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REGIONAL INITIATIVE FOR ENERGY  
(SARI/ENERGY)**

**26<sup>th</sup> July - 8<sup>th</sup> August, 2010**

**Central Institute for Rural Electrification**

**of  
Rural Electrification Corporation Ltd**

**(A Govt. of India Enterprise)**

**Hyderabad, Andhra Pradesh, India**



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# Training programme on

## DISTRIBUTION SYSTEM LOSS REDUCTION

Power Scenario and Reform Concepts



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## POWER SECTOR

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- Electricity is the essential requirement of all facets of our life and a basic need.
- It is also critical infrastructure for the socio-Economic development of any country.
- Its uniqueness lies in the fact that it is the only infrastructure used for all the 24 hrs and 365 days in any year, in the life of any human being
- Considered to be the back bone of all infrastructures as their development depends on progress in power sector
- Per Capita consumption is a key factor indicating extent all round Human development and poverty alleviation .



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## Objectives of Power Utility

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- Supplying of Power of quality, continuity and Reliability
- Extending supply network in the total area under its jurisdiction
- Meeting the demand in full
- Operating plants and network at Optimum efficiency
- Keeping the losses at bare minimum
- Supplying power at affordable price
- Providing effective consumer services



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# Power Supply

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- Power supply of quality means Extending Power Supply :
  - ✓ within specified voltage and frequency limits,
  - ✓ with least interruptions and fluctuations ,
  - ✓ Keeping the Harmonic levels with in limits
  - ✓ Extending best of the commercial services
  - ✓ Limiting fluctuations to the levels specified

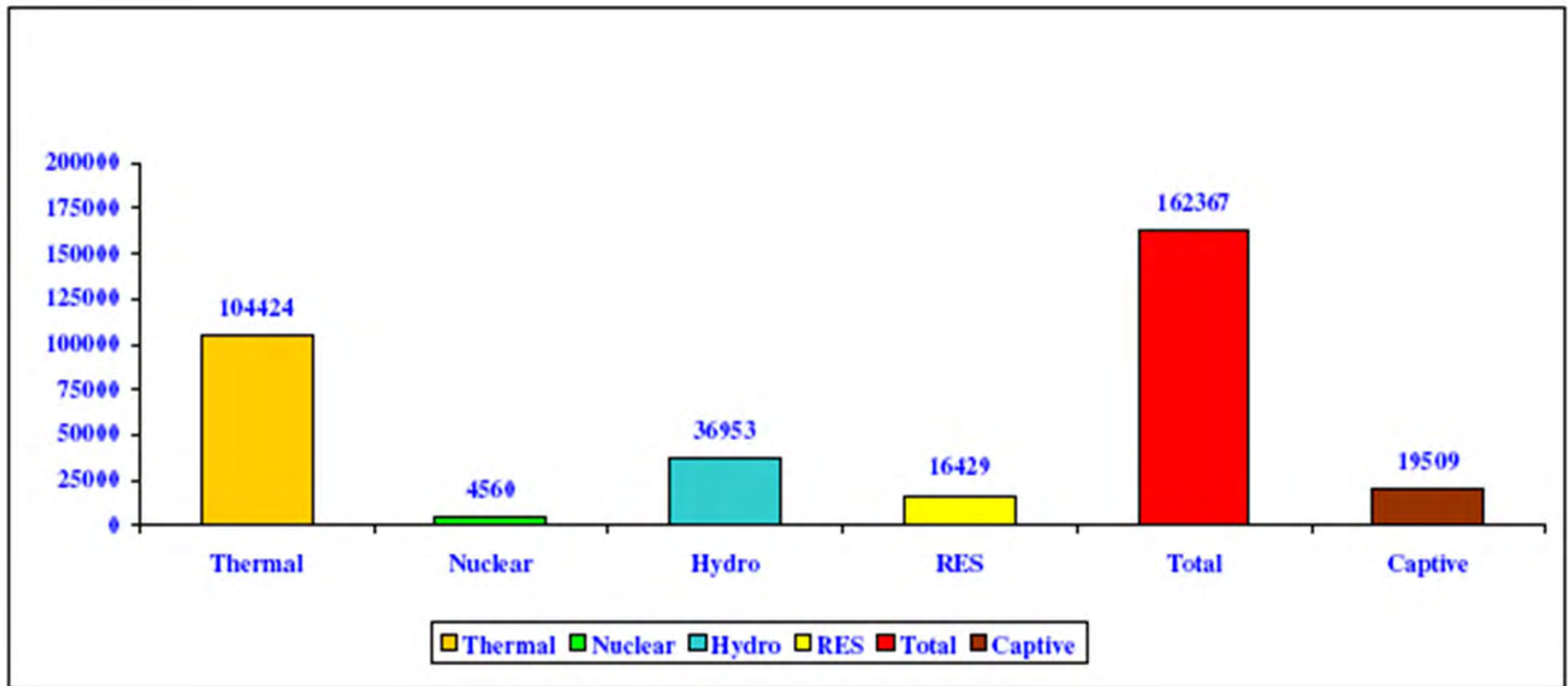


## POWER SCENARIO - INDIA

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Installed Capacity in 1947	1,300 MW
Installed Capacity June 2010	1,62,367 MW
Demand Estimates(FY2012)	16 <sup>th</sup> EPS*
Energy Demand(Billion Units)	750
Peak Demand	155,000
Installed Capacity required to meet peak demand(MW)	195,000
Additional Capacity required(MW)	60,000
■ Present energy shortages	8.2%
■ Peak demand shortfall	13.8%
<i>*Energy Power Survey by GOI</i>	
Village Electrification	83.9%
Pump sets energised	82.9%

# Power Generation Capacity in India (30 June 2010)





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## TRANSMISSION

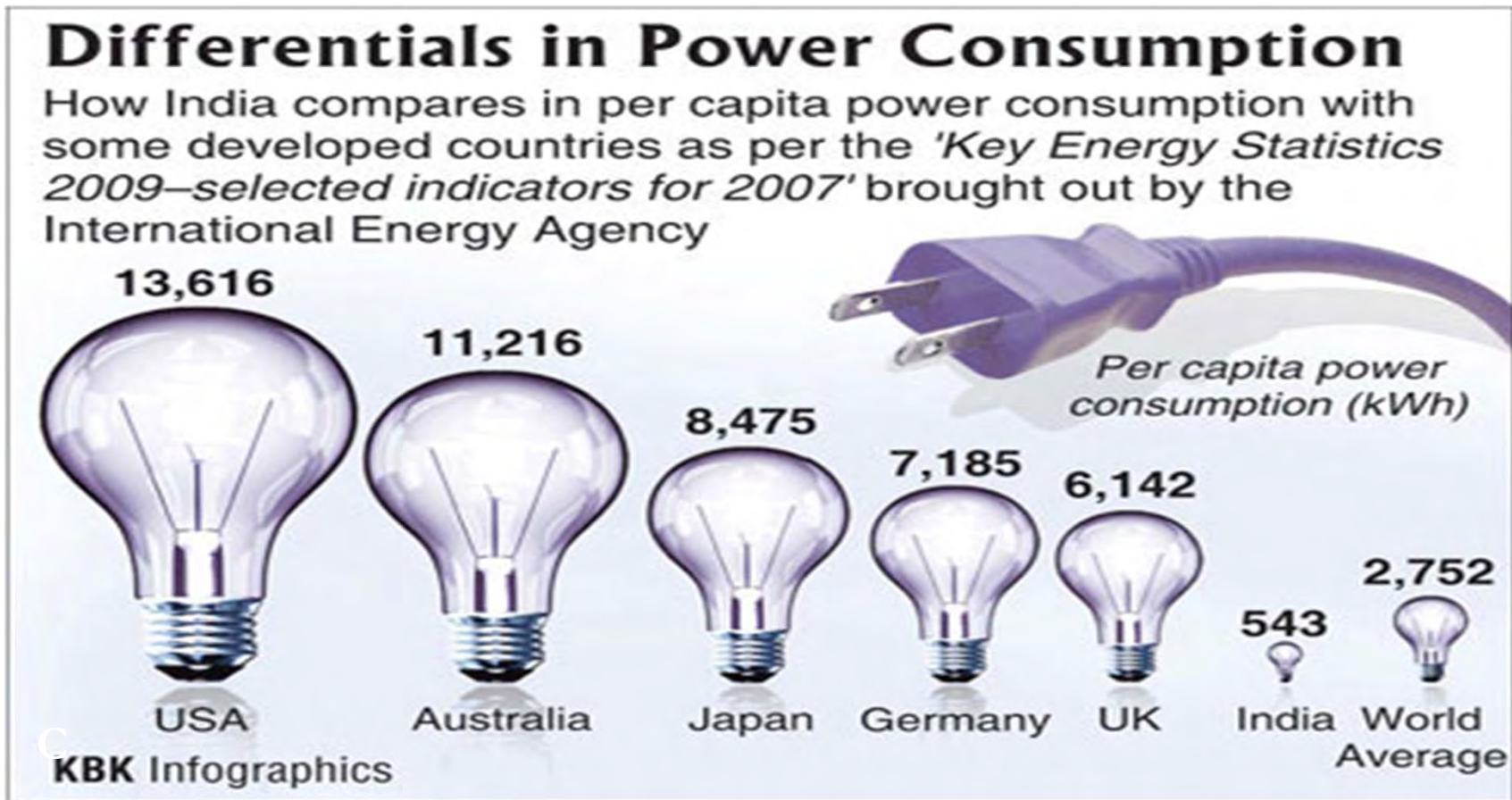
- Transmission Lines – 3,55,000 ckm
- Total transformation capacity- 4,30,000 MVA
- 5 Regional Grids were in Operation in the Country earlier but presently it is only two.
- National Grid is under Formulation
- Transmission Network: AC:- 765,400, 220, 132, 66 kV  
Frequency: 50 Cycles,
- HVDC -  $\pm 500$  kV, 1300 kV -- Capacity - 8200 MWs
- Rural Electrification --Just above 83%
- Total Consumers 144 Million





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# Average Power Per capita (Watts per person)



India Power Per capita (Watts per person) : 50.5

Afganistan Power Per capita (Watts per person) : 3.06



# Power Sector Structure

## ■ Generation



## ■ Transmission

State Utilities

CEA

CERC

## ■ Distribution State/Private Utilities

SERC



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# Power Generated – How does it flow? Where does it go?

Generating Station

Transmission System losses

Unavoidable Distribution  
Losses

Pilferage Losses

Billed to consumer

Energy usefully consumed



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## Electricity Supply Issues

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- Intermittent
- Voltage and frequency fluctuations  
Equipment damage
- Vicious circle: (World Bank, 2001)  
Subsidized Tariffs  
Low Investments  
Poor quality
- T&D Losses  $> 30\%$  (I2R + Theft)



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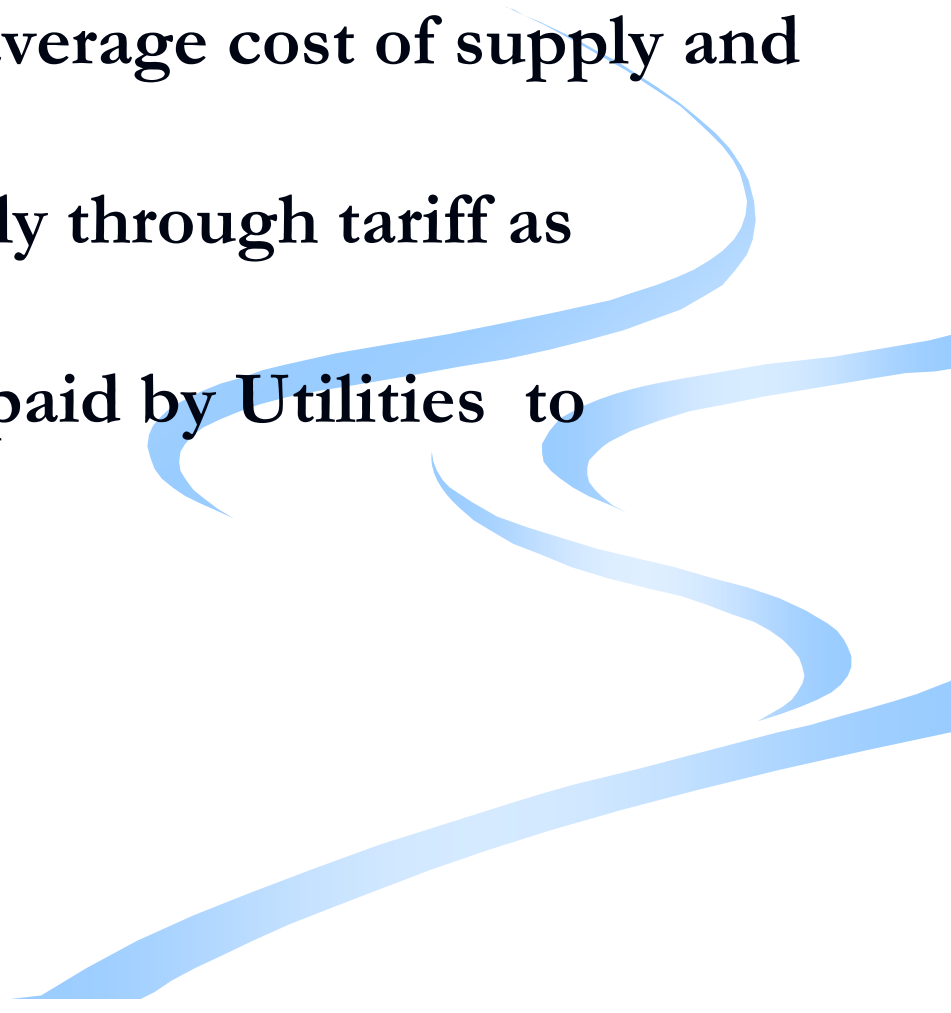
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# Reforms for .....

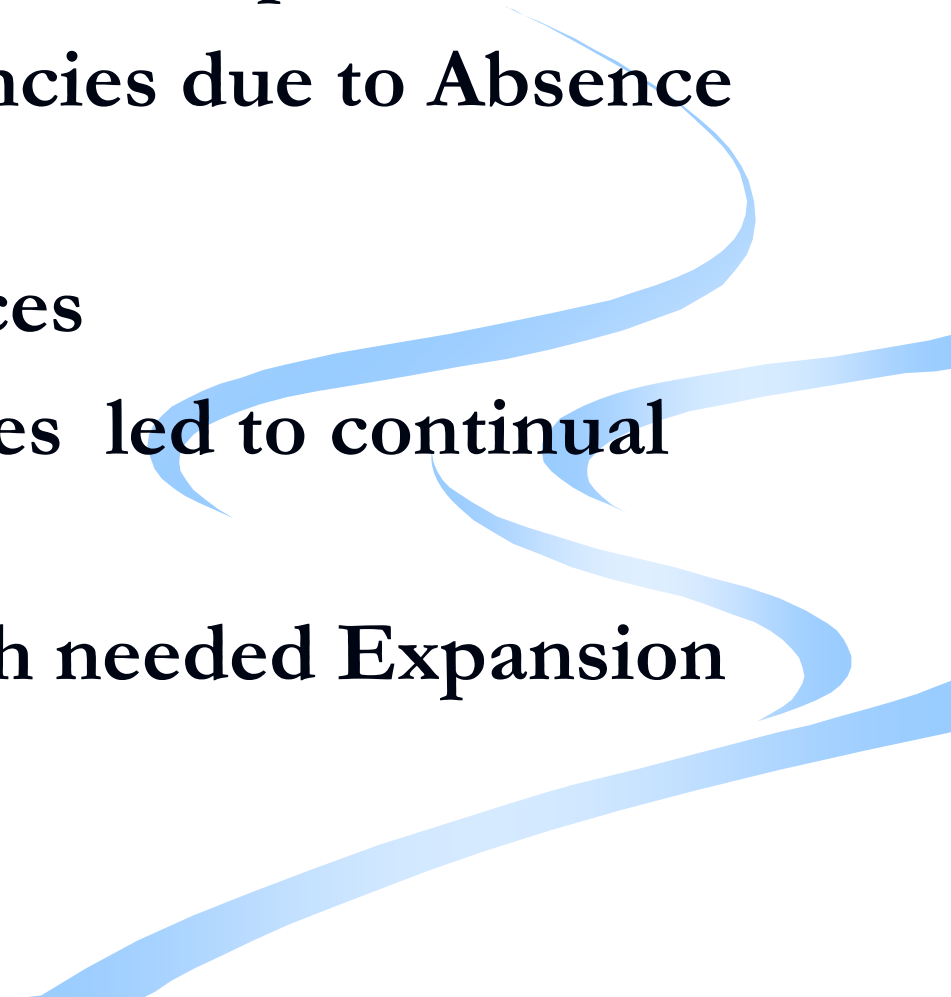
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- Efficiency
- Economy
- Competition
- Transparency
- Better Consumer Services
- Better performance

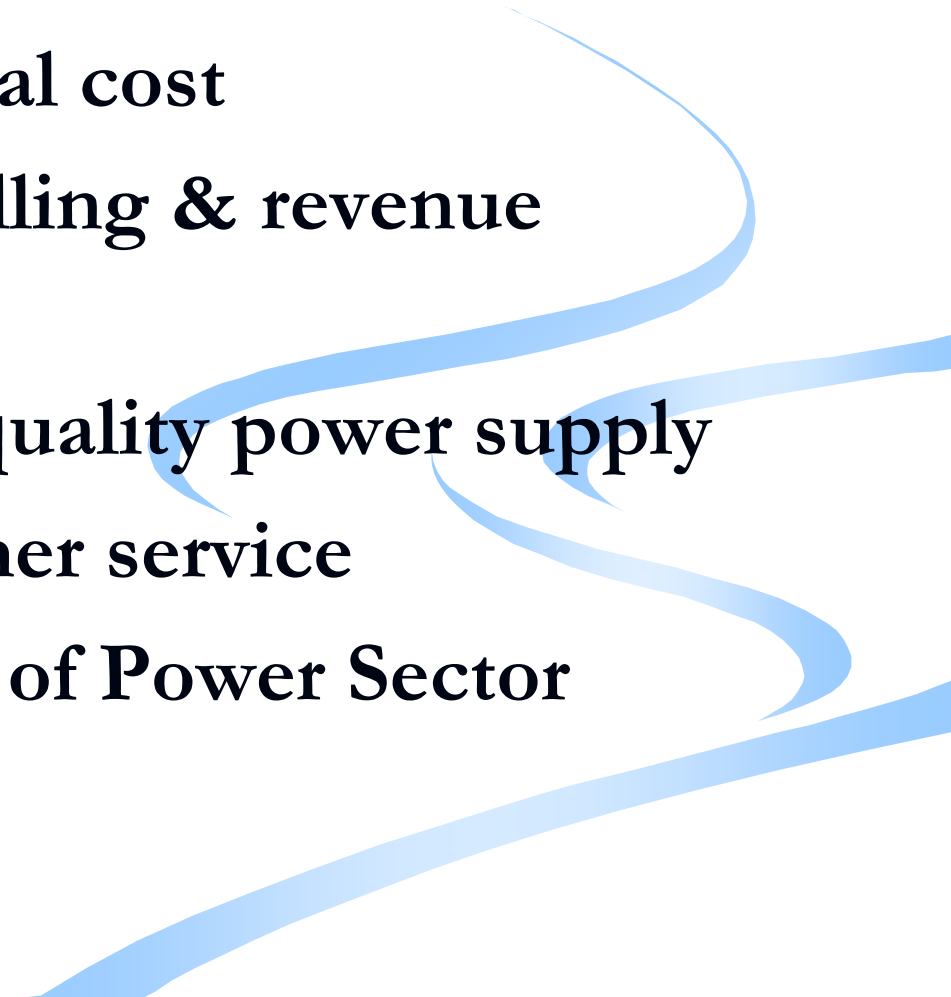
# Why Reforms

- Declining financial viability of utilities
  - Widening gap between average cost of supply and average tariff
  - Recovery of cost of supply through tariff as declined
  - Outstanding dues to be paid by Utilities to Financial Institutions
- 

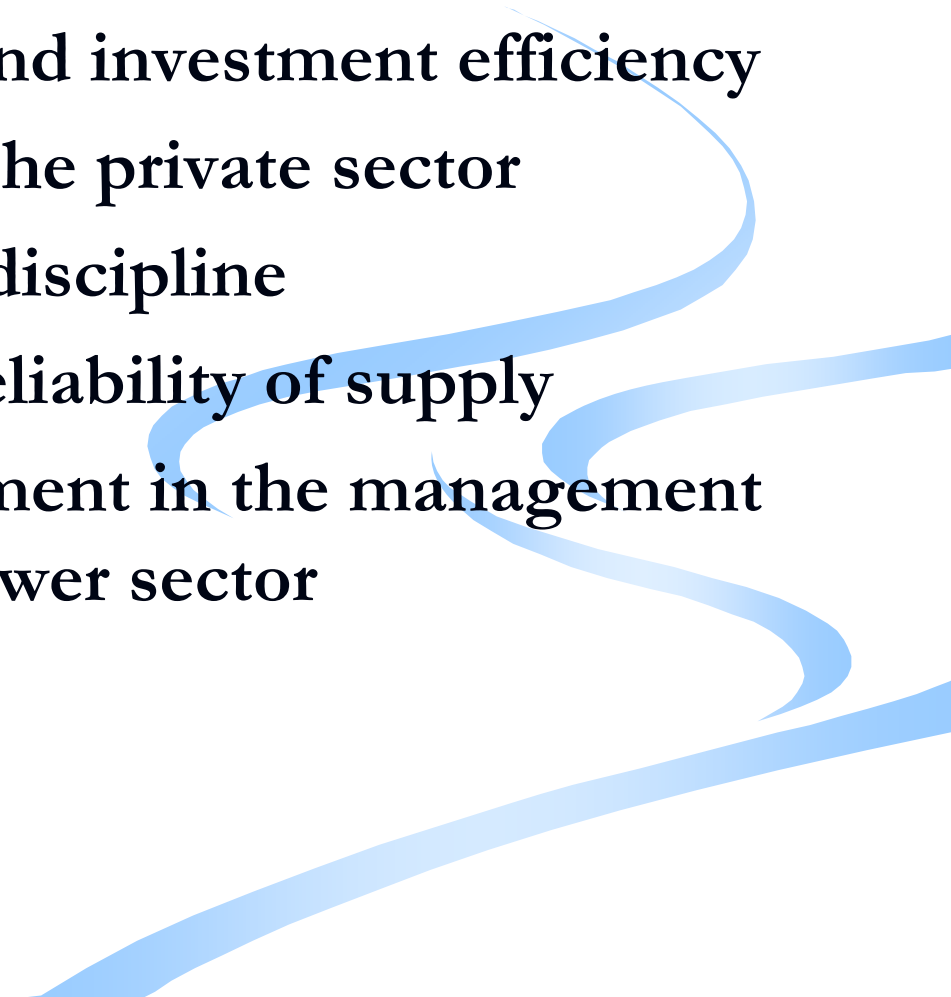
# Why Reforms

- **Single Provider with no Competition**
  - **Operational Inefficiencies due to Absence of Competition**
  - **Poor quality of Services**
  - **Huge losses of Utilities led to continual drains on budgets**
  - **Inability to fund much needed Expansion**
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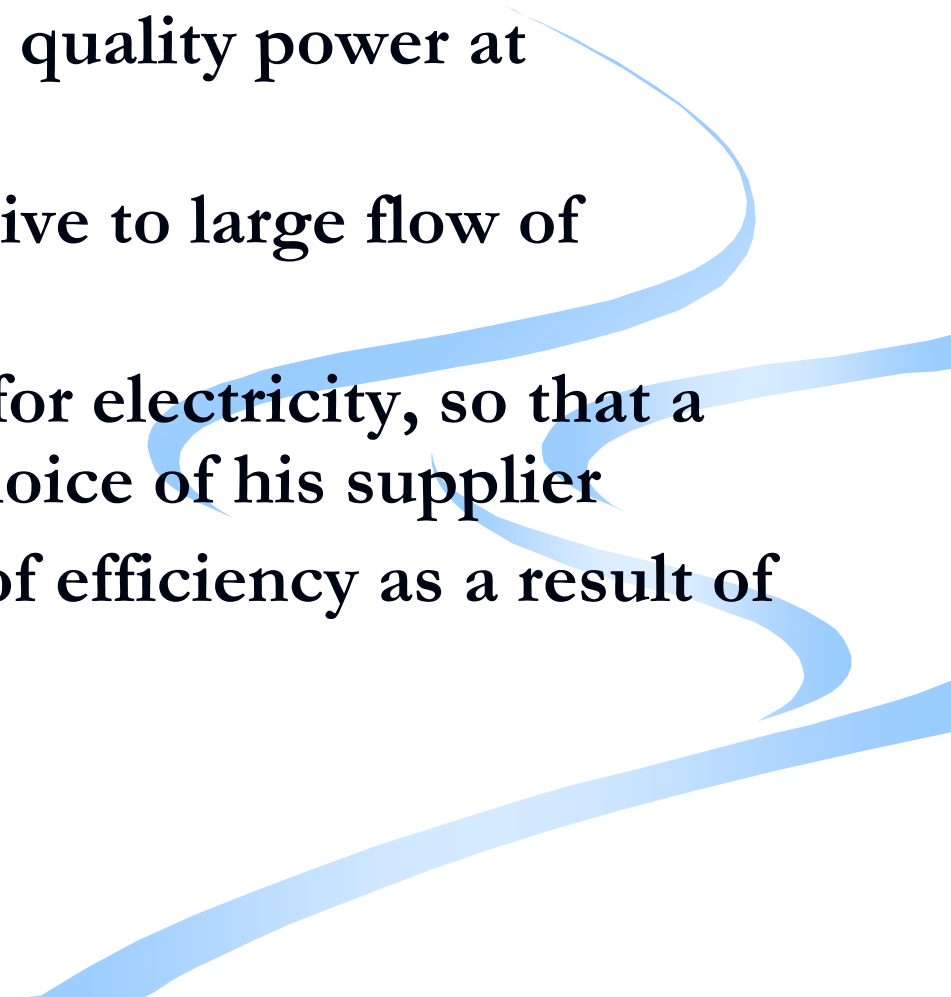
# Need for Reforms

- **Reduce technical and Commercial losses**
  - **Reduce the operational cost**
  - **Improve metering, billing & revenue collection**
  - **Provide reliable and quality power supply**
  - **Provide better customer service**
  - **Financial turnaround of Power Sector**
- 

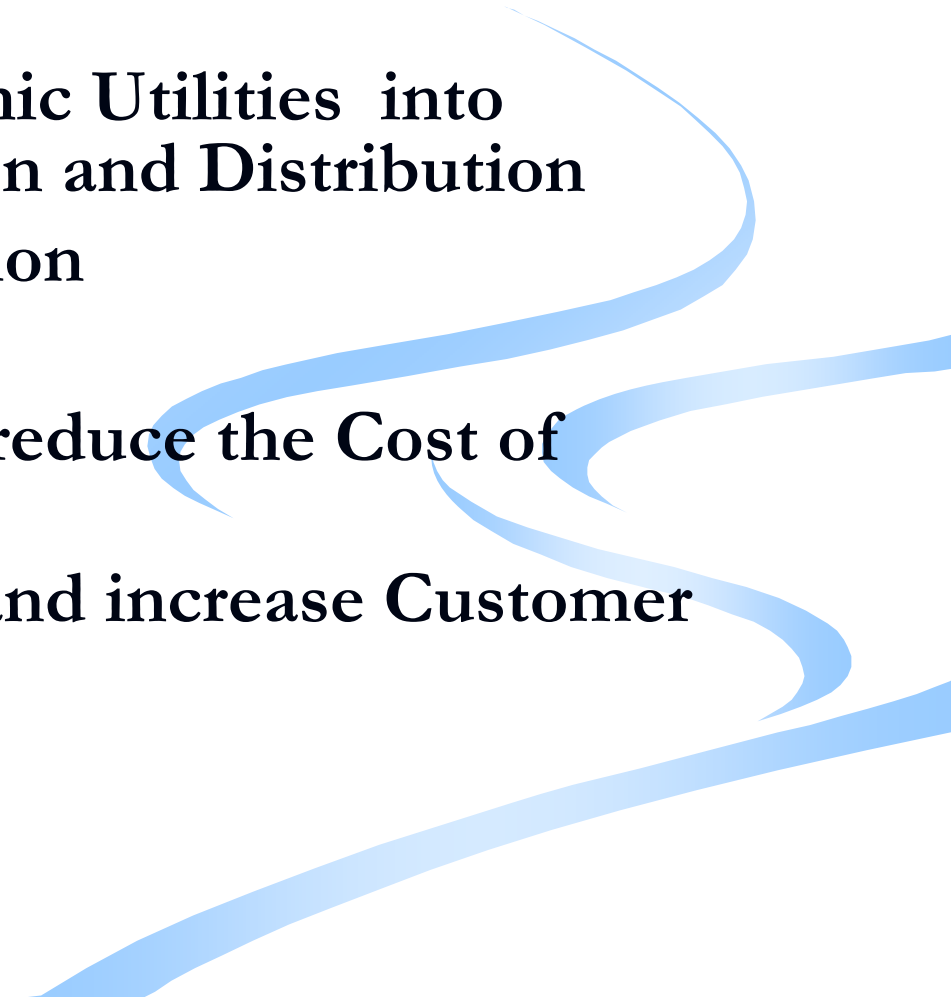
# Need for Reforms

- **Achieving financial viability of the sector**
  - **Promoting operational and investment efficiency**
  - **Accessing finance from the private sector**
  - **Enhancing commercial discipline**
  - **Improving quality and reliability of supply**
  - **Eliminating the Government in the management and regulation of the power sector**
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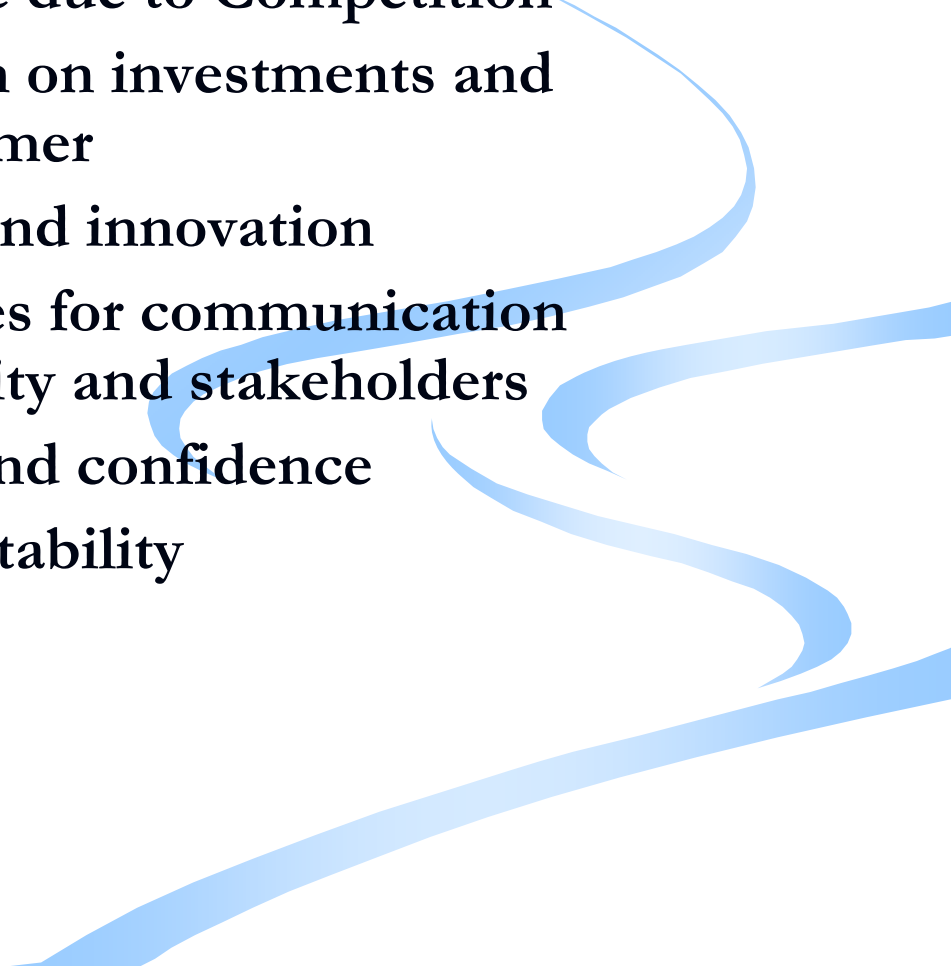
## Reforms Lead To

- **Technically and financially sound Power Sector**
  - **Consumers getting good quality power at reasonable price**
  - **An environment conducive to large flow of private investment**
  - **Development of market for electricity, so that a consumer can make a choice of his supplier**
  - **All round improvement of efficiency as a result of competition**
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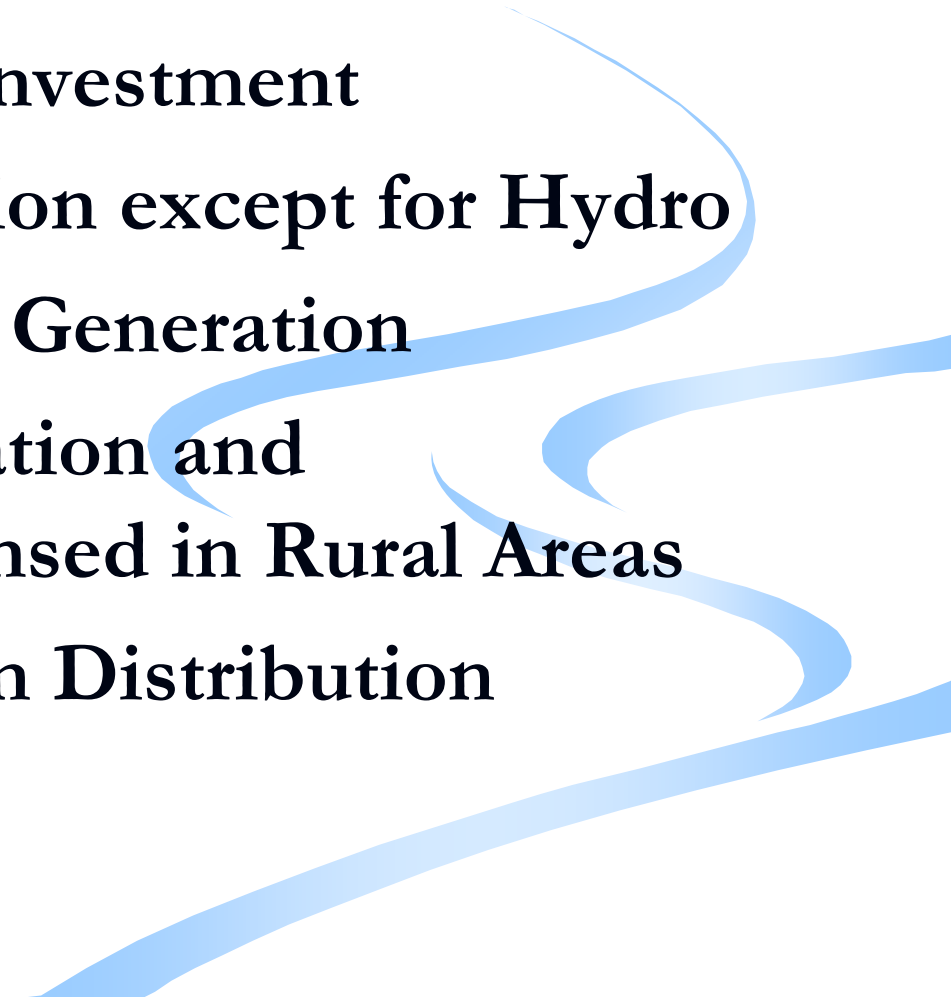
# What is Reforms

- **Establishment of Independent Electricity Regulatory Commission**
  - **Unbundling of Monolithic Utilities into Generation, Transmission and Distribution**
  - **Private Sector Participation**
  - **Cost related Tariff**
  - **Improve Efficiency and reduce the Cost of Electricity**
  - **Introduce Competition and increase Customer Choice**
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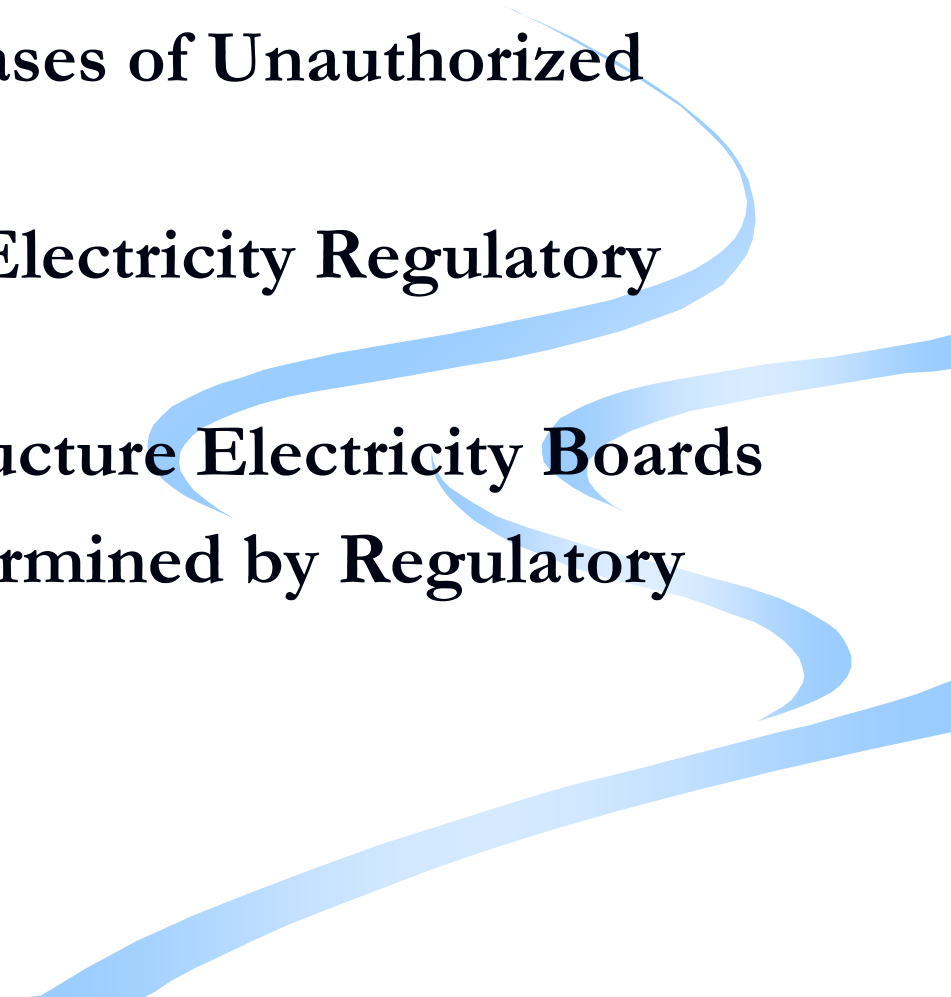
# Role of Regulatory Commissions

- Regulation brings in much needed Private Capital
  - Better Standards of Service due to Competition
  - Ensuring fair rate of return on investments and reasonable tariff for consumer
  - Technology upgradation and innovation
  - Establishing better avenues for communication between the regulated utility and stakeholders
  - Building consumer trust and confidence
  - Transparency and Accountability
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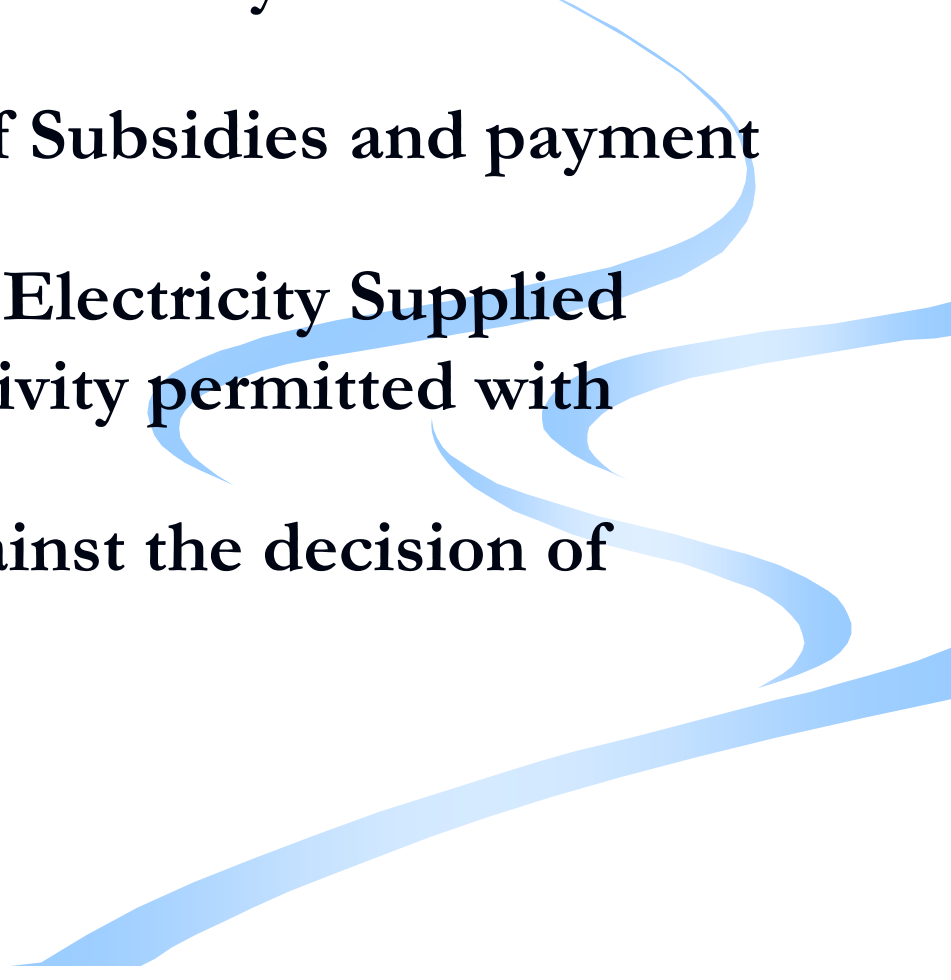
# **ELECTRICITY ACT 2003**

- **Creates Competitive Environment**
  - **Facilitates Private Investment**
  - **Delicenses Generation except for Hydro**
  - **Free Captive Power Generation**
  - **Stand-Alone Generation and  
Distribution Delicensed in Rural Areas**
  - **Multiple licensing in Distribution**
- 

# **ELECTRICITY ACT 2003**

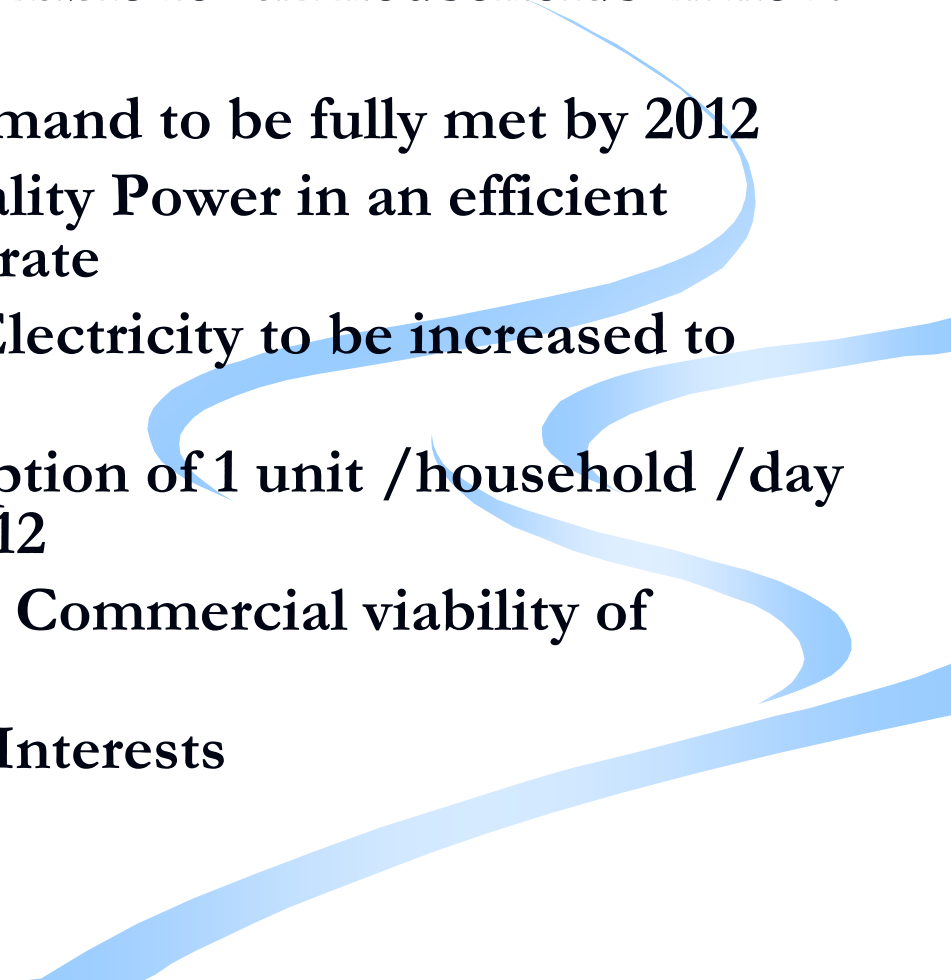
- **Stringent provisions for Theft of Electricity**
  - **Revenue recovery in cases of Unauthorized Use of Electricity**
  - **Mandates creation of Electricity Regulatory Commissions**
  - **Obliges States to restructure Electricity Boards**
  - **Retail Tariff to be determined by Regulatory Commissions**
- 

# **ELECTRICITY ACT 2003**


- **Open Access in Transmission from outset and in Distribution to be allowed by SERCs in phases**
  - **Gradual phasing out of Subsidies and payment through Budget**
  - **Mandates Metering of Electricity Supplied**
  - **Trading as distinct activity permitted with License**
  - **Appellate Tribunal against the decision of CERC and SERCs**
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# NATIONAL ELECTRICITY POLICY

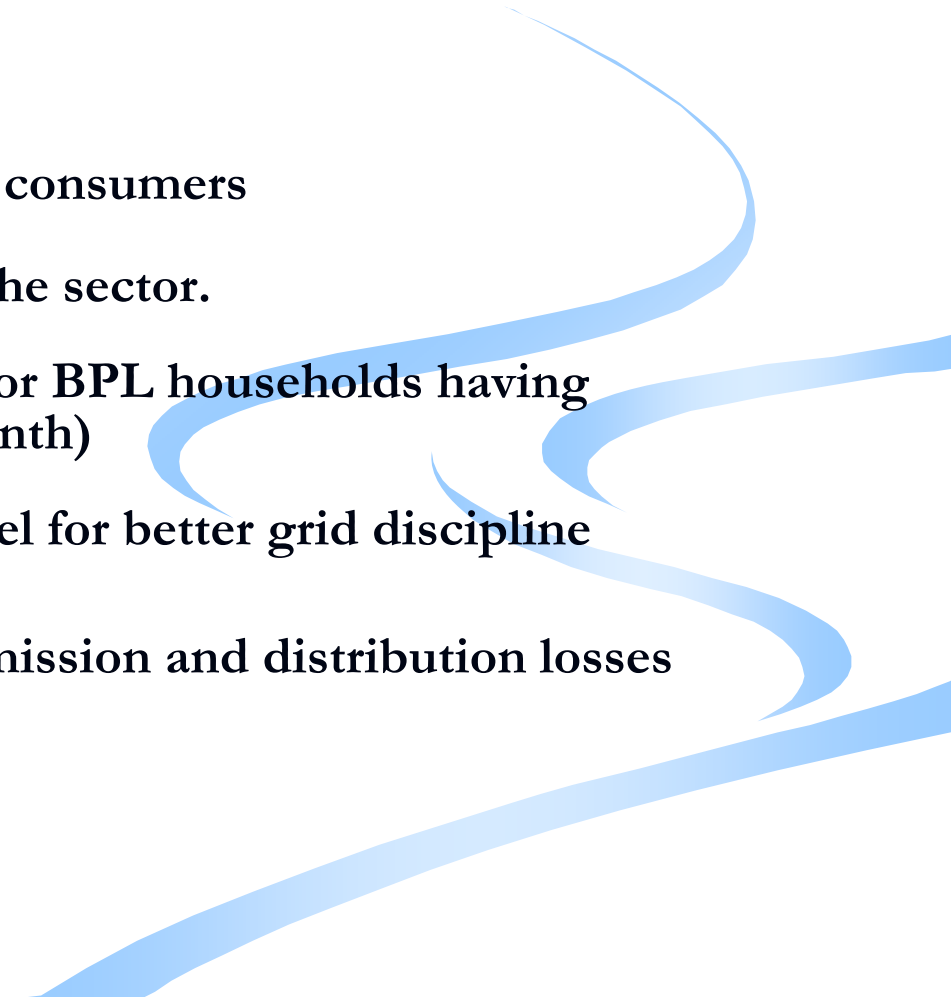
## *Aims and Objectives*

- ***Access to Electricity*** – Available for all households in next five years
  - ***Availability of Power*** – Demand to be fully met by 2012
  - **Supply of Reliable and quality Power** in an efficient manner and at reasonable rate
  - **Per Capita availability of Electricity** to be increased to over 1000 units by 2012
  - **Minimum lifeline consumption of 1 unit /household /day** as a Merit good by year 2012
  - **Financial Turnaround and Commercial viability of Electricity Sector**
  - **Protection of Consumer's Interests**
- 

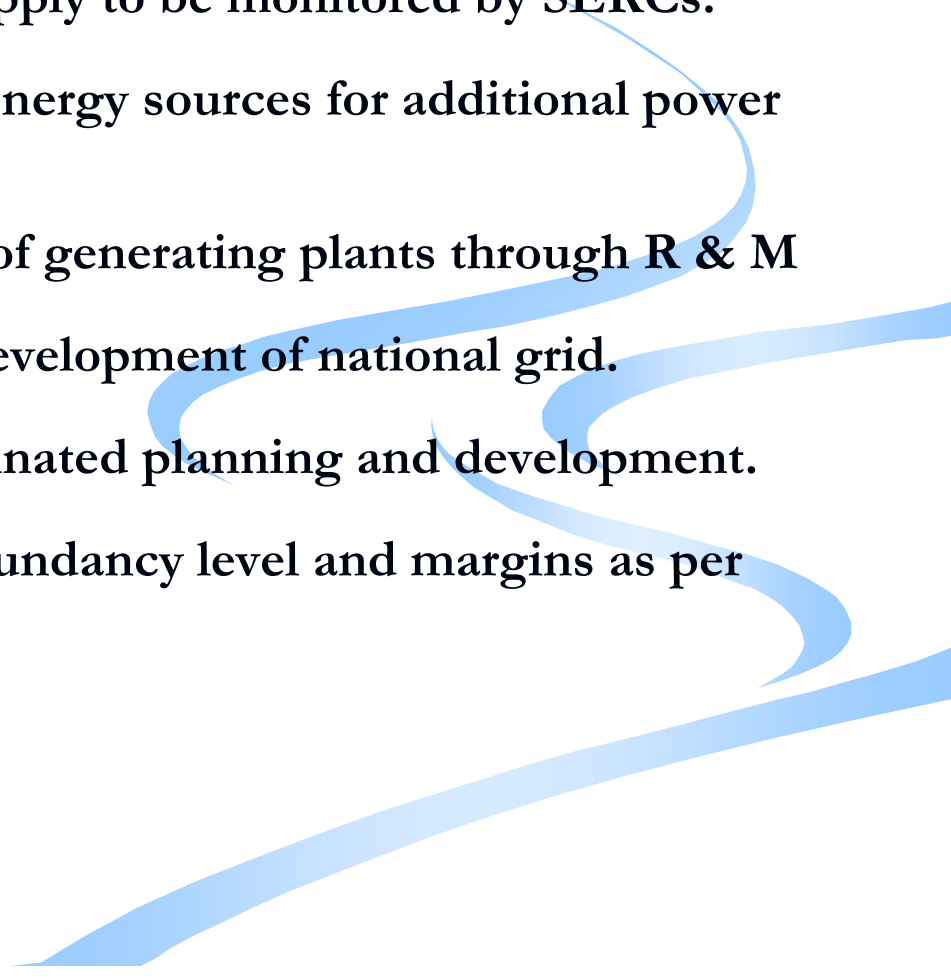
# **SALIENT FEATURES OF NEP**

- **CEA to notify first National Electricity Plan in six months and to be used by prospective licensees**
  - **Development of Rural Electrification Distribution backbone to achieve household electrification in next five years.**
  - **Financial support to States for Rural Electrification**
  - **REC to be nodal agency for Rural Electrification at Centre**
  - **Creation of adequate generation capacity by 2012 with availability of installed capacity at 85%.**
  - **Full development of hydro potential.**
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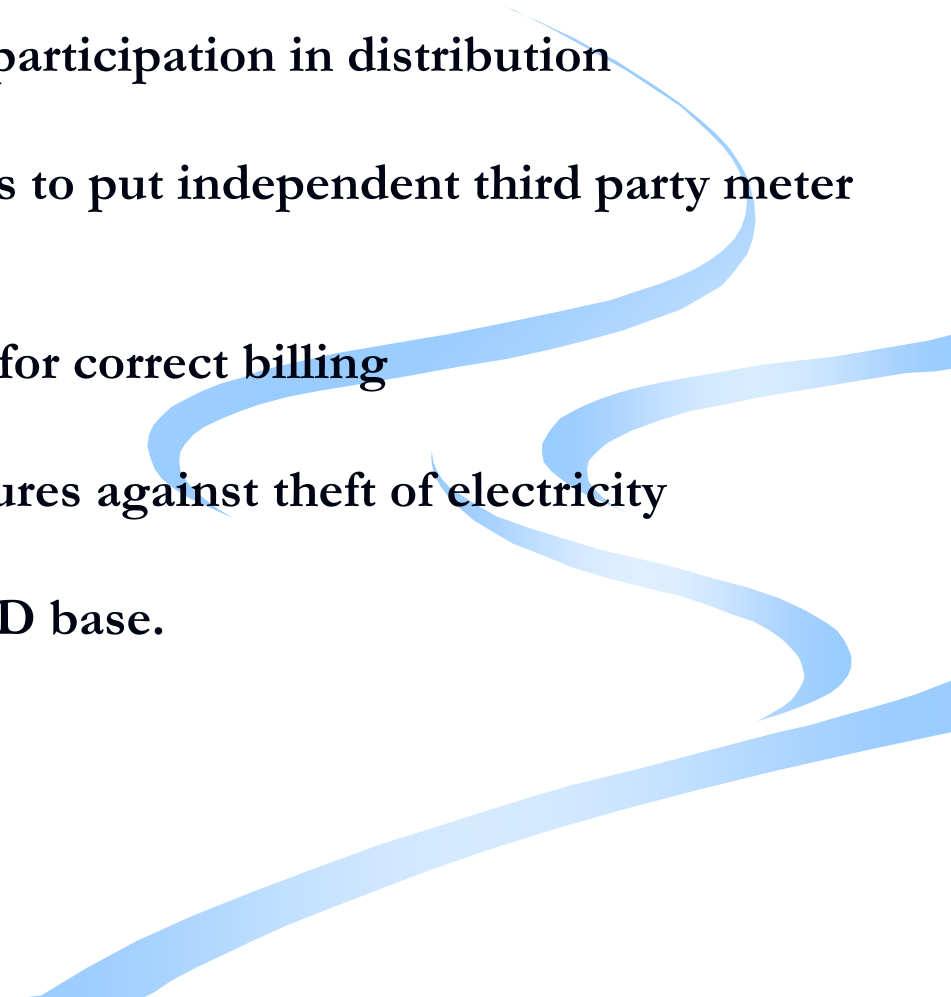
# SALIENT FEATURES OF NEP

- **Choice of fuel based on economics of generation and supply of electricity**
  - **Development of National Grid.**
  - **Cost of recovery of service from consumers**
  - **Ensuring financial viability of the sector.**
  - **Support to lifeline consumers (for BPL households having consumption of 30 units per month)**
  - **ABT to be extended to State level for better grid discipline**
  - **Time bound reduction of transmission and distribution losses**
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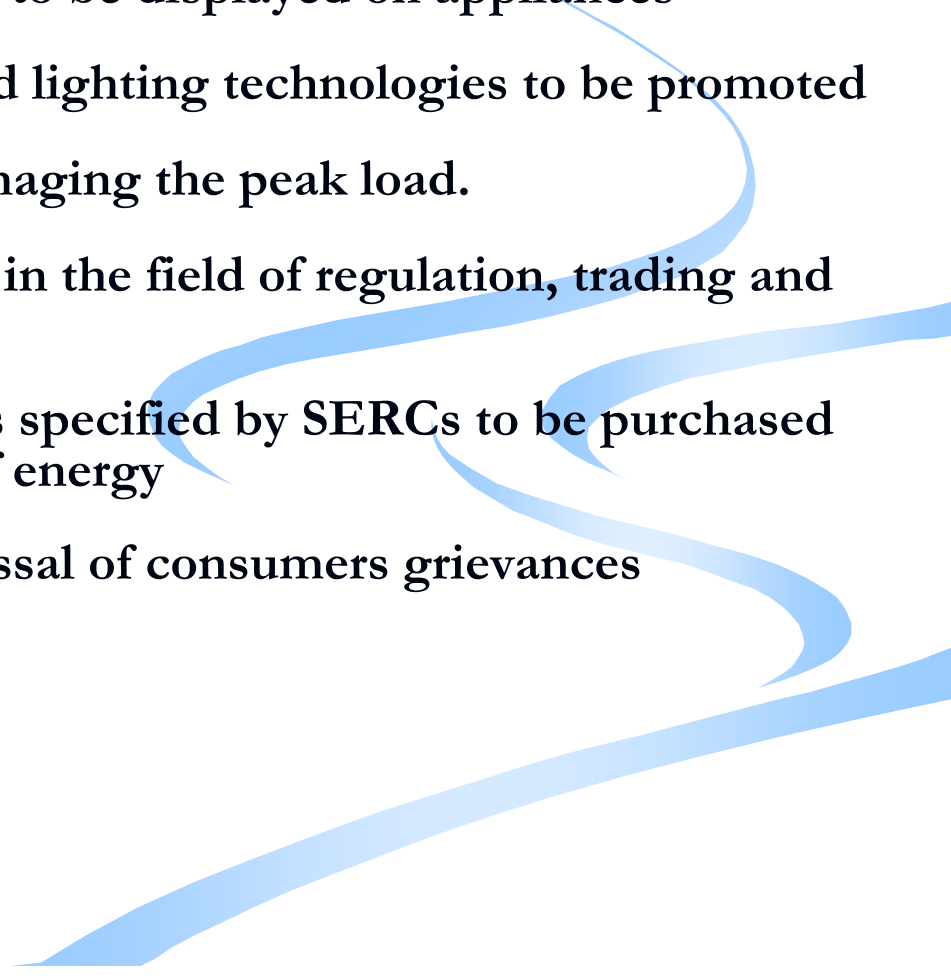
# SALIENT FEATURES OF NEP

- Promote competition aimed at consumer benefits.
  - Reliability and quality of power supply to be monitored by SERCs.
  - Exploitation of non-conventional energy sources for additional power generation capacity
  - Achieving higher efficiency levels of generating plants through R & M
  - Central Government to facilitate development of national grid.
  - CTU and STU to undertake coordinated planning and development.
  - Transmission capacity to have redundancy level and margins as per international standards.
- 

# SALIENT FEATURES OF NEP

- Financial support for reforming power utilities
  - Encouragement for private sector participation in distribution
  - The State Regulatory Commissions to put independent third party meter testing arrangement.
  - Support for adoption of IT system for correct billing
  - Implementation of stringent measures against theft of electricity
  - Emphasis on augmentation of R&D base.
- 

# SALIENT FEATURES OF NEP

- DSM through energy conservation measures
  - Labels regarding energy efficiency to be displayed on appliances
  - Efficient agricultural pumpsets and lighting technologies to be promoted
  - Appropriate tariff structure for managing the peak load.
  - Developing training infrastructure in the field of regulation, trading and power market
  - Prescribed percentage of power, as specified by SERCs to be purchased from Non-Conventional sources of energy
  - Appointing Ombudsman for redressal of consumers grievances
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# The Rural Electrification Policy (REP) 2006

The REP aims at :

- Provision of access to electricity to all households by year 2009 – ensuring access to all.
- Quality and reliable power supply at reasonable rates
- Minimum lifeline consumption of 1 unit per household per day as a merit good by year 2012
- The RE Policy also states that in places where local distribution has been handed over to users' association, co-operative society, panchayat Institutions or non-Government organization, the universal service obligation for the area would rest with that institution and the supply obligation of the licensee



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## Definition of Village Electrification

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- According to the new definition of village electrification, a village would be declared electrified if:
  - Basic Infrastructure such as Distribution Transformer and Distribution lines are provided in the habited locality as well as Dalit Basti/hamlet where it exists
  - Electricity is provided to public institutions like Schools, Panchayat office, Health Centres , Dispensaries, Community centers etc
  - The number of households electrified should be at least 10 % of the total number of household in the village .
- The Panchayat has to give certificate to this effect.



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## Main Features of RGGVY

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- All ongoing schemes merged in “Rajiv Gandhi Grameen Vidhyutikaran Yojana” (RGGVY) launched in April 2005
- 90% grant and 10% loan
- Electrification as per new definition
- Franchisee arrangement for revenue sustainability
- Programme covers entire country
- **Rural Electrification Corporation (REC)** is the Nodal Agency for implementation of scheme



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## RGVY Aims at ...

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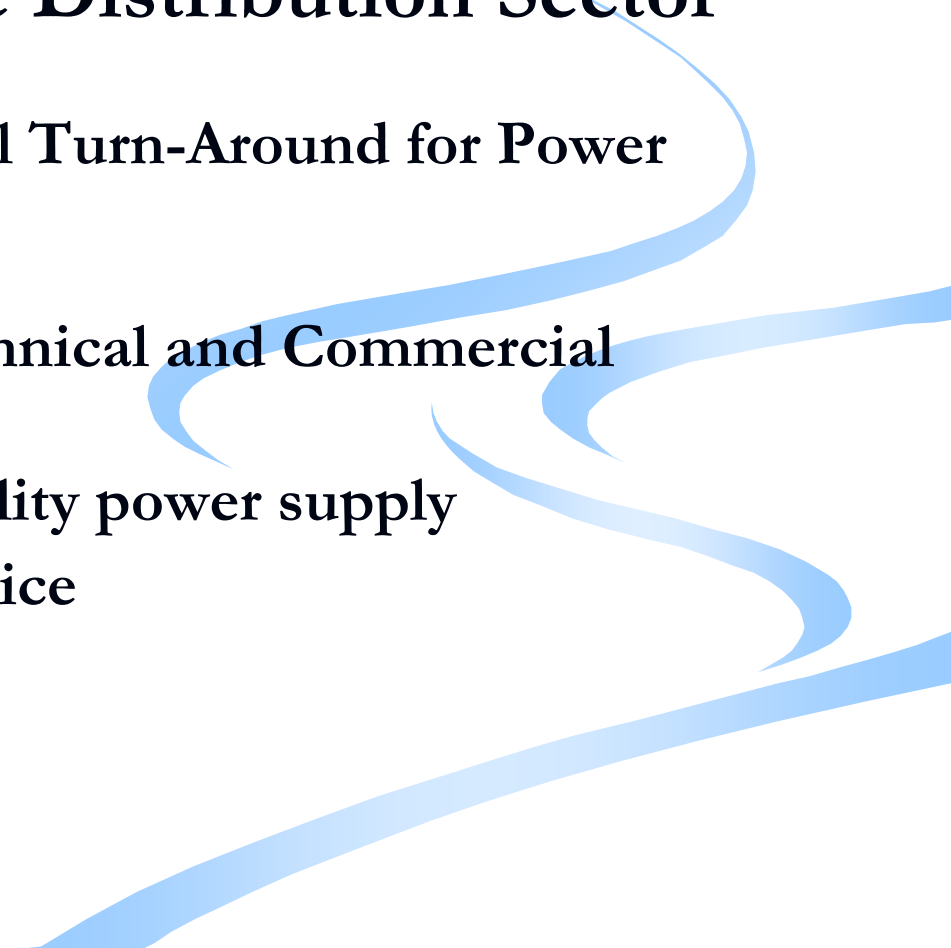
- Electrification of all villages and habitations
- Provision of access to electricity to all households
- Provision of Electricity Connections to Below Poverty Line (BPL) families free of charge

In 5 years...

ACCELERATED POWER DEVELOPMENT REFORMS  
PROGRAMME

## **Real Challenge of Reforms lies in Efficient Management of the Distribution Sector**

**APDRP aims at Financial Turn-Around for Power  
Distribution Sector**

- **Reducing Aggregate Technical and Commercial Losses**
  - **Assuring reliable and quality power supply**
  - **Improving customer service**
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## ACCELERATED POWER DEVELOPMENT REFORMS PROGRAMME

**MOP has formulated six level intervention strategy for Distribution Reforms**

- (i) **National level** – *Policy Issues, Legal Framework, Standardisation, Accounting*
  - (ii) **State level** – *Tariff Fixation, Unbundling, Subsidies, Budgetary Support*
  - (iii) **SEB/Utility level** – *Restructuring, Accounting, MIS, Erratic Frequency*
  - (iv) **Distribution level** – *Outage & Loss Reduction, Reliability, Accountability*
  - (v) **Feeder level** – *Reliability, Erratic Voltage, Metering, Billing & Collection, HT/ LT Ratio*
  - (vi) **Consumer level** – *Metering, Compliance of Billing, Consumer Satisfaction*
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## APDRP-II Scheme

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**Restructured APDRP-II** is GoI's initiative to reform Distribution Sector during XI<sup>TH</sup> plan. Total Programme size is about Rs 50,000 Crores

Proposed to cover urban areas – towns and cities with population of more than 30,000 (10,000 in case of special category states). Projects under the scheme shall be taken up in **Two Parts**.

- Part-A will cover IT applications in distribution sector
- Part-B will cover System improvement, strengthening and augmentation etc.



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## APDRP-II Scheme

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Part-A will include among others

- Consumer Indexing,
- GIS Mapping, Asset Mapping
- Metering of Distribution Transformers / Feeders,
- Automatic Data Logging
- Feeder Segregation/ Ring Fencing
- IT applications for redressal of consumer grievances, meter reading, billing & collection,
- Energy Audit
- Establishment of the Base Line data System



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## APDRP-II Scheme

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Part-B will include among others

- Renovation, modernization and strengthening of 11 kV level Substations, Transformers/Transformer Centres,
- Re-conductoring of lines at 11kv level and below,
- Load Bifurcation, Load Balancing,
- HVDS,
- Strengthening at 33 kV or 66 kV levels
- installation of capacitor banks and mobile service centres etc.



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## Funding of Schemes

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- GoI will provide 100% Loan for part A of the schemes including IT applications and projects for establishing Base Line data.
- GoI will provide 50% Loan for Part B of the schemes (90% for special category States).
- The counterpart funding will be done by PFC/REC (FIs)



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Thank You