Sharing of Interstate transmission charges and losses Regulations

By
Shilpa Agarwal

Transmission Planning

Background

- Development of transmission system in the country was traditionally the responsibility of the erstwhile State Electricity Boards (SEBs).
- The country's transmission networks were organised into five regional grids – North, West, South, East and NE.
- Grid developed as the Associated Transmission Systems (ATS) for various generation projects. Initially, CGS like NTPC, NHPC etc. too took up the construction of ATS.
- Power Grid Corporation of India (PGCIL) was created (originally NPTC) in 1988 with the objective of creating strong regional grids and subsequently a national grid.
- PGCIL was entrusted with the task of building inter-state and inter-regional transmission systems.
- Various Central GENCO transmission assets were transferred to PGCIL.
- Role of transmission system planning for harmonious development was carried out by the Power System wing of the Central Electricity Authority (CEA).

Planning Framework (Post Electricity Act 2003)

- National Electricity Policy (NEP) provides "the CEA shall prepare **short term** and **perspective plan"**
  - Perspective Plan- 15yrs., 3 plan periods
  - Short Term- 5yrs., 1 plan period

- Transmission mandated as a licensed business.
  - 2 statutory entities created & assigned roles of transmission system planning & development
    - Central Transmission Utility (CTU) & State Transmission Utility (STU).
      - CTU responsiblke for inter-state systems
      - STU responsible for intra-state systems
    - To start with, PGCIL has been designated as the CTU
    - The transmission wing of the erstwhile SEBs designated the STUs.
  - CTU and STU also deemed licensees- build own, operate and maintain transmission systems

- CTU to issue Network Plans and update plans periodically (not later than annually)
  - To contain details like identified new lines and substations, system strengthening projects, broad design specs, probable line lengths and substation locations etc.

- New transmission planned based on
  - Requests by new generators/ application for transmission access
  - Identified pockets of congestions based on feedback by RLDC/ SLDC
  - Demands by States to meet their load growth

- CTU identifies required Transmission based on Load Flow Studies
- System discussed and agreed in Regional Standing Committee Meetings
  - Chaired by Member (PS), CEA
- Cost sharing for new transmission agreed in RPC- consent for signing BPTA

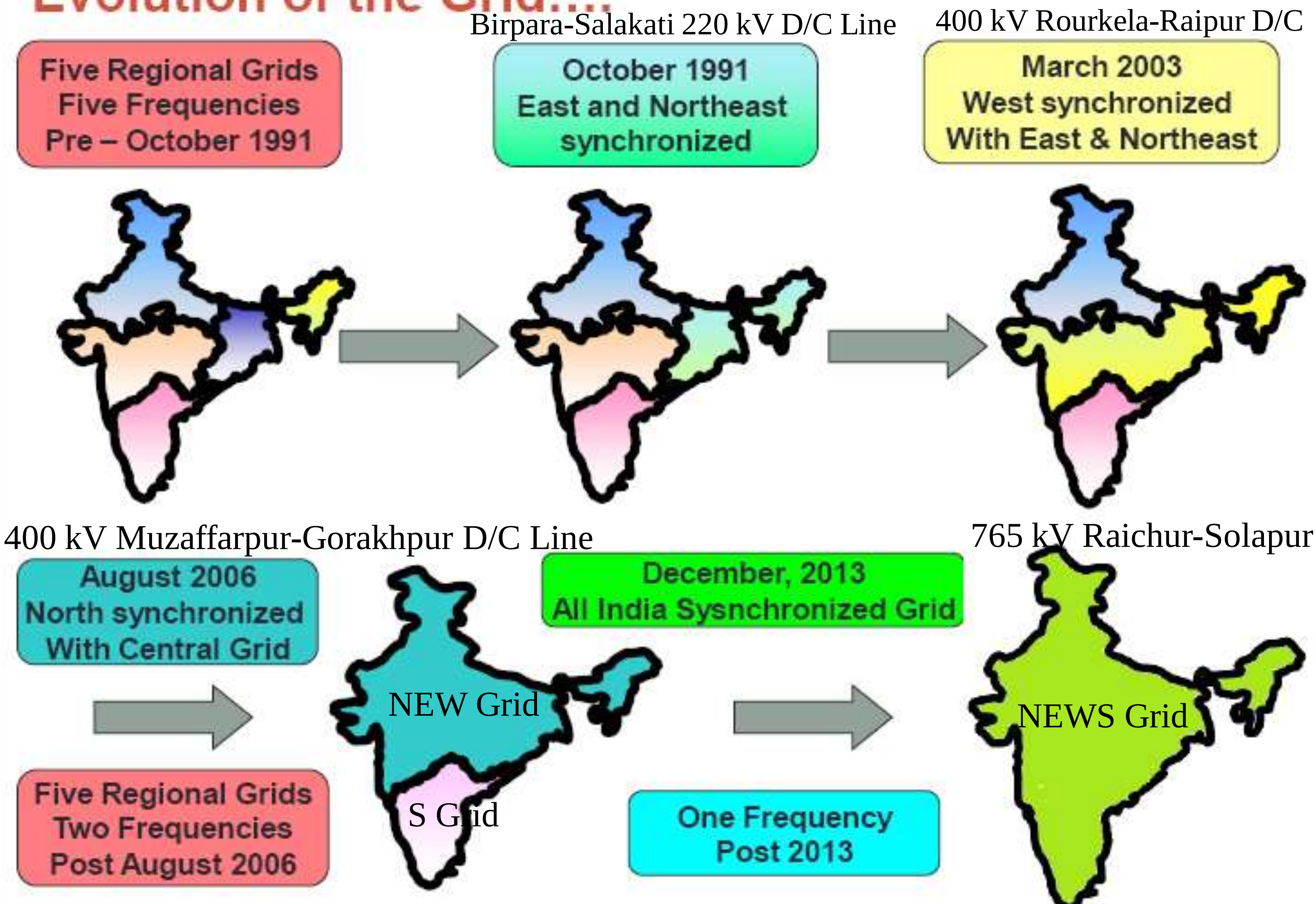
Differences on cost sharing have at times delayed/ held up trans. development

Planning

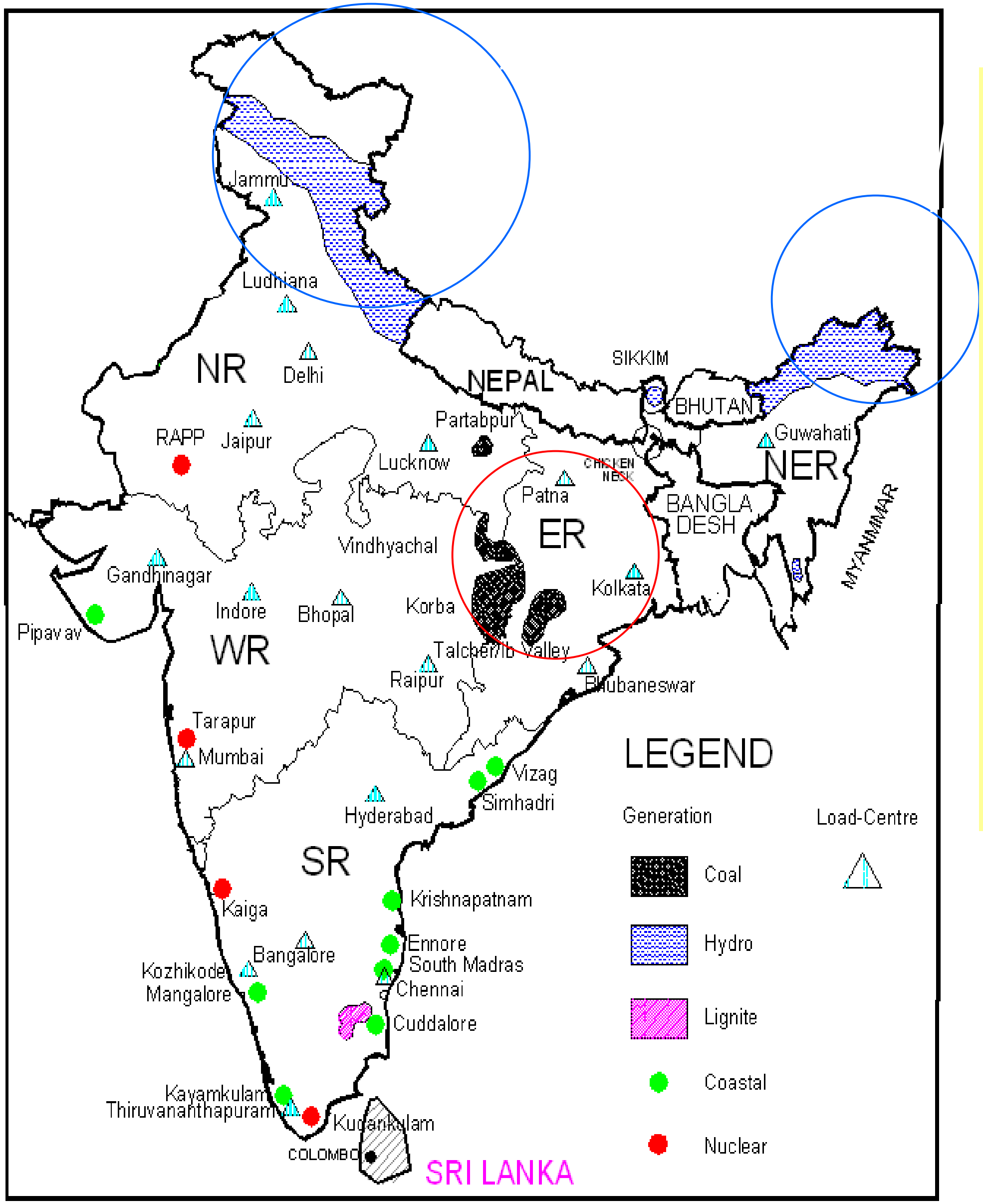
- Generation delicensed with EA2003, private generators were encouraged
- Evacuation ensured under Open Access Regulations 2004
- Connectivity, Long term Access, Medium term Open Access Regulations 2009, effective from 1.1.2010

2008-Power Exchange operationalised & STOA Regulations notified

Evolution of the Grid....



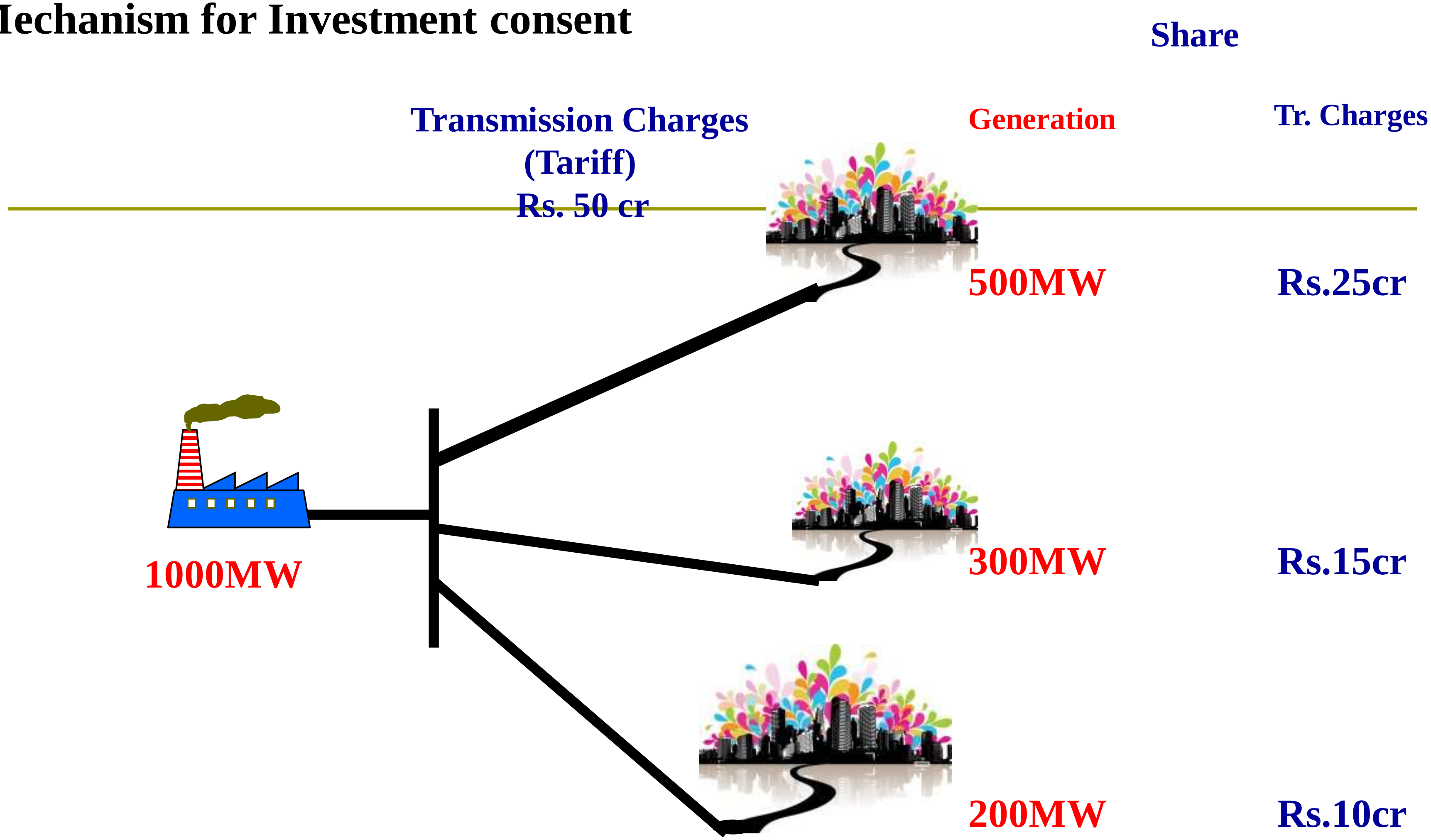
Energy Resource Map



- **Hydro potential in NER and upper part of NR**
- **Coal reserves mainly in ER/ WR**
- **For optimal utilisation of resources – strong National Grid**

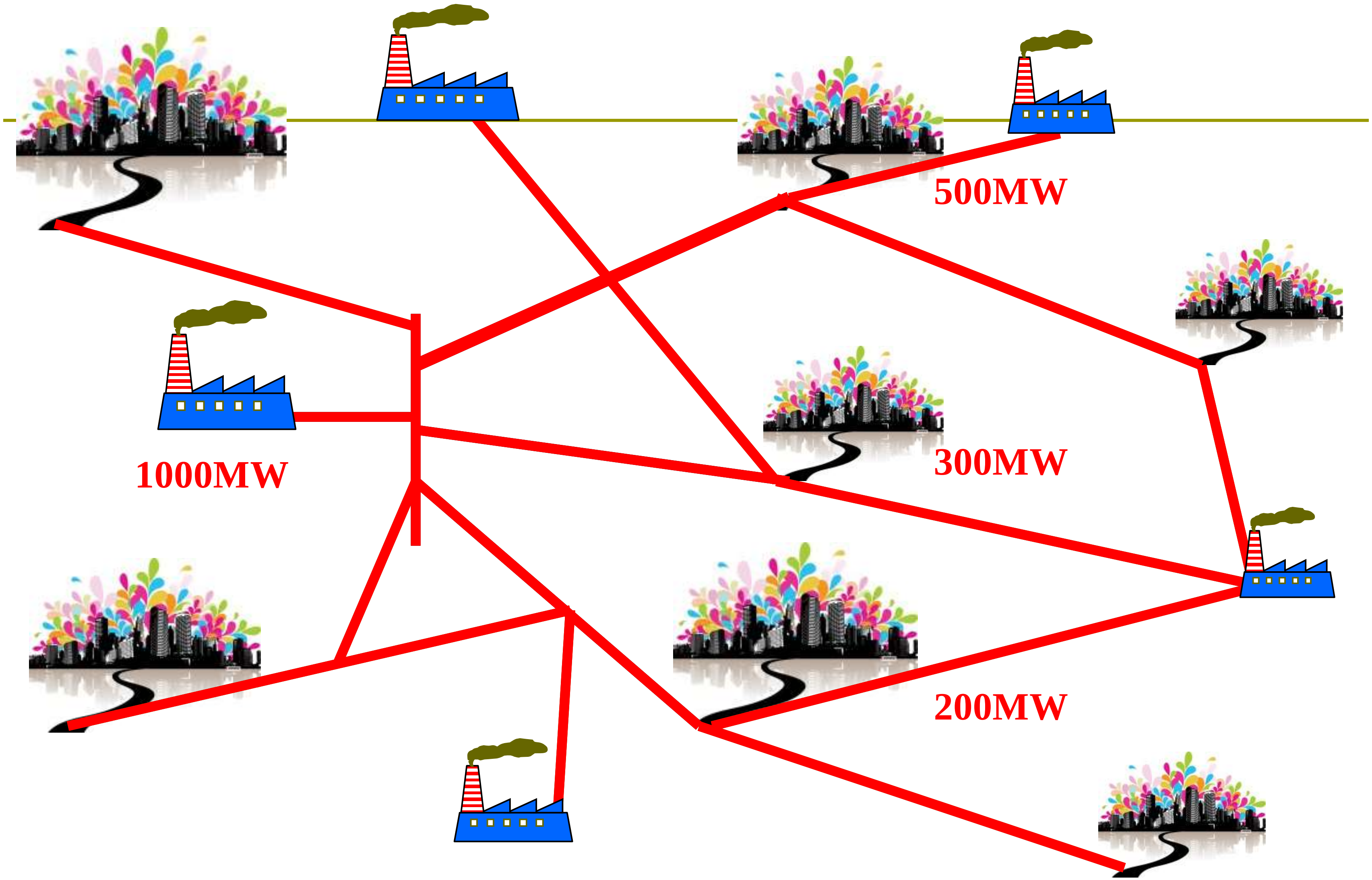
Transmission Pricing

Mechanism for Investment consent



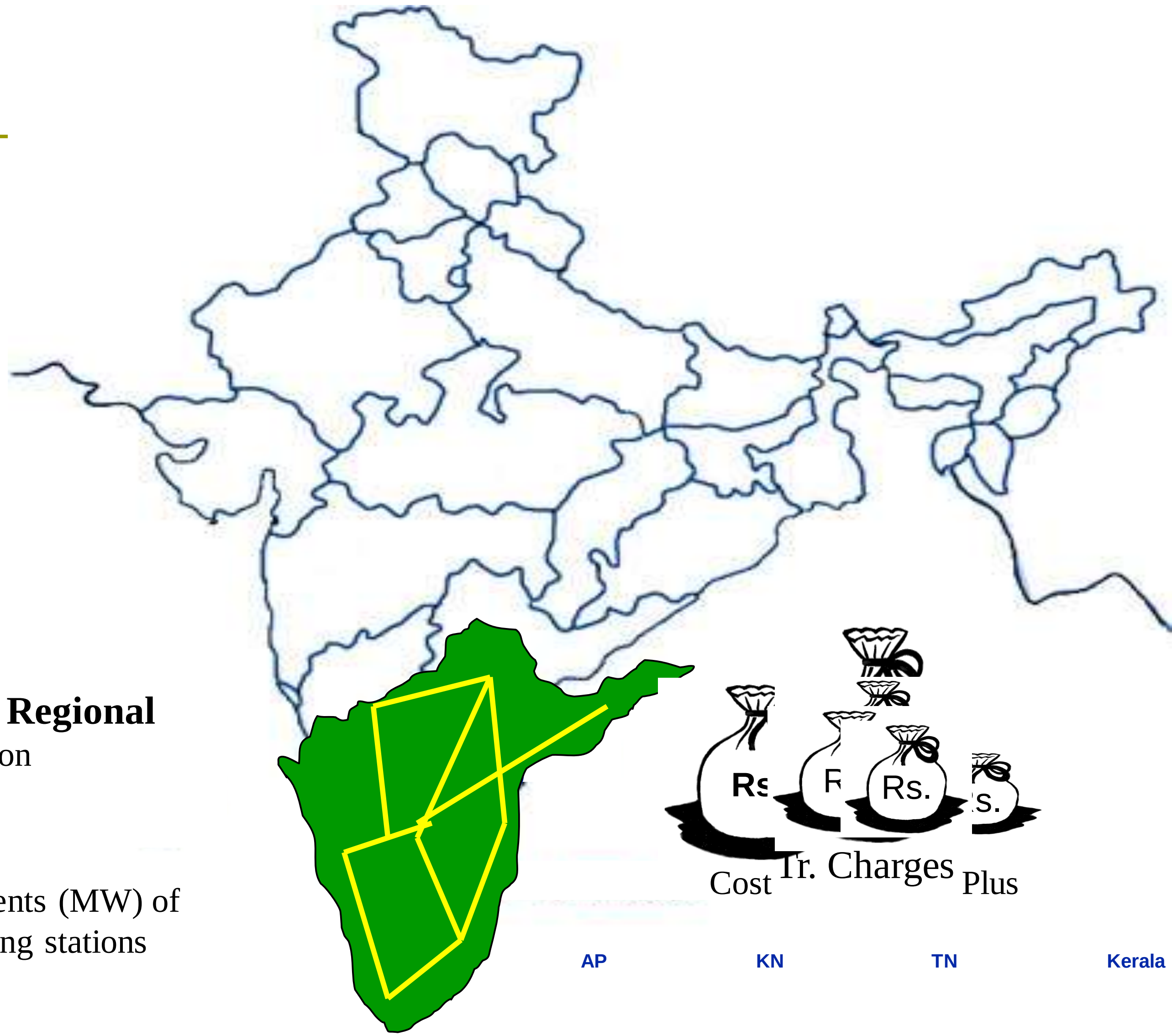
- Sharing of Tr, Charges based on Contracts
- Beneficiaries of Generation are **SYNONYMOUS** with Users of Tr. System
- Since Beneficiaries are identifiable their consent is obtainable

Mechanism for Investment consent*… in reality*



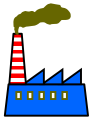
- Benefits of Tr. Systems are shared by all the stakeholders

Old mechanism for sharing Tr. charges

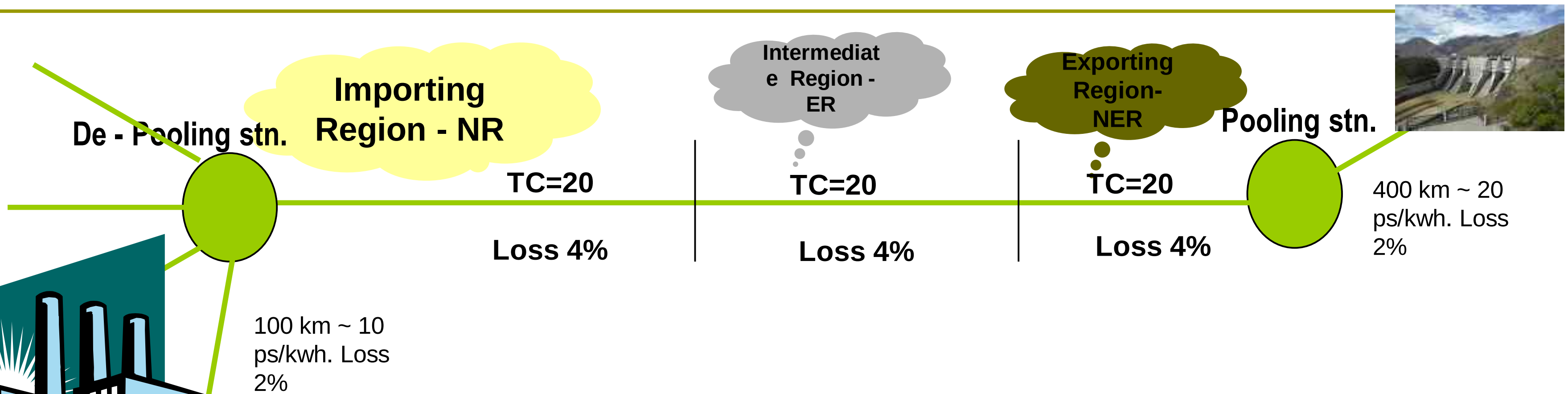


Predominantly Regional
Eg. Southern Region

Allocation
Based on entitlements (MW) of inter-state generating stations



Pricing under Postage Stamp (Long term User) – An Example



Cost of delivery

- Cost at Generator Terminals – 300 ps/kwh
- Transmission costs to load centre – 90 ps/kwh
- Cost of losses – 74.28 ps/kwh
- Final costs – 464.28 ps/kwh

- Much of the cost levels are genuine. There could even be element of cross-subsidisation of new transmission costs by existing beneficiaries
- If new line costs are loaded on to first user(s), then the cost of delivery can be prohibitive
- There could be a tendency of over-estimation of losses
- **Hence the need to ensure a *fairer* allocation**

Evolution of Transmission Pricing

Stage I
- Cost of Transmission clubbed with Generation Tariff
- Implicit

Stage II
- Apportioned on the basis of energy drawn
- (Usage Based)

Stage III
- Apportioned on the basis of MW entitlements
- (Access Based)

Stage IV
- Hybrid Methodology

Upto 1991 → 1992-2002 → 2002-2011 → 2011 onwards

Reference:राष्ट्रीय भार प्रेषण केंद्र

… the need for revisiting the Transmission pricing

•**National Electricity Policy mandates development of a strong National Grid.**
require transmission prices to be *distance and direction sensitive*, *independent of BPTA* and *reflect the utilization of the network* by each network user

•**Tariff Policy further requires that such pricing mechanism be implemented by Apr-06.**

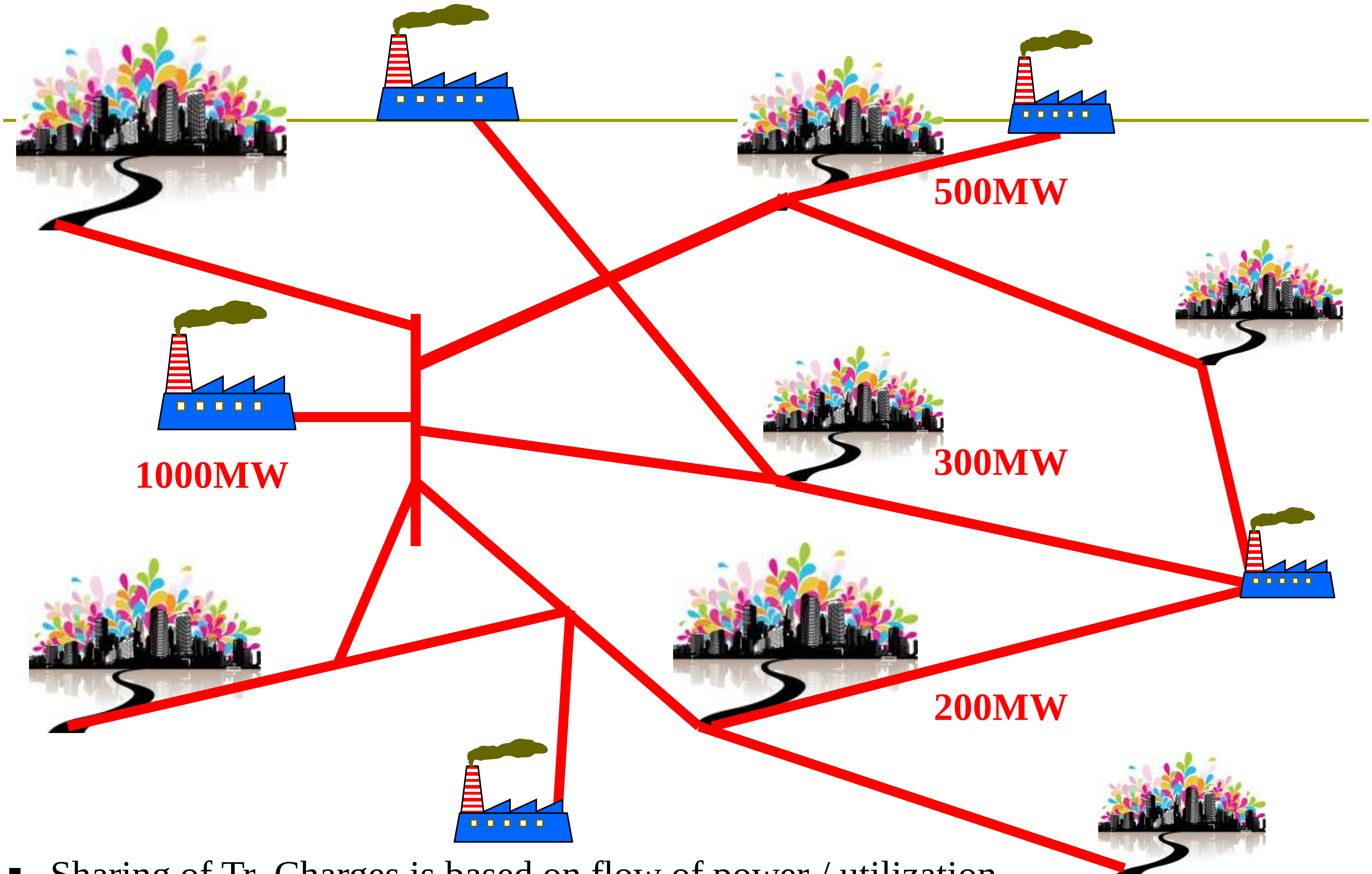
- Evolution of open access and competitive power markets
  Bilateral transactions, Px

- Pricing inefficiency in the emerging circumstances – the problem of pancaking

- Changing nature of use of the transmission system by various users- Merchant generators

Individual Transmission Licensee raise the bill and maintain payment Security Mechanism.

Beneficiaries are not identifiable. Consent from Whom ?
Discussion with All. Thereafter obtain Regulatory approval



- Sharing of Tr, Charges is based on flow of power / utilization
- Beneficiaries of Generation are **NOT SYNONYMOUS** with Users of Tr. System
- In fact they are Anonymous
- Users are beyond boundaries

Regulatory facilitations

- Grant of Regulatory Approval for execution of Inter-State Transmission Scheme to Central Transmission Utility Regulations, 2010
  - For projects where PPA for entire capacity has not been signed and applied Long term Access under Regulations 2009
  - System Strengthening lines
  - CTU could proceed without BPTA based on such approval
  - Examples: System asociated with Krisnapatnam

Sharing of Interstate Transmission Charges & Losses Regulations 2010

- Regulation dated 15.06.2010
- Effective from 1.7.2011
- Remain in force till 1.7.2016

- Transmission charges for the Assets of ISTS licensees / non-ISTS licensees shall continue to be determined by respective Commission.

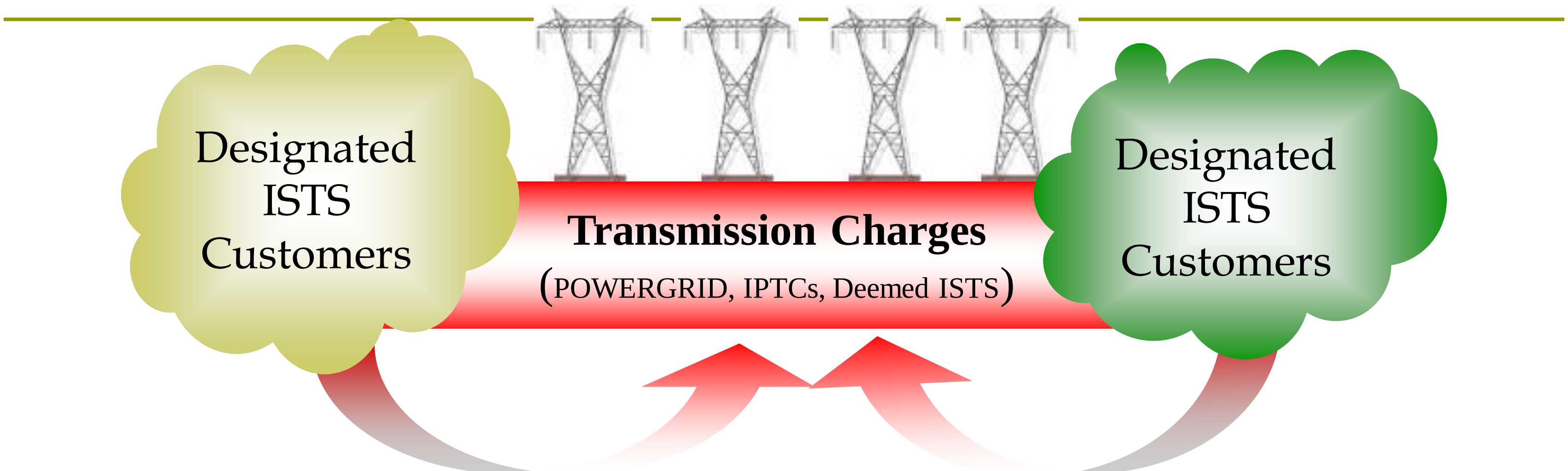
- No change in Annual Tariff recoverable for ISTS licensee…. *Revenue neutral*

- Sharing based on Point of Connection (PoC) Tariffs based on load flow analysis to capture distance and direction vectors also

- Load flow analysis to be carried out by NLDC who is designated as the Implementing Agency for the initial two years.

- PoC Charges to be paid by generators & discoms
  - For Long term customers of ISGS, charges payable by such generators shall be billed directly to customers post COD of generator

As per the new Regulation



- Transmission charges are **determined by CERC** (Section 61,62 or 63 of EA 2003)
- Charges of all ISTS (POWERGRID, Reliance etc.) to be **pooled** together
- Charges of Non-ISTS systems (certain State transmission systems) as approved by RPC/CERC shall also be considered in the pool… **Deemed ISTS**
- The Pooled charges are recovered from Demand Customers as well as Generators
- CTU vested with the responsibility of Billing, Collecting and Disbursement (BCD) of the Transmission Charges on behalf of all the ISTS licensees. Revenue Sharing Agreement (RSA) prepared by CTU

18

Principles of sharing ISTS charges and losses

Principles of sharing ISTS charges and losses

- **Factors to be calculated**
  - Point of connection charges – in terms of
    - RS./MW/month for LT/MT access
    - paise/kwh for STOA
  - Loss allocations factors
  - Load flow based methods to be used for calculating above factors

- **PoC charges Methodology-Hybrid method & Uniform Charge Sharing Mechanism**
  - Hybrid Methodology: Cost Allocation through marginal usage; Slack bus identification through Average Participation Method.
  - Uniform Charge Sharing Method: Present Methodology of Regional Postage Stamp Method
  - For 1st 2 years- 50% charges will be recovered through Hybrid method & 50% through Uniform charge sharing method.
  - After 2 years weightage to be reviewed

- Data to be provided by DIC to IA by end of Nov, each year. Else Commission may authorize IA to obtain such information from alternative sources.- as per Procedure issued by NLDC

- The Yearly Transmission Charge of the ISTS Licensees shall be fully and exactly recovered. There shall be periodic truing up of YTC as per actual billing.

- **Solar Based Generation**
  - No. Tr. Charges/Tr. Losses for use of ISTS for the useful life of the projects commissioned in next 3 yrs. (July 2014)

Methods employed in arriving at Point of Connection Charges

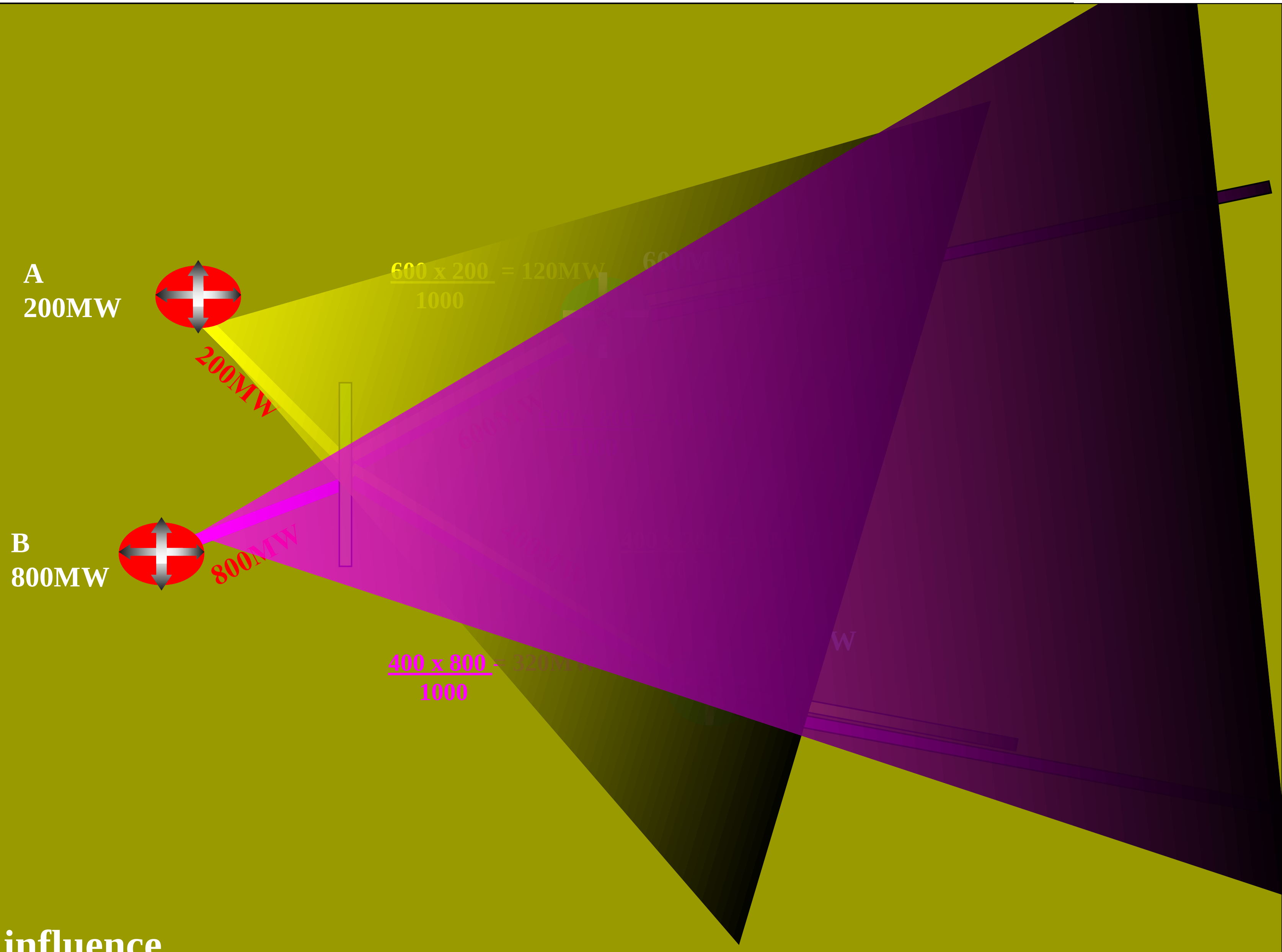
Hybrid Method

Marginal Participation + Average Participation

Plus

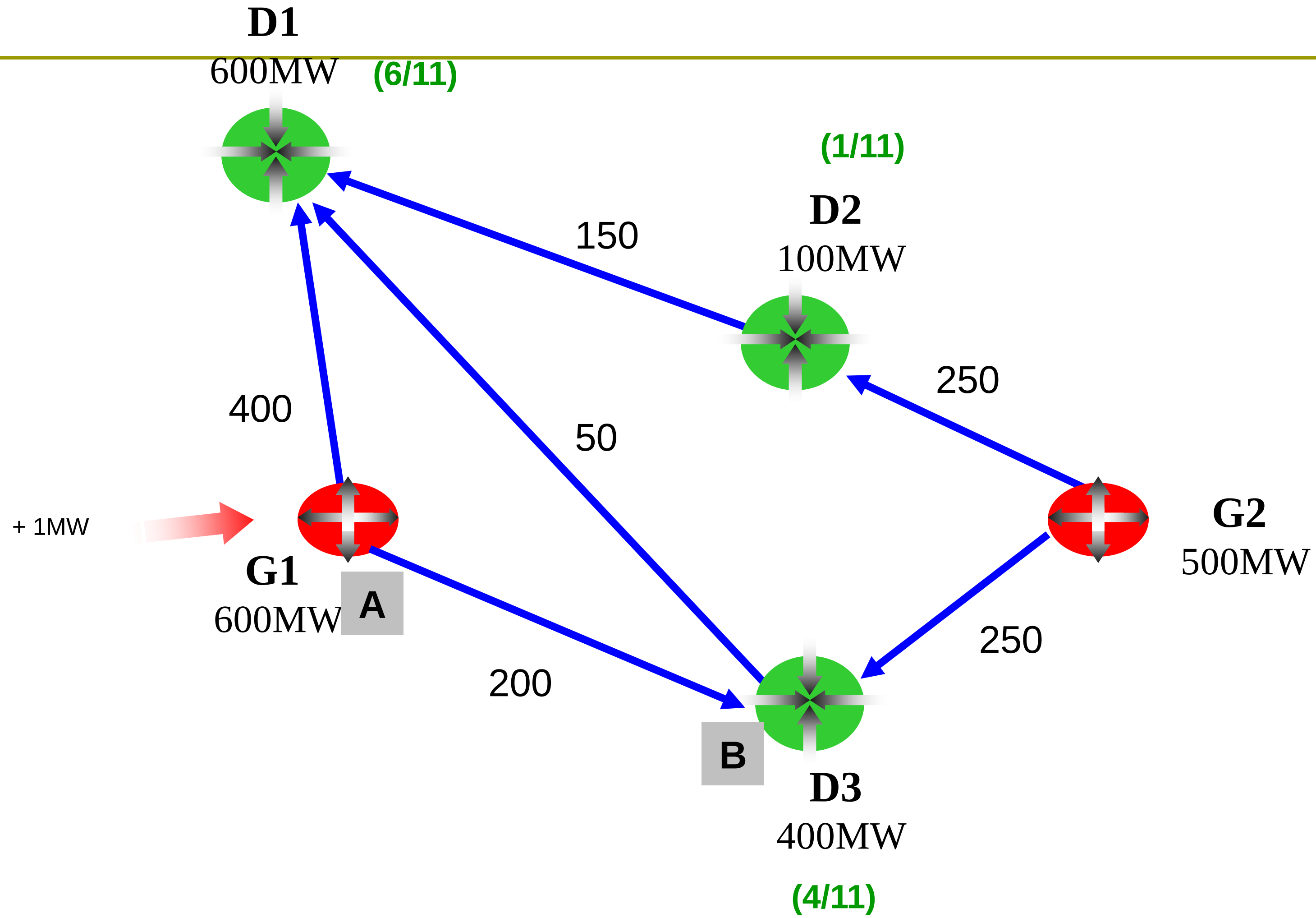
Uniform Charging Method

Average Participation



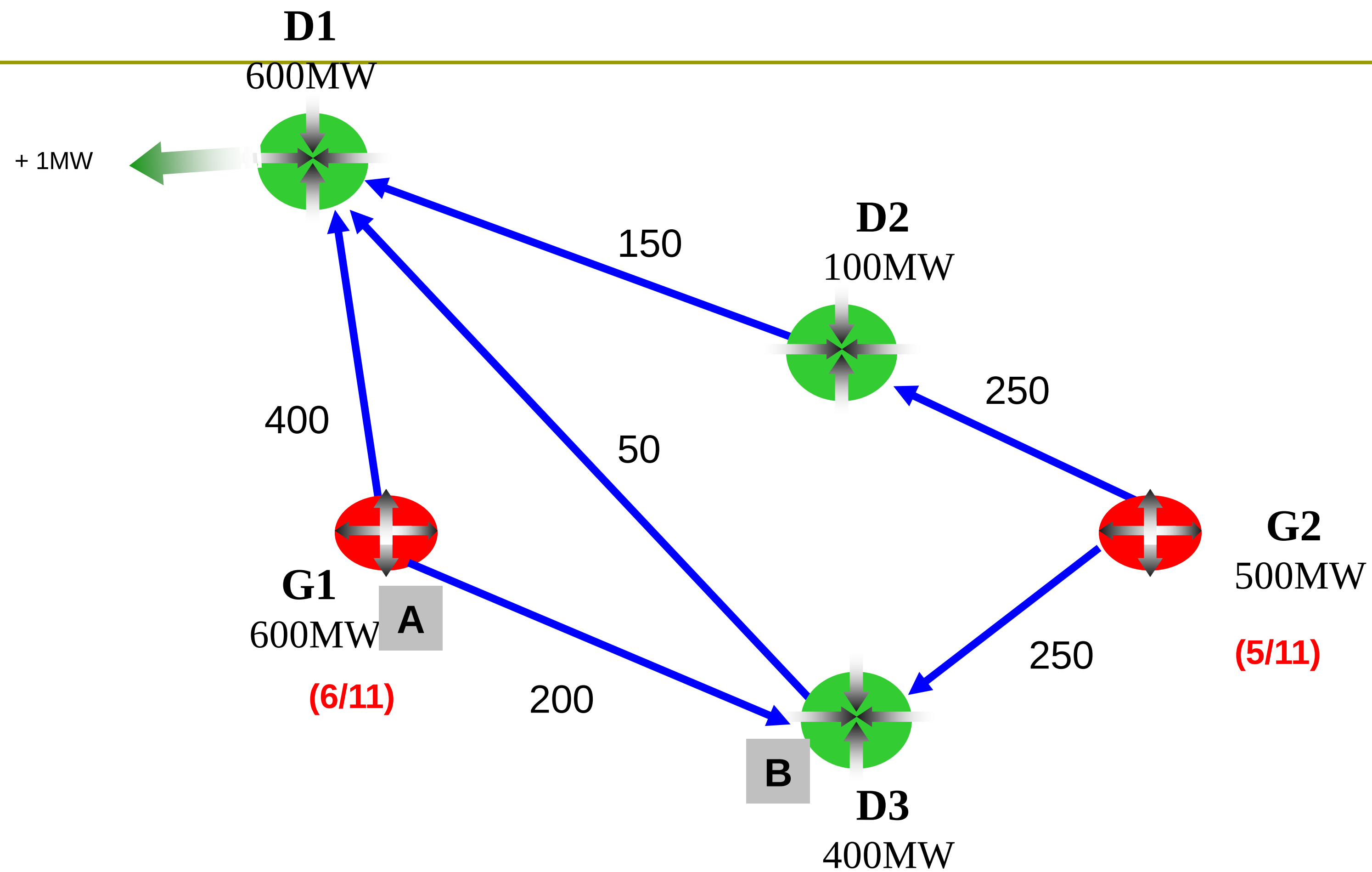
Area of influence

Marginal Participation



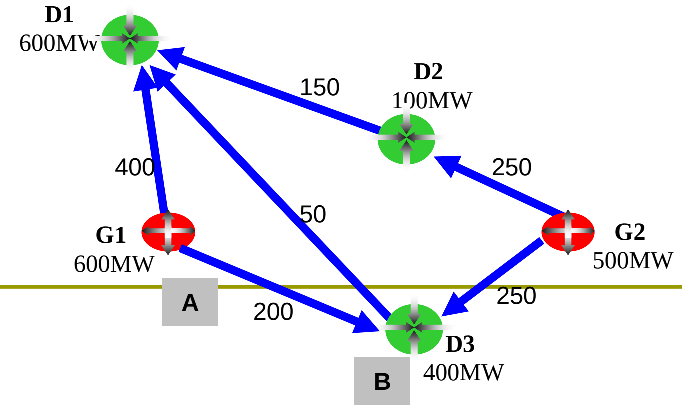
*Indicative only
Power flow in lines in MW

Marginal Participation



*Indicative only
Power flow in lines in MW

Marginal Participation



Line AB

BC + CD +EF+… Point Tariff

Users
G1
G2
D1
D2
D3

* Identification of the slack node(s) changes the rule of the game

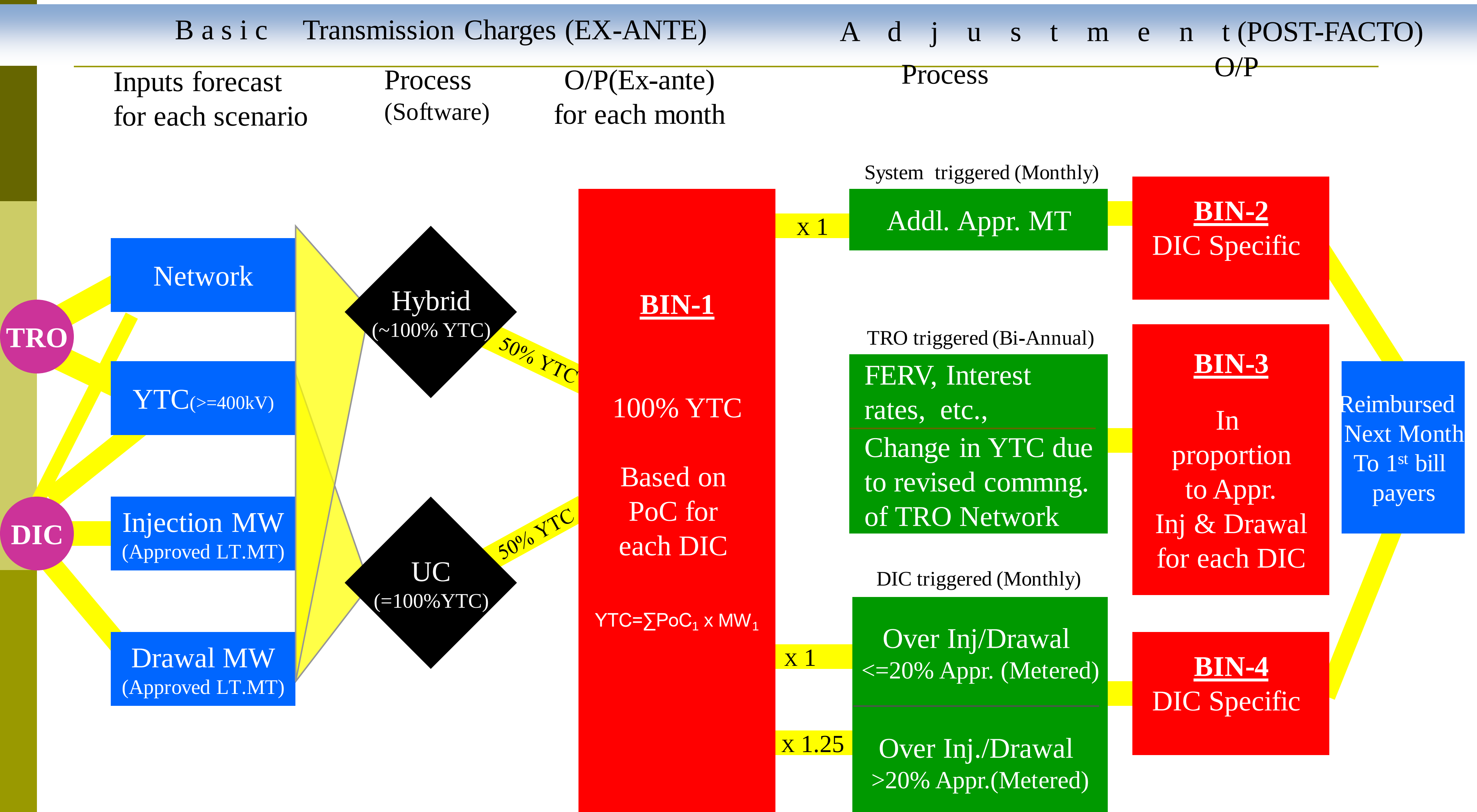
Uniform Charging Method

$$\frac{\text{Total YTC in Rupees}}{\text{Approved injection in MW} + \text{Approved withdrawal in MW}} = \text{'U' Rs./ MW}$$

'U' Rs./MW is charged for each MW (Approved Injection & Withdrawal)

U x (Approved injection in MW + Approved withdrawal in MW) = Total YTC

Flow chart for Sharing of Charges



TRO : Transmission Owners
DIC : Designated ISTS Customers
YTC : Yearly Transmission Charges
PoC : Point of Connection Charge
UC : Uniform Charge

Billing- Four Parts

- To be raised/collected by CTU
- Redistribute to Tr. licensees in proportion to their Monthly Tr. charges

First Part Raised on 1st working day of each month for previous month, determined prior to application period	Charges for use of transmission assets based on PoC method. [PoC Tr. Charge of generation zone in Rs/MW/month for peak hrs.]X[(Approved injection for peak hours)]+ [PoC Tr. Charge of generation zone in Rs/MW/month for other than peak hrs.]X[(Approved injection for other than peak hours)]
Second Part Raised along with first part of the bill	Similar to first part to recover additional MTOA charges
Third Part Raised on first working day of September and March for the previous six months.	•To adjust any variations in interest rates, FERV,rescheduling of commissioning of transmission assets, etc. as allowed by the Commission for any ISTS Transmission Licensee. •Total amount to be recovered /reimbursed because of such under recovery / over recovery shall be billed by CTU to each DIC in proportion of its average Approved Injection /Approved Withdrawal over previous six months on a biannual basis.
Fourth Part Raised within 3 working days of issuance of Regional Tr. Deviation A/c by RPCs.	•Additional bill for deviations- shall be charged seperately •First 20% deviation-zonal PoC charges •Beyond 20% deviation- 1.25 times zonal PoC charges •A generator instead of injecting, withdraws from the grid- Case of Commissioning power -1.25 times zonal PoC charges

As per the new Regulation

National Game

Based on forecast commitments of

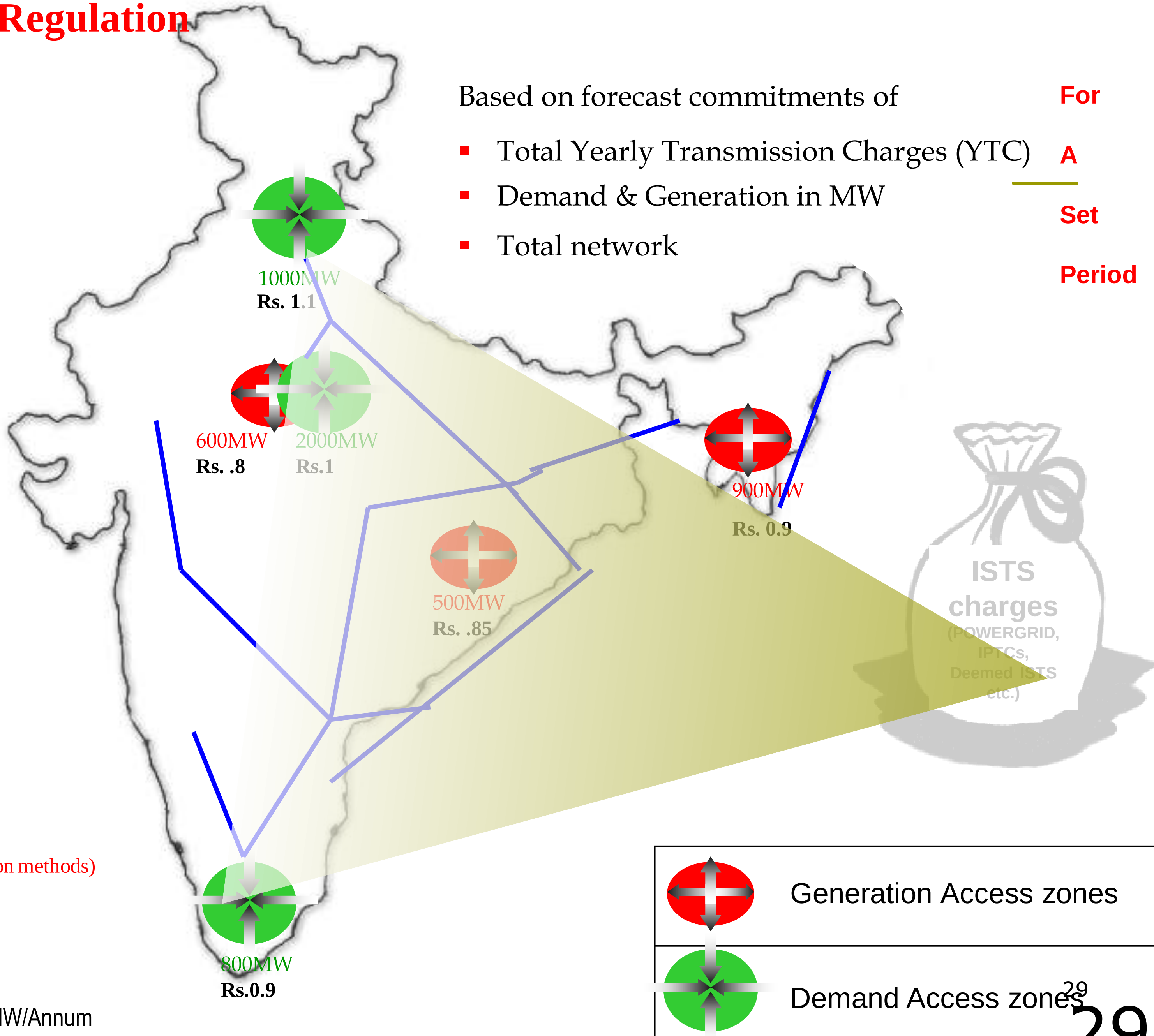
- Total Yearly Transmission Charges (YTC)
- Demand & Generation in MW
- Total network

For

A

Set

Period



Based on PoC

Hybrid method

(Marginal & Average participation methods)

\+

Uniform method

PoC: Indicative only in Rs.Lakh/MW/Annum

Initially NEW and SR separately

Commercial Agreements

a) Transmission Service Agreement (TSA)

- Between CTU, USERS (DICs) and ISTS licensees
- Interalia covers the USERS to pay the PoC charge which covers the revenue of ISTS licensees
- All USERS shall be default signatories to the TSA
- The commercial arrangement would facilitate financial closure of transmission investment
- Effective Post COD of the line. Before COD of line it shall be governed as per existing mechanism of Indemnification, BPTA etc
- NTPC also to become signatory to TSA as generator.
- <u>Model TSA notified by CERC dated 29.04.2011. Model TSA is a deemed signed document as per CERC Order dated 25.01.2012. CERC directed vide Order dated 1.05.2013 directed all DICs to sign TSA within 1month.</u>
- Payment security mechanism
- Default and its consequences; Dispute resolution mechanisms
- Term of the Agreement and termination provisions; Force majeure conditions

b) Revenue Sharing Agreement (RSA)

- To be signed among CTU & other transmission Service providers.
  - Detailed commercial and administrative provisions related to disbursement of ISTS charges

Third Amendment effective from 1.5.2015

Scope

- Definition of approved injection and withdrawal based on peak.
- Removal of Uniform charges
- Slabs- 3 to 9
- Computation based on peak scenario.
- No truncation of network.
- STOA adjustment.
- ISTS charges and losses for Solar Power
- Transmission charges of State Lines based on % usage
- Sharing of injection charges for Tied up power
- State embedded generators to pay for ISTS usage.
- HVDC Charges sharing
- Reliability Charge

- **“(c) ‘Approved Injection’** means the injection in MW computed by the Implementing Agency for each Application Period on the basis of maximum injection made during the corresponding Application Periods of last three (3) years and validated by the Validation Committee for the DICs at the ex-bus of the generators or any other injection point of the DICs into the ISTS, and taking into account the generation data submitted by the DICs incorporating total injection into the grid:

- Provided that the overload capability of a generating unit shall not be used for calculating the approved injection:

- Provided further that where long term access (LTA) has been granted by the CTU, the LTA quantum, and where long term access has not been granted by the CTU, the installed capacity of the generating unit excluding the auxiliary power consumption, shall be considered for the purpose of computation of approved injection."

- “(f) ‘**Approved Withdrawal**’ means the withdrawal in MW computed by the Implementing Agency for each application period on the basis of the actual peak met during the corresponding application periods of last three (3) years and validated by the Validation Committee for any DIC in a control area after taking into account the aggregated withdrawal from all nodes to which DIC is connected and which affect the flow in the ISTS, and the anticipated maximum demand to be met as submitted by the DIC:
-
- Provided that the overload capability of a generating unit in which the DIC has an allocation or with which the DIC has signed an agreement, shall not be used for calculating the approved withdrawal under long term access (LTA).”

Methodology for Calculation of forecasted maximum generation/withdrawal of DICs for vetting by Implementing Agency

- **For Demand data:**
- The projected maximum withdrawal figures provided by DICs will be vetted by Implementing Agency based on the following:
- Monthly peak demand met for each State/UT in the last 3 years for the period corresponding to the Application Period shall be considered.
- The average of monthly peak demand met for each State/UT in each of the last 3 years for the period corresponding to the Application Period shall be calculated.
- The average peak demand met for each State/UT for the Application Period shall be projected based on last 3 year's average of monthly peak demand met figures.
- Similarly All India peak demand met in last 3 years shall be averaged for the period corresponding to the Application Period. This shall be projected for the ensuing Application Period. The projected peak demand of each State/UT thus arrived shall be normalized with the projected All-India peak demand met of the Application Period under consideration for the current year.

- **For Generation Data:**
- **....**Similarly maximum injection data (for last 3 years as well as projected for the ensuing quarter) for generators embedded within the State system shall be provided by respective SLDC. In case data is not provided by SLDC to the Implementing Agency, the maximum injection of the concerned State shall be taken as the difference between peak met and withdrawal from ISTS based on actual metered data (for the time block corresponding to the block in which peak met occurred).
- b. If sum of projected generation in the grid is more than sum of projected demand, the generation may be proportionately reduced to match sum of withdrawal data. If sum of projected generation in the grid is less than sum of projected demand, the demand may be proportionately reduced to match sum of generation.

Slabs

- 9 slabs for transmission charges
- 9 slabs for transmission losses.
  - There shall be 4 steps above the average loss and 4 steps below the average loss with a slab size of 0.25% subject to minimum loss of Zero percent.
- The slabs may be reviewed by the Commission after two years.

Methodology for calculation of slab rates

- The POC rates shall be arrived at by dividing the quantum of charges allocated to each zone by its LTA+MTOA.

- The PoC rates so arrived shall be adjusted based on average rate and one sigma deviation on either side. The difference between maximum rate and minimum rate so arrived shall be divided by eight to determine width of each slab. The POC rates for all entities shall be placed in appropriate slab, minimizing the distance from slab rate as per its adjusted rate calculated after accounting for standard deviation. The rates may be scaled up/down as required.

- For the purpose of STOA, collective transactions and computation of transmission deviation charges, there shall be separate slabs for injection and withdrawal rates.

HVDC Charge payment

- 10% of Monthly Transmission Charges (MTC) of HVDC transmission system shall form part of Reliability Support Charges and the balance shall be billed as detailed below:

- Transmission charges for HVDC system created to supply power to specific regions shall be borne by DICs of such regions. The HVDC Charge shall be payable by DICs of the Region in proportion to their Approved Withdrawal. In case of Injection DICs having Long Term Access to target region, it shall also be payable in proportion to their Approved Injection.
- Where transmission charges for any HVDC system are to be partly borne by a DIC (injecting DIC or withdrawal DIC, as the case may be) under a PPA or any other arrangement, transmission charges in proportion to the share of capacity in accordance with the PPA or other arrangement shall be borne by such DIC and the charges for balance capacity shall be borne by the remaining DICs by scaling up of MTC of the AC system included in the PoC. Such HVDC shall not be considered under (i) above.
- B/B by scaling up YTC.

Reliability Charge Calculation

- **Reliability Support Charge** means the Charge for reliability benefits which accrue to the DICs by virtue of operating in an integrated grid.
- 10 % of MTC including HVDC B/B +10% HVDC for specific region.

Payment in case of delay of generator

- "Where the Approved Withdrawal or Approved Injection in case of a DIC is not materializing either partly or fully for any reason whatsoever, the concerned DIC shall be obliged to pay the transmission charges allocated under these regulations:

- Provided that in case the commissioning of a generating station or unit thereof is delayed, the generator shall be liable to pay Withdrawal Charges corresponding to its Long term Access from the date the Long Term Access granted by CTU becomes effective. The Withdrawal Charges shall be at the average withdrawal rate of the target region:

- Provided further that where the operationalization of LTA is contingent upon commissioning of several transmission lines or elements and only some of the transmission lines or elements have been declared commercial, the generator shall pay the transmission charges for LTA operationalised corresponding to the transmission system commissioned:

- Provided also that where the construction of dedicated transmission line has been taken up by the CTU or the transmission licensee, the transmission charges for such dedicated transmission line shall be payable by the generator as provided in the Regulation 8 (8) of the Connectivity Regulations:

- Provided also that during the period when a generating station draws start-up power or injects infirm power before commencement of LTA, withdrawal or injection charges corresponding to the actual injection or withdrawal shall be payable by the generating station and such amount shall be adjusted in the next quarter, from the ISTS transmission charges to be recovered through PoC mechanism from all DICs:

DIC

- (l) **Designated ISTS Customer or DIC** means the user of any segment(s) or element(s) of the ISTS and shall include generator, State Transmission Utility, State Electricity Board or load serving entity including Bulk Consumer and any other entity or person directly connected to the ISTS and shall further include any intra-State entity who has obtained Medium Term Open Access or Long Term Access to ISTS.

Thank You

Maharashtra

Slabs for PoC Rates - Western Region (May-June 2015)				
Sl. No.	Name of Entity	PoC Slab Rate (₹MW/Month	Reliability Support Charges Rate (₹MW/Month)	HVDC Charges for Mundra - Mohindergarh (amount payable by M/s Adani for 1495 MW LTA to Haryana)
1	Maharashtra	305438	22669	
2	Goa	305438	22669	
3	ACB Limited	272649	22669	
4	Lanco	239859	22669	
5	APL Mundra	239859	22669	₹251050367/ Month
6	Gujarat	174279	22669	
7	Madhya Pradesh	141489	22669	
8	Spectrum	141489	22669	
9	EMCO	141489	22669	
10	Chhattisgarh	108699	22669	
11	D&D	75909	22669	
12	DNH	75909	22669	
13	Jindal Power Ltd.	43119	22669	
14	Torrent Sugen	43119	22669	

Maharashtra drawal-MW

	Q4 (2014-15) Average case			Q1 (2015-16) Peak Case		
DICS	Generation	Load	ISTS Drawl	Generation	Load	ISTS Drawl
Maharastra	5804	9911.15	4107	11386	17936	6550