OVERVIEW OF INDIAN POWER SECTOR AND REGULATIONS

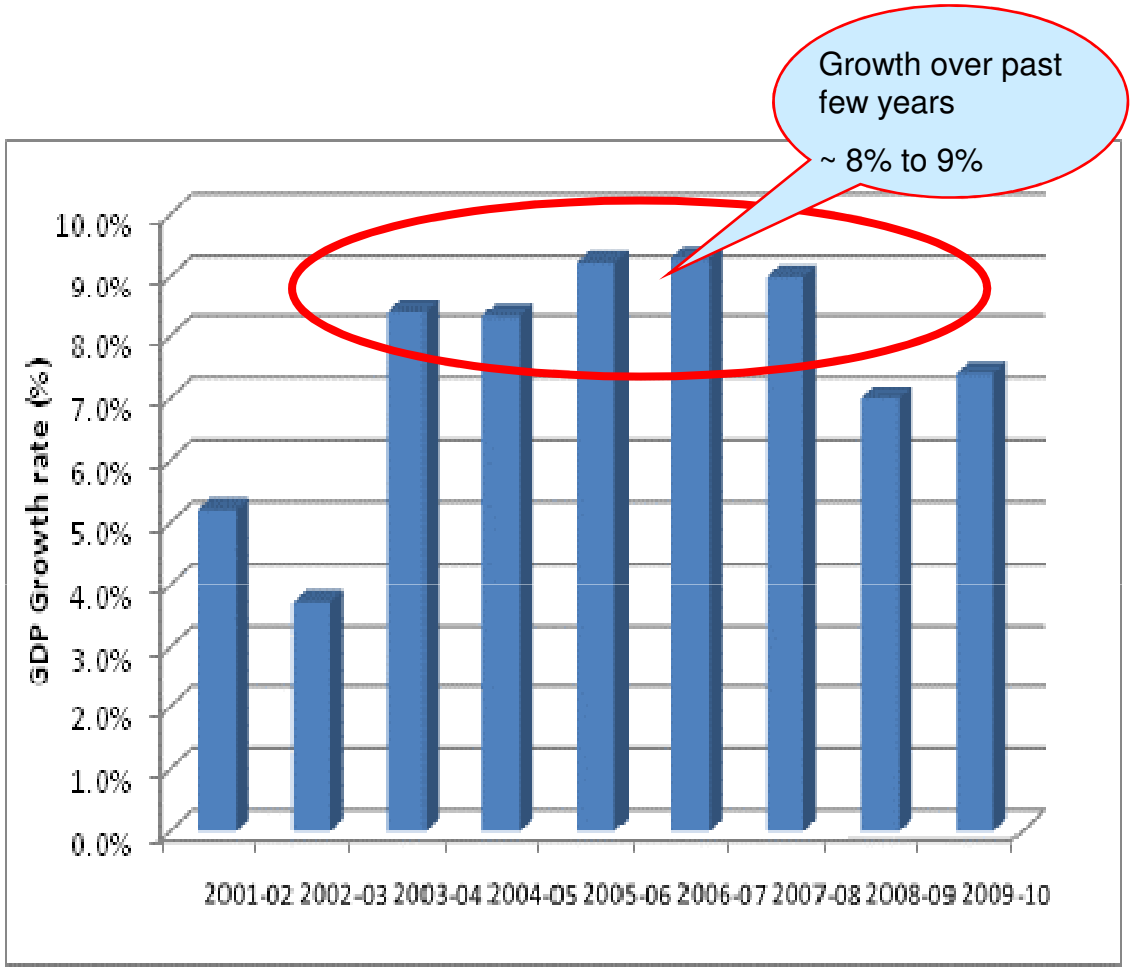
Power Markets and Trade in South Asia: Opportunities for Nepal

February 14-15, 2011

Indian Economic Growth – Sustained Momentum

- 4th largest economy (PPP); GDP ~ 3.6 Trillion US$

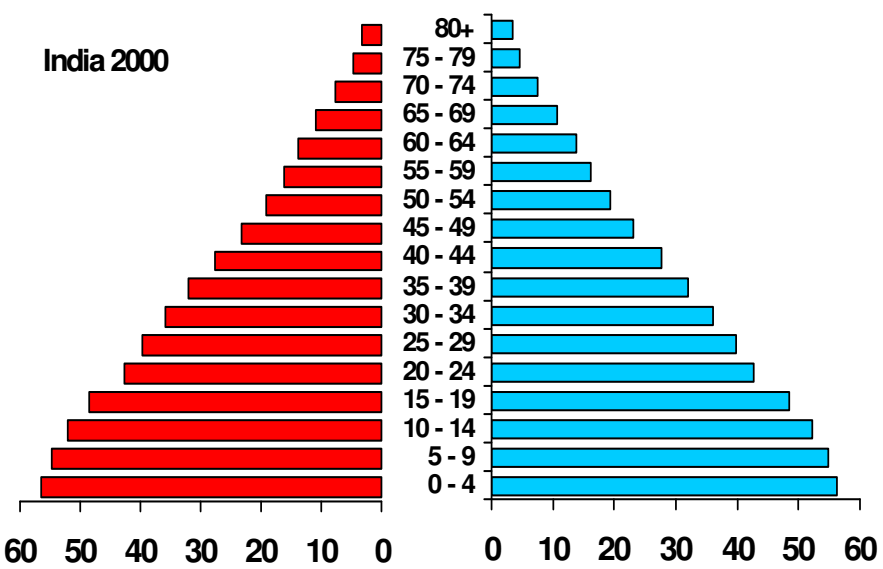
- Growth during 1992-2007 faster than peers, except China

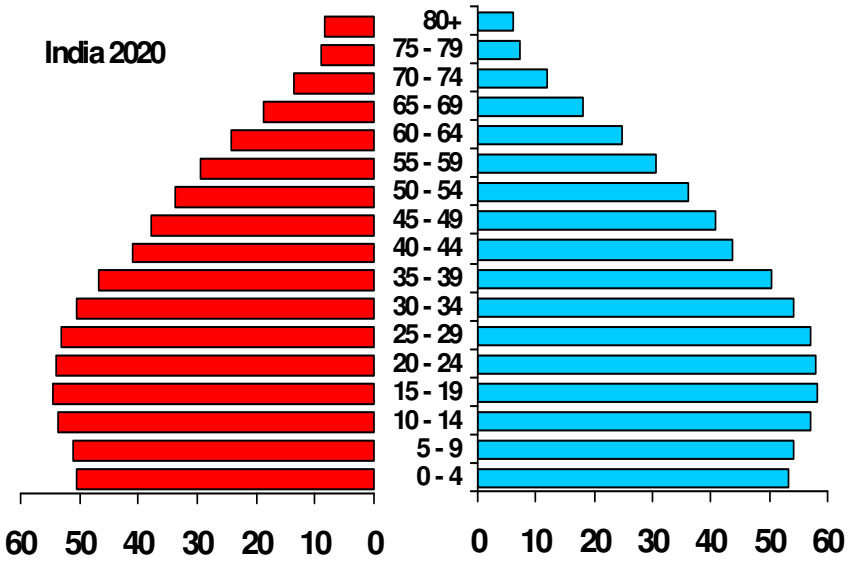


Overview of Indian Demographics

- The massive numbers of young people in the population today will reach the working age over the next 15-20 years.

- By 2020, India will have 270mn people (more than today's total US population) between the ages of 15 and 35





Future Potential

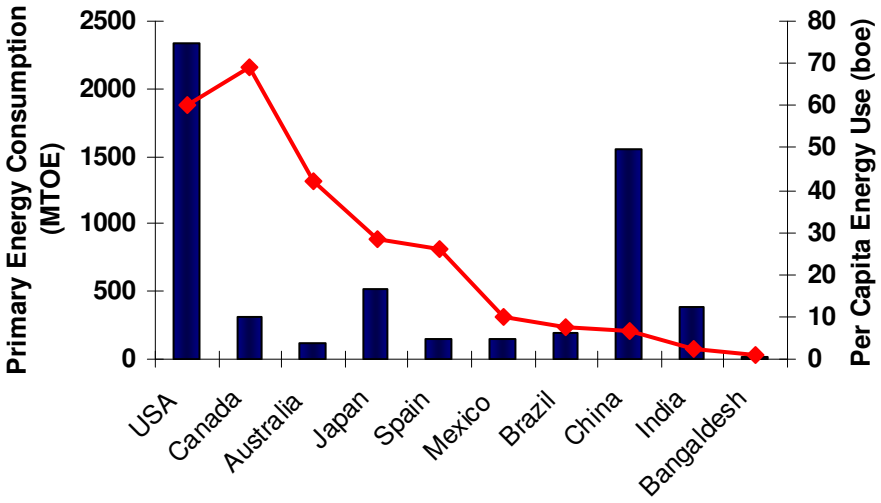
BY 2025

- ☑ **INDIAN INCOMES WILL ALMOST TRIPLE**
- ☑ **RISING INCOMES WILL CREATE A 600 MN STRONG MIDDLE CLASS**
- ☑ **INDIA WILL BECOME THE WORLD'S 5TH LARGEST CONSUMER MARKET**
- ☑ **AGGREGATE CONSUMPTION WILL QUADRUPLE**

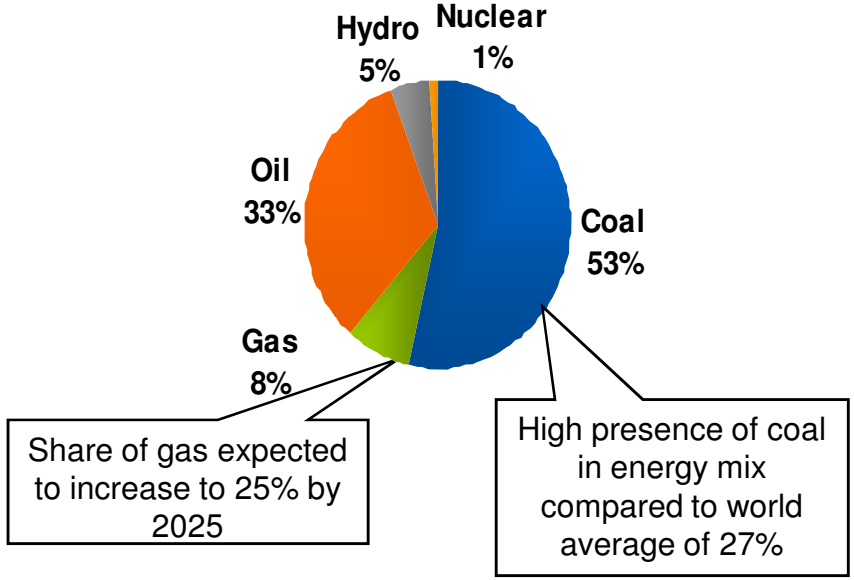
Overview of Indian Energy Sector

India's Energy Overview

Comparative Annual Energy Consumption



India's Primary Energy Consumption



- India is the world's 6th largest energy market
- Primary Energy Consumption ~387 MMTOE (per capita 2.4 / boe) – low compared to world average of 11.3/boe
- Projected growth at 3.2% CAGR
- Key drivers include GDP growth at 7-9% p.a.

Source: Director General Hydrocarbons, India

Key Features

- Energy intensity of the Indian economy increasing with rapid economic growth
- High level of import dependence
- Huge investment required
- Government initiatives to augment supply along with private sector participation
- Move towards energy markets and market driven pricing
- Independent regulatory set-up across the energy chain integral part of policy
- Increasing awareness of environmental issues

Challenges

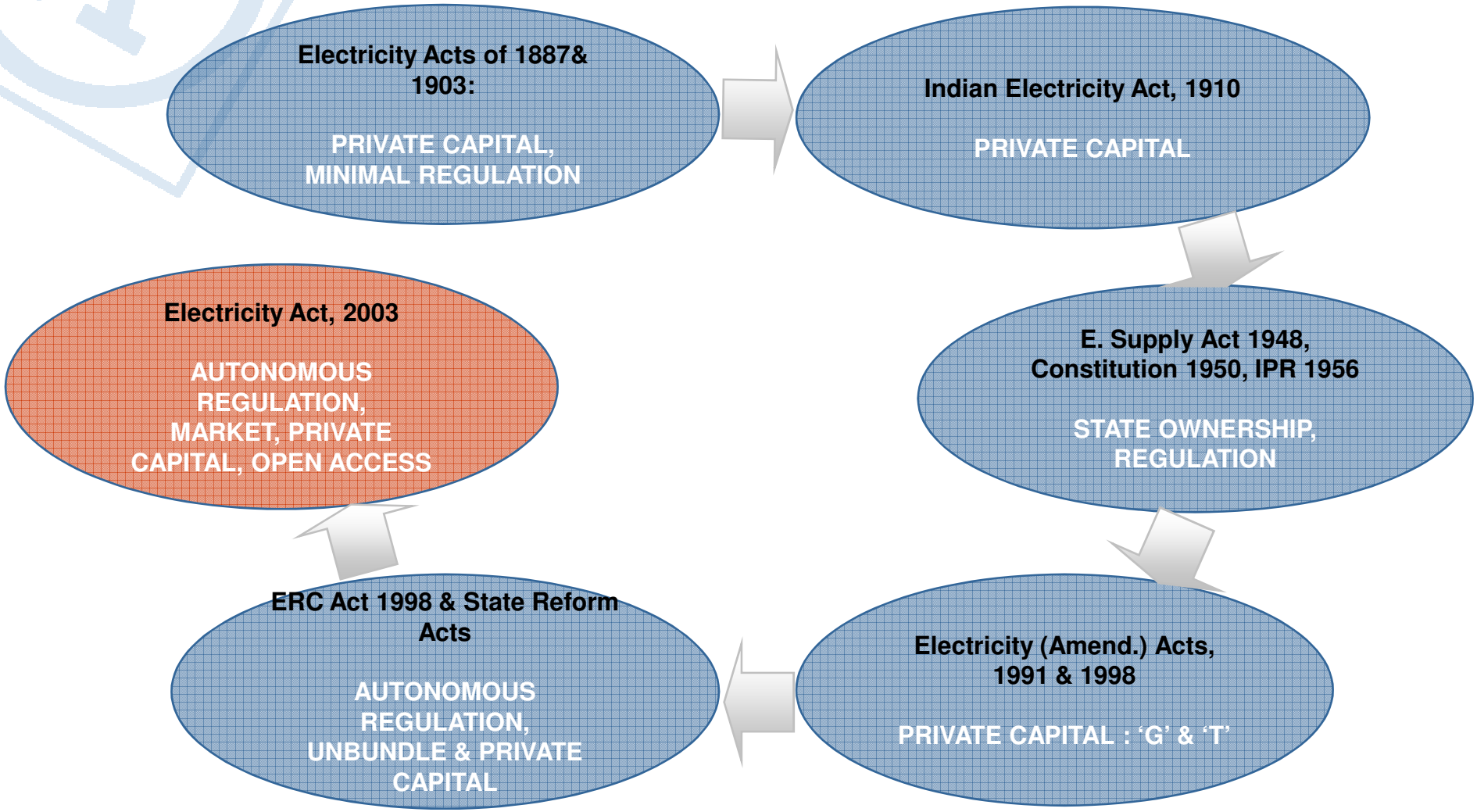
- Level of investment required
- Adequacy and stability of policies and regulation
- Conducive environment to implement policy reforms
- Regulatory capacity and maturity
- Creation of a market based pricing environment and reducing the current price distortions (in fuels and power)
- Poor efficiencies of the state owned entities (particularly in the power sector)
- *Fuel*

POWER SECTOR OVERVIEW

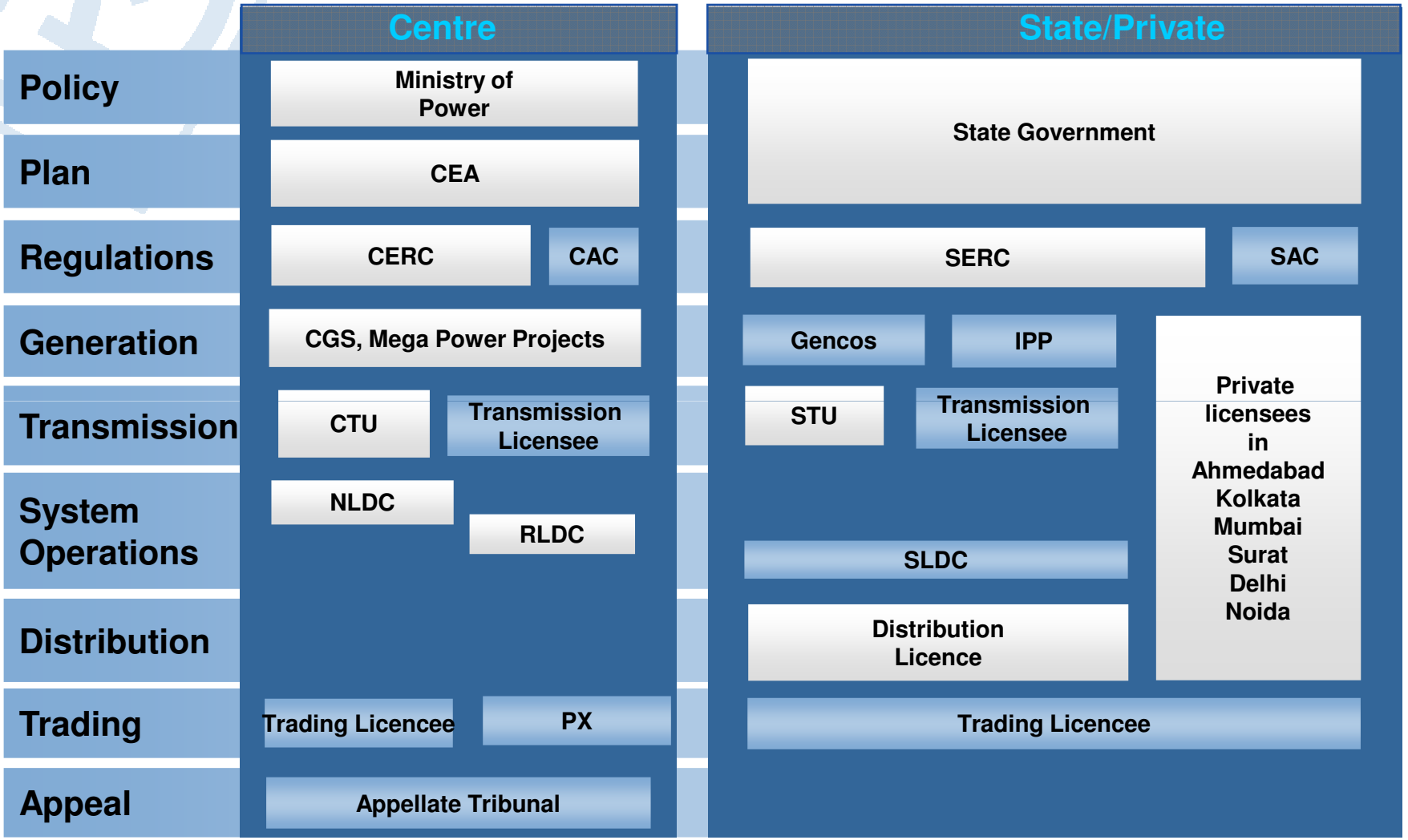
Sector Goals & Vision – National Electricity Policy

Access to Electricity	Available for all households by 2012
Availability	Electrification of all villages by 2007
Electrification	Demand to be fully met by 2012 Energy and peaking shortages to be overcome
Reliability and quality of power	5 % spinning reserves by 2012
Per Capita consumption	Per capita consumption of electricity to be increased to 1000 units by 2012

Industry Structure Development



Industry Structure Post EA 2003



Legislative, Policy and Regulatory Developments

Policy/Legislation/Regulation	Year	Key Focus
ERC Act	1998	Independent regulation
Electricity Act	2003	Sector reorganisation and competitive markets
National Electricity Policy	2005	Overall sector development
National Tariff Policy	2006	Performance based regulation
Guidelines for Competitive Bidding	2006	Transparent tariff based bidding for new generation
Rural Electrification Policy	2006	Access to all by 2011-12
Hydropower policy	2008	Accelerated hydropower development
Terms and Conditions of Tariff, CERC	2009	Generation and Transmission tariff determination
Indian Electricity Grid Code Regulations	2010	Grid operations with competitive markets and renewables
REC Regulations	2010	Trading of renewable energy certificates
Power Market Regulations	2010	Transparent power market operations
Sharing of Transmission Charges Regulations	2010	Efficient transmission pricing

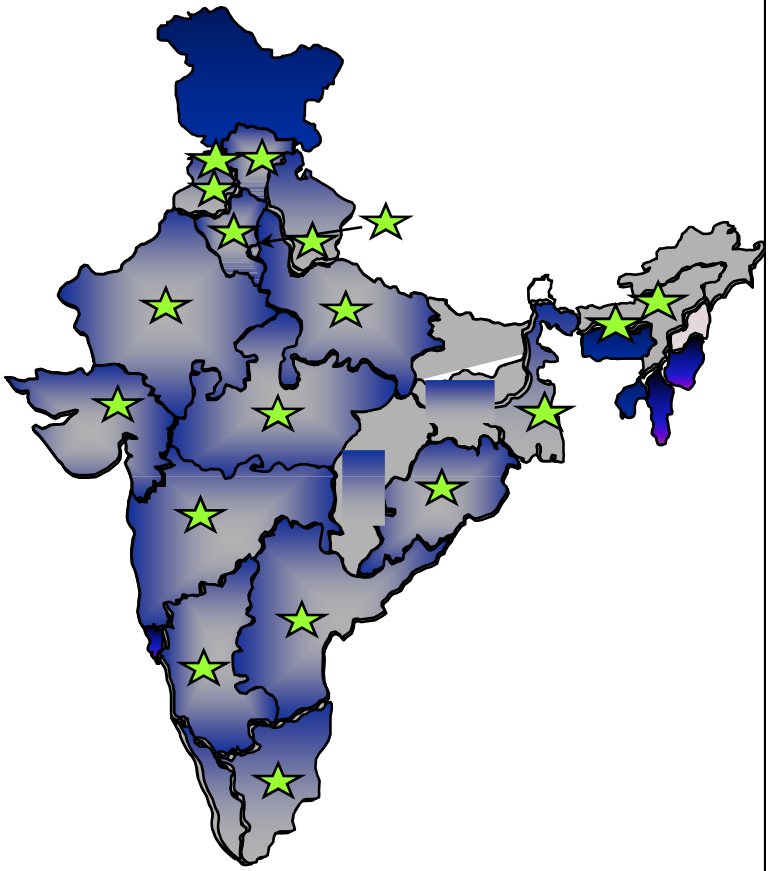
Sector unbundling and regulatory reform

- State Electricity Regulatory Commissions in 25 states out of 28
- Joint Electricity Regulatory Commission in others states and Union Territories

Tariff orders issued in 20+ states

Unbundling of SEBs in 22 States

Draft/ Final Open Access Regulations – 12+ ERCs



Source: Tenth Plan Document & Ministry of Power. Updates by Mercados EMI

ELECTRICITY ACT 2003

Objective of EA 2003

- **Consolidate the laws** relating to generation, transmission, distribution, trading and use of electricity
- Taking measures conducive to the **development of electricity industry, promotion of competition, protecting interest of the consumers and supply of electricity to all areas**
- **Rationalisation** of electricity tariff, ensuring **transparent policies** regarding subsidies
- Promotion of **efficient and environment friendly policies**

National Electricity Policy and Plan

3. (1) The Central Government shall, from time to time, prepare the **national electricity policy and tariff policy in consultation with the State Governments** and the Authority

Provisions on Generation

7 Any generating company may establish, operate and maintain a generating station **without obtaining a licence**

8 (1) Any generating company intending to set-up a **hydro**-generating station shall submit to the Authority, a scheme estimated to involve a capital expenditure exceeding such sum, as may be fixed by the Central Government

Captive Generation

2. (8) "Captive generating plant" includes a power plant set up by any **co-operative society or association of persons** for generating electricity **primarily** for use of members of such co-operative society or association

2 (49) "person" shall include **association or body of individuals, whether incorporated or not**

9. (1) A person may **construct, maintain or operate** a captive generating plant and dedicated transmission lines

9. (2) A person shall have the **right to open access** for the purposes of carrying electricity from his captive generating plant to the destination of his use

39. Provided also that surcharge shall **not** be leviable in case **open access** is provided to a person who has established a captive generating plant

Generating Companies

10. (2) A generating company may supply electricity to any licensee in accordance with this Act and the rules and regulations made thereunder and may, subject to the regulations made under sub-section (2) of section 42, supply electricity to any consumer.

11. (1) The Appropriate Government may specify that a generating company shall, in extraordinary circumstances operate and maintain any generating station in accordance with the directions of that Government.

Explanation - For the purposes of this section, the expression "extraordinary circumstances" means circumstances arising out of threat to security of the State, public order or a natural calamity or such other circumstances arising in the public interest.

(2) The Appropriate Commission may offset the adverse financial impact of the directions referred to in sub-section (1) on any generating company in such manner as it considers appropriate.

Provisions Related to Tariff Fixation

61. The Appropriate Commission shall, subject to the provisions of this Act, specify the terms and conditions for the determination of tariff, and in doing so, shall be guided by the following, namely:-

(a) the principles and methodologies specified by the Central Commission for determination of the tariff applicable to generating companies and transmission licensees;

(b) the generation, transmission, distribution and supply of electricity are conducted on commercial principles;

…

(f) multi year tariff principles;

Provisions Related to Tariff Fixation

62. (1) The Appropriate Commission shall determine the tariff in accordance with provisions of this Act for –

(a) supply of electricity by a generating company to a distribution licensee:

(b) transmission of electricity ;

(c) wheeling of electricity;

(d) retail sale of electricity.

Provisions Related to Tariff Fixation

63. Notwithstanding anything contained in section 62, the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government.

Provisions Related to Trading and Market Development

52. (1) …..the Appropriate Commission may, specify the technical requirement, capital adequacy requirement and credit worthiness for being an electricity trader.

(2) Every electricity trader shall discharge such duties, in relation to supply and trading in electricity, as may be specified by the Appropriate Commission.

66. The Appropriate Commission shall endeavour to promote the development of a market (including trading) in power in such manner as may be specified and shall be guided by the National Electricity Policy referred to in section 3 in this regard

National Electricity Policy, 2005

Overall Objectives of National Electricity Policy

- Ensure financial viability of the sector and attract investments
- Promote rural electrification
- Ensure protection of consumer interests
- Promote transparency and efficiency in operations and governance
- Promote competition
- Promote consistency in regulatory approaches across jurisdictions for minimising regulatory risks

Generation: Resources Utilization (1)

- Hydro : Maximum emphasis on full development of the feasible hydro potential in the country.
  - 50000 MW hydro initiative to be actively pursued.
  - Debt financing of longer tenor to be made available to hydro projects
  - State Governments to review procedures for land acquisitions and other approvals to expedite hydro projects
  - Harnessing potential in northern and north eastern states
  - Focussed implementation of R&R policies
  - However threshold for CEA concurrence not specified in policy
- Thermal :
  - Economics of generation and supply to form the basis for choice of fuel
  - Coal would continue to remain the major fuel
  - Imported coal to be encouraged at coastal locations.
  - Medium term and long term fuel supply arrangements for generators for utilizing imported fuels

Generation: Resources Utilization (2)

- Gas
  - Availability at reasonable prices key consideration for use as fuel in power generation
  - Commercial viability key consideration for LNG
  - National Gas grid advocated
- Liquid Fuels :
  - To shift to gas at the earliest to reduce costs
- Co-generation/Renewables/ Non conventional Energy Sources
  - Development of feasible potential to be encouraged
- Nuclear
  - Capacity share to be increased
  - Private sector partnership to be facilitated

Trading and market development (1)

- Overall Power market design guidelines including the **creation of suitable Power Exchange** to be developed by Government of India in one year.
- **PPA to be assigned to the Distribution Companies** subject to mutual agreement.
- CERC is authorized to issue inter-state trading license including authorization for **trading throughout the country**. SERC to issue license for trading within the State.
- **Unallocated power** from central generating stations to be progressively released for Trading
- SERCs advised to introduce ABT regime at the State level **within one year**

Trading and market development (2)

- To promote market development, new generators may sell portion of capacities through trading arrangements without committing it through long term PPA.
- Part of new capacity (15% indicated) should participate in trading markets
- Regulations on market development to be framed expeditiously. Appropriate Commission to notify regulations on power exchanges **<u>within six months</u>**

Tariff Policy, 2006

Overall Objectives of Tariff Policy

- Ensure financial viability of the sector and attract investments
- Ensure protection of consumer interests
- Promote transparency and efficiency in operations and governance
- Promote competition
- Promote consistency in regulatory approaches across jurisdictions for minimising regulatory risks
  - Consistency across time
  - Consistency across market participants in the same segment of value chain
  - Consistency across policy and regulatory jurisdictions

General Approach to Tariff Structuring

- Two part tariffs for all *long term* contracts
- CERC to periodically determine rate of return
- Option to the CERC to consider Return on Equity (RoE) or Return on Capital Employed (RoCE)
- Debt swaps to be incentivised keeping in view consumer interest
- **After 5 years of policy formulation all power to be procured by distribution licensees through competitive bid process**

Competitive Bidding Guidelines, 2006

BACKGROUND

- SEC – 63 OF THE ELECTRICITY ACT STATES:
  - Notwithstanding anything contained in section 62, the Appropriate Commission shall adopt the tariff if such tariff has been determined through transparent process of bidding in accordance with the guidelines issued by the Central Government.
- The guidelines have been framed under the above provisions of the Act.
- Issued by the Ministry of Power on 19th January 2005 and amended subsequently.

OBJECTIVES

- Promote competitive procurement of electricity
  - Tariff Policy mandates that all future procurement of power by Distribution Licensees is to be through tariff based competitive bidding process except in cases of expansion projects or projects developed by public sector
  - Even in case of public sector projects tariff would be decided by competitive basis after a period of 5 years or as and when the Regulator decides to introduce competition

- Facilitate transparency and fairness in procurement processes
  - Transparency is ensured by the Guidelines & Standard Bid Documents for tariff based bidding
  - Information regarding site, water, fuel linkage, other clearances & project details are made available to bidders before start of bidding process

OBJECTIVES

- Facilitate reduction of information asymmetries for various bidders
    - Standard Bid Documents for procurement of Power have been issued by Ministry of Power for Case -1 and Case-2 projects
- Protect consumer interests by facilitating competitive conditions in procurement of electricity
    - UMPP at Sasan, Mundra, Krishnapatanam and Tilaiya have been awarded to developers at Competitive tariff of INR1.196 / kWh, INR. 2.26 / kWh, INR2.33 / kWh & INR1.77 / kWh on levellised basis for 25 years

OBJECTIVES

- Enhance standardization and reduce ambiguity and hence time for materialization of projects
    - Standardization of Bid documents , Bid submission and evaluation process, timeline for the bidding process, Tariff structure has been facilitated by the issuance of Guidelines for Competitive Bidding and Standard Bid Documents
- Provide flexibility to suppliers on internal operations while ensuring certainty on availability of power and tariffs for buyers.
    - Tariff to be quoted upfront for the life of the plant and the Regulator to adopt the tariff arrived through transparent bidding process as specified by the Guidelines
    - Developer has the flexibility to choose optimum unit configuration,
    - Provides incentive to Developer to adopt innovative financial modeling and tax planning to ensure competitive tariff & return on investment.

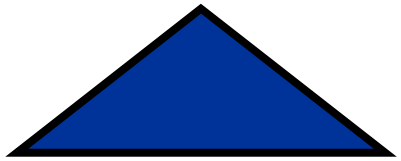
SCOPE

Period of Procurement

- Long-term → 7 years and above
- Medium term → > 12 months up to 7 years

Applicable for procurement of

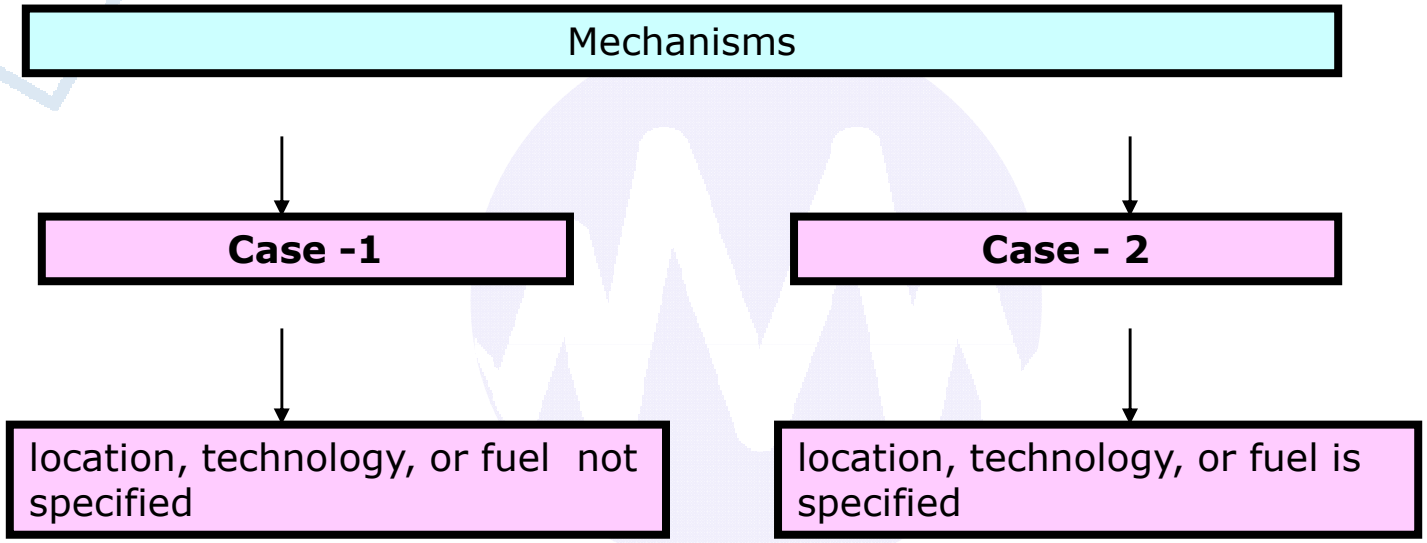
Base-Load



Seasonal Power

Peak-Load

SCOPE contd..


Mechanisms
Case -1
Case - 2
location, technology, or fuel not specified
location, technology, or fuel is specified

SCOPE contd..

- Procurement by more than one distribution licensee through a combined bid process is permitted through an authorized representative/ SPV.

- In case of combined procurement where the distribution licensees are located in more than one State, the Appropriate Commission shall be the Central Electricity Regulatory Commission (CERC).

BIDDING PROCESS

Two Stage Process for Case-2:

i) Request for Qualification (RFQ)

ii) Request for Proposal (RFP)

For Case-1 or Medium term:
The procurer has an option to adopt a single stage tender process combining the RFP & RFQ process.

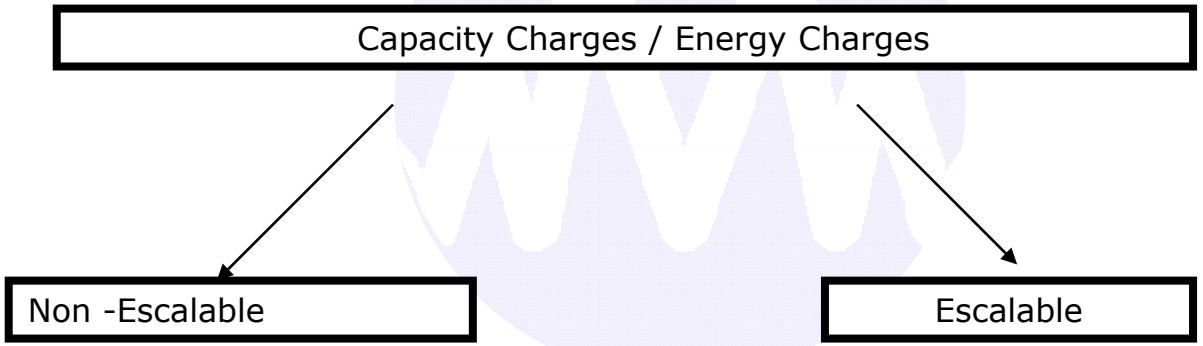
The bidding shall be necessarily by way of International Competitive Bidding (ICB).

TARIFF STRUCTURE

- Tariff in INR only. (FERV is allowed in coastal plants based on imported coal in Case-2 and for long-term procurement in Case-1)
- Multi – part tariff to form basis of bidding:

  i) Capacity Component

  ii) Energy Component



(Based on Predefined Index)

Indices for Escalable components are notified by CERC

TARIFF STRUCTURE contd..

Energy Charges Components (Case-2) :

1. For captive mine or fuel linkage.
2. For imported fuel:

(i) Imported fuel (USD/kWh)

(ii) Transportation of fuel (USD/kWh)

(iii) Inland fuel handling (Rs./kWh)

Non -Escalable

Escalable

(Based on Predefined Index)

TARIFF STRUCTURE contd..

- For Medium term Procurer has the option to call bids on Single part basis.
- For Long term with Specific fuel allocation (Case-2) bids to be called on basis of:
- Capacity Charge
- Net Quoted Heat Rate (Energy Charges to be derived).
- FERV risks to be borne by Supplier .
- Transmission Charges to be borne by the Procurer.
- Cost of Specific Oil to be factored in Capacity Charges.

TARIFF STRUCTURE contd..

- Bidder can Quote Differential Rates for Peak load/Seasonal Requirements.
- For hydro projects under **Case 2**, the Hydrological risk is to be borne by the Procurer and Geological risk to be borne by the developer.
- **Change in Law**: impacting cost or revenue from the business of selling electricity to the procurer with respect to the law applicable on the date which is 7 days before the last date for RFP bid submission shall be adjusted separately.

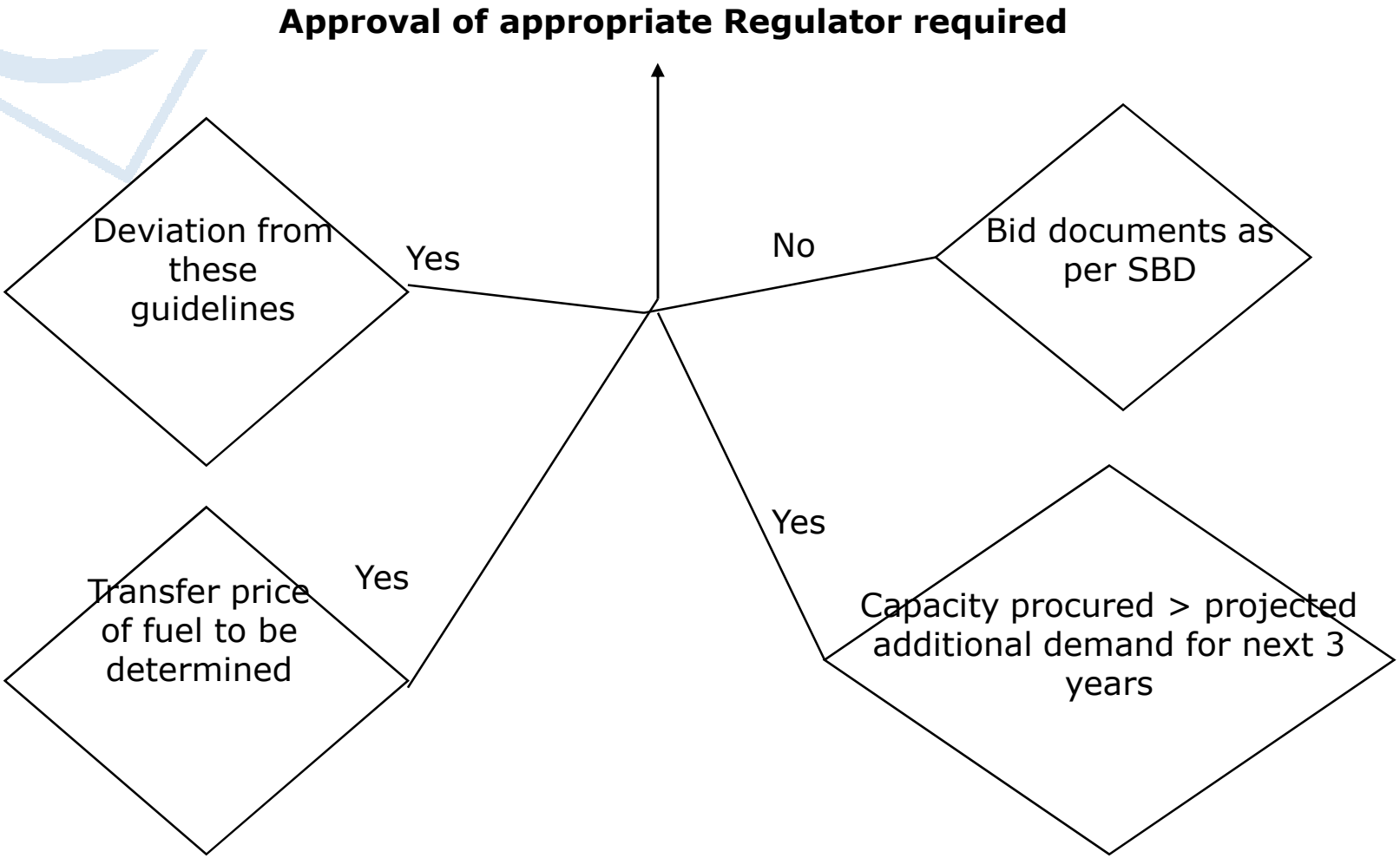
REGULATORY INTERFACE

- **Appropriate Regulator to accord approval or require modification to bid documents in time not exceeding 90 days.**

- **Intimation to appropriate Regulator is required about initiation of bidding process.**

- **Appropriate Regulator to adopt the tariff determined through competitive bidding process**

REGULATORY INTERFACE



PAYMENT SECURITY

Payment Security constitute:

i) Letter of Credit (LC)

ii) LC backed by credible Escrow Mechanism

- The procurer shall restore the payment security mechanism prior to the next date of payment.
- In the event of payment default the seller can sell up to 25% of the contracted power to other parties without loosing claim on the capacity charges.
- If the payment security mechanism is not fully restored within 30 days of the event of the payment default, the seller can sell full contracted power to other parties without loosing claim on the capacity charges.

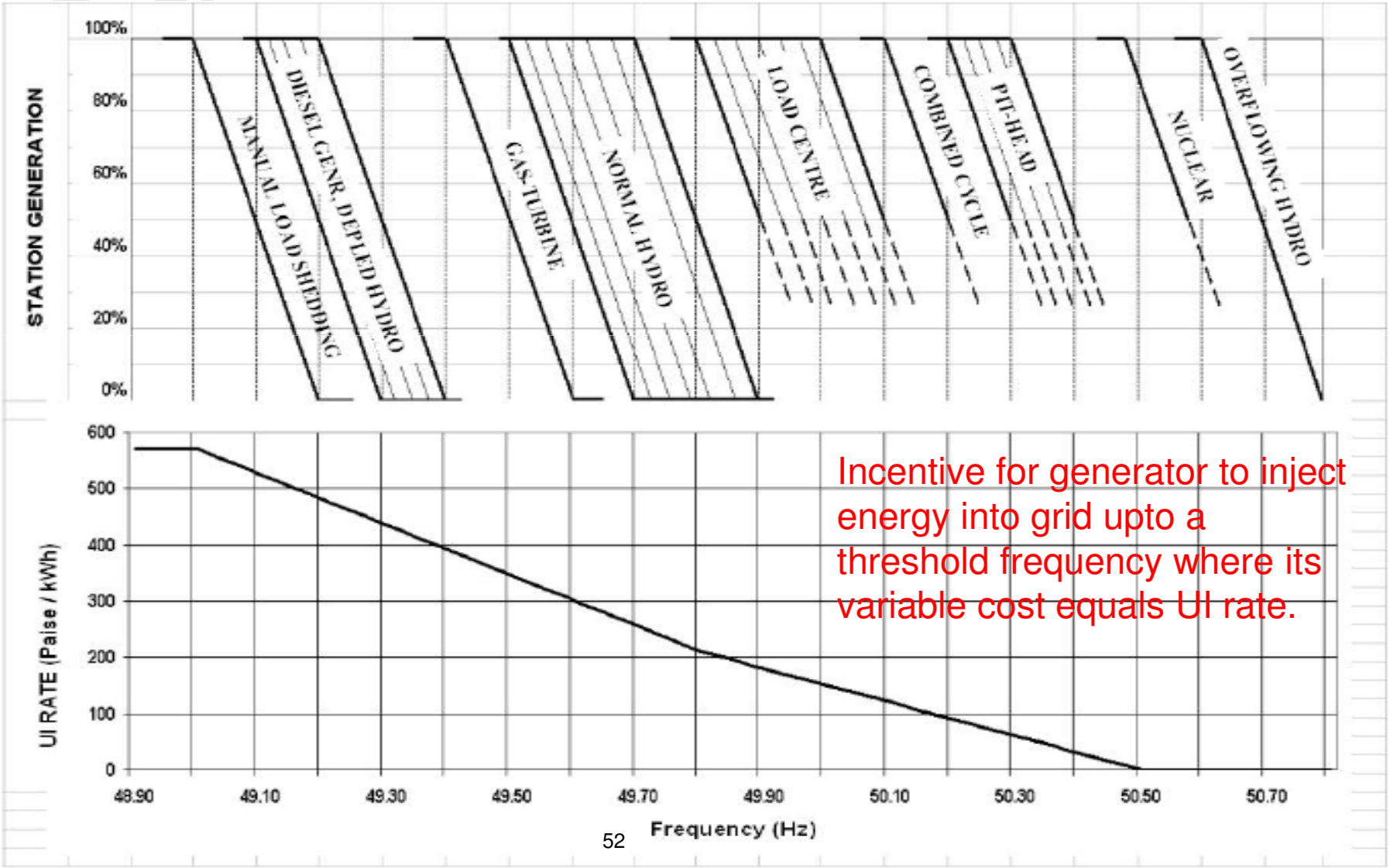
UI Charges and Related Matters Regulation

Unscheduled Interchange

- Unscheduled Interchange (UI) is a frequency linked mechanism that accomplishes the following,
  - Frequency management in the Grid through commercial signals for over-drawal and under-drawal
  - Balancing of demand and supply within the permissible frequency band
  - Real time trading of energy through a pooling mechanism
- Variation from scheduled generation and drawal is charged at the rates defined by CERC
- Charges are payable for
  - Over-drawal by the buyer or the beneficiary
  - under-injection by the generating station or the seller
- Charges are receivable for
  - Under-drawal by the buyer or the beneficiary and
  - Over injection by the generating station or the seller

Each 0.02 Hz step is equivalent to 15.5 paise/kWh in the 50.2-49.7 Hz frequency range and 47.0 Paise/kWh in the 49.7-49.50 Hz frequency range.

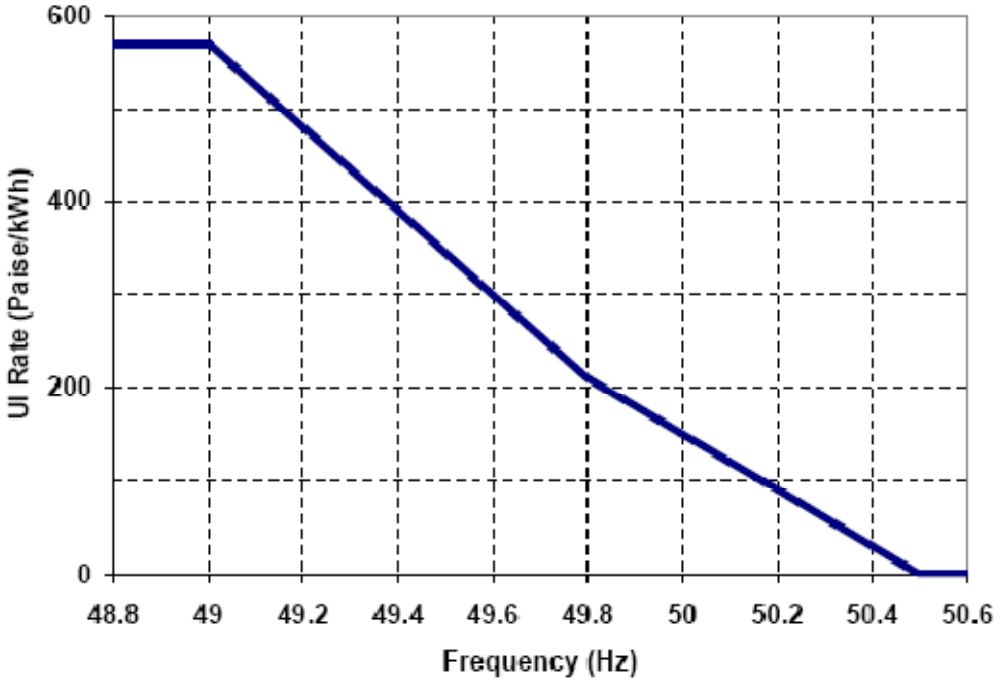
Original UI Design - Threshold frequency

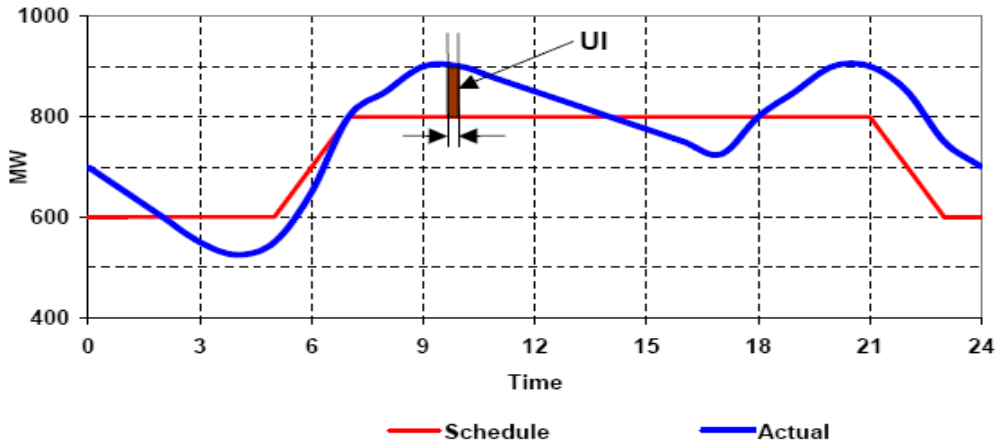


Incentive for generator to inject energy into grid upto a threshold frequency where its variable cost equals UI rate.

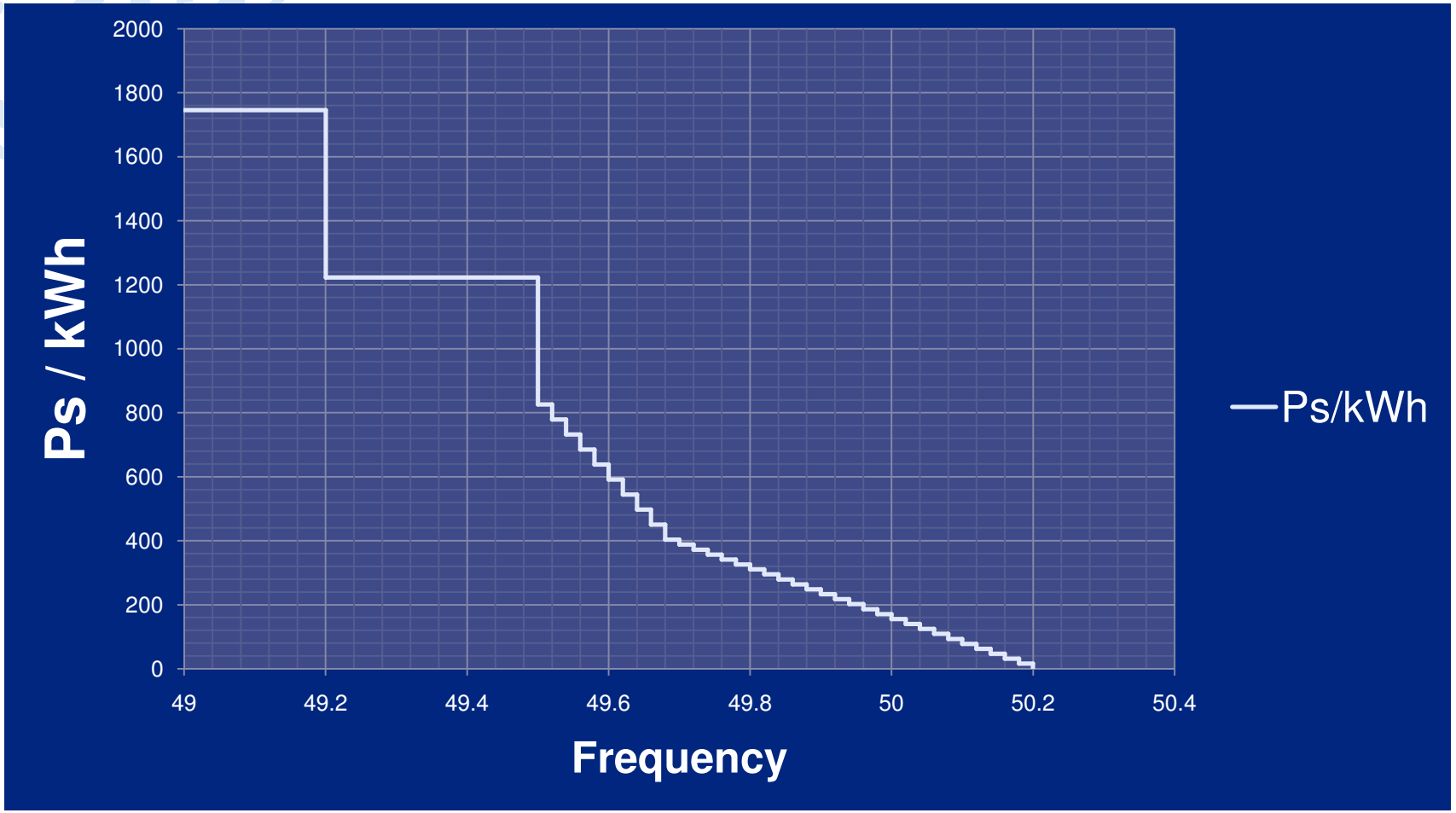
UI rate

- 15 minute scheduling cycle followed
- Two sets of accounts generated
  - As per schedules
  - As per deviations from schedules (or unscheduled interchange)
- Similar payments to the loads for deviations from scheduled drawals
  - Original UI pool a zero sum operation. Settled weekly

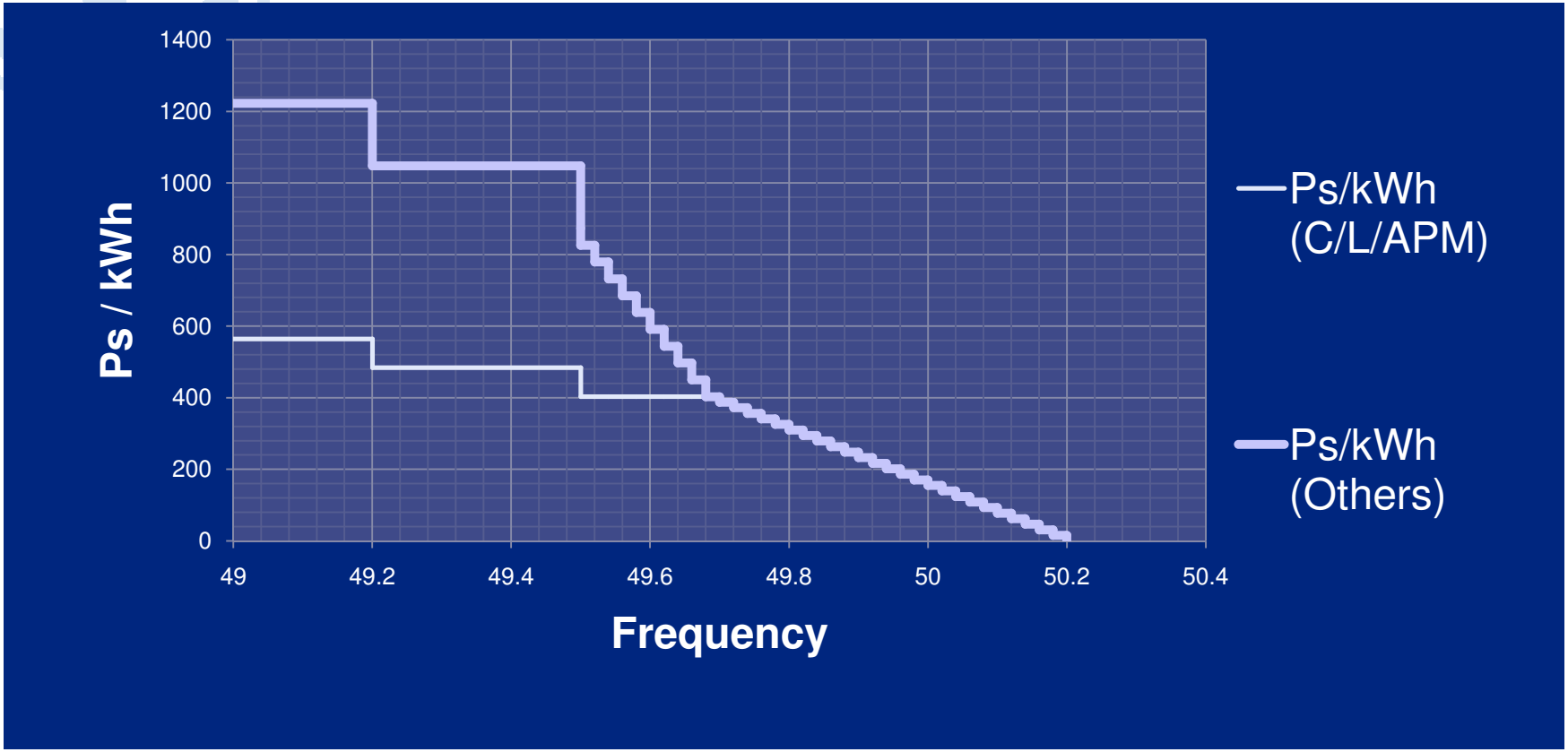




Present UI Price Vector – Overdrawal (Payable)

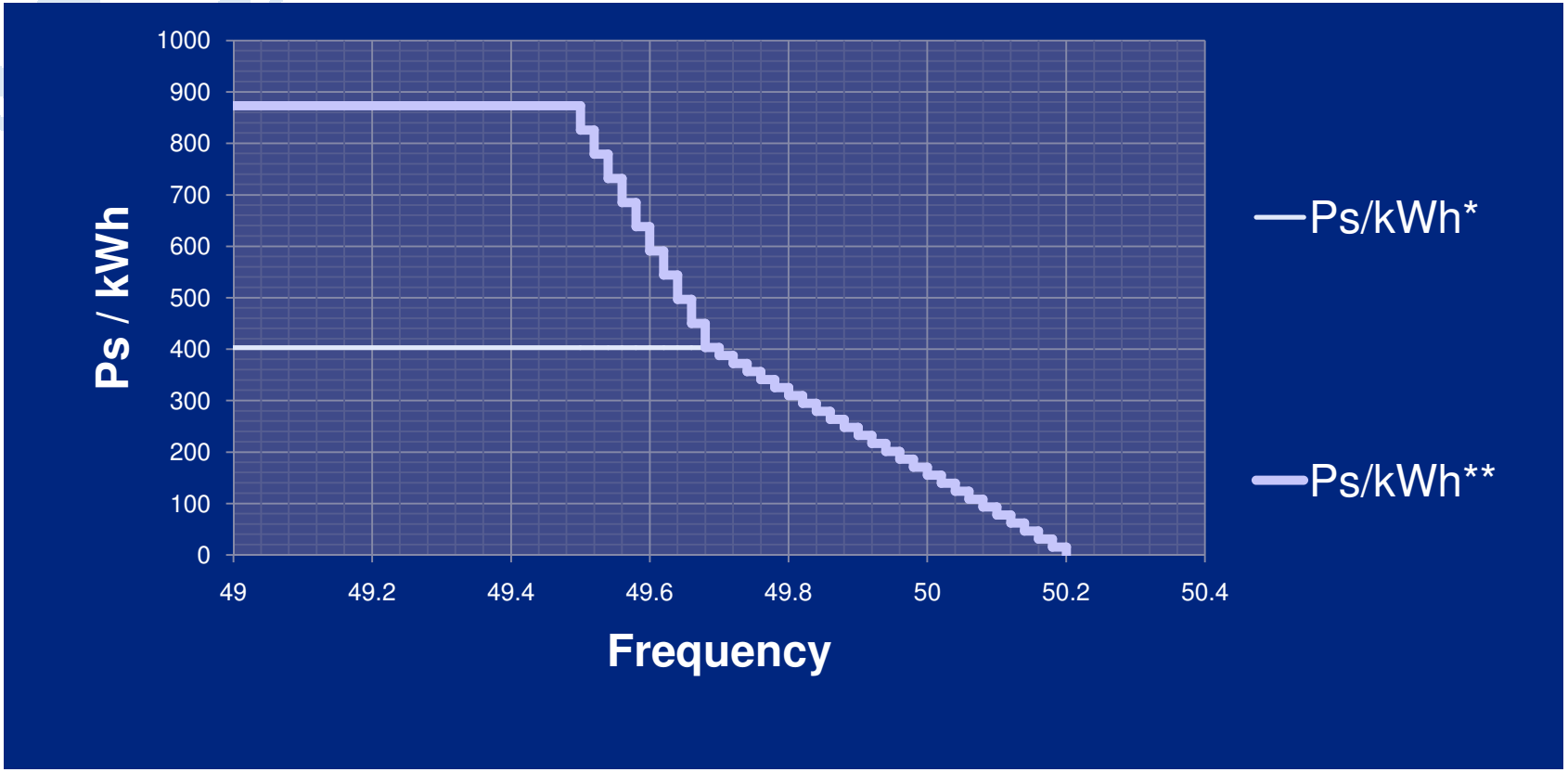


Present UI Price Vector – Under Injection (Payable)



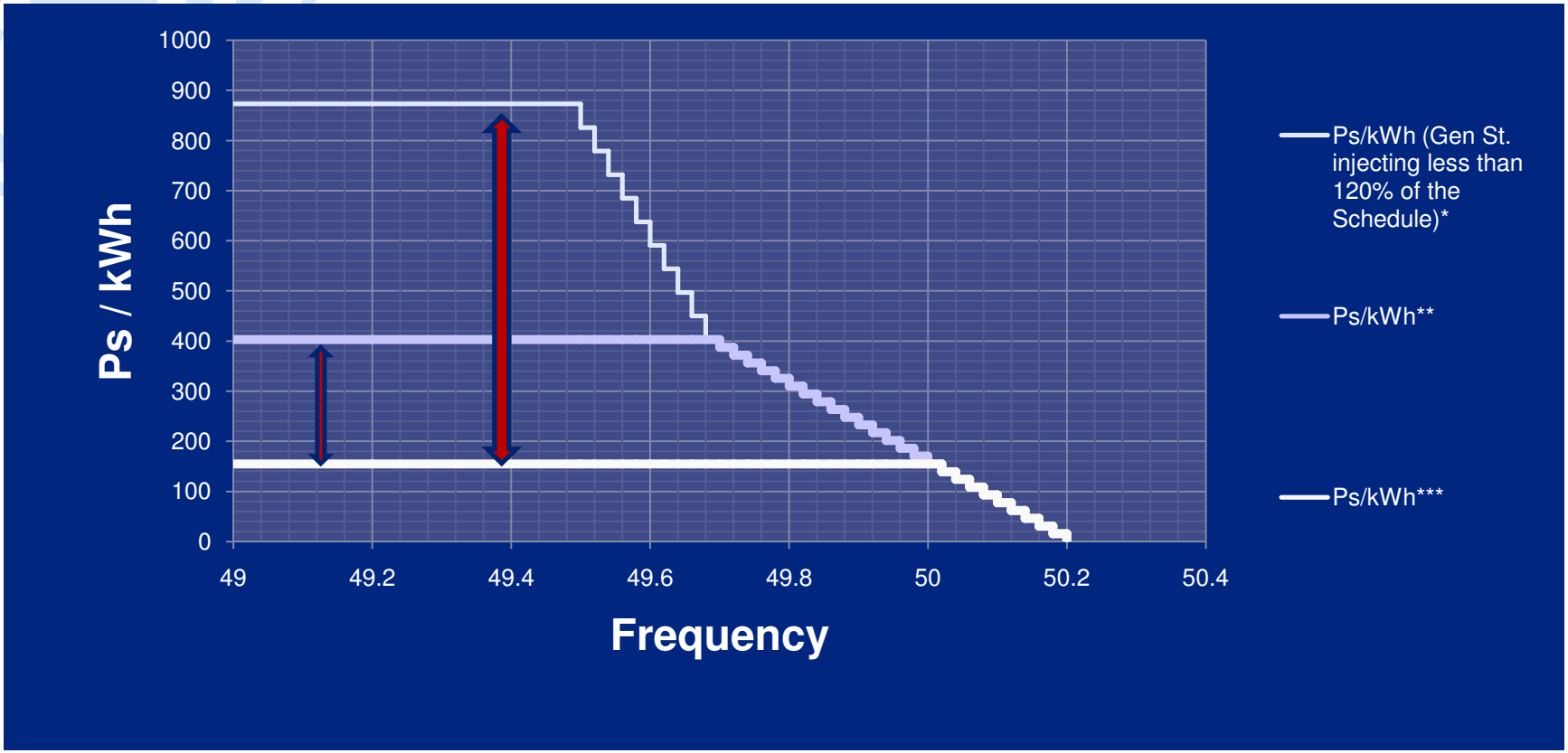
Ps / kWh (C/L/APM) – are payable by coal / lignite / APM Gas based generators
Ps / kWh (Others) – are payable by generators that do not fall in the above category

Present UI Price Vector – Underdrawal (Receivable)



*Receivable by buyers/beneficiaries who under draw in excess of 10% of their Schedule or 250 MW, whichever is less.
**Buyers / beneficiaries who draw less than 110% of their schedule get the normal UI rate (excluding the additional charges)

UI Price Vector – Over injection (Receivable)



*Overinjection by non-coal, non-lignite and non-APM gas based generators
**Overinjection by coal, lignite and non-APM gas based generators and also other generators for generation in excess of 120% of the schedule subject to a maximum of 105% of Installed capacity or 101% of installed capacity over the day
***Over injection by the seller in excess of ex-bus generation corresponding to 105% of the Installed Capacity of the station in a time block or 101% of the Installed Capacity over a day

Thank You