Structure of Power Business

Sanjay Jadhav

B Tech. IIT-Mumbai & MBA IIT-Kanpur

Golden Arch International Ltd., Delhi

Needs of Human Life - Food

- Food Production
- Food Processing
- Food Preservation
- Food Transport
- Cooking

Needs of Human Life - Clothing

- Cotton Production
- Yarn Making
- Weaving and Knitting
- Stitching
- Transport
- Woolen blankets and clothes

Needs of Human Life - Shelter

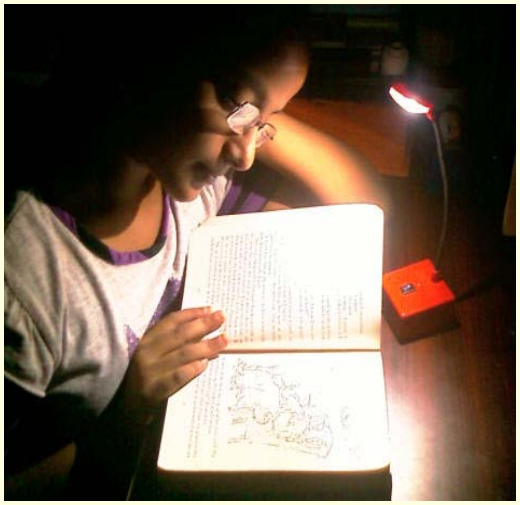
- Cement
- Building Material
- Construction
- Interior

Needs of Human Life - Health

- Diagnosis
- Treatment
- Medicine Production
- lighting

Needs of Human Life - Education

- Printing and production of books
- Teaching
- Study
- PC/ laptop and Internet
- Newspapers



Needs of Human Life - Entertainment

- Radio
- Television
- Cinema
- Children's Parks & Funfair ride
- Games
- Exercise

Needs of Human Life - Transport

- Railways
- Intra City Metro rail
- Streetlight signals
- Airports/ railstations
- Conveyer belts in quary

- PRODUCTION OF ALL MEANS OF TRANSPORT,
- MAKING OF ROAD, RAIL, AIRPORTS, SEAPORTS

Needs of Human Life

- Food
- Clothing
- Shelter
- Health
- Education
- Entertainment
- Transport

- Electricity helps us make them

Importance of Electricity in Human Life

- **Electricity**
  - **supports lifestyle**
  - **Makes life comfortable**
  - **Spares from rudimentary work and drudgery**
  - **Catalyses Productivity of Economy**
  - **Without Electricity, non-Food economy can not be promoted**

Key Stakeholders of Electricity Business

- Women
  - Where electricity is not available, Indian women spend most of the day's work in fetching cooking fuel wood, water, fodder, grinding flour, which is unpaid labour.
  - That keeps them away from childcare and productive activities.
  - Electricity catalyses emancipation of women from such work.
- Government
  - Formalised Economy promotes tax collection
  - Public Works & Coordination of Economy
  - Control of Public Goods/ Merit Goods
- Industries & Businesses
  - For production, for profit, for employment, for longer working hours
  - Industry needs continuous and reliable supply
  - Economy of Scale
- Workers
  - Industrial employment pays more than agriculture and primary businesses (Wood cutting, mining, extraction)
  - Landless citizens can work/live in economy only in industrial work
- Households
  - For lighting,
  - For Education
  - For Household work

BRIEF OVERVIEW OF KEY ISSUES & CHALLENGES FACING POWER SECTOR

Key Issues faced by Electricity Business

- Is electricity a business? Should it be run like business?
- Equity, Access and Pricing
- Challenges in Rural Supply of electricity
- Is cheaper electricity better?
- Pollution
- Cost of Capital
- Political decision making Versus Commercial decision making
- Power theft
- Excess capacity is necessary
- Priority of supply of Scarce Capacity
- Productivity of Electricity Business
- Electricity is peace time business

Understanding Electricity Business

- **Electricity is Infrastructure**
  - Positive externality
  - Upfront Investment
  - Pricing dilemma – very low variable cost
  - Inability to Exclude non-paying customers and address the products to paying consumers – Technology, Social issues
- **Electricity is Service Industry and Utility**
  - Unused capacity is lost revenue
  - Intensive seller / consumer intimacy
  - Frequent transaction
  - Very high fixed Cost
  - Price Cost dilemma
- **Electricity is Network Commodity**
  - Connect source and destination
  - Disables Competition
  - Market power of Incumbent players
  - Embedded Products and delivery - Carrier and Contents

Electricity Business

- Merit Goods and public Goods
  - Every family and person ought to have access
- Capital Intensive Business
- Defies rules of Perfect Competition
- Need for standardization and Licencing
- Safety is Key Issue
- Multiplicity of Technologies, Fuels, costs, social costs (displacement, pollution, etc.), environment degradation
- Is low price, a good price? Is low price of electricity worthy goal?
- Politics and Challenges of pricing
- Dilemma of transporting Coal Versus electricity,
  - Dilemma of Load centred generation Versus Pit head generation
- Multiple generators can access the Transmission Network

Structure of Power Business: Generation, Transmission and Distribution

3 Components of Electricity Business

- Generation – Single Location, highly automated
- Transmission – Highly technical
- Distribution – Interacts with Customer, Commercial Activity

Comparison of G T & D

	Generation	Transmission	Distribution	
Share of Capital Investment	55%	8%	37%	100 %
Share of Revenue	75 %	4%	21%	100 %
RoGFA	5%	4%	7.5%	
Profit margin	8.5%	8.5% ##	4.2%	
## Profit margin against Revenue, without owning the electricity				

Electricity Business - Generation

- Highly Capital Intensive Business
- Types of Generation
  - From Fossil Fuels – Coal, Gas, Oil
  - From Water Resources
  - Nuclear Fuels
  - Solar
  - Wind
  - Sea tides
  - Chemical reactions
  - High Frequency Light on metal surface liberates electrons
- Pollution and Environment
- Disposal of fuel waste
- Limited Resources, & Replenishment of resources

Electricity Business - Generation

- Factory Kind of Business
- Investment in beginning
- Good Control on manpower, productivity of Manpower, theft
- Opportunity to produce more and earn more
- Opportunity to save cost, by better O&M practices
- Key processes
  - Capital Investment
  - Monthly procurement fuels
  - Periodic Maintenance, preventive maintenance, planned maintenance

Electricity Business - Transmission

- Cross country lines
- High Voltage
- Assets spread in land not owned by Transmission Company
- Right of Way
- Mostly Overhead wires
- Fixed revenue
- Availability can be improved by better O&M practices
- Excess capacity is necessary
- Investment in laying lines only.
- Periodic Maintenance, preventive maintenance, planned maintenance

Electricity Business - Distribution

- Last mile supply business
- Last mile linkage with customer
- Customer Intimacy and Customer confidence is the key
- Continuous Investment in the network
- Employee motivation, involvement and loyalty drives performance of DisCom

Electricity Business - Distribution

- Key issues
  - Managing Working Capital
  - Controlling Power theft
  - Network Metering and Consumer Metering
  - Managing Line Losses
  - Consumer awareness on energy conservation
  - Consumer satisfaction and confidence
- Political Decisions in DisComs
- Management of (DisCom) Business is science and art

IMPORTACE OF POWER DISTRIBUTION SECTOR & COMPONENTS OF POWER DISTRIBUTION SYSTEM

Importance of Distribution Sector

- Businesses are designed around key processes
  - Annual Capital Expenditure Plan and capital Investment
  - Customer registration
  - Monthly billing cycle
  - Consumer Complaints and fault repairs
  - Annual Budgeting
  - Monthly Energy Audit
- Distribution business collects cash that is shared by G T D
- Financial viability and sustenance depends on performance of distribution
- Power Distribution balances the commercial interests and social conscience of power industry.
- Customer motivation for energy conservation and environment rests with distribution sector
- Energy saving and conservation is More challenging in distribution than in Transmission and Generation

Components of Power Distribution Business

- Power Transformers and Transformers 66/33 kV, 66/11 kV, 33/6.6 kV, 11/6.6 kV,
- Distribution Transformers 33/11 kV, 11/.433 kV, 6.6/.433 kV
- Capacitor banks
- SCADA, Optical fibre cable and remote operation of Power Transformers & Distribution Transformers
- Energy Audit accounting Meters and data system
- Remote meter reading
- Metering and Billing
- Overhead lines, underground Lines
- Service lines
- Customer Service offices, IT systems
- HVDS

END