
10	<u>Transmission System associated with LTOA projects in Krishnapatnam Area</u>
11	<u>Transmission System associated with LTOA projects in Srikakulam Area</u>
12	<u>Common Transmission System Associated with ISGS Projects in Vemagiri Area of Andhra Pradesh</u>

## List of Sub Pools (3)

---

Sl.No	Name
13	<u>Common Transmission System Associated with ISGS Projects in Nagapattinam / Cuddalore Area of Tamil Nadu</u>
14	<u>Transmission System for Transfer of power from IPPs in SR to NR/WR</u>
15	<u>Transmission System for Thermal PowerTech Ltd, in SR</u>
16	<u>Transmission system associated with Farakka-III</u>
17	<u>Transmission schemes for enabling import of ner/er surplus power by NR</u>
18	<u>Transmision system under the Scope of POWERGRID Strengthening System in Orissa</u>

## List of Sub Pools (4)

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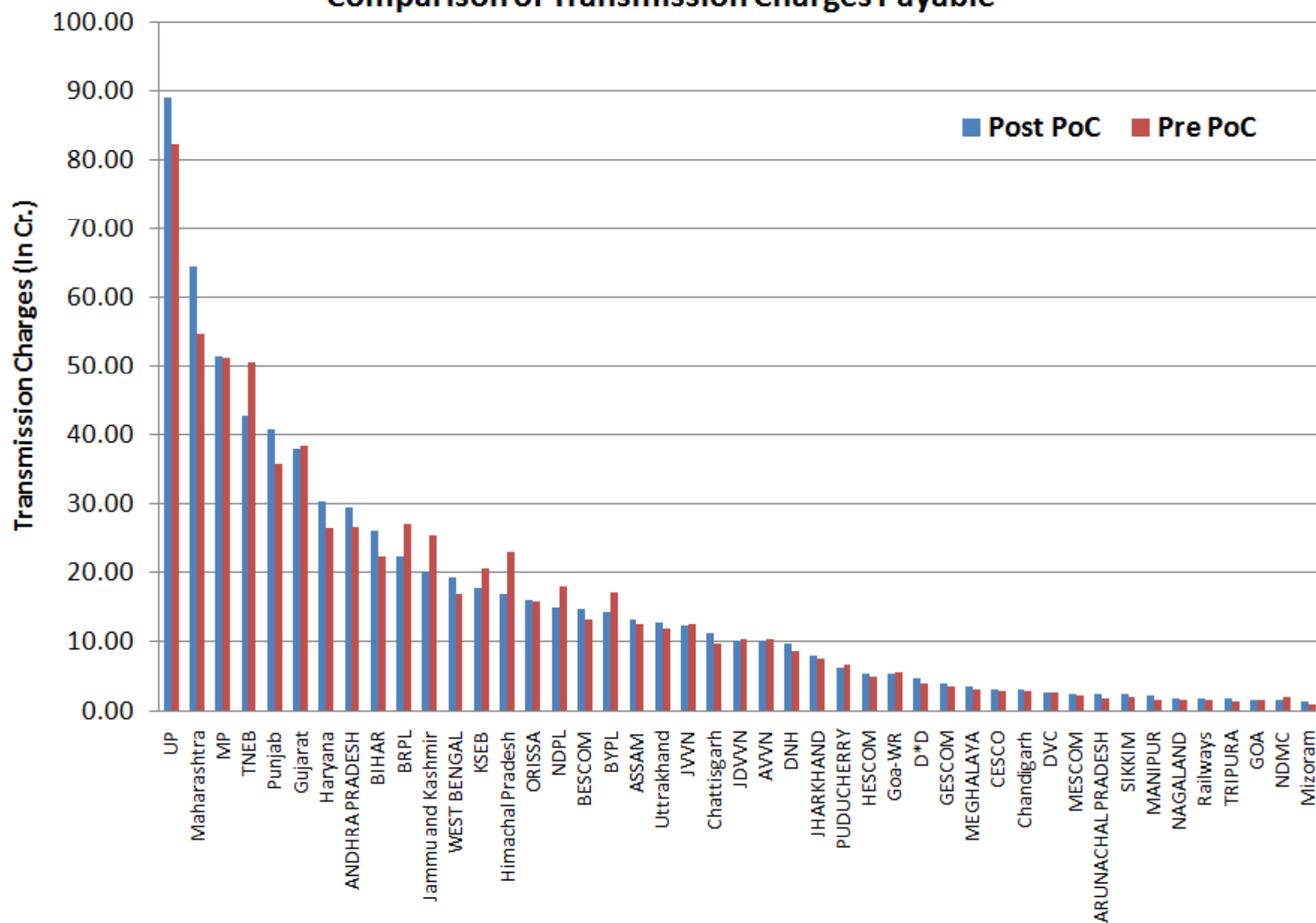
Sl.No	Name
19	<u>Evacuation of Power from Sikkim Generation Projects</u>
20	<u>Transmission System for Phase-I Generation Projects in Jharkhand &amp; West Bengal</u>
21	<u>Transmission system for Barh (1980 MW)</u>
22	<u>Kameng (600 MW ) &amp; Lower Subansiri HEP (2000 MW) Transmission system</u>
23	<u>Transmission Scheme for transfer of power from DVC projects &amp; Maithon-RB</u>
24	<u>Interconnecting lines from North Karanpura STPP to the pooling stations at Ranchi and Gaya</u>
25	<u>Immediate Evacuation System for Tilaiyya UMPP(4000MW)</u>

## List of Sub Pools (5)

---

Sl.No	Name
<u>26</u>	<u>Immediate Evacuation System for Barh-II(1320MW)</u>
<u>27</u>	<u>Immediate Evacuation System for Nabinagar(1000MW)</u>
<u>28</u>	<u>Evacuation of Power from Nabinagar-II (1980 MW) Generation Projects</u>
<u>29</u>	<u>Transmission System of Kahalgaon-II</u>

## Comparison of Transmission Charges Payable



## Comparison of PoC charges of July' 11 with existing Trans. Charges for July' 11, May &amp; June' 11

Rs. in Cr

		July' 11											May' 11 Tr. Charges	June' 11 Tr. Charges
		PoC			Pre PoC				Difference with STOA		Difference without STOA			
Region	Dic Name	PoC Charges	Less STOA	Net Trans Charge	POWERGRID ASSETS	Other ISTS	Less STOA	Net Trans Charge	In Rs. (Cr)	%	In Rs. (Cr)	%		
1	2	3	4	5 = 3 - 4	6	7	8	9 = 6 + 7 - 8	10 = 5 - 9	11=10/9	12	13		
Northern Region	ADHPL	1.34	0.18	1.16	2.82	0.27	0.3745	2.72	-1.56	-57%	-1.75	-57%	1.98	2.63
	Anpara-C	0.70	0.10	0.60	1.47	0.14	0.195	1.42	-0.81	-57%	-0.91	-57%	1.03	1.37
	UP	87.47	11.96	75.51	73.03	7.70	10.4207	70.31	5.20	7%	6.74	8%	54.72	71.76
	Uttarakhand	12.38	1.69	10.69	10.69	1.11	1.4525	10.34	0.34	3%	0.58	5%	7.8	10.2
	Punjab	39.90	5.46	34.45	33.77	3.34	4.7949	32.32	2.13	7%	2.79	8%	25.46	33.61
	Railways	1.73	0.24	1.49	1.47	0.15	0.195	1.43	0.07	5%	0.11	7%	1.03	1.37
	POWERGRID HVDC	0.03	0.00	0.02	0.02	0.00	0.0032	0.02	0.00	18%	0.00	19%		
	Jammu and Kashmir	19.57	2.68	16.90	19.78	2.37	2.9404	19.21	-2.32	-12%	-2.58	-12%	15.23	19.76
	NDPL	14.53	1.99	12.55	15.46	1.68	2.2346	14.90	-2.36	-16%	-2.60	-15%	11.93	15.65
	NDMC	1.50	0.21	1.29	1.60	0.17	0.2301	1.54	-0.25	-16%	-0.27	-15%	1.24	1.61
	BYPL	13.78	1.88	11.90	14.68	1.17	2.119	13.73	-1.83	-13%	-2.07	-13%	11.32	14.84
	BRPL	21.78	2.98	18.80	23.18	0.95	3.3495	20.79	-1.98	-10%	-2.35	-10%	17.89	23.46
	Haryana	29.62	4.05	25.57	25.04	2.47	3.49	24.02	1.55	6%	2.11	8%	18.51	24.48
	Himachal Pradesh	16.50	2.26	14.25	18.66	2.15	2.5037	18.31	-4.06	-22%	-4.31	-21%	13.51	23.52
	Chandigarh	3.00	0.41	2.59	3.07	0.26	0.4104	2.92	-0.33	-11%	-0.33	-10%	2.17	2.89
	AVVN	9.75	1.33	8.42	8.25	1.59	1.1709	8.66	-0.25	-3%	-0.08	-1%	6.31	8.13
	JVVN	11.95	1.63	10.32	10.10	2.52	1.4353	11.19	-0.87	-8%	-0.67	-5%	7.72	9.97
	JDVVN	9.75	1.33	8.42	8.25	0.95	1.1709	8.02	0.39	5%	0.56	6%	6.31	8.13
		<b>Sub - Total</b>	<b>295.30</b>	<b>40.37</b>	<b>254.93</b>	<b>271.34</b>	<b>28.99</b>	<b>38.49</b>	<b>261.84</b>	<b>-6.91</b>	<b>-3%</b>	<b>-5.03</b>	<b>-2%</b>	<b>204.16</b>
Western Region	Torrent Power	2.80	0.38	2.42	5.94	0.26	0.6955	5.50	-3.08	-56%	-3.40	-55%	4.75	5.3
	HVDC Vindhyachal	0.01	0.00	0.01	0.01	0.00	0.0013	0.01	0.00	26%	0.00	29%	0.01	0.01
	PTC(LANCO Amarkantak)	3.00	0.41	2.59	4.45	0.19	0.5217	4.12	-1.53	-37%	-1.64	-35%	3.56	3.98
	JINDAL	5.00	0.68	4.32	7.42	0.32	0.8694	6.87	-2.55	-37%	-2.74	-35%	5.94	6.63
	MPAKVNL Indore	0.23	0.03	0.20	0.19	0.01	0.0225	0.18	0.02	13%	0.03	16%	0.16	0.17
	MP	50.47	6.93	43.54	45.48	2.36	4.9107	42.93	0.61	1%	2.63	6%	37.22	41.73
	Maharashtra	63.13	8.63	54.50	52.93	2.53	5.9806	49.48	5.02	10%	7.67	14%	41.9	48.01
	HWP	0.18	0.03	0.16	0.22	0.01	0.026	0.21	-0.05	-22%	-0.05	-20%	0.22	0.2
	Gujarat	37.16	5.08	32.08	36.56	1.77	4.231	34.10	-2.02	-6%	-1.17	-3%	29.4	33.27
	DNH	9.34	1.28	8.06	8.11	0.40	0.9508	7.56	0.50	7%	0.83	10%	6.57	7.32
	Goa-WR	5.17	0.71	4.46	5.04	0.25	0.5905	4.70	-0.24	-5%	-0.12	-2%	4.14	4.61
	Chattisgarh	10.88	1.49	9.39	9.20	0.44	1.0012	8.64	0.75	9%	1.24	13%	7.25	8.02
	D*D	4.47	0.61	3.86	3.84	0.18	0.4504	3.57	0.28	8%	0.45	11%	3.07	3.46
	APL MUNDRA	1.40	0.19	1.21	2.97	0.13	0.3478	2.75	-1.54	-56%	-1.70	-55%	2.37	2.65
HVDC Bhadrawati	0.05	0.01	0.04	0.04	0.00	0.0044	0.03	0.01	26%	0.01	27%	0.03	0.03	

	<b>Sub -Total</b>	<b>193.29</b>	<b>26.46</b>	<b>166.84</b>	<b>182.41</b>	<b>8.85</b>	<b>20.60</b>	<b>170.65</b>	<b>-3.81</b>	<b>-2%</b>	<b>2.04</b>	<b>1%</b>	<b>146.59</b>	<b>165.39</b>
Southern Region	PG HVDC SR	0.11	0.02	0.09	0.12		0.0126	0.11	-0.01	-14%	-0.01	-10%		
	TNEB	41.86	5.69	36.17	47.93		5.1656	42.76	-6.59	-15%	-6.07	-13%	38.7	38.68
	LANCO KONDAPALLI PPL	3.85	0.52	3.33	5.99		0.6894	5.30	-1.97	-37%	-2.14	-36%	4.98	4.84
	PUDUCHERRY	5.89	0.80	5.09	6.63		0.7649	5.87	-0.78	-13%	-0.74	-11%	5.53	5.37
	KSEB	17.24	2.34	14.90	19.42		2.2302	17.19	-2.29	-13%	-2.18	-11%	17.35	16.87
	GOA	1.52	0.21	1.31	1.72		0.1967	1.52	-0.21	-14%	-0.20	-12%	1.42	1.38
	GESCOM	3.81	0.52	3.29	3.82		0.4166	3.40	-0.12	-3%	-0.01	0%	23.21	22.57
	CESCO	3.04	0.41	2.63	3.05		0.3333	2.72	-0.09	-3%	-0.01	0%		
	BESCOM	14.24	1.94	12.30	14.26		1.5588	12.70	-0.40	-3%	-0.02	0%		
	MESCOM	2.39	0.33	2.07	2.39		0.2617	2.13	-0.06	-3%	0.00	0%		
	HESCOM	5.22	0.71	4.51	5.22		0.5711	4.65	-0.14	-3%	0.00	0%		
	ANDHRA PRADESH	28.75	3.91	24.84	33.37		3.7065	29.66	-4.82	-16%	-4.62	-14%	27.13	26.38
	<b>Sub -Total</b>	<b>127.92</b>	<b>17.39</b>	<b>110.53</b>	<b>143.92</b>	<b>0.00</b>	<b>15.91</b>	<b>128.01</b>	<b>-17.48</b>	<b>-14%</b>	<b>-16.00</b>	<b>-11%</b>	<b>118.32</b>	<b>116.09</b>
Eastern Region	SIKKIM	2.26	0.31	1.95	1.44	0.22	0.1859	1.47	0.48	32%	0.60	36%	1.26	1.3
	WEST BENGAL	18.87	2.58	16.29	12.47	1.89	1.5907	12.77	3.52	28%	4.51	31%	10.69	11.14
	ORISSA	15.62	2.14	13.49	10.94	1.76	1.3524	11.35	2.14	19%	2.92	23%	9.28	9.91
	POWERGRID PUSAULI	0.02	0.00	0.02	0.01	0.00	0.0016	0.01	0.01	80%	0.01	81%		
	JHARKHAND	7.75	1.06	6.69	5.26	0.82	0.66	5.42	1.27	23%	1.67	28%	4.58	4.76
	BIHAR	25.46	3.48	21.98	17.01	2.48	2.1933	17.30	4.68	27%	5.97	31%	14.74	15.36
	DVC	2.51	0.34	2.17	2.39	0.29	0.2096	2.47	-0.30	-12%	-0.17	-6%	1.4	1.42
	Sterlite												3.25	3.88
	<b>Sub -Total</b>	<b>72.50</b>	<b>9.91</b>	<b>62.59</b>	<b>49.52</b>	<b>7.46</b>	<b>6.19</b>	<b>50.79</b>	<b>11.80</b>	<b>23%</b>	<b>15.52</b>	<b>27%</b>	<b>45.20</b>	<b>47.77</b>
NER	ARUNACHAL PRADESH	2.31	0.32	2.00	1.89		0.0889	1.81	0.19	11%	0.42	22%	1.68	1.72
	ASSAM	12.75	1.74	11.01	11.35		0.5984	10.75	0.25	2%	1.40	12%	10.08	10.33
	MANIPUR	2.13	0.29	1.84	1.62		0.0665	1.55	0.29	18%	0.51	31%	1.49	1.48
	MEGHALAYA	3.52	0.48	3.04	3.17		0.1696	3.00	0.04	1%	0.36	11%	2.83	2.89
	Mizoram	1.26	0.17	1.09	1.05		0.0499	1.00	0.09	9%	0.21	21%	0.93	0.95
	NAGALAND	1.78	0.24	1.54	1.61		0.0869	1.53	0.01	1%	0.17	10%	1.49	1.46
	TRIPURA	1.69	0.23	1.46	1.29		0.053	1.24	0.22	18%	0.40	31%	1.17	1.18
	<b>Sub -Total</b>	<b>25.46</b>	<b>3.48</b>	<b>21.98</b>	<b>21.99</b>	<b>0.00</b>	<b>1.11</b>	<b>20.88</b>	<b>1.10</b>	<b>5%</b>	<b>3.47</b>	<b>16%</b>	19.67	20.01
	<b>Grand Total</b>	<b>714.47</b>	<b>97.61</b>	<b>616.86</b>	<b>669.17</b>	<b>45.30</b>	<b>82.31</b>	<b>632.16</b>					<b>533.94</b>	<b>622.64</b>

1. Karnataka Tr. Charges are in total as per monthly reports

2. May & June charges are compiled from monthly reports input files.





Presentation to  
Forum of Regulators

Policy and Regulatory Interventions for Promotion of  
Community Level Off Grid Projects

Supported by:



October 2011



# Agenda

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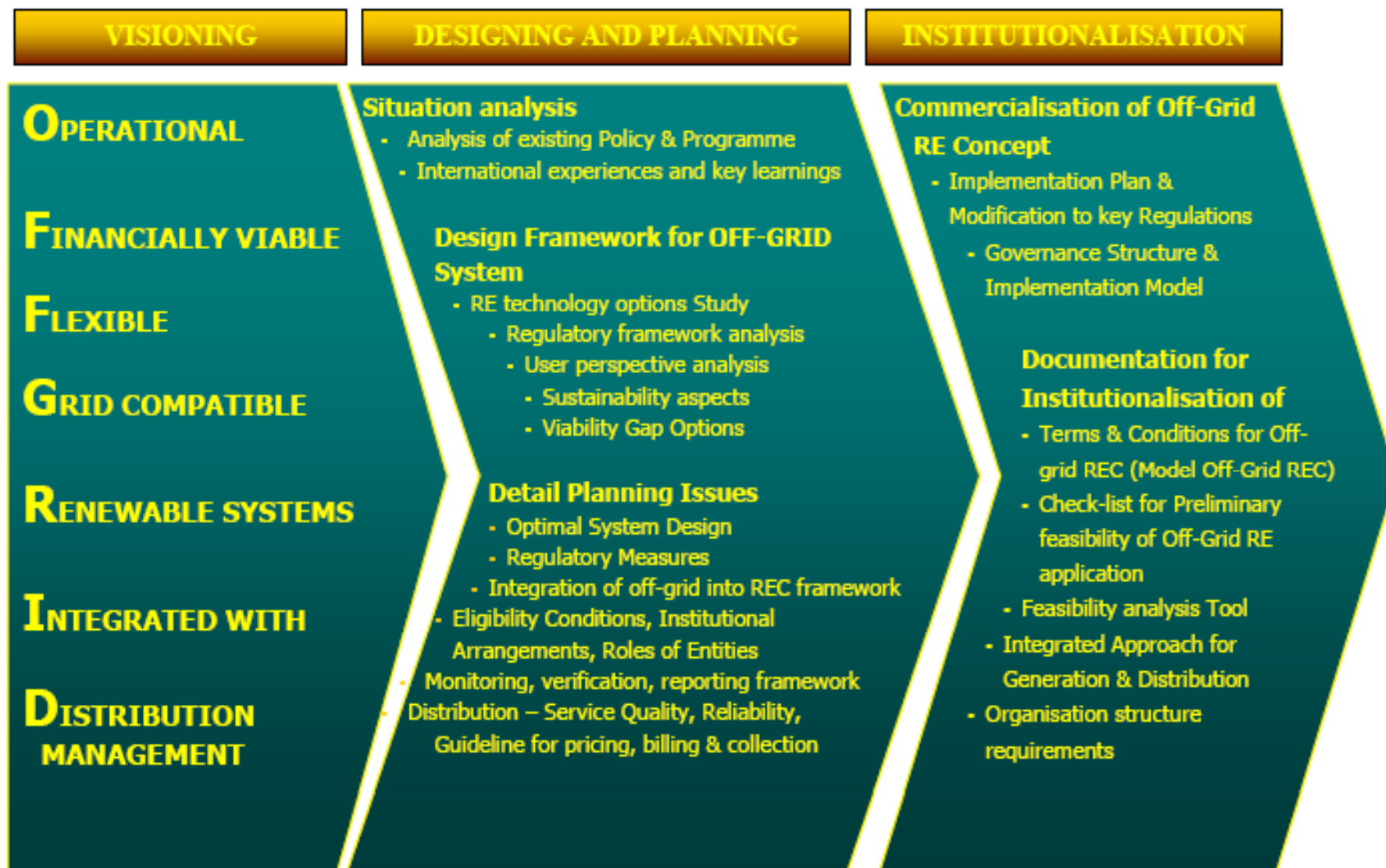
- Background, Approach & Methodology
- Legal & Policy Analysis
- Challenges in Off-Grid Rural Electrification
- Proposed Business Models for Community Level Off-Grid Projects

# Background

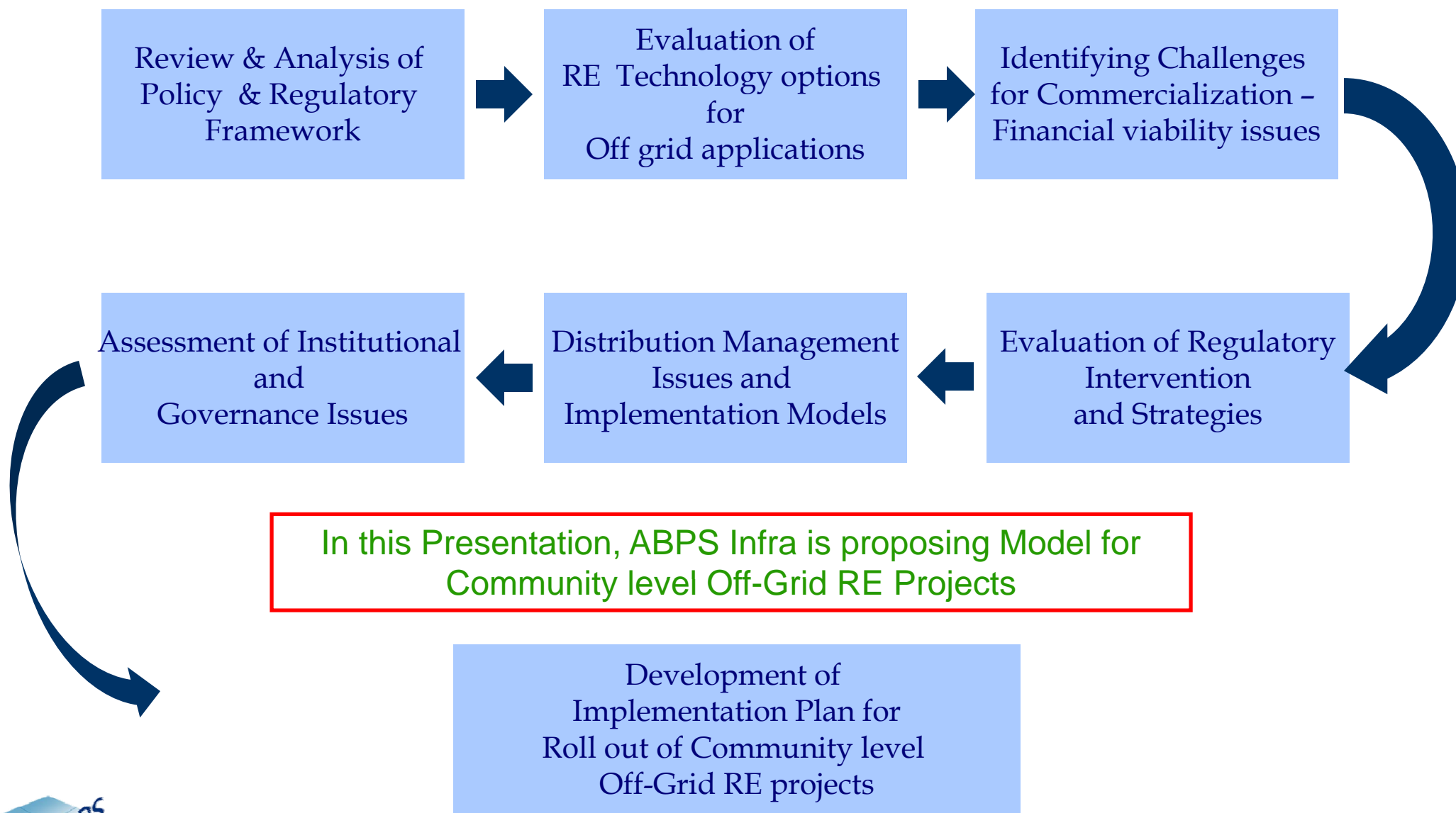
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- Mission to bring electricity services to ALL by 2012 is on
- Out of 6 lakh villages, only 14,000 are remaining
- However, 55% of rural & 12% of urban households are yet to be electrified
- Several of these households are in un electrified villages, *padas, bastis*.
- Typically these habitations have less than 100 households
- Even electrified villages are witnessing shortages in supply
- At the same time, local renewable resources are not being tapped
- Costs of renewable technologies is reducing with time
- It has become imperative to develop decentralized RE generation options
- ABPS Infra has been engaged by Shakti Sustainable Energy Foundation / ClimateWorks Foundation to support CERC & FOR in this initiative.

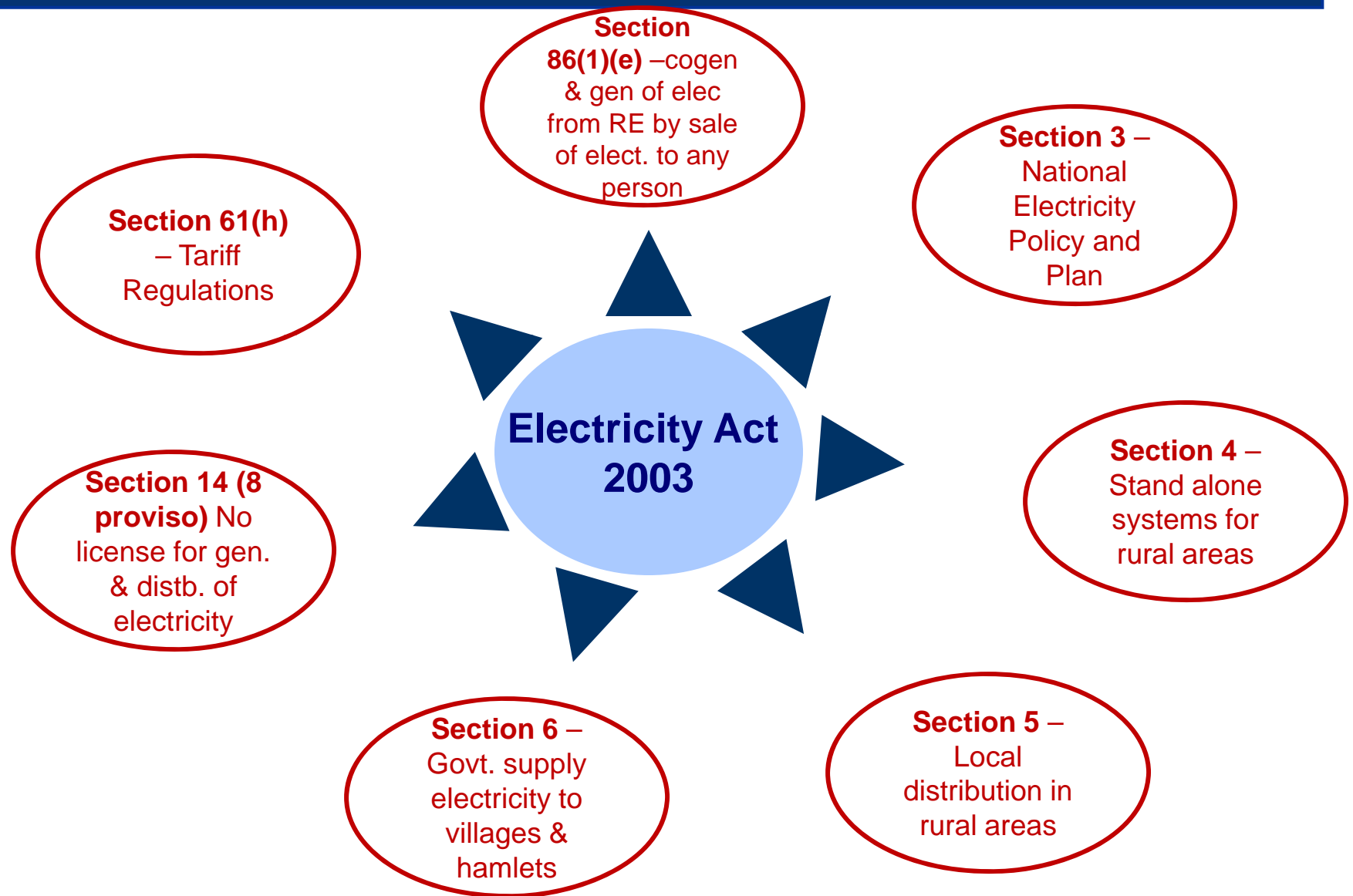
# Overall Approach



# *Methodology & Status*



# *Electricity Act, 2003 : Enabling Provisions*



# *Key Learnings from Policy Analysis*

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- Several enabling legal provisions for promotion of Renewable & Rural Electrification
- Attempt to promote every possible model
- As a result, weak or no implementation framework prescribed
- Franchisee framework has emerged over time
- No structure to implement “license exempt” framework
- Grid has reached but not “electricity”
- Different ministries pursuing different approaches



# *National & International Experiences*

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- Field Visits to following places were carried out.
  - Husk Power Systems at Japhan, Turki, Hathodi & Bhadai villages in Bihar
  - Bio-oil based power generation at Mokhayachapada, Maharashtra
  - Biogas based power generation at Jawhar, Maharashtra
  - Solar village lighting at Chondipada, Maharashtra
- Also, Micro Hydel Project in Orissa for Rural Electrification was covered.
- At the international level, several case studies were prepared.
  - Brazil
  - China
  - South Africa







## *Challenges in Off-Grid Rural Electrification*



# *Present Energy use & Willingness to Pay*

## *Present Energy Use Pattern*

### Lighting:

- Kerosene: Domestic 3 - 9lit/month (@avg price Rs 9/lit)
- DG set (300-700ml/kWh)
- Biogas (0.12 m<sup>3</sup> per hour per 100 candle power light)
- Rechargeable battery-lantern

### Commercial loads:

- Kerosene/diesel genset (265-500ml/kWh)
- Biogas (0.75 m<sup>3</sup>/kWh)

## *Willingness to Pay*

### Lighting:

- Equivalent to monthly Kerosene cost (30-120 Rs/month)
- Varies with region/area (higher with higher monetary income)
- Higher in some areas who are already using DG set electricity for light e.g. Bihar (HPS)
- Rs 5-10 per charging of lantern battery

### Commercial loads:

- Rs 10-15 per kWh (equivalent to DG price)

*Costs incurred by currently un-electrified rural households is far more than costs incurred by electrified consumers in DISCOM area;  
Per kWh tariffs paid by consumers of off-grid scheme are far higher than that of DISCOM*



# Distributed Generation Systems In Use

Load profile	Technology options	Example
High load areas (>50kW) • Rural industry • Irrigation	• Gasifier • Micro hydro	• Desi power/BERI • Many micro hydro sites
Medium load (10-20kW) • Domestic load • Livelihood/irrigation	• Gasifier • Micro hydro	• VESP pilot projects • Many micro hydro sites
Low load (<10kW) • Domestic (lighting/basic) • Commercial lighting	• SPV • Gasifier • Micro hydro	• Solar Home RVE sites • Husk Power System • VESP pilot projects • Many micro hydro sites

Most common four technologies SPV, Gasifier, Micro-Hydro & Solar-Wind Hybrid have been considered for further analysis.



# SWOT Analysis of Technology Options

## Solar Photo Voltaic

Clean, Sophisticated  
Matured, Modular  
Trouble-free

High capital,  
Lighting alone  
No productive load

Automation,  
Grid interaction  
Trouble free

No economic growth in  
absence of  
motive power

## Biomass Gasifier

Local resource  
Modular

Not mature  
High O&M cost

Livelihood creation  
Local job generation  
Local cash recycle

Sustainable biomass  
supply, lack of after  
sale service network

## Micro-Hydro

Mature, Clean, Grid  
quality

Resource site-specific  
Seasonal variation

Grid interaction ,  
economic activity

Water flow may  
change

## Solar-Wind Hybrid

Mature, Clean,  
Trouble-free

High capital,  
Lighting alone  
Resource site specific

Automation,  
Grid interaction

No economic growth  
in absence of  
motive power

Though focus of work has been on off-grid generation, it is necessary to promote systems supporting productive loads to ensure economic growth.



## *Business Models for Community Off-Grid Projects*



## *Key Reasons for development of new PRI*



- Large number of villages and hamlets are yet to be electrified.
- Where grid has reached, supply is severely constrained.
- Liquid fuels (kerosene & diesel) are being widely used for basic applications such as lighting. These are:
  - Expensive
  - Hazardous to health
- Significant local renewable energy potential still exists
- RE though cheaper than kerosene, expensive than grid supply
- However, existing policies/programmes are inadequate for large scale deployment of off-grid generation projects

**It is necessary to promote distributed generation to strengthen supply**





## *Two distinct but interconnected problems*

- Rural Electrification consists of two distinct but interconnected problems i.e. generation & distribution.
- Different business models exist for generation & distribution.

Parameters	Off-Grid		Grid Connected
	Without Grid	After Grid	
Generation	Must	Remains Idle	Not required
Hours of Supply	Limited based on technology	Depends on grid supply	As far as grid can supply
Certainty of supply	Fixed duration / fixed time	Depends on grid supply	Closely tied with grid supply
Distribution Network	Property of franchisee	Duplicate Network	DISCOM takes over
O&M of Distribution Network	Franchisee	Two separate operators	DISCOM / Franchisee
MBC	Franchisee	Duplicate efforts	Franchisee / DISCOM
Major Risk	Grid Interconnection	Idle Infrastructure	-

**Proposed PRI must address these problems**

# *Characteristics of PRI*

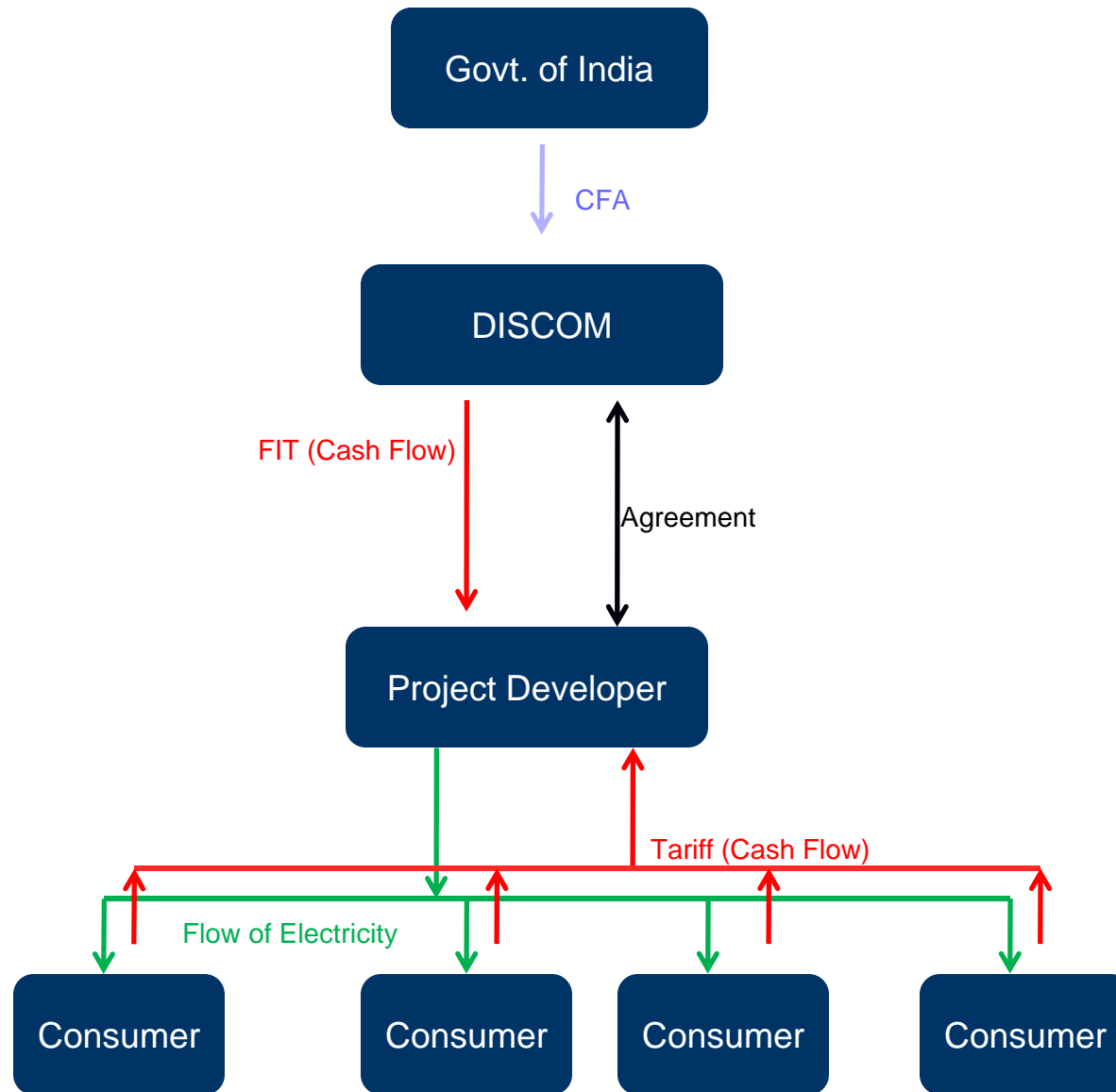
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- Proposed business model must work in both, off-grid & grid connected set up
- Consumer should not pay more than
  - Electricity tariff in adjoining areas (not more than DISCOM tariff)
  - Existing expenditure on lighting load
- Compliant with EA 2003, existing policies
- Create structure for flow of subsidy
- As far as possible, internalization of costs of Rural Electrification
- Should make use of existing institutional structure
- Avoid conflict between programmes of two ministries
- Should promote private sector involvement

**In view of these requirements, and the analysis carried out, two potential models have been proposed**



# Off-Grid Distributed Generation Based Distribution Franchisee



# Recommendations

- Advantages of ODGBDF Model
  - Maximum certainty of revenue to the developer
  - Proper integration of off-grid projects with grid as and when is feasible
  - Would enable large scale deployment of off-grid projects
  - Internalisation of costs of rural electrification
  - Possible to customise model according to local requirements
  - Optimum utilisation of the government subsidy, if offered
  - CERC and FOR could develop FIT guidelines as in case of large scale renewable projects as well as REC Mechanism
  - Distribution franchisee framework under RGGVY could be adopted
  - Model could be used for off-grid generation as well as on-grid supply augmentation

Therefore, it is recommended that ODGBDF Model for development of Policy & Regulatory Initiative.

# *ODGBDF – New Comprehensive Solution for Rural Electrification*

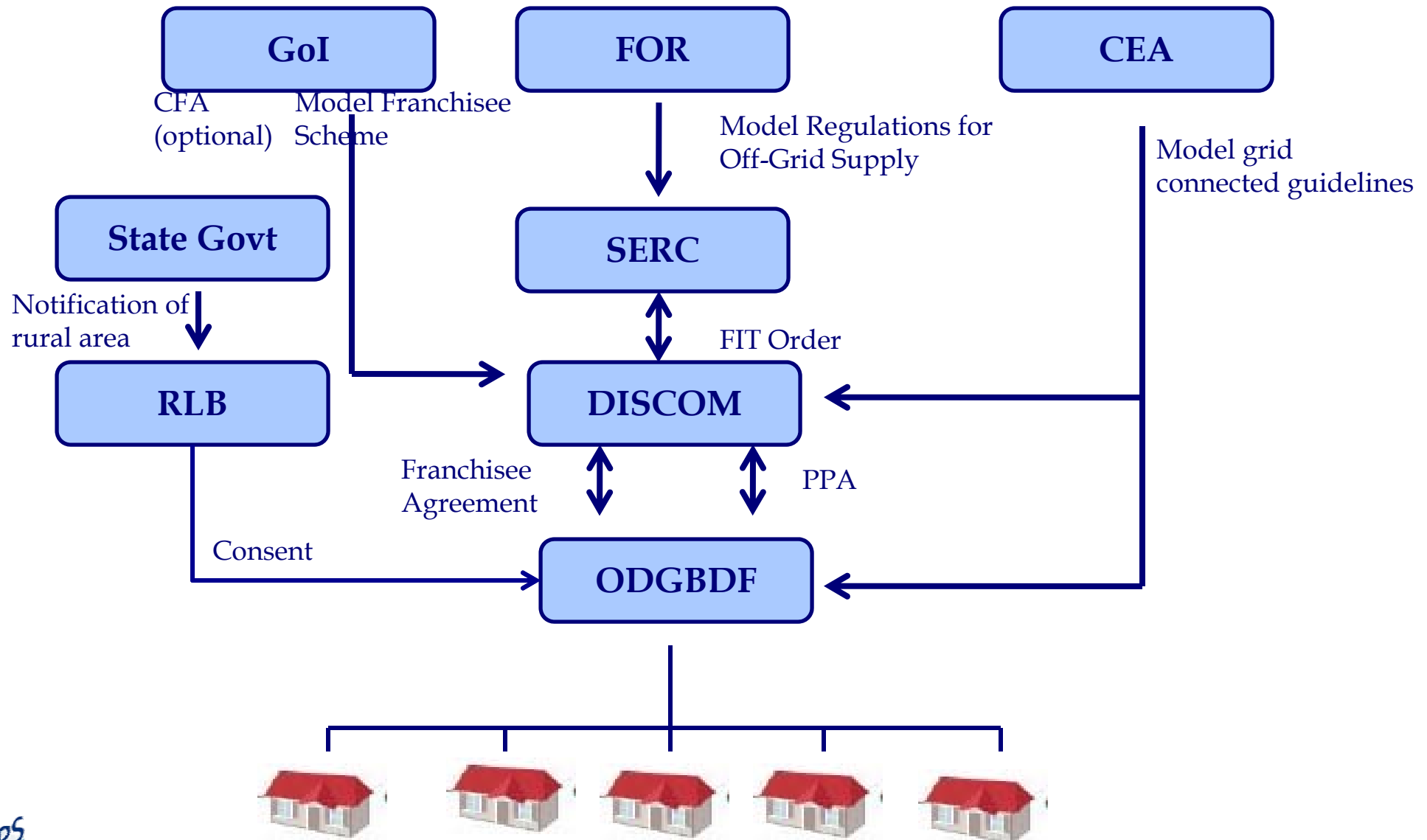


- Proposed model addresses both problems i.e. generation & distribution
- Two problems represent two distinct activities under the EA 2003 i.e. generation & supply
- Policy / legal/ regulatory framework for these two are different
- Hence, special policy / regulatory dispensation would be required to implement the same

# Institutional & Contractual Structure

ODGBDF

4/13



## *Roles & Responsibilities of Key Stakeholders (1/3)*

### *Government of India*

- Provide CFA to DISCOM to support Off-grid RE projects

### *Forum of Regulators*

- Model Regulations for Off-grid Renewable Energy Generation and Supply
- Develop guidelines for development of feed-in tariff for small scale renewable energy generators used for off-grid supply

### *Central Electricity Authority*

- Develop model grid connectivity guidelines for small RE systems

### *State Electricity Regulatory Commission*

- Notify State Regulations for Regulations for Off-grid Renewable Energy Generation and Supply
- Adoption of Model Regulations with suitable adjustments to take into consideration state specific factors
- Issue Tariff order for Off-grid renewable energy generation
- Guidance to various stakeholders participating in the scheme

## *Roles & Responsibilities of Key Stakeholders (2/3)*

### ***DISCOM***

- Must allow each project on “first come first serve” basis
- DISCOM submit tariff petition to SERC;
- Enter into Franchisee Agreement and PPA with PD
- Provide FIT to PD;
- Request to GoI for CFA if / as required
- Take into consideration off-grid schemes while planning grid expansion

### ***Rural Local Body***

- Confirm un-electrified status of village / hamlet / pada
- Confirm number of households & establishments
- Provide consent to PD for generating and distributing electricity

## *Roles & Responsibilities of Key Stakeholders (3/3)*

### ***ODGBDF***

- Identification of Project Scheme;
- Finalization of technology based on resource availability
- Confirm State Government's notification of rural area from RLB
- Undertake prefeasibility study;
- Development of DPR;
- Agreement b/w DISCOM and PD;
- Financial Closure & project commissioning;
- Provide electricity to consumers and receive tariff as paid by the consumer of the local DISCOM;
- Receive FIT minus consumer tariff from DISCOM

### ***Consumer***

- Pay charges to ODGBDF

## *Regulations for Off-Grid Generation & Supply (1/2)*

### ➤ Need for Regulations

- Eighth Proviso to Section 14 exempts generation and distribution in rural areas from licensing requirement
- However, no institutional/ regulatory framework is prescribed either in Act or Rural Electrification Policy
- It is possible to make use provisions related to generation of electricity (S9), Tariff (S61h), Renewable (S86-1e), franchisee (S14) & put cogent framework
- Establish need to determine tariffs and not follow competitive bidding route for selection of these projects
- This framework would be established using these Regulations



## *Regulations for Off-Grid Generation & Supply (2/2)*

### ➤ Contents of the Regulations

- Supporting legal provisions
- Concept of ODGBDF
- Nature of PPA and Franchisee Agreement
- Eligibility Criteria for village/ hamlet
- Eligibility criteria for ODGBDF Operator
- Eligibility criteria for technology and sizing of the plant
- Responsibilities of ODGBDF Operator
- DISCOM to create supporting institutional structure
- Responsibility of DISCOM to enter into Agreement
- Modes of payment for generation and franchise operation
- Grid interconnection requirement

# *Model Franchisee Framework*

- To be developed by MoP under RGGVY
- Over last few years, concept of franchisee has taken roots
- RGGVY has identified six models for franchisee arrangement
- It is suggested that 'Revenue Franchisee – Input Based' be modified for off-grid supply
  - During off-grid operations, input shall be quantum of generation from RE
  - When connected to grid, input shall be quantum of energy supplied plus generated from the plant
- Fixed loss equal to loss level in the adjoining area should be allowed to ODGBDF Operator
- Loss levels may be fixed for tenure of the contract or for a year at the beginning of the year

# *Power Purchase Agreement*

- Contracting Parties
- Definition of the project
  - RE technology
  - Capacity of Project (kW & kWh)
  - Distribution Network
  - MRV (tele-metering system)
  - Grid synchronization (in event of future grid extension)
- Agreed tariff
- Period of contract
- Billing & Payment cycle
- MRV process
- Delayed payment charges
- Force majeure conditions

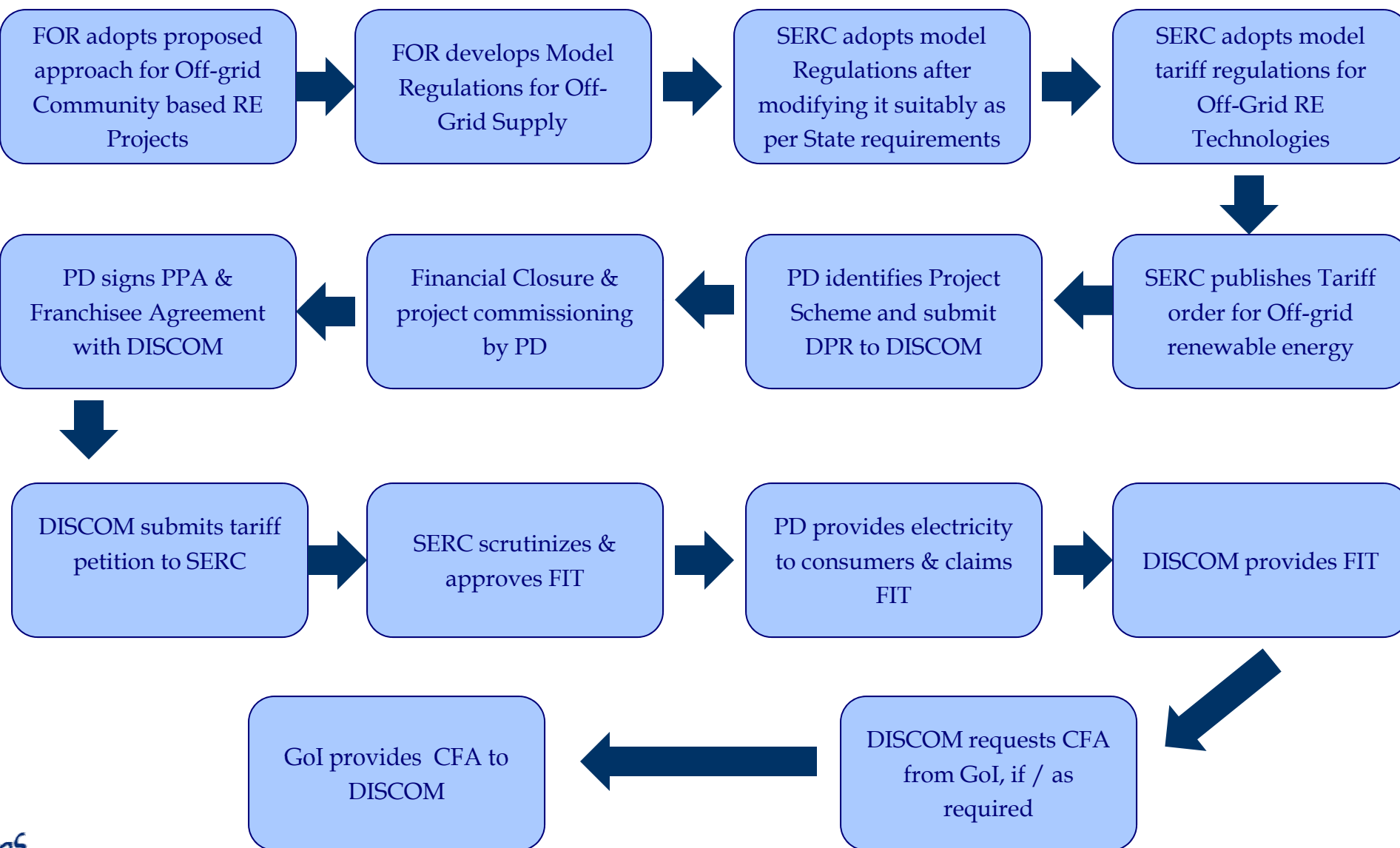
# *Franchisee Agreement*

- Definition of area
- Period of contract
- Billing & Payment cycle
- Agreed power price
- Tariff for different consumer categories
- MRV process
- Force majeure conditions

# Implementation Plan

ODGBDF

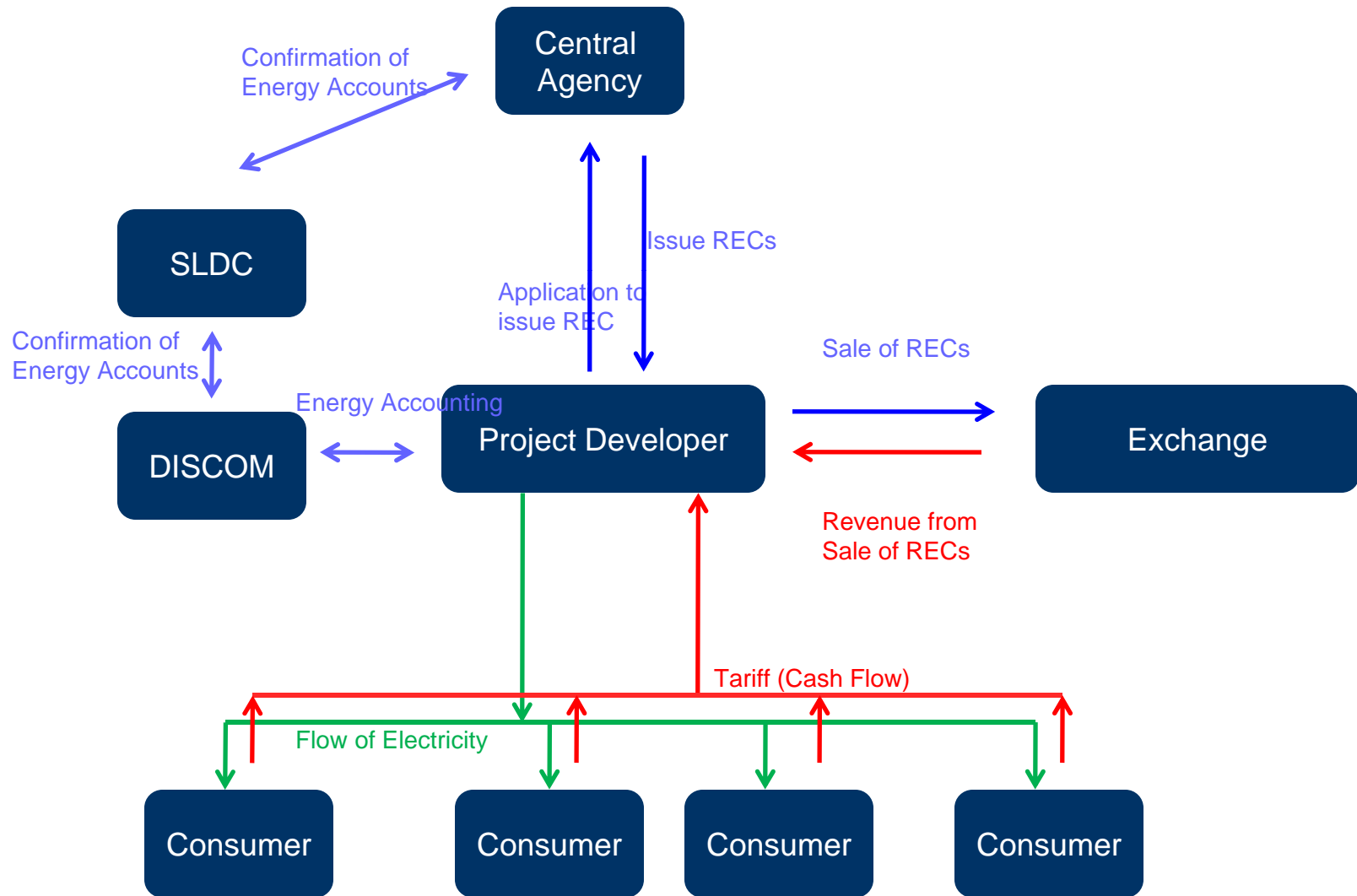
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# REC for Off-Grid Generation

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# *REC for Off-Grid Generation*

- Can be a viable business model if
  - PD gets sufficient benefit from sale of electricity to the consumer
  - And sale of RECs on the Exchange to recover all his costs
- Energy accounting to be carried out by DISCOM
  - Projects are very small in size,
  - Located at far off places connected at distribution voltage levels
  - Difficult for SLDC to do energy accounting at this level
- Need to develop Off grid REC regulations,
  - Regulations allow off-grid RE generators to receive RECs & sell on Exchange.
  - Purchase of RECs by obligated entities be allowed to meet compliance of RPO target

# Conclusions

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ABPS Infra proposes following two models to FOR

## ODGBDF Model

- FOR may initiate the work for development of Model regulations for Off-grid Renewable Energy Generation and Supply
- Develop guidelines for development of feed-in tariff for small scale renewable energy generators used for off-grid supply

## REC based Model, where,

- PD get sufficient benefit from sale of electricity to the consumer
- And sale of RECs on the Exchange to recover all his costs
- FOR may initiate the work for development of Off grid REC regulations





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*Practical Solutions to Real Life Problems*

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