CRITICAL ANALYSIS AND ROLLOUT PLAN OF INTRODUCING RETAIL COMPETITION IN ELECTRICITY DISTRIBUTION SECTOR OF MAHARASHTRA

A thesis submitted to the
University of Petroleum and Energy Studies

For the Award of
Doctor of Philosophy
in
Management (Power)

BY
Prafulla Shrihari Varhade

December 2021

SUPERVISOR (s)

Dr Anil Kumar

Dr. Tarun Dhingra

Dr. Prashant Navalkar

Department of Energy Management

School of Business

University of Petroleum & Energy Studies

Dehradun-248007: Uttarakhand

CRITICAL ANALYSIS AND ROLLOUT PLAN OF INTRODUCING RETAIL COMPETITION IN ELECTRICITY DISTRIBUTION SECTOR OF MAHARASHTRA

A thesis submitted to the
University of Petroleum and Energy Studies

For the Award of
Doctor of Philosophy
in
Management (Power)

BY
Prafulla Shrihari Varhade
(SAP ID 500036211)

December 2021

Internal Supervisor
Dr. Anil Kumar
Professor and Head (Department of Energy Management),
School of Business, University of Petroleum & Energy Studies

Internal Co-Supervisor
Dr. Tarun Dhingra
Professor (Strategic Management) and Asst. Dean (Research),
School of Business, University of Petroleum & Energy Studies

External Supervisor
Dr. Prashant Navalkar
Director, Power Anser Labs Pvt. Ltd., Mumbai

`

Department of Management

School of Business, University of Petroleum & Energy Studies

Dehradun-248007: Uttarakhand

December 2021

DECLARATION

I declare that the thesis entitled **Critical Analysis and Rollout Plan of Introducing Retail Competition in Electricity Distribution Sector of Maharashtra** has been prepared by me under the guidance of **Dr. Anil Kumar and Dr. Tarun Dhingra**, Professor of School of Business, University of Petroleum and Energy Studies, Dehradun. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

Prafulla Shrihari Varhade
School of Business, Management (Power),
University of Petroleum & Energy Studies, Dehradun- 248 007,
Uttarakhand
DATE:

This is to certify that the thesis entitled "**Critical Analysis and Rollout Plan of Introducing Retail Competition in Electricity Distribution Sector of Maharashtra**", is being submitted by **Prafulla Shrihari Varhade** in fulfillment for the Award of DOCTOR OF PHILOSOPHY in **(Management (Power)** Subject / area) to the University of Petroleum and Energy Studies. Thesis has been corrected as per the evaluation reports dated 12/09/2022 and all the necessary changes / modifications have been inserted/incorporated in the thesis.

Signature of Supervisor

Name of Supervisor: **Dr. Anil kumar**

Department: **Dept. of Energy Management**

Designation: **Professor & Head**

Contact address: **School of Business, University of Petroleum & Energy Studies**

Dehradun- 248 007, Uttarakhand

Date:

This is to certify that the thesis entitled "**Critical Analysis and Rollout Plan of Introducing Retail Competition in Electricity Distribution Sector of Maharashtra**", is being submitted by **Prafulla Shrihari Varhade** in fulfilment for the Award of DOCTOR OF PHILOSOPHY in **(Management (Power)** Subject / area) to the University of Petroleum and Energy Studies. Thesis has been corrected as per the evaluation reports dated 12/09/2022 and all the necessary changes / modifications have been inserted/incorporated in the thesis.

Signature of Supervisor

Name of Supervisor: **Dr. Tarun Dhingra**
Department: **Strategic Management**
Designation: **Former Professor & Asst. Dean (Research), SoB, UPES**
Present- Professor, Jaipuria Institute of Management, Noida, UP
Contact address: A-32 A, Sector 62, Noida, UP

Date: 14 September 2022

Power Anser Labs Private Limited
CM-01, Business Incubator
KreSIT, IIT Campus, Mumbai- 400076

CERTIFICATE

I certify that **Prafulla Shrihari Varhade** has prepared his thesis entitled "**Critical Analysis and Rollout Plan of Introducing Retail Competition in Electricity Distribution Sector of Maharashtra**", for the award of PhD degree of the University of Petroleum & Energy Studies, under my guidance. He has carried out the work at the **School of Business**, Department of **Management (Power)**, University of Petroleum & Energy Studies.

External Supervisor
Dr. Prashant Navalkar,
Director, Power Answer Labs Pvt. Ltd., Mumbai

Date:16 December 2021

ABSTRACT

Indian power sector has seen tremendous changes in the past starting from the India Electricity Act 1910 till Draft Electricity Act Amendment bill, 2021. Since independence, the Indian power sector has been dominated by state and centrally owned vertically integrated utilities with the primary purpose of making "electricity available to all." The early 1990s saw India's economy open up, along with large-scale liberalisation, urbanisation, and industrialization, resulting in a surge in energy demand. The amount of investment necessary grew at an exponential rate, and the government was no longer able to fund the industry adequately on its own. As a result, power generation was de-licensed and opened up to private participation in 1991, allowing the sector to thrive.

Beginning in 1996, the focus shifted to the unbundling of State Electricity Boards (SEBs), with the overarching goals of improving function-specific efficiencies and providing higher returns to generating and transmission enterprises. Starting with Orissa, five more states have chosen to unbundle their SEBs. The Electricity Regulatory Commission Act, which set provisions for the establishment of independent regulatory commissions to regulate electricity prices at the state and federal levels, was enacted shortly after, in 1998. This market structure was formerly supposed to be a stand-in for competition in monopoly markets, with a separate regulatory body defending the interests of consumers and other market participants. However, such a market structure is only temporary unless a full-scale competitive market is formed.

The Electricity Act of 2003 was enacted to address the changing needs of the electricity markets. Reorganization of state-owned vertically integrated electricity boards, de-licensing of power generation to allow for additional investment, and other elements are included in the Electricity Act of 2003. Tariffs and subsidies, as well as consumer interest and open access, are all factors to take into account. The Electrical Act of 2003 has as one of its key purposes the promotion of competition in the electrical sector. The Central and State Governments have implemented a number of reforms aimed at enhancing

competition, such as open access for consumers with loads greater than 1 MW, competitive power procurement, and competition in power transmission and distribution franchisee activities.

State Electricity Regulatory Commissions have been tasked with monitoring and regulating state power utilities as well as power markets in order to ensure that all consumers have affordable access to electricity. However, the roadmaps and implementations for several of these programmes, such as the methods for providing open access to consumers, are still being debated.

The Electricity (Amendment) Bill of 2014 proposes separating the content and carriage businesses in order to enable numerous supply licensees for content and carriage to be carried as regulated activity. The Forum of Regulators (FOR) has developed a model rollout plan for introducing competition in electricity retail sales and has recommended a framework on key issues such as disaggregation/reorganization of Discoms and their new structure, roles and responsibilities, power procurement mechanism, cross subsidy reduction, and loss allocation among wire and retail supply companies. Given the varying levels of preparedness in the distribution sector from state to state, the Forum of Regulators proposed a three-stage implementation process: functional segregation of Discoms, competition preparation, and competition onset. Following that, the Draft Electricity (Amendment) Bill, 2021, discusses distribution delicensing, with just the requirement of registration with the proper commission, as well as other essential modifications to the distribution sector in order to give consumers a choice.

In the United Kingdom, New Zealand, Norway, Finland, Spain, various Australian states, and the state of California in the United States of America, the competitive retail supply model has been fully implemented. The barriers and constraints of introducing retail competition in India have been discussed in this report based on international experiences, evaluation of how retail competition has been introduced in various countries around the world with successful and unsuccessful outcomes, and thus the barriers and constraints of introducing retail competition in India.

Given the condition in each state, each state will require a different level of preparedness, and each state must endeavour to implement the plan in accordance with the state scenario, demand supply, financial losses, and so on. Maharashtra, in western India, is one of the most progressive states in the country, with agriculture accounting for 57.65% of its total land area. Maharashtra generates 25% of the country's industrial production and contributes for 23.2 percent of the country's GDP. Maharashtra consumes more electricity per capita than the rest of the country. The state consumed 1424 units of electricity per capita in FY 2018-19, compared to 1181 units nationally.

Maharashtra has four distribution licensees who serve the state's consumers. The load in Mumbai and its suburbs is catered by BEST, AEML-D, and TPC-D, whereas the rest of Maharashtra is catered by Maharashtra State Electricity Distribution Company (MSEDCL), with the exception of the Mumbai distribution licensees' region. In FY 2019-20, Maharashtra's total energy sale, including Mumbai, was around 132,000 Mus. MSEDCL provides electricity to a population of 27 million people in Maharashtra.

Maharashtra is also known for creating and expanding participatory spaces in regulatory procedures, which has aided in informed decision-making, enhanced public accountability, and discussion of innovative solutions to the sector's problems. Mumbai residents are the only ones in the country who have the option of switching distribution utilities. This was done in order to promote customer choice and competition with framework of Electricity Act 2003.

Thus, the Mumbai Parallel Licensing approach was used to find out the level and extent to which Maharashtra's existing distribution sector and infrastructure are prepared (power availability, wholesale market, and metering structure) and adequate (financial analysis of MSEDCL/MahaDiscom, cross subsidy reduction, and current level of losses) for introducing retail consumer choice. What are the aspects and root causes (financial losses, large borrowings, and phasing out of cross subsidies) that have rendered Maharashtra's distribution sector financially unviable.

The thesis also discusses in detail the transfer scheme and the roll out plan for the introduction of retail competition in the Maharashtra distribution sector, taking into account the barriers and constraints in bringing retail supply competition under current policy, the preparedness of Maharashtra State distribution sector, financial viability, and international experiences.

The implementation of this transfer scheme and roll-out plan will give consumers a choice and will certainly assist many Discoms improve their current position. If implemented properly, the plan can serve as a model and a guide for introducing retail competition in other Indian states, with minor adjustments based on local conditions. Aside from that, this research might be utilised to identify additional issues that may arise during the implementation of retail competition in various sections of the country. This report will aid in the advancement of information technology in the distribution sector. As a result, competition will expand, as will distribution franchising models for diverse activities. The framework was created with the idea that planned amendments to the existing Electricity Act would be passed, as well as the current state of Maharashtra's distribution sector, which could alter over time. Adoption of the same framework in a different state may necessitate some changes, depending on the preparedness and adequacy of the state distribution sector. Based on the FOR suggestive model framework, international experience, and Mumbai parallel licencing experience, a document analysis was produced for the design of Maharashtra's Rollout Plan and Transfer Scheme to introduce a competition in the distribution sector.

ACKNOWLEDGEMENT

It was a highly satisfying experience for me to work on this research. The study's topic was one that I was passionate about and delving into its complexities was a genuine intellectual enrichment for me. All of this would not have been feasible without the active assistance of both internal and external guides. I owe them a huge debt of gratitude for guiding me through the entire process, from concept to thesis. Dr. Shreevardhan A. Soman, Dept. of Electrical Engineering, IIT Bombay, deserves special gratitude for his external assistance in shaping the current study. I would also like to express my gratitude to the Maharashtra Electricity Regulatory Commission's Hon'ble Chairman, Members and Secretary and colleagues for providing guidance and facilitating the collection of data for the study. Last but not least, I am obliged to my family (Father Shrihari, Mother Rajkannya, Wife Dr Swapna Varhade, and my daughter Shravani) for their unwavering support throughout the process.

(Prafulla Shrihari Varhade)

TABLE OF CONTENTS

ABBREVIATIONS

ABR	Average Billing Rate
ACoS	Average Cost of Supply
ACS	Average Cost of Supply
AMI	Advanced Metering Infrastructure
APTEL	Appellate Tribunal
ARR	Annual Revenue Requirement
AT&C	Aggregate Technical & Commercial Losses
BEST	Brihanmumbai Electric Supply & Transport
CAGR	Compound Annual Growth Rate
CERC	Central Electricity Regulatory Commission
CGRM	Consumer Grievance Redressal Mechanism
CSS	Cross Subsidy Surcharge
DE	Debt to Equity
DNO	Distribution Network Operator
DPO	Distribution Planning Operator
DSO	Distribution System Operator
ESP	Energy Service Provider
FOR	Forum of Regulators
GERC	Gujarat State Electricity Regulatory Commission
GoI	Government of India
GT&D	Generation Transmission & Distribution
IC	Intermediary Company
IDL	Incumbent Distribution Licensee
IDL	Incumbent Distribution Licensee
IEX	Indian Energy Exchange
IndAS	Indian Accounting Standards
ISC	Incumbent Supply Company
KSERC	Kerala State Electricity Regulatory Commission
MERC	Maharashtra Electricity Regulatory Commission
MoP	Ministry of Power
MSEDCL	Maharashtra State Electricity Distribution Company Limited

MSETCL	Maharashtra State Electricity Transmission Company Limited
MSLDC	Maharashtra State Load Dispatch Centre
MSPC	Maharashtra State Power Committee
MYT	Multi Year Tariff
NAPCC	National Action Plan for Climate Change
NTP	National Tariff Policy
OA	Open Access
PFC	Power Finance Corporation
PPA	Power Purchase Agreement
PXIL	Power Exchange of India Limited
RE	Renewable Energy
RES	Retail Electricity Supplier
RoW	Right of Way
RSC	Retail Supply Competition
SEB	State Electricity Board
SERC	State Electricity Regulatory Commission
SEZ	Special Economic Zone
SL	Supply Licensee
SoLR	Supplier of Last Resort
SRC	State Regulatory Commission
T&D	Transmission & Distribution Losses
USA	United States of America
USO	Universal Supply Obligation

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND:

From humble origins, India's power sector has grown to become a substantial contributor to the country's post-independence GDP. Generation, transmission, and distribution are Indian power sector's the three primary parts. The process of producing power from various sources of energy is known as generation. The transmission system is responsible for transferring electricity from power plant to distribution substations. The grid is a network of interconnected power plants, transmission lines, and substations. The transmitted power from generating stations through the interconnected grid is monitored by regional and state load despatch centres. The distribution system supplies substation electricity to individual consumers via a network.

Since independence, vertically integrated utilities owned by state and central have driven the India's power sector, with the primary goal of making "electricity accessible to all." India's power sector policies have changed over time, with a clear understanding that a financially sound electricity industry is critical for economic growth and poverty alleviation. The Indian Constitution includes electricity as a concurrent subject. SEB was established with the goal of planning and constructing generating, transmission, and distribution facilities across the country, but by the 1970s, SEBs were racking up massive financial deficits. The opening of the Indian economy in the early 1990s, as well as large scaled liberalisation, urbanisation, and industrialisation, resulted in a surge in power demand. The amount of investment required expanded at an exponential rate, and the government could no longer make sufficient investment in the sector on its own which resulted in de licensing of power generation in 1991 and allowed private participation to help the sector grow.

The focus turned to unbundling of SEBs starting in 1996, with the bigger goals of improving efficiencies in the functioning and providing higher return to the generation and transmission enterprises. Following Orissa's lead in 1996, five additional states chose to unbundle their SEBs. The Electricity Regulatory Commission Act of 1998 established independent Regulatory Commissions at the state and federal levels to oversee electricity pricing. This market structure was originally intended to be a stand-in for competition in monopoly markets, with an independent Regulatory Commission protecting customers and other market participants. This market structure, on the other hand, will only last until a large-scale competitive market emerges.

1.2 POWER SECTOR REFORMS IN INDIA AND ITS IMPACT

1.2.1 EVOLUTION OF THE SECTOR AND ELECTRICITY ACT 2003

It is commonly acknowledged that a financially healthy energy sector is critical to India's prosperity and poverty eradication. From the development of the basic outline in 1910 through the EA 2003, which introduced crucial enhancements to a changing market, the Indian power sector has achieved significant progress.

Power sector policies in India have evolved as detailed below.

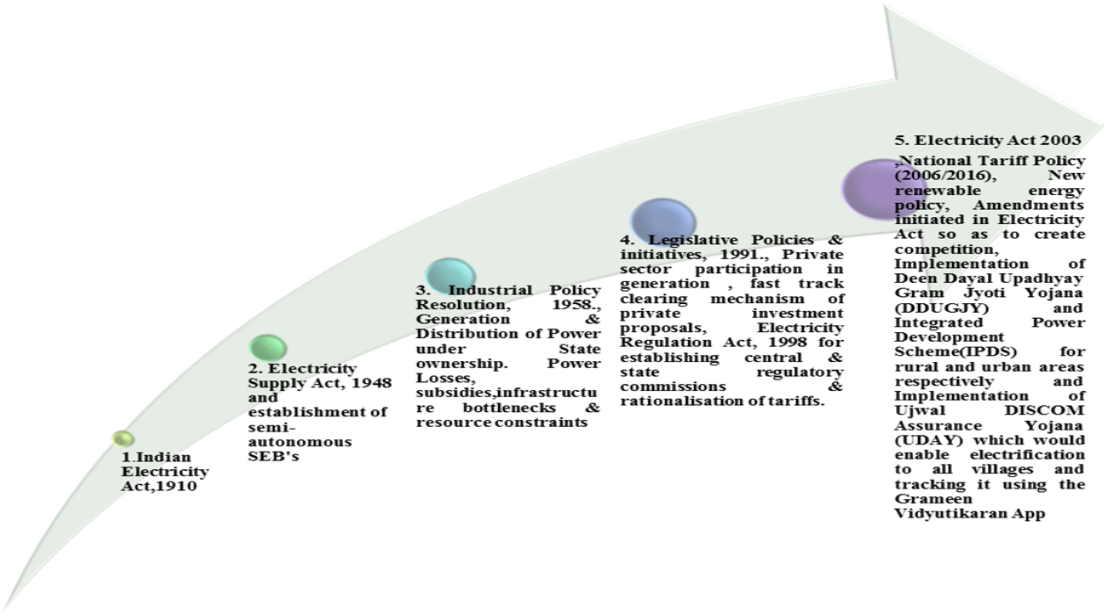


Figure 1: Evolution of the Power Sector in India

After decades of trying various policies, only in 2003 did a comprehensive statute become law. The Electricity Act of 2003 (EA 2003) is a ground-breaking piece of legislation that aspires to overhaul India's power sector. It was drafted in response to the evolving needs of the power market. This act has brought a paradigm shift in the way the sector is to be regulated. The EA 2003 consolidated the reforms and catapulted India's power sector forward toward Accountability, commercial viability, market-driven competition, thermal generation de-licensing, power trading, open access, rural electrification, renewable energy, multiyear pricing, and all with a strong focus on consumer interests. The key objectives of the EA, 2003 are shown below.

Figure 2: Key objectives of the Electricity Act,2003

In 2003, the EA's main goal was promotion of generation competition via competitive and captive generation along with open access, interstate and intrastate commerce, and distribution competition through OA and different licensees. Metering, universal access, independent regulation, theft control, and

reduction of cross subsidy are all aimed at enhancing the overall operations and financial performance of distribution and other sectors.

The EA, 2003 was first amended in January 2004 to mandate the State Electricity Regulatory Commission (SERCs) to introduce OA to costumers having a demand of more than 1 MW within five years. The original act was not specifying any timelines. The EA, 2003, authorizes the Appellate Tribunal for Electricity (ATE) to issue directions to Electricity Regulatory Commissions (ERC) to perform their functions. The second amendment was mainly to emphasize the responsibility of the Central Government for rural electrification.

By allowing private sector engagement through open access principles, the EA 2003 aimed to increase competition in the sector. The EA 2003 reformed the electricity sector and created the groundwork for its vision of a competitive market with a diverse range of seller and buyer. It starts with a multi-seller model at the wholesale end, which provides large consumers with broad access. As part of India's market expansion, the CERC has developed two power exchanges i.e., IEX and PXIL. SEBs must be unbundled, and SERCs must be established.

1.2.2 INSTITUTIONAL FRAMEWORK UNDER ELECTRICITY ACT 2003

Various institutions have been developed with specific roles and responsibilities to serve the EA, 2003's objectives. India's constitution includes electricity as a concurrent topic, some institutions are operating at the Central and State level with specific roles and responsibilities. For example, system operation responsibilities are distributed at National, Regional, and State levels. NLDC is accountable for the overall system operation of the country. In contrast, RLDC is accountable for system operation within the region, and SLDC is accountable for state-specific system operation. Distribution is a state-specific sector, and there is no entity operating at the regional or national level. Similarly, power exchanges are working at the national level, and States are transacting in national-level exchanges. The summary of the institutional structure under the EA, 2003 is shown in **figure 3** below.

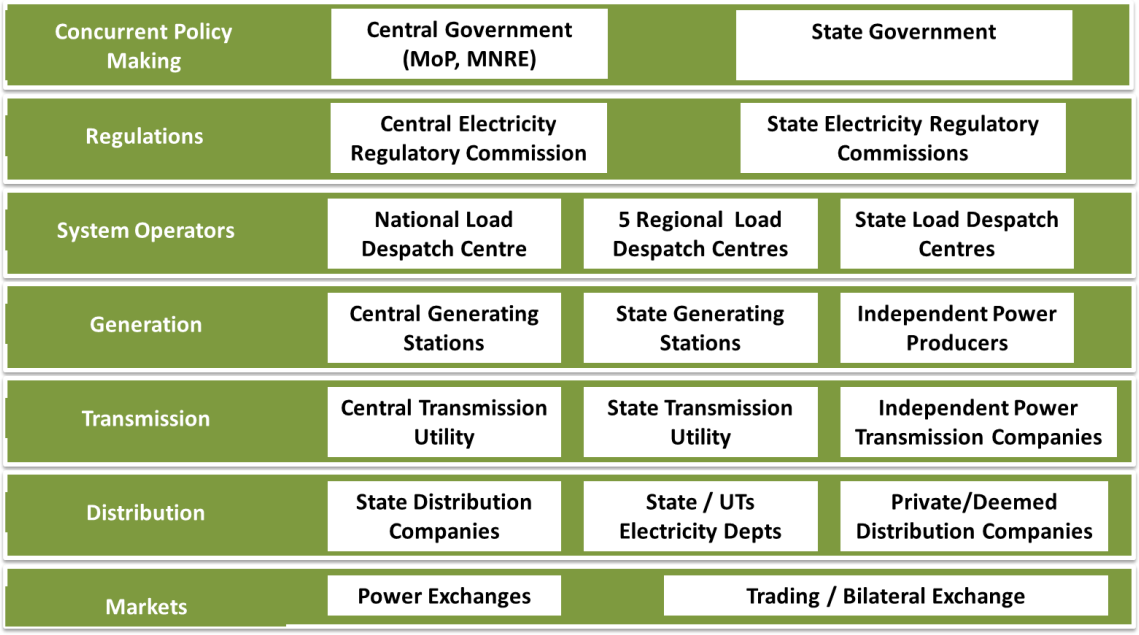


Figure 3: Institutional framework under the Electricity Act,2003

Understanding institutional frameworks would help devise an appropriate operational framework during the further study of the segregation of the current distribution sector's wire and supply businesses. It will also be useful for developing the roles and responsibilities of institutions during further study.

From a vertical integration monopoly to wholesale competition, India's power sector has evolved, which resulted in Distribution Companies (Discoms) and large /bulk consumers through open access as multiple buyers and increased competition in generation. The EA 2003 emphasised two points: "creation of a competitive electricity market with transparent market-driven pricing mechanisms that provide customers with sufficient options to select from," and "offering the necessary policy, legal, and regulatory platform for consumers to exercise their choice." The EA 2003 contains six primary topics based on these two core agendas:

i. State-owned vertically integrated SEBs reorganisation;

ii. De-licensing of generation of power to allow for greater private sector involvement.

iii. Open Access for Transmission and Distribution network;

iv. Trading and market development;

v. Rationalisation of Tariff and progressive reduction of cross-subsidies and;

vi. Consumer interest.

1.2.3 IMPACT OF POWER SECTOR REFORMS:

Generation Capacity

With the Centre 25 percent, States 33 percent, and the Private Sector 42 percent (up from 4 percent in 2003), generating capacity has expanded from 1362 MW in 1947 to 367.28 GW in December 2019 (i.e. nearly 270 times growth in 72 years with a CAGR of 8%. Electricity generation in India by coal fuel remains 58% compared to World's 40%. In the last three years, shortages have reduced substantially, and, in fact, at present, India has an unutilized generating capacity for various reasons. India's present installed power capacity is still dominated by a thermal (coal and gas) generation of about 63.15 %, large hydro of 12.4 %, and renewable energy capacity of 23 % of total capacity. Source wise RE installed capacity is shown below.

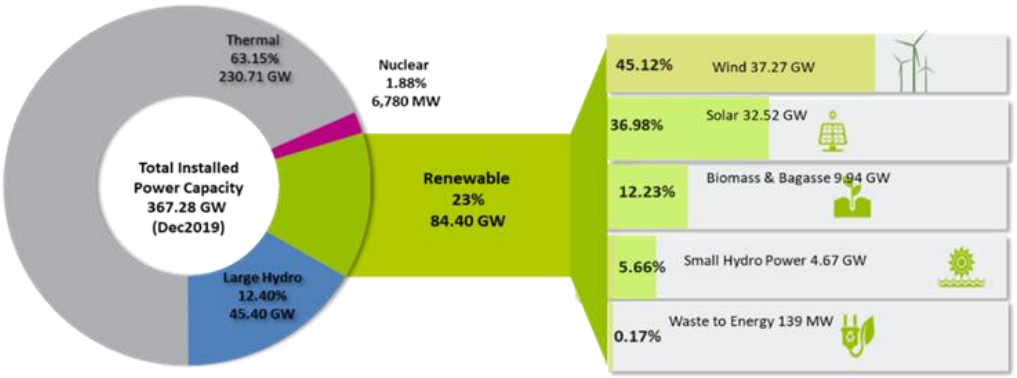


Figure 4:: Source-wise installed capacity of India (As of December 2019)

In 2010, NAPCC set a goal of 5% Renewable Energy (RE) procurement, increasing by 1% each year until it reaches 15% by 2020. The GOI revised targets under National Solar Mission (NSM) and come up with a target of 175 GW of installed RE capacity by 2022 and 275 GW by 2027, with a combination of 100 GW from solar, 60 GW from wind, 10 GW from biomass, and 5 GW

from small hydro (SHP). Ninety (90) % of the targeted RE capacity addition is planned from wind and solar sources, which are inherently variable. India's installed renewable energy capacity has grown from 0.34 GW in 1995 to over 84.40 GW at present, registering more than 250-fold growth during this period.

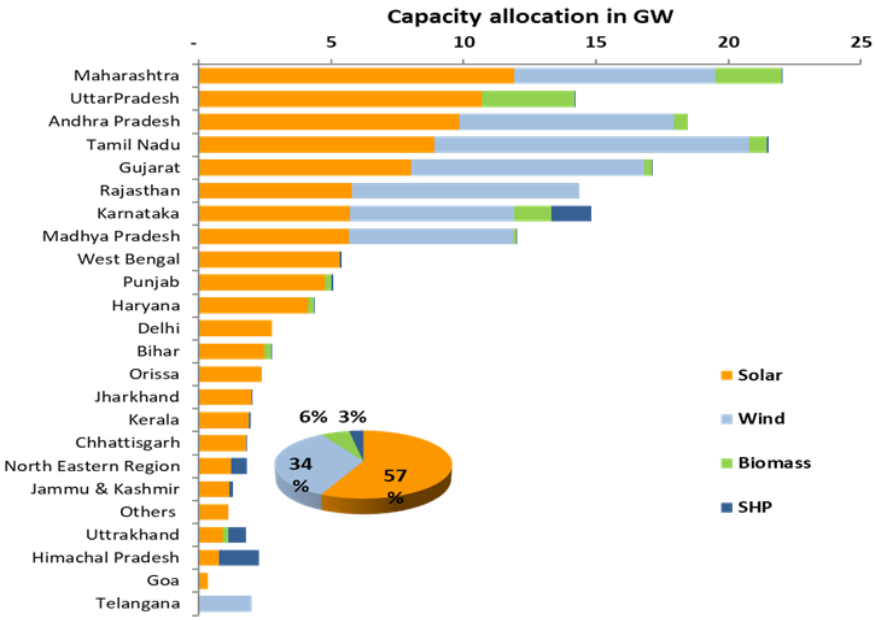


Figure 5:: State-wise renewable energy targets by 2022 (MNRE)

Despite significant capacity addition in generation due to a coal scarcity, we have not been able to reach all of our targets in recent years due to strong private sector engagement. Because of the scarcity of coal/gas and below par quality of coal, the problem has worsened, resulting in a reduced average plant load factor of 55.99 percent in 2019-20, down from 77.5 percent in 2009-10.

Demand growth and demand variation

In 2018-19, India's per capita energy usage increased to 1181 kWh, up from 16 kWh in 1947. However, India lags behind affluent countries such as Canada (16473 kWh), the US (13246 kWh), and China in terms of per capita consumption (3,298 kWh). In India, 300 million people still lack access to electricity, and those who do have it have been irritated by intermittent power and harassment. India's energy deficit is 3.6 percent, with a high shortfall of 4.7 percent.

The electricity demand in India has grown significantly post-independence. Total demand has increased from 4182 GWh in 1947 to about 11,96,309 GWh at the end of March 2019, reporting 286 times growth in 72 years with a compound annual growth rate of 8 %.

While there has been some private sector participation in the generation and transmission parts, it has been restricted in the distribution segments. State-owned distribution corporations handle the majority of the distribution. However, prior to the adoption of the EA, 2003, private businesses operated in the distribution business in places such as Delhi, Kolkata, Surat, Ahmedabad, and Mumbai.

Value Chain of Indian Power Sector

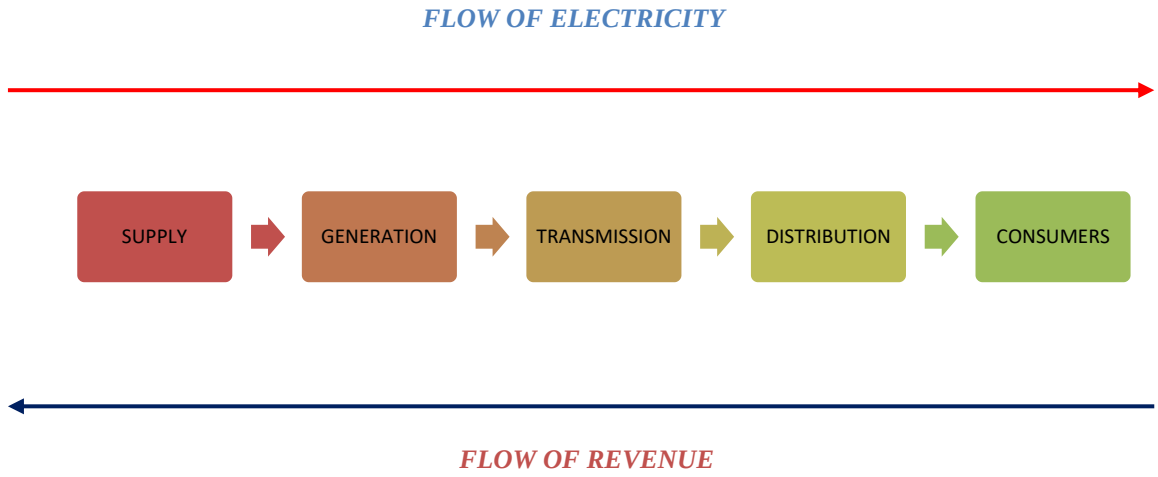


Figure 6:: Value Chain of Power Sector

Figure 6 shows the value chain of the Power Sector along with the flow of electricity as well as the revenue. To meet the growing power demand the major investment in power sector areas will be required for the addition of generating assets to create more generating capacities and in the transmission and distribution sectors to create adequate infrastructure to transmit and distribute and supply power to end consumers. However, such investment will be captivated only if the returns on investment are made attractive and can recover from Discoms. In electricity supply, the chain role of Discoms has been

very crucial as they are the last and important link of the supply chain. The financial position of Discoms decides the business confidence/fate and determines the investment participation in the capital-intensive power sector business and speed of reform initiatives of the power sector.

The major significance of this value chain is that, even if one of the driving sector performance gets disturbed whether it's a generation, transmission or distribution segment or the disturbance in the supply side i.e. sudden change in fuel price or any factors which are volatile in nature and affects the supply side, the whole value chain gets disturbed and each driving sector has to face its consequences.

Although the country's Power Sector has shown rapid growth, the sector still faces huge challenges which result in minimum utilisation of the upcoming opportunities. The country's overall challenges have been reviewed below, which will justify which are the driving factors that are affecting the value chain.

Competition in Power Sector

One of the pillars of EA 2003 is to promote competition in the electrical sector. Open access for purchasers with loads exceeding 1 MW, competitive power procurement by Discoms, inviting participation in distribution, distribution franchisee initiatives, and competitive bidding participation in the power generation and transmission segments have all been implemented by the Central and State governments in the spirit of encouraging competition. Discoms' competitive bidding criteria for power procurement have enabled for price discovery via a market-based method. This meant that private producing companies have access to the same platforms and opportunities as public companies, but most critically, it assured fair tariffs for both customers and the market. Discoms and open access users (1MW and 0.5 MW in some states and up) now have the option of purchasing power from any producing firm in the country that offers competitive prices. Increasing competition in power generation and transmission (through tariff-based competitive bidding for specific transmission projects) has led in the formation of a wholesale market and increased private sector engagement, thanks to initiatives by the Indian government and several states. However, several of these programmes'

roadmaps and implementations, such as the mechanisms for providing consumers with open access to distribution and private sector participation in distribution, are still up for debate. Competition in the distribution industry, in particular, has been quite restricted and is still in its infancy.

Through OA and support for multiple/parallel licensees, the EA 2003 created the groundwork for creating competition at the consumer level. By requiring DLs in a given region to distribute electricity "by own distribution infrastructure inside the same territory," the multiple/parallel licensee regime has the potential to lower tariffs. Because capital investment is a pass-through charge, each DL making investments in its own network would result in network duplication, raising end-user costs/tariffs. As a result, competition in the distribution segment necessitates a considerable financial commitment from a second distribution licensee, posing entry barriers for new distribution licensees. In metros like Mumbai, Delhi, and Kolkatta, pure play privatisation has had mixed results. In several states, discoms are already implementing the distribution franchisee model, which appears to be a feasible approach for allowing competition and investment in the distribution sector. However, the market now requires a new reform programme aimed at electricity end users.

By enabling free access, the EA 2003 boosted competition in the generation segment by allowing large users to buy their power directly from generators through connections to transmission and distribution networks. This has led to multiple buyers for generators and hence helped in establishing wholesale market by using transmission open access. The fact that India's Discoms have two types of operations - wire and retail – explains why distribution open access hasn't taken off. The wire business is a monopolistic, regulated-return-earning sector by definition. Because it requires acquiring energy in bulk from producers and selling it to customers, retail supply is better suited to offering consumers a variety of options in the context of numerous providers, as well as providing customer service, billing, and fee collection. Conflict of interest makes Discoms apprehensive of losing their retail segment to competition in a market structure where a single distribution company handles both wire and retail activity. As a result, the opportunity for establishing

distribution open access is restricted in this circumstance, and only a few consumers have benefited from it.

India's electricity sector is broadly distributed in 3 stages of development viz: Pre-independence, Post-independence, and Post EA, 2003. In the initial phase, all generators and consumers are connected with a dedicated network, and consumers did not have any choice in the selection of generators. After that, the SEBs were developed, and SEBs started procuring power on behalf of consumers and supplied to consumers. In this model, generators did not have more choice, but SEBs had a choice. Also, consumers would have had to live with SEBs only, without service choices. The progress of the electricity sector in India over the period is shown in **figure 7**. With the enactment of the EA, 2003 provisions like a parallel licensee, open access, electricity market, competitive bidding was introduced, which provides choice to generators and consumers.

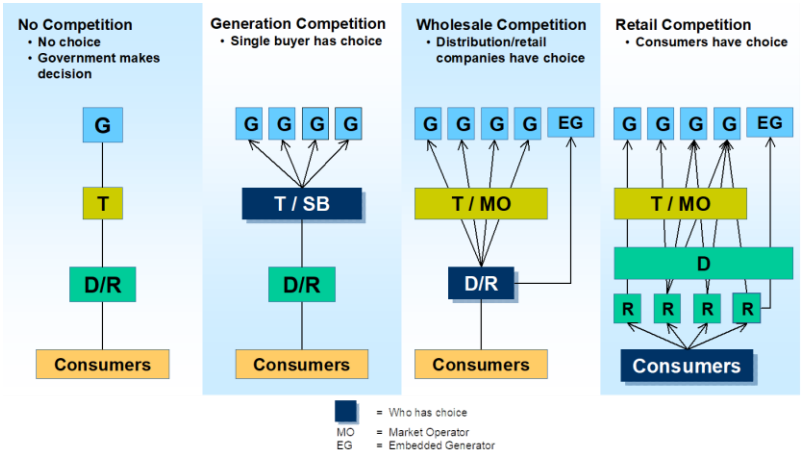


Figure 7: Evolving Electricity Market in India

Unbundling of SEBs created GENCO, TRANSCO, and DISCOMS as separate legal entities. Independent power producers (IPPs) came forward to install power plants to meet the need of the increasing demand of DISCOMS. DISCOMS started procurement of power through competitive bidding. Private developers started investment in renewable projects to meet RPO targets of DISCOMS under the EA, 2003.

Sally Hunt (2002) suggested four models of power industry structure which were differentiated through the degree of monopoly retained by them. These four models of power industry structure progressively reduced the degree of monopoly and progressively increased the degree of competition.

The structure of evolution of electricity market in India from stage-1 of conventional vertically integrated when only a single utility with whom the customer dealt with (a monopolist utility and the customer) to stage-3 wholesale competition through the creation of multiple generating companies and distribution companies is evolved. However, a retail competition giving choice to retail consumers is yet to be evolved in India. Even still, many more market developments are expected to be made as soon as possible.

The Power Sector all around the globe is restructuring vertically integrated utilities through unbundling and open for competition with the private players. This puts an end to the monopolistic era. Through the exercise of unbundling of single power sector utility into generation, transmission, and distribution as a separate entity enhanced and opened the competition to certain areas of the power sector, which were often termed as monopoly utilities. With the introduction of private sector engagement in the power industry, the government policy did not want private actors to have a monopoly and exploit end users, thus laws were enacted. As a result, the early power sector industry became regulated monopoly utilities. The regulations, which were supposed to regulate the government in a previous era, have been enforced to keep the system running efficiently and with discipline, without giving any single institution an unfair advantage at the expense of the end customer. When a monopoly is detected in an industry, it is obvious for the government to intervene and establish a structure for conducting business in order to defend the interests of end consumers. The following are some of the features of monopoly utility:

1. Monopoly in one area of operation for a single utility.
2. Regulated Framework: The utility shall operate within the Regulator's business framework.

3. Universal Supply Obligation (USO): The utility must offer electricity to all consumers who request it.
4. Regulated Costs: The utility's investment return is governed by the Regulator.

In a word, regulation is concerned with controlling monopolist prices in the absence of private actors and market forces.

"What is deregulation or restructuring of an industry?" is the next apparent question. The name implies that the framework given by the rule has come to an end. In other terms, deregulation is the process of removing price control through the entrance of market participants into a sector. In a strict sense, however, this is incorrect. It would be impossible to make an effective adjustment in the electricity business framework overnight by allowing competing suppliers access and exposing pricing to market interaction. Certain circumstances make it easier for the competition to succeed. These conditions must be met when a system is deregulated or restructured. The concept of deregulation of the power business was driven by a variety of factors. During the early 1990s, one popular viewpoint highlighted concerns regarding monopolistic utilities' effectiveness. The proponents of this viewpoint argued that the electric utilities' monopoly status did not create an incentive for efficient operation. In privately operated utilities, the utility's costs were passed straight on to the customers. Factors other than economics, such as treating all public utilities equally, overstaffing, and so on, contributed to the slow performance of government-linked public utilities. Economists began to advocate for the creation of a competitive market for electrical energy as a way to improve the entire power sector. This argument was backed up by successful reforms in other industries such as aviation, gas, and telecommunications.

Customers and private businesses profit from the competitive environment, which provides a wide range of benefits. Deregulation of the power business is said to provide a number of key advantages, including:

1. Electricity costs will fall: It is a well-known fact that competitive prices are lower than monopolistic rates. In an ideal competitive system, the producer will endeavour to sell the power at its marginal cost.
2. Customer choice: Customers will have the option of choosing their retailer. Retailers will compete not only on pricing, but also on the additional services they provide to their clients. Better strategies, more dependability, and higher quality are just a few examples.
3. Better customer service: Retailers would provide better service than monopolists.
4. Innovation: Electric utilities had no motivation to improve or take chances on innovative ideas that could increase consumer value due to the regulatory procedure and a lack of competition. In a deregulated environment, the electric company will continually endeavour to come up with new ways to improve service and, as a result, save money and maximise profits.

The industry's deregulation has given electrical energy a new dimension, allowing it to be viewed as a commodity. The 'commodity' classification accorded to electricity has enticed private entrepreneurs to enter the market. Private players make the entire business difficult for the system operator, as it now has to deal with a large number of players who are not under its direct control. This necessitates the establishment of a set of fair and transparent regulations for operating the power industry. The structure of the market is critical to the effective deregulation of the power industry.

1.3 OVERVIEW OF ISSUES IN THE INDIAN POWER SECTOR:

- **Fuel Security Concerns leading to lower plant load factor:** Thermal capacity expansion is hampered by the industry's growing concerns about fuel supplies. Due to the lack of gas, a considerable amount of gas-based capacity, totaling more than 20 GW, is idle. Coal supplies by Coal India Ltd. (CIL) are limited to roughly 65 percent of real coal demand by coal-based thermal power plants, resulting in a greater reliance on imported coal and, as a result, higher and more volatile

power generating prices. As a result, the average plant load factor has decreased from 77.5 percent in 2009-10 to 55.99 percent in 2019-20.

- **State Discoms' Financial Health:** State Discoms' financial health has been affected by Tariff schemes aimed at the general public, combining aggregate AT&C losses, and operational efficiencies, which have resulted in large indebtedness. In 2018-19, AT&C losses, which comprise losses from billed amount collection issues and distribution losses due to technical and commercial (including theft) causes, were 22.03 percent, which is still higher than the R-APDRP baseline of 15%. As shown in **Figure 8** there has been a very slight decrease in the overall country's AT&C losses, but still, the decline rate is not at the right pace to achieve the desired target of below 15%. China had 6% T&D losses in 2011, the United Kingdom had 8%, the United States had 6%, and Germany had 4%. Higher AT&C losses result from inefficient invoicing and collection. For measuring energy sales, 100% metering is required. States estimate agriculture sales with assumptions in the absence of metered agriculture sales, resulting in poor billing efficiency.

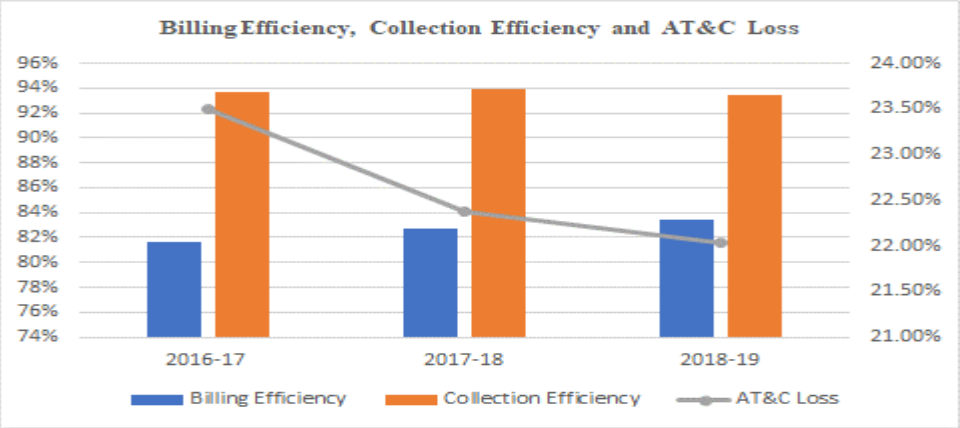


Figure 8:: Billing and Collection Efficiency and Aggregate Technical &Commercial Loss

- Increased power generation costs because of lack of fuel, State Discoms' weak financial health, huge AT&C losses, and a growing gap (Rs 0.52/Unit from Rs 0.37/Unit as shown in the following figure) between the ACOS and the released cost have all contributed to State Discoms' suppressed demand projections.

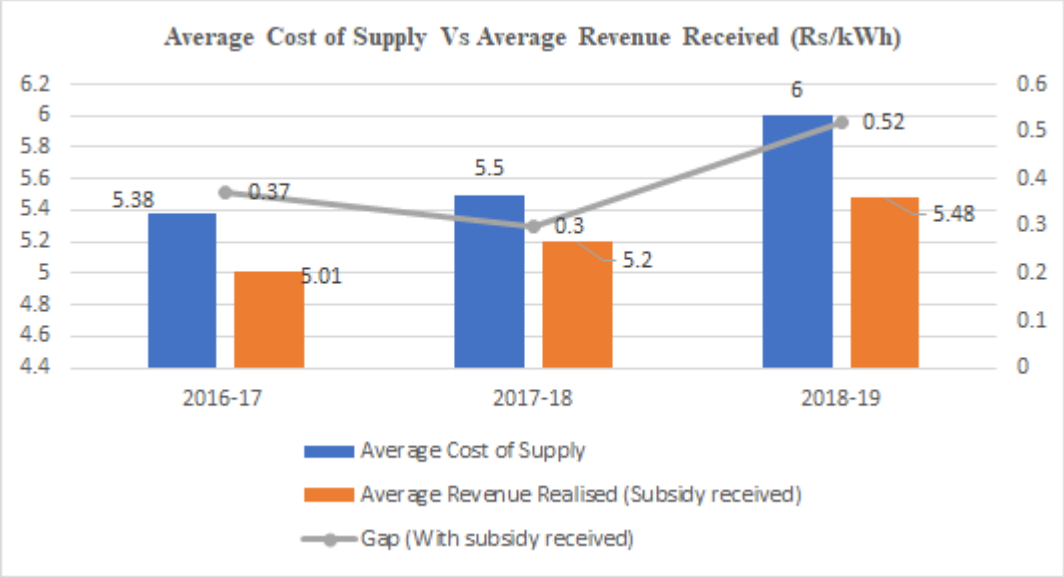


Figure 9: Average Cost of Supply (ACoS) & Average Realised Cost and its Gap

- **Inimical Financing Environment:** Due to rising risks resulting in project cost overruns and thus higher-end tariffs, financing rates have climbed dramatically from the time of project evaluation during the last 4-5 years.

- **Differential Tariff, which results in financial losses due to delays in tariff adjustments:** Consumer mix in the Discoms supply sector has a significant impact on cash flow and Discoms' ability to give greater quality service to their consumers. Industrial 29 percent, domestic 28 percent, and agricultural 22 percent of 9.57 lakh MU sales in 2018-19, whereas revenue shares were industrial 35 percent, domestic 22 percent, and agricultural just 20 percent (with subsidy booked). This disparity in Discom tariffs places a hardship on high-revenue earning customers. In 2018-19, the average cost of delivering power was Rs 6/kWh, compared to an average pan-India electricity rate of Rs 5.58/kWh, a commercial pricing of Rs 9.44/kWh, an industrial tariff of Rs 7.52/kWh, and a tariff of Rs 0.82/kWh for agricultural consumers. Agricultural users had the lowest average rate due to direct subsidies from the state government and increased cross-subsidization by commercial and industrial customers. The EA 2003 amendment, which went into effect in 2007,

required a gradual lowering of the cross-subsidy. The prospect of a tariff hike in the agriculture industry is also linked to low supply quality and food security concerns. Discoms have suffered substantial financial losses as a result of supplying power at a lower tariff than the cost of delivery, as well as delays in tariff changes.

- **State-owned Discoms have been expanding their borrowings:** State-owned Discoms' accumulated losses (net of subsidies) increased from Rs 11,699 cr in 2004-05 to Rs 4,88,686 cr as of March 31, 2019. As a result of these losses, State Discoms have become more reliant on short-term borrowing to support their operations. State-owned utilities borrowed Rs 4,78,452 cr in 2018-19, up from Rs 1,34,771 cr in 2008-09. As a result, the interest rate on these loans exacerbates State Discoms' financial difficulties. Discoms' financial difficulties limit their ability to purchase electricity, resulting in power shortages.

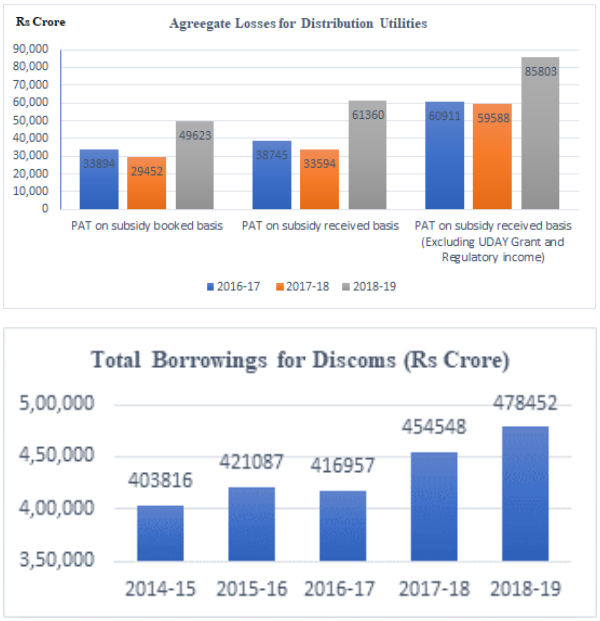


Figure 10: Aggregate Losses and Borrowings by State Discoms

- **Impact of Open Access on Discoms**: To give generators and suppliers a level playing field, the Act bars transmission corporations from selling or generating energy, whereas Discoms are required to perform both distribution wire and retail supply tasks. The retail supply function of

distribution is not identified as a separate regulated operation under the Act. The wires' function, which includes electricity transportation, needs to be separated functionally from the distribution supply firm to encourage fare competition by permitting non-discriminatory OA to the network. In India, discoms are needed not only to offer energy to all areas while dealing with the past burden of cross-subsidy and distribution losses, also along with that to give bulk users unrestricted access to distribution cables. Discoms contend that by giving open access and losing bulk customers, they are not completely reimbursed for their losses, and hence the competitive environment suffers. The Table below shows illustrate the Case of the MSEDCL and assess the potential impact of open access transactions and its influence on the Tariff hike for existing subsidized categories, and in particular, on the agriculture consumer category.

Table 1: Impact of Open Access Consumption of Maharashtra Discom (MSEDCL)

Consumer type	Grouping	No of consumers	Revenue Contribution (Rs Cr)	% of Total Revenue	ABR*/ ACoS	Ratio (ABR/ ACoS)
HT Indus. / HT Commer.	(a)	17,595	31,627	38.8%	8.76 / 7.31	120%
1 MW above (estimated)**	(b)	1,01,743	32,218	39.5%	8.62 / 7.31	118%
All Remaining consumers	(c)	2,72,09,739	49,320	60.5%	6.63 / 7.31	91%
Agriculture	(d)	42,93,284	11,307	13.9%	3.71 / 7.31	51%
All Remaining excl. Agri.	(e)=(c)-(d)	2,29,16,455	38,013	46.6%	8.17 / 7.31	112%
All consumers	**(f)=(b)+(c)**	**2,73,11,482**	**81,538**	**100.0%**	**7.31 / 7.31**	**100%**

Source: MERC Tariff Order 322 of 2019 for MSEDCL as projected for FY21
Note:
ABR: Average billing rate; ACoS: Average cost of supply
* ABR has been calculated based on aggregate revenue requirement and sales for FY21 as approved in the Order
** Estimated portion of industrial and commercial consumers

The above illustration of MSEDCL finds that:

a) **A significant share of revenue comes from HT category consumers (Industrial/Commercial)**: Around 17600 HT consumers contribute around Rs 316 billion (approx 39%) of the total revenue of the utility. These consumers also contribute cross-subsidy of around 20% as against the ACOS (Rs 7.31/unit).

b) **Agriculture Consumption forms a significant component of the overall consumption base:** There are around 42 Lakh agriculture consumers in the state with consumption of around 25% of total consumption, whereas the revenue contribution from the agriculture category (Rs 105 billion) amounts to 14% of the total revenue.

c) **Inadequate Cost Coverage for supply to agriculture category:** The average billing rate for agriculture is Rs 3.71/KWh as against the ACOS of Rs 7.31/KWh. Thus, only around 51% of the average cost of supply is designed to be recovered through tariffs from agricultural consumers. Thus, the shortfall in cost coverage for agriculture consumption of around Rs 92 billion, is partly met out of the cross-subsidy available through other subsidizing categories such as HT-Industrial/Commercial.

d) **Cost Coverage of remaining categories excl. agriculture is close to an average cost of supply:** The cost coverage for all other remaining categories with around 230 Lakh consumers (mainly comprising LT-domestic costumers) is more than the ACOS (105% to 112%). The tariff rationalization in the case of these categories is taking place over the period.

e) **The proliferation of Open Access consumers would only worsen the case for Utility and Government unless Agriculture Tariff and Subsidy issues are addressed:** It is estimated that around 1,00,000 consumers, which contribute around Rs 322 Billion (40% of total revenue) would be eligible for open access whereas revenue from CSS with proposed Tariff Policy formulation with a cap of 20% and reducing trajectory, may not be adequate to address the cost to serve the subsidized categories such as agriculture consumption, without significant revision in Tariff and/or increase in direct subsidy by Government for consumption by such consumer categories. Out of the present tariff of Rs 3.71/unit, only a part is expected to be directly recovered from the consumer and the

remaining is expected to be compensated by way of State Government subsidy for agriculture up to Rs 50 billion.

- **Competition in Distribution with Parallel Network**: In order to increase competition in electricity distribution, the EA 2003 calls for multiple or parallel distribution networks. International practices, on the other hand, demonstrates that, to stimulate RSC, different suppliers are permitted to sell through a single distribution network instead of multiple networks, because duplicating the current distribution network is commercially unviable. Mumbai is India's sole power distribution location where two electrical distribution companies compete for customers, and Mumbai residents can choose between switching to a shared distribution network or switching to a parallel distribution network. The concept of OA and several licensees in the same area of supply were used to envision competition in the distribution sector. Through either of these strategies, there has been relatively little progress in introducing competition. While open access at the inter-State level has created a wholesale market and competition in the generation segment, there are concerns about the deployment of OA at the distribution level, which has resulted in disincentives and conflicts of interest. As a result, despite more than ten years of reforms in India's power sector, power distribution continues to be the bottleneck. The Mumbai example demonstrates that rival distribution networks should be avoided, and that the separation of distribution wire and retail supply business is essential to eliminate network operator conflicts of interest. Separating retail supplies from Discoms' wire business becomes critical in this situation.

- **High Power Purchase Cost of Discom**: Power procurement accounts for 70–80 percent of Discoms' expenses in a regulated environment, and it is mostly dependent on the reliability of coal supply to thermal generating units. The Discoms have been absolutely taken aback by the lack of attention paid to assuring coal supplies and the length of time spent (about 15 years) in formulating policies for coal allocation to

regulated thermal units. High distribution losses and inefficient distribution business operations, along with regulatory disallowance, exacerbate Discoms' revenue shortfall. Because the Discoms are 100 percent owned by the state government, they can borrow money from public-sector banks to make up for revenue shortfalls. However, over time, this results in a big amount of debt and higher interest payments. State Discoms eventually lose their confidence as electricity buyers, forcing the government to intervene. Unmet power demand is not accommodated for due to State Discoms' low financial health, and generation capacity is underutilised. In such a case, gencos refuse to enter into long-term PPAs with Discoms. As a result, although the consumers are ready and able to afford, the State Distribution companies are unable to provide electricity. The lack of market pressure is the primary reason of State Discoms' poor financial health on multiple occasions (Niti Aayog, 2017). The ultimate step in resolving the issue is to subject State Discom to market forces (Niti Aayog, 2017). As a result, with afflicted Discoms and many illnesses draining the country's budget, India's Discoms are in desperate need of reforms.

- **Value Chain**: The distribution segment is the major element of the value chain, which generates revenue and serves the end consumers. Several schemes have been laid by the government to revive the distribution sector eg. the Financial Restructuring Program in 2012, R-APDRP which has been converted to the latest scheme named as IPDS scheme, UDAY for the financial turnaround of the whole distribution sector in India. Several states like Gujarat, Maharashtra, Madhya Pradesh, etc has made the maximum utilisation of these schemes, but still, the issues are stranded to almost at the same level.

- **Distribution Sector Reforms with States**: Since electricity is a ongoing topic under the Indian Constitution, states are accountable for carrying out the EA 2003's centrally mandated requirements and policies. The EA 2003 aims to improve competition, accountability, and commercial viability in the sector. Unbundling and corporatizing

utilities, as well as establishing independent regulators, were mandated by the EA 2003 as steps to strengthen utility performance accountability to external stakeholder, minimise State Government authority, and promote internal accountability for results. As a result, the Electricity Act set the way for a significant change in the electricity sector's institutional architecture. There are 28 state regulatory commissions that span all states as of 2013. In 19 states, SEB unbundling has been accomplished. The remaining states each have a single utility that functions as either a power department or a State Electricity Board. The market structure of the unbundled 19 states varies: ten have split into many Discoms, six have split into a single Discom for the state, and three have split transmission but retained generation and distribution under one business. The following is the current status of such SEBs unbundling various markets:

Table 2: Power Sector Structure by States

States Un-bundled with Multiple Distribution Companies in the State	**States Un-bundled with One Distribution Company for the State**	**States unbundled with separate Transmission Company and combined Generating and Distribution Company**	**Yet to unbundle/SEB/Dept. (Generation, Transmission and Distribution)**
Bihar	Uttarakhand	Tamil Nadu	Tripura
Uttar Pradesh	Meghalaya	Punjab	Sikkim
Rajasthan	Maharashtra (Except – Mumbai)	Himachal Pradesh	Nagaland
Orissa	Chhattisgarh		Goa
Madhya Pradesh	Assam		Manipur
Karnataka	West Bengal		Jharkhand
Haryana			Kerala
Gujarat			
Delhi			
Andhra Pradesh			

1.4 CONCLUSION AND WAY FORWARD

Despite all of these attempts and a decade of historic EA, the goal of state Discoms' financial viability has yet to be attained. Heavy borrowings have resulted from mounting Discoms losses of Rs 4,88,686 crores as of March 31, 2019. Total debt climbed to Rs 4,78,452 crores in 2018-19, up from Rs 1,34,771 crores in 2008-09.

State Discoms financial health has further taken a beating because of migration of revenue on account of open access, roof top solar net metering arrangement and surplus capacity charges. Unlike other developed countries, In India, distribution licensees are coupled with wire and supply businesses. Operational and financial parameters in the determination of tariff for Discoms play a major role in terms of leading Discoms in a weak financial state. The operational parameters such as the financial statements are heavily influenced by AT & C loss and power purchase costs.

The above-mentioned issues faced by the power sector has a major contribution from the Distribution sector. Hence, this has affected the entire value chain and created the major barrier for achieving the target growth rate which is required to achieve the overall growth of the sector as well as the country's economy. It is self-evident that the electricity sector and growth prospects for the Indian economy cannot coexist unless the distribution is adjusted. While this is a politically challenging undertaking, it is unavoidable, distribution must provide cash flows to fund the power industry value chain.

The distribution sector is the tail that wags the power dog, and as loans become unavailable, due to massive debt and losses (banks are more careful now), Discoms are unable to pay for power purchases. This has an impact on the financial viability of power generation companies and the electricity sector, as well as banks and financial institutions. The financial viability of state-owned utilities has been further harmed by the high cost of power as a result of domestic coal shortages. Finally, if we are to achieve the promise of growth, inclusion, and job creation in India, we must place energy distribution businesses on a fiscally sustainable path.

96% of the Indian Distribution sector is catered by State-owned Distribution Companies. As the distribution sector is entirely handled by the States, the distribution sector is developed in the State depending on the requirement of a particular State and hence it is equipped at a different level. High AT&C losses, inability to accomplish the regulatory norms and recovery of its cost, increased liabilities than assets, non-recovery of its receivables, high power purchase cost and migration of its revenue on open access /solar rooftop net metering are the main general factors, which are putting distribution sector into the financially unviable situation. Although major factors contributing financial health of Distribution companies are assessed at the national level, but distribution sector is being managed at the State level, the specific factors and root causes of the financial health of State Discoms would be fully known if the financial health of State Discom is analyzed with proper methodology.

To solve this difficulty, the wire and retail sectors must be separated. All wire enterprises will function as common carriers in such a market and will be reimbursed for their investments at a fair, regulated rate. If the retail business were to be opened up to several enterprises operating in the same location, end consumers would be able to select their merchants on the basis of pricing and service quality. Retail competition aims to increase operational and financial efficiencies while also giving customers additional choices. While competitors work to reduce input costs, cost efficiency is achieved, and operational efficiency is emphasised as consumers examine performance when picking between different suppliers. Competitive power retailers will have to purchase power from generators or the wholesale market and combine it to meet a wide range of consumer needs. Their commercial sustainability would be evaluated by their capacity to match consumer desires, which, in the face of competition, is predicted to lead in reduced retail pricing (as competitive suppliers cut margins) and more attempt from competing retailers to enhance efficiency and consumer welfare.

Market competition is supposed to improve service quality and pricing by promoting competition in retail energy supply and ensuring that the market performs well within the stated set of laws. By increasing user choice through

competition, the regulator's job shifts from price-setter to monitor and arbitrator. Rather than setting rates for individual services, the regulator's role in a competitive framework will be to generate guidelines/rules for the competitive energy retail market and closely monitor compliance. This can be accomplished by separating the ownership of the distribution wire from the distribution of electricity. The wire would remain in the hands of discoms, but the sale of energy would be passed on to retailers/separate supply licensees. The SL would acquire electricity from Gencos to sell to its ultimate customers. Customers will be competed for by electricity distributors. Retail competition is expected to increase operational and economic efficiency, as well as provide end users with a choice of electricity suppliers. A competitive provider would purchase power from generators or the wholesale market, then combine it to fulfil a variety of consumer needs. Their financial survival would be determined by their capacity to match consumer desires, which is predicted to result in reduced retail pricing and more effort from competitors to improve efficiency and consumer welfare. As a result, promoting competition in retail power supply and assuring that the market operates under a specified set of regulations is intended to ensure service quality and acceptable price. (2017, Niti Aayog).

1.5 INDIAN EXPERIENCE IN RETAIL CONSUMER CHOICE UNDER ELECTRICITY ACT 2003:

1.5.1 MUMBAI – PARALLEL DISTRIBUTION LICENSEES-LESSONS FOR COMPETITION:

Geographically Mumbai (Municipal Corporation of Greater Mumbai- MCGM) covers two Revenue Districts. One Revenue District is the main city of Mumbai and the Second Revenue District is Mumbai Suburban. Since 1926, Mumbai and its Suburban District (except Mulund and Bhandup areas) have seen three licenses for electricity which are as follows:

1) BEST which distributes and supplies electricity at the retail level to Mumbai Revenue District (About 95 Sq. Km).

2) Adani Electricity Mumbai Ltd. (AEML) (earlier known as BSES or RInfra) which has its GT&D setup in & around Mumbai, distributes and supplies electricity at a retail level covering Mumbai Suburban Revenue District and Mira Bhayander Municipal Corporation which is part of Thane Revenue District (384 Sq. Km).

3) Other parts of Mumbai Suburban Revenue District i.e., Kanjur, Bhandup, Mulund areas are supplied by MSEDCL or MahaDiscom.

4) Tata Power Company (TPC) which has its GT&D setup in & around Mumbai, distributes and supplies electricity at a retail level covering both Mumbai and Mumbai Suburban Revenue Districts (except Kanjur, Bhandup, Mulund areas are supplied by MSEDCL) and Mira Bhayander Municipal Corporation which is part of Thane Revenue District.

Historically and under the terms and conditions of licenses, TPC was a bulk supplier licensee for supply to AEML and BEST, and also to large industrial consumers (Central Railway, BPCL, and RCF etc.) having a load of 1000kVA and above. BSES was granted the right to supply power at voltages of 33 kV and lower. TPC provided BSES with a significant amount of power for retail selling.

TPC allegedly encroached on BSES' supply zone, according to a lawsuit filed by BSES in 2002. According to BSES, TPC's direct delivery of power to retail consumers with maximum demand <1000 kVA inside BSES's area of supply was in breach of its licence limits along with various electricity rules. TPC can deliver power to any customer, according to the MERC, which heard the case in July 2003. TPC, on the other hand, has been prohibited from supplying new connections below 1000 kVA in the authorised zone shared by both BSES and TPC, alleging a lack of an equal playing field between the two companies.

The Appellate Tribunal for Electricity heard separate appeals from both licensees against the order. The Appellate Tribunal dismissed both challenges in a judgement dated May 22, 2006, holding that the TPC was only allowed to

offer energy in bulk, not retail, to users, regardless of their demand, under the terms of its licence.

The APTEL ruling was appealed by TPC and others. Finally, on July 8, 2008, the Supreme Court upheld TPC claim that it was a universal provider in Mumbai, with the capacity to distribute power to any retail user in the city in addition to its bulk power supply authority to other licensees. The Supreme Court found that the introduction of wheeling goes opposing the claim that the lack of a distribution line prevents Tata Power Company from delivering energy in retail directly to consumers through AEML's (previously RInfra) common network. The Power Act of 2003 established the concept of wheeling, which allows distribution licensees who have still to complete their distribution line to distribute energy straight to retail customers for a fee in addition to the state-determined wheeling rates.

TPC was a Bulk Supply licensee until 2008 (Supreme Court Judgement), and only supplied bulk users (1000 kVA and above), such as BSES and BEST. Following the Supreme Court's decision, On October 15, 2009, MERC issued the following order, establishing a mechanism for facilitating consumer choice through the existing Distribution Licensee's distribution network, thereby providing a lower tariff to consumers in the region shared by TPC and RInfra (now AEML). The migration of 300 MW load and roughly 6 lacs consumers from Reliance Infra (now AEML) to Tata Power Company in Mumbai is believed to have occurred following in July 2008, the Supreme Court issued a ruling, and in September 2009, the MERC issued an order implementing parallel licencing. In the last ten years of Mumbai's parallel licencing regime, about 5.62 million users moved from RInfra-D (now AEML) to TPC, with domestic consumers accounting for 96 percent, commercial (3%) and industrial consumers (less than 1 percent). TPC's residential rates are competitive, which has resulted in a boom in consumer migration.

Given the conditions, a considerable number of customers, particularly high-value customers, exercised their right to choose their supplier and switched from RInfra (now AEML) to TPC in a relatively short period of time. This development has caused retail supply competition to emerge in retail supply in

the distribution license supply areas of RInfra-D (now AEML) and TPC-D (in and around Mumbai Suburbs & Mira Bhayander Municipal Corporation). This retail supply competition model of Mumbai leading to the following issues as detailed out below.

i. In case there is an already established/developed distribution network and multiple retail distribution suppliers are existing in one supply area, the existing consumers who are taking supply from the incumbent distribution licensee can exercise their choice of the supplier by using the same incumbent distribution licensee's network by another licensee and without laying its own network. This type of situation brings sufficient market pressure to the incumbent licensee to cut the inefficiencies built in the system. However, due to the conflict of interest involving the capital investment from RInfra (now AEML) has come down. Therefore, it is necessary to separate out the wire function and retail supply function from the present distribution license. While the provision of a number of distribution licensees in the same geographic area is perceived by many as cherry-picking by new entrants (selecting to supply to only high value paying/cross-subsidising consumers and without having any obligation to supply low-end consumers), others have criticized the requirement of multiple own distribution networks as wasteful and suggested the complete separation of the "Distribution Wire" supply function business, on the lines of the restructured electricity industry in many countries.

ii. Due to the large difference in the cost of supply of RInfra (now AEML) and TPC, large numbers of high-value consumers of RInfra (now AEML) migrated to TPC. This situation left RInfra (now AEML) to serve large numbers (22 lakhs) of small household subsidised consumers and also loss of the support of cross-subsidisation /cross-subsidising HT consumers (Rs 1000 Cr in total revenue requirement of Rs 6600 Cr in a year). When numerous licensees operate in a single area, difficulties such as substantial cross-subsidy built-in tariffs, which are historical, and vast differences in customer mix and cost of

supply are prominent issues. Therefore, to evolve the retail competition, it is necessary to evolve a suitable price framework for the sustainability of RSC.

iii. The present provision of the EA 2003 enables to create competition in the electricity distribution. The 6th provision to Section 14 of the EA, 2003, contemplates the circumstance of a parallel licensee. Under this clause, the SRC may provide a licence to two or more people for the distribution of power through their own system within the same region if certain criterias are met. Due to the expiry of the licence term of RInfra (now AEML) in the year 2011 and TPC in the year 2014, Maharashtra Electricity Regulatory Commission (MERC) undertook a proactive initiative of inviting participation in Mumbai Distribution by publishing Expression of Interest (EOI). However, mandatory provision of installing own distribution network by second licensee response to the EOI from second applicants was limited and hence experienced that it is a major hurdle for bringing new player/investor for creation of a competitive market in retail supply segment. Installation of electricity infrastructure is a time and resource-consuming activity and also requires land and the much difficult right of way for the installation of electrical equipment, wires/network in City of Mumbai/large mega cities, where there is underground network. It has been experienced that installation of the distribution network is being delayed due to the ROW problem and land acquisition issues. In the Metro cities like Mumbai which is the ideal place for the introduction of retail supply competition, it is very difficult to lay electricity Infrastructure. Also, laying of the parallel network will lead to duplication of assets, and may also render the assets of competition licensees stranded when consumers shift from one licensee to the other, unless provisions are made to enable consumers to use the assets of one license to avail supply of electricity from the other licensee.

iv. The regulatory framework for promoting retail competition in electricity distribution in Mumbai faces a number of legislative and practical problems, including network construction and tariffs.

v. Mumbai has been in the forefront of giving Indian consumers more options when it comes to retail electricity. However, as with any other bold action, there have been a number of regulatory and legal hurdles to overcome. The legal disputes in Mumbai between Reliance Infra-Distribution (now AEML) and Tata Power Company-Distribution highlight the importance of keeping distribution wire and retail supply separate to avoid a network operator's conflict of interest. Cross-subsidies must be reduced and gradually phased out because the IDL, burdened with a old tariff structure replete with cross-subsidies, will automatically resent the loss of high-paying (and cross-subsidizing) consumers to competitive retail providers.

vi. Simultaneously, the Mumbai example has raised some concerns about the parallel licensee regime. Because TPC-D was using RInfra-wires D's network, the organisation resembled open access than a parallel licensee regime, as the Appellate Tribunal for Electricity noted in its December 2012 verdict. Another APTEL decision from November 28, 2014, stated that distribution network duplication should be limited to locations where it will help improve the distribution system's reliability and in the event of new consumers. In all other area/conditions, regardless of whether the existing distribution system was built up by Reliance Infra-D or Tata Power Company-D, the existing distribution system should be used to provide supplies to the customers under the Changeover Protocol. However, because a parallel licencing regime requires each licensee to build in its own network, infrastructure repetition occurs in countries like India, increasing the financial burden on end users. However, such an APTEL did not apply to the BEST area since BEST, as a municipal government, is protected by open access regulations and is not required to allow open access to its distribution

wire. As a result, TPC needed to build its own distribution network to feed consumers in the BEST and TPC areas.

Given this, it appears that separating the wire and supply business before introduction of the competition in the retail segment is a solid method for expanding retail choice.

1.5.2 SPECIAL ECONOMIC ZONES OF MAHARASHTRA, GUJARAT AND KERALA:

Because these are greenfield areas with no existing distribution network, power distribution and supply within SEZ may demand a one-of-a-kind regulatory strategy. As a result, while the SEZ would be inside a distribution licensee's geographical supply area, it would not have an "incumbent distribution licensee" in the traditional sense. The MERC, GERC and KSERC thoroughly analysed and researched these concerns when issuing licences for the distribution of power within the SEZs in the States.

The regulation of electricity distribution in Special Economic Zones (SEZ) is new. Because these are greenfield areas with no existing distribution network, it is up to the regulators to decide if a developer applying for a distribution licence for supplying power inside the SEZ should be granted a 2nd licence (Discoms whose service area is within the SEZ are regarded as incumbent licensees), as in Maharashtra and Gujarat, or an special licence to supply, as in Kerala. It is important to note that only Maharashtra and Gujarat's regulatory decisions result in customers in the SEZ area having a retail choice. However, due to green field areas and the incumbent distribution licensee does not have any distribution network and consumers in these parallel licensees areas, it does not experience a parallel licensing regime.

1.6 PROPOSED AMENDMENTS OF ELECTRICITY ACT 2003

1.6.1 ELECTRICITY (AMENDMENT) BILL 2014:

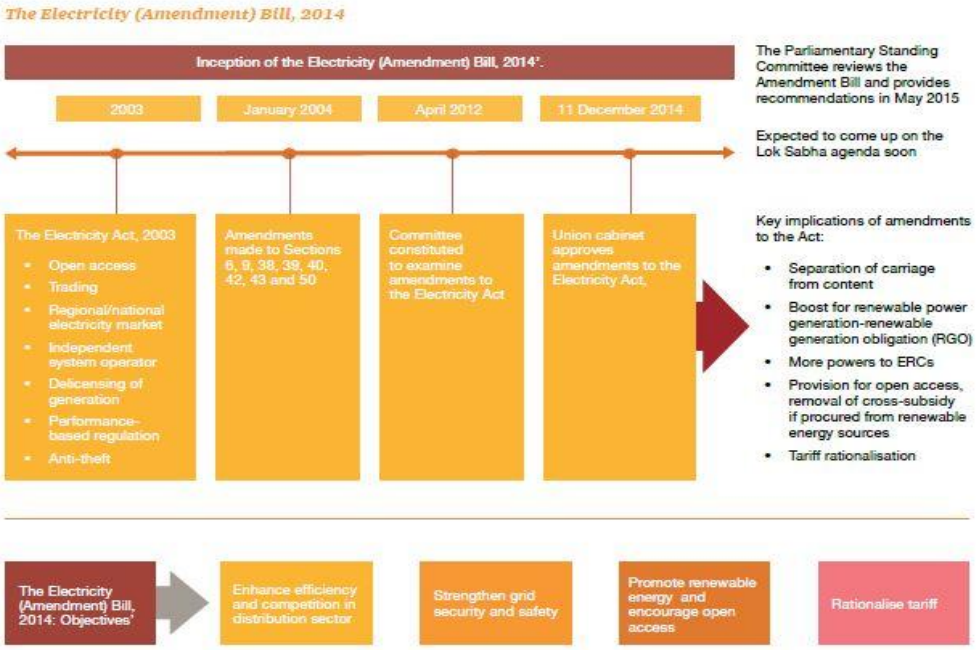
In the Lok Sabha, the Electricity (Amendment) Bill, 2014 was submitted on December 19, 2014, in order to improve competition and give retail

consumers more options. The Bill sought to decouple the carriage from the content business in the power sector by permitting several supply licensees in the content while maintaining control over the carriage (distribution network). As a result, the distribution network and the electricity supply will be separated.

The Draft Amendment Bill proposes some of the above-mentioned concerns deriving from separation of wires and supply (segregation of carriage and content) provisions. The segregation of carriage from the content business is one of the fundamental modifications, which allows for retail competition in the distribution industry. Consumers will be able to choose from a variety of suppliers in their area, and generators will no longer be reliant on a single buyer. The proposed amendment provision for carriage and content separation in distribution will consequent in a distinct DL (a State Government-controlled company) and several supply licensees in a given area. According to the amendment, an appropriate commission may also allow supply licences to two or more businesses in the same supply region, with one of the SLs having to be a company controlled by government. Each of these supply licences will likewise have a USO to provide power to all of the area's consumers, with the exception that such requirements on successive supply licensees may be imposed gradually based on the consumers' connected load. The consumer's option to purchase power from any of the SLs, along with incumbent supply licensees, relate to the requirement that, once a SL is selected, the consumer must stay with the distribution licensee for a minimum amount of time as stipulated. On reorganisation, an intermediate company will be formed to take over the relevant distribution licensees' current PPAs and procurement arrangements. State governments must devise a transfer scheme for the separation of content and carriage firms in order to carry this out. However, this must effectively address the supply licensee's handpicking of consumers, as well as clearly defining the supply licensee's area, defining the new entity's functions and responsibilities, ownership, treatment of existing power procurement commitments, tariffs and subsidies, resource transfer, technical and financial loss allocation, and so on. This is thought to be necessary to increase competition and efficiency in the electricity supply by allowing

multiple supply licensees to provide electricity to consumers in the same region, in addition to the consumer's ability to obtain electricity directly from generators such as CPPs and trading licensees.

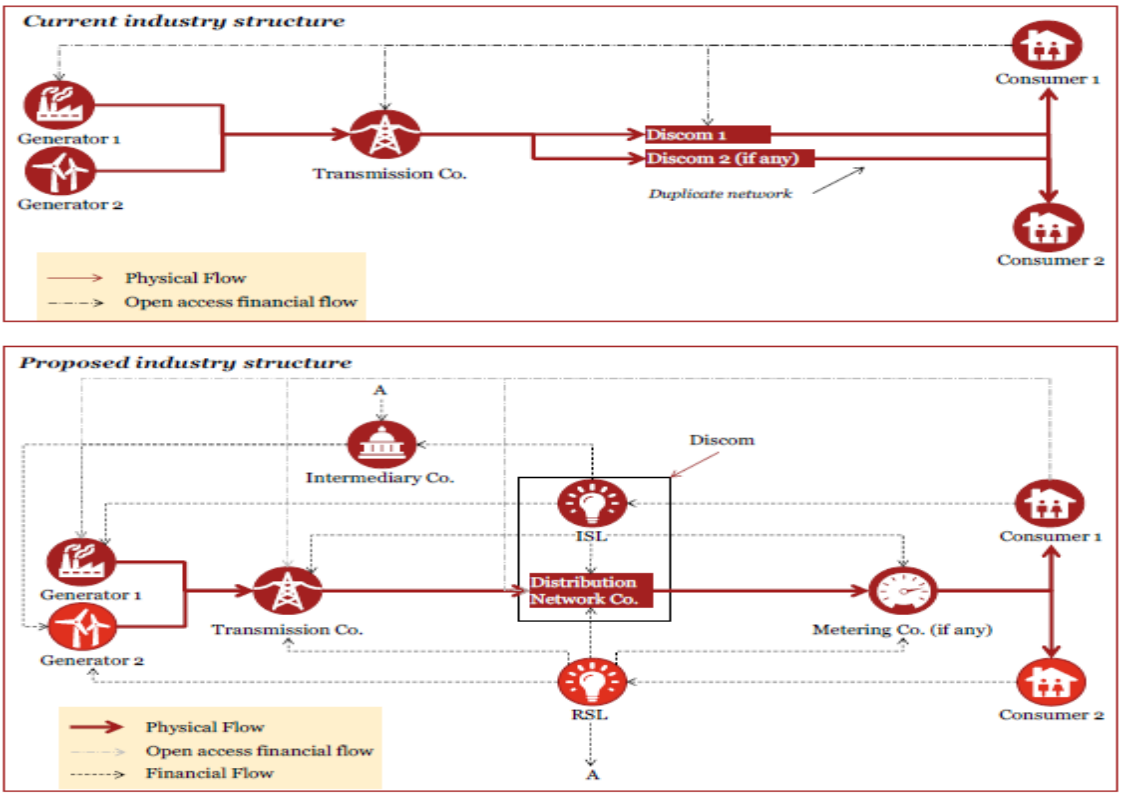
Figure 11: Key features of the Electricity (Amendment) Bill, 2014



Multiple supply licences for the supply business, as well as necessary provisions of one Government firm, are proposed in the Bill of 2014. The State Government, on the other hand, will be in charge of distribution. There will be a multiple distribution licensee as well as several supply licensees in areas where carriage and content are kept separate in distribution segments. According to the amendment, 2 or more players in the same supply region may be granted supply licences by an appropriate commission, with 1 of the supply licensees having to be a government-controlled company. All of these supply licencees will have a USO to provide power to all of the region's purchasers, with the exception of requirements on subsequent supply licensees may be enforced gradually based on the consumers' connected load. The consumer's ability to purchase power from any of the supply licensees, including incumbent supply licensees, is subject to the requirement that, once a SL is chosen, the consumer must stay with the distribution licensee for the specified amount of time. Following the reorganisation, an intermediate company will be formed to

take on the current PPAs and procurement arrangements of the relevant DLs. In order to carry this out, state governments must devise a transfer plan for the separation of content and carriage firms.

Figure 12: The proposed industry structure by the Electricity (Amendment) Bill, 2014



Issues with the proposed Electricity (Amendment) Bill:

Some of the anticipated difficulties with the proposed amendment's carriage and content separation are:

a) When transferring supply or distribution functions to a new company, ambiguity in the transferee's ownership provisions can result in state government discretion during the transfer.

b) To carry out this, state governments must devise a transfer plan for the separation of carriage and content enterprises. Along with this, it's critical to address the supplier licensee's cherry-picking of customers, clearly identifying entities' tasks and responsibilities, ownership, and so on.

c) Uncertainty about the incumbent licensees. Supply licensees cherry-pick high-value customers.

d) Financial impact on utilities owned by state; it is believed that bringing in new supply licensees would have a negative impact on current state and private utilities.

e) The proposed modification should ensure Universal Service Obligation and bring parity in terms of service costs; fundamentally, the cross-subsidy must be resolved, and a surcharge on the supply business must be imposed.

f) Unbundling of generation and distribution has taken place now and yet to become mature and yet to provide 24 x 7 supply.

g) States has shown concerns on segregation of carriage and content as this amendment will be unworkable due to multiple supply licensees and surplus power situation requirements.

Indian Model suggestive framework

Because the rollout strategy for carriage and content separation was not stated in the Electricity (Amendment) Bill, 2014, the MoP urged the FOR to develop a sample transfer scheme to convey the needed clearance on the challenges associated with deploying the framework. This would make it easier for the Ministry to propose a "Model Scheme" for the States to use. FOR provided a transfer plan for the separating carriage and content, as required by the Electricity (Amendment) Bill, 2014 in its July 2015 report for adoption by various Indian states. In its report, FOR proposes three-stage execution methods for the roll-out plan to ensure a easy transition of the electricity market into RSC. Several activities would have to be completed in three stages to introduce competition in the retail selling of energy, and several challenges could develop while completing these tasks. It generated alternate rollout plans depending on losses (high or low) and power availability to formulate various techniques to overcome each of these concerns (surplus or deficit). Four scenarios of rollouts are proposed for adoption in various States based on present levels of losses, power availability, and power procurement cost.

Although the Electricity (Amendment) Bill, 2014 and model transfer scheme and rollout plan has been formulated strategically, many of the issues need more clarification for preparation of Transfer Plan and rollout plan of introducing retail electricity supply competition through reorganising existing Discoms by States depending on preparedness and adequacy of infrastructure for extending competition at the retail supply level. Gujarat, Maharashtra, & Delhi has set some of the best examples for promoting competition in the distribution sector to a certain extent with more private sector participation. The major eyecatcher is the state of Maharashtra which has had a very unique situation of the retail electricity supply competition since 2009 under the present EA,2003.

The amendment of the Electricity Bill which segregates distribution and supply into separate entities require phasing of revenue deficit before the commencement of retail competition in the distribution of electricity. Also, retail competition requires the existence of multiple private players present in the sector and the availability of wholesale market presence.

1.6.2 DRAFT ELECTRICITY (AMENDMENT) BILL 2021:

The Draft Bill 2021 has proposed the following changes with respect to Distribution Licensee with the objective to provide Choice to the consumer:

a) No Licence is required for undertaking Distribution of Electricity. It only requires registration with the appropriate Commission.

b) Any Company fulfilling eligibility criteria to be specified by the Central Government for operating as a Distribution Company can register itself with the appropriate Commission.

c) For supplying electricity in a State, registration can be undertaken with the concerned SERC and for supplying electricity in more than one state, a company can register with CERC.

d) Multiple Distribution company can supply within the same area. A minimum supply area shall be municipal council / municipal corporation/revenue district.

e) Distribution company can supply electricity through own distribution network or distribution network of other Distribution company. It is mandatory on the distribution company to provide non-discriminatory access of its distribution network to other distribution company on payment of wheeling charges.

f) Existing PPA of incumbent distribution company shall be shared with new distribution company as per arrangement specified by the Commission in accordance with rules, if any, prescribed by the Central Government. Such sharing of PPA would be reviewed periodically by the Commission.

g) Subsequent to sharing of existing PPA, the distribution company can tie up to additional PPA which will not be shared with other distribution companies.

h) In context of various distribution licencees in the same supply area, the Commission has to fix only the ceiling tariff. In that ceiling tariff, cross-subsidy needs to be stipulated separately.

i) USO fund will be created and maintained by the Government Company. Such funds can be used for fulfilling the cross-subsidy requirement of any distribution company in the same or other area of supply.

j) Registration of distribution company shall be valid till not cancelled. Condition of Supply notified by the SERC shall be a condition of registration. The SERC can amend or cancel the registration of the distribution company in case of default.

k) All distribution companies would have USO in their respective area of supply. Provision of OA is continued for consumers to get supply from generator or trading licensee or captive unit.

Thus, draft Bill 2021 has prescribed the following responsibilities on various stakeholders:

a. Central Government:

- Rules prescribing eligibility criteria of a company to qualify as a distribution company.
- Principle of sharing of PPA (optional)

b. CERC:

- Registration of company fulfilling eligibility criteria as a distribution company for the electricity supply in more than one State.

c. State Government:

- Nil

d. SERC:

- Registration of company fulfilling eligibility criteria as a distribution company for the electricity supply in the State.
- Regulations on Supply Conditions which shall be a condition of registration.
- Amend or cancel the registration of the distribution company in default.
- Sharing of existing PPA amongst multiple distribution companies
- Fixing of only ceiling tariff
- Creation of USO Fund and principle of the utilisation of such fund

1.7 BUSINESS PROBLEM:

After the enactment of the Electricity Act 2003, the Indian power sector has provided a choice to large consumers (1 MW and above requirement) through transmission and distribution system open access, which created competition in the generation segment and helped in creating a wholesale market. However, there are large numbers of consumers (1 MW and above requirement) connected to the Distribution system, who are yet to exercise its choice of availing open access to distribution and sourcing their requirement directly from generators. In a marketing environment where a single distribution company handles both wire and retail business, the distribution company is

concerned about losing its retail section to competitors due to a conflict of interest.

Nonetheless, the distribution industry is afflicted by a slew of problems that are wreaking havoc on its finances. It is facing a watershed moment today, as aggregate losses rose from Rs 11,699 crores to Rs 71,271 crores, resulting in increased borrowing from Rs 1, 58,003 crores to Rs 5, 54,922 crores, excluding regulatory assets yet to be forwarded on to consumers in the form of a tariff increase. India's distribution companies are currently cash-strapped, making it difficult for them to invest in improving distribution infrastructure. As a result, private engagement in the electricity distribution industry is still in its early stages, and power distribution competition is quite restricted.

The EA of 2003 created the groundwork for creating retail competition by allowing multiple/parallel licensees to operate in the same area, each with their own distribution network. The primary need of a parallel licensee system is that each licensee put money in their own distribution network, which results in infrastructure repetition in a nation like India, increasing the financial load on end customers and remaining unimplemented. The exercise of inviting expressions of interest for electricity distribution in Mumbai, Maharashtra, has demonstrated that the mandatory requirement for the second licensee to have its own distribution network has been a significant barrier in attracting new applicants in the distribution of electricity.

Due to an Apex Court decision, Mumbai has been at the front of providing retail energy users in India with an alternative by utilising cables from a different distribution licensee. However, as with any other bold action, there have been a number of regulatory and legal hurdles to overcome. The court disputes in Mumbai between Reliance Infra-D (now AEML) and Tata Power Company-D highlight the importance of keeping distribution wire and retail supply businesses separate to avoid a distribution network operator's conflict of interest. Due to the large difference in the cost of supply of RInfra and TPC, large numbers of high-value consumers of RInfra migrated to TPC. RInfra was left with a high number of small household subsidised consumers (22 lakhs) as well as the loss of cross-subsidisation/cross-subsidising HT users as a result of

this circumstance (Rs 1100 Cr in total revenue requirement of Rs 6000 Cr in a year). When numerous licensees operate in a single area, difficulties such as substantial cross-subsidy built-in tariffs, which are historical, and vast differences in customer mix and cost of supply are prominent issues. Therefore, the present principal framework adopted for tariff determination of distribution companies in parallel licensing regime disincentives the objective of retail supply competition. In light of this, it appears that separating the wire and supply businesses and then introducing competition in the retail segment is a good strategy to increase retail choice. Countries all across the world are recognising the need of regulated, well-functioning markets in delivering user choice and high-quality service through provider competition as markets evolve. Such markets operate under a set of rules and are regulated by agencies that ensure that the competitive framework can achieve consumer choice, operational and financial efficiency, as well as policy goals like universal access.

1.8 BUSINESS PROBLEM STATEMENT:

Owing to the non-separation of 'carriage and content' in the distribution sector restricted chance to retail consumers for selecting their supplier for and hence the competition in the retail sale of electricity has not been taking place in India as envisaged in other developed countries. Thus, it is leading to opportunity losses. However, under the current policy framework, only Mumbai and its surrounding areas in Maharashtra State have been at the forefront of providing retail electricity consumers with options. and hence the competition in the distribution has been initiated to some extent. This experience has provided a way out for the implementation of retail electricity supply competition in other cities of Maharashtra as well that can fetch benefits to all stakeholders. This experience of Mumbai has also shown policy constraints and gaps for competition in Distribution under the present policy framework. However, in the absence of any research document that elaborates Mumbai's retail supply competition experience, it is quite difficult to extend it to other cities of Maharashtra.

This situation is leading to opportunity loss to the consumers of an about estimated average of 15% reduction in retail tariff (Average Rs 10,000 Annual Revenue Requirement of Mumbai Suburban) which amount to an estimated average of Rs 1500 Crore opportunity loss to consumers of other cities of Maharashtra in a year by providing choice to retail consumers. The corrective measure of separating wires and supply in the distribution sector of Maharashtra would also help to reduce electricity distribution business financial losses for FY 2015-16 which are at Rs 14978.7 crore impacting more borrowing of Maharashtra's Discoms to the tune of Rs 17980.57 crore.

1.9 MOTIVATION FOR STUDY

The present legal framework (i.e., EA 2003) provides for competition in power sector through OA or multiple licensees supplying through their own distribution networks. While the provision of multiple licensees in the same area is perceived by many as cherry-picking by new entrants others have criticized the requirement of multiple own distribution networks as wasteful and suggested the complete separation of the supply function from the "Distribution Wire" business, on the lines of the restructured electricity industry in many developed countries. The Mumbai experience of promoting choice to retail consumers with a parallel network created challenges for the development of the network and reduction of cross-subsidies in the tariff. This framework is expected to provide prominent research area in the economics of distribution system like policy instruments for separating the present dual role of distribution licence function into separate wire and retail supply, mandatory provision of installing own distribution by second distribution licensee and policy instruments for the handling of large cross-subsidy exist in the supply area and vast difference of consumer mix and cost of supply of licensees when multiple retail supply licensee exist. This framework would also allow for intriguing research into their possible implementation in futuristic applications. Because of my diverse academic and professional background, I am confident that I can contribute to these research initiatives in a meaningful way.

CHAPTER 2: LITERATURE REVIEW

The research addressed the key words to identify the research themes in order to figure out the different works in this area in order to jump at known and unknown facets of non-segregation of 'carriage and content' in the distribution sector, as a result of which competition in the retail supply of electricity has not taken place in India as envisaged in the Electricity Act. Research articles, reports, and orders of electricity regulatory commissions, as well as judgments of the APTEL and the Supreme Court, were used to conduct the literature review.

The following table depicts the details of the same:

Key Words Used	**Journals/Reports/Orders Explored**	**Databases**
1. Reorganisation of Indian Power Sector 2. Indian Power Sector Review 3. Parallel Licensing operation in Mumbai 4. International Experience in the retail competition 5. Impact of electricity retail competition 6. Issues of Competition in the power sector 7. Economics theory for evolving electricity retail competition 8. Efficient market theory and natural monopoly	1. Energy Policy 2. Energetica 3. PTC Chronicle 4. International Energy Agency 5. RAND Journal of Economics 6. Report of Planning Commission 7. Report of World Bank 8. Report of Forum of Regulators 9. Orders of Regulatory Commission	1. Elsevier 2. Google-scholar 3. Jstor 4. Planning Commission 5. MOP, GoI 6. FOR 7. Maharashtra Electricity Regulatory Commission 8. Appellate Tribunal for Electricity

Key Words Used	Journals/Reports/Orders Explored	Databases
	10. Judgements of Appellate Tribunal for Electricity 11. Report of Ministry of Power, Govt. of India	

A total of 125 papers were reviewed.

2.1 THEORETICAL BACKGROUND

Supplying the retail market, the existing distribution component of the Indian power industry is examined in the light of efficient market theory for competition in electricity by isolating wiring and supply operations. A competitive market where numerous players strive for a significant number of customers' desires and requirements. Long-run costs are reduced as a result of competition, and suppliers are only paid enough to cover these expenses. Competition leads to efficiency, according to the core result of economics.

It is assumed to be efficient to allocate resources in such a way that the sum of consumer and producer surpluses is maximised. Consumer surplus is the difference between what buyers are willing to pay for a good and what they actually pay for it, and it indicates the value consumers gain from participating in a market. Producer surplus is the difference between the amount sellers receive for their goods and their cost of production, and it indicates the advantage sellers receive from participating in a market. (G. N. Mankiw, 2007).

When supply and demand are balanced, the overall surpluses of consumers and producers are maximised. That is the market's invisible hand, which directs buyers and sellers to disperse resources efficiently. Market

failures, such as market power or externalities, prevent markets from efficiently distributing resources. 2007 (G. N. Mankiw).

Pareto efficiency occurs when no realistic reorganisation of production or distribution can make someone better off without leaving someone else worse off (or simply efficiency). Under allocative efficiency, the happiness or utility of one individual can only be increased by reducing the utility of another. (2010, A. P. Samuelson).

Competition is a cost-cutting and quality-improvement strategy. It also entails an open market in which resource shortages are quickly resolved by the most efficient allocation of resources. It promotes economic and political democracy while also accelerating growth and development. Consumers are empowered by competition, and it is the best guarantee of consumer protection.

Electricity distribution has traditionally been viewed as a natural monopoly. Few authors have looked into whether power distributors are natural monopolies, as is commonly claimed (Gunn and Sharp, 1999), or whether their underlying cost structures imply a natural monopoly or not (Salvnes and Tjotta, 1998). These research's conclude that distributors are most likely natural monopolies with long-term viability. However, in fact, these studies are equivocal, and a "market" for distribution activities appears to have emerged.

Paul Joskow [2008] analysed that the theory and practise of natural monopoly rules have become less essential over time since a smaller percentage of the economy is affected by these regulations due to competition in so many industries. The fundamental premise of effective pricing is that the regulator is fully informed. Regulators, on the other hand, are ill-informed, and regulated businesses have a better understanding of the cost and demand pressures they confront. This knowledge advantage is used to the benefit of the regulated firm. Adverse selection and moral hazard issues arise as a result of this circumstance, which have been incorporated into the present theory of incentive regulation. Hence it is necessary to have a central institutional questions/framework to resolve this confrontation.

S. Littlechild established the feasibility of applying it in the energy distribution industry in 2001, so demonstrating the possibility of introducing some form of competition in a sector that was previously regarded a natural

monopoly. According to Littlechild (2001), privatisation of the energy business resolved competition in power generation and retail supply, as well as access to electricity transmission and distribution networks. However, "whether the remaining percentage may be exposed more directly to the competitive market" could be questioned, according to Littlechild (2001). In the case of the electrical distribution sector, this is the case.

Competition was first introduced on a global scale in the upstream portions of the power industry, which in this case is generation. In the pre-reform era, there were typically few state-owned electricity boards (bundled businesses) that were unbundled into distinct generation, transmission, and distribution corporations. In such cases, the competitive sector separated out from the monopoly sector i.e., the generation sector was opened for privatization to promote competition in the generation segment. The distribution and transmission of electricity remained controlled monopolies. Despite the fact that the distribution business was kept as a monopoly, certain parts of the distribution business were considered as having room for competition. The distribution industry is divided into two categories: supply and network distribution. The separation of the cables business and the supply business, as well as the introduction of competition in the retail segment, have thus been the focus of sector reform initiatives at the retail end.

As a result, generating and retail supply have become potentially competitive areas, whereas T&D have become natural monopolies. Because of inherent difficulties with the monopoly character of the distribution company, regulators in various nations have only permitted retail competition to begin when the distribution business has been separated into supply and wires businesses.

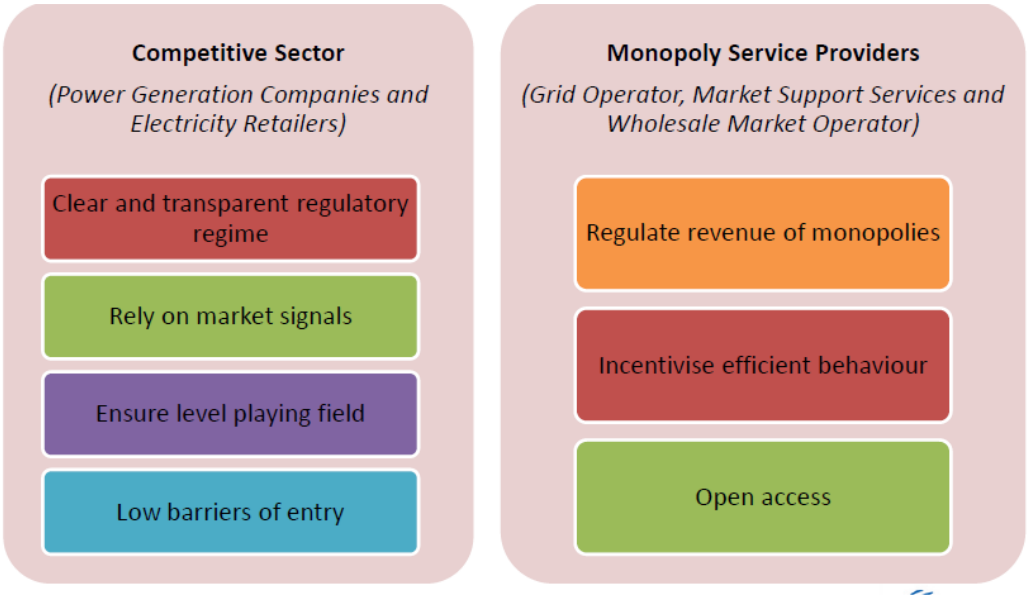


Figure 13: Structure of Competitive Vs Monopoly

The transition to full customer choice entails not just enhanced efficiency in resource allocation, but also an income redistribution process that may have unforeseeable consequences for both consumers and producers. That is why, in most cases, a transition period is predicated on a gradual market opening, beginning with the largest consumers and gradually lowering eligibility thresholds until full consumer choice is achieved after a few years.

It would be required to separate competitive portions of the industry from non-competitive natural monopolies in order to allow for fair competition. As a result, the EA 2003 restricts transmission firms from trading or producing power. To allow competing suppliers to compete on an equal footing, the wires function, which includes the conveyance of electricity, would need to be segregated functionally from the supply company at the distribution level.

2.2 THEME BASED LITERATURE REVIEW:

Because of the subject's intricacy, the literature study identified the following primary themes, under which certain essential sub-themes arose during the review. The findings and inferences from the literature review will be detailed in this part on major themes and subthemes as follows.

1) Implementation status of power sector reforms in India
2) Electricity Retail Supply Competition: Indian policy efforts
3) Electricity Retail Supply Competition: Indian experience

4) Electricity Retail Supply Competition: International experience

2.2.1 JUSTIFICATION ON IDENTIFIED THEMES:

1. **Theme 1**: The implementation status of Indian power sector reforms will provide a status of initiatives undertaken to achieve desired objectives and to what extent it has achieved leading to financially viable distribution sector, competitive and participative for the private sector.
2. **Theme 2**: Indian policy efforts of introducing retail supply competition in the distribution sector will suggest a model framework segregating contents and carrier of distributions sector which need to be rollout by States. To study the States distribution sector based on which the rollout suitable for State can be formulated.
3. **Theme 3**: Indian experience of parallel licensing in the distribution sector of Mumbai provided a choice to Consumers. To study the aspect to what extent the competition in retail supply is achieved and the efficiency of distribution sector is improved.
4. **Theme 4**: International experience of retail supply competition will guide in formulating rollout plan to be prepared for introducing retail, supply competition in distribution sector through segregating content and carrier of Discoms.

2.2.2 THEME WISE LITERATURE REVIEW:

Theme-wise detailed structured literature is as below:

Theme1: Implementation status of power sector reforms in India

EA, 2003, according to Gajendra Haldea (2004), permits competitive producers to sell to various consumers, which not only improves quality and lowers costs, but also helps to attract private investment in power generation, so alleviating the continuous electricity crisis. Competition is the strongest guarantee for consumer welfare, and it must be fully embraced by law and public policy. It has been proven beyond a shadow of a doubt in industrialized economies, as well as in certain developing economies, that competition in the generation and delivery of energy leads to increased efficiency and lower tariffs. The US, Australia, New Zealand, and European Union members are among the

developed countries. Several Latin American economies, for example, have seen similar gains, including large reductions in Transmission and Distribution (T&D) losses. It's worth noting that in more than a decade of worldwide experience, not a single country that has implemented competition has gone backwards.

The EA2003 comprises two main components for promoting competition in the power sector, according to Sidharth Sinha (2005): open access and many distribution licensees in the same area. There is a cross-subsidy surcharge for open access, however, to reimburse the incumbent distribution licensee for the loss of cross-subsidy. New distribution licensees may be required to have a appropriate combination of cross-subsidizing and subsidised consumers to combat 'cream skimming.' These limits will reduce the competitive impact of these policies because cross-subsidization is predicted to be difficult to eliminate, particularly for agricultural and rural clients. There are two stages to introducing competition in the power business. To begin, agriculture and rural supplies should be separated physically and organizationally. Second, tariff cross-subsidies for urban domestic consumers should be taken out in favour of subsidised network expansion to high-cost places and 'lifeline' rates for low-income clients. A sector-specific 'universal charge,' similar to how telecoms is paid, might be used to fund this.

Anoop Singh (2010) presents an overview of the state of competition in the electricity sector's main segments. It also examines the state of several State Electricity Regulatory Commissions staged open access programmes, as well as their influence on competition. The article identifies a number of unresolved difficulties for wholesale and retail competition, as well as a strategy for dealing with them. These include gasoline market liberalisation, market monitoring, retail tariff unbundling, universal service requirement, SOLR, and demand response.

Planning Commission (2014) observed that India's progress, inclusivity, job creation, and aspirations for middle-income country status have all been hampered by an inefficient, loss-making distribution sector and an insufficient and unreliable supply. According to the literature, generation and transmission inefficiencies are passed on to distribution businesses at cost plus, which have

no alternative but to acquire power from state producing companies via state transmission lines for distribution. Insufficiency of tariff is not only a significant reason for mounting losses but also increasing losses of distribution is equally important for the financial misfortunes of distribution companies. The country's Discoms' accumulated losses have raised from Rs 11,699 cr to Rs 71,271 cr, resulting in increased borrowing from Rs 1,58,003 cr to Rs 5,54,922 cr. Discoms in India are frequently cash-strapped, which impedes investment in distribution infrastructure and limits their ability to purchase power, resulting in power shortages. According to the literature, one convincing reform that may be implemented in this circumstance is the separation of the Distribution (Wire) company from Retail Supply, as well as the progressive opening up of the Retail Supply industry to competition. By creating the distribution industry an independent, regulated enterprise with guaranteed returns, the separation of the two activities would incentivize investment in distribution networks.

Planning Commission (2012) analysed that Given the importance of the electricity sector to the economy, the scarcity of budgetary resources, and the poor financial condition of the distribution corporations, it is critical to re-establish order in the power distribution sector. To attract investment and exploit the efficiencies of the private sector, private engagement in the electricity distribution industry should be pursued. The Task Force endorsed both PPP and Franchisee models, leaving it up to the State to decide which model is most suited to their needs.

Sheoli Pargal and Sudeshna Ghosh Banerjee (World Bank Report,2014) analysed that with the enactment of the EA,2003, various measures in power generation and transmission segments through competitive bidding participation have been initiated. The competitive bidding procedures for distribution businesses' electricity buying have enabled price discovery through a market-based method. This assured that private generation businesses had the same platform and access to the market as public enterprises, but most crucially, that pricing is competitive, benefiting both customers and the market. Distribution businesses and open access users (1MW and above loads) now have the option of purchasing power from any generating company in the country that offers competitive prices. Competition in electricity generation and

transmission has resulted from initiatives taken by the Indian government and several states. However, in India's energy distribution sector, the spirit of competition and private engagement is still in its early stages, and competition in power distribution has been quite restricted.

Sheoli Pargal and Sudeshna Ghosh Banerjee (World Bank Report, 2014) identifies the primary issue for increasing performance in the short and medium term in the Indian distribution sector, which includes numerous sources of weakness. Poor power sector performance stems from inefficiencies in distribution and a lack of accountability, thus addressing these issues would assist improve service delivery and other performance measures, put the sector on a financially viable path, and ensure that electricity is no longer a growth bottleneck. The separation of carriage and content, which will bring retail competition to electricity markets, is likely to yield significant benefits. The idea is straightforward: many retail suppliers will compete for customers based on reliability and service, lowering prices. Because it is responsible for AT&C losses, the distribution network (wires business) will be upgraded. The case of India is examined first, followed by that of New Zealand, the US, and then Europe. Finally, the lessons learned from these multinational experiences are examined. Given India's limited institutional capacity to provide the necessary consumer support, state-level regulatory capacity that is still developing, and developments in distributed generation, it is likely that India would be wiser to begin with pilot projects for retail competition rather than a full-scale rollout at this time.

Theme2: Electricity Retail Supply Competition: Indian policy efforts

According to the Supreme Court (8 July 2008), the concept of competition is contained in the founding document to the 2003 Act and penetrates the same in its numerous clauses. One of the purposes of the 2003 Act is to provide consumers the choice of choosing which distribution licensee they wish to acquire their electrical energy supply from. It was decided that Tata Power has the right to supply electrical energy directly to consumers with a maximum demand of 1000 KVA, in addition to its right to supply energy in bulk to other licensees for their own purposes, within its area of supply as

defined in its licences, and subject to the constraints set forth in Sub-Clause (I) of Clause 5 regarding factories and railways. Furthermore, until Tata Power builds its own distribution line to provide power directly to retail customers, it is permitted to wheel/use the wire of other distribution licensees for a price in addition to the State Commission's wheeling charges.

In March 2009, the Forum of Regulators looked into one issue of developing a proper distribution margin model (segregation of wire and supply). Electricity distribution and supply is typically a monopoly business in the country, according to FOR. Regulation is meant to mimic a competitive environment in the absence of true competition. In most states in the country, competition through Open Access and/or Parallel Licensees has yet to take hold. It can assist licensees and open access users in making money and developing a long-term business plan to enable them to compete in a competitive market.

The Forum of Regulators (July 2013) discusses various lessons learned from international electricity retail supply competition experiences (both successful models such as the UK and Victoria and reverberating failures such as California) and providing suggestions on the structure, scope, and timeline of equal reforms for India, taking into account the realities on the ground of the Indian power sector and large Discom losses, as well as major regulatory assets which have not yet been passed. This study also attempts to highlight a number of concerns related to retail supply competition that require a much wider debate with all interested parties in order to create the right kind of atmosphere for retail energy sector reforms to take place. Finally, the goal of this study is to identify certain potential risks that could jeopardise the effectiveness of the proposed reforms. All of these and other risk factors must be well recognised, assessed, and handled before competition in the retail energy supply market in India can be formed.

The Ministry of Power suggested revisions to various areas of the Electricity Act, 2003 in October 2013 and presented the Electricity (Amendment) Bill, 2014 to Parliaments. The Electricity Act of 2003, allows for multiple licensee with parallel networks to introduce competition in electricity distribution. However, global experience with introducing electricity retail supply competition shows that, rather than parallel duplicate networks, multiple

suppliers are allowed to supply through a single network, as duplicating the existing distribution network is not economically feasible due to sunk costs and the scale of economies gained from network operation. Separating supply from distribution wire company becomes critical in this situation. The Bill intended to separate the carriage (distribution sector/network) from the content (electricity supply business) in the power sector by allowing various supply licensees in the content and keeping the carriage (distribution network) controlled. This means that the distribution network and the work of electricity supply will be separated. Until now, this has been done by a single entity, State Discoms. It offered many supply licences for the supply business, as well as one Government company's obligatory provisions. The State Government, on the other hand, will be in charge of distribution. In areas where carriage and content are separated in distribution segments, there will be a separate distribution licensee and several supply licensees. The Bill of 2014 introduces the concept of forming a 'Intermediary Company' to allocate current power purchase agreements (PPA). The major goal of this business is to take over the current Discoms' existing PPAs and power procurement contracts and distribute them among several retail supply companies. It also allows the Central Government to specify the Intermediary Companies' roles and obligations. The IC may be given additional responsibilities, such as handling Cross Subsidy, DMO/DSO, Universal Charge Fund collection, or regulatory asset amortisation, depending on the roll-out plan finalised by state and federal governments. State governments must devise a transfer plan for the separation of content and carriage firms in order to carry this out.

Anil Kumar (December 2014) discusses current power sector challenges faced by India. Why the separation of carriage & content is important. The advantages of its implementation have been discussed and the present provisions in the EA 2003 create the roadblocks for open access in India.

Rajib Kumar Mishra (March,2015) states that the reform process has been going on for more than a decade, with the goal of increasing competition and growth; yet the distribution sector remains a state-owned incumbent utility. New reforms and programmes, such as distribution franchises and smart grids, have been adopted with the goal of improving the performance of distribution

utilities, however these measures do not promote competition in the distribution sector. Separation of wires and supply business of Distribution Licensees is addressed in the modification to the Electricity Act 2003, which envisions competition in the distribution industry. A provision like this gives the retail customer the option of selecting an electricity supplier from a pool of competitors. In this area, the competition will be forced to improve customer service and handle the challenge of lowering Aggregate Technical& Commercial loss through improved billing, collection, and other commercial processes. The Author has quoted the situation of Mumbai parallel licensing which provided a choice to retail consumers. As a result, at a time when power distribution is the weakest link in the Indian power sector and most utilities are in financial trouble, a convincing reform separating the wire and retail businesses should be implemented. The article analyses the Forum of Regulator's (FOR) retail competition report, 2013 and the Electricity Amendment Bill, 2014. The retail supply model that could be adopted in the context of the Indian power sector should include preliminary exercises such as separating network and supply business with ownership separation carried out stage of evolution, allowing multiple retail supply licences, targeting consumers segment-wise beginning with industrial consumers (that 1 MW and above), operationalizing OA, and conciseness in responsibilities of stakeholders enabling the reform/process. It further recommends that the FOR-report's approach for enacting the proposed amendment be implemented.

After consultation with stakeholders, the Standing Committee on Energy, Ministry of Power (May 2015) suggested that the Amendment Bill be corrected in terms of power generation, transmission, separation of transmission and distribution, and the regulatory structure. Separation of commercial losses, such as theft, correction/leakages, and fraud, requires more attention. In the regulatory system, there should be more transparency, affectivity, and accountability. In phases, conveyance and content will be separated. Efficiency in energy use, Power that is both clean and green Choice of supplier for the consumer and a reasonable tariff policy. In its Report, views of various State Governments stated are elaborated as under.

1. States have shown concerns on segregation of carriage and content as this amendment will be unworkable due to multiple supply licensees and surplus power situations.

2. Separation of carriage and content is a welcome step but not an immediate requirement due to shortage of supply and infrastructure setup and Discoms are yet to provide 24 x 7 power supply. This is to be seen before going ahead on separation of carriage and content.

3. While segregating conveyance and content is a forward-thinking strategy, it will be ineffective until an equal playing field is established. Its implementation on the ground will be difficult. This will benefit large industrial and commercial consumers but common consumers will suffer. This needs to be implemented with proper ground work which will benefit all consumers. Cheery picking by new supply licensee should be avoided.

4. Unbundling of generation and distribution has taken place now and is yet to become mature. Further unbundling will impact costs on consumers. Electricity being a concurrent subject it should be done with the desire of the State and should not binding/mandatory on the State.

5. The implementation should be done in stages. In the first phase, the current distribution company will be divided into distribution and retail, and the model will be tested for four to five years before allowing private players to enter the retail market, depending on the results.

6. The proposed modification should secure USO and introduce cost-of-service parity, basically removing cross-subsidies and imposing some form of tax on the supply firm.

7. It would necessitate a huge upgrade in metering infrastructure.

8. The consumer metre is the point of separation between the distribution and supply licensees in the proposed amendment. This would result in a large number of lawsuits and disagreements, which would be overwhelming. The conflicts will be so severe that most state

governments will be forced to abandon the project even in its early phases. As a result, it's suggested that the distribution transformer start at 33/11 kV or even lower than 11/LT. Things will be quite simple if that becomes the segregation point between the distribution licensee and the supply licensee.

9. The role and duties of Wire and Supply should be clearly defined.

10. The separation of carriage and content is intended to boost content industry competition.

The Forum of Regulators developed a model transfer scheme for the separation of carriage and content, as envisioned in the Electricity (Amendment) Bill, 2014, for Indian states to adopt in July 2015. It has proposed three-stage implementation processes to ensure a smooth transition of the electrical market into retail supply competition (Functional Segregation of Discoms, Preparation for Competition, and Onset of Competition). Various tasks would have to be completed in three stages in order to introduce competition in the retail sale of energy, as well as several challenges that may occur during the implementation of these tasks and possible approaches to resolving each of these issues. It has created alternate roll-out plans based on power availability and losses (high or low) (surplus or deficit). Four scenarios of rollouts are proposed for adoption in various States based on present levels of losses, availability of power, and cost of power procurement.

Akhil Joseph (August,2015) discusses that Retail competition in the electricity sector can enable a completely competitive power distribution model, which can be made more successful when combined with smart grid technology like AMI. It is critical that the development of smart grids and the deployment of retail competitiveness take place in lockstep. It discusses about the smart grid implementation in India by analysing the current framework made, advanced metering technology, implementation of solar rooftop plants, the requirement of the policies in future and integration of the smart grid programme with the retail supply market which was analysed based on the draft Electricity

Amendment Bill-2014. Also, some of the issues related to retail competition with respect to consumer interest have been highlighted.

Theme 3: Electricity Retail Supply Competition: Indian experience

TPC was prohibited from issuing new connections to any client with an energy demand of less than 1000 KVA by an order issued by the Maharashtra Electricity Regulatory Commission on July 3, 2003. (Maximum demand). BSES (formerly RInfra) and TPC, on the other hand, is free to approach the Commission under section 42(4) of the Electricity Act, 2003, if they want to deliver energy to any consumer to whom they have no responsibility to supply even before the aforementioned process is completed.

The decision of the Appellate Tribunal for Electricity (22nd May,2006) Tata Power has been denied permission to distribute electricity in retail to customers in the area where REL (now RInfra) has been doing so, as Tata Power only has permits to deliver electricity in bulk to licensees.

MERC's Order (22nd July, 2009) clarifies that Tariff Orders issued for 2009-10 in respect of TPC and RInfra shows saving in electricity bill (Table indicated) on switching from RInfra to TPC. Utilities were directed to not only make it easy for consumers to exercise their option, but also to facilitate it proactively by allowing other distribution licensees to use their distribution network to fulfil the Supreme Court's (see above) judgement in letter and spirit.

The Maharashtra Electricity Regulatory Commission's Order (15th October, 2009) established the mechanism for distributing power to consumers in the shared area of RInfra-license D's utilising each other's existing distribution network. This has operationalized the parallel distribution license operations to facilitate the choice of retail consumers and promoting retail competition in the distribution of electricity sector.

The MERC's discussion paper on operationalizing parallel Distribution Licensees in the State of Maharashtra (May 2010) identified key issues for introducing parallel licencing and providing choice to retail consumers in the State, including tariffs, operating procedures for changeover, USO responsibility for network augmentation and expansion, and recovery of regulatory assets and past revenue gaps.

Competition Commission of India (14th March, 2011) in its statutory opinion under the Competition Act, 2002 to Maharashtra Electricity Regulatory Commission provided that under the current legislative structure, Distribution of Electricity is a licensed business and there is no separate mention of licence for retail supply in the EA, 2003 and hence relevant product market for distribution business is Distribution and Retail Supply of Electricity and relevant market for Distribution of electricity is supply area.

Maharashtra Electricity Regulatory Commission's Order (22nd July, 2011) accorded its approval for entitlement of levying cross-subsidy surcharge on Changeover consumers who were using/wheeling the wires of RInfra's distribution network in line with Supreme Court Judgement.

Maharashtra Electricity Regulatory Commission's Order (9th September 2011) specified and determined the CSS to be levied on changeover consumers who were using/wheeling wires of RInfra.

In order to protect the interests of low-end consumers receiving electricity in the Common Area of Supply between Reliance Infra-D and Tata Power Company-D, the MERC issued an order on August 22, 2012, allowing consumer changeover only for residential consumers who consume less than 300 units per month. This restriction was in place for a year. TPC was instructed to develop out its distribution network in such a way that it can give supply to existing and prospective clients located anywhere within these Clusters using its own distribution network within a month's time.

Maharashtra Electricity Regulatory Commission's Orders (11 August 2011), while dealing EoI submitted by Indiabulls, Lanco Infratech, Torrent Power and MSEDCL as a second distribution licensee for RInfra's supply area, the MERC vide its Orders dated 11 August, 2011, in Case No. 5,6,7,8 of 2011 rejected the Licence Applications as they had to meet the mandatory requirement of having their own distribution network. These applicants were requested to apply a Supreme Court Judgment dated 8 July, 2008 for allowing dispensation of using Reliance Infra's wires to them in similar to TPC. In this regard, the MERC took a view that the ratio of the Judgment is specific to TPC-Reliance case based on the legal opinion of Shri Gopal Subramanian.

Mathew K. N. (August 2013) suggested that efficient market competition cannot be achieved merely by reorganising monopoly companies into unbundled entities and ordering them to go out and compete; an efficient central market must first be established. A robust wholesale market is a prerequisite for retail competition to be implemented. In most cases, a proactive approach to actual competition begins with a focus on the wholesale market, which will be required before substantial competition is compatible with decent efficiency. The authorities must also maintain market vigilance and obstruct any integration of generators or retailers to prevent market power abuse, as evidenced by a study of the New Zealand power system, where generators have undergone upstream integration at the retail end.

TPC and BEST are parallel distribution licensees in the South Bombay Area, according to the Supreme Court of India (8 May 2014), and BEST as a municipal authority is not excluded.

TPC was given a Distribution Licence by the Maharashtra Electricity Regulatory Commission on August 14, 2014, for Mumbai City, a portion of Mumbai Suburban, and Mira Bhayandar Corporation, which includes Chene and Versave villages. The Commission, on the other hand, did not approve TPC's proposed Rollout strategy, deeming it insufficient, and asked TPC to submit a revised Rollout plan within six weeks.

The Appellate Tribunal for Electricity's decision (November 28, 2014) on the issue of restricting supply to the 0 to 300 Residential categories of consumers and direction regarding network development in 11 clusters, but not directing TPC to stop using the RInfra network, ruled that it is not conclusively proven that TPC engaged in cherry-picking, and in light of the practical difficulties in laying down the parallel network in Mumbai, as pointed out by TPC. There are no restrictions on new consumer supply. It is possible that a changeover will be authorised.

Maharashtra Electricity Regulatory Commission's Order (9th November, 2015) formed a committee that will submit its recommendation on key aspects discussed in the Order in respect of who should lay distribution network and fulfil its Universal Supply Obligation and finalise the operational specifies of the matter.

Idam Infra. Advisory Pvt. Ltd. (November 2015) discusses about the current power sector scenario of India, provision of competition in EA-2003, challenges, some overview of the open access & its charges mechanism. This report also discusses the current situation of the Mumbai parallel distribution licensees and formulated a business model for consumer choice i.e., one Mumbai one network, competition framework, the role of stakeholders and the issues in the implementation of this business model in Mumbai city by application of draft amendment of segregation of carriage & content.

The Maharashtra Electricity Regulatory Commission's Committee in Case 182 of 2014 (March 29, 2016) recommended multiple conditions/scenarios in which Tata Power Company should lay its distribution network in order to avoid the duplication of a distribution network based on the Commission's Order in Case 182 of 2014. In accordance with the ATE judgement dated November 28, 2014, it also advised an institutional structure for processing capital investment projects in the case of a parallel licencing system and avoiding unnecessary duplication of distribution networks.

Theme 4: Electricity Retail Supply Competition: International experience

Amy W. Ando and Karen L. Palmer (1998) described to investigate whether and how certain features of the markets as well as the decision makers and interest groups influence to decide and to open its retail market for electricity to competition.

Douglas R. Bohi and Karen L. Palmer (1996) described the relative advantages of the implementation of the retail and wholesale competition in the electricity sector and how the competition can improve the efficiency of the whole electrical system of the country.

Australia's electrical industry has changed dramatically since the early 1990s, according to the Australian Parliament (1998). Formerly single-entity vertically integrated electricity authority that were entirely owned and run by the state have been disaggregated into competing producing and retailing entities, as well as regulated transmission and distribution entities. Each state's restructuring has taken place over a varied timeline, but the overall goal has been to boost efficiencies and cut prices. Victoria's restructuring has moved fast,

with all corporatized companies undergoing full privatisation and the sale of all of the state's electrical holdings. The reorganisation of Australia's energy business has resulted in the creation of a national electricity market, which will go live in October 1998. Since May 1997, a trial nationwide market has been operating. New South Wales, Victoria, South Australia, and the Australian Capital Territory are all participants in the national market. The national power market is predicted to improve the country's economy significantly. Electricity will be transported across state lines to avoid supply shortages caused by excessive demand or plant failure in certain locations. Low-cost base-load power will be accessible far from the generation site. Low-cost electricity will be a critical factor in the creation and sustainability of cost-competitive industries. Electricity prices have dropped significantly since the restructure, despite the fact that some industry observers believe that current levels, if maintained, would not deliver sufficient returns on investment for market participants. If this is the case, future prices may rise to some extent, and the sector may merge to achieve better economies of scale. There are a variety of reasons why the extremely big domestic market may not see the same significant price reductions as industrial and commercial clients. Cross-subsidization of the household market from large industrial and commercial clients may no longer be possible when all customers become 'contestable.' Furthermore, unlike industrial and commercial clients, families will not have the same ability to minimise demand through load management.

The importance of creating competition in the retail segment, according to Paulina Beato and Carmen Fuente (1999), is to improve the functioning and competitiveness of the wholesale market, hence increasing the efficiency of the entire system. Retail competition, it has been emphasised, allows all consumers a choice in how to meet their energy demands, may enhance efficiency in providing small and medium-sized clients, and reduces regulatory load. Several countries have employed different techniques to establish retail competition, as detailed in this study. To begin, consider the forces that drive consumer choice and retail competitiveness. Second, the characteristics of a broad retail competition model. Finally, alternative proposals for promoting consumer choice are discussed. It assesses the retail competition model and addresses the

issues faced by retailers. The widespread claim that regulation has failed to bring low electricity prices is one such force. Ando and Palmer (1998) support the concept that regulatory failure to reduce costs is a driving force in the U.S. retail competitiveness process.

From a political standpoint, the prospect of retail competition or retail "customer choice" leading to lower retail electricity prices has been the primary selling point for competition in electricity among consumers in the United States and American government officials, according to Haldane Fagundes Lima (2003). Without a question, retail competition in the electrical sector is a goal that all governments should strive for. Brazil is attempting to re-route the railway, that is, to find a suitable structural model and regulatory framework. The cards have been placed on the table. Let's wait and see what the new government's proposal will bring. One thing is certain, as Adam Smith wisely stated many years ago: monopolists sell their commodities substantially over the natural price by persistently understocking the market and never fully satisfying the effectual demand. (Chapter VII of The Wealth of Nations, Book I).

Stephen Littlechild (2014) discusses the evolution of UK electricity policy in the perspective of the European Union's energy policy. It highlights the lessons learned on how to promote competition as a result of the experience. It outlines the steps taken to make the nationalised electricity industry completely competitive, both in terms of generating and retail supply. It discusses the Pool and the NETA, as well as policy and advances in wholesale trading. Finally, it outlines some of the expenses and benefits to customers, as well as the gradual growth in regulation.

The Electricity Act 1989 in the United Kingdom (UK) enforced consumer choice in stages, according to Gajendra Haldea (2004). By April 1990, this rule had been implemented, and consumer competition had become institutionalised. From April 1994, users with 100 KW or more had the option to pick their supplier, and by June 1999, all consumers (about 24 million) had the option to do so. Consumer tariffs have been steadily declining since the UK's electricity business was restructured on the basis of competition. Several other industrialised countries, including the US, Australia, New Zealand, and

European Union members, have seen similar patterns. Several Latin American economies have seen similar benefits, such as large reductions in T&D losses, in developing countries.

According to ERDF (France), the law mandates complete separation of firms involved in electricity generation, transmission, distribution, and supply. At the same time, it stipulates that firms involved in the generation and distribution of energy must be completely open to competition. As a result, businesses, professions, local communities, and private customers have the freedom to select their electrical provider. They can choose between a market-based offer in which the price is set by power suppliers and a regulated price set by governmental bodies (in partnership with previous suppliers).

According to Richard Pond (2006), the United Kingdom has led the globe in the privatisation of the power sector, not only within Europe. It now has a totally privately held industry, with all customers free to switch suppliers and the sector's regulated monopoly aspects – transmission and distribution – operating apart from generating and supply. Consumers received large price reductions between 1990 and 2005, while the most recent trend is for increased prices as a result of the major changeover to long-term gas contracts in the 1990s. The enormous switch from coal-fired power plants to gas-fired power plants resulted in a significant reduction in carbon emissions for the industry.

According to Payal Malik [2011], the world has undergone a general shift from the monopoly model to the retail competition model over the last decade. This transformation is being driven by new technologies, the fact that most countries now have public-supply infrastructure, and a new wave of regulatory thought. Surprisingly, this transformation has almost always necessitated the completion of numerous important tasks.

The first is the decoupling of the transmission system (national grid) from the large, typically state-owned generator. Traditionally, this has meant separating the two into different organisations, but neutral prices that reflect transmission costs are all that is needed. Unbundling is usually done as a first step before introducing full retail competition. In 1990, the vertically integrated monopoly in England and Wales was divided into four parts: two fossil-fuelled generators, one nuclear generator, and the national grid. In May 1999, nine years

later, the complete retail competition was launched. Victoria, New South Wales, Queensland, the Australian Capital Territories, and Ontario were among the first to unbundle their services, long before full retail competition was introduced. Transmission firms are now referred to as "common carriers" in the United States, despite the fact that retail competition is not yet on the horizon in most states. Norway, on the other hand, completed everything at once, detaching generation and transmission from one another and allowing full retail competition to begin on the same day.

The establishment of generational competition is the second step. This has almost always necessitated the separation of a large generator into a number of smaller generators, reducing market dominance in the process. England and Wales first built three generators out of the erstwhile monopoly, but one of them produced more expensive nuclear electricity, resulting in a market duopoly. This choice has resulted in considerable challenges and a significant rethinking of the energy market. Other states, including Victoria, learned from their mistake and separated their state-owned generator into multiple portions. Ontario Hydro was forced by recent legislation to sell down to 35% of its generation capacity over time.

The third step is to establish a wholesale market for electricity trading (usually a spot market and in time a secondary futures market in hedge contracts). This has typically been the first stage, similar to the unbundling of generating and transmission. The wholesale market in England and Wales began in 1990, the same year as the initial reforms. The power pool in Norway was established in 1991, one year after the first changes, and has subsequently grown to encompass Sweden, Finland, and Denmark. The wholesale market was likewise created by the statutes enacting the original changes in Victoria, Queensland, and New South Wales. A successful power pool has been largely credited for lowering electricity prices in Victoria. Before small residential consumers from any state became contestable, Australia established a National Electricity Market. The most effective approach of lowering overall electricity prices is through generation competition.

The fourth phase is to create a number of new management jobs to oversee the new system. A dispatcher is responsible for organising the physical dispatch of

electricity to meet demand and ensuring supply security; a transmission provider is responsible for setting the terms of grid access and collecting revenue; and a market operator is responsible for running the trading markets and resolving imbalances between contracted and actual power flows. These positions are conceptually independent of the grid's real owner and can be mixed. The National Electricity Market Management Company (NEMMCO) in Australia, for example, serves as both a dispatcher and a market operator, although the national networks are still owned by the state grid companies. Transmission terms are determined by a complicated agreement. In Norway, the international power pool is regulated by NordPool, a specialist corporation, although the grid is still owned by the government.

Injecting corporate mentality into retail/distribution businesses has usually been the fifth phase. This is frequently accomplished by coercing people into forming formal corporations. For example, the power systems in New South Wales and Queensland are wholly owned by the state; Norway has corporatized its supply businesses; and Ontario supply companies must incorporate by 2002. Privatization has had an impact on this conclusion, but only in a few circumstances. The Victorian and British systems are now completely privatised. The question of whether New South Wales' assets should be privatised is now being debated.

The introduction of retail competition for all consumers is the sixth step, which is normally done gradually after giving generation competition time to establish itself. This has typically been accompanied by some type of profiling, as the costs of data reconciliation can effectively prevent small consumers from competing. High switching costs and the late implementation of profiling, for example, meant that retail competition in Norway only reached 1.0 percent in 1997, seven years after the initial changes. The United Kingdom has introduced profiling at the same time that it has opened up retail competition to all customers.

Daisy Shen and Qing Yang (2012) discussed the objectives, the reform techniques, and the consequences of the reforms in New Zealand's energy sector have been summarised. New Zealand's reform experience implies that: First and foremost, the reform process is protracted and continuing. In the mid-1980s,

New Zealand began market reform in the electricity sector by corporatizing activities formally administered by a government department, then in 1998 introduced complete ownership unbundling of the formally vertically integrated electricity utilities and established a wholesale market, which it has been fine-tuning for the past 15 years.

Unbundling and vertical integration, on the other hand, have both costs and benefits. Market restructure designs must strike a balance between the costs and advantages. Empirical research revealed that forced ownership unbundling resulted in immediate efficiency and quality improvements, substantial TFP growth, and a decrease in retail prices. Unbundling's impact on competition, on the other hand, may have been modest and ephemeral, especially after 2003. Retail prices have risen since 2003, but TFP has decreased and service quality has deteriorated. Furthermore, it does not appear that unbundling has facilitated better competition in the power generation industry, which has been the subject of multiple antitrust lawsuits since 2003. In the retail industry, the formation of vertically integrated gentailers is unlikely to have improved competition. After a brief drop, the retail price, particularly for residential users, skyrocketed. The five major gentailers possessed strong market strength, which resulted in higher wholesale prices, particularly during the dry season. Re-bundling could be a remedy to the problems caused by unbundling. It has the potential to boost scope economies, increase incentives for investing in distributed generation, lower transaction costs, encourage retail competition, and provide retail customers with more options. However, there are hazards connected with it that must be considered, such as the potential development of a regional monopoly, which might inhibit new store entry and discourage retail competition, which is what the newly adopted EIA was intended to promote. Third, well-intentioned market change could result in unforeseen consequences. The merging of generation firms with retail enterprises, which may have provided generation businesses market power in a generation that benefited their retail operations, is one unforeseen consequence of ownership unbundling. Finally, the New Zealand government enacted the Power Industry Act 2010 in response to concerns about inadequate competition in the retail and generation industries, as well as worries about electricity supply security. By permitting distribution to return to retailing

and lifting the ownership separation barrier between distribution and generation, this new act eliminates the constraints on ownership separation between distribution and retail and generation. This new regulation encourages distribution companies to invest in generation and retailing. It could, however, result in vertically integrated power utilities that include generating, distribution, and retailing. It is yet too early to judge the impact of this policy. East Asian countries' energy market reforms are currently at a distinct stage. The experience and consequences of ownership unbundling, as well as the current reversal to enable bundling, may be instructive for East Asian countries. The example of New Zealand demonstrates both the potential benefits of ownership unbundling and the risks of unforeseen outcomes. Policymakers should exercise caution when employing ownership unbundling to achieve market reform goals in the electrical industry.

Essential Services Commission (2013) analysed that in January 2002, Victoria (Australia) implemented Full Retail Competition (FRC) for electricity. This allowed new retailers to compete in the small customer market against incumbents who had gained their power retail operations through privatisation or later acquisition. The sector in 2012 had high churn rates and high customer complaints about the retail supplier, focussing on the necessity of the suppliers to follow the norms of the retail business.

According to the Essential Services Commission (May, 2013), there has been a continuous process of competitive entry since 2003, with over 30 licenced merchants operating in the Victorian market by 2012, over three times the number in 2003. By 2012, the aggregate market share of new entrants was close to 30% of all residential and small business market consumers, indicating that some of the entrants have obtained significant market share. Standard concentration indicators have been falling in recent years, implying that the market is no longer highly concentrated. The rate at which customers switch from one retailer to another is referred to as 'churn.' This reflects consumers' proclivity to 'shop around' for the best offer, putting competitive pressure on shops in the process. Customer churning has been reported to be around 17% in Victoria. This is substantially lower than commonly published data, which are based only on total transactions, which include both new and existing

residences. When these two sources of consumer transfer are removed, the switching rate indicates customers switching from one retailer to another in order to acquire better supply terms and conditions. Various observers have expressed concerns about some retailer marketing techniques, and complaints data shows a sharp upward trend in the number of customer complaints. These developments highlight the significance of retailers adhering to industry standards and codes of behaviour.

Maria Fe V. Reyes (2013) analysed that The provision of freedom of choice for all energy end-users is critical to the implementation of changes in the Philippines' electric power market. Users' ability to switch to a different power provider is closely tied to this, which will drive market actors to improve the efficiency of the service they provide to their clients. However, several transitional concerns with the Retail Competition and Open Access (RCOA) programme must be addressed, particularly the effect of potential stranded costs that could be passed on to consumers. Inflationary pressures could come from the cumulative effect of stranded costs. As a regulatory agency, the ERC should verify that corporations do not exaggerate their stranded costs by declaring additional assets stranded or claiming that spot market prices were lower than the initial contract price. The smooth deployment of RCOA requires complete transparency. An education campaign aiming at informing customers about electricity tariffs, techniques for getting the best deal from RESs, power supply reliability, consumer protection, and support would aid in determining the RCOA's possible difficulties and market failures, and therefore strengthen the ERC's trust. In the near run, with only the Contestable Market as a source of choice, lower prices for major end-users may be offset by higher prices for others (particularly small customers) due to greater stranded costs. With existing supply constrained by ageing power plants in Luzon and the Visayas (which have been operating since the 1960s and frequently produce lower outputs and undergo shutdowns) and rising demand for electricity in the medium term, the cost of power could rise, further impeding the efficient implementation of retail competition. Nonetheless, the electric power industry reforms are projected to bear fruit in the long run, with electricity costs falling or remaining stable. According to the DOE and the ERC, once power supply is

adequate and RCOA is fully implemented, a reduction in generation charges can be realised. The EPIRA also calls for the commissioning of new generation plants by 2016, with the goal of increasing power supply reserves and lowering prices.

Retail energy markets across the national electricity market (NEM) are changing and maturing, according to the Australian Energy Market Commission (2014). Customers have more options for retailers and energy plans as jurisdictional governments enact changes to promote competition. Customers that look around and use these options save money on their energy bills. Customers should expect to see a greater variety of energy products and services as retailers compete more fiercely. These innovations should assist customers who have the knowledge and tools they need to compare offerings. Markets are dynamic: conditions shift as input costs and technology shift, as firms enter and exit the market, and as customer preferences shift. Markets allow shops to learn what their customers want and for customers to learn about the service and price combinations that retailers have to offer. Iterative competition drives shops to attract and keep customers, as well as customers to seek out the best bargain that matches their demands.

The basic workings of Singapore's gas and electricity sectors, as well as the old situation, the current scenario, and suggested changes that can be institutionalised to make the market more competitive and mitigate the challenges faced, are detailed in the Singapore Energy Market Authority's (Nov.2015) report. It also establishes performance standards for transmission systems, both with and without penalties. The research also includes a model for the long-term operation of Singapore's transmission infrastructure. Singapore has separated the retail sector into non-contestable and contestable customers to safeguard low-end residential consumers. Consumers who consume less than 2000 units per month are considered non-contestable, whereas those who consume more than 2000 units per month are considered contestable. Non-contestable consumers are required to use the default supplier (Singapore Power) with a regulated rate, but contestable consumers have the freedom to choose any retail supplier. Non-contestable consumers account for 98.6 percent of the total 14.4 million consumers, generating 27 percent of total

revenues. There are 6 Retail Supply Corporations operating in the contestable market, which are primarily owned by producing companies and provide supply to 20,846 consumers (consumption greater than 2000 units per month), accounting for 73 percent of total sales. Power cannot be purchased directly from a generating business by a consumer. Consumers who are contestable must purchase power from Retail Supply Company. Singapore Power (Transmission and Distribution Network) is submitting a five-year business plan to the European Commission for approval, with a year-to-year review of the approved plan. There is no differential in tariffs based on the voltage level, and there is no differentiation based on the purpose of supply.

Forum of Regulators (July, 2015) described that The United Kingdom and Victoria, Australia's state, are largely recognised as effective implementation models for implementing retail supply competition. United Kingdom, Australia and Philippines are the Countries wherein the energy reforms process involved separate distribution and supply functions as required in the Indian context and hence relevant to study in detail. Electricity Industry in United Kingdom was restructured before introduction of retail supply competition starting from April, 1990 in three phases with functional segregation of distribution business, independent metering operator for installation and maintenance of meter, electricity trading arrangements as an energy market operator and independent consumer grievance redressal mechanism. Consumer loads above 1MW were allowed to choose supplier in the first phase (1990-1994), consumer loads above 100kW were allowed to choose supplier in the second phase (1994-1998), and all consumers were allowed to choose supplier in the third phase (1998-2004). In Australia (Victoria), retail supply competition was implemented in stages commencing in December 1994 and ending in January 2002. In five phases, retail consumers were separated into two categories: franchise and non-franchise consumers (Starting from above 40 Gwh consumptions per year to below 160 Mwh consumption per year). This allowed new retailers to compete in the small customer market against incumbents who had gained their power retail operations through privatisation or later acquisition. The responsibility of metering services provided to retailer who can appoint either distribution

company for such services or third company accredited by market operator or first tier retailer (regulated company). It has national electricity market company for facilitating trading of electricity. In case the retailer fails to provide electricity due to any reasons, the consumer will be automatically transferred to Retailer of Last Resort with no loss of connection regulated by the Regulatory Commission. The sector in 2012 had high churn rates and high customer complaints about the retail supplier, focussing on the necessity of the suppliers to follow the norms of the retail business. The lack of output price control in retail generates a new function for the retail market regulator. Electricity Industry of Philippines initiated retail supply competition in a phase-wise manner starting from 2013. In first phase (2013 to 2015), consumer loads above 1MW were allowed to choose supplier, in second phase (by end of 2015), consumer loads above 750kW were allowed to choose supplier and subsequently and every year thereafter Regulatory Commission shall evaluate the performance and readiness of infrastructure and consumers and based on such evaluation it shall gradually reduce the threshold level until it reaches to household level. Installation and maintenance of meters with time of use facility being done by the distribution companies. The trading procedure is facilitated by an electricity market corporation. If the retailer fails to provide power to a contestable consumer or the consumer is unable to engage into a supply contract with the retailer, the consumer may enter into a Supplier of Last Resort regulated by the Regulatory Commission and obtain electricity. In the Philippines, the establishment of a Universal Charge to be recovered from all customers to account for all forms of cross subsidies that remain throughout the phased-out period was developed as a preliminary measure for retail supply competition. According to the literature, a UC should be imposed on all power customers in order to phase out the remaining cross subsidies in the Indian distribution industry.

Bert Willems & Machiel Mulder (2016) examines the market structure, regulation, and performance of the Dutch energy market over the last decade. Price disparity across retailers for identical products, as well as within a single merchant, remains substantial. He finds no indication of unequal wholesale cost pass-through. Consumer complaints have decreased, and switching rates have

increased, indicating that the retail industry has matured. To assist consumers, it appears that more stringent regulation of mature energy retail markets is required.

Detailed theme-based literature review understanding and findings

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
Implementation status of power sector reforms in India (16)			
Implementation status of power sector reforms in India (16) [Planning Commission, Sheoli Pargal and Sudeshna Ghosh Banerjee, Anoop Singh , V.S. Ailawadi , Bhawna Gulati , Sidharth Sinha, R Dossani, A.R Abhyankar,.S.A Khaparde, Gajendra Haldea]	1. The Literature suggests that the initiatives undertaken for power sector reforms allowed equal platforms and opportunity to access in Generation and Transmission sector which enabled more entrants and ensured competitive prices for benefitting consumers and market both. This has created whole sale market in India. However, in India's energy distribution sector, the spirit of competition and private engagement is still in its early stages, and competition in power distribution has been quite restricted. 2. The Literature observed that mandatory requirement for second distribution licensee to have its own distribution network poses entry barriers for new participants in the distribution sector due to significant capital investment requirement. 3. One of the main reasons why distribution open access has not taken off in India is that distribution companies (Discoms) in India run businesses of two separate types: wire business and retail company. By definition, the wire business is a monopoly, regulated-return-earning industry. Retail supply, on the other hand, is more suited to providing consumer choice in the form of various providers because it entails purchasing energy in bulk from generators and selling it to consumers, as well as providing customer service, billing, and fee collection. Conflict of interest makes Discoms fearful of losing their retail segment to competition under a market	Factors for limited full scale competition in distribution segment of power sector : (Policy , Regulatory framework , Information) , Assessment of evolution of whole sale market process in India, identification of factors (parallel layout) for limited private sector participation in various States of Indian distribution sector, identification of factors for distribution open access and its conflict of interest, assessment of preparedness for separation of wire and supply Identifications of factors for financial distribution losses and	Barriers and constraints in the introduction of competition in distribution sector as outlined in the EA 2003 is unknown. Level and extent of preparedness and adequacy of the distribution sector for extending competition at retail level is unknown. Literature is not available on the different factors and root causes (financial losses, high borrowings and level of cross subsidies to be phased out) which resulted in the distribution sector being financially unviable.

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
	structure where single Discoms control both wire and retail activity. As a result, in this context, the possibility for implementing distribution open access and retail competition is limited. 4. According to the literature, India's progress, inclusivity, job creation, and aspirations for middle-income country status have been hampered by an inefficient, loss-making distribution segment and an insufficient and unreliable supply. 5. According to the literature, generation and transmission inefficiencies are passed on to distribution businesses at cost plus, which have no alternative but to acquire power from state producing companies via state transmission lines for distribution. Inadequate tariffs are not the only cause of rising losses; increased distribution losses are also a factor in Discoms' financial woes. The country's Discoms' accumulated losses have increased from Rs 11,699 crore to Rs 71,271 crore, resulting in increased borrowing from Rs 1,58,003 crore to Rs 5,54,922 crore. Discoms in India are frequently cash-strapped, preventing them from investing in distribution infrastructure and limiting their ability to purchase power, resulting in power shortages. 6. According to the literature, one convincing reform that may be implemented in this circumstance is the separation of the Distribution business from Retail Supply, as well as the progressive opening up of the Retail Supply industry to competition. Separating the two tasks would promote investment in distribution networks by creating a unique, regulated industry with predictable profits.	causes, identification of present distribution sector functions in States causing inefficient and unreliable supply, Identification of inefficient areas for capital investment, assessment of cost and revenue structure of distribution utilities	

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
Indian Policy efforts on Electricity Retail Supply Competition (14)			
Indian Policy efforts on Electricity Retail Supply Competition (14) [Forum of Regulators, Ministry of Power, Dr Rajib Kumar Mishra, Dr Anil Kumar, Akhil Joseph, Mathew K. N., Keshav Khanna, Supreme Court of India, Payal Malik, Appellate Tribunal for Electricity, Maharashtra Electricity Regulatory Commission]	1. According to the literature, the Power Act of 2003 allows for parallel distribution networks to introduce competition in electricity distribution. However, global experience with introducing competition in retail supply demonstrates that, rather than parallel networks, numerous providers are allowed to supply through a single network, as duplicating the existing distribution network owing to sunk costs is not economically viable. 2. Based on Indian (Mumbai) and international experience in retail supply competition in electricity, literature suggests similar reforms of retail supply competition in electricity for India through Electricity (Amendment) Bill,2014 and preparation of transfer scheme/rolling plan for implementation by States ,keeping in view the ground realities. It primarily proposes the separation of the distribution network from the work of electricity supply, which is currently performed by a single entity, i.e., State Discoms, and increases competition and efficiency in the distribution sector. 3. Existing Distribution Licensees will be divided into three categories: incumbent supply licensees (ISL), intermediary companies (IC), and reorganised distribution licensees, according to the Bill. It establishes distinct government-owned licences for maintaining the distribution system (distribution licence) and supplying electricity (supply licence), with supply licensees purchasing power and selling it to consumers after segregation. Within a supply region, the SERC may give multiple supply licences.	Identification of additional issues for amendment of EA2003, Identification of issues for preparation of rollout plan/transfer plan, structure and timeframe for implementation of retail supply competition in electricity in States, Identification of Role and functions for Supply Licensees and Distribution Wire Licensees,	Literature lacking in clarity on certain following factors : i. Mechanism for basis of PPA allocation. ii. Role of SLDC for handling new system in the absence of adequate metering infrastructure. iii. Basis of allocation of financial and technical losses. iv. Process of allowing Govt. controlled Discoms in supply area of existing private Discoms. v. Mechanism for servicing large numbers of low end/cross -subsidised consumers by the new entity. Additional factors, as outlined above, have not been adequately enumerated by the Amendment Bill. Also lacking on preparation of transfer scheme and rollout plan for segregation of distribution

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
	Customers will be able to purchase electricity from any of the licenced suppliers. Until the new SL enters the market, the ISL will provide electricity. The consumer will be provided power by the supplier of last resort if the SL designated by the consumer ceases to be a supply licensee or if his supply licence is suspended (POLR). The SERC will designate the POLR as a supply licensee. It stipulates that at least one of the supply licensees in a given supply region must be a government entity. The existing PPAs and procurement contracts with distribution corporations will be transferred to an IC by state governments. Following that, the IC will distribute these PPAs to the supply licensees 4. t proposes that the Bill offer further clarification on the degree and method of implementing the distribution and supply segregation. 5. It also proposes a model transfer/rollout plan (wide and flexible guidelines) to give States enough leeway in implementing the plan and aligning it with local needs for a seamless transition of the electricity market to retail supply competition. 6. It suggests a model rollout plan with three stages of implementation processes. It suggests four roll out plans scenarios based on losses and availability of surplus or deficit situation for implementations by various States of India		utilities, its structures, timeline and extent, phasing of competition, power procurement model, universal service obligations, metering infrastructure, and tariff determination is unknown to certain extent.
Indian Experience of Electricity Retail Supply Competition (20)			

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
Indian Experience of Electricity Retail Supply Competition (20) [Maharashtra Electricity Regulatory Commission, Supreme Court of India, Appellate Tribunal for Electricity, Competition Commission of India, Idam Infra]	1. According to the literature, the MERC began retail supply competition in 2009 by giving Mumbai consumers the option of choosing their power service supplier. However, the rate at which competition takes place is extremely slow. The historical built-in cross-subsidies in the Tariff are one of the key reasons or obstacles for introducing full-scale competition. Removing cross-subsidies abruptly will result in an abnormal increase in tariffs and a shock to consumers. As a result, MERC has been reducing/determining cross-subsidies with great care over the years. In an ideal world, competition would be based on the quality of supply and network in the case of a tariff with low cross-subsidies 2. The MERC-initiated arrangement (of using another licensee's network) is in support of the goal of avoiding duplication of retail supply expenditures and optimising capital expenditures by Distribution Licensees. The main goal of the proposed modification to the EA 2003 is to allow for more competition and improved customer service in the retail supply chain (with one distribution network business and many shops). 3. It has also observed that the main requirement of a parallel licensee system under the 2003 Act, that each licensee invest in its own network, leads to infrastructure replication, putting a financial burden on end consumers, and has thus held that distribution network duplication should be limited to areas where duplication will help improve the distribution system's reliability and in the case of new consumers. For all other areas/situations, the existing distribution infrastructure for supplying consumers should be used.	Identification of transitory plan/provisions for separation of wire and supply, Identification of preparatory requirements for introduction of retail electricity supply competition , Identification of various risk factors that can poses a challenge to the success of the separation of wire and supply	1. Impact and materialisation of present regulatory framework (Tariff setting and Network Development) for providing choice to low end domestic consumers is unknown. 2. Constraints and barriers experienced in Regulatory framework (return on investment on capital investment in distribution network or on supply, criteria for setting of distribution network) for incentivising distribution companies to offer fair choice to low end domestic consumers is unknown.

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
	4. In Mumbai, the key reason driving competition is the distribution tariff. According to tariff principles, the utility recovers different expenses as well as receives a Return on Equity on investment/network set, all of which are recovered through tariff determination. However, TPC's delayed progress in establishing their own distribution network in comparison to duplication of network aspects resulted in various costs such as CSS and RAC, which increased overall charges and made switch economics less appealing for some consumers. This type of circumstance puts enough market pressure on incumbent licensees to reduce the system's inefficiencies. 5. The Literature on Mumbai's parallel licensing operation, which provides the choice to consumers and benefited with the reduction in electricity charges of consumers, faces challenges for tariff design (impact of tariff on low end consumers and cherry picking , recovery of Regulatory Assets and Past Revenue Gaps), operating procedure for changeover of consumer from one Utility to other Utility, ensuring Universal Service Obligations of Utilities and avoiding cherry picking, responsibility with respect to distribution network augmentation / expansion. The presence of multiple distribution licensees in the same area is perceived by many as cherry picking by new entrants (selecting to supply to only high value paying/cross subsidising consumers and without having any obligation to supply low end consumers) and hence it is necessary to evolve a suitable price framework/tariff setting framework for sustainability of retail supply competition.		

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
International Experience of retail supply competition in electricity (73)			
International Experience of retail supply competition in electricity (73) [Haldane Fagundes Lima, Paulina Beato Carmen Fuente, Universidad Catolica de Chile, Douglas R. Bohi and Karen L. Palmer, Paul S Galen, French Energy Regulatory Commission, ERDF, Council of European Energy Regulators, Essential Services Commission , Centre	1. A review of the literature reveals projects in the power sector in the United States, the United Kingdom, Singapore, Spain, New Zealand, Finland, Norway, France, the Netherlands, the Philippines, Argentina, and Australia. The competitive retail supply model has been fully adopted in the United Kingdom, Singapore, New Zealand, Norway, Finland, Spain, certain Australian states, and the United States of America, according to the report. Other countries, such as the Philippines, are currently implementing it in various phases. The United Kingdom and Victoria, Australia's state, are often recognised as successful models of implementation when it comes to retail supply competition. The United Kingdom, Australia, and the Philippines are three countries whose energy reforms have resulted in separate distribution and supply functions, as necessary in India, and hence are worth studying in depth. 2. The Literature find that Electricity Industry in United Kingdom was restructured before introduction of retail supply competition starting from April,1990 in three phases after functional segregation of distribution business , independent metering operator for installation and maintenance of meter , electricity trading arrangements as an energy market operator and independent consumer grievance redressal mechanism. In first phase (1990 to 1994), consumer loads above 1MW were allowed to choose supplier, in second phase (1994-1998), consumer loads above 100kW were allowed to	Identification of stage wise implementation of electricity retail supply competition, Policy for protection of regulated consumers, Structure for functional separation of retailing and distribution functions (and assets) to achieve vertical and horizontal disaggregation of the electricity industry, Assessment for creation of Electricity Market organized as a centralized market-based trading pool for buying and selling electricity, Establishment of appropriate regulatory regimes (Separation of energy retail tariff from energy network (wheeling) tariff to enable separation of businesses)	Literature is lacking on how existing Distribution Licensee is reorganised for functional separation, allocation of losses and how rollout plan for retail supply competition prepared and implemented with different State's conditions Preparation of Transfer Scheme and Rollout Plan for functional separation, allocation of losses, basis of allocation of power to new retailers from existing PPAs, etc. is unknown.

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
for Credit and Consumer , Electric Power Supply Association, Gas and Electricity Markets Authority, International Energy Agency, Stephen C. Littlechild, Valeria di Cosmo and Muireann Á Lynch, Christophe Defeuilley, Larsen, Rafael Merino, Energy Market Authority (Singapore), Frank A. Wolak, Florence School of Regulation, RAND Journal of Economics, Xuejuan Su, Douglas R. Bohi and Karen L. Palmer, Silvia Concettini	choose supplier and in third phase (1998 to 2004) all consumers were allowed to choose supplier. 3. According to the literature, the Philippine Electricity Industry began retail supply competition in phases beginning in 2013. Consumer loads above 1MW were allowed to choose supplier in the first phase (2013 to 2015), consumer loads above 750kW were allowed to choose supplier in the second phase (by the end of 2015), and the Regulatory Commission will evaluate the performance and readiness of infrastructure and consumers every year thereafter, gradually lowering the threshold level until it reaches household level. The distribution firms are responsible for the installation and maintenance of metres with a time-of-use feature. The trading procedure is facilitated by an electricity market corporation. If the retailer fails to provide power to a contestable consumer or the consumer is unable to engage into a supply contract with the retailer, the consumer may enter into a Supplier of Last Resort regulated by the Regulatory Commission and obtain electricity. In the Philippines, the establishment of a Universal Charge to be recovered from all customers to account for all forms of cross subsidies that remain throughout the phased out period was developed as a preliminary measure for retail supply competition. According to the literature, a Universal Charge should be imposed on all power customers in order to phase out the remaining cross subsidies in the Indian distribution industry. 4. According to the literature, retail supply competition was established in Australia (Victoria) in stages, starting in December 1994 and ending in		

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
Creti, Daisy Shen, Stephen Littlechild, Steven L. Puller and Jeremy West, London Economics, Ole Jess Olsen, Tor Arnt Johnsen and Philip Lewis, Wiley, David Levi-Faur, Daljit Singh, Stephen Thomas, Tooraj Jamasb and Michael Pollitt, Eirik Schrøder Amundsen and Balbir Singh, Nils-Henrik M. von der Fehr and Petter Vegard Hansen, Juan F. Escobar and Alejandro Jofré, Salla Annala , Torstein Bye and Einar Hope, Market Observatory	January 2002. In five phases, retail consumers were separated into two categories: franchise and non-franchise consumers (Starting from above 40 Gwh consumptions per year to below 160 Mwh consumption per year). This allowed new retailers to compete in the small customer market against incumbents who had gained their power retail operations through privatisation or later acquisition. The responsibility of metering services provided to retailer who can appoint either distribution company for such services or third company accredited by market operator or first tier retailer (regulated company). It has national electricity market company for facilitating trading of electricity. In case the retailer fails to provide electricity due to any reasons, the consumer will be automatically transferred to Retailer of Last Resort with no loss of connection regulated by the Regulatory Commission. The sector in 2012 had high churn rates and high customer complaints about the retail supplier, focussing on the necessity of the suppliers to follow the norms of the retail business. Retail competition with no output price regulation creates new role of retail market regulator. 5. In Singapore, to protect low end residential consumers from market forces, retail electricity market divided in non-contestable and contestable consumers. The consumers which are consuming less than 2000 units in a month are non-contestable consumers while consumers having consumption more than 2000 units/month are contestable consumers. Non-contestable consumers are obligated to take supply from default supplier (i.e. Singapore Power) with regulated tariff and contestable consumers are given option to		

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
for Energy of the European Commission, Amy W. Ando and Karen L. Palmer, Bert Willems & Machiel Mulder, Howard J. Axelrod, David W. De Ramus & Collin Cain, UK Power Networks, Valeria Di Cosmo & Muireann Á. Lynch, Mine Yücel & Adam Swadley, Erkan Erdogdu, StephenHall a,n, KatyRoelich, Anton Eberhard, Mehmet Baha Karan and Hasan Kazdagli, William W. Hogan, Parliament of Australia, David M	select any retail supplier. Out of total 14.4 Lacs consumers, 98.6% consumers are non-contestable consumers contributing sales of 27% in total sales. In contestable market, there are 6 Retail Supply Companies in operation which are mainly controlled by generating companies and providing supply to 20,846 consumers (consumption more than 2000 units/month) having 73% of total sales. No consumer can buy power directly from generating company. Contestable Consumers have to buy power from Retail Supply Company. Time differentiation in tariff for contestable market consumers in retail market is a major challenge faced by the Singapore. Competitive generating markets in Holland, for example, develop time-varying wholesale prices, but competitive retail sellers continue to charge some customers flat retail rates. 6. In France it finds that the immediate advantages of retail competition have frequently been exaggerated, especially for small and domestic clients. The final market has proven to be less dynamic than anticipated, making new supply entry more challenging to maintain in the medium-term. Due to non-negligible market imperfections, regulatory needs are shown to be more significant. 7. In Dutch it finds that Consumer complaints have decreased, and switching rates have increased, indicating that the retail industry has matured. To provide benefits for consumers, it appears that more stringent regulation of mature energy retail markets is required.		

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
Newbery, Ofgem, Maria Fe V. Reyes1, CRI, Richard Pond, Daisy Shen and Qing Yang, Australian Energy Market Commission, Mario Vignolo Facultad de Ingeniería, Michael Rosenzweig Sarah P. Voll Carlos Pabon-Agudelo, Sally Hunt]	8. According to the literature, determining whether retail competition improves the overall efficiency of the power market is difficult. Retail competition opens up new possibilities for engaged consumers while also forcing suppliers to improve their efficiency. However, it is difficult to see how the opening of retail electricity markets benefits consumers who are unable or unwilling to participate. It finds that while the impacts of a competitive retail electricity market vary by state, they typically appear to cut costs in states with high customer engagement and raise prices in states with low customer participation. It also concludes that retail competition provides all consumers with an option of how to meet their energy demands, may improve efficiency in providing small and medium-sized customers, and minimise regulatory burden. 9. According to the literature, regulatory failure to reduce costs is a driving force in the retail competition process in the United States of America, and only residential customers have benefited from much lower rates, while commercial and industrial customers have not. It also discovers that the benefit is transient and fades over time, and that retail competition does not appear to cut electricity rates for retail customers across the board or over time. 10. According to the literature, a phased strategy of introducing retail competition is required to allow the market, which has been insulated from competition and governed by a regulator, to evolve to competition-based price fixing. The path of retail competition may take into account the retail		

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
	power sector, and small users, such as households, may be opened up to competition only after a thorough examination of retail competition's performance in relation to other consumer groups. The United Kingdom, Singapore, Australia, and a number of other nations have implemented retail competition, initially for large consumers and then for all energy customers. 11. The Literature also suggests formation of a trading pool/market operator for ensuring proper functioning of supplying power to retailers in the country through government owned Energy Market Company. 12. There are six steps in the transition from the monopoly model to the retail competition model, according to the literature. The first step is to decouple the transmission system/national grid from the state-owned generator; the second step is to introduce competition in generation; the third step is to establish a wholesale market for trading electricity; the fourth step is to establish institutions to manage the new system; the fifth step is to instil corporate ethos into retail/distribution entities; and the sixth step is to introduce retail competition for all consumers.		
Theoretical Premise (2)			

THEME [Authors]	INFERENCE	INITIAL CONCEPTUAL CONSTRUCT	RESEARCH GAPS
	1. **Theory of Efficient Market:** It is considered to be efficient to allocate resources in such a way that the sum of consumer and producer surplus is maximised. 2. **Theory of monopoly:** The distribution and transmission of electricity remained controlled monopolies. Despite the fact that the distribution business was kept as a monopoly, certain parts of the distribution business were considered as having room for competition.		In Indian Distribution sector segregating competitive segment (Retail Supply) from monopoly (Distribution Network), which leads to efficient market, has not been documented.

2.3 CONSOLIDATION OF RESEARCH GAPS FROM THE LITERATURE REVIEW:

The detailed literature review was focused on the understanding what all has been researched in the area of power sector reform implementations status in India, identified barriers and constraints for limited competition in the distribution and to what extent Indian distribution sector prepared and adequate for extending competition at retail supply level, internationally, and how its rollout plan for Indian distribution sector, which special reference to Maharashtra State be taken for preparation and implementation.

From the review of above literature, primary gaps on four literature review themes for further understanding are:

Research Gaps under Research Theme 1 (T1): Implementation status of power sector reforms in India:

1) Barriers and constraints in the introduction of competition in distribution sector as outlined in the EA 2003 is unknown.
2) Level and extent of preparedness and adequacy of the distribution sector for extending competition at retail level is unknown.
3) Literature is not available on the different factors and root causes (financial losses, high borrowings and level of cross subsidies to be phased out) which resulted in the distribution sector being financially unviable.

Research Gaps under Research Theme 2 (T2): Indian Policy efforts on Electricity Retail Supply Competition:

1) Additional factors, as outlined below, have not been adequately enumerated by the Amendment Bill.
    1.1 Mechanism for basis of PPA allocation.
    1.2 Role of SLDC for handling new system in the absence of adequate metering infrastructure.
    1.3 Basis of allocation of financial and technical losses.

1.4 Process of allowing Govt. controlled Discoms in supply area of existing private Discoms.

1.5 Mechanism for servicing large numbers of low end/cross - subsidised consumers by the new entity.

2) Also lacking on preparation of Transfer Scheme and Rollout Plan for segregation of distribution utilities, its structures, timeline and extent, phasing of competition, power procurement model, universal service obligations, metering infrastructure, and tariff determination is unknown to certain extent.

Research Gaps under Research Theme 3 (T3): Indian Experience of Electricity Retail Supply Competition:

1) Impact and materialisation of present regulatory framework (Tariff setting and Network Development) for providing choice to low end domestic consumers is unknown.
2) Constraints and barriers experienced in Regulatory framework (return on investment on capital investment in distribution network or on supply, criteria for setting of distribution network) for incentivising distribution companies to offer fair choice to low end domestic consumers is unknown.

Research Gaps under Research Theme 4 (T4): International Experience of retail supply competition in electricity:

1) Internationally preparation of Transfer Scheme and Rollout Plan for functional separation, allocation of losses, basis of allocation of power to new retailers from existing PPAs, etc. is unknown.

The above-mentioned research gaps were examined further in light of the available literature. They were fine-tuned in light of the literature available. The gaps have been refined as follows:

1. Lacking the extent of barrier and constraints in introducing competition in distribution sector.

2. Lacking to what extent State distribution sector is prepared and adequate for introducing competition in the distribution sector.
3. State Specific factors causes distribution sector unviable are unknown.
4. Lack of scholarly attention suggesting what suitable competitive retail supply competition for distribution sector would be suitable for State and how it is to be formulated. Moreover, there is a dearth of literature on regulatory reforms and their impact leading to an efficient market.

The funnel approach to derive the consolidated research gap is shown as below:

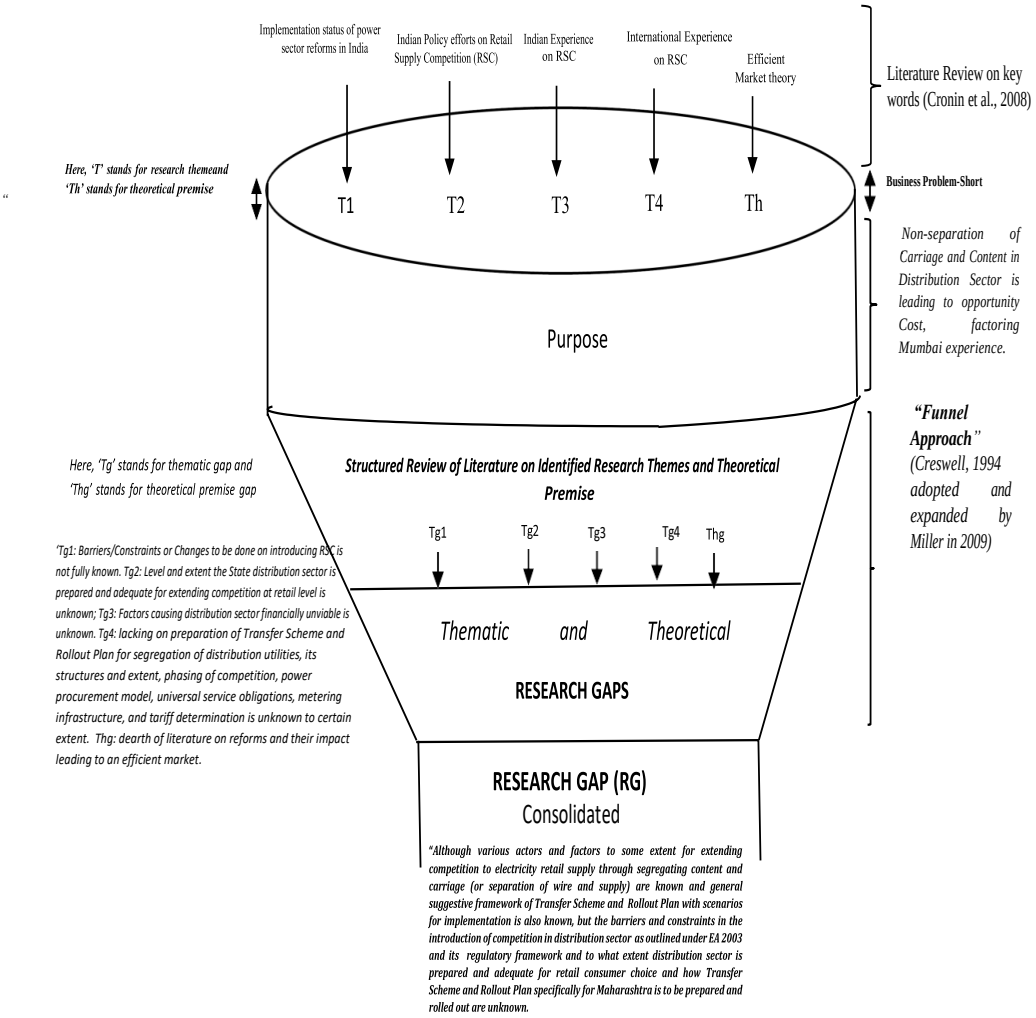


Figure 14 : Funnel Approach for Consolidation of Research Gap

2.4 RESEARCH PROBLEM:

Although various actors and factors to some extent for extending competition to electricity retail supply through segregating content and carriage (or separation of wire and supply) are known and general suggestive framework of Transfer Scheme and Rollout plan with scenarios for implementation is also known, but the barriers and constraints in the introduction of competition in distribution sector as outlined under EA 2003 and its regulatory framework and to what extent distribution sector is prepared and adequate for retail consumer choice and how Transfer Scheme and Rollout Plan specifically for Maharashtra is to be prepared and rolled out are unknown.

2.5 RESEARCH QUESTIONS:

RQ1: What are the barriers and constraints in the introduction of retail competition in distribution sector as outlined in the EA 2003 and following additional issues enumerated under the Electricity (Amendment) Bill, 2014.

a) Mechanism for basis of PPA allocation.

b) Role of SLDC for handling new system in the absence of adequate metering infrastructure.

c) Basis of allocation of financial and technical losses.

d) Process of allowing Govt. controlled Discoms in supply area of existing private Discoms.

e) Mechanism for servicing large numbers of low end/cross -subsidised consumers by the new entity.

RQ2: What is the level and extent to which the existing distribution sector and its infrastructure is prepared (availability of power, wholesale market structure) and adequate (Reduction of cross subsidies, current level of losses, existing metering infrastructure) for introducing retail consumer choice in Maharashtra (factoring Mumbai's retail consumer choice).

RQ3: What are the different factors and root causes (financial losses, high borrowings and level of cross subsidies to be phased out) which resulted in the distribution sector of Maharashtra being financially unviable.

RQ4: How existing distribution sector for introducing retail competition will be segregated into separate network and retail company through Transfer scheme and Rollout Plan (functional segregation of existing distribution, its actors for managing new system and structures, timeline and extent, phasing of competition, power procurement model/reorganisation of existing long term contracts, universal service obligations, metering role) and its implementation for Maharashtra State.

2.6 RESEARCH OBJECTIVES:

RO1: To find out barriers and constraints in the introduction of retail competition in distribution sector as outlined in the EA 2003 and following additional issues enumerated under the Electricity (Amendment) Bill, 2014.

a) Mechanism for basis of PPA allocation.

b) Role of SLDC for handling new system in the absence of adequate metering infrastructure.

c) Basis of allocation of financial and technical losses.

d) Process of allowing Govt. controlled Discoms in supply area of existing private Discoms.

e) Mechanism for servicing large numbers of low end/cross -subsidised consumers by the new entity.

RO2: To explore the level and extent to which the existing distribution sector and its infrastructure is prepared (availability of power, wholesale market structure) and adequacy (Reduction of cross subsidies, current level of losses, existing metering infrastructure) for introducing retail consumer choice in Maharashtra (factoring Mumbai's retail consumer choice).

RO3: To analyse different factors and root causes (such as financial losses, high borrowings and level of cross subsidies to be phased out) which resulted in the distribution sector of Maharashtra being financially unviable.

RO4: To formulate a Transfer Scheme and Rollout Plan of introducing retail competition in electricity distribution sector (functional segregation of existing distribution, its actors for managing new system and structures and extent, phasing of competition, power procurement model/reorganisation of existing long-term contracts, universal service obligations, metering role) of Maharashtra.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research methodology is utilised to answer the research topic in a methodical and scientific manner. Research technique consists of a set of research steps that are used in a research project and follow a set of rules. The nature of the problem can influence the research methodology utilised in diverse investigations. There are primarily two sorts of research methods:

i. Quantitative research

ii. Qualitative research

Quantitative research use numerical, mathematical, or statistical analysis tools to answer an issue, whereas qualitative research is largely exploratory and employs a range of material and interpretive practises to bring the world into focus. Data is acquired using quantitative approaches such as surveys, questionnaires, and polls, whereas qualitative research examines details in a natural situation and interprets them using relevant contributions provided by many people.

Quantitative procedures are typically rigid, whereas qualitative ones are more adaptable. In the quantitative method, the researcher asks all participants the same questions in the same order. Because the questions in this method are closed ended, it is possible to make a meaningful comparison of responses across all participants. This strategy, however, necessitates a thorough understanding of both the statistical tools and the questions to be answered. Because open-ended questions are utilised in qualitative approaches, respondents have more latitude in answering inquiries. Because respondents respond in their own words, which are not always the same, the responses for this methodology are thought to be more complex than quantitative. Contact between the researcher and the respondent is less formal in qualitative methods

than in quantitative methods, and the researcher has the opportunity to respond to what the respondent says right away by asking follow-up questions.

The goal of research is to "learn what has never been known before; to raise an important question for which no conclusive answer has been found, and to seek to uncover the solution to that question via the channel of pertinent facts and their interpretation.". In a qualitative research approach, knowledge is developed based on the enquiry by choosing either of constructivist perspectives or participatory perspectives. The approach uses strategies like case studies, grounded theory, framework analysis etc. as the inquiry strategies.

The purpose of this research is to identify barrier and constraints in introducing RSC in India, to ascertain the preparedness and adequacy of Maharashtra's distribution sector, to find out factors which are making distribution sector of Maharashtra financially unviable and based on these assessment , create a framework for retail competition to be introduced in distribution sector of Maharashtra through formulation of rollout for segregation of carriage and content business of Discoms of Maharashtra. As qualitative research design explores complex situations and enhance understanding, the formulation led the researcher to take qualitative methods based on his research questions except finding out factors which resulted distribution sector of Maharashtra financially unviable Furthermore, a conceptual foundation upon which a framework can be built is required. The qualitative research sources for conceptual development include Vygotsky (1934,1986) and Cutcliffe et al. (2006). Guba and Lincoln (2005) criteria are referred for the validity and reliability of the present qualitative work. The 'Framework Methodology' to data analysis is obtained from Ritchie and Spencer (1994) expanded and adapted by Smith and Firth (2011). Framework analysis is regarded as the most appropriate qualitative method for applied policy research (Srivastava and Thomson, 2009).

Hence framework analysis method has been used to arrive at formulation of rollout plan of introducing retail supply competition for distribution sector of Maharashtra after ascertaining the preparedness and adequacy of the sector. To analyse different factors and possible root causes which resulted in the

distribution sector of Maharashtra being financially unviable, a fishbone diagram tool has been used.

3.2 FRAMEWORK APPROACH FOR DATA ANALYSIS

Every organisation is regulated by a set of policies and procedures that must be followed. These procedures and rules are evaluated on a regular basis to ensure that available resources are used as efficiently as possible. The review process determines if a policy is successful or unsuccessful, while also laying out a plan for implementing that policy. Applied policy research is the research methodology that performs this function. By acquiring particular information, researchers can develop workable outcomes in applied policy research. During the last several decades, qualitative research methodology has been regarded as a useful method of conducting management research and study in the social sciences and social policy fields.

Jane Ritchie and Liz Spencer of the Social and Community Planning Research Institute in London created framework analysis in 1994. For applied policy research, framework analysis is thought to be the most appropriate qualitative method.

Framework analysis allows for some flexibility in data analysis. Users can either collect all data before analyzation or execute the analyzation while collecting data in this approach. The data is analysed using a five-step framework analysis process:

i. Familiarization
ii. Identification of thematic framework
iii. Indexing
iv. Charting
v. Mapping & Interpretation

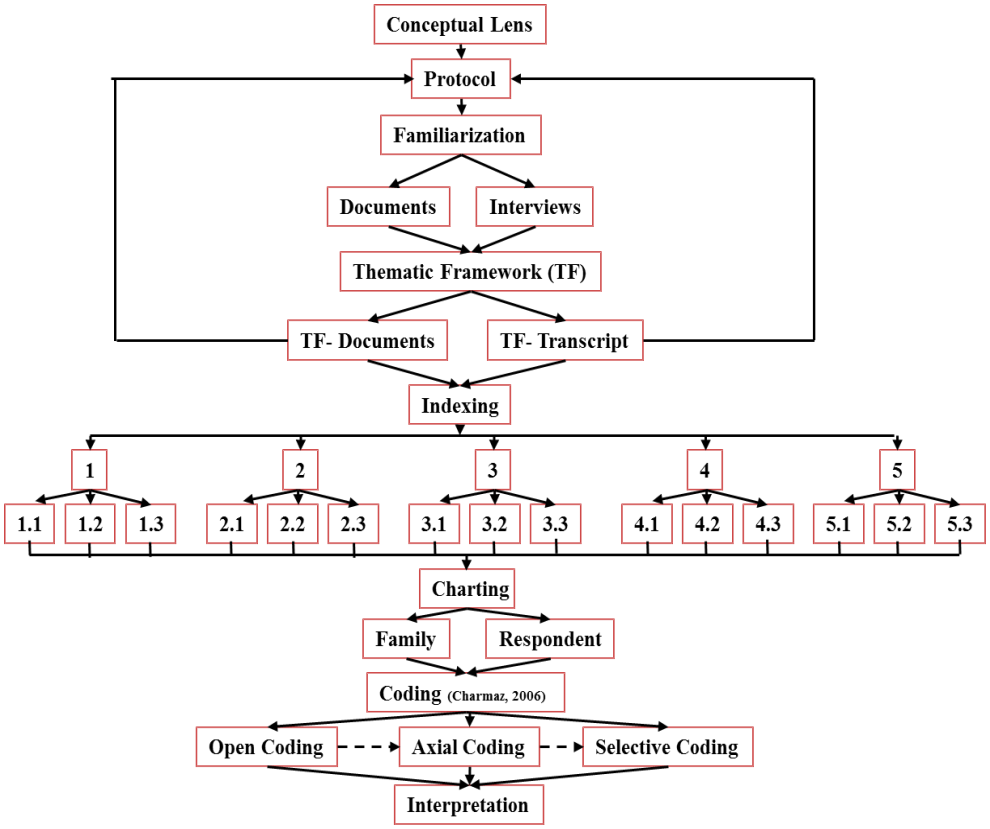


Figure 15 :FLOW CHART: FRAMEWORK ANALYSIS

The above five steps are briefly explained as under:

i. **Familiarization**: Familiarization is the process through which researchers become acquainted with the transcripts while also gaining a comprehension of the data obtained. Field notes, observations, document analysis, and interviews can all result in a transcript. The researcher becomes familiar with major ideas and specific themes in this step and makes a comment or memo about them. It is impossible for the researcher to go through it all because qualitative research collects a lot of data and so a selection of data is made that can be based on particular criteria.

ii. **Identification of thematic framework**: The framework analysis process continues with this stage. Once the researcher is comfortable with the acquired data, themes or issues are discovered. The nature of the acquired data is used to categorise these themes and concerns. It may also be noted that according to certain themes the data can be sorted and classified. There should be no pressure to set data on a certain topic. The set of issues, on the other hand, serves simply as a beginning point for

constructing a coherent thematic framework because the study is usually aimed to address a specific set of problems. This document is considered a rough draught that can be changed as the analysis progresses. A thematic process' refining job is not a mechanical or automatic procedure, but rather one that requires natural and logical reasoning. It connects disparate ideas, opinions, and perspectives on an issue's importance and significance. It also ensures that all research questions have been addressed.

iii. **Indexing**: The third stage of framework analysis is indexing. Indexing allows you to find sections or pieces of data that are relevant to a specific theme. All of the acquired textual material is subjected to indexing. To give a suitable sequence and reference, a numeral system should be used before the text. Indexing can be done with qualitative software such as Atlas.ti and NVivo.

iv. **Charting**: The fourth level of framework analysis is charting. The previous stage's indexed data is organised in charts for various subjects. Data is obtained from its original source and charted using headings and subheadings defined earlier in the topic framework or during primary research inquiries.

v. **Mapping and Interpretation**: The key qualities depicted in charts are analysed. A schematic map or diagram of the event is required to interpret the data set. The researcher becomes familiarized with outcomes of his qualitative research at this point. The method offered as a study output reflects the participants' genuine value, attitude, and belief because of associations, concepts, or technologies used to develop it are based on their observations.

3.3 APPLICATION OF THE FRAMEWORK ANALYSIS:

Framework Analysis is used to support data analysis for a variety of reasons. First, the framework analysis is well-suited to cross-sectional descriptive data analysis, which allows for the capture of different aspects of the research. Second, the researcher's interpretation of the participants' experiences is open to the public. Third, framework analysis elucidates the processes that

lead to systematic data analysis and the creation of descriptive and explanatory accounts (Ritchie and Lewis 2003).

Figure 16 Below is a stage-by-stage breakdown of the Framework Analysis employed in this study.

Stages			
	Data Management	**Descriptive Accounts**	**Explanatory Accounts**
Processes	• Familiarisation with Data (Reading and Re-reading) • Identifying initial themes/categories. • Developing coding index • Assigning data to themes and categories in the coding index .	• Summarising and synthesising range and diversity of coded data by refining initial themes and categories. • Identifying association between themes until the whole picture emerges. • Developing more abstract concepts.	• Developing associations/patterns with concepts/themes. • Reflecting on original data and analytical stages to ensure accurate presentation of participants account for reducing any misinterpretation. • Interpreting and explaining concepts and themes. • Seeking wider applications of concepts and themes.

Figure 16 :PROCESS OF FRAMEWORK ANALYSIS

3.4 DATA COLLECTION INSTRUMENT

Qualitative interviews are an adaptable and dynamic data collection technique. These are commonly used to express messages, points of view, and conclusions related to a study issue. The sort of interview chosen according to the study's needs determines the interview protocol. Open-ended questions were utilised to conduct the semi-structured interviews in this study.

3.4.1 PROTOCOL FOR CONCEPTUALISED FRAMEWORK

The protocol for the conceptualised framework was built using conceptual lenses. (Developed based on internal experience, Indian suggestive model framework, and Mumbai parallel licencing experience), which are discussed in the next section.

3.4.2 INTERVIEW QUESTIONS/PROTOCOL

Structured Interviews, Unstructured Interviews, and Semi-structured Interviews are the three types of interview questions that can be asked. In organised interviews, each responder is typically asked the same questions. This approach does not allow for variation in questions. Unstructured interviews, on the other hand, are considered to be more informal and do not contain a set of questions. Between the interviewer and the respondent, a comprehensive and holistic discourse takes place. Semi-structured interviews, on the other hand, take a middle ground between unstructured and structured interviews. This method creates an environment in which detailed discussion can take place. As a result, the interviewer assists the respondent in dragging into the study area, which aids in the collection of more thorough information with a greater degree of depth. Framework analysis is the most effective method to provide a focused and looping procedure even though a procedure is required for every sort of interview.

The study's interview protocol was designed using the conceptualised framework. The procedure that led to the creation of a conceptualised framework for Maharashtra's distribution sector was examined with industry professionals. After incorporating the necessary changes, the protocol was validated to make it final.

3.5 SUMMARY OF FRAMEWORK ANALYSIS RESEARCH METHOD:

To determine connections, meaning, and salience, Framework Analysis employs the researcher's creative and conceptual thinking abilities. To give the structure strength, a well-defined approach is required. The Framework Analysis method is a five-step process. In the first, the researcher becomes acquainted with the data's diversity and range, as well as an overview of the information gathered. During this stage, the researcher reads extensively and may also listen to recorded audios, among other things. After analysing the data, the researcher goes back to the notes and looks for key themes, topics, or concerns to which data might be referred in the next stage. Indexing is

completed in the third stage, which involves several judgments regarding the significance and meaning of data. Indexing is a technique for dividing large amounts of data into digestible chunks. In the fourth phase, indexed data is charted. In charting, data is abstracted and synthesised for a certain theme. According to the respondent's point of view a summary is entered here. Researchers discover essential characteristics of the data in the fifth and final step of framework analysis. In this stage, researchers interpret and map all of the data. Following this stage, the framework analysis approach used in research can be used to map ranges, establish typologies, find links, provide explanations, or develop strategies.

3.6 RESEARCH METHOD- FISHBONE DIAGRAM FOR ROOT CAUSE ANALYSIS

One of the research objectives of the study aims to provide different factors and possible root causes (financial losses, high borrowings and level of cross subsidies to be phased out) which resulted in the distribution sector of Maharashtra being financially unviable. The formulation of transfer scheme of segregating Network and Retail Supply Company requires allocation of losses, assets, and liabilities from one Distribution Company into separate entities. If the reasons of such losses are known, the rationale for allocating losses between the Network and Retail Supply Company will be revealed. Hence this root cause analysis would result in the formulation of appropriate Transfer Scheme and Rollout Plan of introducing retail competition in electricity distribution sector of Maharashtra.

Root Cause Analysis (RCA):

- Visible problem – symptom
- First level cause
- Higher level cause

Steps for RCA:

- Identify the issue (*The happenings and the specific symptoms*)
- Collect information (*The evidence for existing problem, the period of its existence and its impact)*
- Determine the potential causative factor: *(Rooting the sequence of events causing the problem, the conditions which allowed it to occur, and the other problems surrounding the central one's occurrence)*
- Determine the underlying cause(s): *(The reasons for the existence of causal factor, and the true cause)*

Tools for RCA:

- Fishbone Diagram: *Cause–and–Effect Diagram*
- Pareto Chart

After defining the Problem and collection of the Data, the First step is the diagnosis of the financial health of MahaDiscom through observation, financial analysis and RCA and identifying the prevailing issues within the MahaDiscom. ,The next step is to discuss the findings, linked to the observation and outline the major possible factors that are contributing to prevailing issues and their impact on the revenue and financial health of MahaDiscom. And, finally, the conclusion, which outlays the different root causes that affect the financial health of MahaDiscom by representing in Fishbone Diagram (i.e. Cause-and-Effect Diagram). The analysis and findings for this research objective are discussed in the subsequent section.

3.7 SCHEMATIC FLOW OF THE RESEARCH METHODS

The schematic flow for solving Four Research Objectives as set out in this research are explained as under: `

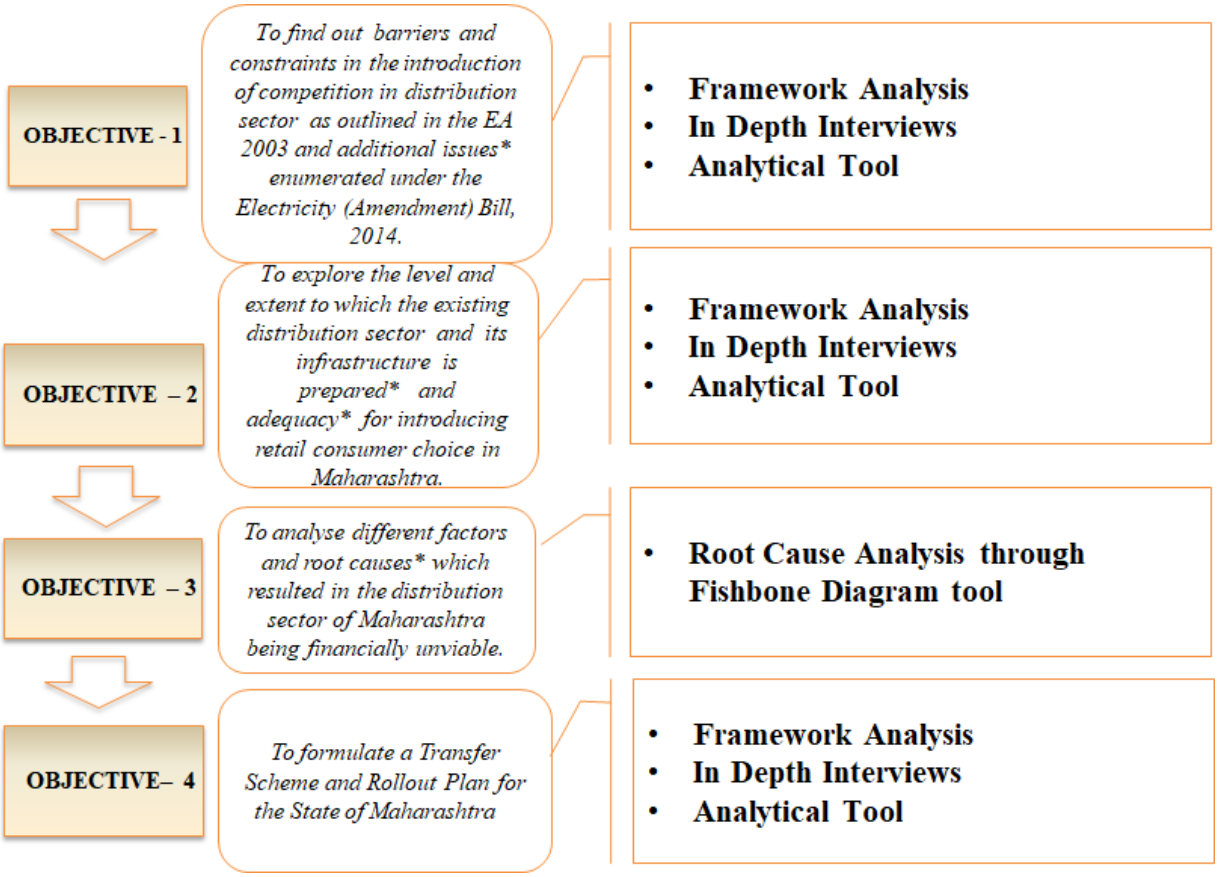
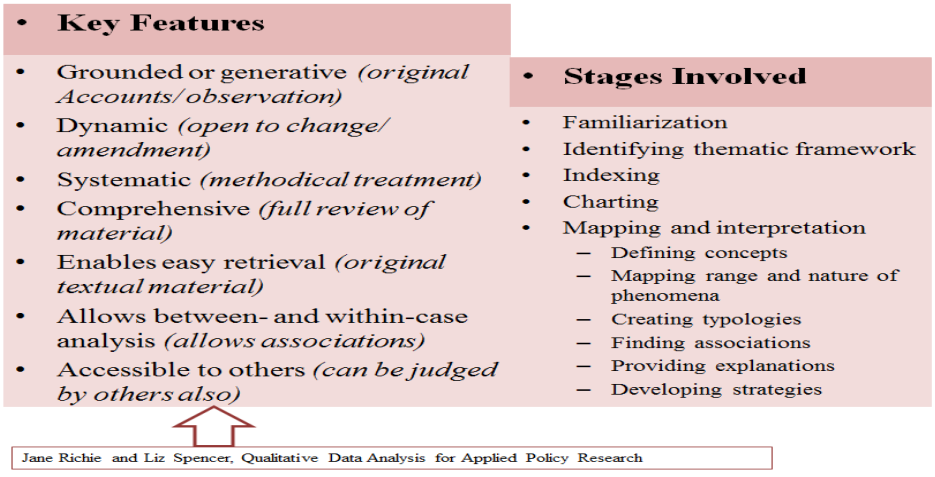


Figure 17 :Schematic flow

Depth Interview Data Analysis – Framework Approach



Data Analysis Framework on following 4 categories (Source: Ritchie and Spencer,1994):

1. Contextual (What exists)

2. Diagnostic (Causes of Existence)
3. Evaluative (Effectiveness of Existence)
4. Strategic (figuring out new policies/ plan/ action for improvement)

2. Transcriptions and data collections are stopped when the researcher thought no new material or new ideas / indexes/ codes are generated.
3. Recurrent themes and emerging issues are identified.
4. Themes and responses are indexed and charted.
5. Thematic charts are used for interpreting the qualitative data obtained through Depth Interviews.
6. Combine important data features to map and analyse the data as a whole.
7. Data Analysis done using modified grounded theory approach.

Following steps will be used iteratively for conducting data analysis (Yin, 2003):

1. Open coding
2. Axial Coding
3. Focused / selective coding

The first two steps will aid in researching and understanding the nature of experiential knowledge processes and their management in project teams by establishing the codes, categories, and concepts of experiential knowledge management in project teams. The final stage will assist in determining the link between experiential knowledge management and project team outcomes.

Quality of research: Followed these methods for quality of research according to the book (Yin, 2003).

- **Construct Validity**: Under consideration determining which operational measurements are best suited for the ideas in question.
- **Internal validity**: Proving a causal relationship, rather than a false relationship in which certain conditions are shown to cause other conditions.
- **External Validity**: Determining the domain in which a study's results can be applied.

- **Reliability**: demonstrating that the study's operation—for example, data gathering procedures—can be replicated with the same outcomes.

CHAPTER 4: CONCEPTUALISING FRAMEWORK FOR INTRODUCING RETAIL COMPETITION IN ELECTRICITY DISTRIBUTION SECTOR OF MAHARASHTRA

This chapter conceptualizes a retail competition introduction framework in the electricity distribution business of Maharashtra. The conceptualization is based on three conceptual lenses. The first conceptual lens is developed based on International Experience. The second conceptual lens is developed based on the Indian suggestive prototype framework governing retail competition in India by FOR in pursuant to Electricity Amendment Bill 2014. The third conceptual lens is developed based on Mumbai experience through various study report, Regulations, Regulatory Orders, and reports which also includes Maharashtra's power sector scenario. In last, the discussion on conceptualized framework leads to the formulation of the interview protocol.

4.1 INTRODUCTION

The objective of this study reveals the need to develop a framework for introducing retail competition in Maharashtra's power distribution sector after assessing its preparedness and adequacy, as well as the reasons that contribute to its financial unviability and learning from Mumbai. Before developing such a framework, conceptualisation for the same is necessary.

Five worldwide experiences of United Kingdom, Australia, the Philippines, New Zealand, and California have been selected for a comprehensive study of the reforms in power sector, in particular criteria that needed to be considered for the introduction of RSC in India, with mixed experience of success and failures, in order to develop the conceptual lens of international experience.

To develop the conceptual lens of the Indian suggestive model framework, the following documents were studied: i) Fourth Report by Standing Committee on Energy, Electricity (Amendment) Bill, 2014, ii)

Introducing competition in retail electricity supply in India 2015, FOR. On other hand to develop the conceptual lens for Mumbai experience and Maharashtra's distribution sector, Regulatory Tariff Orders for Paralleling Licensing and Mumbai Distribution Licensees along with balance sheets of MSEDCL are studied.

The conceptualized framework is then described. Based on the understanding developed by the conceptualized framework, an interview protocol was drafted. Before finalization, this draft was discussed/validated with the industry experts and PhD guides for necessary modifications.

4.2 INTERNATIONAL EXPERIENCE ANALYSIS IN INTRODUCTION OF RETAIL SUPPLY COMPETITION.

In the United Kingdom, New Zealand, Singapore, Norway, Finland, Spain, Argentina, and numerous Australian states, along with California, U. S. A., the competitive retail supply strategy is completely implemented. Other countries, such as the Philippines, are currently implementing it in various phases. The UK and Victoria, Australia, are commonly considered as pertinent implementation models, where introducing competition in retail power supply entailed the segregation of distribution and supply operations, which was deemed necessary in the Indian context, and resulted in a decrease in electricity rates for low-end users. Five examples from across the world were chosen for a thorough examination of their electrical reform processes, with a focus on key variables that needed to be evaluated for establishing retail supply competition in India, as well as mixed success and failure experience. The FOR presented a framework for India, which was assessed based on diverse global experiences on main concerns about energy retail supply competition.

The study chose five countries: the United Kingdom, Australia, the Philippines, New Zealand, and the state of California in the United States, because these countries have segregated distribution and supply functions from Discoms, as is required in India. Furthermore, researchers focused on factors

that must be solved while integrating retail supply competition in India while reviewing the research on these nations' expertise with retail competition. Splitting existing Discoms, segregating distribution and supply operations and possession, structuring power procurement from the wholesale market, tariff determination, reducing cross-subsidies built into existing tariffs, USO, phasing retail competition, a structure for consumer interfaces, and updating metering infrastructure are just a few of the requirements.

United Kingdom (UK): The United Kingdom has developed a successful model of competition that began in the end of 1980s and underwent various transitions prior to retail competition implemented for the end customer up to the household level in the retail energy sector. The electrical structure was vertically integrated before the reforms in the UK with the state-owned Central Electricity Generating Board (CEGB) in charge of power generation and transmission, and regional area boards in charge of power distribution and supply to specific geographical areas. The following are some of the most significant changes in the industry:

- State-owned CEGB's generating units in England and Wales were handed to National Power, Powergen and also transmission business to National Grid Company, i.e., NGC.
- The local distribution networks were handed to the RECs, immediately prior to the regional area boards that were changed by 12 Regional Electricity Companies (RECs) which were eventually sold off by the government.
- The electricity pool was formed in England and Wales as a retail market mechanism for exchanging electricity. By giving generators the ability to present bid prices for each half-hour of the day, the Pool was developed to stimulate competitive bidding for electricity. The system's clearance price was decided by the last unit necessary to meet demands, and the bids were prioritized by price. As a result, the Pool served as a conduit for wholesale customers and generators (primarily the RECs). On behalf of Pool members, the NGC ran the Pool and supervised the settlement mechanism. The Pool

was frequently exposed to regulatory measures aimed at avoiding re-integration into the power industry and curbing monopolistic behaviour.

- The Electrical Council should be abolished, and a system of independent regulation should be established to regulate the newly privatised electricity industry.
- These reforms changes unbundled the vertically integrated structure of the power sector of the UK, however, distribution and supply both remained as the combined function of Regional Electricity Companies. These Regional Electricity Companies were allowed to do limited investment in Generation which was up to 15% of the sales volume of the respective company.
- The Utilities Act of 2000 stipulated that distribution (wire) and retail supply businesses be owned separately. The former distribution/retail licences have been removed, and a new Great Britain-wide permit has been issued, allowing all suppliers to supply clients across the country. Customers were classed as "franchise" or "non-franchise" on the retail side of the market. Non-franchise clients could choose from any of the 12 RECs, the pool, or the merchants as their provider. A distribution network operator could no longer sell power as a retail supplier as a result of this legislation. The notion that allowing Discoms to continue providing retail services could impair market competition backs this up. When it came to network-related services, these Discoms may have distinguished between their own customers and those who acquired supplies from competitors, or they may have subsidised their own customers by utilising the wire rate to cross-subsidize them. As a consequence, the 2000 Act segregated retail supply's competitive activity from the essentially monopolistic distribution sector, eliminating any chance for conflict of interest.
- The retail market was opened up to competition in three stages between April 1990 and May 1999. The supply industry chooses to open up the “supplier choose” for consumers in three phases. Consumers with a connected load higher than or equal to 1MW were given the option of choosing their own supplier in April 1990. Users with a connected load

larger than 100 KW have had the ability to pick their supplier since April 1994, and all consumer groups have had the freedom to choose their provider since September 1998.

- During the years 1999-2000, 80 percent of consumers with loads greater than 1 MW chose to purchase power from the competitive market (Supplier other than the local PES). 67 percent of consumers in the 100 KW–1 MW sector also chose power from non-local PES suppliers. In the lower end of the market (loads under 100 kW), 38% of electricity customers changed suppliers. This supplier change occurred one or more times.
- Services related to the meter involve meter operation and meter provision. Metering services in the UK are provided by meter operators while the services related to the metering point administration are obligated to be given by the distribution company. The area of metering services is not the monopoly and any authorized company may provide meter related services in line with the provisions of the EA 1989.

For a country considering separating the electrical wire and retail supply industries and establishing retail competition, the United Kingdom's experience is quite good. This shows that a phased approach to retail competition is necessary to allow the market, which has previously been mostly immune to competition and regulated by a regulator, to develop into a competitive price determining system. The development of a trade pool that was regularly examined, evaluated, and altered by the regulator through numerous review procedures to ensure the correct functioning of trading arrangements, was a key aspect of retail sector reforms in the UK. The wholesale market has evolved into a comprehensive mechanism for power trade, complete with specialised financial instruments and tools. This, in combination because of the energy surplus condition, was crucial in aiding retail reforms.

Retail electricity rates declined as a result of a number of factors, including wholesale market reforms and the invention of a new energy source, which supplemented the benefits of retail competition (gas). Regional Electricity Companies were permitted to purchase up to 15% of their power

from own facilities. As a result, the segregation of generation and retail was jeopardised. Until 1998, generators bought retail businesses and retail businesses bought generators.

The RECs were urged to separate their distribution and retailing businesses in accounting terms. The golden share requirement shielded them against acquisition for the first five years (i.e. at least 51 percent of voting rights at all time with the company). The regulator was concerned about the possibility of the retail sector being subsidised by limiting competition in the distribution sector. By 2004, companies other than retail shop owners owned the majority of the distribution in England, Wales, and Scotland. Scottish and Southern, EDF, Scottish Power, Power-Gen, and Scottish and Southern all have distribution and retail operations. To eliminate the risk of unequal network access, the government made it a priority in 1990 to make sure that generator did not own the transmission. The Government was able to achieve this goal by the formation of National Grid Transco in 2003.

The fully competitive structure that had been intended is no longer possible as a result of the government's decision to allow generating and selling to be integrated. The parent firms of three foreign corporations are significantly larger than the parent companies of the three British-owned enterprises among the six integrated companies.

Another thing we may learn from the UK is how the universal service responsibility protected consumers' rights and ensured their power supply by giving the IDL Last Resort Supply directive in specific instances. Furthermore, "Duty to Connect" refers to DNO's obligation to make the distribution network available on demand, whereas "Duty to Supply" refers to incumbent licensees and competitive retailer(s)' obligation to meet all reasonable demands for electricity supply made by consumers in their supply areas based on criteria that are both acceptable and permitted.

Victoria, Australia: Victoria is the first state in Australia to implement retail competition, as it has the country's largest energy market, with 2.1 million residential and 300,000 commercial customers. The purpose of restructuring

Australia's power industry is to make it more competitive and increase the country's economic efficiency and international competitiveness while simultaneously reducing state and national deb. The result was expected to be lower prices and improved service. Reforms were implemented during a 25-year period beginning in 1980. The following were the most notable aspects of the reform of the power industry:

- Privatization and corporatization of state-owned electric utilities into independent governmental corporate divisions to commercialise them;
- Segregation of vertical and horizontal electrical business through structural unbundling of GT&D and retailing services (assets);
- National Electricity Market establishment, which will function as a trading pool which is centralized and market based for the purchase and sale of Power; and
- Creating adequate regulatory frameworks.
- Full retail competition was established across Victoria in 2004, after a 24-year preparatory period, and there are now five electrical networks (known as distributors) in operation. The power networks in various geographical areas are owned and maintained by these distributors. Power providers can establish their retail pricing now that the retail market is fully deregulated. In November 2012, fourteen major retailers were present selling energy to Victorian residents. In Victoria, the phasing of competition was highly cautious, with the initial phase focusing on smaller (in terms of the number of customers affected) areas, which were gradually deregulated over time. Significantly, Victoria's implementation of the Maximum Uniform Tariff (MUT) system was a useful step toward ensuring substantial lowering in tariff for end users. Furthermore, lawmakers should exercise caution before enacting such a measure, as the disadvantage of a fixed retail tariff regime can be seen if prices in the generation/wholesale market start rising unexpectedly without accounting for other factors in the specified retail tariffs/MUT, as retail businesses would be severely impacted. As mentioned

later in this section, a variation of such a scenario occurred in California, with tragic results.

Philippines: The Electric Power Industry Reform Act of 2001 mandated the implementation of the Retail Supply Competition and Open Access system in the Philippines (EPIRA). The EPIRA intends to make power markets more competitive in recognition of the fact that the Philippines' electrical business, as it was organised, was unsustainable and underperforming. The electrical regulator kicked off the process of establishing retail competition by stating unequivocally that competition will enter the market if the EPIRA's pre-conditions were achieved and the regulator declared it. When this occurs, customers will be able to select their RES, with industrial and commercial consumers being the initial ones' to be able to do so. The EPIRA requires phasing out of all cross-subsidies over a set length of time. Every cross-subsidy threshold is to be disclosed as a different item in consumer bills until cross-subsidies are completely removed. It was necessary, among other things, to establish a UC that would be collected from all electrical consumers in order to account for all sorts of cross-subsidies that remained during the phasing-out period.

New Zealand: It is the one country that has separated distribution from remaining power industry through forced separation of ownership. The network assets are owned and operated by a distinct entity under ownership unbundling. This firm is not permitted to have or operate non-regulated generation and/or retail businesses.

The Energy Companies Act of 1992 began the liberalisation and deregulation of New Zealand's energy sector. Self-regulation regimes were offered to Power Supply Authorities (ESAs), often known as Discoms. Following the 1992 bill, the government passed the Power Industry Reforms Act in 1998 to address issues that arose between 1992 and 1998, including increasing generation competition by separating the existing big company ECNZ and forcing the industry to make it easier for customers to switch suppliers at their leisure. The Electricity Industry Reform Act of 1998 required Complete Separation of

ownership of the distribution and supplier firms, i.e. line, retail, and generation businesses. By April 1, 1999, power firms had to complete interim corporate unbundling, and by December 31, 2003, they had to separate the Electricity Supply and Retail Businesses. Despite this, New Zealand's electricity industry elected to move fast, completing the ownership split on April 1, 1999. As a result, electricity retailers' switching systems were made available to New Zealand power industry customers.

Commercial power rates have decreased, but rates of industrial consumers have remained unchanged and rates of residential consumers have risen. As a result, the average electricity price has stayed unchanged. Although competition appears to have increased for large commercial users, average electricity rates appear to have remained same. After decreasing between 1997 and 2001, the pricing cost margin has consistently increased. The number of competitors dropped from 43 to 22, implying greater concentration and less competition. Ownership unbundling has had a mixed impact on retail competition. The competitiveness has decreased following a reduction in the price-cost characteristic, which indicated increased competition. The quality of networks has improved as a result of unbundling, and there has been a significant reduction in operational costs.

California: The most important cautionary storey in the area of power sector reorganisation is the California experience. Industry reorganization and modifications aimed at deregulation and more competition went tragically wrong within several years, wreaking havoc on the California energy industry and also the state budget.

According to several accounts, rates in California's competitive wholesale energy market surged by 500 % from 1999 to 2000, and wholesale spot rates were over 10 times higher in the first four months of 2001 than they were from 1998 to 1999. In any case, retail prices, which were set by the regulator prior to 2001, were unable to keep up with the unanticipated increase in wholesale rates, and as a result, California's two largest utilities went bankrupt in 2001, because they were paying far more for wholesale power than they were paying for high-

priced retail power. Finally, the state of California was forced to intervene, and state money were used to help the state weather the storm (FOR, 2015).

Before 1994, California's energy business provided by three Investor-Owned Utilities (IOUs), with vertically integrated monopolies that were highly controlled. To cater to consumers in their exclusive franchise territories, these IOUs were responsible for the GT&D of electricity. The California Public Tariffs, pricing, performance, and service requirements were all under the authority of the Utilities Commission (CPUC). In April 1994, the CPUC introduced a significant structural reform, outlining a new industry structure in which power generation from existing and new generating units would be deregulated and sold in a competitive wholesale market. Retail customers can choose to get "direct access" to such competitive wholesale markets by simply connecting to their local utility's wires system, or they can continue to get power from their local utility at regulated standard service rates, which are limited under the standard service pricing model.

Since 1998, all retail customers have had the option of selecting a competitive ESP to offer generation services. If they did not choose an ESP, they may receive "regular service" from their Discom at the indicated standard service prices. During the four-year transition phase, most retail customers were projected to progressively shift to ESPs. Nevertheless, despite of expectations, just a small percentage of customers (>12 percent of retail demand) switched to ESPs.

Some lessons from the International Experience

1) International experience implies that competition is often introduced first in the upstream sectors of an industry, such as generation and the development of a wholesale market by allowing direct access from generation to major users in the case of electricity. The distribution and transmission of electricity remained controlled monopolies. As a further step, most regulators chose to establish an electrical pool in order to construct a wholesale market.

2) Despite the fact that the distribution business was kept as a monopoly, certain parts of the distribution business were considered as having room for competition. The segregation of the cables and supply business, as well as the introducing of competition in retail sector, have therefore been the focus of sector reform initiatives at the retail end. As a result, generating and retail supply have become areas that could be competitive, whereas T&D businesses have become natural monopolies. Because of inherent difficulties with the monopoly character of the distribution company, regulators in various nations have only permitted retail competition to begin when the distribution business has been separated into supply and wires businesses.

3) Energy supply is often separated from distribution wire operation and ownership after wholesale competition, and a number of suppliers or retailers compete to sell power to consumers, or rather, consumers choose their suppliers, allowing retail competition.

4) The United Kingdom, Australia, and a number of other nations have implemented retail competition, initially for large consumers and later for all electrical customers.

5) India may be opened up to retail electricity competition only after a thorough examination of retail competition's success in relation to other consumer categories.

6) The imposition of a UC on all power consumers to phase out lingering system cross-subsidies is a proposal that India could consider, where massive cross-subsidies still exists in retail pricing. It's also worth remembering that before embarking on the path of retail competition, the Philippines undertook significant wholesale market changes.

4.3 ANALYSIS OF INDIA'S MODEL SUGGESTIVE FRAMEWORK FOR THE INTRODUCTION OF COMPETITION IN THE RETAIL SUPPLY OF ELECTRICITY.

The Electricity Bill of 2014 advocates for the segregation of wire and supply businesses to increase competition, however it is silent on a number of concerns, including rollout plans and the use of division and reorganisation in segregated businesses. In order to resolve the confusing areas of Bill 2014, the MoP, GoI, requested the FOR to prepare a rollout plan and transfer scheme to bring in the necessary clarification on the challenges connected with adopting the state framework. As a result, FOR devised a model rollout plan for the segregation of carriage and content businesses for Indian states to implement. It has suggested implementing it in three steps for a smooth transition of the energy market into retail supply competition: functional segregation of Discoms, preparation for competition, and competition commencement.

FOR has suggested Three Stage implementation process which is as under.

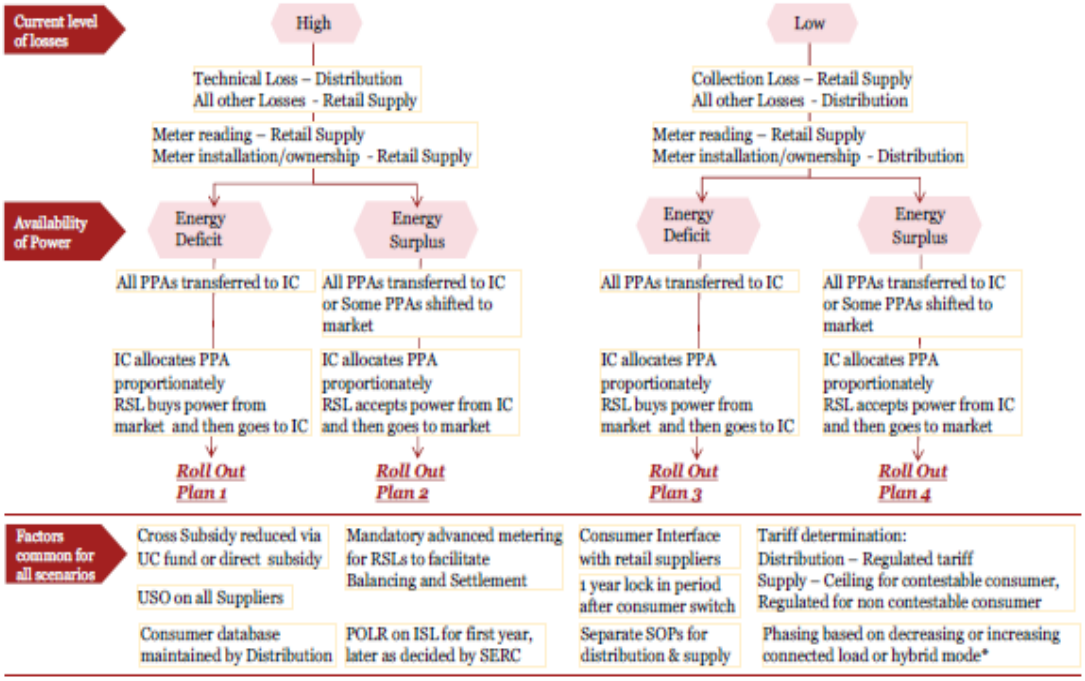
Stage		Time period to complete
1	**Functional Segregation of Discoms:** In this stage, the current Discoms would be segregated into Distribution and Retail Supply functions. Their individual roles and responsibilities will be defined and they would be equipped with enough financial and manpower resources to take on those roles.	1 - 2 year(s)
2	**Preparation for Competition:** In this stage the, steps would be taken to make the market conducive for retail supply competition like ownership segregation, cross subsidy reduction, upgradation of metering, loss allocation etc. Entry barriers would be removed in order to create a level playing field for all and encourage competition.	Start: after stage 1 objectives are achieved Completion time: 2-3 years after completion of Stage 1
3	**Onset of Competition:** New Retail Supply Licenses would be given in this stage in order to give retail consumer choice. The market would be opened up for competition in phases i.e. initially certain set of consumers would be open to competition and then gradually other consumers will be brought under the purview of competition.	Start: after stage 2 objectives are achieved This stage will be an ongoing activity till the time all consumers are open for competition

States are obligated to place their Discoms on a financially sustainable route for power sector reforms stipulated by the Centre because energy is a concerning issue under the Indian Constitution. States, on the other hand, are implementing these reforms in the energy industry in a variety of ways, resulting in a variety of distribution networks across India. As a result, FOR's model

framework may not be relevant across India's several states, necessitating a detailed plan for each state that considers distribution preparedness and adequacy into account. Several tasks must be completed and several problems that arise during the application of these tasks must be taken into consideration for the introduction of competition in the retail sale of power to ensure the financial viability of the Discoms as well as the provision of quality power and uninterrupted supply to customers at a competitive rate.

As a result, FOR has offered four Rollout Plan Scenarios and advised that rollout and transfer schemes be prepared based on these scenarios, which consider existing levels of losses, power supply, and other considerations such as cross-subsidy built-in pricing and metering infrastructure.

Scenarios of Rollout Plans suggested by Forum of Regulators



Following key steps are suggested for preparation of Rollout Plan and Transfer Scheme:

1. Functional segregation of Discoms and its structure into:

    a. To encourage competition, the ISL will provide retail supply to customers alongside the entry of other Retail Supply Licensees.

   b. IC will be Inheritor/repository of current PPAs between Distribution Licensees and Generators.

   c. A restructured DL that only deals with network.

2. Technical and commercial losses are allocated across distribution and supply businesses.
3. Segregation of present Distribution business amongst new businesses on the balance sheet.
4. Treatment of existing financial losses
5. Power procurement mechanism and wholesale market
6. USO and creation of SOLR
7. Upgradation of infrastructure and metering
8. Reduction of cross-subsidies.
9. Tariff setting mechanism.
10. Phasing of retail supply competition.
11. Consumer switching mechanism.
12. Framework for the consumer interface and grievance mechanism

These identified tasks for the preparation of Rollout Plans by States are discussed as under:

(i) Functional segregation of Discoms and their structure:

In order to separate the competitive part from the monopoly segment, incumbent governments have primarily led international experiences in functional separation of Discoms by dividing wire and retail supply businesses. The governments of the United Kingdom, Australia, and the Philippines took a step-by-step approach to introducing competition in electricity retail supply, according to research of best international practises, whereas in New Zealand, the unbundling of distribution from the rest of the electricity supply industry

was accomplished forcefully. International experience has also indicated that having a strong and competitive wholesale market is critical for the functional separation of Discoms.

The second step of most international cases is separating distributor and retailer obligations and ring-fencing the distribution wire and retail supply businesses by forming network operators.

The introduction of retail supply competition to a specific group of customers, specifically franchise and non-franchisee customers, was the next phase in the functional segregation of Discoms.

The Electricity (Amendment) Bill 2014 in India states that the current DL will be divided into three categories:

(1) ISL for provision of retail supply to consumers along with the entry for other Retail Supply Licensee to encourage competition;
(2) An IC that will inherit and store current PPAs between DLs and Generators;
(3) The DL has been reorganised to focus solely on the network.

Separating the new DL into DNO, DPO, DSO, and DMO was suggested by FOR of India. These tasks would be assigned to various organisations to avoid conflicts of interest and to ensure that operations and investments are focused on each objective. In the early stages of RSC, a DL may be assigned DNO and DPO responsibilities, whereas an SLDC or an Intermediary Company could be assigned DSO and DMO responsibilities. Due to the unavailability of SCADA systems in many modern Discoms, SCADA must be constructed for DSO before RSC can be implemented. In terms of ownership, FOR recommended that the previous Discoms be split into two functions: distribution and retail supply in the first stage, and the State Government either redirect money or remain as a separate entity with autonomous ownership supervised by the state in the second stage.

The structure proposed by FOR does not deal with the problem of preventing subsidised retail businesses from stifling competition in the distribution sector or Mechanism to meet revenue shortfall of incumbent supply

licensee in case cross-subsidy is eliminated and multiple supply licensee is allowed. Furthermore, the framework has been unable to provide any measures to integrate generation and retailing, as best worldwide practices suggest. Therefore, to successfully implement the separate carriage and content, a developed electricity market is a must that address the concerns prevailing in the existing power sector as well as need not affect the financial viability of the incumbent supply licensee.

Conclusion:

Based on the findings of the study and best global practises, it is recommended that India eliminate the concept of mixing generators and sellers. When cheaper power becomes available, retailers will be unable to avoid competition by establishing long-term PPAs with their own generators (e.g., Tata Power, Reliance Infrastructure, Torrent Power, RPG Group), putting the wholesale market at risk. In India, a single company with both generation and distribution characteristics is selling electricity from its generator to its distribution company, essentially removing competition and favouring monopolistic behaviour.

Furthermore, Discoms should be completely separated from the distribution wire/network business to eliminate the possibility of the retail company being subsidised by distribution market competition. If a Discom continues to sell electricity at retail, it can differentiate network-related services for its own customers and those who buy from competitors, or it can cross-subsidize its own customers by using the network tariff. A single network licensee, as used in other industrialised nations, can be a solution to eliminate any duplication of the distribution network, which could negatively affect end-user tariffs.

(ii) Mechanism for Power procurement and wholesale market:

Before introducing competition in the retail provision of electricity, a strong wholesale market for energy procurement (typically a spot market and, over time, a secondary futures market in hedge contracts) must be established,

according to international trends. The best worldwide methods, whether from the United Kingdom, the Philippines, or Australia, have all established that a national-level energy pool or a highly competitive wholesale market, along with a power surplus situation, is required for RSC in electricity. This aids merchants in obtaining power at market-competitive prices. Lower electricity rates can be attributed to the success of a power pool in Victoria, Australia.

According to the FOR framework, incumbent Discoms' current PPAs should be transferred to Intermediary Company, and state governments should investigate the possibility of reallocating part or a portion of these agreements to the wholesale market. The IC would offer these PPAs to various RSC based on their power consumption. The framework also suggests that if the number of PPAs issued by current Discoms exceeds the region's power consumption, the IC may be left with extra PPAs after meeting the needs of retail providers.

Furthermore, power may be offered on the market at cheaper prices than the PPAs. In this case, the RSCs are more likely to purchase power from the market than from the IC. However, because the IC lacks the assets or income to sustain financial losses from unassigned PPAs, FOR recommended that the RSCs take all of the IC's power and then seek out the market for any remaining needs.

The FOR model proposes a system for PPA transfer rather than a model for the construction of a national-level wholesale market mechanism for RSC.

Also, due to Universal Service Obligation to the incumbent Licensee (Provider of Last Resort), the power purchase planning will be difficult since the subsequent supply licensee may cherry-pick the high-end consumers whenever suited for him. This will make the power purchase/capacity contracted stranded, and the incumbent Licensee will be additionally burdened for such stranded capacity. These issues have not been addressed clearly in the proposed amendment in the Electricity Act.

Conclusion:

The system for the wholesale market in India should be examined, and seller or buyer supremacy should be abolished. This can be achieved by arranging the market in such a way that:

(1) The short-term market, which used to account for approximately 5-10% of total energy sales across the country, has expanded significantly, and Retail Supply Companies should be able to meet their needs at competitive pricing;

(2) National pools or markets, i.e., State Gencos contracted to State Discoms, should be introduced to the market in stages, and policies should be created in this regard;

(3) Monopolistic generators having the ability to sway the market must be handled and restrained.

(4) In addition to the above, the allocation of power capacity by the IC to the licensee cannot be at pool cost and a mechanism is required to allocate power based on the Consumer mix of the supply licensee. Also, the Marginal Cost of power purchase approach may be adopted to protect the interest of low income /agriculture consumers.

(iii) Upgradation of infrastructure and metering:

Rather than adopting the traditional interconnected metering department strategy, top global practises recommend founding an independent metering firm to separate original metering businesses from their big businesses.

This is achieved by a multi-level segregation method that incorporates third-party arrangements for the functions listed below:

(1) Acquisition, property management and reporting, issue assessment, and case formulation administration are just a few of the services available;

(2) Installing, operating and maintaining the meters.

Furthermore, improved metering infrastructure was developed as a precondition for the establishment of RSC in the majority of international cases. It's because it will allow consumers to transfer between retail suppliers without having to install new metres or duplicate assets. In some international

circumstances, discoms are still in charge of metering system supply, deployment, and maintenance. In most cases, AMI development entails the implementation of new metering technologies such as Time-of-Use metering, prepaid metering, and so on, which have improved retail supply competitiveness, asset management, accurate invoicing, and collection.

According to the FOR framework, Retail Supply Companies would be responsible for metering and reading, whereas retail suppliers would be responsible for decreasing collection inefficiency loss. Metering responsibilities like as metre installation/replacement, metre ownership, metre operation, and checking would be assigned to Distribution, Retail Supply Company, or a third-party organisation, based on the ways taken to loss allocation. According to the FOR model, existing metres should be replaced with advanced/smart metres capable of capturing intake every 15 minutes to allow for precise supply loss counting, computation of power purchased actually and sold out by each Retail Supply Company, and identification of deviation settlement of energy scheduled for each Retail Supply Company.

Conclusion:

To address the concerns about a Discom cross-verifying electricity metre reading data, it is proposed that electricity consumer metres have data transfer/download functionality, and that actual energy drawl accounting, metre installation, and metre operation and maintenances of metering system be made available to third-party services (rather than remaining regulated) (i.e. Discom).

(iv) Framework for the consumer interface and grievance mechanism:

Customer complaints, enquiries, and requests are handled separately by distribution and retail supply businesses in the vast number of global cases. If a customer is unhappy with the outcome of their issue, they can make a complaint with the Ombudsman. Consumer concerns that the energy company is unable to address are investigated by the Ombudsman (after 2 months). The Electricity Ombudsman has been given the authority to fix the issue and explain the situation, as well as to make a cash reward. The ombudsman collects the

company's case cost, and the service is free for customers. In the event of a power line failure, the Retail Supply Companies and the relevant Discoms must consent on a protocol outlining the procedures to be followed to tackle the problem and an information distribution programme for the affected customers. There is also the option to submit a complaint with the Electricity Regulatory Commission if a consumer has an unresolved problem.

FOR recommended that the RSCs provide a single point of contact for all consumer complaints, inquiries, and requests. A double-layered CGRM with a single grievance forum for all businesses (Distribution, Retail Supply Company, and Metering if appropriate) and an independent electricity ombudsman should also be designed.

Conclusion:

Following the events in Mumbai, the Electricity Act of 2003 expanded the consumer complaint and grievance resolution process, requiring both distribution and retail supply companies to create a single-window interface for all customer complaints and requests, as recommended by the Forum of Regulators. The framework, on the other hand, overlooks the requirement for a protocol in the event of an emergency or a power supply line outage, as well as the need for Retail Supply Companies and Discoms to work together.

(v) Tariff determination mechanism:

According to global experience, the retail supply industry is a competitive market with no price limits on retail tariffs. Electricity retailers, even ones with regulated prices, can service all customers in a competitive market. Customers who opt for this option will be moved from the regulated to the market contract price. On the other hand, regulated electricity prices remain a critical component, particularly when clients reject to propose a market contract or accept the offer, resulting in a regulated price. Small clients that pick a market contract can later switch to a non-market contract at the regulated price, subject to the market contract's contractual terms. In effect, the regulated pricing

establishes a minimum price that clients must pay. Regulated pricing, as a result, must appropriately reflect the costs and risks that energy sellers incur.

According to the Forum of Regulators model, the SERC will have to decide unbundled rates independently for distribution and retail supply firms. The SERC would set a regulated price for the distribution industry. Unless consumers are prepared to enable competition, the State Electricity Regulatory Commissions will set a fixed price for all incumbent Retail Supply Company customers. The SERCs would be required to create two separate rates for the Retail Supply Companies following the introduction of new Retail Supply Companies: a regulated tariff for non-contestable consumers and a ceiling pricing for contestable consumers. Retail Supply Companies would be obligated to include a standard tariff plan with a ceiling rate in their offer. Because incumbent Retail Supply Companies have both contestable and non-contestable customers, they must keep separate financial accounts for each.

Conclusion:

The Forum of Regulators framework's pricing/tariff determination system is likely to be in line with best worldwide practises. In the instance of the Mumbai parallel licencing operation, practice has revealed that in RSC, setting a ceiling tariff requires a consistent sale and revenue balance amongst Licensees for whom the ceiling must have been established.

As a response, it is advised that an intentional solution reflecting the Mumbai model be devised to foster retail competition, and that the installation of a ceiling tariff be explored in deeper level. Additionally, the California example portrays a circumstance in which retail electricity prices were set at a ceiling and held steady while wholesale prices soared, culminating in the bankruptcy of California's top 2 utilities and, as a consequence, the RSC model collapsing.

In the FOR suggestive framework, it is suggested that India implement strategies to remedy California's failings.

The tariff setting Mechanism also needs to address the impact of cross-subsidy and non-availability of compensatory surcharge that will affect the financial sustainability of the incumbent supply licensee and tariff shock to its consumers.

A balanced approach between cost-reflective tariff, market-oriented tariff and compensation determined tariff is to be adopted.

(vi) USO and creation of SOLR:

USO provisions address the duty to connect and the duty to supply on a worldwide basis and are intended to ensure that no customer is left without access to energy. If an energy retailer experiences difficulties, such as licence revocation or loss of privileges to purchase electricity from the wholesale market, all of its customers will be automatically transferred to the SOLR without losing service, and if one local retailer fails, its customers will be transferred to the remaining local retailers.

On a global scale, the ERC governs the terms and circumstances of power supply via SOLR. The SOLR rate is higher than the ex-ante nodal energy price on the applicable wholesale electricity spot market and the SOLR's bilateral contract price, plus a ten percent premium.

According to the Forum Of Regulators concept, the USO's "Duty to Connect" for connecting the network to customers should be passed to Discom, but the responsibility of supplying energy to customers should be assigned to the incumbent Retail Supply Company at first. When a new Retail Supply Company enters the market, they are also bound by a supply commitment. The Incumbent Supply Licensee would be accountable if the Retail Supply Company fails to provide electricity to its customers because the provider is insolvent or lacks sufficient power, according to FOR. It was suggested that the State's transfer mechanism and roll-out plan would need to define whether the SOLR, i.e., the ISL, would be paid based on the tariff imposed on customers by the failed Retail Supply Company, competitive tariffs, ceiling tariffs, or actual cost pass-through to consumers.

Conclusion:

Forum Of Regulators proposed model for Universal Supply Obligation and SOLR formation appears in line with practises internationally and could be accepted.

Though it is specified that in case of the failure of RSC to supply power due to insolvency or insufficient power to the end consumer, the responsibility goes to ISL. But the availability of the power with ISL along with the technical arrangement and the applicability of the tariff are the issues that are required to be addressed.

(vii) Cross-subsidies reduction:

Built-in cross-subsidies must be removed or phased out before the start of RSC, according to international experience. All sorts of cross-subsidies were phased down over a specified length of time in most international circumstances before the establishment of full RSC. If cross-subsidies persisted after the retail RSC was implemented, the ERCs were required to create a UC that would be collected from all electricity users in order to account for all sorts of cross-subsidies that persisted during the phase-out period.

According to the Forum of Regulators model, given the large amount of cross-subsidies for particular categories in some states, the strategy of 'Year on Year tariff hikes' may culminate in tariff shocks. Moreover, the wheeling charges may not be enough to pay the high amount of cross-subsidies. As a consequence, Forum of Regulators advocated that cross-subsidies be reduced either using Universal Charge fund or a straight government subsidy.

Conclusion:

To avoid regulatory ambiguity before and after the introduction of competition, all Electricity Regulatory Commissions should be required to use a precise approach for establishing Universal Charges for restoring cross-subsidy. These UCs must be in addition to the tariff ceiling.

Also, as can be analysed from the below Table, at present for FY 2020-21, the cross-subsidy to the extent of Rs. 12,497 crores for MSEDCL are met by the subsidising consumers whereby Agriculture is the major subsidised consumers. In the case of Multiple Supply Licensee, Subsided consumers might be staying with the incumbent supply licensee and elimination of cross-subsidy to such a large extent may result in tariff shock for consumers as the subsidizing consumers may become a consumer of other Supply licensees. Therefore, the Mechanism to meet the revenue shortfall of the incumbent supply licensee in case cross-subsidy is eliminated and multiple supply licensee is allowed needs to be determined which can be by way of UCs or inbuilt cross-subsidy mechanism for new supply licensee to offset the loss of incumbent supply licensee.

Table 3: Details of Cross Subsidy of MSEDCL for FY 2020-21

Details of Cross Subsidy for FY 2020-21 (MSEDCL)					
Category	**Sales – Mus**	**Cross Subsidy - Rs. Crs**	**Category**	**Sales - MUs**	**Cross Subsidy - Rs. Crs**
Subsidising Consumers			**Subsidised Consumers**		
Industrial	41,672	4,993	Residential (Below 100)	(14,901)	1,866
Commercial	8,694	4,138	Agriculture	(28,130)	9,163
Residential (Above 100)	7,753	2,735	Others	(7,391)	1,468
Others	3,509	631			
Total	**61,628**	**12,497**	**Total**	**(50,422)**	**12,497**

Also, as per the recently proposed amendment in the Electricity Act (i.e.,2021 Bill), the tightening caps concerning the zero-subsidy stage which is proposed to be achieved in three years may result in an incremental gap that may be recovered through subsidy or by way of tariff shock to a certain category of consumers. Therefore, it is necessary to ascertain the mechanism for such recovery so in future so that the incumbent licensee becomes more competitive with no regulatory assets to be recovered and there is no burden on utility or consumers.

(viii) Phasing of retail supply competition:

According to worldwide experience, retail competition can be implemented in stages, with each phase allowing new retail supply enterprises to supply power to a specific segment of consumers. Phases are important because they allow for preliminary research by introducing competition to a limited group of consumers first. As the phases progress, newcomers will have more time to build up their resources and react to new legislation and industry structure. The connected load, energy consumption, supply location, and consumer type of a customer can all be used to determine phasing.

Furthermore, depending on these factors, the phases can be introduced in an upward or downward going fashion.

Phasing, according to the Forum Of Regulator architecture, can either be on reduction or increment of consumer connected load. Consumers with higher connected loads will be opened to competition sooner under the decreasing connected load method, and the cut-off limit might be dropped further afterwards. Under the growing consumer load strategy, consumers with lesser connected loads will be allowed pick their Retail Supply Company. The distribution loss reduction chance will be higher in the latter method, because a large number of these consumers are connected at a lower voltage level, where a large percentage of losses of distribution occurs; even so, the scale of operation required will be a massive obstacle and may act as a barrier to entry for newcomers, making the entire reform process a non-starter.

4.4 RESEARCH ON INDIAN SPECIFIC VITAL PROBLEMS OF INTRODUCING RETAIL SUPPLY COMPETITION:

(i) Allocating Technical and Commercial losses among distribution and retail supply company: Forum of Regulators mentions 3 choices for allocating losses among separated distribution and supply companies:

1) Retail Supply Company takes collection losses and remaining losses handed over to Discom's;

2) Discom handles the technical and hooking loss and Retail Supply Company handles remaining losses;

3) Retail Supply Companies handle commercial losses and Discom handles technical losses.

Technical and hooking losses must be attributed to the Distribution business, because they are related to the physical network, and they are hard to evaluate as well as separate. As a result, all losses will be attributed to a single organisation, with the exception of inefficient collection and technical losses (which can be measured). As previously stated, this equates to utilising either technique 1 or 3 of loss allocation.

Complete commercial losses could be ascribed to the retail supply firm in licence regions where the current level of losses is considerable in order to attract investment, improve metering, and reduce losses faster. This corresponds to the third loss allocation approach.

Commercial losses apart from inefficient collections could be attributed to the distribution business in licence regions where losses are currently modest. This corresponds to Approach 1 of loss allocation.

As a result, the Forum of Regulators framework recommended that either approach 1 or approach 3 of loss allocation be used, based on the current level of distribution losses (aggregate technical and commercial loss minus collection efficiency) in the State.

(ii) Separation of Balance sheet of present Distribution business among new players:

Forum Of Regulators framework suggested the following:

- **Allocating assets/properties:** The Discom will be in charge of fixed assets before to the meter, while the Retail Supply company would be in charge of those after the meter. Metering resources will be provided to Discom or RSC depended on who is accountable for other metering-related tasks (meter installation/replacement, metering resources ownership, metering operations and testing). As a result, an electronic asset register for the Wire and Supply business must be created.

Receivables from retail customers and subsidies could be assigned to the IC, or an escrow mechanism between the IC and RSC could be considered. The IC can use these assets for servicing its responsibilities. Consumer security deposits will be received by the RSC rooted on the quantity and kind of consumers within the respective enterprises. The guaranteed aggregates given by existing Discoms to various vendors will be divided among the Distribution and RSC on the basis of Fixed Properties assigned to each.

- **Allocating liabilities:** The liabilities connected with fixed assets must always be assigned to the Distribution and Supply firms, accordingly, on the basis of allocation of fixed assets between individual enterprises.

  IC will take on the present liabilities linked with the procurement of electricity. The Intermediary Company would then go to the present Retail Supply Company and collect them. Contractor payment liabilities need to be split amongst the Discom and the RSC depending on their respective operations and asset allocation. The Wire and Supply firms will split funds relating to current employee terminal liabilities on the basis of no. of employees.

  Some of the assumptions need to be undertaken for bifurcation of certain assets and liabilities as mentioned below:

  - Direct Taxes of past period of an existing distribution licensee;
  - Inter-unit treatment and amount payable between Wire and Supply licensee;
  - Allocation of funds related to terminal liabilities related to the retired employee;
  - Cleaning up of balance sheet for unrealisable assets and liabilities for wire and supply business;
  - Treatment of past contingent liabilities.

(iii) Treating current financial losses: According to the Forum of Regulators framework, Current Discoms' existing identified regulatory assets will be handed to IC, which would subsequently incur these resources by collecting a UC or getting monetary aid from the Government. Unidentified financial losses on Discoms' balance books as a consequence of Electricity Regulatory Commission refusal of certain charges or reckless costs would be either transferred to existing enterprises or aid from the State Government sought to clean up the balance sheets.

(iv) Mechanism for Consumer switching: According to the Forum Of Regulators model, switching customers from one electricity retail supplier to alternative would necessitate consideration of the following changeover.

(1) Consumer reimbursement of stranded expenditures such as prior revenue gaps or regulatory assets;

(2) Impact of loss of cross-subsidy on the existing licensee;

(3) Recovery of pending payments from the consumer;

(4) Interpreting the customer class while switching;

(5) Security Deposits**;** and

(6) Frequency of switching**.**

Forum Of Regulators proposed that this consumer switching difficulties be treated in depth in the state-developed transfer mechanism and roll-out plans. According to experts, the process and methods specified in the parallel licensing operation of Mumbai should be applied in the rollout plans of segregating wire and supply business made by each state.

4.5 SUMMARY OF CONCLUSIONS:

Following the passage of the Amendment Bill 2014, FOR developed a concept rollout plan for the introduction of competition as well as a model for major

problems such as disaggregation of Distribution companies, their new structures, functions and duties, power purchase mechanism, reduction of cross-subsidies built in the existing tariff and allocating loss among wire and retail supply companies. The suggested scheme for power procurement is different from the international context has a strong wholesale market or trading pool at the country level and offers retail enterprises a contentious price for bulk electricity. Instead of the Forum Of Regulators framework's recommendation of an IC at each State Distribution firm, which will become the inheritors/repository of existing PPAs between Distribution Licensees and Generators, power will be allocated to retail supply companies based on the average price of PPAs.

The construction of an extremely competitive wholesale energy market was the focus of reforms, as per worldwide practices, and the effectiveness of expanding competition to retail users is significantly supported on this factor. It may be noted that prior to pursuing retail competition, the Philippines and Australia explored considerable wholesale market reforms. Because of its historical dependence on its own regulated generating plant, the parallel licencing experience of Mumbai operational under the current Electricity Act 2003 offers sluggish growth in customer preference due to its substantial time taken in cutting down existing tariff cross-subsidy and has no level for reduction of power procurement cost. As a result of this, before taking efforts to increase RSC, a systematic evaluation of the Indian wholesale market must be carried out, and the capability of retail enterprises in each State to buy their needs at competitive wholesale market pricing must be modelled.

Charging a UC on all energy consumers in India, where considerable power price cross-subsidies still exist in retail pricing set by regulators, to phase out residual cross-subsidies in the sector is a concept that can be examined based on worldwide scale practise.

Retail competition should be implemented in stages, with each step permitting new retail supply businesses to offer power to a certain sector of consumers, resulting in a debateable (non-regulated) and non-contestable

(regulated) retail market. This sequencing is crucial because it helps fledgling businesses to gradually develop their resources, protect smaller customers, adjust to new legislation and industry structure.

Large Indian agricultural consumers are given with a set pricing structure and an electrical connection without a meter. Before they may be regarded a contestable consumer, they must have a metering arrangement. According to the Forum Of Regulator framework, for unmetered clients, the incumbent RSC will connect the meter. This approach makes no suggestions for addressing the contestability of such customers. Dividing the distribution business from the supply contents appears to be a non-conflicting mechanism based on international practice.

It envisions a separate distribution network corporation that owns and operates distribution network assets but is not permitted to own or operate un-regulated generation or retail businesses. These challenges arising from worldwide expertise must be included in for complete model framework of segregating retail supply competition.

Certain essential features, including as the apportionment of monetary losses, the allocation of commercial and technical losses across entrants, and the balance sheet separation of distribution businesses, are all unregistered worldwide lessons learned that must be formulated according to state realities.

4.6 FINDINGS OF MUMBAI CASE STUDY AND LESSONS FOR RETAIL COMPETITION:

a) With the issuance of the Supreme Court Judgment, the licencing of TPC for retail supply has largely begun. Previously, in the Mumbai Suburban District, RInfra (now AEML) was the principal power distributor (excluding Mulund and Bhandup regions and few small parts distributed by TPC). In terms of consumer outreach, RInfra (now AEML) has historically had a well-spread distribution network at the Low-Tension distribution level, unlike TPC. Consumers benefited

from choosing TPC supply over RInfra's network at a time when RInfra's tariff was the highest. Out of a total consumer base of 7 lakh, TPC has about 5.62 lakh changeover (from AEML-D to TPC-D) and 1.38 lakh switchover (provided on TPC-own D's lines) customers.

b) The MERC-initiated solution (using another licensee's network) is in support of the purpose of avoiding replication of retail supply expenditure and maximising capital investment by the DLs, as determined by the Supreme Court. The suggested modification to the Electricity Act 2003 (Bill 2014) has as its principal purpose allowing RSC and better consumer service without considerably raising tariffs. The amendment splits the distribution network and power supply businesses, allowing multiple supply licensees to compete in the market.

c) In 2009, the MERC launched retail supply competition by giving Mumbai residents the option of selecting an electricity service provider. However, it can be seen that the rate of increase in competition is very slow. Cross-subsidies in the Tariff have historically been a major reason or impediment to the introduction of full-scale competition. Cross-subsidies will be eliminated abruptly, resulting in an unexpected rise in tariff and consumer shock. From 2009 Tariff Orders through 2020 Tariff Orders, the graph below displays fluctuations in the cross-subsidy level and decrease (i.e. ratio of average billing rate to average cost of supply in %), with forecasts up to 2024-25. The lowering in existing tariff cross-subsidy level (i.e. ratio of average billing rate to average cost of supply in %) varied from 94 percent -131 percent to 84 percent - 134 percent for TPC and from 74 percent -162 percent to 88 percent - 140 percent for AEML (earlier RInfra), as opposed to a band of 20 Percent of average cost of supply.

Over the years, Maharashtra Electricity Regulatory Commission has been lowering/determining cross-subsidies with great attention and allowing consumer choice while balancing the revenue mix. Competition

should ultimately be focused on supplier quality and network in the case of tariffs with minimal cross-subsidies.

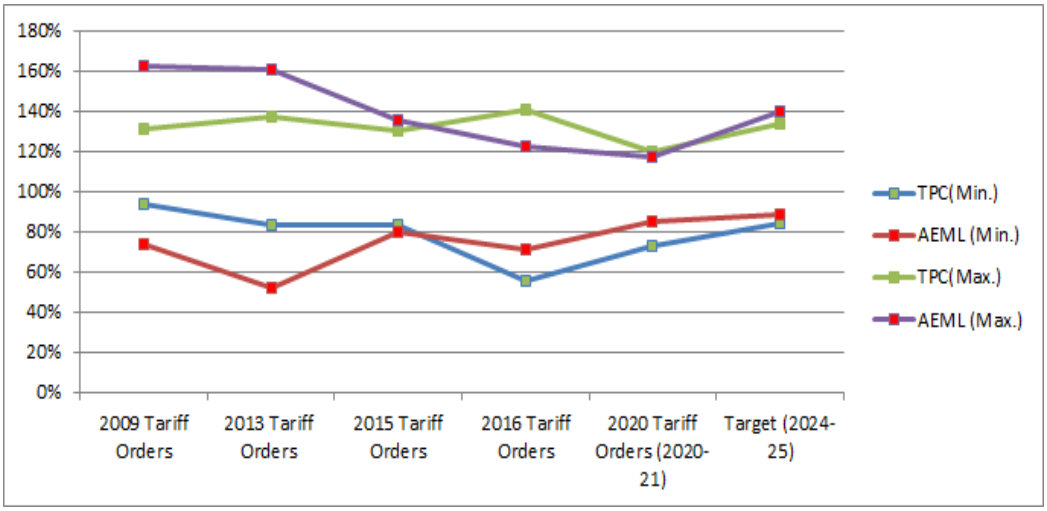


Figure 18: Variations in cross-subsidy level for TPC and RInfra(Now AEML)

d) The following graph displays the ACS trend for TPC and AEML (earlier RInfra) from 2005-06 (situation before initiation of consumer choice) to 2009-10 (situation after initiation of consumer choice) and its projection for 2024-25.

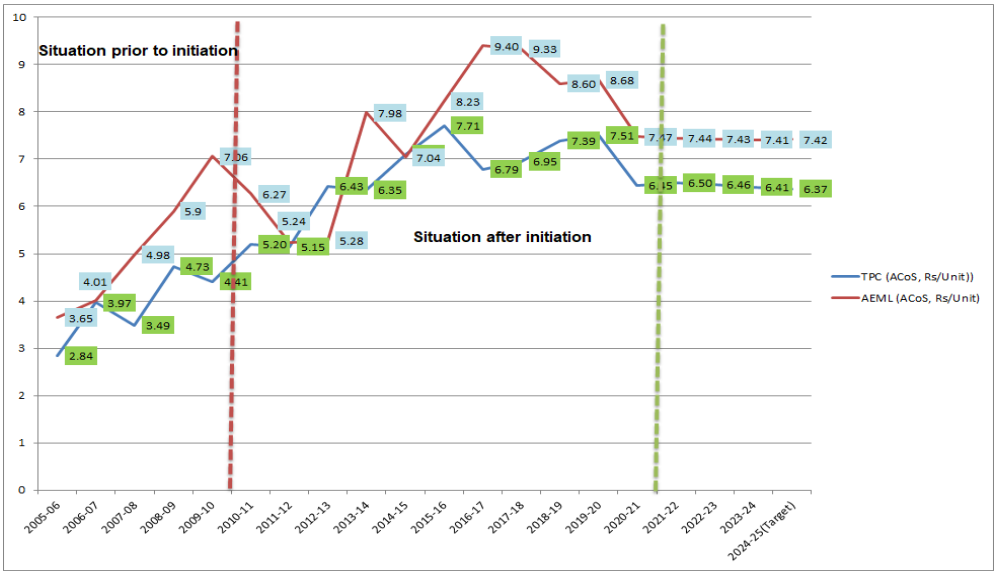


Figure 19: Average cost of supply level for TPC and AEML (Earlier RInfra)

The main factor driving competition in Mumbai is distribution tariffs alone. The utilities collect expenses as well as a ROE on investment/network through tariff setting, according to tariff principles. However, TPC's poor pace in establishing their own distribution network in compared to network replication caused in various costs such as CSS and RAC, which raised overall charges and made transition economics less viable for particular Consumers.

e) Tariff maximum ceiling rate fixing in line with Section 62(1)(d) of the Electricity Act: When there are multiple DLs in a given area, Section 62 of the Act empowers the Maharashtra Electricity Regulatory Commission to determine the ceiling tariff. In their separate 2013 Tariff Orders, the Commission analysed TPC's and RInfra's relative mix of consumers, sales and revenue and decided that sales to the residential category of TPC-D contribute 16 % of consumption and 11 % of revenue. Moreover, industrial consumption including railways represent for about 43 percent of TPC-sales/consumption mix, contributing for about 45 percent of RInfra-revenue, while commercial consumer sales account for about 40 percent of RInfra-sales mix, accounting for about 43 percent of RInfra-revenue. As a consequence, RInfra-D and TPC-sales D's and revenue mix are separate and diverse.

4.7 MAHARASHTRA STATE POWER SECTOR SCENARIO

Geographically in the west of India, Maharashtra is one of the most progressive states in the country and its 57.65% area is under agriculture. Maharashtra accounts 25 percent of the nation’s industrial output and 23.2 percent of its GDP. For sustaining industrial growth, electrical infrastructure is of utmost importance and acts as a catalyst for the growth of industries, agriculture, and services sectors, that supports economic growth by boosting labour and capital productivity, lowering production costs while increasing profitability, production, revenue, and employment. The per capita electricity consumption

of Maharashtra has been above the national average. In FY 2018-19, the per capita electricity consumption was 1424 units for the State as compared to 1181 units for the country.

In 2005, the MSEB was divided into four entities as part of structural changes.

1. MSEB Holding Company Limited.
2. Mahanirmiti or Mahagenco (Maharashtra State Power Generation Company Limited (MSPGCL).
3. Mahapareshan or Mahatransco (Maharashtra State Electricity Transmission Company Limited (MSETCL).
4. Mahavitaran or Mahadiscom (Maharashtra State Electricity Distribution Company Limited (MSEDCL).

Apart from MSPGCL, other IPPs, CPPs, and renewable energy generators carry out electricity generation in the State. Transmission systems of various transmission licensees are collectively called the intra-state transmission system (InSTS). The onus of InSTS planning lies with the state transmission utility (STU). Apart from MSETCL, Adani Group, Tata Power, JSW, Rattan India, Reliance Infrastructure Company's private transmission licensees are operating in the State. Mainly Four distribution licensees cater to the demand of consumers of Maharashtra other than Indian Railways and a few SEZs who are catering their requirement through their owned deemed distribution licensee status. These main four licensees are MSEDCL, Adani Electricity Mumbai Ltd. (AEML-D)-Distribution (formerly RInfra-D), TPC-D, and BEST. BEST, AEML-D and TPC-D cater to the consumers of Mumbai city and its suburb. In contrast, MSEDCL caters to the rest of Maharashtra consumers, excluding areas of Mumbai distribution licensees. Also, there are few deemed distribution licensees operating in the special economic zone (SEZ) area. System operation function is assigned to Maharashtra State Load Despatch Centre (MSLDC).

POWER SECTOR OVERVIEW

Generation

The state's energy requirement is supplied from the generation plants of MSPGCL, IPPs, Central sector generating plants, and renewable energy generators. The energy requirement of the state in FY 2018-19 was 162559 MU, out of which MSPGCL supplied 30%, 30 % from central sector allocation, 25 % by IPPs, 6 % by renewable energy generators, 9 % from embedded Mumbai generators, and short term, Inter-State bilateral procurement and exchange transactions.

The MSPGCL has a major share in terms of installed capacity and generation. The MSPGCL's plants (total 13607 MW) are located at Chandrapur, Koradi, Paras, Parali, Bhusawal, Khaparkheda, Nashik. (Thermal) with total (10170 MW, 75 %), gas-based plant at Uran (672 MW, 5 %), hydro at Koyna, Vaitarna, Bhira, Ghatghar (PSH) (2585 MW, 19 %) and Solar PV at Sakri (180 MW, 1 %). Among all state generating utilities in India, the MSPGCL has largest thermal generating capacity. After NTPC, it is the 2nd largest generating company in terms of generation capacity. The MSPGCL has long term PPAs (MoU basis) with MSEDCL. The MSPGCL has proposed to add 1 unit of 660 MW (supercritical) at Bhusawal in the next 3 years. In addition to MSPGCL, the state is also sourcing power from 13 IPPs and CPPs, including Mumbai Genco's having a combined installed capacity of 11502 MW (Thermal). The MSEDCL has also shared in central sector generators (thermal, gas, and hydro) of about 7174 MW [2-4].

Transmission

Transmission is a crucial function that connects the supply and demand in the electricity market. The responsibility of InSTS planning is with the STU i.e., MSETCL. Apart from MSETCL, there are 8 private transmission licensees are existing. The total Ckt-km of InSTS is about 51487 km with a total transformation capacity of about 147062 MVA.

Distribution

Four distribution licensees cater to the demand of the consumers of Maharashtra. BEST, AEML-D and TPC-D cater to the load of Mumbai city and its suburbs, while the rest of Maharashtra, excluding the area of Mumbai distribution licensees, is catered by MSEDCL. Maharashtra's total energy sale, including Mumbai, was about 132,000 MUs for Fiscal Year 2019-20.

MSEDCL serves a total of 27 million customers across Maharashtra. MSEDCL serves approximately 20.71 million domestic users (72.4 percent), 4.1 million agricultural (16 percent), 2 million commercial (7.0 percent), and 0.3 million industrial (1.8 percent) users. Residential consumers account for 19.03 percent of total consumption, while commercial consumers account for 7.4 percent, industrial customers account for 42.5 percent, agricultural customers account for 25.11 percent, and others account for 6.50 percent.

Table 4: Key particulars of MSEDCL ARR for FY2020-21

#	Particulars for FY 2020-21	Details
1.	Total power purchase of MSEDCL (Incl. all sources)	139, 413 Mus
2.	Fixed capacity charges to be paid to generators	21,087 Crores
3.	Average variable charge to be paid to generators	INR 2.68/kWh
4.	Total variable charges to be paid to generators	INR 37,369 Crores
5.	Other charges	INR 669 Crores
6.	Total charges to be paid to generators	INR 59,126 Crores
7.	Rate per unit of power procured	INR 4.24/kWh
8.	Aggregate revenue requirement	INR 80,163 Crore
9.	Estimated energy sale	110,622 Mus
10.	The average cost of supply	INR 7.25/kWh

According to the World Bank's report published, structural reforms such as promoting competition, improving accountability and transparency, reimbursement and commercial viability, access to electricity and rural electrification, enhanced quality and affordability of supply, and promotion of RE have been executed unevenly all over India's states. Delhi, Gujarat,

Maharashtra and Andhra Pradesh are the top States who have made the most progress in implementing these reform measures. Of these, Maharashtra has fought hard for changes to be implemented across the board, and it is one of the top five states in four regions (promoting competition, enhancing accountability and transparency, cost recovery and commercial viability and promotion of RE)

The present supply-demand position of Maharashtra State shows that it has surplus contracted power with the best available services (34,480 MW as of FY2020-21). Various generating businesses have added capacity, network infrastructure has been strengthened, T&D losses have been reduced, and energy conservation initiatives have strengthened the state's supply situation. In FY 2011-12, the State was having a deficit of 4652 MW. By 2018-19 State was able to surplus the peak demand by 610 MW.

Table 5: Peak Demand Surplus/Shortfall of Maharashtra State

Peak demand Surplus/(shortfall) in MW			
Year	**Peak demand**	**Peak Met***	**Surplus/(shortfall)**
2011-12	21069	16417	(4652)
2012-13	17934	16765	(1169)
2013-14	19276	17621	(1655)
2014-15	20147	19804	(343)
2015-16	20973	20594*	379
2016-17	22516	22207	309
2017-18	22542	22494	48
2018-19	23864	23254	610
2019-20	24550	24550	0
2020-21	25576	25513	63
Note: * Peak met with planned load shedding for regulating higher distribution losses in certain pockets			

Source - CEA

The Maharashtra Power Market Structure is depicted in the following figure:

Function	**Power Market Player**
Policy, Plan	Government of Maharashtra
Regulations	Maharashtra Electricity Regulatory Commission

Function	Power Market Player
Generation **(36,033 MW)**	▪ State and Centre Sector: Maharashtra State Power Generating Company Ltd. (11,724 MW- 33%), Central Sector (6097 MW; 17%) ▪ Private Sector: Independent Power Producers (IPPs): 11232 MW (31%) (Tata Power Company, Reliance Infrastructure Ltd., Vidharbha Industries Power Ltd., Adani Power Maharashtra Ltd., RattanIndia, JSW Energy, Sai Wardha Power, Abhijit MADC Energy, Gupta Energy, Ideal Energy Projects Limited, etc.) ▪ RE Generators (6980 MW; 19%)
System Operation (25,000 MW)	MSLDC and MSPC (Economic Load Despatch for Generation to four Distributing Companies with Monthly State Merit Order Despatch (MOD) stacks at State level demand and Intra-State Availability Based Tariff Mechanism with centralised deviation mechanism for balancing and settlement of electricity)
Transmission (1,31,289 MVA Transformation Capacity with Transmission Pricing Framework for Intra-State Transmission)	▪ State Transmission Utility (Transmission Planning Authority)–MSETCL ▪ *Private Licensees (8 Nos)* -Adani Electricity Mumbai Ltd., The Tata Power Company Ltd., Adani Transmission (India) Ltd., Jaigad Power Transmission Ltd., Maharashtra Eastern Grid Power Transmission Company Ltd., Amravati Power Transmission Company Ltd., Sinnar Power Transmission Company Ltd and Vidharbha Industries Power Ltd.

Function	Power Market Player
Distribution (Four Discoms) (About 40 Lacs Consumers in Mumbai with Annual Revenue Requirement of Rs 15,000 Crore and 2.70 Crore Consumers in rest of Maharashtra with Rs 80,000 Crore Annual Revenue Requirements)	▪ MSEDCL (Entire State of Maharashtra except for Mumbai and part of Suburban areas) ▪ BEST (South Mumbai) ▪ Adani Electricity Mumbai Ltd (AEML). (North Mumbai and part of Suburban areas) ▪ Tata Power Company (TPC) (Entire Mumbai city and part of Suburban areas-Overlapping BEST and RInfra area of supply), ▪ Indian Railways started its distribution operation as a deemed distribution licensee. ▪ 6 SEZs deemed distribution licensees(MIHAN MADC-Nagpur, Mind Space-Airoli, Gigaplex-Airoli, Nidhar Utilities-Panvel, KRC-Pune, EON-Kharadi Pune) ▪ Distribution Franchisees (Torrent Power) in Bhiwandi and Mumbra Divisions of MSEDCL
Trading(4 Intra-State Trading)	NTS Power, Knowledge Infrastructure Systems Pvt Ltd, 21st Century Infrastructure (India) Private Ltd, DM Corporation Limited.
Open Access	About 400 Consumers are availing of open access having loads of about 2100 MW. Total HT Consumption: 32,500 MW; 85% of total consumption comes from consumers with demand of 1 MW and above;15% of consumption opted for Open Access and 70% is yet to exercise open access route. Central Railway draws about 400 MW of electricity at 46 Points in Maharashtra. It has become fully open

Function	Power Market Player
	access and deemed distribution licensee and sourcing their power requirement from RGPPL.
Mumbai Parallel Licensing	This has provided an option for retail consumers in the common area of TPC with AEML and BEST to choose a supplier. About more than 6 Lacs consumers exercised the option.
Appeal	Appellate Tribunal for Electricity (Mumbai Circuit Bench)
Consumer Representations	Six Regional Institutional Consumer Representations and Five Individual Consumer Representations: (Prayas Energy, Thane Belapur Industries Association, Mumbai Grahak Panchayat, Maharashtra Chamber of Commerce, Vidarbha Industries Association, Chamber of Marathwada Industries & Agriculture)

The above statistics show that Maharashtra has a strong institutional mechanism for the development of the electricity sector intending to promote competition, increased transparency and accountability, reimbursement and financial viability for Discoms, rural electrification, improved quality and affordability of supply, and promotion of RE. As explained above it is also known for its unique case of parallel licensing in the city of Mumbai. It has 4 major Distribution Licenses. Out of these four licensees, TPC-D & RInfra-D has a parallel licensee operation in the suburban areas of Mumbai city. This has created competition for both the utilities and a choice for the consumers to opt for the best suitable electricity supply service. The existing competition is regulated according to provisions of the Electricity Act 2003. MERC has implemented various provision of the said act to maintain the level playing competition keeping in mind the cross-subsidy level impact on low end subsidised consumers.

To introduce retail electricity supply competition by segregating wire and supply functions of existing Discoms, it is necessary that State's Power Sector prepared for factors:

- The existence of a strong institutional regulatory mechanism for recovery of cost and implementation of provisions of the centrally designed policy framework.
- The presence of multiple private players in Generation, Transmission, Distribution and Trading in the State, which will enable participation in the retail sector
- Availability of State Load Despatch Centre with centralised merit order despatch and balancing settlement mechanism, which will act as a Market Operator in retail electricity competition scenario.
- Experience of retail electricity supply competition in Mumbai under the present EA, 2003 and become mature in understanding retail electricity supply competition which can take up its implementation in other cities
- High urbanisation and service sector industry presence in the State

Considering various factors as explained above and pre-requisite requirements for initiation of retail electricity supply competition, the research has considered preparing a Transfer Plan and Rollout Plan for the introduction of retail electricity supply competition by segregating existing companies into separate network company and retail Supply Company in Maharashtra.

4.8 PREPAREDNESS AND ADEQUACY OF MAHARASHTRA'S DISTRIBUTION SECTOR

4.8.1 DEFICIT OR SURPLUS IN REVENUE:

Post segregation of erstwhile MSEB in 2005, the financial viability of MSEDCL was affected from the year 2008 onwards due to accumulating financial losses, low rate of recovery, higher distribution loss and increase in debt due to infrastructure augmentation and working capital requirement. As can be witnessed from the following table, the accumulated loss between FY 2011-12 to FY 2019-20 is ~Rs. 16101 Crores part of which is yet to be recovered from tariff (recognised as Rs. 8447 Crores as Regulatory Asset) and part is due to claim disallowed by MERC due to inefficiency of the licensee.

Table 6: Revenue and Expenses Statement for MSEDCL (FY 2011-12 to 2019-20)

Particulars	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
Revenue	39555	45575	50622	55556	53707	57601	66312	73211	73761
Other Income	1252	1440	1640	1937	2882	2248	3593	12384	8444
Total	**40807**	**47015**	**52262**	**57493**	**56589**	**59849**	**69905**	**85595**	**82205**
Total Expenditure	40808	47591	53429	60171	59383	63026	69412	83789	90212
Net loss	**-1**	**-576**	**-1167**	**-2678**	**-2794**	**-3177**	**493**	**1806**	**-8007**
Accumulated Loss	-16101								

As can be witnessed, the loss has been steadily increased till 2016-17 and certain improvement has been outlined in FY2018 and FY 2019. However, in FY 2020 a loss of Rs. 8007 Crores has been outlined in the balance sheet and regulatory income of Rs. 8447 Crs has been outlined resulting in a profit of Rs. 439 Crs. The resultant loss is due to the following accounts:

- ***The gap between Average Cost of Supply and Aggregate Revenue Realised***

The financial losses also attributable due to the gap between the ACS and ARR and delay in recovery of the revenue which is been postponed to next year increasing working capital requirement.

Table 7: Revenue Gap for MSEDCL (FY 2009-10 to FY 2018-19)

Particulars	**2009-10**	**2010-11**	**2011-12**	**2012-13**	**2013-14**
Net Aggregate Revenue Requirement	**27566**	**33241**	**41,157**	**49,919**	**48980**
Revenue from Sale of Power	26621	31767	39220.56	44279.68	50,961
Revenue Gap (Rs. Crores)	**945**	**1,474**	**1,936**	**5,639**	**(1,981)**
Particulars	**2014-15**	**2015-16**	**2016-17**	**2017-18**	**2018-19**
Net Aggregate Revenue Requirement	**54840**	**55443**	**58854**	**63343**	**74541**
Revenue from Sale of Power	55,135	50517	53956	61146	72592
Revenue Gap (Rs. Crores)	**-295**	**4926**	**4898**	**2197**	**1950**

This gap/surplus is approved by MERC to be allowed to be adjusted in the next year revenue. However, the gap/surplus submitted by MSEDCL differs compare to as approved by MERC due to various shortcoming such as operational and management issues, regulatory shortcomings, efficiency management, etc. Therefore, such a gap is a resultant outcome of 2 issues such as inadequate tariff hike and operational inefficiency.

Also as can be a witness from the above table, the expenditure has been doubled in 8 years witnessing a CAGR of 10.24% whereas revenue has increased with a CAGR of 8.10% which highlights that tariff hike and inefficiency has resulted in lower revenue against expenditure. Over and above the revenue growth, the revenue realisation is also low whereby the collection efficiency is ~93% and collection efficiency of agriculture consumers is ~20%. The increase in expenditure can be attributable to various factors:

- Impact of Change in Law recognised in last 3 years in Power Purchase cost.
- High level of Distribution Loss and AT&C Loss.

- Fuel Shortage and dependence on alternate coal resulting in lower PLF and forced shut down.
- Higher cost of renewable power till FY 2017-18 which was procured to meet RPO.
- Dependence on Working capital loan at higher interest rate due to cash shortfall and under-recovery of revenue.
- Increased level of cross-subsidies especially domestic and Agriculture consumers and migration of industrial and commercial consumers under open access.
- Huge CAPEX Augmentation resulting in higher debt with higher interest rate.

Detailed root cause analysis of factors which resulted in the distribution sector of Maharashtra being financially unviable are discussed in Section 5.

4.8.2 CROSS SUBSIDY

Even though the Electricity Act 2003 mandates the elimination of cross-subsidies, the actual position differs drastically. Mechanism of cross-subsidy through tariff envisages support to consumer categories with low capacity to pay or sectors doing economic activities (e.g., BPL, low-end residential consumers, agriculture etc.) having an impact on society as a whole. Consumer mix especially the number of Agriculture consumers, geographical/topographical diversity, the regulatory and economic framework of State and quality of supply even shows a crucial role in the tariff fixation. Considering the above, consumers in every state will have different requirement of cross-subsidy and thus the ultimate consumer tariffs.

Table 8: Details of Cross Subsidy for MSEDCL (FY 2020-21)

Details of Cross Subsidy for FY 2020-21					
Category	**Sales – Mus**	**Cross Subsidy - Rs. Crs**	**Category**	**Sales – Mus**	**Cross Subsidy - Rs. Crs**
Subsidising Consumers			**Subsidised Consumers**		
Industrial	41,672	4,993	Residential (Below 100)	(14,901)	1,866
Commercial	8,694	4,138	Agriculture	(28,130)	9,163
Residential (Above 100)	7,753	2,735	Others	(7,391)	1,468
Others	3,509	631			
Total	**61,628**	**12,497**	**Total**	**(50,422)**	**12,497**

Currently, the ACS of MSEDCL is Rs. 7.61/KWh (FY 2020-21) and the subsidizing categories as outlined above are Industrial, Commercial Consumers and Residential (consumption above 100 units) whereas subsidized consumers are domestic and agriculture consumers. As can be analysed from the table, at present for FY 2020-21, the cross-subsidy to the extent of Rs. 12,497 crores are met by the subsidising consumers whereby Agriculture is the major subsidised consumers.

The following Figure shows actual ACoS sine 2015-16 to 2018-19 and projected ACoS up to 2024-25.

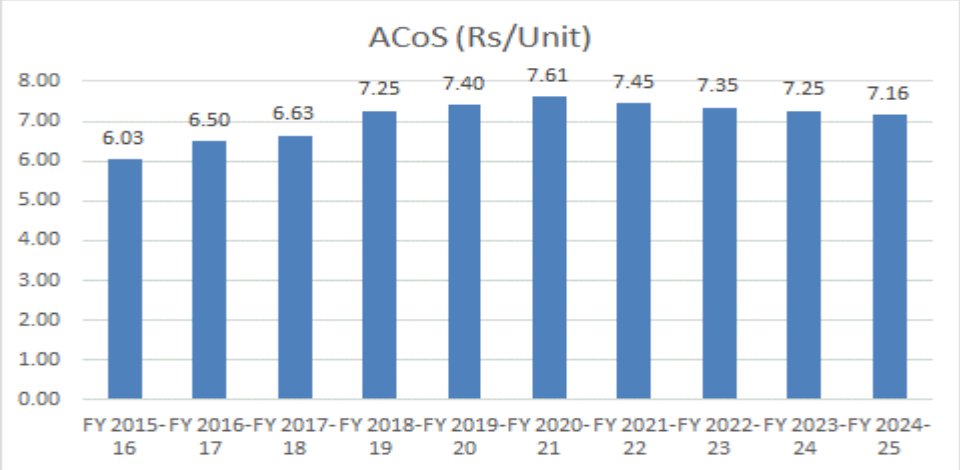


Figure 20: Average Cost of Supply for MSEDCL

Furthermore, the NTP has insisted on limiting the subsidy and cross-subsidy to a maximum of 20 percent. When evaluating cross-subsidies for different consumer categories and evaluating Tariff, MERC seeks to follow the ACoS ± 20 percent Tariff philosophy to the degree practicable. Nevertheless, because some consumer categories are subsidised, the burden of Rs. 12,497 crores mentioned above falls under the subsidising group. A cross-subsidy reduction trajectory has not yet been suggested in Maharashtra for MSEDCL.

Table 9: Details of Cross Subsidy built in tariff for MSEDCL (FY 2020-21)

Category	AvCoS	ABR	Cross Subsidy
HT I (A): HT – Industry	7.31	8.50	116%
HT II: HT – Commercial	7.31	13.47	184%
HT III: HT - Railways/Metro/Monorail Traction	7.31	8.24	113%
HT IV: HT - Public Water Works (PWW)	7.31	7.35	101%
HT V: HT – Agriculture	7.31	4.51	62%
HT VI: HT - Group Housing Societies (Residential)	7.31	7.06	97%
HT VIII (A) : HT - Public Services Govt	7.31	9.28	127%
HT VIII (B): HT - Public Services Others	7.31	11.12	152%
HT Total	**7.31**	**8.53**	**117%**
LT I: LT – Residential	7.31	7.66	105%
LT II: LT - Non-Residential	7.31	11.61	159%
LT III: LT - Public Water Works (PWW)	7.31	4.56	62%
LT IV: LT - Agriculture Metered	7.31	3.71	51%
LT V: LT – Industry	7.31	8.70	119%
LT VI: LT - Street Light	7.31	6.84	94%
LT VII (A)- Public Services Govt.	7.31	8.09	111%
LT VII (B)- Public Services Others	7.31	8.77	120%
LT Total	**7.31**	**6.63**	**91%**

As seen in the table, the present system of the Retail Supply tariff includes an in-built cross-subsidy element. Commercial and industrial cross-subsidizing categories have a higher tariff than the ACoS, but residential and agricultural cross-subsidizing categories have a lesser tariff than ACoS. To put it another way, high Commercial and Industrial Tariffs subsidise low Residential and Agriculture Tariffs. However, the cross-subsidy of Commercial, PWW and agriculture is still not within ± 20% as per the mandate of the Tariff policy and also any hike to such subsidised consumers may result in tariff shock. Therefore, a gradual movement of tariff is required to achieve

the cross-subsidy range of ± 20%, for which cross-subsidy reduction trajectory is required. In case this cross-subsidy need to be phased out before commencement of full-fledge retail supply competition, a universal charge needs to be devised which would be recovered from all consumers or except non-contestable consumers.

4.8.3 DISTRIBUTION LOSS:

Because many states currently have no metering for agriculture customers where consumption (and thus total sales and distribution losses) is difficult to quantify accurately, accurate assessment of distribution losses would be challenging. However, once distribution has been kept separate from the supply business, distribution losses must be evaluated in order to allocate commercial and technical losses amongst distribution and supply business, which is required for the distribution network operator to cast incentive-based efficiency targets. The following table depicts MSEDCL's actual distribution loss, which is in the range of 20%.

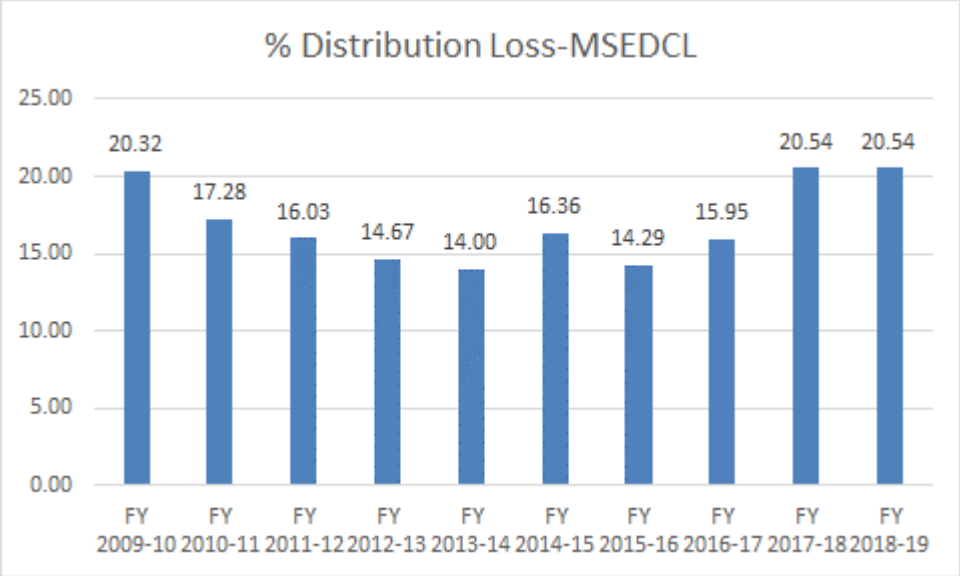


Figure 21: Distribution Losses for MSEDCL

All technical distribution losses can be ascribed to the incumbent Discom because they are caused by technical characteristics. Commercial losses, on the other hand, might be attributed to merchants due to a variety of difficulties such as faulty metres, non-metering, metre bypassing, and so on. As a result, in order to arrive at the appropriate distribution loss allocation, this loss segregation is required. After the two functions are differentiated, precise baseline values of current distribution losses are required because achievement (and over/under-achievement) of distribution loss objectives will constitute one of the tariff elements for the Wires licensee and also the regulated segment of the retail supply market.

Further, loss allocation methodology will decide the responsibility of metering services. It depends on the licensee which is responsible for managing the loss. If the Commercial and Technical losses are to the account of the Wires licensee then metering has to be the responsibility of the Wires Licensee. This is because if metering, billing is given to Retail Licensee and Wires Licensee is responsible for overall losses, then any theft, underbilling by the Retail Licensee will inflate the losses and will be to the account of Wires Licensee. If Commercial losses are to the account of the Retail Licensee then, metering related activities can be handed over to Retail Licensee. It is, therefore, the approach taken for loss allocation will decide the ownership of metering services.

4.9 THE CONCEPTUALISED FRAMEWORK

Based on the document analysis and international experiences, the conceptualized framework on critical analysis and introducing electricity retail supply competition in the distribution sector of Maharashtra may be as follows:

Stage 1: Barriers and Constraints under present Electricity Law and Changes to be done to introduce retail supply competition in India.

- Separate Wire and Supply Company
- Ownership separation of Distribution Licensees into separate Distribution Wire Company and Incumbent Supply Company and

Intermediary Company (Power Procurement) till the market establishes.

- Only one Govt. controlled Distribution Company dealing wire in the Supply area and removal of own wire provisions for 2nd Distribution Company. Wire of Distribution Company can be accessed by retail supply company.
- Powers to State Govt. for Transfer Scheme and Rollout Plan to be framed in a certain period.
- Creation of USO Fund and determination of UC by SERC to be collected from all Consumers.
- ISC to act as a Supplier of Last Resort till USO is obligated to RSC by SERC.
- Powers of Tariff determination for RSC by SERC
- Framework for entry of new retail supply company
- Phasing criteria for introduction of RSC

Stage 2: Study on adequacy and preparedness of retail supply competition in Maharashtra's distribution sector

- Availability of Power in the State.
- Level of Cross subsidy built-in the tariff.
- Distribution losses and AT&C Losses
- Deficit and Surplus in revenue and expense /Financial losses
- Metering Infrastructure and visibility of SCADA for Distribution drawal
- Power purchase procurement and creation of a state-level pool
- Mechanism to attract/participate RSC.

Stage 3: Transfer Scheme and Rollout Plan

- Ownership unbundling/Ownership separation of Distribution Company into (1) Incumbent Retail Supply Licensee (ISL)/ Supplier of Last Resort (SOLR) Company (2) Intermediary Company-Repository of Power Purchase Agreement/Procurement Company (3) Distribution Licensee dealing Wire business**.**
- Defining Roles and Responsibility of reorganised Discom along with the allocation of manpower and infrastructure.
- Determination and Apportionment of Commercial and Technical Losses between a distribution company and ISL (Present distribution loss is @20%). A mechanism for allocation of losses between a distribution and RSC/ISL.
- Balance sheet segregation of distribution business among reorganised companies.
    - Allocation of Assets (Responsibility of meter related activity, fixed asset before meter to Discom or ISL; Receivables due and subsidy to IC or RSC; Security Deposit for supply and wire tariff)
    - Allocation of Liabilities (As per Fixed Asset allocation to respective Discom or ISL; Liabilities to power purchase to IC and collect from ISL; liability of contractor's payment built on asset allocation and activities; handling of past contingent liabilities).
- Treatment for allocation of financial losses (Transfer to IC and amortise by collecting UC or financial support from Govt.) (Accumulated losses to extent of Rs 16,000 Cr, out of which Rs 8447 Crore are recognised as Regulatory Asset)
- A mechanism for allocation of PPA/Power to IC and its reallocation to RSC along with cost. Creation of state-level market/pool by relocating certain PPA quantum. (About 11,000 MW PPAs with

MSPGCL-Thermal and Gas; 5500 MW with NTPC; 5800 MW with IPPs).

- Upgradation of Metering Infrastructure and online visibility for distribution drawal points/feeders through SCADA.
- Consumer interface and grievance mechanism.
- Tariff determination by SERC
    - Regulated Wire tariff
    - Regulated retail supply tariff for ISL and RSL
    - Ceiling tariff/market price applicability for contestable consumers (for the category of consumers where RSC introduced)
    - Appropriate supply margin for RSC and ISL
- USO and creation of SoLR (i.e.. ISL) and USO tariff determination for ISL.
- Reduction of cross-subsidies promptly and establishment of Universal Charges to be collected from all consumers in the State or except certain consumers (over and above regulated tariff /ceiling tariff). Determination of UC by SERC.
- Phasing of RSC on following any of the criteria.
    - Connected Load
    - Consumption
    - Area of Supply
    - Consumer Category

Consumer Switching and its prerequisite (Recovery of stranded cost/past revenue gap/Regulatory asset charge; the impact of the loss of cross-subsidy, recovery dues, security deposit and frequency of switching)- Mumbai experience.

Stage 4: Functional segregation of Maharashtra's distribution sector

- Corporate functional separation of Distribution Company into:
    a. ISL for providing retail supply to consumers along with the entry for other Retail Supply Licensee to encourage competition.
    b. Intermediary Company (IC), which will inherit existing PPAs between DLs and Generators.
    c. DL dealing just with the distribution wires.
- The time frame for ownership separation and its commencement

Stage 5: Preparedness for competition in Maharashtra's distribution sector

- Market creation or conducive steps for attracting RSC
- Completion of ownership separation of Discom
- Phasing out of cross-subsidy
- Upgradation of metering
- Loss allocation
- Removal of a barrier for a level playing field.

Stage 6: Onset of Competition

- Phasing of RSC initially for a certain set of consumers and time frame to gradually opening up for other consumers.
- Monitoring framework for changes to be made.

4.10 INTERVIEW PROTOCOL

For this research, qualitative interviews are being used as a tool for capturing the data. Open-ended questions have been used for conducting semi-structured interviews. In semi-structured interviews, the interviewer assists the participant in entering the field of study. This aids in the collection of more specific information with a greater level of depth. Interview protocol for this particular

research is developed on the initial protocol which was further modified and validated through the advice of industry experts. Questions of protocol and discussion around them are given as below:

Research Objective 1:

To find out Changes to be done or barriers and constraints in the introduction of retail competition in the distribution sector and changes required in the Electricity Act 2003 and Electricity (Amendment) Bill, 2014.

Questionnaire for Interviews (Open ended questions) - Contextual/Evaluative

1. According to you, what are changes to be done or the barriers and constraints in the introduction of retail competition in the distribution sector **and changes required in the Electricity Act 2003 and Electricity (Amendment) Bill, 2014 or 2020 with respect to the following issues**;
    i. Role and functions of Discoms;
    ii. Power purchase contracts (long term/medium term) or power purchase mechanism;
    iii. A national-level wholesale market mechanism for power procurement;
    iv. Cross-subsidy reduction built in existing tariff ;
    v. Distribution loss and non-metered sales;
    vi. Tariff determination;
    vii. Role of SLDC;
    viii. Financial losses ;
    ix. Metering
    x. Rollout and Time frame for phasing of competition;
    xi. Any other issue.

2. What are your views in regards to functions and framework proposed for Intermediary Company (IC) under Bill 2014 regarding power procurement mechanism?

3. Till the wholesale market at the national level or state level for procurement of power to new retail companies is developed, what is the mechanism

proposed to be considered for the financing of new Generation investment in the situation of uncertainty in long term power procurement?

4. According to you what are the issues to be addressed under the present regulatory regime for improvement of existing retail consumers' choice operating in Mumbai under the present Electricity Act 2003.

Research Objective 2:

To explore the level and extent to which the existing distribution sector and its infrastructure is prepared (availability of power, wholesale market structure) **and adequacy** (Reduction of cross-subsidies, the current level of losses, existing metering infrastructure) **for introducing retail consumer choice in Maharashtra (factoring Mumbai's retail consumer choice).**

Questionnaire for Interviews (Open-ended questions)- Evaluative

1. According to you, what level and extent Maharashtra's electricity sector is prepared, in respect of the availability of power and wholesale market (the ability of retail enterprises to obtain their needs at a competitive market price), and for promoting competition in the retail supply of power.)

2. According to you, to what extent electricity infrastructure, in respect of the reduction of cross-subsidies, the current level of losses and existing metering infrastructure, are adequate for introducing retail consumer choice in Maharashtra.

3. What should be the factors for phasing retail competition in the distribution sector of Maharashtra?

4. What are the existing institutional frameworks' lacking for managing retail supply competition in the electricity sector of Maharashtra?

5. According to you, what are other key issues that are to be considered for the preparedness and adequacy of introducing retail consumer choice in Maharashtra?

Research Objective 4:

(Note: Research objective 3 is in respect of finding root causes of financially unviability of Maharashtra Discoms, different methodology being used and hence not covered under this interview protocol)

To formulate a Transfer Scheme and Rollout Plan of introducing retail competition in the electricity distribution sector (functional segregation of existing distribution, its actors for managing new system and structures and extent, phasing of competition, power procurement model/reorganisation of existing long term contracts, universal service obligations, metering role) **of Maharashtra.**

Questionnaire for Interviews (Open-ended questions) - Strategic

1) According to you, what should be the functional separation of Distribution Companies of Maharashtra and its new structure of role, responsibilities and ownership?

2) What mechanism required to be considered for avoiding integration of generation and retailing activities which will circumvent the competition by entering into long term PPAs with their own generators?

3) What mechanism required to be considered to eliminate any prospect of supporting the retail business from the distribution business's choking off competition?

4) The Bill provides that at least one supply company in the area of the DL must be a Govt. owned entity as a supplier of the last report. What could be a process of allowing Govt. controlled Discoms in the supply area of existing private Discoms in Mumbai for playing the role of supplier of last resort?

5) At what time and circumstances, the GoM allows 2nd Retail Supply Company to enter the market for competing with ISL. Is it necessary for the new RSL's supply region to be coextensive with the area's existing supply licencee?

6) What is your view in respect of Power Procurement Mechanism and Wholesale market for the introducing retail competition in Maharashtra?

7) Is it possible to have a fixed or active allocation of PPAs across retail supplier companies?

8) According to FOR's model deployment plan, if IC assigns electricity to retail supply enterprises rather than PPAs, it may impose a standard average cost of power acquisition from suppliers or compute a differential bulk supply cost. What are your thoughts on Maharashtra's transfer strategy in this regard?

9) For Maharashtra's transfer scheme, whether the New retail supply companies may be provided with the opportunity of initially procuring power from the market and then accepting electricity from the IC if necessary.

10) When it comes to energy procurement, the new RSL would have the option of arranging new power purchase agreements with generators. Because IC is smaller than current Discoms, the Forum of Regulators recommended that States consider using IC as an integrator for electricity procurement in their own rollout plans and transfer schemes. What are your thoughts on Maharashtra's transfer strategy in this regard?

11) Once the present Discom is divided into Distribution and Retail Supply tasks, metering services can be the responsibility of a Distribution or Retail Supply Company or a 3rd Party Company. The Forum of Regulators advocated that reading-related metering tasks be transferred to retail supply firms, with retail suppliers responsible for decreasing collection inefficiency losses. On the other hand, the metering operations related to metre installation/replacement, metre ownership, metre operation, and testing would be governed by the loss allocation plan. What are your thoughts on Maharashtra's transfer strategy in this regard?

12) How should Maharashtra's Consumer Interface and Grievance Mechanism be structured?

13) What is your view on the tariff setting mechanism for retail supply competition in Maharashtra?

14) According to the FOR model, the Discom would be assigned the Universal Service Obligation for connecting the distribution network to consumers, known as the "Duty to Connect," while the ISL would be assigned the responsibility for supplying electricity to consumers at first. Once the

new/2nd RSL enters the market, the responsibility for supply will be expanded to them. How do you feel about Maharashtra's transfer plan?

15) What is your view on the reduction of cross-subsidies of Maharashtra's Discoms?
[Note: FOR suggested either approach of Universal Charge fund on similar lines of Philippines or to decrease cross-subsidies, the government could use a direct subsidy strategy.]

16) Retail Supply Phasing Competition can be conducted based on a consumer's connected load, power requirement, supply region, or consumer type. In its model rollout, Forum Of Regulators noted that phasing may involve users' connected load dropping or increasing. What is your view on the phasing of introducing retail competition in Maharashtra?

17) FOR uses a model rollout plan in its implementation. Depending on the current level of distribution losses in the state (AT&C loss minus collection efficiency), loss allocation strategies 1 (collection losses to RSL and remaining losses to Discom) or 3 (all commercial losses to RSL and technical losses to Discom) could be used. What are your thoughts on the proposed Maharashtra distribution and supply businesses allocating commercial and technical losses?

18) What are your thoughts on separating the present Distribution business's balance sheet into new entities for Maharashtra's transfer scheme?

19) What is your view on the treatment of existing financial losses (recognised and unrecognised both) for Maharashtra's transfer scheme?

20) Whether the consumer switching mechanism covers issues such as recovering stranded costs from consumers, such as historical revenue gaps or regulatory assets, recovering dues from consumers, and so on. When it comes to defining a consumer category at the time of a transition, Deposits for security, The frequency of switching would be included in the Maharashtra deployment plan.

CHAPTER 5: ROOT CAUSE ANALYSIS OF FINANCIAL HEALTH OF MAHARASHTRA'S DISTRIBUTION SECTOR AND FINDINGS

This Chapter outlines the analysis of the various financial and operational parameters that are affecting the financial viability of Maharashtra's State Distribution Company (i.e., MahaDiscom) through detailed analysis and identifying the possible causes by the "Root Cause Analysis" (RCA) method.

5.1 INTRODUCTION:

This analysis also aims to assess and diagnose the financial health of MahaDiscom using Fish Bone Diagram as a tool of Root Cause Analysis, which would provide possible causes that are affecting the financials of MahaDiscom. The formulation of the transfer scheme of separating Network and RSC requires allocation of losses, assets and liabilities from one Distribution Company into separate entities. The basis of losses allocation amongst the Network and RSC will be revealed if the causes for such losses are known. Hence this analysis would result in the formulation of an appropriate Transfer Scheme and Rollout Plan of introducing competition in the retail side of power distribution sector of Maharashtra. It can act as a revival plan to overcome the vicious cycle, and therefore help Distribution companies to bounce back and lead them into being a financially robust entity.

The result of the Root Cause Analysis of financial viability for MahaDiscom indicates the possible causes that are affecting the financials of MahaDiscom that would be useful in the formulation of an appropriate Transfer Scheme and Rollout Plan of introducing RSC in the power distribution sector of Maharashtra.

The analysis aims to provide different factors and possible root causes (financial losses, high borrowings and level of cross-subsidies to be phased out) which resulted in the distribution sector of Maharashtra being financially

unviable. The secondary data analysis is thus divided into two major parts.

In the first part, we will provide background information on MahaDiscom's financial situation. This will necessitate the documentation of the financial methods and parameters used to assess/diagnose MahaDiscom's financial health. Financial methods of accounting are recognized from several financial statements, regulatory norms and tariff orders of MahaDiscom. The study draws threads from critical reports on the financial status of other Discoms such as the SCR (2011) and reports produced by Planning Commission, MOP, PFC, World Bank, Tariff Orders of MERC for MahaDiscom etc. We have compiled time-series data on the performance from year FY2011-12 to FY2015-16 for MahaDiscom and create simple charts that provide us diagnostic results with symptoms and causes contributing towards finances of MahaDiscom.

In the second part, to find out the real reason of problem/ factors that are leading to the financial unviable condition of MahaDisom, specific symptoms were assessed/found out and further the symptom/problem which is impacting various financial parameters of MahaDiscom are analysed. Based on the findings, the possible problem/root cause of the financial health of MahaDiscom are identified/drawn using Fish Bone Diagram as a tool of Root Cause Analysis (RCA). In RCA, a fishbone diagram technique is used to graphically identify and organize many possible causes of a problem/symptom to reach a common understanding of the problem.

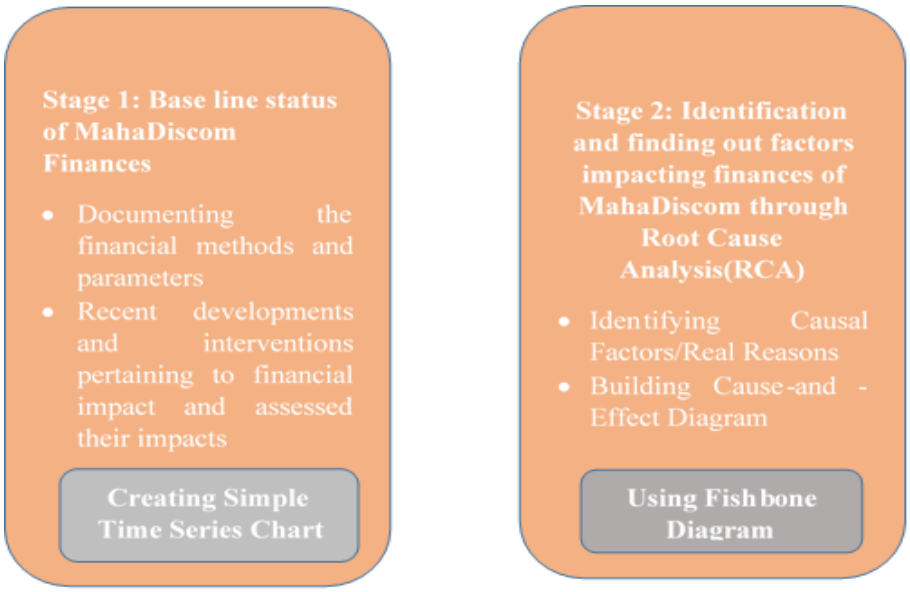


Figure 22 : Flow Chart of RCA

5.2 DIAGNOSTIC OF FINANCIAL HEALTH OF MAHADISCOM

The diagnostic of financial health based on financial statements of MahaDiscom for 5 years i.e. FY2012 to FY2016 are outlined in this Section, as below.

5.2.1 ASSETS AND LIABILITIES:

The summary of 5 years Balance sheets for the aforesaid period shows that the net change in the assets and liabilities has been Rs. 44,708 Crore resulting in a CAGR of 33%. The summary of the observations is as under:

Table 10: Balance Sheet Changes from FY2011-12 to FY2015-16

Balance Sheet of MSEDCL		
Particulars	**Change**	**CAGR**
	Rs. Crs	**%**
Sources of Funds		
Shareholders funds		
Share capital	41,180	72%
Reserves and surplus	2,144	9%
Profit and (Loss) Account (Credit Bal.)		
Sub Total	**43,323**	**50%**
Loan Funds		
Capital Liabilities	1,385	3%
Sub Total	**1,385**	**3%**
Total	**44,708**	**33%**
Application of Funds		
Fixed Assets		
Gross Block	58,342	33%
Less : Accumulated Depreciation	19,123	33%
Net Block	**39,219**	**33%**
Capital work in Progress	-1,402	-10%
Total Fixed Assets	**37,817**	**28%**
Investments	-3	0%
Deferred Tax Assets / Liabilities	898	-100%
Current Assets ,Loans & advances		
Stores and spares	-37	-1%
Sundry Debtors	14,962	18%
Cash and Bank Balances	114	6%
Loans and Advances	29	1%
Other Current Assets	1,668	27%
Total : Current Assets	**16,737**	**17%**
Current Liability		
Consumers Security Deposits	1,607	8%
Working Capital Loan	4,563	25%
Other Liabilities	22,202	24%
Less : Current Liabilities and Provisions	**28,372**	**21%**
Net Current Assets	**-11,635**	**33%**
Profit and (Loss) Account (Debit Bal.)	17,631	48%
Total	**44,708**	**33%**

- There is an increase in own funds and Long-Term Liabilities of Rs. 44,708 Crore against which the Fixed Assets have also increased by Rs. 58,342 Crore. This proves that the growth is pertinent to the increase in the distribution infrastructure for catering for the increased demand of the consumer base.

- The major change in assets and liabilities parameter happened in FY 2015-16 due to the final transfer scheme, as a result of the revaluation of assets mainly for land, building and Lines/Cables and simultaneously increased in shareholder fund.

- There is a steep increase in current liabilities during the same period by 21% (i.e. Rs 28,372 Crore) while current assets have increased by 17% (i.e. Rs. 16,737 Crore) in the review period. This issue is also in the case of other State Discoms, which has also

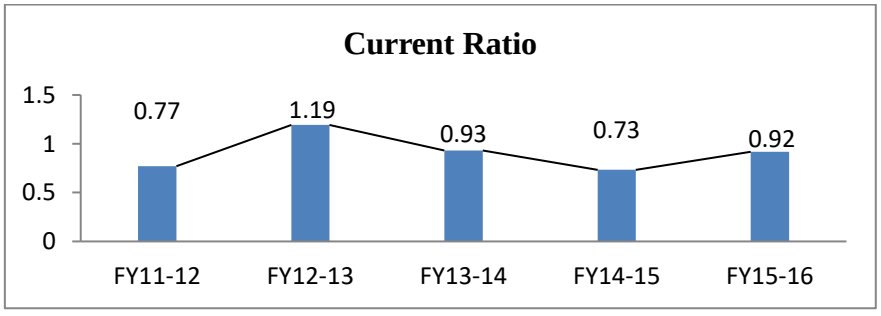
been pointed out in the Expert Committee report by the Shunglu Committee. This indicates that inefficiency in recovery from consumers has affected the discharge of current liabilities which directly affects the operations which are being financed by short term current liabilities or they remain unpaid.

- In addition to this, the weakening of short term liquidity and negative working capital highlights the precarious financial position of MahaDiscom wherein the current liabilities have been increased more than the current assets and the funding, therefore, is undertaken through the short term financing or has been delayed.

5.2.2 RATIO ANALYSIS OF THE MAHADISCOM FINANCIALS:

Liquidity: - The analysis of the current ratio/liquidity ratio shows continuous declination since FY 2012-13. MahaDiscom's existing or short-term liabilities exceed its existing or short-term assets, indicating that it is unable to meet both short- and long-term obligations. The current liabilities have been discharged through working capital loans and recovery from other consumers which impacts its operational expenditure.

Figure 23:: Current Ratio Trend Analysis for MSEDCL



Solvency: - Debt to Assets ratio was less, which means MahaDiscom has low financial leverage and a greater part of the assets is funded by equity. Whereas DE ratio was relatively higher mainly because financial loss is increasing every year resulting in erosion of net worth to a huge extent. Also, apart from erosion

of net worth, the debt has increased on the increase in the distribution infrastructure to cater for the demand of the consumers.

Figure 24:: Debt to Equity Ratio Trend Analysis for MSEDCL

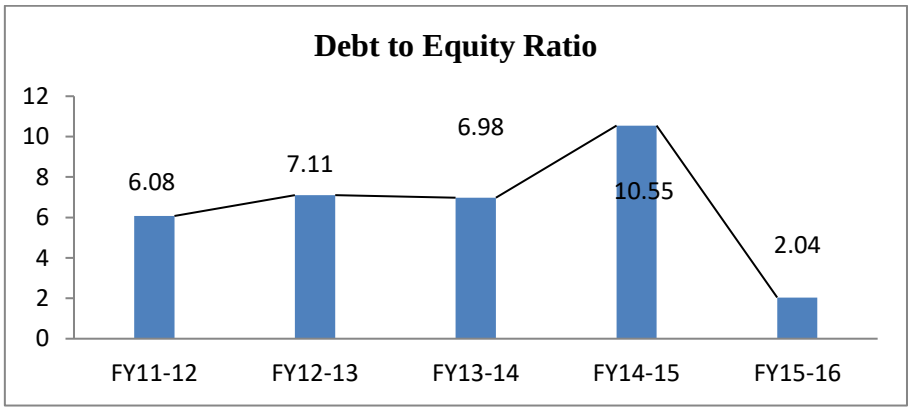
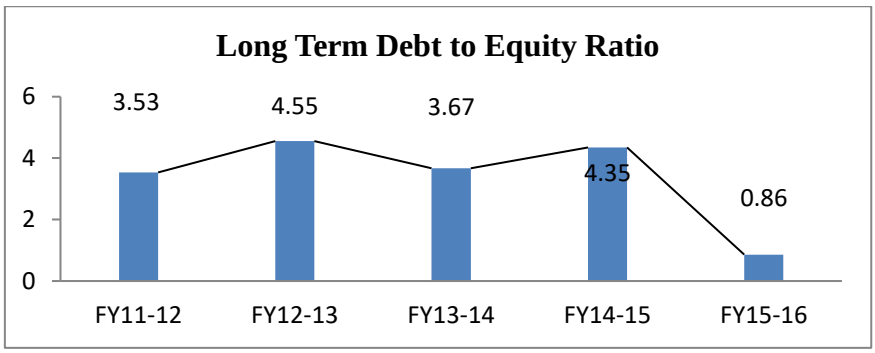
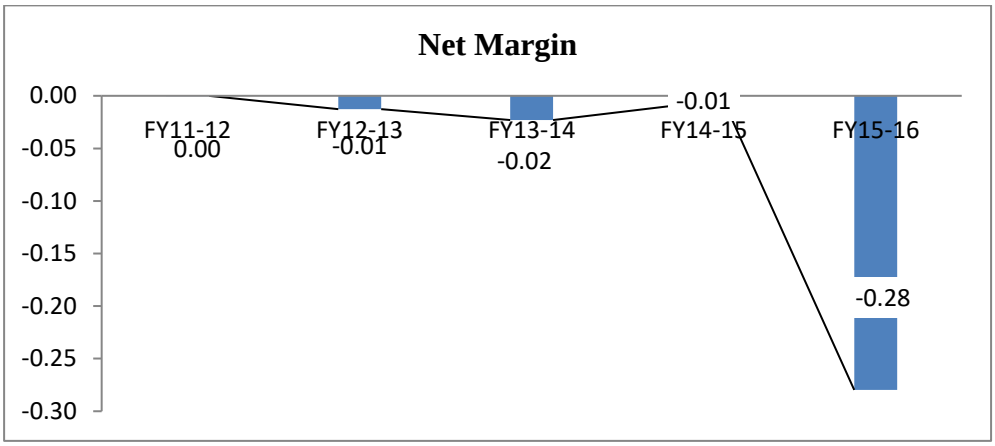


Figure 25:: Long Term Debt to Equity Ratio Trend Analysis for MSEDCL



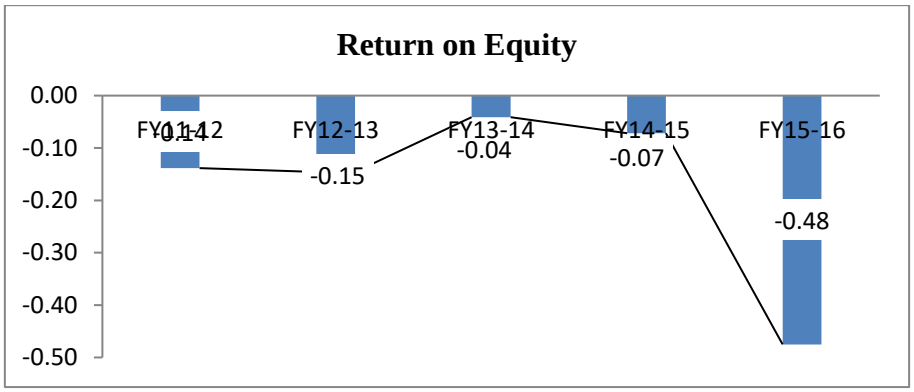
Profitability: - Operating profit margin ratio decreased due to lower revenue and increase in power purchase cost, whereas Net profit margin ratio decreases substantially due to the under-recovery of the cost resulting in a financial loss.

Figure 26:: Net Margin Trend Analysis for MSEDCL



On the other hand, Return on Equity (pre-tax and Prior Period) was negative which reflected that MahaDiscom was not able to generate returns for the shareholders due to incurring financial loss for the various reason outlined in this paper.

Figure 27:: Return on Equity Trend Analysis for MSEDCL



In addition, Return on Assets (Pre-tax and Prior period) was negative, which indicated MahaDiscom was generating negative earnings.

Figure 28:: Return on Assets Trend Analysis for MSEDCL

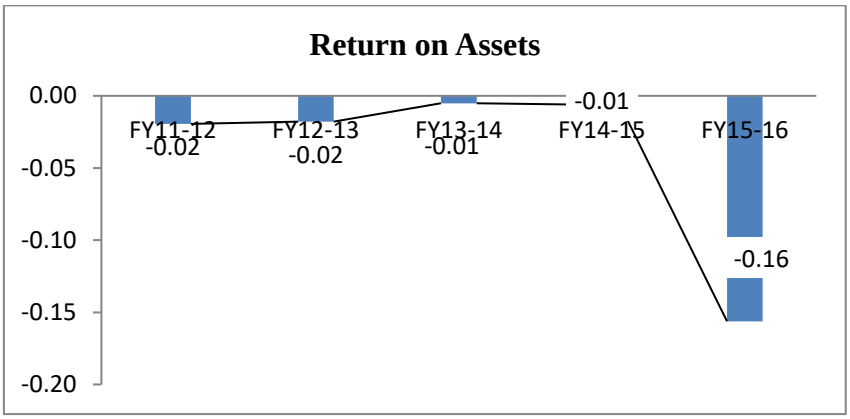
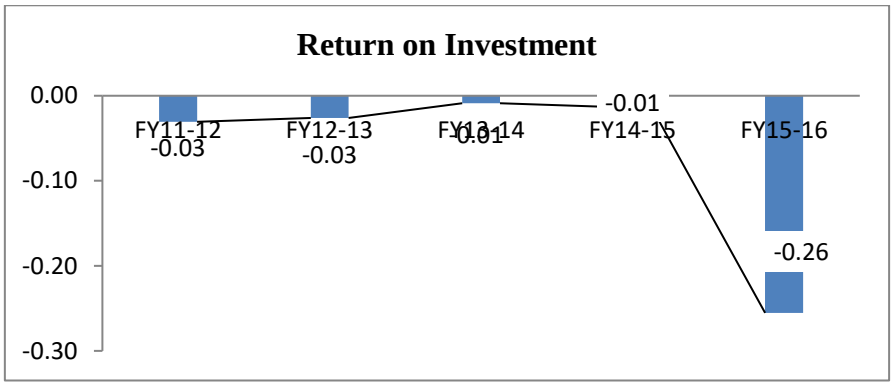


Figure 29:: Return on Investment Trend Analysis for MSEDCL



Moreover, the Return on Investment of MahaDiscom remains negative, over the period, although, in FY 2015-16, there was a substantial capital infusion. However, the sales remained relatively stagnant resulting in reduced profits. Thus, it resulted in the erosion of the net worth. Even though an RoE of 15.5% has been provided in the determination of tariff but the cost incurred is much higher than the revenue realization, affecting the operational and efficiency parameter of MahaDiscom.

Efficiency: - The average debtor collection period for receivables for the period has been increased to 7 months that needed to be for 1 month. This has resulted in late recovery and accumulation of arrears. Whereas the average creditor payment period increased to 9 months from 4 months due to liquidity issues.

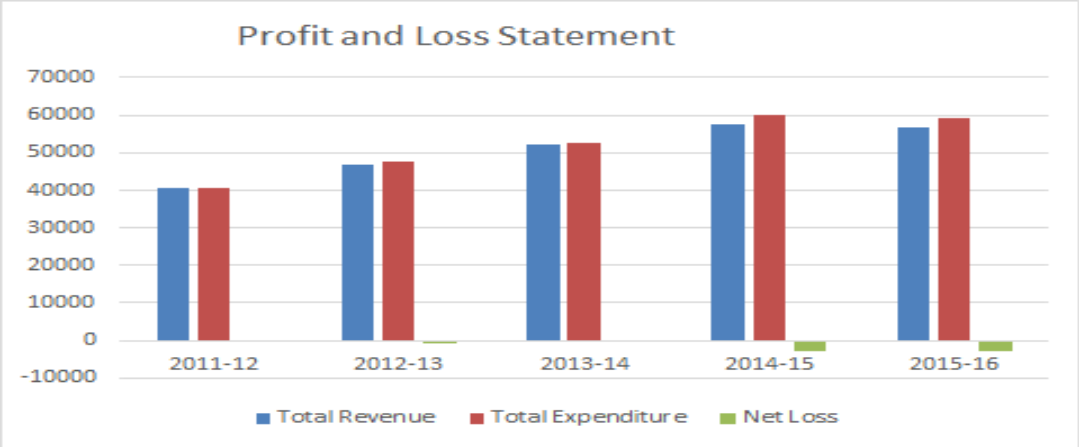
Table 11: Efficiency Trend Analysis

Ratios: Efficiency	2011-12	2012-13	2013-14	2014-15	2015-16
Average Debtor collection period	146	149	164	165	209
Average Creditor payment period	158	184	214	222	267

5.2.3 REVENUE AND FINANCIAL LOSSES:

The financial statements for the revenues earned and expenditure incurred over the years show that the losses have steadily increased each year, as compared to a loss of just Rs 1 Crore in FY 2011-12, the losses increased to Rs 2,794 Crore in FY 2015-16. MahaDiscom has been consistently making losses in last 5 years, whereby though the Revenue has increased by ~36% in last 5 years, there is a similar corresponding increase in expenses also, which has been increased by 46% and hence it has not been able to generate enough revenue to meet such expenses. It is to note that there was a change in Accounting Policy in FY2011-12 because of a change in depreciation rates, which resulted in lower losses for FY2011-12. In addition, the interest on capital liabilities and working capital in FY 2015-16 were at Rs. 1,595 Cr & Rs. 640 Cr approximately, which is because of the high-interest rate of 11-15%.

Figure 30:: Profit and Loss Statement Trend Analysis for MSEDCL



Source: Balance Sheet of MahaDiscom for the applicable year

5.3 FINDINGS AND DISCUSSION

5.3.1 FINANCIAL HEALTH FOR FY 2011-12 TO FY2015-16:

The details of cause and effects of these financials period are detailed out as under:

- Current liabilities of Rs 28,372 Crore have been increased more than the Current Assets Rs. 16,737 Crore due to inefficient recovery from the consumers and the funding, therefore, is undertaken through short-term financing or has been delayed. Due to the non-recovery of its dues from consumers, its current ratio/liquidity ratio continuously on a declining trend and it is incapable to pay short-term loans and long-term liabilities.

- Due to liquidity issues, its average debaters' collection and creditors' payment period increased to 7 months and 9 months respectively.

- Consistently making financial losses during FY2011-12 to FY2015-16 as expenses are increased at 46% and revenue increases at 36% and not able to generate revenue to meet expenses.

- The debt-to-equity ratio has been higher which shows that there are financial losses and debt is increasing every year for building infrastructure to cater to the increasing demand of consumers.

- Operating profit margin decreased due to lower revenue and higher power purchase expenses whereas net profit margin also decreases due to under-recovery of its cost that result in financial losses.

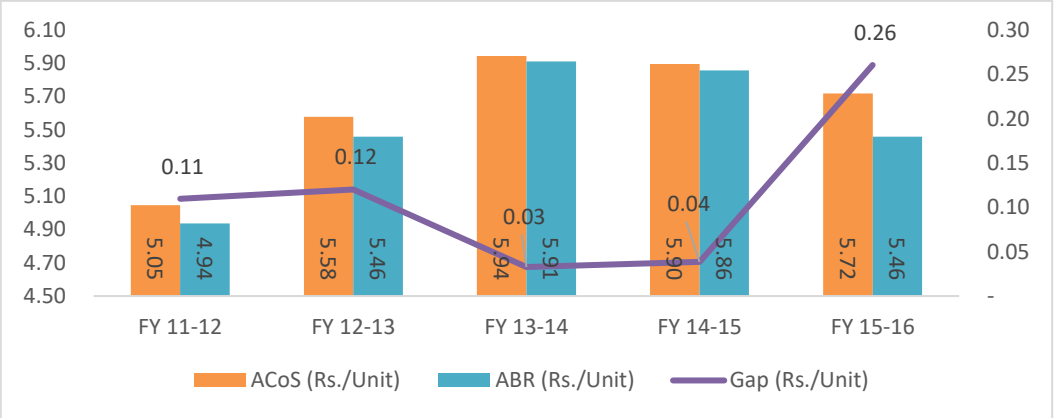
- Due to financial losses, MahaDiscom is not able to generate returns for its shareholders and hence return on equity reflected as negative. Furthermore, Return on Assets also reflects as negative, which is due to reduction in sales and increase in capital infusion.

- Continuous financial losses forced MahaDiscom to raise short-term loans for activities at a higher interest rate of 11-15% to retain capital liabilities commitments and working capital cash flows.

5.3.2 THE GAP BETWEEN ACOS AND ABR*:*

- In a regulated regime when the approved tariffs are not insightful of the costs sustained by the Licensee, they indicate that the costs sustained are inefficient as compared to the efficient norms set by the Regulator. As can be seen from **Figure 11**, the financial losses are also attributable due to the gap between the ACoS and ABR. The analysis revealed the gap between ACoS and ABR has increased considerably in FY 2015-16 to Rs. 0.26/kWh, which is in line with an increase in assets and liabilities of MahaDiscom due to various shortcomings.

Figure 31:: Gap between ACoS and ABR for MSEDCL (2011-12 to 2015-16)



Source: Annual Accounts of MahaDiscom from FY 2011-12 to FY 2015-16

- Additionally, MahaDiscom has a major share of 30% sales, related to the agriculture category, however, when it comes to revenue, it is around 14% only, as agriculture consumers are the subsidised category of consumers. The same is on the account of the applicable subsidy. Still, 40% of agriculture consumers are not metered, billing to them is being done based on pump set (HP)/fixed charges basis. Therefore, correct and full recovery on receivables is not recorded for agriculture consumers. On the other hand, Industry has a revenue share of 30% from the share of 25% in sales. This major issue also affects the financial revenue of MahaDiscom due to the prevailing cross-subsidy. Therefore, any change in consumption of subsidising consumers affects the revenue recovery model. To close the revenue-to-expenditure gap and to pay interest on borrowed funds, MahaDiscom is forced to avail of short-term loans.
- Furthermore, due to delay in the tariff revision, there is an increase in the working capital requirement and losses that are required to be recovered through tariff revision. However, due to regulatory norms, regulators do not approve the actual interest on working capital resulting in widening the gap between ACoS and ABR.
- Altogether this financial gap can be segregated into 7 parts: Related to inadequate tariff increases, Change in Sales Mix, Open Access, Net

Metering, Unmetered Agricultural billing or fixed charges basis, Delay in receivables of tariff subsidy from GoM on time and other related to inefficiencies on part of the Discoms, i.e. DPC, higher AT&C losses. These are explained in the subsequent section.

5.3.3 NON-ACHIEVEMENT OF REGULATORY NORMS UNDER TARIFF DETERMINATION

- MERC specifies the (MYT) framework that clearly defines the components of the ARR of the distribution wire and retail supply business to be recovered through wheeling charges and retail tariffs respectively. These components have been factored under controllable and uncontrollable factors as specified in the regulations.
- It has been observed that the exercise of tariff determination has an indirect impact on the MahaDiscom finances, under tariff and cost recovery, which are detailed out as below:

  i. MERC had lay down the trajectory for reduction of Distribution Loss in its 2016 MYT Order for MahaDiscom. As per the trajectory, the Distribution Loss level stipulated for FY 2016 was 13.50%, FY 2017 was 17.76% and for FY 2018 was 16.26% respectively. However, MahaDiscom did not achieve the target set by MERC, which allows sharing of losses because of the achievement of the Distribution Loss target. The Distribution Loss achieved for FY 2016 was 14.29%, FY 2017 was 15.95% and FY 2018 provisional given at 15.81%, which is lower than the set target. According to the MYT Regulations, 1/3 of the efficiency gain/(loss) has been passed on to consumers, with the remaining 2/3 allowed to be retained by MSEDCL. The sharing of efficiency gains/(loss) on account of Distribution Loss are displayed below:

Table 12: Sharing of efficiency gains/ (loss) on account Distribution Loss for MSEDCL

FY	Efficiency Loss retained by MahaDiscom (Rs. Cr)	Efficiency Loss by the consumers (Rs. Cr)
2014-15	(1115)	(558)
2015-16	(275)	(137)
2016-17	(690)	(345)

Source: Tariff Orders of the MAHADISCOM

From the above table it is observed that MahaDiscom has incurred a loss of Rs 1115 Crore, Rs. 275 Cr & Rs. 690 Cr in FY 2015, FY 2016 and FY2017 approximately because of non-achievement of distribution loss reduction target set by the MERC.

ii. MYT Regulations has also specified that Interest on Working Capital (IoWC) as ARR item controllable norm and to be shared as 1/3 of the efficiency gain/ (loss) on to consumers and 2/3 to be retained by MahaDiscom. The sharing of efficiency gains/(loss) on account of IoWC are shown in the Table below: -

Table 13: Sharing of efficiency gains/(loss) on account of IoWC for MSEDCL

Year	Efficiency Loss retained by MahaDiscom (Rs.Cr)	Efficiency Loss borne by the consumers (Rs.Cr)
2014-15	(145)	(72)
2015-16	(331)	(166)
2016-17	(431)	(216)

Source: Tariff Orders of the MAHADISCOM

From the above Table, it is observed that MahaDiscom has incurred a loss of Rs. 145 Cr, Rs. 331 Cr & Rs. 431 Cr in FY 2015, FY 2016 and FY2017 individually due to delay in receipt of payment of its dues.

iii. MYT Regulations has also specified that Operation and Maintenance (O&M) as ARR item controllable norm and to be shared as 1/3 of the efficiency gain/(loss) on to the consumers and 2/3 to be retained by MahaDiscom. The sharing of efficiency gains/(loss) on account of O&M. are shown in the Tables below:

Table 14: Sharing of efficiency gains/(loss) on account of O&M for MSEDCL

Year	Efficiency Loss to be retained by MahaDiscom (Rs.Cr)	Efficiency Loss to be borne by the consumers (Rs.Cr)
2014-15	(119)	(60)

Source: Tariff Orders of the MAHADISCOM

From the above Table, it is observed that MahaDiscom has incurred a loss of Rs 119 Crore in FY 2014-15.

iv. Therefore, due to the non-achievement of the above norms set by MERC, MahaDiscoms has suffered from losses that impacted its revenue and thereby incurring a financial loss.

- *Disallowance of Delayed Payment Charges as a cost of recovery in tariff determination***:** Due to its precarious financial position, MahaDiscom was not able to pay its dues to Generators and Transmission within the timelines and ends in paying Delayed Payment Charge (DPC). DPC paid or due by the Distribution Licensee to the Generating Company or Transmission Licensee is not admissible as an expense for the Distribution Licensee, according to MYT Regulations. As a result, it was not entitled to collect the cost from tariffs, and it was a direct income loss for MahaDiscom, which it must endure. To compensate for the DPC loss, MahaDiscom utilized the RoE fund for compensation purpose, which resulted in the lower fund that was left in working capital for utilization for operational purpose. Therefore, to maintain the operations, fund arrangement was done through short-term borrowing at a high interest rate against working capital.

- Thus, the exercise of tariff determination has an indirect impact on the MahaDiscom finances, under tariff and cost recovery. The Gap between ACoS and ABR has been increased due to the disallowance of inefficient cost such as high distribution losses (Rs 275 Crore for 2015-16) and interest on working capital (Rs 331 Crore for 2015-16), non-consideration of Delayed Payment Charges to extent of Rs 973 Crore in FY 2014-15. Also, recovery under revenue, change in sale mix and changes in cross-subsidy requirement, non-recovery of dues from Agriculture Consumers and delay in receipt of subsidy from State Government added to woes. This non-recovery of expenses under revenue has increased its financial losses.

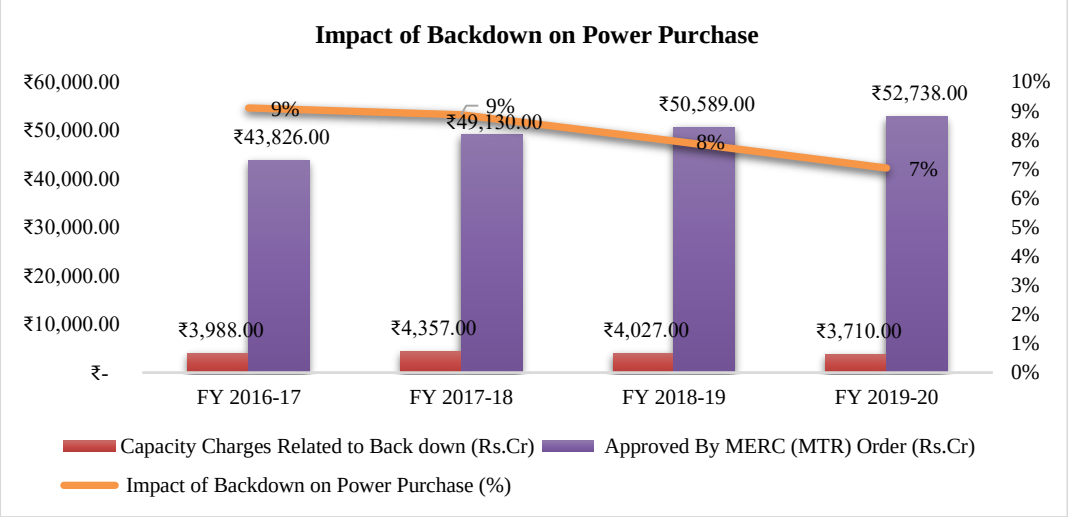
5.3.4 RISING POWER PURCHASE COST DUE TO NON - UTILISATION OF SURPLUS CAPACITY AND TREATMENT OF COAL DISTRIBUTION POLICY 2013 UNDER THE CHANGE IN LAW:

- MahaDiscom was carrying out load shedding up to FY2012-13 mainly owing to insufficient availability of power. To avoid the load shedding, MahaDiscom entered into Long term PPAs for catering to the demand up to FY 2025 by considering the then prevailing power demand-supply situation and growth rate of 8% in electricity demand as forecasted in the 17th Energy Power Survey (EPS) published by CEA. Therefore, MahaDiscom entered into long term PPAs with MSPGCL for 13,627 MW, Central Sector Share 5,313 MW and IPPs 5545 MW (Adani 3,085 MW, EMCO 200 MW, CGPL 760 MW, JSW 300 MW and Rattan India 1200 MW). Furthermore, MahaDiscom has also signed Long Term EPAs with Renewable sources for 6,222 MW and with other hydro projects for fulfilling Renewable Purchase Obligations. Thus, overall, MahaDiscom has signed PPAs for 31,197 MW. However, the actual average growth in electricity demand in the last four years was only 5.6%. Thus, one-third of the present installed capacity was added in the

last 5-6 years alone, which resulted in a surplus power situation for MahaDiscom and currently being 'backed down' to 70% of the capacity i.e. not being despatched for supply due to lower demand. As a result, MahaDiscom is required to bear full fixed costs of such idle capacity as per PPA terms.

- The Figure shown below indicates that of the total projected cost of power purchase of MahaDiscom for FY 2016-17 to 2019-20 and around 7- 9% of the cost would be because of fixed costs payable for idle capacity/back down. Therefore, the fixed capacity charges payable to idle plants are adding a financial burden on MahaDiscom.

Figure 32:: Impact of Backing down on Power Purchase of MSEDCL



Source: Tariff Orders of the MAHADISCOM

- The analysis revealed that most of Generating Plants with whom PPAs are entered are coal-based generating plants and these power plants suffered from coal shortages during 2012-13 to 2016-17. While the capacity of MahaGenco has increased by around 21% from FY2010-11 to FY2015-16, coal availability has decreased by around 15% during the same period. In the Year 2014, there was a shortfall of 33% coal supply

on a quantitative basis and 38.42% on a qualitative basis (heat value)*(MERC, 2014a)* for MahaGenco. Short supply and grade slippage of domestic coal resulted in the non- achievement of the normative PLF (i.e. 85%).

- Similarly, long term PPAs entered with Private Generators under competitive bidding framework for Levelized tariff were entitled to change in the law because of change in coal distribution policy of GOI. This change in law attributes to an increase in variable cost per unit and the average cost of power purchase for MahaDiscom. As a result, the estimated percentage increase year on year between the FY2015-16 to FY2016-17, as shown in **the following Table**, was in the range of 4-6% in the year 2016 and 2017 and the avg. cost of power purchase was in the range of 7% -101.87% respectively. Thus, an increase in the variable cost acts as an additional burden to the consumer, as the cost is allowed and passed through, in terms of tariff.

Table 15: Impact of change in Law on Average Cost of Power Purchase for MSEDCL

Source of Power (Station wise)	Installed Capacity (MW)	Variable Cost per unit including Fuel Price Adjustment (Rs/kWh)		% Y-Y	Average Cost of Power Purchase (Rs/kWh)		% Y-Y
		FY 2015-16	FY2016-17		FY2015-16	FY2016-17	
Adani power	125.00	2.24	2.34	4.46%	3.69	3.95	7.05%
Adani power	1320.00	1.53	1.6	4.58%	2.66	2.73	2.63%
Adani power	1200.00	2.24	2.36	5.36%	3.7	3.94	6.49%
EMCO Power	200.00	1.96	2	2.04%	3.25	4.07	25.23%

Rattan India	1200.00	2.73	2.82	3.30%	4.27	8.62	101.87%

Source: Tariff Orders of the Applicable Discom

- Given the above analysis, it is inferred that MahaDiscom is procuring power from some of the generating stations of MahaGenco that are either operating below desired PLF level due to coal shortage (qualitative shortage) or are operating on costlier coal or are not operating at all or part capacity has been backed down due to low demand or has a higher variable cost due to change in law impact.

5.3.5 RISING AT&C LOSSES AND NON-RECOVERY OF DUES/ARREARS/RECEIVABLES FROM CONSUMERS:

- Following Table depicts the AT&C Losses during the last five years**.**

Table 16: AT&C Losses for MSEDCL (FY 2011-12 to FY 2015-16)

Particulars	2011-12	2012-13	2013-14	2014-15	2015-16
Net Input Energy (MU)	95,433.00	97,846.00	99,575.00	1,04,043.00	1,10,961.00
Net Energy Sold (MU)	80,132.00	83,488.00	85,631.00	88,390.00	94,268.00
Collection Efficiency (%)	93.34%	91.48%	99.55%	95.05%	90.49%
Energy Realised (MU)	74,793.00	76,372.00	85,245.00	84,017.00	85,303
Distribution Losses (%)	17.28%	16.03%	14.00%	13.75%	14.29%
Change in Distribution Losses (%)	-4.04%	-1.25%	-2.03%	-0.25%	0.54%
AT & C Losses (%)	21.63%	21.95%	14.39%	19.25%	23.12%

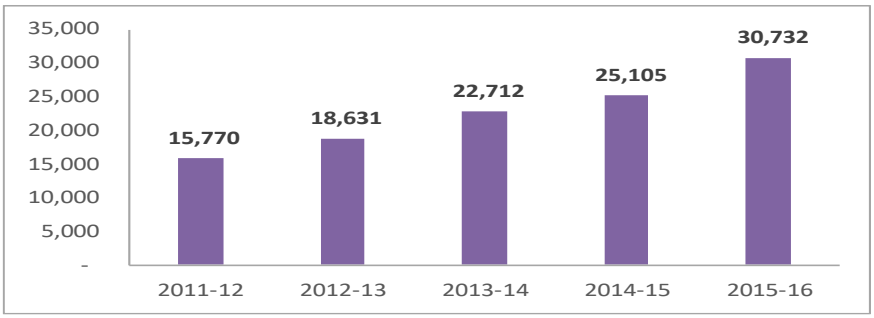
Source: PFC & MahaDiscom Tariff Orders

- The AT & C loss increased by 3.87% in FY 2015-16 in comparison to FY 2014-15. The collection efficiency for agricultural in April'2014 to Feb'2015 was 51% while the same reduced to only 18% during April'2015 to Feb'2016. Interestingly, there has been an increase in the metered sale to agricultural consumers by approx.1800 MU during this period. Despite the increase in the metered sale to agricultural consumers, MahaDiscom was not able to increase or even sustain the same level of collections from the agriculture consumers. Hence the

increase in AT&C losses is attributed to the decrease in collection efficiency from the agricultural consumers despite an increase in metered sales. It is important to note here that the number of agricultural consumers increased from 36.02 lakhs in March 2014*(MERC, 2014b)* to 39.43 lakhs in March 2016. A comparative analysis of AT & C losses revealed that while most of the States across India showed a reduction in AT & C losses in FY 2015-16 in comparison to FY 2014-15, whereas MahaDiscom showed an increase in AT & C losses. Several other states have been able to reduce the losses by more than 4% in the same period *(PFC, 2016a)*.

- The balance sheet indicates trade receivables of Rs. 30,732 Crore that has consistently increased throughout FY 2011-12 to FY2015-16. This pertains to default on the payment of bills and dues by a certain category of consumers especially agriculture. Agriculture remains the segment where the metering is low, out of a total of 39.43 Lakh Agricultural Consumers, only 23.52 Lakhs[1] are metered indicating that still, 40% of consumers remain unmetered. The following Figure shows the trade receivables' status at the end of the respective financial year.

Figure 33 :: Trade Receivables for MSEDCL (2011-12 to 2015-16)



Source: Balance Sheet of MahaDiscom for the applicable year

[1] *Source: MAHADISCOM petition for true of FY 2015-16 and FY 2016-17*

- Of the above-mentioned trade receivables, the subsidy component receivable from GoM accounts for a substantial portion which stood at Rs.1, 663 Crore as of March 31, 2016. Moreover, **Table 8** indicates that approx. 52.74% of the arrears are from the Agriculture category and permanently disconnected consumers comprise 22.94% of receivables at the end of June 2016.

Table 17: MahaDiscom Consumer Category-wise arrears (June 2016)

Consumers Category	Arrears at the end of June 2015 (In Rs. Cr)	Weightage (%)	Arrears at the end of June 2016 (In Rs. Cr)	Weightage (%)
Residential	1251.06	5.03%	1569.4	5.19%
Commercial	441.84	1.78%	518.33	1.72%
HT-Industrial	388.09	1.56%	458.66	1.52%
LT Industrial	231.61	0.93%	257.51	0.85%
Power loom	890.31	3.58%	924.1	3.06%
PWW	1023.65	4.11%	1272.6	4.21%
Street Light	1547	6.21%	2269.33	7.51%
Agriculture	12335.03	49.55%	15937.74	52.74%
Others	39.17	0.16%	82.49	0.27%
Railways	0	0.00%	-0.24	0.00%
Permanently Disconnected	6744.14	27.09%	6931.59	22.94%
Total	**24891.9**	**100.00%**	**30221.51**	**100.00%**

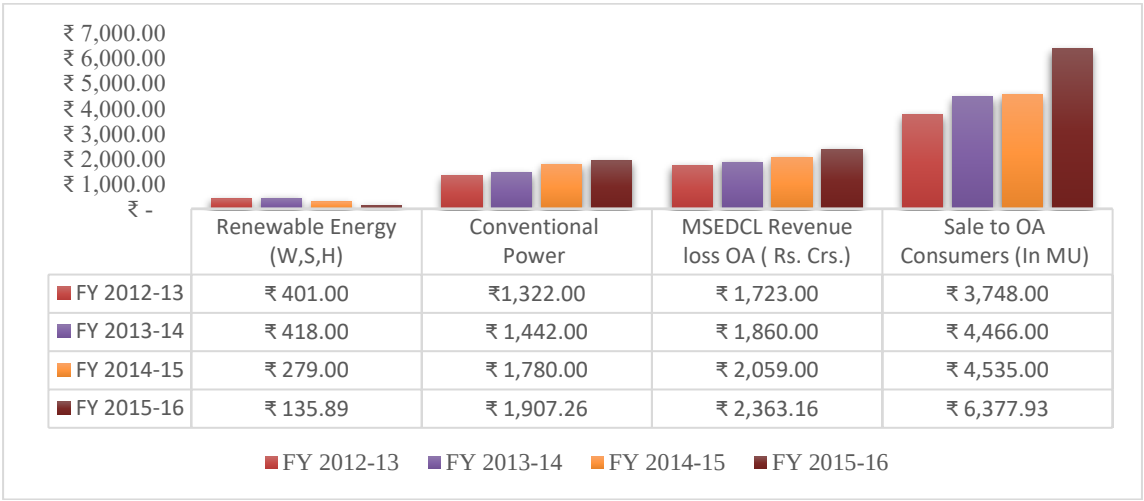
Source*: MahaDiscom *Website (MSEDCL, 2018)

As a result, dues/receivables of agricultural consumers have a substantial bearing on MahaDiscom finances. Moreover, MahaDiscom is required to provide subsidy to particular categories of consumers like agriculture, and the power loom industry in their electricity tariff. Therefore, delay in receipt of subsidy and under-recovery of trade receivables has led to stress on working capital and interest payment, which has resulted in short term borrowing at a high interest rate and difficulties in repayment of existing debt.

- ***Loss of Revenue or Migration of Sales due to Open Access and Solar Roof-top net-metering mechanism instituted under Electricity Act 2003***

- High paying consumers such as the Industrial and Commercial category are migrating out of the revenue base of MahaDiscom under open access due to its high tariff. Moreover, migration of Industrial consumers to open access reduces the subsidizing portion and simultaneously increases the burden on the subsidized category of consumers of MahaDiscom. HT Industries sales have come down to 25% in FY2015-16 from 32% in FY 2012-13. On the other hand, sale to OA consumer has increased from 3748 MUs to 6378 MUs from FY2012-13 to FY2015-16 respectively. In addition, revenue loss due to open access in FY2012-13 accounted for Rs. 1723 Crore, which was increased by 37% to Rs. 2363 Crore in FY 2015-16. These migrations of sales also increased the surplus capacity of MahaDiscom that affected other consumers.

Figure 34: Sale to OA Consumers



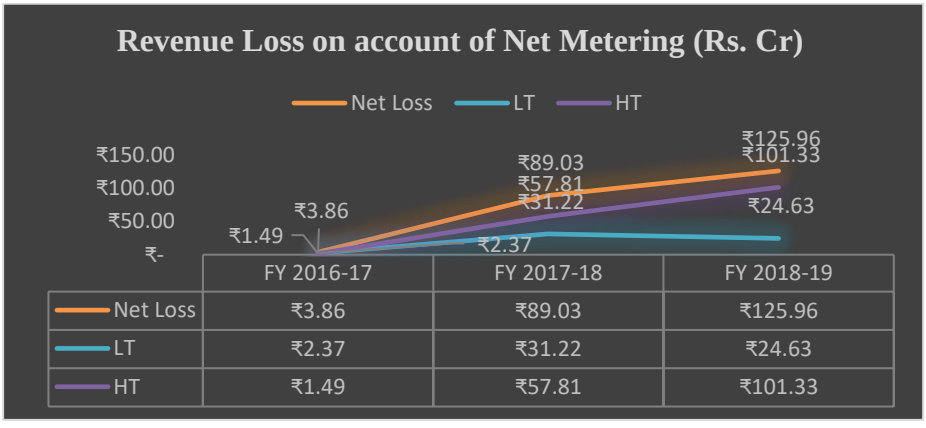
	Renewable Energy (W,S,H)	Conventional Power	MSEDCL Revenue loss OA (Rs. Crs.)	Sale to OA Consumers (In MU)
FY 2012-13	₹ 401.00	₹1,322.00	₹ 1,723.00	₹ 3,748.00
FY 2013-14	₹ 418.00	₹ 1,442.00	₹ 1,860.00	₹ 4,466.00
FY 2014-15	₹ 279.00	₹ 1,780.00	₹ 2,059.00	₹ 4,535.00
FY 2015-16	₹ 135.89	₹ 1,907.26	₹ 2,363.16	₹ 6,377.93

Source: Tariff Orders of the MAHADISCOM

To address the impact of open access and loss of cross-subsidy, measures have been taken to levy additional surcharges of Rs. 1.11/ kWh and electricity duty on Open Access consumer and CPP. These measures have helped to address the loss of cross-subsidy for MahaDiscom.

The solar rooftop net metering has resulted in a reduction of revenue and affecting cross-subsidy of MahaDiscom. **Figure 15** indicates that both LT and HT consumers are moving out of the revenue base of MahaDiscom by opting for Net Metering arrangement. Therefore, it has caused a net revenue loss of Rs.3.86 Crore in FY2016-17, which expected to increase to around Rs. 125.96 Cr in FY 2018-19 (up to Dec'18). Such shift to net metering consumption by subsidising consumers has a resultant impact on distribution transformers, low utilisation of distribution assets (resulting in higher wheeling charges for consumers), technical loss and also loss of cross-subsidy.

Figure 35:: Revenue Loss of MSEDCL due to Net Metering Generation



	FY 2016-17	FY 2017-18	FY 2018-19
Net Loss	₹3.86	₹89.03	₹125.96
LT	₹2.37	₹31.22	₹24.63
HT	₹1.49	₹57.81	₹101.33

Source: Tariff Orders of the MAHADISCOM

- It has been observed that for the last 4 years, 85% of the revenue gap is due to lower sale of power that resulted in a net revenue loss of Rs. 13,082 Cr. The decrease in the sale of power was mainly because of the migration of HT consumers to OA and LT and HT consumers to net

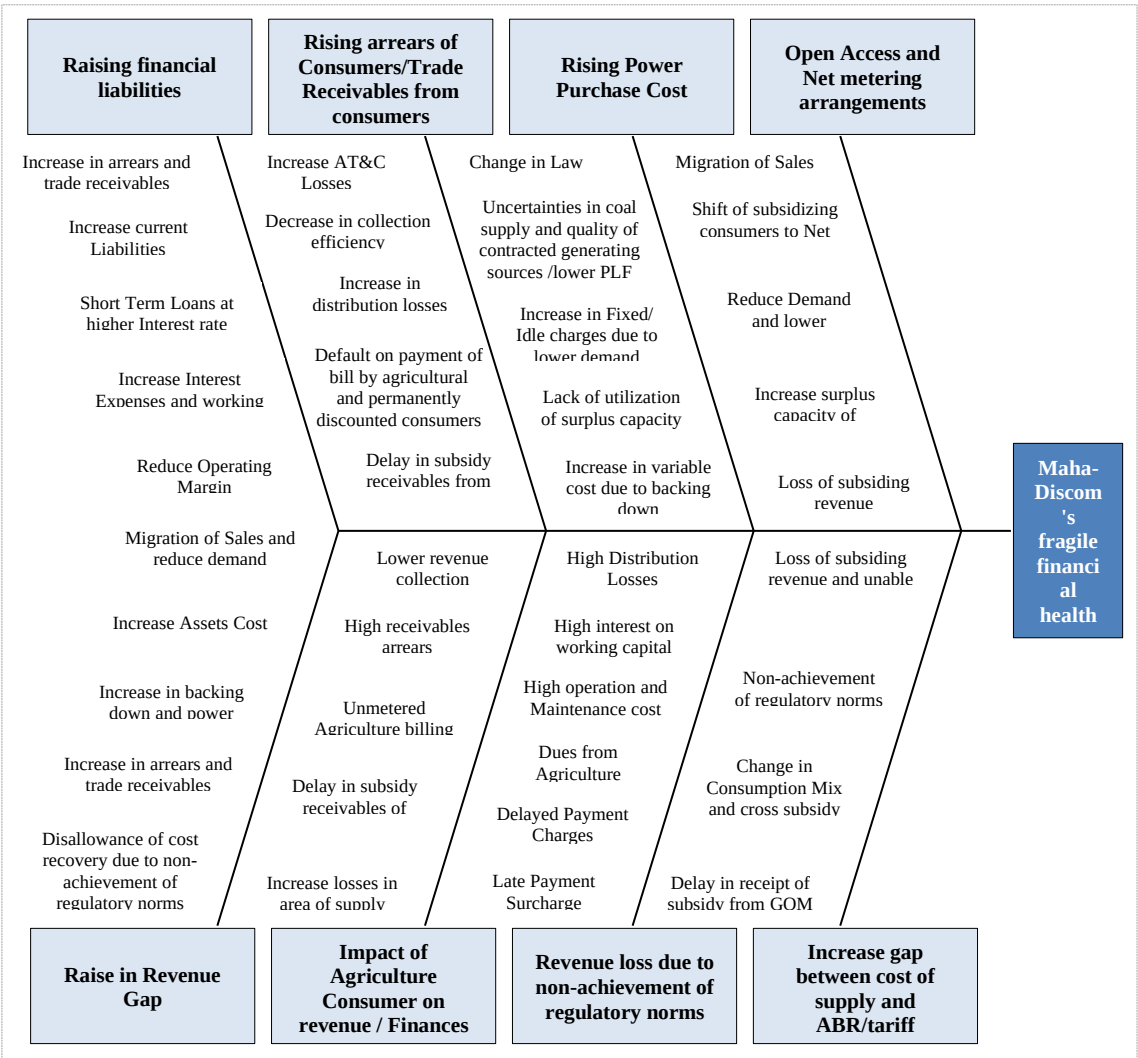
metering. Therefore, the resultant impact on the gap is because there is a loss of revenue but the substantial fixed cost is incurred to augment, create and maintain the infrastructure with the available resources, which cannot be curtailed and restricts it to provide competitive tariff to Industries.

5.4 FISHBONE DIAGRAM:

The above-mentioned different factors and causes of financial and operational parameters that are affecting the financial viability of MahaDiscom are identified. Using Fishbone Diagram (Cause-and-effect Diagram) as a tool of Root Cause Analysis (RCA) technique as shown in Figure 36 is used to graphically identify and organize different possible causes of a problem/symptom to reach a common understanding of the problem.

Figure 36: Fishbone Diagram for MahaDiscom's financial performance

Analysis and compilation



The study has considered the financial statement for the Period FY 2012 to FY 2017 when the migration of sales and lost revenue impact was yet to contribute substantially, and further period should have a major impact on these factors including loss of revenue of Indian Railways being a separate Distribution Licensee for their electric traction requirement. On one side, the Revenue of the Distribution Sector is eroded due to various policies and on the other side, they are expected to operate at a competitive cost and deliver the sale

of electricity at a competitive tariff that appears to be major areas for the future analysis.

5.5 CONCLUSION

The Central and State Government has initiated numerous revival schemes for distribution in the India's power sector for the last 15 years, but revival schemes were short-sighted and had a negligible effect on Discom's financial performance. Through this research, findings and RCA methodology offer MahaDiscom a pictorial depiction of possible causes/ problems that have resulted in fragile financial health and the reason for the vicious cycle. This study and analysis provide resemblance to other State Discoms in India as to why Discoms in India are on verge of financial collapse. Therefore, to break this vicious cycle, another reform framework has to be brought in, which can deliver an efficient performance of State Discoms.

Moreover, the analysis diagnoses the possible causes that are contributing to the various areas of financial losses of the MahaDiscom, which would form a basis and guidance of allocating losses in formulating a Transfer Scheme and Rollout Plan of segregating Distribution Network from Retail Supply Business by State Government.

5.6 FINDINGS

The findings of the study based on the above analysis are summarized as follows as per research question (RQ), *What are the different factors and root causes (financial losses, high borrowings and level of cross-subsidies to be phased out) which resulted in the distribution sector of Maharashtra being financially unviable.*

- Inefficient recovery /non-recovery of dues /trade receivables from Consumers (mainly from Agriculture) resulted declining in the current ratio/liquidity ratio and incapability of paying debts.
- Expenses increased at a higher rate than revenue and not able to generate revenues for meeting expense.

- Loss and migration industrial/commercial high paying category under Open Access and migration of LT subsiding consumer/high revenue paying category under Solar rooftop net metering arrangement instituted under 2003 Act.
- A higher expense due to:
    - Increased power purchase fixed cost due to backing of contracted capacity due to migration of Consumers under Open Access and lower demand materialisation than estimated power purchase contract and increased power purchases due to change in the law.
    - Raising short term loans at higher interest cost for retaining capital liabilities
    - Increased debt to equity ratio due to increased financial losses.
- Lower revenue due to:
    - Non-recovery of Agriculture Sales, which is about 30% of total sales.
    - Reduction of HT Industrial/Commercial Sales under Open Access which provides higher and timely revenue.
    - The increasing gap between ACoS and ABR as approved tariff is not reflective of the cost incurred. The tariff determination principle allows cost based on norms to be achieved and do not allow inefficient cost.
    - Regulatory norms do not allow cost recovery when actual distribution losses, IOWC, Operation and Maintenance expense, expense on account of delayed payment charges to Generators and Transmission when dues are not paid within timeline due to lower recovery of sales.

CHAPTER 6: QUALITATIVE ANALYSIS AND FINDINGS

This chapter summarises the demographic profile of respondents. Since the purpose of research emphasizes the formulation of policy matters at the State level through qualitative research design, therefore, the sample population is inclusive of the senior-level experience professional of the power industry and experts of subject matter.

The data is treated following the methodology taken by Smith and Firth in 2011 for framework analysis. This includes analysis in 3 steps. The first step is Data Management (data reduction), followed by Descriptive Accounts (theme discovery and association construction), and finally Explanatory Accounts (mapping and interpretation of reduced data).

In this chapter, the researcher has answered the research questions in the interpretation to research findings. To address the research objective, the research questions were further discussed in light of relevant studies.

6.1 INTRODUCTION

The conceptualization of the model suggestive framework for introducing RSC in the electricity distribution sector of India, International Experiences and Present scenario of Maharashtra's distribution sector has been examined for preparing the Conceptualized framework along with relevant studies/regulatory report/Tariff Orders/Analysis.

The conceptualization process has helped in the preparation of interview protocol which after validation is used for in-depth interviews of the respondents in the sample population. The demographic profile of the respondents is presented in **Table 18**. Responses of interviews have been noted with respondents' permission manually and electronically which is then inputted into the computer using ATLAS.ti software. Then with the help of

interview transcripts, quotations are prepared, and to determine the saturation level, open codes were generated from each interview. The descriptive and explanatory accounts are created after the transcripts are completed (Ritchie and Lewis, 2003; Smith and Firth, 2011).

6.2 DEMOGRAPHIC PROFILE OF RESPONDENTS

In qualitative research, the most important factor in determining sample size is saturation. (Mason, 2010). The present study includes 12 Respondents of senior-level experts. The information on the respondents' demographic profile on – 'experience, expertise, domain, designation and the organization in which the respondent was employed at the data collection time, is presented in **Table 18**:

Table 18:: Respondent's Demographic Profile

Demographic Profile of Respondents					
Respondents Profile					
Sr No.	**Level of Experience**	**Organisations Area**	**Expertise Area**	**Level of Designation**	**Objective of Interview**
1	25 Years	Regulatory Commission	Regulatroy Affairs	Chief (RA)	Validator
2	25 Years	Consultant	Regulatroy Affairs and Power Market	Director	Validator
3	25 Years	Consultant	Distribution Tariff	Director	Interviewee
4	25 Years	Consultant	Power Market and PPA	Director	Interviewee
5	25 Years	Consumer Organisation	Consumer Protection	President	Interviewee
6	25 Years	Distribition Company	Distribution Commercial	Director	Interviewee
7	38 Years	Regulatory Commission	Distribtion Operation and Commercial	Ex Member SERC	Interviewee
8	25 Years	Consumer Organisation	Electricity Tariff and Power Purchase	Director	Interviewee
9	20 Years	Consultant	Distribtion Tariff and Power Purchase	Director	Interviewee
10	25 Years	Legal & Policy	Electricity Laws	Director	Interviewee
11	25 Years	Exchange Market	Power Market/Purchase	Director	Interviewee
12	20 Years	Generator	Generation Finance and Fuel Management	Manging Director	Interviewee

Since this research discusses the segregation of wire and supply from existing distribution companies in Maharashtra State based on changes carried out at the National level and after analysing its critical factors, hence for the interview; the researcher targets experienced power sector professionals who have relevant experience at Maharashtra State level and experience in distribution sector policy matter and had also witnessed the unbundling of State Electricity Boards under EA 2003. The Respondents have expertise in Operations and Commercial experience of Distribution, Distribution Planning, Regulatory Affairs, Generators, Legal & Policy aspects of Electricity Sector, Power Market, Tariff and Finance.

In total, interaction with 10 members happened. From the 12 respondents, 2 experts were interviewed for protocol validation. Interviews were conducted in accordance with the validated protocol until data saturation was reached. The researcher experienced saturation while conducting the tenth interviews. Given the above, no further interview is conducted.

6.3 DATA ANALYSIS

Framework Analysis is utilised to facilitate data analysis, as indicated in the previous Chapter. The framework analysis is especially well adapted to cross-sectional descriptive data analysis, which allows for the collection of various aspects of the inquiry. The interconnected framework analysis stage explicitly outlines the methods that lead systematic data analysis for the construction of descriptive and explanatory accounts (Ritchie and Lewis 2003; Smith and Firth 2011).

6.3.1 DATA MANAGEMENT

Identification of New Codes

To arrive at framework analysis for these research objectives – The research involved 8 industry experts. The participants were interviewed in order to learn more about their data collection experiences. The researcher interviewed each participant once for up to 120 minutes. The researcher conducted semi-structured interviews until the saturation in data was reached (Ward et al., 2013). For greater flexibility in data analysis during interviews, the Framework Analysis methodology is provided. The Codebook is generated for each “Interview transcripts” where the researcher analyzes the data after every interview. The codebook depicts the emergence of new codes for each interview by identifying in-vivo codes. Despite the fact that the number of in-vivo codes generated for each interview is roughly similar, the number of new codes generated for each subsequent interview is decreasing. Tables 19, 20, and 21 evaluate the codebook generated for "Interview transcripts" to determine the number of new codes that emerged for each interview.

A. For Research Objective 1

	Emergence of New Codes									
	Q/R	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**
Barrier and Constraints	Q1	107	60	50	66	39	24	11	18	0	0
	Q2	9	4	4	3	2	1	5	0	0	0
	Q3	13	3	3	4	2	3	2	1	0	0
	Q4	13	3	3	3	1	0	0	0	0	0
	Total	**142**	**70**	**60**	**76**	**44**	**28**	**18**	**19**	**0**	**0**

Table 19:: Emergence of New Codes for Interviews for RO1

The above **Table 19** shows that after interviewing the first respondent, 142 codes were generated. These all codes were new in nature. After the second interview, 70 new codes were identified. The researcher saw a notable decrease in the number of new codes generated after each subsequent interview, as 60, 76, 40, 28, 18, and 19 new codes were formed after the third, fourth, fifth, sixth, seventh, and eighth interviews, respectively. After the ninth interview, no new code was discovered, indicating that data collection had reached saturation. As a result of the foregoing, the researcher did not conduct any additional interviews for this RO. The sample size for the interviews was increased to 10 after data saturation occurred at the eighth interview**.**

B. For Research Objective 2

	Emergence of New Codes										
	Q/R	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**
Preparedness and Adequacy of Maharashtra	Q1	8	2	8	9	8	11	3	0	0	0
	Q2	4	5	8	4	1	4	4	1	0	0
	Q3	9	8	5	3	1	0	4	1	0	0
	Q4	6	5	4	4	5	4	6	2	0	0
	Q5	6	4	5	6	9	4	3	4	0	0
	Total	**33**	**24**	**30**	**26**	**24**	**23**	**20**	**8**	**0**	**0**

Table 20:: Emergence of New Codes for Interviews for RO2

Table 20 reveals that 33 codes were created after interviewing the first respondent. All of these codes were completely new. 24 additional codes were discovered after the second interview. The researcher saw a noticeable decrease in the creation of new codes after each subsequent interview, with 30, 26, 24, 23, 20, and 8 new codes generated after the third, fourth, fifth, sixth, seventh, and eighth interviews, respectively. After the ninth interview, no new code was discovered, indicating that data collection had reached saturation. As a result of the foregoing, the researcher did not conduct any additional interviews for this RO. Because the data saturation occurred at the eighth interview, the sample size for the interviews was increased to ten**.**

C. For Research Objective 4

Table 21:: Emergence of New Codes for Interviews for RO4

	Emergence of New Codes									
	Q/R	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**
Transfer Scheme and Rollout Plan for Maharashtra	Q1	7	5	12	0	6	4	3	4	0	0
	Q2	3	4	7	2	2	2	1	1	0	0
	Q3	8	4	3	3	3	0	6	2	0	0
	Q4	7	7	1	2	4	4	2	1	0	0
	Q5	14	5	3	0	1	2	0	3	0	0
	Q6	2	2	4	6	2	4	5	0	0	0
	Q7	3	5	2	0	2	0	0	1	0	0
	Q8	5	4	0	6	6	8	2	0	0	0
	Q9	6	2	4	3	4	1	5	0	0	0
	Q10	8	6	2	3	3	4	0	3	0	0
	Q11	2	5	4	1	3	6	2	2	0	0
	Q12	4	1	6	4	2	0	0	1	0	0
	Q13	4	3	8	6	4	5	4	0	0	0
	Q14	4	1	6	0	3	1	2	3	0	0
	Q15	3	4	2	2	0	0	0	0	0	0
	Q16	5	4	0	4	0	5	0	1	0	0
	Q17	2	5	2	1	2	3	1	1	0	0
	Q18	5	2	6	3	2	3	4	2	0	0
	Q19	2	3	3	2	1	1	0	0	0	0
	Q20	3	2	1	2	3	3	1	0	0	0
	Total	**97**	**74**	**76**	**50**	**53**	**56**	**38**	**25**	**0**	**0**

Table 21 reveals that 97 codes were created after interviewing the first respondent. All of these codes were completely new. 74 additional codes were discovered after the second interview. The researcher saw a marked decrease in the formation of new codes after each subsequent interview, as 97, 74, 76, 50, 53, 56, 38, and 25 new codes were generated after the third, fourth, fifth, sixth, seventh, and eighth interviews, respectively. After the eleventh interview, no new code was discovered, indicating that data collection had reached saturation. As a result of the foregoing, the researcher did not conduct any additional interviews for this RO. Because the data saturation occurred at the seventh interview, the sample size for the interviews was increased to ten**.**

Developing Categories

The data was familiarised by the management researcher by reading and rereading the interview transcripts. A collective transcript is created based on the interview transcripts in order to complete the actions suggested by the framework analysis. In-vivo codes were discovered thanks to data management. The codes were generated from each line of the transcript. The codes generated for each interview question were summarised in the section titled "preliminary ideas." More formal concepts about the codes and the citations that go with them arose from these notions. In the formation of 'first categories,' quotation, in-vivo coding, and preliminary thoughts are encouraged. The following are the in-vivo codes and initial categories for each of the study objectives examined in the framework analysis:

A. For Research Objective 1

1. Identified in-vivo codes: 457
2. Initial Categories: 13

B. For Research Objective 2

1. Identified in-vivo codes: 188
2. Initial Categories: 7

C. For Research Objective 4

1. Identified in-vivo codes: 469

2. Initial Categories: 20

6.3.2 DESCRIPTIVE ACCOUNTS

The original categories were combined together to make bigger categories as the coding progressed. Refined categories were created as a result of the development of broader categories. The bigger categories were successively brought together to generate first themes based on their similarity.

The data was then refined and synthesised to reveal more abstract thoughts in the form of finalized themes. This made it easier to summarize information into digestible chunks. The summarization and integration of diverse coded material emerged from the continuing improvement of categories and themes. The refining procedure necessitated careful thought about the link between codes. The data was pieced together until a whole image formed. This was accomplished by going back to the original data and comparing meaning amongst transcripts.

The data was summed up by refining initial categories and then establishing beginning themes. The ultimate step in summarisation is the formation of abstract conceptions, sometimes known as "final themes." Final themes arose as a result of the framework analysis process, resulting in the establishment of key concepts for each research objective. For each study objective considered in the framework analysis, the refined categories developed, the development of early themes, and the emergence of final themes are as follows:

A. For Research Objective 1

1. Refined Categories: 10
2. Initial Themes: 9
3. Final Themes: 7

B. For Research Objective 2

1. Refined Categories: 6
2. Initial Themes: 4
3. Final Themes: 3

C. For Research Objective 4

1. Refined Categories: 14
2. Initial Themes: 8
3. Final Themes: 5

6.3.3 EXPLANATORY ACCOUNTS

To guarantee that the opinions and experiences indicated in documents and interviews were appropriately reflected, the researcher checked back in both the original database and the analytical stages in Explanatory accounts. The core notion for each of the research objectives was developed through the use of explanatory accounts. Seven, three, and five final themes emerged in descriptive accounts for respective research objectives, resulting in the formation of core concepts on the research objectives of RO1 " Barriers and constraints in the introduction of retail competition in the distribution sector "; RO2 " To explore the level and extent to which the existing distribution sector and its infrastructure are prepared for introducing retail consumer choice in Maharashtra "; and RO3 " To explore the level and extent to which the existing distribution sector and its infrastructure are prepared for introducing retail consumer choice in Maharashtra ".

6.4 INTERPRETATION OF DATA

The researcher is now presenting the category wise interpretation of the data management following Smith and Firth in 2011 methodology for framework analysis for three research objectives as follows.

6.4.1 Interpretation of Data for Research Objective 1: Legislative Barrier or Constraints in introducing RSC in the distribution sector of India.

INTERPRETATION OF CATEGORY 1: **Segregating distribution and supply functions of Discom:**

The present Electricity Act 2003 does have a framework for electricity retail sector competition. The Act provides for network/wires and retail supply businesses bundled/subsumed into one Licensed Business Company (Distribution Licensee). EA 2003 allows an open-access framework to allow the users to use the wires of the Discom. When a consumer/user is granted open access, it uses the wires of Discom to source power from the generator. However, the EA 2003 does not explicitly provide for the separation of a Discom's business into that of wire and supply. This open-access framework is an essential condition but not an adequate condition for the introduction of retail competition. The operational experience over a period of time shows that this open access framework is not sufficient for achieving the real motive of retail competition.

The introduction of retail competition is threatened due to a perceived conflict of interest. This conflict of interest may arise from the fact that wire and supply business are subsumed in one Organisation and that organisation owning the network (i.e. natural monopoly) may block open access and create barriers to entry of other sources of power supply at the wholesale level. This will block retail competition because if another utility or more utilities are allowed to operate the supply business they will be completely dependent upon the incumbent distribution utilities in which not only the wires but also the supply business is currently subsumed so,, therefore, it is necessary to explicitly segregate and separate the wires business from the supply business and allow

the incumbent network operator to only operate the network business and not allow it to operate the supply business.

To introduce competition, it is essential to separate the functions and have a single wires licensee which could be an incumbent licensee who has already established a network (Network Operator) and multiple retail licensees which will compete in the market. Need one network company and ownership is irrelevant, it can be private, or Govt. Network Company need not have only ownership from Govt. There should be only one Distribution Company dealing wire in the Supply area and removal of owning wire business for 2nd Distribution Company should be enacted by way of legislation. Wire of Distribution Company can be accessed by retail supply company. This concept has also been upheld by the Supreme Court of India in the case of Tata power versus Reliance Energy Limited and others. Following this judgement, the Regulatory Commission in Maharashtra has implemented such a provision whereby in the suburban area of the city of Mumbai the consumers of the incumbent distribution licensee have been enabled the use the wires of the said incumbent distribution licensee for getting the supply component from another distribution license after payment of Wheeling charges and other charges.

Mumbai, Maharashtra is a unique situation of a parallel network in one licence area but need one network company. Some mechanism required for bringing one network company. Cannot have two lines in one area. Going forward there should be one network company in one supply area. Regulatory intervention is required in Mumbai to bring one network company as presently parallel network company exist in one supply area. Amendment of Act should say only one Network Company. Removal of owning wire business by 2nd Distribution Company under present EA and only one wire company in supply area which will provide access of its wire to Retail Supply Companies is required to be addressed in the proposed amendment.

Clarity may be required with regards to the bifurcation of commercial loss to be undertaken at wire or meter end along with the responsibility of the supply licensee. Unrecognised losses in the allocation of financial losses issue,

should not be allowed as it is disallowed by Regulators. This aspect must be clarified under proposed amendments and Transfer Scheme.

The basic objective of RSC is to bring efficiency in the operation of power purchases. Competition forces efficiency. There would always be a gap between regulated tariff and competitive tariff. There should be complete ring-fencing between a distribution and retail supply after a transitory period. Transmission/Dist. (network) company should not be engaged in generation and trading.

Hence, formulation of Transfer Scheme by the State Government for reorganisation and ownership segregation of Distribution Licensees in consultation with SERCs would be necessary.

INTERPRETATION OF CATEGORY 2: **Reduction of Cross subsidy built-in tariff:**

The need to immediately introduce competition at the retail level is primarily because of highly tariff structure due to the high cross-subsidy built-in tariff. There is a socio-political angle to it that goes deep into the history of the nation but that is not a subject matter of the present paper and therefore that has not been elaborated here. High-end consumers are tending to seek open access because of economies of scale they are better placed for procuring power from an entity other than the existing incumbent distribution utilities. The way the tariff is structured is to make high-end consumers cross-subsidise and lowers the retail supply tariff of the economically backward consumers, agricultural consumption, and domestic category of consumers (subsidy to low end subsidised consumers). But practical experience shows that this is not adequate to compensate for the cross-subsidy requirements of Discoms. Conflict of interest arises because of the tariff structure we have. Also, Wire is not amenable to competition, barring wire other business of electricity is amenable for competition. In the event the wires business is also made available for competition then there will be issues of duplication of a network, stranding of current assets, digging up of roads and lands, right away, safety issues, and many other engineering issues. Hence, the existence of cross-subsidy is one

level of a barrier. The root cause is tariff and the second is ownership. Cross subsidy reduction should be done by using the UC charge. Retail Competition should be opened without waiting for the complete removal of cross-subsidies.

Tariff is structured due to socio-political issue exist in the country and hence Political acceptance is also anther constraint or factor. For the separation of carriage and content, the big question is how to protect the end consumer. This may lead to cheery picking wherein high-end consumers would go under open access and adversely impact low-end consumers buy not fully cross-subsidising them though there is a provision for process of cross-subsidy surcharge in the present enactment. This must be seen before suggesting any framework and not that the existing law does not have a framework, but it does not happen due to political acceptance as there is a socioeconomic issue in the country. Suggesting any framework should address the concern of socioeconomic issue as there is a need to protect low-end consumers. Through the introduction of Universal Charge (UC) to be collected from all consumers may be considered for phasing out cross-subsidy built-in tariff. Further amortization of financial losses either through UC or support from the Government by IC is also required. However, this will require backup support of specific provisions to be incorporated in the Electricity Act amendment by the parliament or else the powers and jurisdiction of the intermediary company may come under challenge.

Considering the entry of multiple supply licensee, there is a high probability of shifting of subsidising consumers from existing to new supply licensee for which the existing supply licensee needs to be adequately compensated for such loss of cross-subsidy by way of CSS or Additional Surcharges or creating of any fund from surplus CSS of the new licensee.

INTERPRETATION OF CATEGORY 3: Structuring of power procurement and wholesale market:

The issue of contracting of power procurement arrangement of Discom i.e., the big burden of PPA, Discom has to bear the fixed charges of generation, there is a provision of additional surcharge due to stranded power purchases, but such

charges are at high-level. PPAs are structured with high cost and surplus. All these issues leads to changes required in the present law and better to tweak the EA 2003, make sure for the consumer to get open access. Need to bring mechanism for changes in wholesale market changes and contracting of power. Though Electricity (Amendment) Bill 2014 and 2021 covers the rules and regulations regarding retail competition in India, the 2014 Bill did not see the light of the day. And 2021 Bill is yet to pass by the Houses of Legislature. Also, the said Bills are not adequate in the way they have been presented. The bills do not present the consolidated picture of all the mischiefs that are ailing the power sector in contemporary times. The issues are represented in a pick and choose the manner of priority issues such as payment security mechanism in favour of the generating companies and transmission licenses, the introduction of multiple distribution licenses, etc. A proper regulatory policy platform needs to be created in this regard.

Wholesale market, fuel issues for long term PPA and shortage of fuel scenario need some reforms or certain changes in the existing wholesale market or day-ahead market operated by the system operator which happened internationally. But internationally those contracts are financial contracts. The power which gets transacted in the wholesale market of India are all physical (spot) market and very close to real-time. There are three components of the market, one is the physical market, real-time market and third is an ancillary market for deviation settlement. These are physical for scheduling and despatch. Market operators are not bothered by this contract. In India, these have been mixed. The wholesale market does not exist the way we want. Contracted PPA is a barrier but EA 2003 vision was competition and what exactly are the changes required in the wholesale market is another research area.

It is pertinent that with the introduction of Competition, the existing PPA's of existing Distribution licensee are likely to be stranded if they're not successfully allocated to other buyers and consumers will be required to bear fixed costs. Accordingly, it is essential to have an appropriate clause so that existing PPA's are shared between the Existing and new licensees. There needs to be clarity on sharing PPAs based on consumer mix, demand allocation, Base

and Peak Demand, Marginal cost or Avg. cost of power purchase, Mechanism for merit order despatch between the two Companies, Treatment of surplus power, etc.

It is worthwhile to note that considering the larger Agriculture base of State Distribution Licensee, to avoid any cross-subsidy impact and tariff shock, the low-cost PPAs should be left with the Existing State-owned Licensees.

Intermediatory Company (IC) suggested under Amendment Bill 2014 is the way forward and not a barrier for addressing concerns of high-cost PPAs. It may be suggested to house all PPAs with ICs. Mechanism to protect PPAs which will protect existing Discoms burden-free. Internationally all PPAs were open to the market. Need to decide, it is transitory in nature, one school of thought is even you do open in wholesale nothing will happen. The formation of IC for protecting existing PPAs as an interim arrangement. IC for each Discom licence area need to be formed and there can be 3 or 2 ICs in Maharashtra or 1 IC that need to be clarified. Need to develop the strong national level wholesale market as in interim IC mechanism suggested and the new retail company has to purchase from IC, incremental growth from market. Dynamic allocation of PPAs should be done as State level MOD framework in Maharashtra. Strengthening of Wholesale market for procurement of power by Retailers and in interim setting up of Intermediary Company for handling and allocation of legacy PPAs may be considered.

Hence, reorganisation of Distribution Licensee into Separate Distribution Company owned either by Government or Private, Separate Incumbent Retail Supply Company and Intermediatory Company (State Government Owned holding company) handling existing Power Purchase Agreements for Distribution Licensee required to be addressed through Transfer Scheme.

As regard owned generating capacity national energy policy state that beyond 2020 no thermal generation capacity is required to be added. Hence One should not get into long term contracts. No conflict of generation and retailing together, when you have a proper wholesale competitive market, and it can be

addressed through proper economic despatch. Developing wholesale market from IC approach for RSC is not thought through Regulatory and policy intervention in developing market is necessary instead of changes in the Act.

SLDC ring-fencing or independence is also necessary. Section 32 of the 2003 Act specifies the responsibility of SLDC. However, considering the introduction of competition and multiple licensees within an area of supply, it is essential that SLDC need to be strengthened in terms of various IT related modules for scheduling, energy accounting etc. The major issue which remains to be addressed is the availability of meter data on a real-time basis for low tension consumers which presently is being considered on an estimated basis for scheduling the power.

INTERPRETATION OF CATEGORY 4: Legal clarity on the operationalisation of Open Access framework:

The total percentage of consumers moving out to open access should not be criteria for retail supply competition. The current provisions in the EA 2003 mandate that no retail supply tariffs will be determined for the category of consumers who have been granted Open Access and for them only the Wheeling tariff and the surcharges will be decided. This would imply that the Open Access category that is mainly the commercial and industrial consumers will be enabled with a free market compelling them to source power from other sources and thereby and consequently for such category of consumers the incumbent distribution licensee will be relegated to be only and network operator. This will be one form of segregation of content and carriage by implication. But the issue that was debated in the legal framework was whether Open Access was given the right to Consumers or it is obligated to go for the Open Access framework. Hence a legal clarity needs to be in the policy on OA framework and no regulated tariff shall be applicable if a consumer opts for open access.

INTERPRETATION OF CATEGORY 5: Universal Service Obligation (USO):

The functions and duties of the Wire and Supply business are required to be outlined cause providing connection and supply of electricity are two different

distinct works. However, Distribution Licensee cannot provide the Connection without identification of the source of supply or Supply Licensee and hence the obligation to be outlined in the proposed amendment clearly. The specific area of Supply licensee needs to be segregated in a way that no cherry-picking takes place and Subsidised consumers are not retained by the existing State Distribution licensee. The procedure of Introduction of 2nd Retail Supply Company and Universal Service Obligation need to be specified under Transfer Scheme.

INTERPRETATION OF CATEGORY 6: Tariff determination:

SERC to determine the ceiling tariff for the retail licensees operating in the same area of supply. Such tariff can be determined founded on the standard costs and performance standards. However, though the ceiling tariff has been determined, the cross-subsidy obligations towards existing State Distribution Companies need to be fulfilled. While deciding the ceiling tariffs, allocation of the power purchase sources, base and peak load generation, quantum, period and duration of supply, provision of ancillary services and so on, should also be considered. Hence, more tariff determination powers for SERCs (Ceiling Tariff and determination of tariff applicable for ICs and determination) are required to be specified.

INTERPRETATION OF CATEGORY 7: Phasing of retail competition:

Competition must be introduced by specifying the minimum area of supply which will be open to competition (rather than consumer category) subject to the clearance of the SERC. The Act may specify the timeline for complete competition whereas phasing may be left to the discretion of the Appropriate Commission. The specific area of Supply licensee needs to be segregated in a way that no cherry-picking takes place and Subsidised consumers are not retained by the existing State Distribution licensee.

6.4.2 INTERPRETATION OF DATA FOR RESEARCH OBJECTIVE 2: PREPAREDNESS AND ADEQUACY OF MAHARASHTRA STATE TO INTRODUCE RETAIL SUPPLY COMPETITION IN THE DISTRIBUTION SECTOR.

INTERPRETATION OF CATEGORY 1: **Availability of Power in the State of Maharashtra for power procurement:**

In accordance with the Electricity (Amendment) Bill 2014, the Forum of Regulators has proposed a state level model rollout plan for the introduction of competition in the retail sale of electricity, as well as a framework on key issues like segregation/reorganisation of Distribution companies and their new structure, role and responsibility, power purchase mechanism, cross-subsidies reduction, and allocation of losses among wire and retail supply companies.

Hence for introducing retail electricity supply competition by segregating wire and supply functions of existing Discoms, it is necessary that State's Power Sector is prepared with the following arrangements:

- Surplus availability of Power would enable structuring of power procurement at a competitive rate.
- The presence of multiple private players in Generation, Transmission, Distribution and Trading in the State, which will enable participation in the retail sector.
- Availability of Ring-fenced State Load Despatch Centre with centralised merit order despatch and balancing settlement mechanism, which will act as a Market Operator in retail electricity competition scenario.
- Strong institutional regulatory mechanism for allowing cost-reflective tariff along with cross-subsidy and implementation of provisions of the centrally designed policy framework. Plan to phase out Cross subsidies built-in existing tariff.
- Assessment of financial losses and distribution losses for its allocation into new entities.

- Maharashtra distribution sector has witnessed the experience of retail electricity supply competition in Mumbai under the present EA, 2003 and become mature in understanding retail electricity supply competition which can take up its implementation in other cities.
- High urbanisation and service sector industry presence in the State

Considering the above factors, presently, the availability of power is not an issue in the State of Maharashtra given the demand and PPA's entered into by the licensees. However, given the surplus scenario in Maharashtra, it is vital to pre-allocate existing PPAs to all retail supply licensees to avoid any stranded capacity in the retail supply of electricity. However, it indicates that there is a little amount of spare capacity available in terms of fuel availability for MSEDCL, and Mumbai Utilities' PPAs are due to expire.

The suggested FOR model framework differs from the international framework in terms of power procurement processes, which has a strong competitive wholesale market at the national level and offers retail enterprises a competitive price for bulk electricity. Power will be allocated to retail businesses based on the average price of Power Purchase Agreements, unlike the FOR framework, which suggested an IC at each State Discom to be the inheritors/repository of existing power PPAs between Distribution Licensees and Generators. The construction of a highly competitive wholesale energy market was the centrepiece of reforms, according to worldwide experience, and the success of extending competition to retail end users is significantly dependent on this component.

Before embarking on the path of retail competition, significant wholesale market reforms were undertaken on a global scale.

Ideally one Discom area and one IC for that Discom. It can be analysed and evaluated with amendment bill and FOR model rollout by taking one Discom as IC. Centralised MOD, wholesale market is a different approach; existing ABT mechanism is required to change. IC need to be operated by Govt.

company, remain discharge and it should not be handled by SLDC. IC will be like a government holding company. Starting IC with one Discom but optimization will be centralized level by forming one IC with multiple Discom ICs through the creation of state-level pool.

INTERPRETATION OF CATEGORY 2: **Mumbai experience via Parallel Licensing Arrangement**

Mumbai is the only city in India wherein consumers can choose their power supplier (TPC or AEML in Mumbai Suburban and BEST or TPC in Island city of Mumbai) via the parallel licensing arrangement under the present EA 2003. Such a choice is thought to lead to a competition that can increase efficiency and lower tariffs. The Mumbai parallel licencing experience, on the other hand, has seen modest improvement in consumer choice due to a reduction in cross-subsidy built-in rate and no possibility for cutting power purchase cost because it is historically tied to its own regulated generating plant. As a result, before moving further with RSC, a thorough examination of the Indian wholesale market is required, as well as a simulation of the State's retail enterprises' ability to acquire their requirements at competitive wholesale market pricing.

Based on the learnings of retail competition in Mumbai, Maharashtra is well prepared in terms of introducing competition. However, the issues peculiar to MSEDCL in respect of metering of Agriculture consumers (42 Lakhs), Financial Losses (Rs 16,101 Cr), Accumulated arrears/dues (about Rs 30,000 Cr) and cross-subsidy (Rs 12,449 Cr) need to be addressed before introducing retail competition. The aforesaid issues can be resolved by direction to Distribution Licensee for metering of consumers in a time-bound manner, however, it appears to be a challenging task. Recognised Financial Losses to be converted to Regulatory Assets and same to be recovered as Regulatory Asset Charge from all the Consumers and loss of cross-subsidy to be collected by way of CSS. Further, Cross Subsidy issue can also be resolved by removing the cross-subsidy built-in tariff and the subsidy component to be transferred by the Government. However, looking at a large chunk, the task appears to be challenging.

Where massive cross-subsidies still persist in regulator-set retail prices, international experience suggests that levying a Universal Charge on all power customers to phase out lingering cross-subsidies in the system is an idea worth examining. The determination of UC by SERCs and its administration, on the other hand, would be a challenging task.

Also, the cross-subsidy built-in tariff to be compensated to the existing distribution licensee. The Electricity Bill, 2021 has made such provision by creating the fund which will certainly compensate the incumbent licensee. Cross subsidies should be phased out first before introducing retail competition.

INTERPRETATION OF CATEGORY 3: **Institutional arrangement for preparedness issues of retail competition.**

The major factors which are to be addressed before rolling out retail supply competition are as follows: Cost reflective tariff; Cross Subsidy built-in tariff; Financial Losses; Accurate determination of Distribution Losses; Allocation of PPA; Determination of Normative cost.

Hence Institutional frameworks need to undergo changes mainly covering as follows:

1. Regulatory: Increased compliances/ tariff reforms/tariff rationalisation
2. Commercial/Financial: Restructuring /Reorganization of Discoms-Assets/Manpower
3. Operational: Distribution network, Zones/Circle/Division/Sales mix/Management/Loss management. Profit centre to be operationalised.
4. Technical: Technological changes in term of grid operation, network operation and power procurement/optimization techniques required (DSO creation/ demand response etc.)

New institutes are to be created as IC. Strong/ring fencing SLDC and DSO needed which need not require any creature other than IC. USO fund also to be handled by IC. A state can draw transfer scheme, role and responsibilities can also be assigned by State based on broad framework specified by Centre.

The role of the regulator will also change regard to monitoring of competition other than the tariff.

Worldwide experience indicates a non-contradictory method for decoupling the distribution company from the contents of the supply chain. It envisions a distinct distribution network corporation that will own and run distribution system assets, but not non-regulated generation and/or retail operations. These challenges arising from international experience must be incorporated into a thorough rollout framework for implementing competition in the retail sale of energy.

There are a few critical issues that are unique to Maharashtra, such as the allocation of Rs 16,101 Cr in financial losses, the allocation of 20 percent in technical and commercial losses for MSEDCL between new entities, and the balance sheet segregation of Discoms, for which international learnings are not documented and must be framed in accordance with state conditions.

Determination and segregation of distribution loss for the areas which are to be opened for RSC are needed. Based on its assessment, the distribution loss could be allocated between new entities.

Precondition of metering and energy accounting for reform is a must. Not sequential, parallel initiatives of metering and certain reduction of cross-subsidies should be done. For introducing the retail consumer choice, the major challenge would be unmetered Agriculture consumers which are currently being billed based on estimation of connected load (Units/HP/Month). It is therefore essential that there should be time-bound program for meter installation of such consumers by ISL. Also, the implementation of the smart meter in a phased manner will take care of the dynamic and energy balancing and settlement mechanisms of SLDC. Hence identification of such smart metering arrangement to be in place before the commencement of retail supply competition.

Retail competition should be introduced in stages, with each stage permitting new retail energy supply companies to serve a certain sector of consumers, culminating in a unregulated and regulated retail market. This phasing is important because it allows emerging players to progressively

increase their resources, safeguard low-end consumers, and respond to new policies and industry structure. About 42 lakh agricultural consumers in Maharashtra have access to power without the use of a meters and at a fixed rate. A metering arrangement must be in place before they may be regarded a competitive consumer. For unmetered clients, the incumbent retail supply licensee would install the metering, according to the FOR framework. This approach makes no recommendations for resolving the contestability of such customers.

Hence under the phasing of competition, a smaller consumer may have inertia to move in competition; a larger consumer may see the economic sense to move to competition and hence hybrid model suggested by FOR considering the socio-politico issue would be appropriate. Area of supply – mixed section of consumers may be undertaken with the beginning.

Regulatory mechanisms for the participation of new retail supply companies in the Sector should be in place. Hence, considering the adequacy of Maharashtra's distribution sector it would be appropriate to plan the Mumbai utility distribution area for retail supply competition in the first phase and depending on a review of the first phase, a separate rollout plan for MSEDCL may be formulated.

6.4.3 INTERPRETATION OF DATA FOR RESEARCH OBJECTIVE 4: ROLLOUT PLAN AND TRANSFER SCHEME FOR INTRODUCING RSC IN THE DISTRIBUTION SECTOR OF MAHARASHTRA.

INTERPRETATION OF CATEGORY 1: **Transfer Scheme and Rollout Plan.**

A transfer scheme as required under Electricity Amendment (Bill) 2014 is needed to divide assets, liabilities, personnel, and proceedings of Distribution Company into Network, ISL and IC. Such Transfer Scheme are required to be prepared by State Government in consultation with the State Commission. State Government can seek statutory advice of State Commission on the formulation of Transfer Scheme and Rollout.

The Transfer scheme shall also contain provisions regarding the allocation of financial losses. All existing recognised regulatory losses pertaining to the MSEDCL (Rs 8447 Crore as of FY2020-21), or Mumbai Discoms (Nil) shall be allocated to the IC. The IC may further amortise them through Universal Charge or State Government assistance. Unrecognized losses, on the other hand (about Rs 8007 Crore as reported in MSEDCL's Balance Sheet for 2019-20), will be allocated to existing entities, and the State Government may be involved to help clear the balance sheets. The MSEDCL's claims against the State Government, as well as the State Government's claims against the MSEDCL, will be annulled and extinguished. All mutual claims will be considered fully and ultimately resolved, and the MSEDCL or other Mumbai Discoms' residual assets and liabilities will be transferred and vested in the State Government. For this transfer scheme, all assets will be valued using the 'Historical Book Value' technique.

- Allocation of Asset and liabilities /manpower amongst the successor entities. Vesting of legal rights, role, and duties of new entities. Treatment of monetary losses (Accumulated losses of Rs 16,101 Crore including Rs 8447 Crore as Regulatory Asset) among new entities.
- Role and Responsibilities of new entities.
- New entities shall be as under:
    1. IC (Holding company of Govt.)
    2. ISC (Incumbent Supply Company)
    3. Distribution Network Company

The existing Power Purchase Agreements (Conventional Power) of the current MSEDCL may be studied on parameters such as the term of PPA, fuel linkage, balance life of the plant, average cost of variable power and after its evaluation a decision to transfer them to the IC may be undertaken. Those Power Purchase Agreements may be distributed by the IC among various retail supply companies based on their power consumption A Certain ratio of Power

Purchase Agreements may also be shifted into the State level pool market to facilitate the development of the capacity market in the State.

- Reallocation of PPA (about 34,800 MW including RE) to IC after a detailed study on the term of PPA, fuel linkage, balance life of the plant, average cost of variable power.
- Structuring of power procurement for Mumbai Discoms requirement of about 3500 MW.

The Transfer Scheme may stipulate the phasing plan for rolling out retail supply competition in the distribution sector considering the pilot area as Mumbai as a large part of preparedness infrastructure required for commencement of retail supply competition in Mumbai is already exist and after period review the retail supply competition may be taken further in other parts of Maharashtra. In the beginning, only consumers in Mumbai having a single point supply of load more than 1 MW above or 100 kW and above may be considered for retail supply competition. Consumer above 100KW and below may be considered in retail supply competition after smart metering for those consumers is in place.

For the first few months/years of the transfer, the allocation should be provisional and should be treated as fixed after a prescribed period in the transfer scheme. After the segregation of distribution wire and supply businesses, the distribution company and supply company shall need to apply for a fresh license. State Government may publish certain regulations to remove any difficulty arising in the implementation of the transfer scheme.

INTERPRETATION OF CATEGORY 2: **Unbundling or Ownership and Functional Separation of Maharashtra Discoms.**

After notification of Transfer Scheme and Rollout Plan, ownership and functional separation for pilot areas of Discom for Mumbai in the first phase and MSEDCL in later phase shall be undertaken as under:

- Ownership of wire/distribution company should remain with Govt. or Private.

- Framework for pooling of cost recovery of wire companies and unified wheeling charges across distribution wire network. To introduce competition in the wire business, multiple wire companies (Govt/Private) can be enabled and development rights of network development could be awarded through the bidding process.
- The network company should be given metering installation and operation responsibility. Reading of meter should be kept with wire or retail company/ISL and mandate to share the data with various retail supply company/ISL.
- Ownership of Supply company into multiple retail company and Disinvestment of ISL

INTERPRETATION OF CATEGORY 3: **Tariff Determination and Mechanisms for Reduction of Cross subsidy or creation of Universal Charge**

The tariff for a Discom will be regulated, whereas for a supply company, it will be the ceiling for competitive consumers and regulated for non-competitive consumers. A mechanism to determine the tariff shall be formulated as under:

- Tariff determination principle on voltage wise cost to supply and consumer category wise cost to serve to be introduced.
- Principle for Price control regulations.
- Reforms in the tariff structure and tariff design by way of introduction of multipart tariff concept
- Tariff determination for contestable (wheeling charges and other grid support charges and ceiling supply tariff) and non-contestable (regulated tariff with all components) for ISL and Retail Supply Company.
- Mechanism to determine universal service charge needs to be evaluated before its calibrated introduction across all consumers.
- Tariff determination for USO

- Tariff for Intermediary Company - equivalent to the sum of Costs incurred towards Power Purchase Agreements and Operational Expenditure as Bulk Generation Charge.

Cross-subsidies must be phased away over time. Year-on-year rate increases, the creating UC fund, and limiting subsidies to wheeling charges can all be used to address these issues. The construction of a comprehensive consumer database will aid in the identification of consumer subsidies. This database will also be beneficial to retail supply licensees because it will provide information on consumer mix for the area in which they wish to operate.

INTERPRETATION OF CATEGORY 4: **Phasing of Retail Supply Competition**

Once the distribution business for pilot areas of Mumbai will be split in distribution wire and supply business, the second retail supplier shall be created in the Mumbai market. The market can be opened for competition in stages as a combination of supply area and mixed category/load of the consumer. Retail Electricity Supply Market can be opened in a systematic manner and choice to the consumer shall be provided gradually (1MW and above, 100 kW and above and below 100kW). The phasing of retail competition may consist of two phases. In the first phase, Mumbai Supply Areas (Mumbai City and Suburban area catered by BEST, TPC and AEML) can be introduced in two stages (100 kW and above and 100kW and below) and in the second phase upon review of all issues of preparedness, entire State of Maharashtra (Area catered by MSEDCL) may be introduced in four stages (1MW and Above except agriculture, 100 kW and Above except agriculture, 100kW and below except agriculture and All Consumers)

Though consumers of a certain segment are allowed for open access, there are certain issues that need attention and further gradual opening of competition to others. Availability of 24x7 power supply, lack of infrastructure, inappropriate estimation of losses, no incentive for the generator, lack of consumer awareness, cross-subsidy, unavailability of technical support from DISCOMs, absenteeism of emergency support from DISCOMs are the major

issues and certain aspect of these issues are already experienced in Mumbai. This can be periodically reviewed by the monitoring framework of the State Commission.

If a consumer of any category is dissatisfied with their current power provider, they should be able to switch. A proper guideline shall be defined for governing the consumer switching by the State Commission depending on monitoring and review of the framework. The consumer has to fill the past revenue gaps and other past liabilities as stipulated in by the State Commission. The present supplier will be authorized to recover the dues from the consumer who wants to switch. A frequency for the supplier switching shall be defined for each category of a consumer by the State Commission based on Mumbai experience.

INTERPRETATION OF CATEGORY 5: Review of Supply Code, Standard of Performance and Consumer Grievance Redressal System

Distribution Company shall have universal service obligation to connect whereas the Incumbent or Retail Supply Company shall have universal service obligation to disconnect the premise. Initially, the incumbent supply company can be given the obligation of supplying power to a consumer. The responsibility of metering installation and operation/testing of the meter could be given to the Distribution Company. Whereas meter reading, billing and collection can be given to retail company or ISL. These provisions of various responsibilities and obligations specified by the State Commission under their Supply Code Regulations shall be reviewed in terms of multiple retail supply companies.

Further, in case these obligations under certain norms as specified by the State Commission are at default by Distribution company or Incumbent or retail supply company, the appropriate compensation shall be specified by the SERC under their Standard of Performance Regulations.

In case of any grievance of consumers, a two-stage Consumer Grievance Redressal Mechanism needs to be specified by the SERC as follows: A single common ‘Grievance Redressal Forum’ for Distribution Company, and Retail

Supply Company; and Independent Ombudsman. This will provide a single-window solution to consumer grievances. The procedure followed in the case of Mumbai parallel licensing as a single-window solution may be adopted for such a task.

6.5 FINDINGS

The findings of the study based on the above interpretation are summarized as follows as per the research question (RQ).

1. ***What are the barriers and constraints in the introduction of retail competition in the distribution sector as outlined in the EA 2003 and following additional issues enumerated under the Electricity (Amendment) Bill, 2014.***
    a. ***A mechanism for the basis of PPA allocation.***
    b. ***Role of SLDC for handling new system in the absence of adequate metering infrastructure.***
    c. ***Basis of allocation of financial and technical losses.***
    d. ***Process of allowing Govt. controlled Discoms in the supply area of existing private Discoms.***
    e. ***A mechanism for servicing large numbers of low end/cross-subsidised consumers by the new entity.***

The findings for the above RQ are summarised as follows:

i. The idea of separation of contents and carrier in the distribution business is contained in the existing EA 2003. This framework is a crucial condition but not an adequate condition to facilitate the introduction of retail competition in India and hence need changes through amendment of the Electricity Act 2003. Need to enact the Electricity Amendment with suggestive modifications as given by stakeholders while introducing Amendment Bill 2014 and 2021.

ii. This framework needs ownership segregation of distribution wire and retail supply business/functions which will remove the barrier

of conflict of interest involved in the present situation. Hence, no ownership separation for distribution and supply functions of Discom (Bundled) created a barrier and constraints.

iii. Presently Distribution Company is supplying consumers at highly irrational tariff due to cross-subsidy built-in tariff for protecting low-end domestic/public/agriculture category of consumers which belongs to the socio-political factor or agenda of the Government. Hence removal of cross-subsidy built-in tariff through a mechanism of either by increasing a tariff on the subsidised category of consumers or introducing a mechanism of Universal Charges to be collected from all consumers shall be provided in the amendment.

iv. To protect existing PPAs, an Intermediatory Company owned by the Government for each supply area of Discom need to be formulated under Transfer Scheme. This IC can allocate existing PPAs of Discoms based on criteria such as shortage of fuel issues, existing term of PPAs, the variable cost of generation plant, balance life of contracted generating plant and linkage of fuel.

v. IC can be strengthened to allocate the PPA power-based dynamic allocation criteria/daily schedule and may structure a pool of power procurement. A retailer may be allowed to purchase incremental /future power requirement through market or pool or setting its own generating plant to a certain capacity of its requirement. Power procurement should be done through the transparent bidding process.

vi. The wholesale market for procurement not sufficient. Steps for changes in the national-level wholesale market need to identify by CERC/Power Exchanges.

vii. A transfer scheme shall be drafted by State Government for separation of carriage and content business based on the advice of SERCs and Mumbai parallel licensing experience.

viii. The transfer scheme shall divide assets, liabilities, personnel, and proceedings of existing Distribution Company into newly formed companies including reallocation of PPAs.

ix. The Assets, Liabilities, Proceedings and Personnel shall be allocated through the Undertakings defined in the schedules of respective companies.

x. The transfer scheme in a phased manner shall commence on the Date of Transfer as decided by the State Government in consultation with SERC.

xi. The transfer scheme shall have the provisions for the treatment of existing losses (recognised and unrecognised) and existing claims of a distribution company and clear function, role, and responsibilities of new entities.

xii. The amendment should provide a Guideline or clarity on whether the existing all financial losses (recognised as Regulatory Asset and disallowed by SERCs as unrecognised) to be converted as Regulatory Asset and same may be recovered from all the Consumers as Regulatory Asset Charge.

xiii. No ring-fencing between wire and supply company –conflict of interest. Upon segregation of wire and supply businesses, the network and supply companies shall apply for the grant of separate license with SERC within a certain time frame of the effective date of transfer.

xiv. State Load Despatch Centres yet to be ring-fenced. SLDC should be fully ring-fenced with equipped advanced technological support from NLDC for scheduling, metering, accounting, and deviation settlement mechanism.

xv. Separate only one distribution network company in one supply area either Govt. owned or Private. Removal of provisions regarding 2nd Distribution Company to have its own wire. Parallel /duplicate

network in one supply area through 2nd Discom – wasteful expenditure /barrier for competition in distribution.

xvi. Complete arms distance rule for distribution wire and retail supply or incumbent supply company after a transitory period should be prescribed under Transfer Scheme.

xvii. Clarity on the operationalisation of Open Access.

2. What is the level and extent to which the existing distribution sector and its infrastructure is prepared (availability of power, wholesale market structure) and adequate (Reduction of cross-subsidies, current level of losses, existing metering infrastructure) for introducing retail consumer choice in Maharashtra (factoring Mumbai's retail consumer choice).

The findings for the above RQ are summarised as follows:

i. Maharashtra State has sufficient availability of power considering the demand and power purchase agreement entered by Discoms. However, it appears that there is minimal/marginal surplus schedule capacity available during peak requirement in terms of the availability of fuel source linkage.

ii. Maharashtra State has mainly three supply areas viz. 1. MSEDCL Supply area (Entire State of Maharashtra except for few areas of Mumbai) 2. Area common to BEST and TPC (Island City of Mumbai) 3. Area common to AEML and TPC (Mumbai Suburban area). Hence, in Maharashtra, if one IC at the Discom area is followed as suggested in the model framework then either there would be 3 ICs or 2 ICs (One for MSEDCL and another for Mumbai) to handle earlier PPAs. To optimize the power procurement, One IC at the centralised level for multiple Discoms can be considered.

iii. Initially, One IC for Supply areas of Mumbai Discom can be formulated for the Mumbai pilot area of retail competition. Mumbai Discoms long terms PPAs will end in the near future. Also, own generating plants will be outlived in near future except for Hydro.

iv. Maharashtra State has a strong presence of private sector existence in Generation, Transmission, Distribution and Trading Activities of Power Sector, which would enable their ease of participation in the retail sector being associated with the Sector.

v. Mumbai parallel licensing operation has experienced difficulties of consumer choice such as cross-subsidies, metering infrastructure for deviation settlement and duplicate parallel network. Procedures required under Supply Code/SoP/Grievance mechanism are formulated in Mumbai through operation experience of the last 10 years.

vi. Mumbai Changeover/Switching Procedure under Supply Code/Standard of Performance and Consumer Grievance System are formulated through the operational experience of last 10 years and same can be adopted.

vii. Agriculture Consumers (About 42 Lakhs), contributing 73% of total cross-subsidy (Rs 12,449 Cr), supplied by MSEDCL are unmetered and need to prepare for metering before they are put for retail supply competition. This task appears to be the most challenging.

viii. Distribution losses in Mumbai Discoms are less than 10% whereas it is about in the range of 20% for MSEDCL. Separation of this distribution in technical and commercial terms are needed.

ix. Financial losses of about Rs 16,101 Crore for MSEDCL (as of 2020-21) need to be recognised and its recovery mechanism to

be formulated. However, there is no financial losses are recognized for Mumbai Discoms.

x. Issues of cross-subsidy reduction, financial losses, segregation of distribution losses, un-metering of Ag. Consumers and evaluation of long-term power purchase contracts need to be attended before opening for retail competition in the MSEDCL area. Mumbai is prepared and adequate for the introduction of retail supply competition.

3. ***How existing distribution sector for introducing retail competition will be segregated into separate network and retail company through Transfer scheme and Rollout Plan (functional segregation of existing distribution, its actors for managing new system and structures and extent, phasing of competition, power procurement model/reorganisation of existing long term contracts, universal service obligations, metering role) and its implementation for Maharashtra State***.

The findings for the above RQ are summarised as follows:

i. To introduce retail competition, unbundling of existing Distribution Companies shall be done. As a pilot exercise of introducing RSC, in the first phase, Mumbai distribution areas can be undertaken and in the second phase upon the preparedness of metering infrastructure, reduction of cross-subsidies and financial losses, the MSEDCL distribution area can be identified.

ii. The balance sheet segregation of the MSEB was undertaken for successor entities to carry out the Generation, Transmission, and Distribution function through a notified transfer scheme under Act 2003 in June 2005 and finalised in 2012. In a similar way, the distribution licensees, operating in the pilot area identified for retail competition under Transfer Scheme, balance sheet

needs to be separated into Distribution Wire and Retail Supply business and to be assigned to the successor entities.

iii. Upon unbundling, Network Company, Incumbent Supply Company and IC shall be the new bodies in place of the existing Distribution Company in the identified pilot area.

iv. Incumbent Supply Company shall be the Government company or Private Company in the case of Mumbai. To guarantee a level playing field, the second supply licensee will be placed into the market later.

v. The network company, whether public or private, is responsible for delivering electricity to end users via its own network..

vi. The ISL will be responsible for delivering retail electricity to end users via a distribution system.

vii. The government-owned IC would act as a holding company for power procurement and will take over current power purchase agreements and PPAs with distribution firms. After the evaluation, a state pool will be formed to structure power procurement.

viii. POLR should be the incumbent supply firm that will supply electricity to the end customer if the consumer's current supplier is terminated or suspended. The USO/SOLR function can be assigned to ISL at first, and then to all Retailers subsequently.

ix. The retail supply licensee or incumbent supply licensee may build an electricity producing plant or purchase power from the wholesale market to meet shortage requirements.

x. There shall be a certain threshold limit (not for renewables) for the capacity of the power generation plant, to be established by the retail supply licensee.

xi. Elimination of cross-subsidies through an increase in tariff or levy of Universal charge.

xii. A second retail supply licensee will be put into the market after the transfer of particulars into newly formed companies.

xiii. The market shall be unboxed in a systematic manner and choice to the consumer will be provided in a gradual manner (1MW and above, 100 kW and above and below 100kW). Phasing of retail competition in two phases:

a. Mumbai Supply Areas (Mumbai City and Suburban area catered by BEST, TPC and AEML) in two stages (100 kW and above and 100kW and below)

b. Entire State of Maharashtra (Area catered by MSEDCL) in four stages (1MW and Above except for Agriculture consumers, 100 kW and Above except Agriculture consumers, 100kW and below except Agriculture consumers and All Consumers).

xiv. If the client is dissatisfied with his current provider, he will be able to switch. Consumers who want to transfer suppliers will have to meet specific requirements. These situations have already been observed and documented in Parallel licensing operation of Mumbai. The same could be set out in rollout plan to be formulated by the State.

xv. The viability of retail competition depends on the formation of a capacity market and the progressive elimination of cross-subsidies built in existing electricity tariff.

xvi. The tariff shall be regulated for the Distribution Company. While for Supply Company, the tariff will be the ceiling for contestable consumers and will be regulated for the non-contestable consumers. State Electricity Regulatory Commission shall define the price restraint mechanism for the control in relation to the power prices. Tariff determination for wire tariff for Wire company, the tariff for IC (Bulk Generation Charge) and determination of UC for meeting cross-subsidy.

xvii. The Network Company shall have the Universal Service Obligation for "Duty of Connect" whereas supply company and Incumbent Supply Company shall have the Universal Service Obligation for 'Duty to Supply"

xviii. Metering installation shall be done by Distribution Wire Company. Electricity Metering, Billing and Collection services shall be provided by ISL or Retail Supply Company; as the case may be.

xix. After the introduction of RSC, a single window, two-layered Consumer Grievance Redressal Mechanism shall be established in accordance with the Mumbai Parallel Licensing regime.

6.6 VALIDATION OF FRAMEWORK:

The framework to analyse the above research objectives is designed with the help of selective coding. The selective coding suggests the following milestone to formulate a transfer scheme and rollout plan of introducing retail competition in the distributions sector of Maharashtra.

1. Legislative changes to be done for segregating distribution and supply functions of Discoms.
2. Preparedness for MSEDCL in terms of reduction of cross-subsidies, allocation of financial losses, AT&C losses, & metering of unmetered agriculture consumers.
3. Transfer Scheme and Rollout Plan in two phases
4. Structuring of power procurement and reallocation of existing PPAs.
5. Segregation/reorganisation of Mumbai Discoms.
6. Tariff determination.
7. Introduction of 2nd Retailer in Mumbai areas for retail competition.
8. Phasing of competition
9. Review and adoption of Operating Procedure under Supply Code, SoP and Grievance Redressal systems.

The above framework has been validated with 2 Respondents /Experts and the validation sentences are as follows:

Theme	**Sentences**
Legislative Barrier and Constraints	Electricity Draft Bill 2021 for segregating wire and supply functions needs to be enacted
	One distribution wire company in one supply area either Government-owned or Private Owned
	Mechanism of Universal Charge for meeting cross-subsidy
	Amortization of financial losses either through UC or support from the Government by IC is also required
	Changes in the wholesale market to be done by CERC
	Legal clarity on open access framework
Adequacy of Maharashtra distribution sector and Mumbai experience	Availability of marginal surplus capacity in terms of availability of fuel source for MSEDCL and PPAs of Mumbai Utilities is expected to end its term
	Starting IC with one Discom but optimization will be centralized level by forming one IC with multiple Discom ICs through the creation of state-level pool.
	Initially, one IC for Mumbai areas can be formulated on a pilot basis
	Mumbai's operationalization in the parallel licencing experience has resulted in slow progress in consumer choice due to the reduction of cross-subsidies and limited scope for reducing power purchase cost as it is historically contracted with its own generating stations.

Transfer Scheme and Rollout Plan	The Transfer Scheme may stipulate the phasing plan for rolling out retail supply competition in the distribution sector considering the pilot area as Mumbai as a large part of preparedness infrastructure required for commencement of retail supply competition in Mumbai is already exist and after period review the retail supply competition may be taken further in other parts of Maharashtra
	Based on the reorganisation of MSEB experience in 2005/2012, Transfer Scheme and Rollout Plan can be undertaken, reorganising Discoms into Distribution, ISL and IC
	The network company should be given metering installation and operation responsibility. Reading of meter should be kept with ISL or retail company and mandate to share the data with various retail supply company/network company.
	Procedure exist in Mumbai for parallel licensing can be adopted for switching/changeover under Supply Code/SoP/grievance mechanism
Structuring of Power Procurement	The PPA allocation between retail supply companies can be dynamic and can be reallocated at fixed intervals which would bring flexibility for managing the changing consumer base of the retail suppliers.
	Any shortfall of power, not being met by IC, can be met from the Market

	The IC can take up the role of aggregator for procuring power and allocating the power to Retail supply Companies in proportion to their requirements. This will ensure that all retail supply companies compete on an equal footing.
Discom's Segregation	Ownership of wire/distribution company should remain with Govt. or Private
	2nd retail licensee should also be vested with the responsibility of non-discriminate supply obligation to avoid any cherry-picking of the consumers in the area
Tariff determination	Tariff determination for contestable (wheeling charges and other grid support charges and ceiling supply tariff) and non-contestable (regulated tariff with all components) for ISL and Retail Supply Company
	Mechanism to determine universal service charge needs to be evaluated before its calibrated introduction across all consumers
	Tariff for Intermediary Company - equivalent to the sum of Costs incurred towards Power Purchase Agreements and Operational Expenditure as Bulk Generation Charge
Cross subsidy reduction	Cross-subsidies need to be phased out gradually. These can be managed through increase in Year-on-Year tariff rate, creation of Universal Charge (UC) fund, limiting subsidies to wheeling charges.
	A hybrid approach of Universal Charge fund and some subsidy support from the government can be adopted to reduce cross-subsidies

Treatment of losses	unrecognized losses shall be transferred to existing companies and help from State Government may be sought to clear up the balance sheets
	The financial losses for the Maharashtra transfer scheme can be recovered through a combination of the following two approaches: • Collect the charge from a few selective sections of consumers. • Government support for the settlement of balance dues
Phasing of competition	The Regulator can set an upper threshold limit for introducing retail supply competition based on the connected load. This threshold limit can be reduced progressively. Alternatively, it can be also introduced consumer category wise.
	Once the distribution business for pilot areas of Mumbai will be split in distribution wire and supply business, the second retail supplier shall be introduced in the Mumbai market.
	Retail Market shall be unboxed in a systematic manner and choice to the consumer shall be provided in a gradual manner (1MW and above, 100 kW and above and below 100kW). The phasing of retail competition may consist of two phases.
	In the first phase, Mumbai Supply Areas (Mumbai City and Suburban area catered by BEST, TPC and AEML) can be introduced in two stages (100 kW and above and 100kW and below) and in the second phase upon review of all issues of preparedness, entire State of Maharashtra (Area catered by MSEDCL) may be introduced in four stages (1MW and Above except

	agriculture, 100 kW and Above except agriculture, 100kW and below except agriculture and All Consumers)

CHAPTER 7: CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

The laws of electricity in India dates back to 1903. The provision to allow multiple licenses in the business of distribution was provided for as early as in the 1910 Act. Though, theoretically in one area of supply, there could be several distribution licensees providing for competition however once SEBs were established under the 1948 Act virtually the business of distribution and supply that is subsumed in one another came to be a monopoly business. This had its ill effects on opening up of market and competition and choice to the consumers apart from bringing in huge inefficiencies in the system; large workforce; theft; pilferage; transmission and distribution losses and opaque tariff fixation. Thus, all these statutes were consolidated into the Electricity Act 2003 enacted by the parliament. Once again, multiple licenses are allowed in the 2003 Act but the framework for separation of distribution business from supply business is not coming out from the extant provisions of the enactment. Segregation of carriage and content in the state's distribution sector would promote competition in retail supply, and a well-functioning market would safeguard the end consumer's long-term interests. In the long run, increased efficiency will be able to cut prices, and the resulting gains will be passed on to customers. However, such a difficult task would be fraught with difficulties.

The Electricity Act 2003 requires to be amended to introduce retail supply competition, an appropriate transfer scheme and rollout plan needs to be formulated by States which would ensure smooth segregation of distribution wire and retail supply in the distribution sector. Before commencement of retail electricity supply competition in distribution sector, the factors such as availability of sufficient power, creation of a strong wholesale market for power procurement to a new retailer, administration of intermediatory power procurement and handling company,

level of cross-subsidy built-in tariff, active participation of consumers, unmetered agriculture consumers, smart metering infrastructure for balancing and settlement, and treatment of financial losses require to be attended to. These steps would decide timelines for commencement and speed of retail supply competition in distribution.

In Maharashtra State distribution sector, the area catered by MSEDCL requires 42 Lakhs unmetered agricultural consumers, cross-subsidies built-in tariff to the extent of Rs 12,500 Crore out of 72% are used for agriculture tariff, financial losses to the extent of Rs 16,000 Crore, marginal surplus capacity available during peak period due to fuel shortages and average power purchase of PPAs is more than Rs 4 / Unit which needs substantial reforms before PPAs are opened for retail supply competition.

Due to cross-subsidy built-in tariffs and limited scope for reducing power purchase cost because it is historically tied to its own generating station and 2nd Licensee must lay own distribution network, the Mumbai parallel licencing experience (i.e., with parallel distribution network) under the current Electricity Act 2003 provides slow progress in consumer choice. As a result, before taking efforts to increase retail supply competition, a thorough examination of retail enterprises' capacity to obtain their needs at competitive wholesale market pricing is required. However, in terms of the suitability of establishing retail supply competition, Mumbai is better equipped than the rest of Maharashtra.

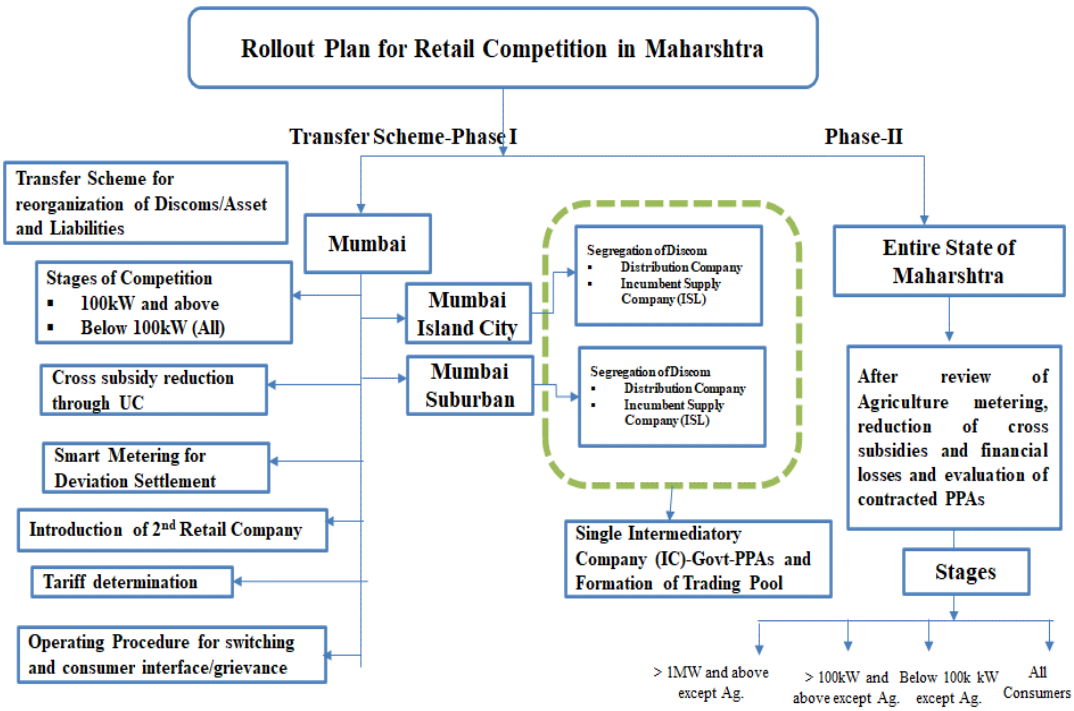
Hence, for Maharashtra rollout plan for introducing retail supply competition can be phased in two parts. Firstly, Transfer Scheme and Rollout as per proposed amendments may be undertaken for Mumbai distribution supply areas – Island City (supply area common to BEST and TPC) and similarly Suburban (supply area common to AEML and TPC). Based on the substantial reforms in power procurement, metering infrastructure, reduction of cross-subsidies and treatment of financial losses for MSEDCL, the transfer scheme and rollout plan for the MSEDCL supply area can be formulated in the second phase. Gradual opening to all consumers (1MW and above except Agriculture, 100 kW and above except Agriculture, 100kW and below except

Agriculture and All Consumers) may be considered. Before opening for the second Phase, a review of metering infrastructure, reduction of cross-subsidies and financial losses shall be undertaken.

Transfer Scheme, upon consultation with SERC, shall address the issues of segregation of Discoms, formation of IC and trading pool, role and responsibilities of new entities, asset and liabilities allocation, phasing of competition, universal service obligation, metering, reduction of cross-subsidies, tariff determination by SERC and operational procedure for retail competition.

The separation of the wire company and the supply business will also ensure that the distribution business does not in any manner support its distribution assets to support the supply business, and vice versa.

Rollout Plan of introducing retail supply competition in Maharashtra



7.2 CONTRIBUTION TO LITERATURE

The gap of the theoretical premise was “there is a dearth of literature on regulatory reforms and their impact leading to an efficient market”.

Electricity, as a commodity, is unlike any other commodity traded on the market. This is due to the fact that it has unique characteristics that necessitate the satisfaction of technical constraints prior to the completion of commercial trades. Two significant aspects of electricity as a commodity are the need for real-time balance and the difficulty to wheel the commodity via the chosen path (in bulk). As a result, normal microeconomic theory's ideas cannot be added directly to the power commodity markets.

Hence in the power industry, quantity-based competition cannot be there. Only price-based competition is possible there in the power industry.

Markets that are competitive require efficient marketplaces. However, efficient marketplaces are not sufficient—they are a necessary but not sufficient condition for competitive markets. Markets can work in favour of consumers if they are structured to be competitive and efficient.

The theoretical premise finds that generation and retail sale of electricity could be exposed to competition while transmission and distribution wire would remain as a natural monopoly. The present distribution company under the EA 2003 comprises bundled functions of wire and supply which creates a conflict of interest. Hence the formulation of segregating distribution wire (monopoly service) and supply business (competitive service) of existing distribution company would introduce competition in the retail segment and thereby leading to an efficient marketplace.

The combined functioning of network business and supply business in the Indian distribution sector has restricted competition at the retail level and inefficient market pricing as all the cost incurred is allowed on normative performance and there is no market pressure to reduce the cost. Segregating monopoly business i.e., wire business from retail supply business and allowing more number players in retail supply business will lead to switching/migration of consumers based on tariff offered and result in efficient marketplace. This market forces from consumer migration would drive the retail company to reduce its inefficient cost and provide competitive tariff to consumers.

Hence with the increased participation of players in the retail supply business, the monopoly and inefficient market will lead to an efficient market structure keeping the monopoly wire business intact and without cross-subsidising each other.

Some of the factors which lead to an efficient marketplace are as under:

1. **Switching of Consumers and Market Force**: A consumer can switch its retail supply company to another company if he has offered to get the same electricity at a lower price for meeting its requirement. A retail supply company may lose significant market share due to the switching of consumers who want to buy the product at a competitive price. This situation will drive the retail supply company to reduce its inefficient cost and transform it into an efficient marketplace.
2. **Quality of Service**: A consumer can switch its retail supply company to another company if he is not satisfied with the quality and reliability of electricity services provided to him. A retail supply company may lose significant revenue and its market share due to the switching of consumers who want to avail quality service. This would affect the revenue of the company and a competitive market force would drive the company to make it an efficient marketplace.

Given the above points, the researcher can state that these suggestions contribute to bridging the research gap of the theoretical premise.

7.3 LIMITATIONS

Following are the limitations of the research:

1. The framework has been developed with an assumption of proposed amendments in the existing Electricity Act.
2. The suggested framework has been developed for Maharashtra for the present situation which may change over the period.
3. For adoption of the same framework to any other State, it may require certain modifications based on the preparedness and adequacy of the state distribution sector.

4. Document analysis has been developed for the formulation of the Rollout Plan and Transfer Scheme for Maharashtra based on FOR suggestive model framework, international experience, and Mumbai parallel licensing experience.

5. Since the retail competition has not been introduced in the Indian power sector except to some extent in Mumbai, hence the introduction of the retail competition mechanism of Mumbai along with international experiences of similarly placed countries has been referred for developing the conceptual lens for interview of Indian Power Sector Experts.

7.4 RECOMMENDATION FOR FUTURE RESEARCH

International experience of introduction of retail supply competition suggested creation of a strong national-level wholesale market by breaking all existing physical contracts /power purchase agreements (PPAs). Due to the legacy of PPAs, it has been suggested to create an intermediatory company that would handle the existing PPA in the interim till the wholesale level market in India is developed. As a result, certain changes in the wholesale market would be required which can be pursued as a future research area.

CHAPTER 8: BIBLIOGRAPHY

1. A.R Abhyankar, Prof. S. A Khaparde (2004*):* Introduction to Deregulation in Power Industry. *https://nptel.ac.in/courses/108/101/108101005/#.*
2. Akhil Joseph (2015): Smart Grid and Retail Competition in India, *ELSEVIER Procedia Technology 21 (2015) 155 – 162, www.sciencedirect.com.*
3. Amy W. Ando, Karen L. Palmer (1998): Getting on the Map: The Political Economy of State-Level Electricity Restructuring. *Resources for the future, 1616 P Street, NW Washington, DC 20036.*
4. Anoop Singh (2010): Towards a Competitive Market for Electricity and Consumer Choice in Indian Power Sector. *ELSEVIER Energy Policy 38 (2010) 4196–4208, www.sciencedirect.com.*
5. Appellate Tribunal for Electricity, Judgements in Appeal No. 31 and 43 of 2005, 132 of 2011, 246 and 229 of 2011.*www.aptel.gov.in*
6. Australian Energy Market Commission (2014): Australian-2014 Retail Competition Review. *AEMC, 2014 Retail Competition Review, Final Report, 22 August 2014, Sydney*.
7. Bert Willems, Machiel Mulder (2016): Competition in Retail Electricity Markets: An Assessment of Ten Years Dutch Experience. *http://ssrn.com/abstract=2796043.*
8. Bohi, Douglas, and Karen Palmer (1996): The Efficiency of Wholesale versus Retail Competition in Electricity. *The Electricity Journal, 9, pp. 12-20.*
9. Competition Commission of India (2011): Opinion to Maharashtra Electricity Regulatory Commission under Section 21 of the Competition Act, 2002. *www.cci.gov.in, www.merc.gov.in.*
10. Centre for Credit and Consumer (2006): Electricity Issues: Interstate perspectives on full retail competition for residential consumers. *www.griffith.edu.au/centre/cccl, Centre for Credit and Consumer Law*

Griffith Law School Griffith University South Bank campus PO Box 3370 South Brisbane Qld 4101.

11. Gajendra Haldea (2004): Introducing Competition in Generation of Electricity: Central Electricity Regulatory Commission. *www.cercindia.gov.in.*
12. Christophe Defeuilley, Larsen (2008): Retail Competition in electricity markets. *Energy Policy (2008), doi:10.1016/j.enpol.2008.07.025.*
13. MERC Case No. 182 of 2014 (2015): Committee Report in Case No. 182 of 2014. *www.merc.gov.in*.
14. Council of European Energy Regulators (2015): Position paper on well-functioning retail energy markets. *Council of European Energy Regulators asbl*
15. CRI (2002): Regulation of the UK Electricity Industry. *CRI School of Management University of Bath.*
16. Daisy Shen (2012): Lessons from Electricity Market Regulation Reform in New Zealand: Vertical Integration and Separation. *ERIA Research Project Report 2011-17, Jakarta: ERIA, pp.103-139.*
17. Daisy Shen, Qing Yang (2012): Electricity Market Regulatory Reform and Competition-Case Study of the New Zealand Electricity Market. *ERIA Research Project Report 2011-17, Jakarta: ERIA.*
18. Daljit Singh (2005): Open Access in Electricity Distribution: Assessing the Financial Impact on Utilities. *Economic and Political Weekly, https://www.jstor.org/stable/4417146.*
19. David Levi, Faur (1999): The Governance of Competition: The Interplay of Technology, Economics, and Politics in European Union Electricity and Telecom Regimes. *Cambridge University Press, https://www.jstor.org/stable/4007587.*
20. David M Newbery (1999): The UK Experience: Privatization with Market Power. *Department of Applied Economics Cambridge, UK.*
21. Division of Energy Resources, Commonwealth of Massachusetts (2002): 2000 Market Monitor: Electric Industry Restructuring. *www.mass.gov/doer*.

22. Dominique Finon, Raphaël H. Boroumand (2011): Electricity retailers' competition: From survival strategies to oligopolistic behaviour. *Colloquium on Regulation of energy industries, Economic Center, IFP School (France) and Center for Economic Regulation, City University, London.*
23. Douglas R. Bohi, Karen L. Palmer (1996): The Efficiency of Wholesale vs. Retail Competition in Electricity. *The Electricity Journal, USA.*
24. Dr. Rajib Kumar Mishra (2014): Competition in Distribution. *PTC India Limited, March 2014(13).*
25. Dr Anil Kumar (2014): Retail Supply Business in Power Distribution. *energetica india NOV|DEC14.*
26. Eirik Schrøder Amundsen and Balbir Singh (1992): Developing Futures Markets for Electricity in Europe. *International Association for Energy Economics, https://www.jstor.org/stable/41326162.*
27. Electric Power Supply Association (2014): Competition in Electricity Markets. *https://espa.org/industry/primer/?fa=competition.*
28. Energy Advisory Committee (2003): Electricity Market Review: Role of Regulator.*https://enb.gov.hk/resources_publications/policy_consultation/files/Reference11.*
29. Energy Retail Markets Comparability Study (2012): A Report of DECC. *www.londecon.co.uk.*
30. ERDF: A market opens to competition. *http://www.enedis.fr/opening-electricity-market.*
31. Erkan Erdogdu (2010): Electricity Market reforms: Lessons from developing countries. *Judge Business School, University of Cambridge, UK, Energy Market Regulatory Authority, Republic of Turkey, https://mpra.ub.uni-muenchen.de/27317/.*
32. Essential Services Commission (2013): Progress of Electricity Retail Competition in Victoria. *https://www.esc.vic.gov.au.*
33. Florence School of Regulation (2016): Putting an end to Regulated Sale Prices. *https://www.fsr.eui.eu.*
34. Forum of Regulators (2013 & 2015): Introducing competition in retail electricity supply in India.*www.forumofregulators.gov.in.*

35. Forum of Regulators (2009): Study on Evolving an Appropriate Model for Distribution Margin. *www.forumofregulators.gov.in.*
36. Forum of Regulators (2019): Review of Status of Open Access in Distribution. *www.forumofregulators.gov.in.*
37. Frank A. Wolak, Stanford University: Retail Market Regulation to Foster Active Consumer Participation in Wholesale Electricity Markets. *http:www.standford.edu/wolk.*
38. French Energy Regulatory Commission (CRE) (2013): Operation of French electricity and natural gas retail markets. *www.cre.fr.*
39. French Energy Regulatory Commission (CRE) (2012): Activity Report-2011.*www.cre.fr.*
40. Gas and Electricity Markets Authority (2015): Standard conditions of the Electricity Distribution Licence. *Gas and Electricity Markets Authority.*
41. Giuseppe Tesauro, Fordham International Law Journal (2001): Market Power in Electricity Markets: Regulation, Deregulation and Competition - Lessons from the Italian Experience and Other European and U.S. Case Studies. *Fordham International Law Journal Volume 25, Issue 4 2001 Article 3.*
42. Haldane Fagundes Lima (2003): Retail Competition: The Brazilian challenge to empower consumers to choose their electricity supplier. *The Minerva Program – Fall 2003 Institute of Brazilian Business and Public Management Issues – IBI The George Washington University Washington – DC.*
43. Howard J. Axelrod, David W. De Ramus & Collin Cain (2006): The Fallacy of High Prices. *Public Utilities Fortnightly, Bates White, November 2006.*
44. Idam Infra. Advisory Pvt. Ltd. (2015): Presentation-Enabling Consumer Choice in Electricity. *IDAM Infrastructure Advisory Pvt. Ltd.,Mumbai.*
45. IDEP (2004): Competition and Regulation in the UK Electricity Market. *www.economie-publique.fr.*
46. IEA (2011): Empowering Customer Choice in electricity markets.*www.iea.org*.

47. IESE School of Business (2008): Competition and Regulations in the Spanish Gas and Electricity Markets. *IESE Business School, University of Navarra.*
48. Inter-American Development Bank (2002): Second-Generation Reforms in Infrastructure Services. *The Inter-American Development Bank Distributed by The fohns Hopkins University Press, Washington.D.C.*.
49. International Energy Agency (2001): Competition in Electricity Markets. *https://www.iea.org/reports/ competition-in-electricity-markets*.
50. Juan F. Escobar and Alejandro Jofré (2010): Monopolistic competition in electricity networks with resistance losses. *Springer, http://www.jstor.org/stable/40784473.*
51. Keshav Khanna (2012): Can Delhi Learn from the Competitive Model of Power Distribution in the UK and the US. *Centre for Civil Society*.
52. Maria Fe V. Reyes1 (2013): The Road Towards Retail Competition and Open Access (Philippines*). Economic Newsletter, No.12-02,Mar-Apr2013*.
53. Market Observatory for Energy of the European Commission, Quarterly Report on European Electricity Markets. *https://ec.europa.eu/energy/data-analysis/market-analysis_en.*
54. Mathew K. N., NPTI (2013): Retail Competition-International Best Practices; Is India Ready for Transition. *Shakti Sustainable Energy Foundation.*
55. Severin Borenstein and James Bushnell (2015): The U.S. Electricity Industry after 20 Years of Restructuring. *http://ei.haas.berkeley.edu.*
56. Mehmet Baha Karan and Hasan Kazdagli (2014): The Development of Energy Markets in Europe. *Springer, Berlin, Heidelberg*.
57. MERC (2010): Discussion Paper on operationalizing Parallel Distribution Licensees in the State of Maharashtra. *www.merc.gov.in.*
58. MERC (2002): MERC Order dated 3rd July 2003in Case No 14 of 2002
59. MERC (2009): Tariff Order for TPC dated 15.06.2009. *www.merc.gov.in.*
60. MERC (2009): MERC Order dated 22 July, 2009 clarificatory Order showing cheaper tariff options. *www.merc.gov.in.*

61. MERC (2009): MERC Order on Operationalization of Parallel Licensing dated 15.10.2009. *www.merc.gov.in.*
62. MERC (2011): MERC Order dated 22 July, 2011. *www.merc.gov.in.*
63. MERC (2011): MERC Orders dated 11 August 2011. *www.merc.gov.in.*
64. MERC (2011): MERC Order dated 9 September, 2011. *www.merc.gov.in.*
65. MERC (2012): MERC Order dated 22 August, 2012. *www.merc.gov.in.*
66. MERC (2014): MERC Order dated 5 June, 2014. *www.merc.gov.in.*
67. MERC (2014): MERC Order dated 14 August, 2014. *www.merc.gov.in.*
68. MERC (2015): MERC Order dated 9 November, 2015. *www.merc.gov.in.*
69. MERC (2016): MERC Committee Report in Case 182 of 2014. *www.merc.gov.in.*
70. MERC (2018): Multi Year Tariff Orders dated 12 September 2018. *www.merc.gov.in.*
71. MERC (2020): Multi Year Tariff Orders dated 30 March 2020. *www.merc.gov.in.*
72. Mine Yücel & Adam Swadley (2011): Did Residential Electricity Rates Fall After Retail Competition? A Dynamic Panel Analysis. *Energy Policy 39(12):7702-7711*.
73. Ministry of Economy, Trade & Industry (2015): Japan's Electricity Market Reform and Beyond. *https://iea.blob.core.windows.net/assets/imports/events/31/Yamazaki.*
74. Ministry of Power (2013): The Electricity (Amendment) Bill, 2014.*https://powermin.gov.in*.
75. Ministry of Power (2015): Report of Standing Committee on Energy on the Electricity (Amendment) Bill, 2014. *https://powermin.gov.in.*
76. Ministry of Power (2020): Report on Performance of State Power Utilities 2018-19. *https://powermin.gov.in.*
77. Ministry of Power (2020): The Electricity (Amendment) Bill, 2020. *https://powermin.gov.in.*
78. Ministry of Power (2021): Draft Electricity (Amendment) Bill, 2021. *https://powermin.gov.in.*

79. Nils-Henrik M. von der Fehr and Peter Vegard Hansen (2010): Electricity Retailing in Norway. *International Association for Energy Economics Stable URL: http://www.jstor.org/stable/41323269.*
80. OFGEM (2009): Electricity Distribution Price Control Review Final Proposals.*www.ofgem.gov.uk.*
81. OFGEM (2003), The New Electricity Trading Arrangements in England and Wales.*www.nao.gov.uk.*
82. Ole Jess Olsen, Tor Arnt Johnsen and Philip Lewis (2006): A Mixed Nordic Experience: Implementing Competitive Retail Electricity Markets for Household Customers. *November 2006, Vol. 19, Issue 9 1040-6190, Elsevier, doi:/10.1016/j.tej.2006.09.011 37.*
83. Parliament of Australia (1998): Electricity Industry Restructuring: The State of Play.*https://www.aph.gov.au.*
84. Paul S Galen (NREL) (1997): Electricity Distribution Industry Restructuring, Electrification, and Competition in South Africa. *National Renewable Energy Laboratory 1617 Cole Boulevard Golden, Colorado 80401-3393.*
85. Paulina-Beato Carmen Fuente (1999): Retail Competition of Electricity.*https://publications.iadb.org/publications/english/document/ Retail-Competition-in-Electricity.*
86. Paul L. Joskow (2008): Incentive Regulations and its Application to Electricity Networks. *Review of Network Economics Vol.7, Issue 4 – December 2008.*
87. Planning Commission (2011): Report of High-Level Panel on Financial Position of Distribution Utilities. *https://niti.gov.in.*
88. Planning Commission (2012): Report of the Task Force on Private Participation in Power Distribution. *https://niti.gov.in.*
89. Planning Commission (February 2014): The Working of State Power Utilities & Electricity Departments: Annual Report (2013-14). Govt. of India. *https://niti.gov.in.*
90. Platts (2012): Two-thirds EU nations still regulate retail energy prices: EC
91. Prafulla Varhade (2018): Study of Introducing Competition in Retail Supply of Electricity across Developed Countries and its Framework for

India. *http://www.researchersworld.com/ijms/, International Journal of Management Studies, Volume V, Issue 1(2), January 2018.*

92. Prafulla Varhade (2018): Introducing Retail Electricity Supply Business in India – Lesson learned from UK. *www.academicsjournal.com, International Journal of Academic Research and Development, Volume 3, Issue 1, Jan-Feb 2018*.
93. Prafulla Varhade (2020): Future Policy of Electricity Sector in India: Electricity Amendment Bill 2020. *www.cbip.org,Water and Energy International,Volume 63/RNI,No. 2,May 2020.*
94. Prafulla Varhade (2021): Financial health of MahaDiscom: A Root Cause Analysis. *www.cbip.org,Water and Energy International, Volume 64/RNI,No. 5,August 2021*.
95. PTC Chronicle (2015): Competition in Distribution (Segregation of Wire Business and Supply Business). *http://www.platts.com/latest-news/electric-power/brussels/two-thirds-eu-nations-still-regulate-retail-energy-8916061*.
96. R Dossani, - Energy Policy, 2004: Reorganisation of Power Distribution in India. *Elsevier, Energy Policy, 2004, vol. 32, issue 11, 1277-1289.*
97. Rafael Merino (2013): Liberalisation of the Electricity Industry in the European Union. *Faculty of Law School of Social Sciences Supervisor: M. Elvira Méndez-Pinedo January 2013.*
98. RAND Journal of Economics (2005): On the efficiency of competitive electricity markets with time-invariant retail prices. *RAND Journal of Economics Vol. 36, No. 3, Autumn 2005 pp. 469–493.*
99. Richard Pond (2006): Liberalisation, privatisation and regulation in the UK electricity sector. *Working Lives Research Institute London Metropolitan University 31 Jewry Street London EC3N 2EY UK.*
100. Salla ANNALA (2009): The Impact of Retail Electricity Market Model on Competition. *CIRD,20th International Conference on Electricity Distribution Prague, 8-11 June 2009.*
101. Severin Borenstein and James Bushnell (2015): The U.S. Electricity Industry after 20 Years of Restructuring. *https://doi.org/10.1146/annurev-economics-080614-115630.*

102. Sheoli Pargal and Sudeshna Ghosh Banerjee (2014): More Power to India-The Challenge of Electricity Distribution. *http://dx.doi.org/10.1596/978-1-4648-0233-1*.
103. Shilpi Mukherjee (2016): Status of Electricity Act, 2003: A systematic review of literature. *xxx 0301-4215/ © 2016, www.elsevier.com.*
104. Shri V.S. Ailawadi, Ms. Bhawna Gulati: Ensuring Electricity to All: Promoting Competition in the Sector- A Study Report. *https://www.circ.in/pdf/Electricity_Sector.pdf.*
105. Sidharth Sinha (2005): Introducing Competition in the Power Sector: Open Access and Cross Subsidies. *Economic and Political Weekly 40(7):631-637, DOI:10.2307/4416200.*
106. Silvia Concettini Anna Creti (2013): Liberalization of electricity retailing in Europe: coming back or going forth?. *HAL Id: hal-00915924 https://hal.archives-ouvertes.fr/hal-00915924.*
107. Singapore Power (2015): "Presentation-Managing Transition to Retail Competition". *https://www.iitk/ac/in/ime.*
108. Smith Joanna, Firth, Jill (2011); "Qualitative data analysis: the framework approach". *Nurse Researcher, University of Huddersfield.*
109. "Stephen C. Littlechild " (2009): Competition in Retail Electricity Supply, University of Cambridge. *UNIVERSITY OF CAMBRIDGE Department of Applied Economics.*
110. Stephen Littlechild (2014): Promoting or restricting competition? Regulation of the UK retail residential energy market since 2008. *UNIVERSITY OF CAMBRIDGE, Energy Policy Research Group.*
111. Stephen Thomas (2005): British Experience of Electricity Liberalisation: A Model for India?. *Economic and Political Weekly, http://www.jstor.org/stable/4417518.*
112. Steven L. Puller and Jeremy West (2013): Efficient Retail Pricing in Electricity and Natural Gas Markets: A Familiar Problem with New Challenges. *AMERICAN ENONOMIC REVIEW VOL.103, NO.3,MAY 2013(pp. 350-55).*

113. Steven Stoft (2002): Designing Markets for Electricity. *IEEE Press & WILEY-INTERSCIENCE A JOHN WILEY & SONS, INC., PUBLICATION.*
114. Supreme Court of India (2008): Supreme Court Judgement TPC Vs. MERC. *https://main.sci.gov.in.*
115. Supreme Court of India (2014): Supreme Court Judgement BEST Vs MERC dated 8 May, 2014. *https://main.sci.gov.in.*
116. Tanga M. McDaniel & Peter A. Groothuis (2012): Retail competition in electricity supply—Survey results in North Carolina. *Retail competition in electricity supply – Survey results in North Carolina. Energy Policy, 48, 315-321, http://libres.uncg.edu/ir/asu/.*
117. The Regulatory Assistance Project (2011): Electricity Regulation in the US: A Guide. *www.raponline.org.*
118. Tooraj Jamasb and Michael Pollitt (2005): Electricity Market Reform in the European Union: Review of Progress toward Liberalization & Integration. *International Association for Energy Economics, http://www.jstor.org/stable/23297005.*
119. Torstein Bye and Einar Hope (2005): Deregulation of Electricity Markets: The Norwegian Experience. *Economic and Political Weekly Stable, http://www.jstor.org/stable/4417519.*
120. UK Power Networks (2015): IFI Report. *https:// smarter.energynetworks.org/media/lhzhdueb/uk-power-networks-2014-2015-ifi-report.*
121. Universidad Catolica de Chile (2005): The Marketer competition agent in the Chilean Electric Market. *Universidad Catolica de Chile, Santiago, Chile.*
122. Valeria Di Cosmo & Muireann Á. Lynch (2015): Competition and the Single Electricity Market: Which Lessons for Ireland?.
123. Valeria di Cosmo and Muireann Á Lynch: The Irish electricity market: new regulation to preserve competition. *http://www.engineersjournal.ie/2015/03/24/irish-electricity-rates market-regulation/.*

124. Wiley (1992): Productivity in Swedish Electricity Retail Distribution. *Wiley on behalf of The Scandinavian Journal of Economics, http://www.jstor.org/stable/3440259.*
125. Xuejuan Su (2014): Have customers benefited from electricity retail competition?. *Department of Economics, University of Alberta, Edmonton, Canada.*

APPENDIX

CODE BOOK FOR INTERVIEW PROTOCOL LEADING TO THE FORMATION OF FRAMEWORK TO INTRODUCE RETAIL COMPETITION IN DISTRIBUTION SECTOR OF MAHARASHTRA

RESEARCH OBJECTIVE 1:

CODE BOOK: INTERVIEW TRANSCRIPTS

1. According to you, what are the barriers and constraints in the introduction of retail competition in distribution sector **and changes required in the Electricity Act 2003 and Electricity (Amendment) Bill, 2014 with respect to following issues**:

    i. Role and functions of Discoms;

Respondent 1: Segregation of Role & Function of discom into wire and supply required: Segregation into Retail Supply and Network business, Coordination with grid operator, maintenance of proper voltage, daily load forecasting, network expansion planning, reduction of Distribution losses, energy audit, mechanism to deal with technical & commercial losses, Accountability for quality of supply and service, Monitor Performance as per SOP and its Compliance etc.

Codes: Segregation, Role & Function of discom, wire, supply, Retail Supply, Network business, Coordination, grid operator, maintenance, voltage, load forecasting, network expansion planning, reduction of Distribution losses, energy audit, mechanism to deal with technical & commercial losses, Accountability, quality, supply and service, Monitor Performance, SOP, Compliance. Code Quantity: 21, New Codes: 21

Respondent 2: As per provisions of Electricity Act, Discoms are performing both the functions of Retail Supply as well Wires. To introduce competition, it is essential to separate the functions and have single wires licensee which could be incumbent licensee who has already established network (Network Operator) and multiple retail licensees which will compete in the market.

Codes: provisions of Electricity Act, Discom, Retail Supply, Wires, competition, essential, separate, function, single wires licensee, incumbent licensee, Network Operator, multiple, retail licensees Code Quantity: 12 New Code: 11

Respondent 3: Bifurcation of wire business for an independent business operation will ensure no duplication of wire network and competition within the Retail Supply Business for the benefits of consumers. The functions and duties of Wire and Supply business is required to be outlined cause providing connection and supply of electricity are two different distinct works.

Codes: Bifurcation, wire business, independent business operation, duplication, wire network, competition, Retail Supply Business, consumers, function, duties, Wire and Supply, business, connection, supply of electricity, distinct Code Quantity: 14 New Code: 12

Respondent 4: The Act provided for framework for network business and retail supply business bundled in one Business Company but it also provided an open access framework. In the scheme of Act, separation of carriage and content in the Act. The idea of separation of wire and supply is contained in the EA 2003. This framework is necessary condition but not a sufficient condition for introduction of retail competition.

Codes: framework, network business, retail supply business, bundled, one Business Company, open access framework, wire and supply, contained, EA 2003, sufficient condition, introduction, retail competition
Code Quantity: 12 New Code: 10

Respondent 5: Maintenance of proper voltage, daily load forecasting, network expansion planning, reduction of Distribution losses, energy audit, mechanism to deal with technical & commercial losses, Accountability for quality of supply and service, Monitor Performance as per SOP and its Compliance etc.

Codes: Maintenance of proper voltage, daily load forecasting, network expansion planning, reduction of T&D losses, energy audit, mechanism to deal with technical & commercial losses, Accountability, quality, supply and service, Monitor Performance, SOP, Compliance
Code Quantity: 12 New Code: 3

Respondent 6: Discoms are performing both the functions of Retail Supply as well Wires. It is essential to separate the functions and have single wires licensee which could be incumbent licensee who has already established network (Network Operator) and multiple retail licensees which will compete in the market.

Codes: Discom, Retail Supply, Wire, separate, function, single wires licensee, incumbent licensee, multiple retail licensees, compete, market
Code Quantity: 10 New Code: 2

Respondent 7: The Act provided for framework for network business and retail supply business bundled in one Business Company but it also provided an open access framework. Bifurcation of wire business for an independent business operation is necessary.

Codes: framework, network business, retail supply business, bundled, one Business Company, open access framework, Bifurcation, wire business, independent business operation
Code quantity: 9 New Code: 0

Respondent 8: Separation of Discom into wire and supply business. The functions and duties of Wire and Supply business is required to be outlined cause providing connection and supply of electricity are two different distinct works. However, Distribution Licensee cannot provide the Connection without identification of source of supply or Supply Licensee and hence obligation to be outlined in the Act clearly.

Codes: Separation, Discom, wire and supply business, function, duties, Wire and Supply business, connection, supply of electricity, distinct, Distribution Licensee, identification, source of supply, Supply Licensee, obligation
Code Quantity: 14 New Code: 0

Respondent 9: Discoms are performing both the functions of Retail Supply as well Wires. To introduce competition, it is essential to separate the functions and have single wires licensee.

Codes: Discom, function, Retail Supply, Wire, competition, single wires licensee
Code Quantity: 6 New Code: 0

Respondent 10: Bifurcation of wire business will ensure no duplication of wire network and competition within the Retail Supply Business for the benefits of consumers.

Codes: Bifurcation, wire business, duplication, wire network, competition, Retail Supply Business, consumers Code Quantity: 7 New Code: 0

ii. Power purchase contracts (long term/medium term) or power procurement mechanism:

Respondent 1: Existing PPA's are to be shared between the Existing and new licensees. clarity on sharing PPAs based on consumer mix, demand allocation, Base and Peak Demand, Marginal cost or Avg. cost of power purchase, Mechanism for merit order dispatch between the two Companies, Treatment of surplus power.

Codes: Existing PPA's, shared, Existing, new licensees, PPAs, Marginal cost or Avg. cost of power purchase, Mechanism, merit order dispatch, Companies, Treatment of surplus power. Code Quantity: 10, New Codes: 10

Respondent 2: Presently, each Discom has entered into long term/medium term PPA's to meet the current and expected demand in future period. It is pertinent that with introduction of Competition, the existing PPA's of existing Distribution licensee are likely to be stranded and fixed cost will have to be borne by existing consumers. Accordingly, it is essential that to have appropriate clause so that existing PPA's are shared between the Existing and new licensees.

Codes: Discom, entered, long term, medium term, PPA's, current and expected demand, Competition, existing PPA's, existing Distribution licensee, stranded, fixed cost, existing consumers, existing PPA's, Existing and new licensees Code Quantity: 15, New Codes: 14

Respondent 3: For allocation of existing PPA's; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy as well as to safeguard any revenue loss for the existing Distribution licensee as the major fixed cost of the thermal plants has already been borne at the initial stage by existing distribution licensee.

Codes: allocation, existing PPA's, Marginal Cost, power purchase, cross subsidy, safeguard, revenue loss, existing Distribution licensee, fixed cost, thermal plants, initial stage Code Quantity: 11, New Codes: 9

Respondent 4: There needs to be clarity on sharing of PPAs based on consumer mix, demand allocation, Base and Peak Demand, Marginal cost or Avg. cost of power purchase, Mechanism for merit order despatch between the two Companies, Treatment of surplus power, etc.

Codes: clarity, PPAs, demand allocation, Base and Peak Demand, Marginal cost, Avg. cost, power purchase, Mechanism, merit order despatch, Companies, Treatment, surplus power Code Quantity: 12, New Codes: 8

Respondent 5: Legacy of the PPAs should not be carried and PPAs should be equally distributed among the new and the old licensees. SERC can be empowered for the reallocation of the of PPAs under Section 86 (1)(b).

Codes: Legacy, PPAs, carried, equally distributed, new and the old licensees, SERC, empowered, reallocation, Section 86 (1)(b) Code Quantity: 9, New Codes: 8

Codes: Delhi Privatisation model, new formula, reallocation, PPAs, Competition, wire and the Supply business
Code Quantity: 6, New Codes: 3

Respondent 7: Sharing of existing PPAs should be done based on consumer mix, demand allocation, Base and Peak Demand, Marginal cost or Avg. cost of power purchase.

Codes: existing PPAs, consumer mix, demand allocation, Base and Peak Demand, Marginal cost, Avg. cost, power purchase
Code Quantity: 7 New Codes: 2

Respondent 8: For allocation of existing PPA's; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy as well as to safeguard any revenue loss for the existing Distribution licensee.

Codes: allocation, existing PPA's, Marginal Cost, power purchase, cross subsidy, safeguard, revenue loss, existing Distribution licensee
Code Quantity: 8 New Codes: 0

Respondent 9: PPAs should be equally distributed among the new and the old licensees.

Codes: PPAs, distributed, new and the old licensees
Code Quantity: 3 New Codes: 0

Respondent 10: It is essential that to have appropriate clause so that existing PPA's are shared between the Existing and new licensees.

Codes: existing PPA's, Existing and new licensees
Code Quantity:2 New Codes: 0

iii. National level wholesale market mechanism for power procurement:

Respondent 1: Framework for Real-Time Market (RTM) and Market Based Economic Dispatch of Electricity at National Level has been initiated by CERC, no amendment required.

Codes: Framework, Real-Time Market (RTM), Market Based Economic Dispatch, Electricity, National Level, CERC, Amendment.
Code Quantity: 6 New Codes:6

Respondent 2: Section 66 of the Electricity Act provides that for Market Development, responsibility is already cast upon the appropriate Commission (CERC for the national level market). Accordingly, there is no requirement of specific amendment in the Act and CERC is empowered to issue Regulations in this regard.

Codes: Section 66, Electricity Act, Market Development, responsibility, appropriate Commission, no requirement, amendment, CERC, empowered, issue, Regulations
Code Quantity: 11 New Codes:9

Respondent 3: Already Framework for Real-Time Market (RTM) and Market Based Economic Dispatch of Electricity at National Level has been initiated by CERC. Such mechanism will ensure to optimise the economic despatch of power within PAN India for the benefit of consumers.

Codes: Framework, Real-Time Market, Market Based Economic Dispatch, Electricity, National Level, CERC, mechanism, optimise, economic dispatch, PAN India, consumers
Code Quantity:11 New Codes:8

Respondent 4: Developing wholesale market from IC approach for RSC is not thought through Regulatory and policy intervention in developing market is necessary instead of changes in the Act.

Codes: Developing, wholesale market, IC approach, Regulatory and policy intervention, developing market, changes, Act
Code Quantity:7 New Codes:7

Respondent 5: Whole sale market at national level will have more bandwidth as compared to the state level. CERC is empowered to issue Regulations for market development.

Codes: Whole sale market, national level, more bandwidth, state level, CERC, empowered, issue, Regulations, market development.
Code Quantity:9 New Codes:3

Respondent 6: Framework for Real-Time Market (RTM) and Market Based Economic Dispatch of Electricity at National Level has been initiated by CERC.

Codes: Framework, Real-Time Market, Market, Economic Dispatch, Electricity, National Level, CERC.
Code Quantity:7 New Codes:2

Respondent 7: Regulatory and policy intervention in developing market is necessary instead of changes in the Act for wholesale market development.

Codes: Regulatory and policy intervention, market, changes, wholesale market development
Code Quantity: 4 New Codes:1

Respondent 8: Section 66 of the Electricity Act provides for Market Development

Codes: Section 66, Electricity Act, Market Development
Code Quantity:3 New Codes:0

Respondent 9: There is no requirement of specific amendment in the Act and CERC is empowered to issue Regulations in wholesale Market Development.

Codes: amendment, CERC, empowered, Regulations, wholesale Market Development
Code Quantity:5 New Codes:0

Respondent 10: A mechanism for Wholesale market development will ensure to optimise the economic despatch of power within PAN India for the benefit of consumers.

Codes: mechanism, Wholesale market development, economic despatch, PAN India, consumers.
Code Quantity:5 New Codes:0

iv. Reduction of cross subsidies:

Respondent 1: Present Tariff Policy, Cross Subsidy is required to be built in tariff to the extent of 20%. As per the recent proposed amendment in the Electricity Act, the tightening caps in relation to zero-subsidy stage which is proposed to be achieved in three years may result in an incremental gap which may be recovered through subsidy or by way of tariff shock to certain category of consumers or through Universal Charge fund.

Codes: Tariff Policy, Cross Subsidy, built in tariff, amendment, Electricity Act, zero-subsidy stage, incremental gap, recovered, subsidy, tariff shock, category, consumers, Universal Charge fund. Code Quantity: 13 New Codes:13

Respondent 2: While introducing competition, it is essential that the Existing distribution licensee is protected to that extent so as to avoid cascading effect of under recovery of cross subsidy on tariff of other consumers.

Codes: Tariff Policy, Cross Subsidy, built in tariff, competition, Existing distribution licensee, protected, cascading effect, under recovery, cross subsidy, tariff, consumers Code Quantity:11 New Codes:6

Respondent 3: It is worthwhile to note that considering the larger Agriculture base of State Distribution Licensee, to avoid any cross-subsidy impact and tariff shock, the low cost PPAs should be left with the Existing State-owned Licensees.

Codes: larger Agriculture base, State Distribution Licensee, cross-subsidy, impact, tariff shock low cost PPAs, Existing State-owned Licensees. Code Quantity:7 New Codes:6

Respondent 4: Considering the entry of multiple supply licensee, there is a high probability of shifting of subsidising consumers from existing to new supply licensee for which the existing supply licensee needs to be adequately compensated for such loss of cross subsidy by way of Cross Subsidy Surcharge (CSS) or Additional Surcharge or creating of any fund from surplus of new licensee.

Codes: multiple supply licensee, high probability, shifting, subsidising consumers, existing, new supply licensee, existing supply licensee, compensated, loss of cross subsidy, Cross Subsidy Surcharge, Additional Surcharge, fund, surplus, new licensee. Code Quantity:14 New Codes:14

Respondent 5: The recent proposed amendment in the Electricity Act, the tightening caps in relation to zero-subsidy stage which is proposed to be achieved in three years may result in an incremental gap which may be recovered through subsidy or by way of tariff shock to certain category of consumers.

Codes: proposed amendment, Electricity Act, tightening caps, zero-subsidy stage, proposed, achieved, three years, incremental gap, recovered, subsidy, tariff shock, category, consumers. Code Quantity:13 New Codes:5

Respondent 6: It is necessary to ascertain the mechanism for recovery of cross subsidy so, in future the incumbent licensee becomes more competitive with no regulatory assets to be recovered and there is no burden on utility or consumers.

Codes: mechanism, recovery, incumbent licensee, more competitive, no regulatory assets, recovered, utility, consumers.
Code Quantity:8 New Codes:6

Respondent 7: Managing and phasing out of the cross subsidy is necessary and a mechanism should be developed for the same.

Codes: Managing, phasing out, cross subsidy, mechanism, developed
Code Quantity:5 New Codes:3

Respondent 8: In future for reduction of cross subsidy, the incumbent licensee should become more competitive with no regulatory assets to be recovered and no further burden on utility or consumers.

Codes: reduction of cross subsidy, incumbent licensee, competitive, no regulatory assets, recovered, utility, consumers.
Code Quantity: 7 New Codes:2

Respondent 9: Existing supply licensee needs to be adequately compensated for such loss of cross subsidy by way of Cross Subsidy Surcharge (CSS) or Additional Surcharge or creating of any fund from surplus of new licensee.

Codes: Existing supply licensee, loss of cross subsidy, Cross Subsidy Surcharge, Additional Surcharge, fund, surplus, new licensee
Code Quantity:7 New Codes:1

Respondent 10: There is a high probability of shifting of subsidising consumers from existing to new supply licensee for which the existing supply licensee needs to be adequately compensated

Codes: high probability, shifting, subsidising consumers, existing, new supply licensee, existing supply licensee, compensated.
Code Quantity:7 New Codes:0

v. Distribution losses and unmetered sales:

Respondent 1: Distribution Loss is related to operational parameter and does not require any amendment in the Act, but if bifurcated distribution losses should be handed to network Companies. In respect of unmetered sales, Section 55 of the Electricity Act clearly provides that no connection shall be released without meter.

Codes: Distribution Loss, operational parameter, amendment, bifurcated, network Companies, unmetered sales, Section 55 of the Electricity Act, connection, meter
Code Quantity:10 New Codes:10

Respondent 2: Clarity may be required with regards to bifurcation of commercial loss to be undertaken at wire or at meter end along with the responsibility of supply licensee.

Codes: Clarity, required, bifurcation, commercial loss, wire, meter, responsibility, supply licensee
Code Quantity:6 New Codes:5

Respondent 3: In respect of unmetered sales, Section 55 of the Electricity Act clearly provides that no connection shall be released without meter.

Codes: unmetered sales, Section 55, Electricity Act, connection, released, without meter
Code Quantity:6 New Codes:0

Respondent 4: Distribution Loss is related to operational parameter and does not require any amendment in the Act.

Codes: Distribution Loss, operational parameter, require, amendment Code Quantity:4 New Codes:1

Respondent 5: Supply Licensee should be given responsibility for managing the commercial losses.

Codes: Supply Licensee, responsibility, managing, commercial losses Code Quantity:4 New Codes:4

Respondent 6: Section 55 of the Electricity Act clearly provides for release of connection with meter. Clarity may be required with regards to bifurcation of commercial loss.

Codes: Section 55, Electricity Act, connection, meter, Clarity, bifurcation, commercial loss. Code Quantity:7 New Codes:3

Respondent 7: Distribution losses should be handed to network Companies. Unmetered connection should not be released.

Codes: Distribution losses, handed, network Companies. Code Quantity:3 New Codes:2

Respondent 8: Unmetered connection should not be released.

Codes: Unmetered connection, released. Code Quantity:2 New Codes:1

Respondent 9: no connection shall be released without meter.

Codes: connection, released, meter. Code Quantity:3 New Codes:0

Respondent 10: Distribution losses doesn't require any amendment in the act and are only related to operational parameters.

Codes: Distribution losses, require, amendment Code Quantity:3 New Codes:0

vi. Tariff determination:

Respondent 1: SERC is responsible for tariff determination. In case of above threshold, SERC will determine the wheeling charges for network company and below threshold SERC will determine regulated tariff for both network and supply companies.

Codes: SERC, tariff determination, above threshold, wheeling charges, network company, below threshold, regulated tariff, network and supply companies. Code Quantity: 8 New Codes:8

Respondent 2: As mentioned, the retail competition has to be based on single wire licensee and multiple retail licensee. As per the new provision in the Act, SERC to determine the ceiling tariff for the retail licensees operating in the same area of supply.

Codes: retail competition, single wire licensee, multiple retail licensee, provision, SERC, ceiling tariff, retail licensees, same area of supply Code Quantity:8 New Codes:7

Respondent 3: Tariff can be determined based on the normative costs and standards of performance.

Codes: Tariff, determined, normative costs, standards of performance Code Quantity:4 New Codes:4

Respondent 4: The ceiling tariff has been determined, the cross-subsidy obligations towards existing State Distribution Companies need to be fulfilled.

Codes: ceiling tariff, determined, cross-subsidy, obligations, existing State Distribution Companies. Code Quantity:5 New Codes:4

Respondent 5: Ceiling Tariff needs to be determined. The ceiling tariffs, allocation of the power purchase sources, base and peak load generation, quantum, period and duration of supply, provision of ancillary services and so on, should be considered.

Codes: Ceiling Tariff, determined, allocation of the power purchase sources, base and peak load generation, quantum, period, duration of supply, provision, ancillary services Code Quantity:9 New Codes:6

Respondent 6: There should be a ceiling tariff in tariff determination in order to bring in competition.

Codes: ceiling tariff, tariff determination, competition. Code Quantity:3 New Codes:1

Respondent 7: SERC is responsible for tariff determination.

Codes: SERC, tariff determination Code Quantity:2 New Codes:0

Respondent 8: For above threshold, SERC will determine the wheeling charges for network comp. and below threshold SERC will determine regulated tariff for both network and supply companies,

Codes: above threshold, SERC, wheeling charges, network comp, below threshold, SERC, regulated tariff, network and supply companies. Code Quantity:8 New Codes:1

Respondent 9: SERC to determine the ceiling tariff for the retail licensees operating in the same area of supply.

Codes: SERC, ceiling tariff, retail licensees, same area of supply Code Quantity:4 New Codes:0

Respondent 10: The ceiling tariff, allocation of the power purchase sources, base and peak load generation, should be considered.

Codes: ceiling tariff, base and peak load generation. Code Quantity:2 New Codes:0

vii. Role of SLDC:

Respondent 1: It is essential that SLDC need to be strengthened in terms of various IT related modules for scheduling, energy accounting etc. Role needs to be well defined with respect to

scheduling of power, managing Ancillary services, commercial settlement, Deviation Settlement mechanism, etc.

Codes: SLDC, IT related modules, scheduling, energy accounting, scheduling of power, Ancillary services, commercial settlement, Deviation Settlement mechanism Code Quantity: 8 New Codes:8

Respondent 2: Section 32 of the Act clearly specifies the responsibility of SLDC.

Codes: Section 32, specifies, responsibility, SLDC Code Quantity: 4 New Codes:3

Respondent 3: Considering the introduction of competition and multiple licensees within an area of supply, it is essential that SLDC need to be strengthened in terms of various IT related modules for scheduling, energy accounting etc.

Codes: introduction, competition, multiple licensees, area of supply, SLDC, strengthened, IT related modules, scheduling, energy accounting Code Quantity: 9 New Codes:5

Respondent 4: Considering the National Level MoD and Despatch mechanism, Role of RLDC, SLDC & NLDC needs to be well defined with respect to scheduling of power.

Codes: National Level MoD, Despatch mechanism, Role of RLDC, SLDC, NLDC, well defined, scheduling of power. Code Quantity: 7 New Codes:5

Respondent 5: Functions of RLDC, SLDC & NLDC needs to be well defined with respect to managing Ancillary services, commercial settlement, Deviation Settlement mechanism, etc

Codes: RLDC, SLDC, NLDC, well defined, managing Ancillary services, commercial settlement, Deviation Settlement mechanism Code Quantity: 7 New Codes:2

Respondent 6: SLDC ring fencing or independence is necessary for proper functioning.

Codes: SLDC, ring fencing, necessary, proper functioning Code Quantity:4 New Codes:3

Respondent 7: Role of RLDC, SLDC & NLDC needs to be well defined with respect to managing Ancillary services, commercial settlement.

Codes: Role of RLDC, SLDC, NLDC, well defined, managing Ancillary services, commercial settlement Code Quantity:6 New Codes:0

Respondent 8: LDC tasks needs to be well defined with respect to , managing Ancillary services, Deviation Settlement mechanism.

Codes: LDC, well defined, managing Ancillary service, Deviation Settlement mechanism Code Quantity:4 New Codes:2

Respondent 9: Role of LDC needs to be well defined with respect to scheduling of power.

Codes: LDC, scheduling of power Code Quantity:2 New Codes:0

Respondent 10: It is essential that SLDC need to be strengthened in terms of various IT related modules for scheduling, energy accounting etc.

Codes: SLDC, strengthened, IT related modules, scheduling, energy accounting Code Quantity: 5 New Codes:0

viii. Financial losses:

Respondent 1: Due to lower revenue collection, theft, no cost reflective tariff, non-revision of tariff, Operational efficiency. There can be provision for compulsory revision of tariff by SERC every year. Limitations on creation of Regulatory assets.

Codes: lower revenue collection, theft, no cost reflective tariff, non-revision of tariff, Operational efficiency, provision, compulsory revision, tariff, SERC, Limitations, creation of Regulatory assets. Code Quantity:11. New Codes:11

Respondent 2: Financial losses may be due to following, Lower revenue collection i.e., under recovery, Increased losses due to theft.

Codes: Financial losses, Lower revenue collection, Increased losses, theft Code Quantity:4 New Codes:2

Respondent 3: No Cost reflective tariff or non-revision of tariff due to socio-political events. Operational inefficiency due to difference in normative and actual cost are also responsible for financial losses.

Codes: No Cost reflective tariff, non-revision of tariff, socio-political events, Operational inefficiency, normative and actual cost, financial losses Code Quantity:6 New Codes:3

Respondent 4: There could be provision in the Act for compulsory revision in tariff by SERCs every year or for the control period (multi-year tariff) to avoid any losses due to non-revision of tariff.

Codes: Provision, compulsory revision, tariff, SERC, every year, control period, multi-year tariff, losses, non-revision of tariff. Code Quantity:9 New Codes:6

Respondent 5: Limitation on creation of Regulatory assets though specified in the National Tariff Policy, is required to be implemented in line with the provisions.

Codes: Limitation, Regulatory assets, National Tariff Policy, implemented, provisions Code Quantity:5 New Codes:5

Respondent 6: Financial planning should be such that it safeguards the future.

Codes: Financial planning, safeguards, future Code Quantity:3 New Codes:0

Respondent 7: Due to lower revenue collection, theft, no cost reflective tariff, non-revision of tariff, Operational efficiency. There can be provision for compulsory revision of tariff.

Codes: lower revenue collection, theft, no cost reflective tariff, non-revision of tariff, Operational efficiency, provision, compulsory revision, tariff Code Quantity:8 New Codes:0

Respondent 8: Formation of regulatory assets should be limited for reduction of commercial losses.

Codes: regulatory assets, limited, commercial losses Code Quantity:3 New Codes:2

Respondent 9: Compulsory revision in tariff by SERCs every year or for the control period (multi-year tariff).

Codes: Compulsory revision, tariff, SERC, control period, multi-year tariff Code Quantity:5 New Codes:0

Respondent 10: Limitation on creation of Regulatory assets though specified in the National Tariff Policy and financial planning should be such that it safeguards the future

Codes: Limitation, Regulatory assets, National Tariff Policy, financial planning Code Quantity4: New Codes:0

ix. Metering:

Respondent 1: Roadmap for unmetered connection, to have proper energy accounting with multiple licensees it is essential to have smart meter in place and appropriate amendment be done in the Act itself. there is a need for proper meters and data collection systems to distinguish such different competitors' customers from a DISCOMs customers. Pre-paid Metering for consumers needs to be implemented to safeguard any revenue loss.

Codes: Roadmap, unmetered connection, energy accounting, multiple licensees, smart meter, amendment, meter, data collection systems, competitors', DISCOMs, Pre-paid Metering, revenue loss. Code Quantity: 12 New Codes:12

Respondent 2: Section 55 of the Act clearly provides that no connection shall be released without meter.

Codes: Section 55, connection, meter Code Quantity:3 New Codes:1

Respondent 3: There exists lot of connections which are still unmetered which needs to be metered on war footing by devising the time bound plan.

Codes: connection, unmetered, metered, time bound plan Code Quantity:4 New Codes:3

Respondent 4: It is necessary to devise a roadmap for metering of Agricultural consumers otherwise, Supply Licensee will have to incur huge capex for procurement of meters and it will lead to tariff increase.

Codes: roadmap, metering, Agricultural consumers, Supply Licensee, capex, procurement of meters, tariff increase Code Quantity:7 New Codes:6

Respondent 5: To have proper energy accounting with multiple licensees it is essential to have smart meter in place and appropriate amendment be done in the Act itself.

Codes: proper meters, data collection systems, competitor, DISCOM, customer Code Quantity:5 New Codes:4

Respondent 6: There is a need for proper meters and data collection systems to distinguish such different competitors' customers from a DISCOMs customers.

Codes: energy accounting, multiple licensees, smart meter, amendment Code Quantity:4 New Codes:0

Respondent 7: Pre-paid Metering for consumers needs to be implemented to safeguard any revenue loss, decrease of arrears, and proper working capital management.

Codes: Pre-paid Metering, consumers, revenue loss, decrease of arrears, working capital management

Respondent 8: Centre can come in for the control of the metering but should be seen through a socio-political angle or there can be a separate metering company at state level.

Codes: Centre, metering, socio-political angle, metering company, state level Code Quantity:5 New Codes:4

Respondent 9: It is essential to have smart meter in place and appropriate amendment be done in the Act itself. There is a need for proper meters and data collection systems.

Codes: smart meter, amendment, meter, data collection systems Code Quantity:4 New Codes:0

Respondent 10: Pre-paid Metering for consumers needs to be implemented to safeguard any revenue loss.

Codes: Pre-paid Metering, consumers, revenue loss. Code Quantity:3 New Codes:0

x. Rollout and Time frame for phasing of competition:

Respondent 1: It is important that competition be introduced by specifying the minimum area of supply. The Act may specify the timeline for complete competition whereas phasing may be left to the discretion of the Appropriate Commission or Appropriate Govt.

Codes: competition, minimum area of supply, timeline, phasing, discretion, Appropriate Commission, Appropriate Govt Code Quantity:7 New Codes:7

Respondent 2: It is important that competition be introduced by specifying the minimum area of supply which will be open to competition (rather than consumer category) subject to approval of the appropriate Commission.

Codes: competition, minimum area of supply, consumer category, Commission Code Quantity:4 New Codes:2

Respondent 3: Act may specify the timeline for complete competition whereas phasing may be left to the discretion of the Appropriate Commission.

Codes: timeline, competition, Commission Code Quantity:3 New Codes:0

Respondent 4: The specific area of Supply licensee needs to be segregated in a way that no cherry picking takes place and Subsidised consumers are not retained by existing State Distribution licensee.

Codes: specific area, Supply licensee, segregated, Subsidised consumers, existing State Distribution licensee
Code Quantity:5 New Codes:5

Respondent 5: Rollout and Time frame for phasing of competition should be in the act itself.

Codes: Rollout, Time frame, phasing of competition
Code Quantity:3 New Codes:3

Respondent 6: It is important that competition be introduced by specifying the minimum area of supply.

Codes: competition, minimum area of supply
Code Quantity:2 New Codes:0

Respondent 7: The timeline for complete competition should be specified in the Act whereas phasing may be left to the discretion of the Appropriate Commission.

Codes: competition, minimum area of supply
Code Quantity:2 New Codes:0

Respondent 8: competition be introduced by specifying the minimum area of supply which will be open to competition.

Codes: competition, minimum area of supply
Code Quantity:2 New Codes:0

Respondent 9: No cherry picking takes place and Subsidised consumers are not retained by existing State Distribution licensee.

Codes: Subsidised consumers, existing State Distribution licensee
Code Quantity:2 New Codes:0

Respondent 10: Phasing may be left to the discretion of the Appropriate Commission or Appropriate Government.

Codes: Phasing, Commission,
Code Quantity:2 New Codes:0

2. What are your views in regards to functions and framework proposed for Intermediary Company (IC) under Bill 2014 regarding power procurement mechanism?

[Note: Clause 55 of the Bill provides that the functions of the IC shall be prescribed by the Central Govt.]

Respondent 1: In Electricity Bill, 2021 clearly specify the allocation of existing PPAs of the incumbent licensee to new retail licensee resolving issue of stranded capacity of incumbent licensee. Rate at which power to be allocated to the new licensee needs to be taken care. Probability of stranded PPA's will be increased. necessary to understand the allocation principle to be adopted by Intermediary company.

Codes: Electricity Bill 2021, allocation of existing PPAs, incumbent licensee, new retail licensee, stranded capacity, new licensee, stranded PPA's, allocation principle, Intermediary company.
Code Quantity:9 New Codes:9

Respondent 2: The amendments proposed in Electricity Bill, 2021 clearly specify the allocation of existing PPAs of the incumbent licensee to new retail licensee. This will certainly resolve the issue of stranded capacity of incumbent licensee.

Codes: amendment, Electricity Bill, 2021, allocation, existing PPAs, incumbent licensee, new retail licensee, stranded capacity, incumbent licensee Code Quantity:8 New Codes:4

Respondent 3: Role of intermediary company and the allocation of power to the intermediary company in case of multiple licensees is not clear. Due to introduction of multiple supply licensee, the probability of stranded PPA's will be increased.

Codes: intermediary company, allocation of power, multiple licensees, introduction, multiple supply licensee, stranded PPA's Code Quantity:6 New Codes:4

Respondent 4: It is necessary to understand the activity to be undertaken by existing distribution licensee as well as intermediary company to avoid the probability of stranded PPA's will be increased.

Codes: existing distribution licensee, intermediary company, probability, stranded PPA's, increased Code Quantity:5 New Codes:3

Respondent 5: It is necessary to understand the allocation principle to be adopted by Intermediary company for allocation of PPA so as to avoid any stranded / stressed assets.

Codes: allocation principle, Intermediary company, allocation, PPA, stranded / stressed assets Code Quantity:5 New Codes:2

Respondent 6: Intermediary Company is way forward not barrier for addressing concerns of high PPAs. You can house all PPAs.

Codes: Intermediary Company, addressing, PPA Code Quantity:3 New Codes:1

Respondent 7: Mechanism to protect PPAs which will protect existing Discoms burden free. Internationally all PPAs were open to market. Need to take a call, it is transitory in nature, one school of thought is even you do open in whole sale nothing will happen.

Codes: Mechanism, PPA, protect, existing Discoms, transitory in nature, whole sale Code Quantity:6 New Codes5:

Respondent 8: Electricity Bill, 2021 clearly specify the allocation of existing PPAs of the incumbent licensee to new retail licensee resolving issue of stranded capacity of incumbent licensee.

Codes: Electricity Bill, 2021, allocation, existing PPAs, incumbent licensee, new retail licensee stranded capacity, incumbent licensee Code Quantity:7 New Codes:0

Respondent 9: Rate at which power to be allocated to the new licensee needs to be taken care. Probability of stranded PPA's will be increased.

Codes: new licensee, Probability, stranded PPA's Code Quantity:3 New Codes:0

Respondent 10: necessary to understand the activity and the allocation principle to be undertaken by existing distribution licensee as well as intermediary company.

Codes: allocation principle, existing distribution licensee, intermediary company Code Quantity:3 New Codes:0

3. Till the wholesale market at national level or state level for procurement of power to new retail companies is developed, what is the mechanism proposed to be considered for financing of new Generation investment in situation of uncertainty in long term power procurement?

Respondent 1: Look towards introducing various products including futures in electricity to hedge the price risk of power purchase for the licensee. Method of additional power requirement shall be met through short term requirement. any new generation investment needs to be recognised only on the basis of the demand-Supply situation. as a whole along with the allocation of PPAs to existing and new licensee. New Retail Supply Company may be allowed to set up its own generating plant with limit of capacity.

Codes: electricity, price risk, power purchase, licensee, additional power requirement, short term requirement, generation, demand-Supply situation, allocation of PPAs, existing and new licensee, New Retail Supply Company, generating plant, limit of capacity Code Quantity:13 New Codes:13

Respondent 2: It is essential that new market should look into moving away from long term firm contracts and look towards introducing various products including futures in electricity to hedge the price risk of power purchase for the licensee.

Codes: new market, long term firm contracts, products, electricity, price risk, power purchase Licensee. Code Quantity:7 New Codes:3

Respondent 3: Till the time market is fully developed, the method of allocation of power as mentioned above shall continue and any additional power requirement shall be met through short term requirement.

Codes: market, fully developed, allocation of power, additional power requirement, short term requirement. Code Quantity:5 New Codes:3

Respondent 4: any new generation investment needs to be recognised only on the basis of the demand-Supply situation as a whole along with the allocation of PPAs to existing and new licensee.

Codes: new generation investment, recognised, demand-Supply situation, allocation of PPAs, Existing, new licensee. Code Quantity:6 New Codes:4

Respondent 5: new generation investment needs to be envisage considering the base and peak load and type of generation source to be commissioned.

Codes: new generation investment, base and peak load, type of generation source Code Quantity:3 New Codes:2

Respondent 6: Financial planning should be such that it safeguards the future.

Codes: Financial planning, safeguards, future. Code Quantity:3 New Codes:3

Respondent 7: look towards introducing various products including futures in electricity to hedge the price risk of power purchase for the licensee.

Codes: introducing, products, futures, electricity, price risk, power purchase, licensee Code Quantity:7 New Codes:2

Respondent 8: It is essential that new market should look into moving away from long term firm contracts, any new generation investment needs to be recognised only on the basis of the demand-Supply situation as a whole.

Codes: long term firm contracts, new generation investment, demand-Supply situation. Code Quantity:3 New Codes:1

Respondent 9: The method of allocation of power as mentioned above shall continue and any additional power requirement shall be met through short term requirement.

Codes: long term firm contracts, new generation investment, demand-Supply situation. Code Quantity:3 New Codes:0

Respondent 10: New generation investment needs to be recognised only on the basis of the demand-Supply situation as a whole along with the allocation of PPAs to existing and new licensee. Such investment needs to also be envisage considering the base and peak load and type of generation source to be commissioned.

Codes: New generation investment, demand-Supply situation, new licensee, base and peak load, type of generation source Code Quantity:5 New Codes:0

4. According to you what are the issues to be addressed under present regulatory regime for improvement of existing retail consumers' choice operating in Mumbai under present Electricity Act 2003.

Respondent 1: Major issue which remains is the availability of meter data on real time basis for low tension consumers. Hence, smart meter for retail competition must be in place. certainty on the applicability of the wheeling charges, Regulatory Charges and CSS affecting the tariff is must to understand the final impact of tariff on the consumers.

Codes: issue, availability of meter data, real time basis, low tension consumers, smart meter, retail competition, applicability, wheeling charges, Regulatory Charge, CSS, tariff, impact of tariff, consumers. Code Quantity: 13 New Codes:13

Respondent 2: The major issue which remains to be addressed is the availability of meter data on real time basis for low tension consumers which presently is being considered on estimated basis for scheduling the power.

Codes: availability, meter data, real time basis, low tension consumers scheduling the power Code Quantity: 5 New Codes:3

Respondent 3: Certainty on the applicability of the wheeling charges, Regulatory Charges and CSS affecting the tariff is must to understand the final impact of tariff on the consumers.

Codes: Certainty, applicability, wheeling charges, Regulatory Charges, Cross Subsidy Surcharge, tariff, final impact, consumers Code Quantity:9 New Codes:3

Respondent 4: There should be a ceiling tariff in tariff determination in order to bring in competition.

Codes: ceiling tariff, tariff determination, competition. Code Quantity:3 New Codes:3

Respondent 5: Issue which remains to be addressed is the availability of meter data on real time basis for low tension consumers.

Codes: Issue, availability, meter data, real time basis, low tension consumers Code Quantity:5 New Codes:1

Respondent 6: Smart meter for retail competition must be in place

Codes: Smart meter, retail competition. Code Quantity:2 New Codes:0

Respondent 7: Regulatory Charges and CSS affecting the tariff is must to understand the final impact of tariff on the consumers.

Codes: Regulatory Charges, CSS, tariff, consumers Code Quantity:4 New Codes:0

Respondent 8: Availability of meter data on real time basis for low tension consumers needs to be addressed.

Codes: Availability, meter data, real time basis, low tension consumers Code Quantity:4 New Codes:0

Respondent 9: CSS affecting the tariff is must to understand the final impact of tariff on the consumers.

Codes: CSS, tariff, consumers Code Quantity:3 New Codes:0

Respondent 10: Meter data on real time basis for low tension consumers presently is being considered on estimated basis for scheduling the power.

Codes: Meter data, real time basis, low tension consumers, scheduling the power Code Quantity:4 New Codes:0

DATA MANAGEMENT AND ANALYSIS:

Sr. no.	Transcript	Description (Invivo Codes)	Preliminary Thoughts	Initial Themes
1.i.	Segregation into Retail Supply and Network business and have single wires licensee which could be incumbent licensee who has already established network. Coordination with grid operator, maintenance of proper voltage, daily load forecasting, network expansion planning, reduction of Distribution losses, energy audit, mechanism to deal with technical & commercial losses.	Segregation, Retail Supply, Network business, incumbent licensee, Coordination, grid operator, maintenance, voltage, load forecasting, network expansion planning, Distribution losses, energy audit, technical & commercial losses.	Views on segregation of distribution and supply functions of the discoms, their roles and Responsibilities.	Segregating distribution & Supply functions of Discom
ii.	Existing PPA's are shared between the Existing and new licensees. clarity on sharing PPAs based on consumer mix, demand allocation, Base and Peak Demand, Marginal cost or Avg. cost of power purchase, Mechanism for merit order dispatch between the two Companies, Treatment of surplus power. SERC can be empowered for the reallocation of the of PPAs under Section 86 (1)(b).	Existing PPA's, Existing, new licensees, PPAs, demand allocation, Base and Peak Demand, Marginal cost, Avg. cost , merit order dispatch, surplus power, SERC, Section 86 (1)(b)	Views on sharing and allocation of the existing PPAs with new licensees.	Power Procurement & Existing PPAs
iii.	Framework for Real-Time Market (RTM) and Market Based Economic Dispatch of Electricity at National Level has been initiated by CERC. Section 66 of the Electricity Act provides that for Market Development, responsibility is already cast upon the appropriate Commission. developing market is necessary instead of changes in the Act.	Framework, Real-Time Market (RTM), Market, Economic Dispatch, CERC, Section 66, Electricity Act, Market Development, Commission	Views on framework for wholesale power procurement	Market for Wholesale power procurement
iv.	Managing and phasing out of the cross subsidy is necessary and a mechanism should be developed for the same. Existing supply licensee needs to be adequately compensated for such loss of cross subsidy by way of Cross Subsidy Surcharge (CSS) or Additional Surcharge or creating of any fund from surplus of new licensee.	phasing out, cross subsidy, mechanism, supply licensee, cross subsidy, Cross Subsidy Surcharge Additional Surcharge	Views on mechanism for phasing out of the cross subsidies	Reduction of Cross Subsidies

v.	Distribution losses should be handed to network Companies. Unmetered connection should not be released. In respect of unmetered sales, Section 55 of the Electricity Act clearly provides that no connection shall be released without meter.	SERC, tariff determination, threshold, wheeling charges, network company, below threshold, regulated tariff, supply companies, ceiling tariff, retail licensees, area of supply, Tariff, normative costs, standards of performance, cross-subsidy obligations, State Distribution Companies	Views on distribution losses and unmetered connections and sales	Distribution losses & Unmetered Sales
vi.	SERC is responsible for tariff determination. In case of above threshold, wheeling charges for network company and below threshold regulated tariff for both network and supply companies. SERC to determine the ceiling tariff for the retail licensees operating in the same area of supply. Tariff can be determined based on the normative costs and standards of performance. the cross-subsidy obligations towards existing State Distribution Companies need to be fulfilled.	SLDC, strengthened, scheduling, scheduling of power, Ancillary services, commercial settlement, Deviation Settlement mechanism, ring fencing	Setting up of tariff determination mechanism for retail supply competition	Tariff Determination mechanism
vii.	SLDC need to be strengthened in terms of various IT related modules for scheduling. Role needs to be well defined with respect to scheduling of power, managing Ancillary services, commercial settlement, Deviation Settlement mechanism. SLDC ring fencing or independence is necessary for proper functioning.	revenue collection, theft, cost reflective tariff, non-revision of tariff, Operational efficiency, SERC, Regulatory assets, Operational inefficiency, normative, financial losses, regulatory assets, commercial losses, SERC, multi-year tariff.	Views on roles and responsibility of SLDC and ring fencing of SLDC.	Role of SLDC
viii.	Due to lower revenue collection, theft, no cost reflective tariff, non-revision of tariff, Operational efficiency. There can be provision for compulsory revision of tariff by SERC every year. Limitations on creation of Regulatory assets. Operational inefficiency due to difference in normative and actual cost are also responsible for financial losses. Formation of regulatory assets should be limited for reduction of commercial losses. Compulsory revision in tariff by SERCs every year or for the control period (multi-year tariff).	unmetered connection, Agricultural consumers, data collection systems, competitors', DISCOM, Pre-paid Metering, revenue loss.	Views on financial losses as a barrier for retail competition	Financial losses
ix.	Roadmap for unmetered connection, Agricultural consumers. There is a need for proper meters and data collection systems to distinguish such	competition, minimum area of supply, Appropriate Commission.	Suggestions for unmetered connections and metering requirement for	Roadmap for metering

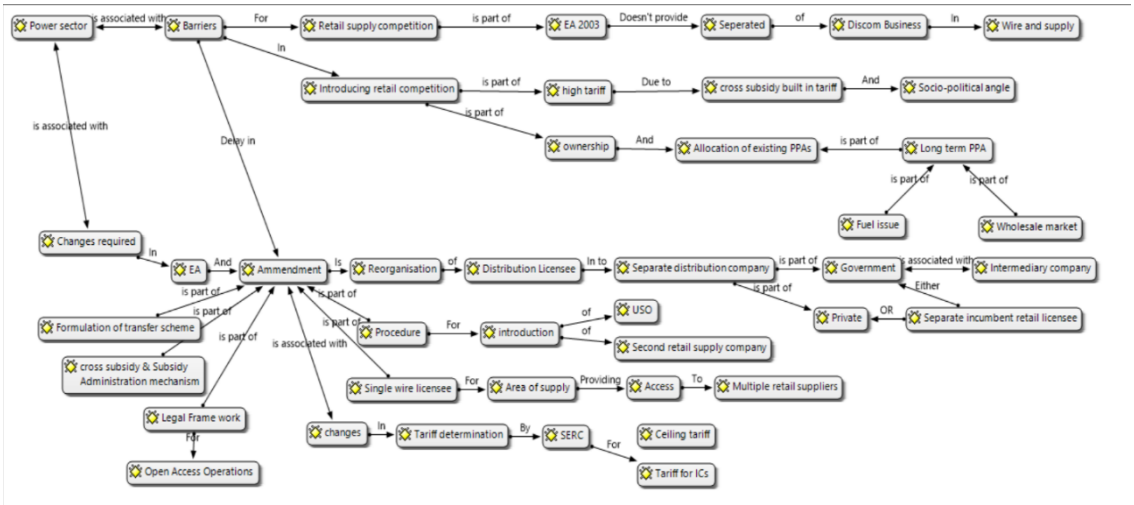
	different competitors' customers from a DISCOMs customers. Pre-paid Metering for consumers needs to be implemented to safeguard any revenue loss.		the retail supply competition.	
x.	It is important that competition be introduced by specifying the minimum area of supply. The Act may specify the timeline for complete competition whereas phasing may be left to the discretion of the Appropriate Commission or Appropriate Govt.	existing distribution licensee, intermediary company, stranded PPA's	Views on time frame for phasing of competition	Time Frame for phasing of competition
2.	It is necessary to understand the activity to be undertaken by existing distribution licensee as well as intermediary company to avoid the probability of stranded PPA's will be increased. Rate at which power to be allocated to the new licensee needs to be taken care.	power purchase, licensee, power requirement, short term requirement, new generation investment, demand-Supply situation, base-peak load, allocation of PPAs	Views on the clarity of functions and framework for the Intermediary company (IC)	functions and framework for Intermediary Company (IC)
3.	Introducing various products including futures in electricity to hedge the price risk of power purchase for the licensee. Method of additional power requirement shall be met through short term requirement. any new generation investment needs to be recognised only on the basis of the demand-Supply situation, base-peak load, type of generation source to be commissioned as a whole along with the allocation of PPAs to existing and new licensee.	power purchase, licensee, power requirement, short term requirement, new generation investment, demand-Supply situation, base-peak load, allocation of PPAs	Views on mechanism for financing new generation investments.	wholesale market (national level/state level) for procurement of power & Financing new generation investments
4.	Major issue which remains is the availability of meter data on real time basis for low tension consumers. Hence, smart meter for retail competition must be in place. certainty on the applicability of the wheeling charges, Regulatory Charges and CSS affecting the tariff is must to understand the final impact of tariff on the consumers. There should be a ceiling tariff in tariff determination in order to bring in competition.	meter data, real time basis, low tension consumers, smart meter, retail competition, wheeling charges, Regulatory Charges, CSS, tariff, consumers, ceiling tariff, tariff determination.	Views on issues for existing consumers' choice.	issues for existing retail consumers' choice operating in Mumbai

DESCRIPTIVE AND EXPLANATORY ACCOUNTS

Initial Categories	Refined Categories	Initial Themes	Final Themes	Core concept
Segregating distribution & Supply functions of Discom	Segregating distribution & Supply functions of Discom	Segregating distribution & Supply functions of Discom	Segregating distribution & Supply functions of Discom	**Barriers & Constraints for retail competition**
Power Procurement & Existing PPAs	Existing PPAs & Wholesale Power Procurement	Existing PPAs & Wholesale Power Procurement	Existing PPAs & Wholesale Power Procurement	
Market for Wholesale power procurement				
wholesale market (national level/state level) for procurement of power & Financing new generation investments				
Distribution losses & Unmetered Sales	Distribution & Financial losses & metering	Distribution & Financial losses & metering	Reduction of Cross Subsidies	
Roadmap for metering				
Financial losses	Financial losses			
Reduction of Cross Subsidies.	Reduction of Cross Subsidies	Reduction of Cross Subsidies		
Tariff Determination mechanism	Tariff Determination mechanism	Tariff Determination mechanism	Tariff Determination mechanism	
Role of SLDC	Role of SLDC	Role of SLDC	Universal Service Obligation	
functions and framework for Intermediary Company (IC)	functions and framework for Intermediary Company (IC)	functions and framework for Intermediary Company (IC)		
issues for existing open access retail consumers	issues for existing open access retail consumers	issues for existing open access retail consumers	Operationalisation of open access framework	
Time Frame for phasing of competition	Time Frame for phasing of competition	Time Frame for phasing of competition	Phasing of retail Competition	

RELATIONSHIP DIAGRAMS:

BARRIERS/CONSTRAINTS IN RETAIL COMPETITION:



RESEARCH OBJECTIVE 2:

CODE BOOK, INTERVIEW TRANSCRIPT

To explore the level and extent of preparedness (availability of power, whole sale market structure) **of existing distribution sector and adequacy of its infrastructure** (Reduction of cross subsidies, current level of losses, existing metering infrastructure) **for introducing retail consumer choice in Maharashtra (factoring Mumbai's retail consumer choice).**

1. According to you, what level and extent Maharashtra's electricity sector is prepared, in respect of availability of power and wholesale market (ability of retail companies to procure its requirement with competitive market price), for introducing competition in retail supply of electricity.

Respondent 1: The availability of power is not an issue in the State of Maharashtra considering the demand and PPA's entered into by the licensees. If we have distributed generation near the load centres there's no need to go out of Maharashtra for procuring power.

Codes: availability of power, State of Maharashtra, demand, PPA's, licensees, distributed generation, load centres, procuring power Code Quantity:8 New Codes:8

Respondent 2: Presently, the availability of power is not an issue in the State of Maharashtra considering the demand and PPA's entered into by the licensees.

Codes: availability of power, issue, State of Maharashtra, considering, demand, PPA's, licensees Code Quantity:7 New Codes:2

Respondent 3: With regards to the introduction of competition in retail supply of electricity, considering the surplus situation within the State of Maharashtra, it is necessary for pre-allocation of existing PPAs to all the retails supply licensee so as to avoid any stranded capacity.

Codes: introduction, competition, retail supply, electricity, surplus, State of Maharashtra, pre-allocation of existing PPAs, retails supply licensee, stranded capacity. Code Quantity:9 New Codes:8

Respondent 4: In Maharashtra Maha discom is the network operator, so many licensees can get cheaper generation on scheme and should be given obligation to strengthen the network and electrify in entire Maharashtra including rural areas.

Codes: Maha discom, network operator, licensees, cheaper generation, scheme, obligation, strengthen, network, electrify, rural areas Code Quantity:10 New Codes:9

Respondent 5: There should be aggressive Renewable energy procurement. Private investment will do good augmentation of electrical network and investments in renewable can be increased through multiple licensees.

Codes: aggressive, Renewable energy procurement, Private investment, augmentation, electrical network, investments, renewable, multiple licensees Code Quantity:8 New Codes:8

Respondent 6: Maharashtra's present sector is equipped with all set of infrastructure. Private players exist in renewables, conventional, transmission, distribution through their own system or through franchisee.

Codes: Maharashtra's, present sector, equipped, infrastructure, Private players, renewables, conventional, transmission, distribution system, franchisee Code Quantity:11 New Codes:11

Respondent 7: Private players can procure through Renewables and have funds for it. Open access requirement may come down because if we have distributed generation near the load centres there's no need to go out of Maharashtra for procuring power.

Codes: Maharashtra's, present sector, equipped, infrastructure, Private players, renewables, conventional, transmission, distribution system, franchisee Code Quantity:8 New Codes:3

Respondent 8: Many licensees can get cheaper generation on scheme and should be given obligation to strengthen the network and electrify in entire Maharashtra.

Codes: licensees, cheaper generation, scheme, obligation, strengthen, network, electrify, Maharashtra Code Quantity:8 New Codes:0

Respondent 9: Open access requirement may come down because if we have distributed generation near the load centres there's no need to go out of Maharashtra for procuring power.

Codes: distributed generation, load centres, Maharashtra, procuring power. Code Quantity:4 New Codes:0

Respondent 10: Private investment will do good augmentation of electrical network and investments in renewable can be increased through multiple licensees.

Codes: Private investment, augmentation, electrical network, investments, multiple licensees Code Quantity:5 New Codes:0

2. According to you, to what extent electricity infrastructure, in respect of reduction of cross subsidies, current level of losses and existing metering infrastructure, are adequate for introducing retail consumer choice in Maharashtra.

Respondent 1: Cross subsidy built in tariff to be compensated to the existing distribution licensee.

Codes: Cross subsidy, built in tariff, compensated, existing distribution licensee Code Quantity:4 New Codes:4

Respondent 2: The Electricity Bill, 2021 has made such provision by creating the fund which will certainly compensate the incumbent licensee standards of performance of Mahadiscom are low.

Codes: Electricity Bill, 2021, compensate, incumbent licensee, standards of performance, Maha discom. Code Quantity:5 New Codes:5

Respondent 3: For introducing the retail consumer choice, the major challenge would be unmetered Agriculture consumers which are currently being billed based on estimation of connected load (Units/HP/Month). It is therefore essential that there should be time bound program for meter installation of such consumers.

Codes: retail consumer choice, challenge, unmetered Agriculture consumers, billed, estimation of connected load, time bound program, meter installation, consumers Code Quantity:8 New Codes:8

Respondent 4: Smart Metering should be introduced. To bring smart metering at higher rates private licensees should be brought in and the state's infrastructure is ready for it.

Codes: Smart Metering, introduced, private licensees, state's infrastructure Code Quantity:4 New Codes:4

Respondent 5: The cross subsidy built in tariff to be compensated to the existing distribution licensee.

Codes: cross subsidy, built in tariff, compensated, existing distribution licensee. Code Quantity:4 New Codes:1

Respondent 6: Implementation of smart meter in a phase manner will also take care of the dynamic load.

Codes: Implementation, smart meter, phase manner, dynamic load Code Quantity:4 New Codes:4

Respondent 7: The development of DT metering is dismal in Maharashtra and standards of performance of Maha discom are low.

Codes: development, metering, Maharashtra, standards of performance, Maha discom Code Quantity:5 New Codes:4

Respondent 8: To bring smart metering at higher rates private licensees should be brought in and the state's infrastructure is ready for it.

Codes: smart metering, private licensees, state's infrastructure Code Quantity:3 New Codes:1

Respondent 9: There should be time bound program for meter installation for Agricultural consumers.

Codes: meter installation
Code Quantity:1 New Codes:0

Respondent 10: Funds to be created which will certainly compensate the incumbent licensee standards of performance.

Codes: compensate, incumbent licensee, standards of performance
Code Quantity:3 New Codes:0

3. What should be the factors for rolling out retail competition in distribution sector of Maharashtra?

Respondent 1: Major factors for consideration: Cost reflective tariff, Cross Subsidy built in tariff, Financial Losses, Accurate determination of Distribution Losses, Allocation of PPA, Determination of Normative cost.

Codes: factors, consideration, Cost reflective tariff, Cross Subsidy, built in tariff, Financial Losses, determination of Distribution Losses, Allocation of PPA, Determination of Normative cost
Code Quantity:9 New Codes:9

Respondent 2: Smaller consumer may have inertia to move in competition; larger consumer may see economic sense to move to competition, hybrid model suggested by FOR considering socio-political issue. Area of supply – mixed section of consumers.

Codes: Smaller consumer, competition, larger consumer, hybrid model, FOR, socio-political issue, Area of supply, mixed section of consumers
Code Quantity:8 New Codes:8

Respondent 3: Rural areas of Maharashtra requires focus. There is no metering, farmers dues, subsidies. Licensees should be given a package

Codes: Rural area, Maharashtra, focus, Licensees, package
Code Quantity:5 New Codes:5

Respondent 4: Major factors for consideration for phasing out retail competition are Cost reflective tariff, Cross Subsidy built in tariff

Codes: factors, consideration, phasing out, retail competition, Cost-reflective tariff, Cross Subsidy, built in tariff
Code Quantity:7 New Codes:3

Respondent 5: Financial Losses, Accurate determination of Distribution Losses needs to be considered during rolling out of retail Competition.

Codes: Financial Losses, Distribution Losses, rolling out, retail Competition
Code Quantity:4 New Codes:1

Respondent 6: Some major factors for consideration are Financial Losses, determination of Distribution Losses, Allocation of PPA, Determination of Normative cost

Codes: factors, Financial Losses, Distribution Losses, Allocation of PPA, Determination of Normative cost
Code Quantity:5 New Codes:0

Respondent 7: Licensees should be given a package, which will come with a pre-condition to serve some % of every type of customer. (Rural area, urban area etc)

Codes: Licensees, package, pre-condition, serve, every type of customer, Rural area, urban area Code Quantity:7 New Codes:4

Respondent 8: hybrid model suggested by FOR considering socio-political issue. Area of supply – mixed section of consumers.

Codes: hybrid model, FOR, socio-political issue, Area of supply, mixed section of consumers Code Quantity:5 New Codes:1

Respondent 9: Determination of Distribution Losses needs to be considered during rolling out of retail Competition.

Codes: Distribution Losses, rolling out, retail Competition Code Quantity:3 New Codes:0

Codes: factors, Financial Losses, Allocation of PPA, cost reflective tariff, Cross Subsidy, built in tariff. Code Quantity:6 New Codes:0

4. What are the existing institutional frameworks' lacking for manging retail supply competition in electricity sector of Maharashtra?

Respondent 1: New institutes are to be created, IC, strong/ring fencing SLDC and DSO needed, need not require any creature other than IC.

Codes: institutes, created, IC, ring fencing, SLDC, DSO. Code Quantity:6 New Codes:6

Respondent 2: State can draw transfer scheme, role and responsibilities can also be assigned by State, only because of uniformity it has to be broadly specified by Centre.

Codes: State, transfer scheme, role and responsibilities, uniformity, Centre Code Quantity:5 New Codes:5

Respondent 3: Research should go into exploring alternative to IC, can there be any other alternative. IC is guarded way of reforming the sector.

Codes: Research, alternative, IC, guarded, reforming the sector Code Quantity:5 New Codes:4

Respondent 4: Institutional framework is sufficient. Retail competition is supposed to be driven by market forces.

Codes: Institutional framework, sufficient, Retail competition, market forces Code Quantity:4 New Codes:4

Respondent 5: It is over institutionalised/ heavily regulated retailers will not be able to function properly. A large part of it needs to be market driven.

Codes: over institutionalised, heavily regulated, retailers, function properly, market driven Code Quantity:5 New Codes:5

Respondent 6: There's a need for a ceiling tariff and less interference in Capex. There are lot of institutions functioning properly and can manage the retail competition.

Codes: ceiling tariff, interference, Capex, institutions, retail competition. Code Quantity:5 New Codes:4

Respondent 7: The major step towards developing competitive market would be to have segregation of wire and retail. Having segregated the network, the wires licensee will have to focus on building robust network to cater to multiple retail suppliers.

Codes: competitive market, wire and retail, network, wires licensee, robust network, multiple retail suppliers Code Quantity:6 New Codes:6

Respondent 8: It is over institutionalised/ heavily regulated retailers will not be able to function properly.

Codes: over institutionalised, heavily regulated, retailers, function. Code Quantity:4 New Codes:2

Respondent 9: IC should be created. Research should go into exploring alternative to IC, can there be any other alternative.

Codes: IC, created, Research, alternative. Code Quantity:4 New Codes:0

Respondent 10: Creation and Management of USO fund should be handled by IC. Rest Institutional Framework is sufficient.

Codes: IC, Institutional Framework, sufficient. Code Quantity:3 New Codes:0

5. According to you, what are other key issues that are to be considered for preparedness and adequacy of introducing retail consumer choice in Maharashtra?

Respondent 1: Largest issue is the political will and Road map which in controversy with the federal structure, that us centre and state.

Codes: issue, political will, Road map, federal structure, centre, state Code Quantity:6 New Codes:6

Respondent 2: Role of regulator should be reviewed and also undergo change other than tariff.

Codes: Role of regulator, reviewed, change, tariff Code Quantity:4 New Codes:4

Respondent 3: Based on the learnings of retail competition in Mumbai, Maharashtra is well prepared in terms of introducing competition.

Codes: learnings, retail competition, Mumbai, Maharashtra, introducing competition Code Quantity:5 New Codes:5

Respondent 4: The issues peculiar to MSEDCL in respect of metering of Agriculture consumers, Financial Losses (accumulated arrears) and cross subsidy need to be addressed before introducing retail competition.

Codes: MSEDCL, metering, Agriculture consumers, Financial Losses, accumulated arrears, cross subsidy, retail competition Code Quantity:7 New Codes:6

Respondent 5: Issues can be resolved by direction to Distribution Licensee for metering of consumers in a time bound manner, Financial Losses to be converted to Regulatory Assets and same to be recovered as Regulatory Asset Charge from all the Consumers and loss of cross subsidy to be collected by way of CSS.

Codes: Distribution Licensee, metering of consumers, time bound manner, Financial Losses, Regulatory Assets, Regulatory Asset Charge, Consumers, loss of cross subsidy, collected, CSS Code Quantity:10 New Codes:9

Respondent 6: The issue of Cross Subsidy can also be resolved by removing the cross subsidy built in tariff and the subsidy component to be transferred by the government.

Codes: issue, Cross Subsidy, built in tariff, subsidy component, transferred, government. Code Quantity:6 New Codes:4

Respondent 7: Centre is not able to amend EA 2003 and putting in things through NEP. Therefore, political will and road map is to be decided.

Codes: Centre, NEP, political will, road map Code Quantity:4 New Codes:3

Respondent 8: Ownership transfer and ring-fenced arrangement between wire and retail supply business.

Codes: Ownership transfer, ring-fencing, wire, retail supply business Code Quantity:4 New Codes:4

Respondent 9: Regulatory Asset Charge from all the Consumers and loss of cross subsidy to be collected by way of CSS.

Codes: Regulatory Asset Charge, Consumers, cross subsidy, collected, CSS Code Quantity:5 New Codes:0

Respondent 10: All key issues are discussed in above questions.

Code Quantity: 0; New Codes: 0

DATA MANAGEMENT AND ANALYSIS:

Sr. no.	Transcript	Description (Invivo Codes)	Preliminary Thoughts	Initial Themes
1.	The availability of power is not an issue in the State of Maharashtra considering the demand and PPA's entered into by the licensees. Many licensees can get cheaper generation on scheme and should be given obligation to strengthen the network and electrify in entire Maharashtra including rural areas. Private investment will do good augmentation of electrical network and investments in renewable can be increased through multiple licensees.	availability of power, Maharashtra, PPA's, licensees, cheaper generation, obligation, strengthen, network, augmentation, electrical network, renewable, multiple licensees	Views on availability of power in Maharashtra and procurement through whole sale market	Preparedness of Maharashtra's electricity Sector regarding Availability of power. Whole sale market for power procurement in Maharashtra
2.	Cross subsidy built in tariff to be compensated to the existing distribution licensee. The Electricity Bill, 2021 has made such provision by creating the fund which will certainly compensate the incumbent licensee standards of performance of Mahadiscom are low. Implementation of smart meter in a phase manner will also take care of the dynamic load.	Cross subsidy, built in tariff, existing distribution licensee, Electricity Bill, 2021, incumbent licensee, Mahadiscom, smart meter	Views on reduction of cross subsidy, current losses and the metering infrastructure in Maharashtra	Reduction of Cross Subsidies current level of losses and existing metering infrastructure
3.	Major factors for consideration: Cost reflective tariff, Cross Subsidy built in tariff, Financial Losses, Accurate determination of Distribution Losses, Allocation of PPA, Determination of Normative cost. Licensees should be given a package, which will come with a pre-condition to serve some % of every type of customer. hybrid model suggested by FOR considering socio-political issue. Area of supply – mixed section of consumers.	Cost reflective tariff, Cross Subsidy, built in tariff, Financial Losses, Distribution Losses, Allocation of PPA, Normative cost, Licensees, socio-political issue, Area of supply, consumers	Views on factors for phasing out of retail competition in distribution sector in Maharashtra	Phasing out of retail competition in distribution sector of Maharashtra
4.	New institutes are created, IC, strong/ring fencing SLDC and DSO needed. Research should go into exploring alternative to IC. The major step towards developing competitive market would be to have segregation of wire and retail. Creation and Management of USO fund	IC, ring fencing, SLDC, DSO, segregation, wire and retail, USO, Institutional Framework	Views on existing institutional framework and suggestions for improvement in Maharashtra	Current institutional framework for retail competition in Maharashtra

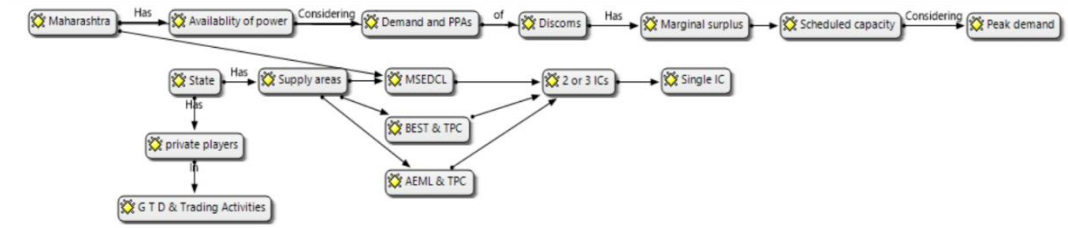
	should be handled by IC. Rest Institutional Framework is sufficient.			
5.	Role of regulator should be reviewed and also undergo change. The issues peculiar to MSEDCL in respect of metering of Agriculture consumers, Financial Losses (accumulated arrears) and cross subsidy need to be addressed before introducing retail competition. Issues can be resolved by direction to Distribution Licensee for metering of consumers in a time bound manner. Ownership transfer and ring-fenced arrangement between wire and retail supply business.	regulator, MSEDCL, metering, Agriculture consumers, Financial Losses, cross subsidy, retail competition, Distribution Licensee, time bound manner, Ownership transfer, ring-fenced, wire, retail supply business	Key issues for preparedness and adequacy for introducing retail competition in Maharashtra	preparedness and adequacy of introducing retail consumer choice in Maharashtra

DESCRIPTIVE AND EXPLANATORY ACCOUNTS:

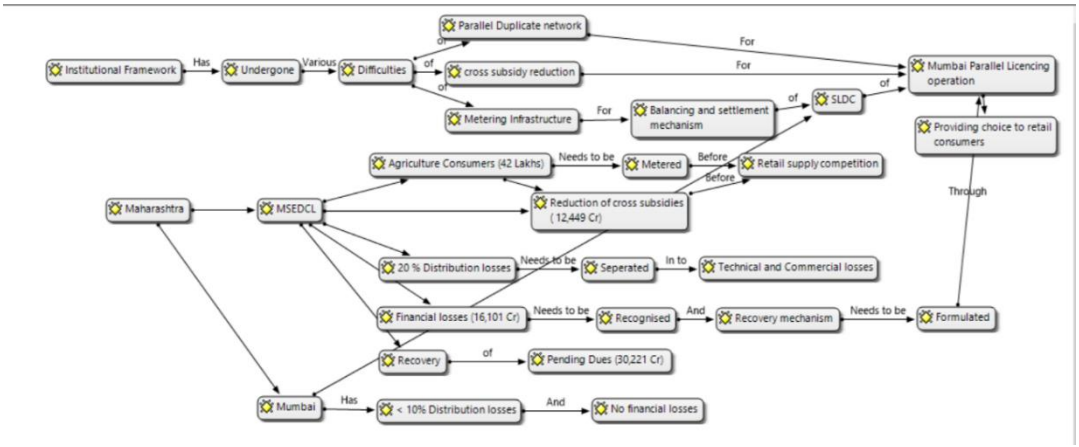
Initial Categories	**Refined Categories**	**Initial Themes**	**Final Themes**	**Core concept**
Preparedness of Maharashtra's electricity Sector regarding Availability of power.	Availability of Power and Whole sale market for retail competition in Maharashtra	Availability of Power in Maharashtra for power procurement, preparedness and adequacy and reduction of cross subsidies	Availability of Power in the state of Maharashtra for power procurement.	**Preparedness of Maharashtra for introducing retail competition**
Whole sale market for power procurement in Maharashtra				
preparedness and adequacy of introducing retail consumer choice in Maharashtra	preparedness and adequacy of introducing retail consumer choice in Maharashtra			
Reduction of Cross Subsidies	Reduction of Cross Subsidies			
current level of losses and existing metering infrastructure	current level of losses and existing metering infrastructure	current level of losses and existing metering infrastructure	Mumbai experience via parallel licensing arrangement	
Phasing out of retail competition in distribution sector of Maharashtra	Phasing out of retail competition in distribution sector of Maharashtra	Phasing out of retail competition in distribution sector of Maharashtra		
Current institutional framework for retail competition in Maharashtra	Current institutional framework for retail competition in Maharashtra	Current institutional framework for retail competition in Maharashtra	Institutional arrangement for preparedness issues of retail competition	

RELATIONSHIP DIAGRAMS:

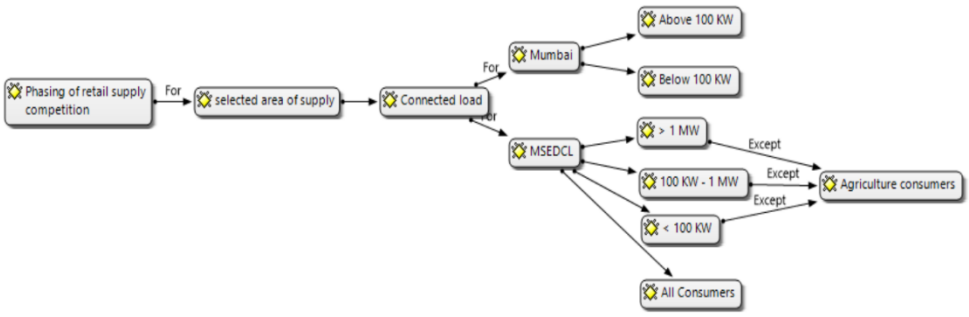
1. Availability of power and wholesale market.



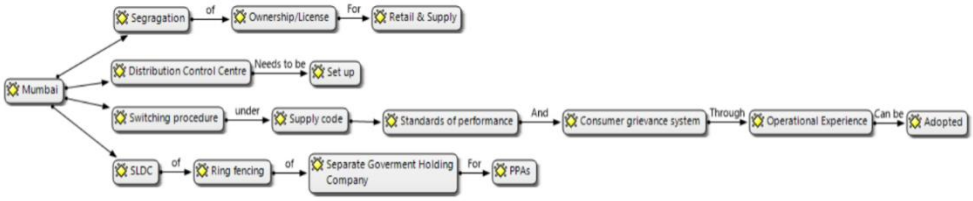
2. Electricity infrastructure, in respect of reduction of cross subsidies, current level of losses and existing metering infrastructure, are adequate for introducing retail consumer choice in Maharashtra.



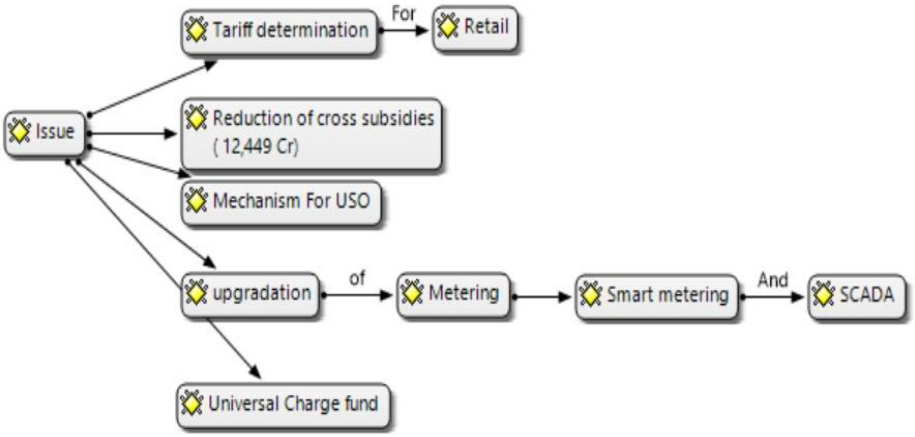
3. Factors for rolling out retail competition in distribution sector of Maharashtra.



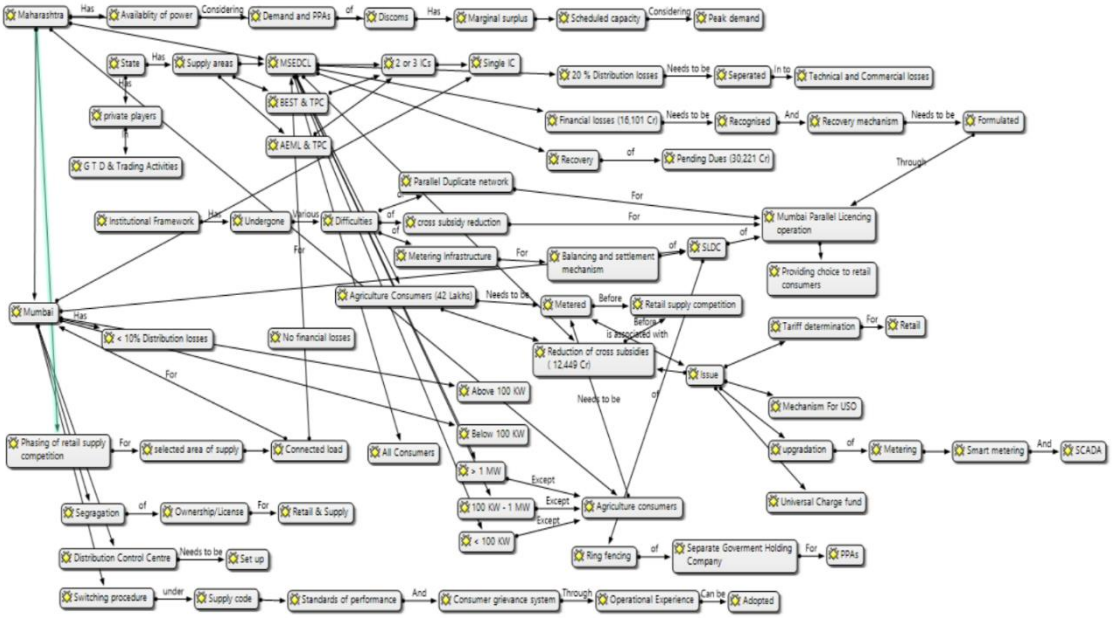
4. Existing institutional frameworks' lacking for manging retail supply competition in electricity sector of Maharashtra.



5. Other key issues that are to be considered for preparedness and adequacy of introducing retail consumer choice in Maharashtra



Preparedness of Maharashtra for Introduction of retail Competition in Maharashtra:



RESEARCH OBJECTIVE 4:

CODE BOOK: INTERVIEW TRANSCRIPTS:

To formulate a Transfer Scheme and Rollout Plan of introducing retail competition in electricity distribution sector (functional segregation of existing distribution, its actors for managing new system and structures, timeline and extent, phasing of competition, power procurement model/reorganisation of existing long-term contracts, universal service obligations, metering role) **of Maharashtra with various scenarios.**

1. According to you, what should be functional separation of Distribution Companies of Maharashtra and its new structure of role, responsibilities and ownership?

Respondent 1: The Distribution Company is required to be spilt into two – Wires Licensee and Supply Licensee (Incumbent) with Ownership transfer and ring-fenced arrangement between wire and retail supply business.

Codes: Distribution Company, spilt into two, Wires Licensee, Supply Licensee, Ownership transfer, ring-fenced arrangement, wire and retail supply business Code Quantity:7 New Codes:7

Respondent 2: The wires licensee shall be responsible to undertake the distribution of power through intra-state distribution network, Infrastructure Planning (Network) and coordination up to last mile connectivity.

Codes: wires licensee, undertake, distribution of power, intra-state distribution network, Infrastructure Planning, coordination, last mile connectivity Code Quantity:7 New Codes:5

Respondent 3: The wires licensee shall be responsible for O&M of Network including restoration of supply during outages to ensure development of an efficient, co-ordinated and economical system of Distribution lines for smooth flow of electricity from a Transmission substation to the last mile connectivity and to provide non-discriminatory open access to all retail supply licensee.

Codes: wires licensee, O&M, Network, outages, efficient, co-ordinated, economical system, Distribution lines, flow of electricity, Transmission substation, last mile connectivity non-discriminatory, open access, retail supply licensee Code Quantity:14 New Codes:12

Respondent 4: Wires Licensee and Supply Licensee (Incumbent) with Ownership transfer and ring-fenced arrangement between wire and retail supply business.

Codes: Wires Licensee, Supply Licensee, Ownership transfer, ring-fenced arrangement, wire and retail supply business. Code Quantity:5 New Codes:0

Respondent 5: The retail licensee shall be responsible for Supply to Consumers, Metering, Billing, Revenue Collection and Power Procurement.

Codes: retail licensee, Supply to Consumers, Metering, Billing, Revenue Collection, Power Procurement Code Quantity:6 New Codes:6

Respondent 6: Customer Care, Single Point Interface for Consumers, Quality and uninterrupted supply of power should be looked over by retail licensee.

Codes: Customer Care, Single Point Interface for Consumers, Quality, uninterrupted supply of power, retail licensee. Code Quantity:5 New Codes:4

Respondent 7: There should be a default network company and they should fulfil USO, and should plan it, operate it and do all the market operations as required.

Codes: network company, USO, market operations Code Quantity:3 New Codes:3

Respondent 8: Then there can be many supply companies who can supply regulated and unregulated tariff. If the annual consumption is more than 2000 units then consumer can exercise the choice for competition or have to take the regulated tariff same like open access category.

Codes: supply companies, regulated and unregulated tariff, Consumer, choice for competition, regulated tariff, open access Code Quantity:5 New Codes:4

Respondent 9: O&M of Network including restoration of supply during outages to ensure development of an efficient, co-ordinated and economical system is the responsibility of the wire licensee.

Codes: O&M, Network, outages, efficient, co-ordinated, economical system, wire licensee Code Quantity:7 New Codes:0

Respondent 10: there can be many supply companies who can supply regulated and unregulated tariff.

Codes: supply companies, regulated and unregulated tariff Code Quantity:2 New Codes:0

2. What mechanism required to be considered for avoiding integration of generation and retailing activities which will circumvent the competition by signing long term PPAs with their own generators?

Respondent 1: Purchase of power has to be necessarily through Competitive Bidding or mandatorily through Exchange.

Codes: Purchase of power, Competitive Bidding, Exchange. Code Quantity:3 New Codes:3

Respondent 2: The standard bidding documents as approved by MoP or Electricity Regulatory Commission needs to be considered for carrying out the competitive bidding process.

Codes: standard bidding documents, MoP, Electricity Regulatory Commission, competitive bidding process. Code Quantity:4 New Codes:4

Respondent 3: Multiple retailers should integrate their generation if that culminates into lower tariff. There will be competition and if the generator directly sells the landed cost will decrease.

Codes: Multiple retailers, integrate, generation, lower tariff, competition, landed cost, decrease Code Quantity:7 New Codes:7

Respondent 4: Power to be purchased only through competitive bidding or exchange.

Codes: Power, purchased, competitive bidding, exchange Code Quantity:4 New Codes:2

Respondent 5: Bidding documents as approved by MoP or Electricity Regulatory Commission.

Codes: Bidding documents, approved, MoP, Electricity Regulatory Commission Code Quantity:4 New Codes:2

Respondent 6: Retailers can integrate their generation if that results into lower tariff.

Codes: Retailers, integrate generation, lower tariff Code Quantity: 4 New Codes:2

Respondent 7: There will be increase in competition and if the generator directly sells the landed cost will decrease.

Codes: competition, generator, landed cost, decrease. Code Quantitv:4 New Codes:1

Respondent 8: MoP or Electricity Regulatory Commission needs to approve the standard bidding documents and all purchase of power should be bought through bidding.

Codes: MoP, Electricity Regulatory Commission, standard bidding documents, purchase of power, bidding Code Quantity: 5 New Codes:1

Respondent 9: Bidding Documents to be approved by MoP.

Codes: Bidding Documents, MoP Code Quantity:2 New Codes:0

Respondent 10: All power to be procured through bidding.

Codes: power, bidding Code Quantity:2 New Codes:0

3. What mechanism required to be considered for eliminating any possibility for subsidizing the retail business from the competition choking off in the distribution business?

Respondent 1: Removal of cross subsidy will go a long way in promoting fair retail competition. USO should be casted upon all the Distribution Companies.

Codes: Removal, cross subsidy, promoting, retail competition, USO, Distribution Companies Code Quantity:8 New Codes:8

Respondent 2: The determination of area of supply of retail supply licensee needs to be designed in such a way that proper consumer mix with combination of subsidised and subsidising consumers is being provided to new licensee so as to reduce the cross-subsidy burden to the existing distribution licensee.

Codes: determination, area of supply, retail supply licensee, consumer mix, subsidised and subsidising consumers, new licensee, cross-subsidy, existing distribution licensee Code Quantity:4 New Codes:4

Respondent 3: Removal of cross subsidy will go a long way in promoting fair retail competition.

Codes: Removal, cross subsidy, promoting, retail competition. Code Quantity:3 New Codes:3

Respondent 4: The mechanism of Direct Benefit Transfer (DBT) to the consumers which government is intending to subside may be considered.

Codes: mechanism, Direct Benefit Transfer, consumers Code Quantity:3 New Codes:3

Respondent 5: USO should be casted upon all the Distribution Companies in an area in order to bring level playing field.

Codes: USO, Distribution Companies, level playing field Code Quantity:6 New Codes:3

Respondent 6: The determination of area of supply of retail supply licensee needs to be designed.

Codes: area of supply, retail supply licensee, designed Code Quantity:3 New Codes:0

Respondent 7: Retail business cannot be used to subsidize the generation or transmission business or coal supply business and it is already protected

Codes: Retail business, subsidize, generation, transmission business, coal supply business, protected. Code Quantity:6 New Codes:6

Respondent 8: Distribution company shall ensure distribution business neither subsidised nor encumbrances any other business.

Codes: Distribution company, distribution business, subsidised Code Quantity:3 New Codes:2

Respondent 9: retail supply licensee needs to be designed in such a way that proper consumer mix with combination of subsidised and subsidising consumers is being provided to new licensee.

Codes: retail supply licensee, designed, consumer mix, subsidised, subsidising consumers, new licensee Code Quantity:6 New Codes:0

Respondent 10: USO should be casted upon all the Distribution Companies

Codes: USO, Distribution Companies
Code Quantity:2 New Codes:0

4. The Bill provides that at least one supply licensee in the area of the Distribution Licensee must be a Govt. owned entity as a supplier of last report. What could be process of allowing Govt. controlled Discoms in the supply area of existing private Discoms in Mumbai for playing role of supplier of last resort?

Respondent 1: Maharashtra being peculiar state having multiple distribution licensees in Mumbai. It is suggested that all the existing licensees should be made incumbent supply licensee for their existing area of supply.

Codes: Maharashtra, state, multiple distribution licensees, Mumbai, existing licensees, incumbent supply licensee, existing area of supply
Code Quantity:7 New Codes:7

Respondent 2: USO should be casted upon all the Distribution Companies in an area in order to bring level playing field. Section 131 of reorganisation of board was not to keep the electricity business with the government so it cannot be made supplier of last resort.

Codes: USO, Distribution Companies, level playing field, Section 131 of reorganisation of board, electricity business, government, supplier of last resort
Code Quantity:7 New Codes:7

Respondent 3: It is suggested that all the existing licensees should be made incumbent supply licensee for their existing area of supply.

Codes: existing licensees, incumbent supply licensee, existing area of supply.
Code Quantity:3 New Codes:1

Respondent 4: Maha discom is the deemed licensee for the entire state of Maharashtra including Mumbai so it cannot be made the supplier of last resort.

Codes: Maha discom, deemed licensee, Maharashtra, Mumbai, supplier of last resort
Code Quantity:5 New Codes:2

Respondent 5: Maha discom cannot be made the supplier of last resort with no network and privately owned network cannot be transferred to the government. Section 132 of reorganisation of board was not to keep the electricity business with the government.

Codes: Maha discom, supplier of last resort, network, privately owned network, transferred, government, Section 132 of reorganisation of board, electricity business.
Code Quantity:8 New Codes:4

Respondent 6: IC needs to be created for Discom, sensitivity analysis, numbers in terms of consumption

Codes: IC, Discom, sensitivity analysis, consumption
Code Quantity:4 New Codes:4

Respondent 7: Multiple networks need to be dealt, no readymade answer for stranded asset issue. How to handle the issue of second network is to be thought through.

Codes: Multiple networks, stranded asset issue, network
Code Quantity:3 New Codes:2

Respondent 8: IC could be Discom wise or at State level.

Codes: IC, Discom, State level Code Quantity:3 New Codes:1

Respondent 9: Maha discom cannot be made the supplier of last resort privately owned network cannot be transferred to the government.

Codes: Maha discom, supplier of last resort, transferred, government Code Quantity:4 New Codes:0

Respondent 10: Section 132 of reorganisation of board was not to keep the electricity business with the government so the entire state of Maharashtra including Mumbai so it cannot be made the supplier of last resort.

Codes: Section 132 of reorganisation of board, Maharashtra, supplier of last resort. Code Quantity:3 New Codes:0

5. At what time and circumstances, the GoM allows 2nd Retail Supply Company to enter market for competing with incumbent Retail Supply Company. Whether the area of supply for the new Retail Supply Company should be coterminous with licence area of the incumbent supply licence of the area.

Respondent 1: Steps need to be implemented before inviting applications for Retail Licensee: Segregation of Wires and Retail Supply, Removal of Cross Subsidy or determination of cross subsidy surcharge Tariff Determination for Wires Licensee (Regulated Tariff), Determination of Regulatory Asset, Principles for allocation of existing PPAs.

Codes: Steps, applications, Retail Licensee, Segregation, Wires and Retail Supply, Removal, Cross Subsidy, cross subsidy surcharge, Tariff Determination, Wires Licensee, Regulated, Tariff, Regulatory Asset, allocation, existing PPAs Code Quantity:14 New Codes:14

Respondent 2: Section 42(3) prohibits from using the wires of the local retailer which should be deleted and can be brought through an amendment.

Codes: Section 42(3), wires, local retailer, deleted, amendment Code Quantity:5 New Codes:5

Respondent 3: Electricity Bill, 2021 allows the separate area to be specified within the existing licence area.

Codes: Electricity Bill, 2021, separate area, existing licence area Code Quantity:3 New Codes:3

Respondent 4: Section 42(3) prohibits from using the wires of the local retailer which should be deleted.

Codes: Section 42(3), wires, local retailer, deleted Code Quantity:4 New Codes:0

Respondent 5: Segregation of Wires and Retail Supply, Tariff Determination for Wires Licensee (Regulated Tariff) are the steps to be taken before introducing retail competition.

Codes: Segregation, Wires and Retail Supply, Tariff Determination, Wires Licensee, Regulated Tariff, retail competition Code Quantity:6 New Codes:1

Respondent 6: some necessary steps to be considered are Removal of Cross Subsidy or determination of cross subsidy surcharge, Determination of Regulatory Asset, Principles for allocation of existing PPAs.

Codes: Removal of Cross Subsidy, cross subsidy surcharge, Regulatory Asset, allocation, existing PPAs. Code Quantity:5 New Codes:2

Respondent 7: The present Electricity Bill, 2021 allows the separate area to be specified within the existing licence area.

Codes: Electricity Bill, 2021, separate area, existing licence area. Code Quantity:3 New Codes:0

Respondent 8: 5 Years' time frame for rollout given and for introduction of 2nd supply licensee, Regulator should invite 2nd Supply Licensee.

Codes: rollout, supply licensee, Regulator Code Quantity:3 New Codes:3

Respondent 9: Player should come when conducive environment is created.

Codes: environment. Code Quantity:1 New Codes:0

Respondent 10: Segregation of Wires and Retail Supply, Tariff Determination for Wires Licensee should be done before hand.

Codes: Segregation, Wires and Retail Supply, Tariff Determination, Code Quantity3: New Codes:0

6. What is your view in respect of Power Procurement Mechanism and Wholesale market for introduction of retail competition in Maharashtra?

Respondent 1: Legacy PPAs will have to be equally distributed.

Codes: Legacy PPAs, equally distributed Code Quantity:2 New Codes:2

Respondent 2: Renewable portfolio should be increased as renewable is a single part tariff.

Codes: Renewable portfolio, single part tariff Code Quantity:2 New Codes:2

Respondent 3: The unscheduled PPAs should be surrendered in front of MOP or renegotiated.

Codes: unscheduled PPAs, surrendered, MOP, renegotiated Code Quantity:4 New Codes:4

Respondent 4: Portfolio wise cost should be compared considering how much term is left and what is the average variable and fixed cost with the state generation companies, IPPs and renewables and based on this evaluation mechanism should be set up.

Codes: Portfolio wise, fixed cost, state generation companies, IPPs, renewables, evaluation mechanism Code Quantity: 6 New Codes: 6

Respondent 5: It is pertinent that with introduction of Competition, the existing PPA's of existing Distribution licensee are likely to be stranded and fixed cost will have to be borne by existing consumers.

Codes: Competition, existing PPA's, existing Distribution licensee, stranded, fixed cost, existing consumers Code Quantity: 5 New Codes: 2

Respondent 6: It is essential that to have appropriate clause so that existing PPA's are shared between the Existing and new licensees.

Codes: clause, existing PPAs, shared, Existing and new licensees Code Quantity: 4 New Codes: 4

Respondent 7: For allocation of existing PPAs; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy as well as to safeguard any revenue loss.

Codes: allocation, existing PPAs, Marginal Cost, power purchase, cross subsidy, revenue loss Code Quantity: 6 New Codes: 5

Respondent 8: Average variable and fixed cost with the state generation companies, IPPs and renewables and based on this evaluation mechanism should be set up.

Codes: fixed cost, state generation companies, IPPs, renewables, evaluation mechanism Code Quantity: 5 New Codes: 0

Respondent 9: Existing PPA's of existing Distribution licensee are likely to be stranded and fixed cost will have to be borne by existing consumers.

Codes: Existing PPAs, existing Distribution licensee, stranded and fixed cost, existing consumers Code Quantity: 4 New Codes: 0

Respondent 10: Portfolio wise cost should be compared considering how much term is left and what is the average variable and fixed cost.

Codes: fixed cost. Code Quantity: 1 New Code: 0

7. Whether the allocation of PPAs between retail supply companies could either be fixed or dynamic.

Respondent 1: Allocation of PPAs between retail supply companies should be dynamic.

Codes: Allocation of PPAs, retail supply companies, dynamic Code Quantity: 3 New Codes: 3

Respondent 2: For allocation of existing PPAs; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy.

Codes: allocation, existing PPAs, Marginal Cost, power purchase, cross subsidy. Code Quantitv: 5 New Codes: 5

Respondent 3: Legacy PPAs will have to be equally distributed.

Codes: Legacy PPAs, distributed. Code Quantity: 2 New Codes: 2

Respondent 4: It should be dynamic in nature.

Codes: dynamic Code Quantity: 1 New Code: 0

Respondent 5: Allocation of PPAs is concerned, if you can pool together at State level, it will be more efficient.

Codes: Allocation of PPAs, State level, efficient Code Quantity: 3 New Codes: 2

Respondent 6: Should be dynamic.

Codes: dynamic. Code Quantity: 1 New Code: 0

Respondent 7: Marginal Cost of power purchase approach may be adopted to protect the cross subsidy for allocation of PPAs.

Codes: Marginal Cost, power purchase, cross subsidy, allocation of PPAs Code Quantity: 4 New Codes: 0

Respondent 8: For better efficiency, existing PPAs should be equally distributed.

Codes: efficiency, existing PPAs, distributed. Code Quantity: 3 New Codes: 1

Respondent 9: Should be dynamic for better operations.

Codes: dynamic. Code Quantity: 1 New Code: 0

Respondent 10: For allocation of PPAs, dynamic approach should be followed.

Codes: allocation of PPAs, dynamic. Code Quantity: 2 New Codes: 0

8. FOR in its model rollout plan suggested that in case IC allocates power to retail supply companies instead of PPAs, it may charge a uniform average cost of power purchase from suppliers or calculate a differential bulk supply tariff. What is your view in this regard for Maharashtra's transfer scheme?

Respondent 1: Also, for allocation of existing PPAs; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy.

Codes: allocation, existing PPAs, Marginal Cost, power purchase, cross subsidy Code Quantity: 5 New Codes: 5

Respondent 2: The new licensee shall be allocated capacity from the existing distribution licensee.

Codes: new licensee, allocated, capacity, existing distribution licensee. Code Quantity: 4 New Codes: 4

Respondent 3: Allocation of PPAs is concerned, if you can pool together at State level, it will be more efficient.

Codes: new licensee, allocated, capacity, existing distribution licensee. Code Quantity: 4 New Codes: 0

Respondent 4: Cost determination with SERC. Section 86(1)(b) only SERC has jurisdiction to allocate power. So, principle can be given by SERC and direction by SLDC.

Codes: Cost determination, SERC, Section 86(1) (b), SERC, allocate power, principle, SERC, direction by SLDC Code Quantity: 6 New Codes: 6

Respondent 5: Average price of pooled PPAs. IC can maintain USO pool. Also part of stranded cost. IC will continue to do including indexation etc.

Codes: Average price, pooled PPAs, IC, USO pool, stranded cost, IC, indexation Code Quantity: 6 New Codes: 6

Respondent 6: Allocation has to be balanced by the appropriate Commission by allowing the new retail licensee to purchase certain percentage (linked to growth rate) independently by retail licensee to being in efficiencies to reduce the tariff of consumers.

Codes: Allocation, balanced, appropriate Commission, new retail licensee, percentage, linked to growth rate, retail licensee, tariff, consumers Code Quantity: 9 New Codes: 8

Respondent 7: Section 86(1)(b) only SERC has jurisdiction to allocate power. So, principle can be given by SERC and direction by SLDC.

Codes: Section 86(1) (b), SERC, jurisdiction, allocate power, SERC, SLDC Code Quantity: 6 New Codes: 2

Respondent 8: Allocation has to be balanced by the appropriate Commission by allowing the new retail licensee to purchase certain percentage.

Codes: Allocation, appropriate Commission, new retail licensee, percentage Code Quantity: 4 New Codes: 0

Respondent 9: If you can pool PPAs together at State level, it will be more efficient.

Codes: PPAs, State level, efficient. Code Quantity: 3 New Codes: 0

Respondent 10: Allocation of PPAs to be done on Marginal Cost approach, and new licensees should be given PPAs from existing distribution licensees.

Codes: Allocation of PPAs, Marginal Cost, new licensees, PPAs, existing distribution licensees Code Quantity: 5 New Codes: 0

9. For Maharashtra's transfer scheme, whether the new retail supply companies may be given flexibility to procure power from the market first and then accept power from the IC if required.

Respondent 1: The retailer can optimise it according to him. If they want to back down PPAs and procure power from short term market and sell it with a cost benefit.

Codes: retailer, optimise, PPAs, procure power, short term market, cost benefit. Code Quantity: 6 New Codes: 6

Respondent 2: If the retailer wants, they can back down PPAs and procure power from short term market and sell it with a cost benefit. This kind of dynamic model can be brought.

Codes: retailer, PPAs, procure power, short term market, cost benefit, dynamic model Code Quantity: 6 New Codes: 2

Respondent 3: Additional power purchase should be allowed at the rate lower than the rate of power purchase from the incumbent licensee.

Codes: additional power purchase, lower, power purchase, incumbent licensee Code Quantity: 4 New Codes: 4

Respondent 4: For allocation of existing PPAs; Marginal Cost of power purchase approach may be adopted to protect the cross subsidy.

Codes: allocation, existing PPAs, Marginal Cost, power purchase, cross subsidy. Code Quantity: 5 New Codes: 3

Respondent 5: The new licensee shall be allocated capacity from the existing distribution licensee. The said allocation has to be balanced by the appropriate Commission.

Codes: new licensee, capacity, existing distribution licensee, allocation, appropriate Commission. Code Quantity: 5 New Codes: 4

Respondent 6: Dynamic model can be brought for allocation of PPAs.

Codes: Dynamic model, allocation of PPAs Code Quantity: 2 New Codes: 1

Respondent 7: Allowing the new retail licensee to purchase certain percentage (linked to growth rate) independently by retail licensee to being in efficiencies to reduce the tariff of consumers.

Codes: new retail licensee, percentage, retail licensee, tariff, consumers Code Quantity: 5 New Codes: 5

Respondent 8: IC needs to be created for Discom. If PPAs are surplus then you can decide about larger IC.

Codes: IC, Discom, PPAs Code Quantity: 3 New Codes: 0

Respondent 9: retailers can back down PPAs and procure power from short term market and sell it with a cost benefit.

Codes: retailers, PPAs, procure power, short term market, and cost benefit Code Quantity: 4 New Codes: 0

Respondent 10: Marginal Cost of power purchase approach may be adopted to protect the cross subsidy.

Codes: Marginal Cost, power purchase, cross subsidy. Code Quantity: 3 New Codes: 0

10. In respect of procurement of new PPAs, the new retail supply company would have option of forming new PPAs with generators. But being smaller in size than the current Discoms, FOR suggested the possibility of IC acting as an aggregator for procuring

power could be explored by States in their respective rollout plans and transfer schemes. What is your view in this regard for Maharashtra's transfer scheme?

Respondent 1: Freedom in market means following dynamic model. Discoms must have their own optimisation and involvement of IC and aggregator will lead to disputes.

Codes: Freedom, dynamic model, Discoms, optimisation, involvement, IC, aggregator, disputes Code Quantity: 8 New Codes: 8

Respondent 2: Current market mechanism where requirement can be fulfilled by the way retailer wants. Market should be available for longer time with flexibility.

Codes: market mechanism, requirement, retailer, Market, longer time, flexibility Code Quantity: 6 New Codes: 6

Respondent 3: Additional power purchase should be allowed at the rate lower than the rate of power purchase from the incumbent licensee.

Codes: power purchase, incumbent licensee. Code Quantity: 2 New Codes: 2

Respondent 4: Allocation of PPAs is concerned, if you can pool together at State level, it will be more efficient.

Codes: Allocation of PPAs, State level, efficient. Code Quantity: 3 New Codes: 3

Respondent 5: Design dynamic allocation of existing PPAs. If PPAs are surplus then you can decide about larger IC.

Codes: Design dynamic allocation, existing PPAs, PPAs, IC. Code Quantity: 4 New Codes: 3

Respondent 6: Average price of pooled PPAs. IC can maintain USO pool. Also, part of stranded cost. IC will continue to do including indexation.

Codes: pooled PPAs, IC, USO pool, stranded cost, IC, indexation Code Quantity: 5 New Codes: 4

Respondent 7: Discoms must have their own optimisation and involvement of IC and aggregator will lead to disputes.

Codes: Discos, optimisation, involvement, IC, aggregator, disputes. Code Quantity: 6 New Codes: 0

Respondent 8: IC acting as an aggregator for procuring power could be explored by States in their respective rollout plans and transfer schemes.

Codes: IC, aggregator, procuring power, rollout plans, transfer schemes. Code Quantity: 5 New Codes: 3

Respondent 9: IC can be responsible for maintaining pooled PPAs.

Codes: IC, pooled PPAs Code Quantity: 2 New Codes:0

Respondent 10: Market should be available for longer time with more flexibility where requirement can be fulfilled by the way retailer wants.

Codes: flexibility, retailer. Code Quantity:2 New Codes:0

11. After the segregation of current Discom into Distribution and Retail Supply functions, metering services can be responsibility of Distribution or Retail Supply Company or 3rd Party Company. FOR suggested that the metering activity relating to reading be given to retail supply company as the responsibility to reduce collection inefficiency losses would lie with retail suppliers. However, the metering activity relating to meter installation/replacement, ownership of meters, meter operation and testing would be decided based on the approach taken towards loss allocation. What is your view in this regard for Maharashtra's transfer scheme?

Respondent 1: It depends on the licensee which is responsible for managing the loss.

Codes: licensee, loss. Code Quantity:2 New Codes:2

Respondent 2: If the Technical and Commercial losses are to the account of Wires licensee then metering has to be responsibility of Wires Licensee.

Codes: Technical and Commercial losses, Wires licensee, metering, responsibility, Wires Licensee.

Respondent 3: If metering, billing is given to Retail Licensee and Wires Licensee is responsible for overall losses, then any theft, underbilling by Retail Licensee will inflate the losses and will be to the account of Wires Licensee.

Codes: metering, billing, Retail Licensee, Wires Licensee, overall losses, theft, Retail Licensee, losses, Wires Licensee Code Quantity:9 New Codes:4

Respondent 4: Commercial losses are to the account of Retail Licensee, then, metering related activities can be handed over to Retail Licensee.

Codes: Commercial losses, Retail Licensee, metering, Retail Licensee. Code Quantity:4 New Codes:1

Respondent 5: Approach taken for loss allocation will decide the ownership of metering services.

Codes: loss allocation, ownership, metering services. Code Quantity:3 New Codes:3

Respondent 6: Get the meters suggested by the network company, install it and maintain it an collect charges but the grievances will have the issues therefore should be installed, managed by retail or network company.

Codes: meters, network company, charges, grievances, installed, managed, retail, network company. Code Quantity:8 New Codes:6

Respondent 7: Metering – 3rd Party – FOR recommended not to have another institution.

Codes: Metering, FOR, institution. Code Quantity:3 New Codes:2

Respondent 8: Meters suggested by the network company, install it and maintain it.

Codes: Meters, network company, install, maintain.
Code Quantity:4 New Codes:2

Respondent 9: Technical and Commercial losses are to the account of Wires licensee then metering has to be responsibility of Wires Licensee.

Codes: Technical and Commercial losses, Wires licensee, metering, responsibility, Wires Licensee.
Code Quantity:5 New Codes:0

Respondent 10: Metering has to be responsibility of Wires Licensee. Technical and Commercial losses.

Codes: Metering, responsibility, Wires Licensee, Commercial losses.
Code Quantity:4 New Codes:0

12. What should framework for Consumer Interface and Grievance mechanism in Maharashtra?

Respondent 1: Discoms should have a window for grievances and there's no need of CGRF and should be simplified.

Codes: Discoms, grievances, CGRF, simplified.
Code Quantity:4 New Codes:4

Respondent 2: Single window for grievances.

Codes: Single window, grievances.
Code Quantity:2 New Codes:1

Respondent 3: Retail Supply licensee shall be single point of interface for the Consumers with CGRF for each Retail Licensee and independent ombudsman.

Codes: Retail Supply licensee, single point of interface, Consumers, CGRF, Retail Licensee, independent ombudsman.
Code Quantity:6 New Codes:6

Respondent 4: FOR suggested that the retail supply company should offer a single window interface for all types of consumer complaints/queries/requests.

Codes: FOR, retail supply company, single window interface, consumer complaints/queries/requests
Code Quantity:4 New Codes:4

Respondent 5: Two layered Consumer Grievance Redressal Mechanism consisting single grievance forum for all entities and independent ombudsman.

Codes: single grievance forum, entities, independent ombudsman.
Code Quantity:3 New Codes:2

Respondent 6: Discoms should have a single window for grievances.

Codes: Discoms, single window, grievances.
Code Quantity:3 New Codes:0

Respondent 7: Retail supply company should offer a single window interface for all types of consumer complaints and requests.

Codes: Retail supply company, single window interface, consumer complaints
Code Quantity:3 New Codes:0

Respondent 8: Consumer Grievance mechanism should be two layered.

Codes: Consumer Grievance mechanism Code Quantity:1 New Codes:1

Respondent 9: Single point of interface for the Consumers with CGRF for each Retail Licensee with independent ombudsman.

Codes: single point of interface, Consumers, CGRF, Retail Licensee, independent ombudsman Code Quantity:5 New Codes:0

Respondent 10: There's no need of CGRF and process of grievances should be simplified.

Codes: CGRF, grievances, simplified. Code Quantity:3 New Codes:0

13. What is your view on tariff setting mechanism for retail supply competition in Maharashtra?

Respondent 1: SERC will have to determine the unbundled tariff for the network and supply company.

Codes: SERC, unbundled tariff, network, supply company. Code Quantity:4 New Codes:4

Respondent 2: Network company will get the wheeling tariff and supply company will get the energy charge.

Codes: Network company, wheeling tariff, supply company, energy charge. Code Quantity:4 New Codes:3

Respondent 3: For below open access category SERC will decide the retail supply tariff as well as wire tariff and above open access category SERC will decide just the network tariff and if someone directly wants to take from a retail company section 49 allows him for a mutually agreed tariff.

Codes: below open access, SERC, retail supply tariff, wire tariff, open access category, SERC, network tariff, retail company, section 49, mutually agreed tariff Code Quantity:9 New Codes:8

Respondent 4: The State Commission's will have to determine unbundled tariff individually for Wires Business and Retail Supply Business. Once Retail Competition is introduced, the Commission may determine ceiling tariff for the Consumers.

Codes: State Commission, unbundled tariff, Wires Business, Retail Supply Business, Retail Competition, ceiling tariff, Consumers. Code Quantity:7 New Codes:6

Respondent 5: The Consumers within a specified area of supply to be allowed for competition, as all consumer categories to take advantage of the competition and will also be natural hedge against consumer mix and avoid cherry picking of only high-end consumers.

Codes: Consumers, supply, competition, consumer categories, competition, natural hedge, consumer mix. Code Quantity:5 New Codes:4

Respondent 6: The State Commission should determine the category wise ceiling for the State Distribution Company and the other Retail Supply licensee should offer the price based on market conditions.

Codes: State Commission, category wise ceiling, State Distribution Company, Retail Supply licensee, price, market conditions. Code Quantity:6 New Codes:5

Respondent 7: SERC have jurisdiction for deciding the tariff and cross subsidy obligations towards State Distribution Companies need to be fulfilled.

Codes: SERC, jurisdiction, tariff, cross subsidy obligations, State Distribution Companies. Code Quantity:5 New Codes:4

Respondent 8: Increase in fuel cost should be allowed by SERC to pass on the loss incurred due to selling power lower than the ceiling tariffs.

Codes: SERC, selling power, ceiling tariffs. Code Quantitv:3 New Codes:0

Respondent 9: SERC is responsible for tariff determination. Once Retail Competition is introduced, the Commission may determine ceiling tariff for the Consumers.

Codes: SERC, tariff determination, Retail Competition, Commission, ceiling tariff, Consumers Code Quantity:6 New Codes:0

Respondent 10: Ceiling Tariff to be determined by SERC. Retail Supply licensee should offer the price based on market conditions.

Codes: Ceiling Tariff, SERC, Retail Supply licensee, market conditions Code Quantity:4 New Codes:0

14. FOR model rollout suggested the responsibility of Universal Service Obligation for connecting the network to the consumers as 'Duty to Connect' would be given to Distribution Company and the responsibility for supplying electricity to consumers would be given initially to incumbent retail supply company. After the new/2nd retail supply company comes into the market, the duty to supply would be extended to them as well. What is your view for Maharashtra's transfer scheme?

Respondent 1: Incumbent supply company will have USO until retail company comes in market.

Codes: Incumbent supply company, USO, retail company, market Code Quantity:4 New Codes:4

Respondent 2: Duty to Connect' should be of Incumbent supply company.

Codes: Duty to Connect, Incumbent supply company. Code Quantity:2 New Codes:1

Respondent 3: Retail Licensee shall be responsible for coordinating with Wires Licensee to get the consumer connected and supply to be released within the timelines specified by the State Commission.

Codes: Retail Licensee, coordinating, Wires Licensee, consumer, supply, State Commission
Code Quantity:6 New Codes:6

Respondent 4: Incumbent supply company will have USO until retail company comes in market.

Codes: Incumbent supply company, USO, retail company, market
Code Quantity:4 New Codes:0

Respondent 5: As there is only single Wires Licensee proposed, the responsibility to connect i.e. Duty to Connect' should be of said Licensee. Supply will be given by the Retail Licensee to whom application has been submitted by the Consumer.

Codes: single Wires Licensee, responsibility, Duty to Connect, Licensee, Retail Licensee, Consumer.
Code Quantity:6 New Codes:3

Respondent 6: Retail Licensee shall be responsible for coordinating with Wires Licensee to get the consumer connected and supply to be released within the timelines specified by the State Commission.

Codes: Retail Licensee, Wires Licensee, supply, State Commission.
Code Quantity:4 New Codes:1

Respondent 7: USO should be casted upon all the Distribution Companies in an area in order to bring level playing field.

Codes: USO, Distribution Companies, level playing field
Code Quantity:3 New Codes:2

Respondent 8: The responsibility of USO for connecting the network to the consumers as 'Duty to Connect' would be given to Distribution Company.

Codes: USO, network, consumers, Duty to Connect, Distribution Company
Code Quantity:5 New Codes:3

Respondent 9: Responsibility for supplying electricity to consumers would be given initially to incumbent retail supply company.

Codes: consumers, incumbent retail supply company
Code Quantity:2 New Codes:0

Respondent 10: Only single Wires Licensee proposed, the responsibility to connect i.e. Duty to Connect' should be of said Licensee.

Codes: Wires Licensee, Duty to Connect, Licensee
Code Quantity:3 New Codes:0

15. What is your view on reduction of cross subsidies of Maharashtra's Discoms?

Respondent 1: For reduction of cross subsidies there can be universal charge fund on the lines of Philippines.

Codes: cross subsidies, universal charge fund, Philippines
Code Quantity:3 New Codes:3

Respondent 2: Universal charge can be determined by commission and every consumer should pay out those charge till cross subsidies phase out for state.

Codes: Universal charge, commission, consumer, cross subsidies, phase out
Code Quantity:5 New Codes:4

Respondent 3: Either approach of Universal Charge fund on similar lines of Philippines or approach of Direct Benefit Transfer of Subsidy by Govt. could be adopted to reduce cross subsidies.

Codes: Universal Charge, Philippines, Direct Benefit Transfer, Subsidy, cross subsidies.
Code Quantity:5 New Codes:2

Respondent 4: Direct Benefit Transfer of Subsidy may have an additional burden on the fiscal deficit of the State and the Universal Charge fund will result in recovery of the same from consumers.

Codes: Direct Benefit Transfer, Subsidy, fiscal deficit, Universal Charge fund, consumers
Code Quantity:5 New Codes:2

Respondent 5: Universal Charge fund will result in recovery of the subsidy from consumers.

Codes: Universal Charge fund, subsidy, consumers
Code Quantity:3 New Codes:0

Respondent 6: Every consumer should pay out Universal charge till cross subsidies phase out for state.

Codes: consumer, Universal charge, cross subsidies, phase out.
Code Quantity:4 New Codes:0

Respondent 7: Approach of Universal Charge fund on similar lines of Philippines.

Codes: Universal Charge fund, Philippines
Code Quantity:2 New Codes:0

Respondent 8: Direct Benefit Transfer of Subsidy by Govt. could be adopted.

Codes: Direct Benefit Transfer, Subsidy.
Code Quantitv:2 New Codes:0

Respondent 9: Universal Charge fund model based on the case study of Philippines can be adopted as suggested by FOR.

Codes: Universal Charge fund, Philippines, FOR
Code Quantity:3 New Codes:0

Respondent 10: Direct Benefit Transfer of Subsidy may have an additional burden on the fiscal deficit of the State which can be recovered through Universal Charge fund.

Codes: Direct Benefit Transfer, Subsidy, fiscal deficit, Universal Charge fund.
Code Quantity:4 New Codes:0

16. Phasing of Retail Supply Competition can be done based on connected load of consumer, energy consumption of consumer, area of supply or consumer category. FOR in its model rollout suggested that phasing could be either decreasing connected load or increasing connected load of consumers. What is your view on phasing of introducing retail competition in Maharashtra?

Respondent 1: Identify the area going for competition and retailer will be given license for that area and then the competition can be phased out on decreasing connected load or increasing connected load.

Codes: competition, retailer, license, phased out, connected load Code Quantity:5 New Codes:5

Respondent 2: Based on the connected load of the consumers within a specified area of supply, the PPA allocation can be undertaken by Intermediary Company.

Codes: connected load, consumers, area of supply, PPA allocation, Intermediary Company. Code Quantity:5 New Codes:4

Respondent 3: It is suggested that all the Consumers within a specified area of supply to be allowed for competition.

Codes: Consumers, area of supply, competition. Code Quantity:3 New Codes:0

Respondent 4: All consumer categories would like to take advantage of the competition and will also be natural hedge against consumer mix and avoid cherry picking of only high-end consumers.

Codes: consumer categories, competition, natural hedge, consumer mix Code Quantity:4 New Codes:4

Respondent 5: Consumers within a specified area of supply, the PPA allocation can be undertaken by Intermediary Company.

Codes: consumers, area of supply, PPA allocation, Intermediary Company. Code Quantity:4 New Codes:0

Respondent 6: Phasing of Retail Supply Competition can be done based on connected load of consumer, energy consumption of consumer, area of supply or consumer category.

Codes: Phasing, Retail Supply Competition, connected load, consumer, energy consumption, area of supply, consumer category. Code Quantity:7 New Codes:5

Respondent 7: Phasing could be either decreasing connected load or increasing connected load of consumers.

Codes: Phasing, connected load, consumers Code Quantity:3 New Codes:0

Respondent 8: For consumer category phasing of retail supply competition can be done based on energy consumed and area of supply.

Codes: consumer category, phasing, retail supply competition, energy consumed, area of supply. Code Quantity:5 New Codes:1

Respondent 9: All consumer categories would like to take advantage of the competition and everyone should be considered for competition.

Codes: consumer categories, competition Code Quantity:2 New Codes:0

Respondent 10: Area going for competition and retailer will be given license for that area and competition should be brought in based on connected load.

Codes: competition, retailer, license, connected load Code Quantity:4 New Codes:0

17. FOR in its model rollout plan suggested that based on the current level of distribution losses (AT&C loss less collection efficiency) in the State, either approach 1 (Allocation of collection losses to Retail Supply Company and remaining losses to Distribution Company) or approach 3 (Allocation of all commercial losses to Retail Supply Company and technical losses to Distribution Company) of loss allocation could be adopted. What is your view on allocation of Technical and Commercial losses between proposed distribution and supply companies in Maharashtra?

Respondent 1: FOR models can be an approach to loss allocation.

Codes: FOR models, loss allocation Code Quantity:2 New Codes:2

Respondent 2: It depends on the licensee which is responsible for managing the loss. If the Technical and Commercial losses are to the account of Wires licensee then metering has to be responsibility of Wires Licensee.

Codes: licensee, managing the loss, Technical and Commercial losses, Wires licensee, metering. Code Quantity:5 New Codes:5

Respondent 3: If metering, billing is given to Retail Licensee and Wires Licensee is responsible for overall losses, then any theft, underbilling by Retail Licensee will inflate the losses and will be to the account of Wires Licensee.

Codes: metering, billing, Retail Licensee, Wires Licensee, Retail Licensee, losses, Wires Licensee. Code Quantity:7 New Codes:2

Respondent 4: If Commercial losses are to the account of Retail Licensee, then, metering related activities can be handed over to Retail Licensee.

Codes: Commercial losses, Retail Licensee, metering, Retail Licensee. Code Quantity:3 New Codes:1

Respondent 5: Approach taken for loss allocation will decide the ownership of metering services.

Codes: loss allocation, ownership, metering services Code Quantity:3 New Codes:2

Respondent 6: Allocation of collection losses to Retail Supply Company and remaining losses to Distribution Company.

Codes: collection losses, Retail Supply Company, Distribution Company. Code Quantity:3 New Codes:3

Respondent 7: Allocation of all commercial losses to Retail Supply Company and technical losses to Distribution Company.

Codes: commercial losses, Retail Supply Company, technical losses, Distribution Company.
Code Quantity:4 New Codes:1

Respondent 8: Underbilling by Retail Licensee will inflate the losses and will be to the account of Wires Licensee.

Codes: Underbilling, Retail Licensee, losses, Wires Licensee
Code Quantity:4 New Codes:1

Respondent 9: Billing is given to Retail Licensee and Wires Licensee is responsible for overall losses.

Codes: Billing, Retail Licensee, Wires Licensee, losses
Code Quantity:4 New Codes:0

Respondent 10: Commercial losses are to the account of Retail Licensee who can handle the metering.

Codes: Commercial losses, Retail Licensee, metering.
Code Quantity:3 New Codes:0

18. What is your view on balance sheet segregation of current Distribution business among new entities for Maharashtra's transfer scheme?

Respondent 1: Entire network revenue will be in the balance sheet of the network company and supply company will have to follow the balance sheet pattern of the traders.

Codes: network, balance sheet, network company, supply company, balance sheet, traders
Code Quantity:5 New Codes:5

Respondent 2: Transfer scheme will spell out the supply assets.

Codes: Transfer scheme, supply assets.
Code Quantity:2 New Codes:2

Respondent 3: If wholesale market rises, it will pass on retail tariff. Supply companies will have supply margin. Transfer scheme will not do these details, Regulator will have to do these things, Transfer Scheme will specify - determine price cap by factoring various points.

Codes: wholesale market, retail tariff, Supply companies, supply margin, Transfer scheme, Regulator, price cap
Code Quantity:7 New Codes:6

Respondent 4: Clean Balance sheet to be provided to the successor entities i.e., Wire and Supply Business.

Codes: Clean Balance sheet, successor entities, Wire and Supply Business
Code Quantity:3 New Codes:3

Respondent 5: The valuation of assets and liabilities to be undertaken based on the revenue potential.

Codes: assets and liabilities, revenue potential
Code Quantity:2 New Codes:2

Respondent 6: Development of criteria and parameters for allocation of the various Balance Sheet items to the dis-aggregate entities based on Capital structuring requirements.

Codes: criteria and parameters, Balance Sheet items, Capital structuring requirements Code Quantity:3 New Codes:3

Respondent 7: Estimation of State Government support for the companies based on agreed financial projections so as to provide financially viable balance sheet to the successor entities so as to survive in the competition.

Codes: State Government, financial projections, balance sheet, successor entities Competition. Code Quantity:5 New Codes:4

Respondent 8: Redefining of Financial and Commercial structures and decision related to investment in business of Wire and Supply business and trading activities.

Codes: Financial and Commercial structures, Wire and Supply business, trading activities Code Quantity:3 New Codes:2

Respondent 9: Estimation of State Government support for the companies based on agreed financial projections.

Codes: State Government, financial projections Code Quantity:2 New Codes:0

Respondent 10: Establishing electronic assets register for Wire and supply business.

Codes: Wire and supply business. Code Quantity:1 New Codes:0

19. What is your view on treatment of existing financial losses (recognised and unrecognised both) for Maharashtra's transfer scheme?

Respondent 1: The existing recognised financial losses to be converted as Regulatory Asset.

Codes: financial losses, Regulatory Asset Code Quantity:2 New Codes:2

Respondent 2: For the State Government owned Distribution licensee, the support from the State government can be envisaged for unrecognized losses.

Codes: State Government, Distribution licensee, unrecognized losses Code Quantity:3 New Codes:3

Respondent 3: Financial losses converted into regulatory assets can be recovered from all the Consumers as Regulatory Asset Charge.

Codes: Financial losses, regulatory assets, Consumers, Regulatory Asset Charge Code Quantity:4 New Codes:3

Respondent 4: Financial losses have to be funded by Govt. but in Maharashtra it has private discoms, and hence complicated.

Codes: Financial losses, Maharashtra, private discoms Code Quantity:3 New Codes:2

Respondent 5: Support from state government can be envisaged for reduction of existing financial losses.

Codes: state government, existing financial losses Code Quantity:2 New Codes:1

Respondent 6: State government should fund for the losses.

Codes: State government, losses. Code Quantity:2 New Codes:1

Respondent 7: Financial losses should be converted into regulatory assets.

Codes: Financial losses, regulatory assets. Code Quantity:2 New Codes:0

Respondent 8: Losses can be recovered from consumers in the form of regulatory asset charge.

Codes: Losses, consumers, regulatory asset charge Code Quantity:3 New Codes:0

Respondent 9: Financial losses have to be funded by Government.

Codes: Financial losses Code Quantity:1 New Codes:0

Respondent 10: Proper management of regulatory assets to be done.

Codes: regulatory assets. Code Quantity:1 New Codes:0

20. Whether consumer switching mechanism covering issues like Recovery of stranded costs like past revenue gaps or regulatory assets from consumers, Recovery of dues from consumer, defining consumer category at the time of switching, Security Deposits, Frequency of consumer switching shall be included in the rollout plan prepared for Maharashtra.

Respondent 1: Consumer must clear the dues and then switch Over.

Codes: Consumer, dues, switch over. Code Quantity:3 New Codes:3

Respondent 2: Network company can disconnect and start recovery of dues. Consumer will have to maintain 2 security deposits.

Codes: Network company, disconnect, dues, Consumer, 2 security deposits Code Quantity:5 New Codes:2

Respondent 3: Frequency of switchover for the consumers should be limited.

Codes: Frequency, switchover, consumers Code Quantity:3 New Codes:1

Respondent 4: Switch over cannot be done until deposit with first company is cleared. This may be allowed from Mumbai experience.

Codes: Switch over, deposit, Mumbai experience Code Quantity:3 New Codes:2

Respondent 5: The Changeover/Switchover protocol adopted in the Parallel Licensing scenario in Mumbai should be adopted while introducing retail competition.

Codes: Changeover/Switchover protocol, Parallel Licensing, retail competition. Code Quantity:3 New Codes:3

Respondent 6: Broad framework for switching procedure (frequency of switching- monthly-linked with power purchase allocation) should be part of transfer scheme

Codes: framework, switching procedure, transfer scheme Code Quantity:3 New Codes:3

Respondent 7: Mumbai experience of switching is a very good example and should be considered for Maharashtra.

Codes: Mumbai experience, switching. Code Quantity:2 New Codes:1

Respondent 8: For introducing retail supply competition, changeover/switchover mechanism should be accelerated.

Codes: retail competition, changeover/switchover mechanism Code Quantity:2 New Codes:0

Respondent 9: Consumers should maintain 2 security deposits for switching procedure.

Codes: Consumers, 2 security deposits, switching Code Quantity:3 New Codes:0

Respondent 10: Consumer must clear the dues and then switch Over. Frequency of consumer switching should be limited. In competition tariff will drive the switching.

Codes: Consumer, dues, switch Over, Frequency Code Quantity:4 New Codes:0

DATA MANAGEMENT AND ANALYSIS:

Sr. no.	Transcript	Description (Invivo Codes)	Preliminary Thoughts	Initial Themes
1.	The Distribution Company is required to be spilt into two – Wires Licensee and Supply Licensee (Incumbent) with Ownership transfer and ring-fenced arrangement between wire and retail supply business. The wires licensee shall be responsible to undertake the distribution of power through intra-state distribution network, Infrastructure Planning (Network) and coordination up to last mile connectivity. The retail licensee shall be responsible for Supply to Consumers, Metering, Billing, Revenue Collection and Power Procurement. There should be a default network company and they should fulfil	Distribution Company, Wires Licensee, Supply Licensee, Ownership transfer, ring-fenced arrangement, retail supply business, wires licensee, distribution network, Infrastructure Planning, Consumers, Metering, Billing, Revenue Collection, Power Procurement, network company, USO	View on the Unbundling & Functional Separation of Discoms	Unbundling & Functional Separation of Discoms

	USO, and should plan it, operate it and do all the market operations as required.			
2.	Purchase of power has to be necessarily through Competitive Bidding or mandatorily through Exchange. Multiple retailers should integrate their generation if that culminates into lower tariff. There will be competition and if the generator directly sells the landed cost will decrease.	Purchase of power, Competitive Bidding, Exchange, retailers, lower tariff, competition, landed cost	Suggestion if the generation & retailing Activities should be integrated	Integration of generation & retailing Activities
3.	Removal of cross subsidy will go a long way in promoting fair retail competition. USO should be casted upon all the Distribution Companies. The determination of area of supply of retail supply licensee needs to be designed in such a way that proper consumer mix with combination of subsidised and subsidising consumers is being provided to new licensee so as to reduce the cross-subsidy burden to the existing distribution licensee. The mechanism of Direct Benefit Transfer (DBT) to the consumers which government is intending to subside may be considered.	cross subsidy, retail competition, Distribution Companies, area of supply, retail supply licensee, subsidised, subsidising consumers, existing distribution licensee, Direct Benefit Transfer	Views on mechanism for subsidizing retail business	Mechanism for subsidizing the retail business
4.	It is suggested that all the existing licensees should be made incumbent supply licensee for their existing area of supply. USO should be casted upon all the Distribution Companies in an area in order to bring level playing field. Maha discom cannot be made the supplier of last resort privately owned network cannot be transferred to the government.	existing licensees, incumbent supply licensee, existing area of supply, USO, Distribution Companies, level playing field, Maha discom, supplier of last resort	Whether government discoms can be made supplier of last resort in area of supply.	Government Discoms as a supplier of last resort in area of supply
5.	Steps need to implemented before inviting applications for Retail Licensee: Segregation of Wires and Retail Supply, Removal of Cross Subsidy or determination of cross subsidy surcharge Tariff Determination for Wires Licensee (Regulated Tariff), Determination of Regulatory Asset, Principles for allocation of existing PPAs. Section 42(3) prohibits from using the wires of the local retailer which should be deleted and can be brough through an amendment.	Retail Licensee, Segregation, Wires and Retail Supply, Cross Subsidy, surcharge, Tariff Determination, Wires Licensee, Regulatory Asset, PPAs, Section 42(3)	Views on what should be the time frame in introducing 2nd retail licensee in the competition	2nd Retail Supply Company entering market for competition with incumbent Retail Supply Company
6.	Legacy PPAs will have to be equally distributed. Renewable portfolio should be increased as renewable is a single part tariff. The unscheduled PPAs should be surrendered in front of MOP or renegotiated. Portfolio wise cost should be compared considering how much term is left and what is the average variable and fixed cost with the state generation companies, IPPs and renewables and based on this evaluation mechanism should be set up.	Legacy PPAs Renewable portfolio, single part tariff, unscheduled PPAs, IPPs, renewables	Views for Power Procurement Mechanism and Wholesale market for introduction of retail competition in Maharashtra	Power Procurement Mechanism and Wholesale market for introduction of retail competition in Maharashtra
7.	Allocation of PPAs between retail supply companies should be dynamic. For allocation of existing PPAs;	Allocation of PPAs, retail supply	Views on allocation of PPAs	Allocation of PPAs

	Marginal Cost of power purchase approach may be adopted to protect the cross subsidy. if you can pool together at State level, it will be more efficient.	companies, PPAs, Marginal Cost, power purchase, cross subsidy		
8.	Cost determination with SERC. Section 86(1)(b) only SERC has jurisdiction to allocate power. So, principle can be given by SERC and direction by SLDC. IC can maintain USO pool. Also part of stranded cost. IC will continue to do including indexation etc. Allocation has to be balanced by the appropriate Commission by allowing the new retail licensee to purchase certain percentage (linked to growth rate) independently by retail licensee to being in efficiencies to reduce the tariff of consumers.	SERC, Section 86(1)(b), SERC, SLDC, USO pool, stranded cost, new retail licensee, tariff, consumers	Suggestions for Transfer Scheme for Maharashtra's Distribution sector	Transfer Scheme for Maharashtra's Distribution sector
9.	The retailer can optimise it according to him. If they want to back down PPAs and procure power from short term market and sell it with a cost benefit. Additional power purchase should be allowed at the rate lower than the rate of power purchase from the incumbent licensee.	PPAs, procure power, short term market, cost benefit, incumbent licensee	Views on Flexibility of Power Procurement for New retail Supply companies	Flexibility of Power Procurement for New retail Supply companies
10.	Freedom in market means following dynamic model. Discoms must have their own optimisation and involvement of IC and aggregator will lead to disputes. Current market mechanism where requirement can be fulfilled by the way retailer wants. Market should be available for longer time with flexibility.	dynamic model, Discom, IC, aggregator, flexibility	Suggestions for roll out plan for procurement of new PPAs for new retail supply companies	Roll out plan for procurement of new PPAs for new retail supply companies
11.	If the Technical and Commercial losses are to the account of Wires licensee then metering has to be responsibility of Wires Licensee. If metering, billing is given to Retail Licensee and Wires Licensee is responsible for overall losses, then any theft, underbilling by Retail Licensee will inflate the losses and will be to the account of Wires Licensee. Commercial losses are to the account of Retail Licensee, then, metering related activities can be handed over to Retail Licensee. Approach taken for loss allocation will decide the ownership of metering services.	Technical and Commercial losses, Wires licensee, metering, billing, Retail Licensee, theft, Retail Licensee, loss allocation, metering services	thoughts about Allocation of metering activities for introducing retail supply competition in Maharashtra	Allocation of metering activities for introducing retail supply competition in Maharashtra
12.	Retail Supply licensee shall be single point of interface for the Consumers with CGRF for each Retail Licensee and independent ombudsman. FOR suggested that the retail supply company should offer a single window interface for all types of consumer complaints/queries/requests.	Retail Supply licensee, consumers, CGRF, single window interface, consumer complaints	Suggestions for Framework for Consumer interface and Grievance mechanism in Maharashtra	Framework for Consumer interface and Grievance mechanism in Maharashtra
13.	SERC will have to determine the unbundled tariff for the network and supply company. Network company will	SERC, unbundled tariff, supply company, Network	tariff setting mechanism for retail	tariff setting mechanism for retail supply

	get the wheeling tariff and supply company will get the energy charge. For below open access category SERC decide the retail supply tariff as well as wire tariff and above open access decide just the network tariff and if someone directly wants to take from a retail company section 49 allows him for a mutually agreed tariff. licensee should offer the price based on market conditions.	company, wheeling tariff, energy charge, below open access, SERC, retail supply tariff, wire tariff, above open access, section 49, mutually agreed tariff.	supply competition in Maharashtra by SERC	competition in Maharashtra
14.	Incumbent supply company will have USO until retail company comes in market. Duty to Connect' should be of Incumbent Licensee. Retail Licensee shall be responsible for coordinating with Wires Licensee to get the consumer connected and supply to be released within the timelines specified by the State Commission.	Incumbent supply company, USO, retail company, Duty to Connect, Incumbent Licensee, Retail Licensee, Wires Licensee, State Commission	Views on FORs Model for the responsibility of Universal Service Obligation for connecting the network to the consumers as 'Duty to Connect'	responsibility of Universal Service Obligation and Duty to connect
15.	For reduction of cross subsidies there can be universal charge fund on the lines of Philippines. Universal charge can be determined by commission and every consumer should pay out those charge till cross subsidies phase out for state. Approach of Direct Benefit Transfer of Subsidy by Govt. could be adopted to reduce cross subsidies.	cross subsidies, universal charge fund, Philippines, commission, Direct Benefit Transfer	Views on reduction of cross subsidies of Maharashtra's Discoms	reduction of cross subsidies of Maharashtra's Discoms
16.	Identify the area going for competition and retailer will be given license for that area and then the competition can be phased out on decreasing connected load or increasing connected load. The PPA allocation can be undertaken by Intermediary Company.	competition, decreasing connected load, increasing connected load, PPA allocation, Intermediary Company	Plan for Phasing of introducing retail competition in Maharashtra	Phasing of introducing retail competition in Maharashtra
17.	It depends on the licensee which is responsible for managing the loss. If the Technical and Commercial losses are to the account of Wires licensee then metering has to be responsibility of Wires Licensee. Allocation of collection losses & Commercial losses to Retail Supply Company and remaining losses to Distribution Company. Underbilling by Retail Licensee will inflate the losses and will be to the account of Wires Licensee.	licensee, Technical and Commercial losses, Wires licensee, Retail Supply Company, Distribution Company	Suggestions for allocation of Technical and Commercial losses between proposed distribution and supply companies in Maharashtra	Allocation of Technical and Commercial losses between proposed distribution and supply companies in Maharashtra
18.	Entire network revenue will be in the balance sheet of the network company and supply company will have to follow the balance sheet pattern of the traders. Transfer scheme will spell out the supply assets. Transfer Scheme will specify - determine price cap by factoring various points. Clean Balance sheet to be provided to the successor entities i.e., Wire and Supply Business.	balance sheet, network company, supply company, traders, Transfer scheme, supply assets, Clean Balance sheet, successor entities, Wire and Supply Business	view on balance sheet segregation of current Distribution business among new entities for Maharashtra's transfer scheme	balance sheet segregation of current Distribution business in new entities

19.	For the State Government owned Distribution licensee, the support from the State government can be envisaged for unrecognized losses. Financial losses converted into regulatory assets can be recovered from all the Consumers as Regulatory Asset Charge. State government should fund for the losses.	State Government, Distribution licensee, unrecognized losses, Financial losses, regulatory assets, Regulatory Asset Charge	view on treatment of existing financial losses (recognised and unrecognised both) for Maharashtra's transfer scheme	Treatment of existing financial losses
20.	Consumer must clear the dues and then switch Over. Network company can disconnect and start recovery of dues. Consumer will have to maintain 2 security deposits. Frequency of switchover for the consumers should be limited. The Changeover/Switchover protocol adopted in the Parallel Licensing scenario in Mumbai should be adopted while introducing retail competition. Broad framework for switching procedure (frequency of switching- monthly-linked with power purchase allocation) should be part of transfer scheme.	Consumer, dues, switch Over, Network company, Frequency, switchover, Parallel Licensing, retail competition, framework, switching procedure , transfer scheme	Views on the aspects of Consumer interface and grievance mechanism in Maharashtra	Consumer switching mechanism

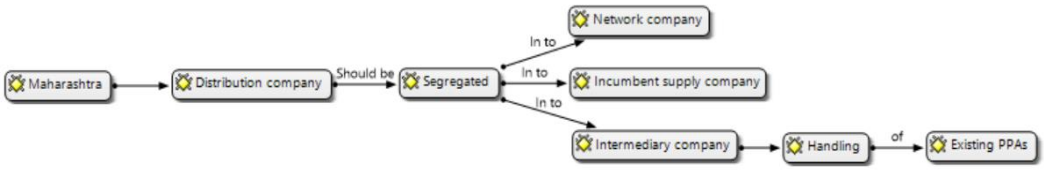
DESCRIPTIVE AND EXPLANATORY ACCOUNTS:

Initial Categories	**Refined Categories**	**Initial Themes**	**Final Themes**	**Core Concept**
Unbundling & Functional Separation of Discoms	Unbundling or ownership and functional separation of Discoms	Unbundling or ownership and functional separation of Discoms	Unbundling or ownership and functional separation of Discoms	**Transfer Scheme and Rollout Plan of introducing retail competition in electricity distribution sector**
Balance sheet segregation of current Distribution business in new entities				
Mechanism for subsidizing the retail business	Mechanism for reduction of Cross subsidy	Tariff Determination & mechanism for reduction of cross subsidy	Tariff Determination & mechanism for reduction of cross subsidy	
Reduction of cross subsidies of Maharashtra's Discoms				
Tariff setting mechanism for retail supply competition in Maharashtra	Tariff setting mechanism for retail supply competition in Maharashtra			
Integration of generation & retailing Activities	Integration of generation & retailing Activities	Transfer Scheme and Roll out plan	Transfer Scheme and roll out plan	
Government Discoms as a supplier of last resort in area of supply.	Government Discoms as a supplier of last resort in area of supply.			
Power Procurement Mechanism and Wholesale market for introduction of retail competition in Maharashtra.	Roll out plan for power procurement			
Allocation of PPAs				
Flexibility of Power Procurement for New retail Supply companies.				
Roll out plan for procurement of new PPAs for new retail supply companies				
Allocation of Technical and Commercial losses between proposed distribution and supply companies in Maharashtra	Treatment of technical, commercial and Financial Losses			
Treatment of existing financial losses				
2nd Retail Supply Company entering market for competition with incumbent Retail Supply Company	2nd Retail Supply Company entering market for competition with incumbent Retail Supply Company			

Transfer Scheme for Maharashtra's Distribution sector	Transfer Scheme for Maharashtra's Distribution sector			
Allocation of metering activities for introducing retail supply competition in Maharashtra	Allocation of metering activities for introducing retail supply competition in Maharashtra	Allocation of metering activities for introducing retail supply competition in Maharashtra		
Consumer switching mechanism	Consumer switching mechanism	Consumer switching mechanism		
Phasing of introducing retail competition in Maharashtra	Phasing of introducing retail competition in Maharashtra	Phasing of introducing retail competition in Maharashtra	Phasing of introducing retail competition in Maharashtra	
responsibility of Universal Service Obligation and Duty to connect	responsibility of Universal Service Obligation and Duty to connect	responsibility of Universal Service Obligation and Duty to connect	Review of Supply code, Std of performance and consumer grievance and Redressal system.	
Framework for Consumer interface and Grievance mechanism in Maharashtra	Framework for Consumer interface and Grievance mechanism in Maharashtra	Framework for Consumer interface and Grievance mechanism in Maharashtra		

RELATIONSHIP DIAGRAMS:

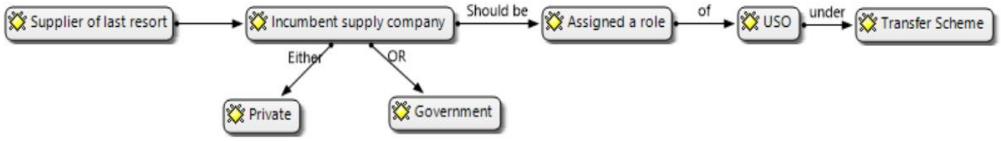
1. Functional Separation of Distribution Companies of Maharashtra:



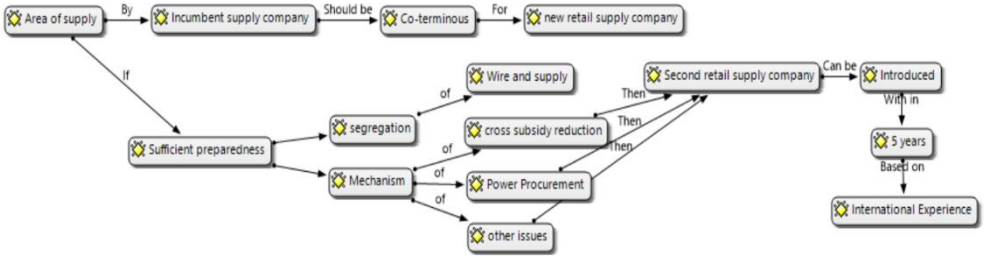
2. Mechanism required to be considered for avoiding integration of generation and retailing activities:

3. Eliminating possibility for subsidizing the retail business from the competition choking off in the distribution business.

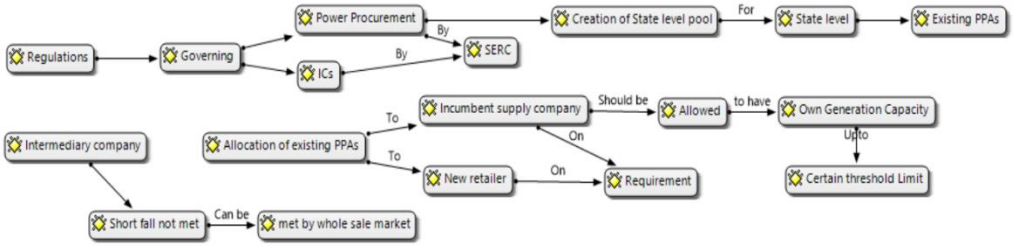
4. Process of allowing Govt. controlled Discoms in the supply area of existing private Discoms in Mumbai for playing role of supplier of last resort.



5. Allowing 2nd Retail Supply Company to enter market for competing with incumbent Retail Supply Company.

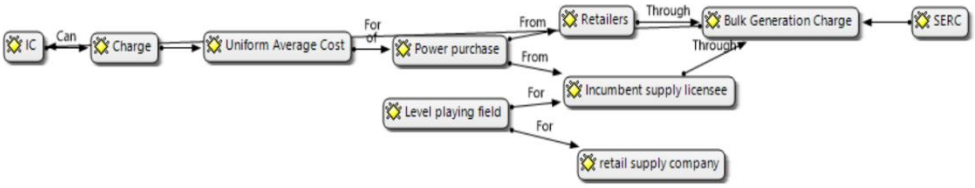


6. Power Procurement Mechanism and Wholesale market for introduction of retail competition in Maharashtra.

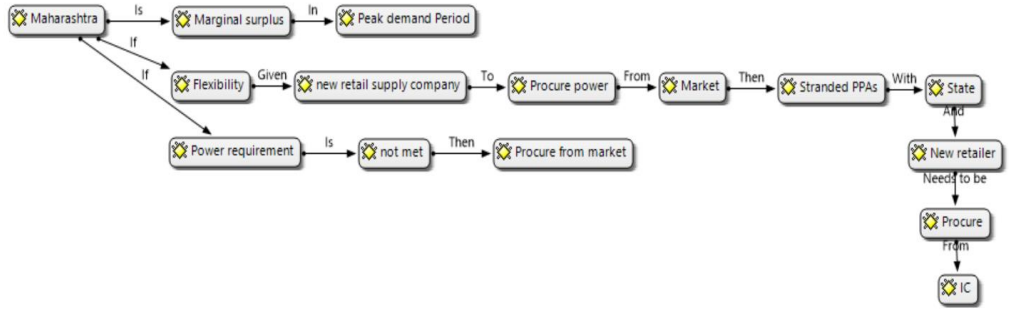


7. Allocation of PPAs between retail supply companies.

8. Maharashtra's transfer scheme.

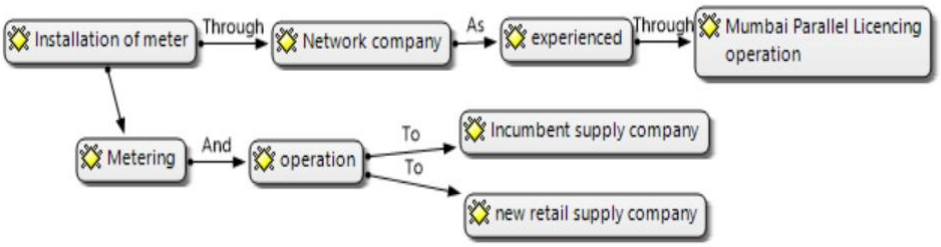


9. Flexibility to procure power from the market.

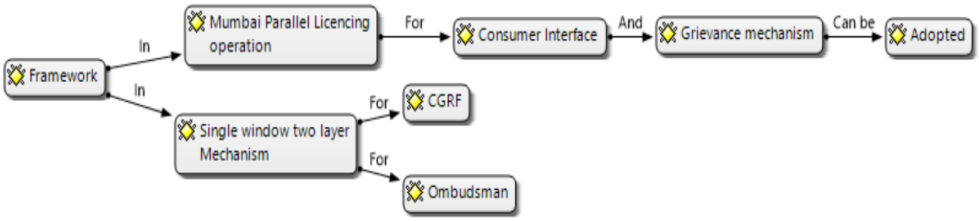


10. IC acting as an aggregator for procuring power could be explored by States:

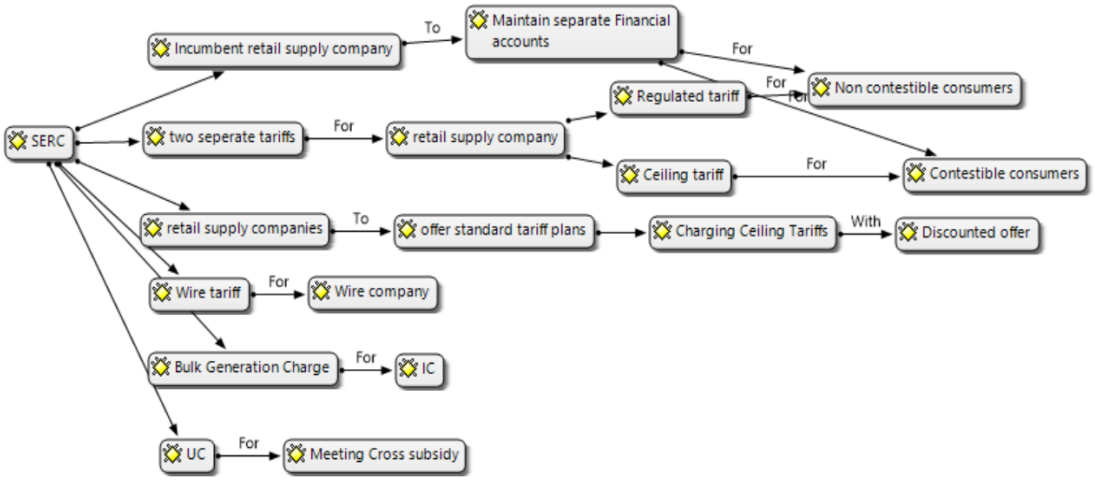
11. The metering activity relating to meter installation/replacement, ownership of meters, meter operation and testing would be decided based on the approach taken towards loss allocation.



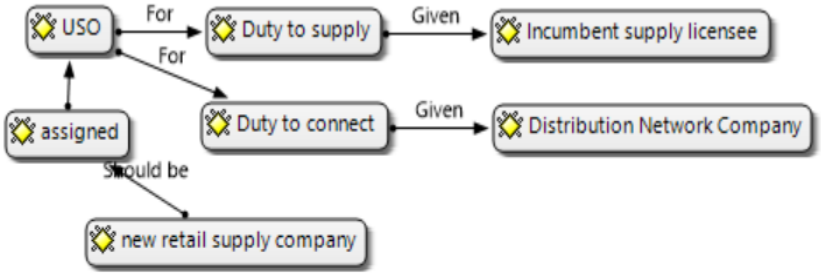
12. Framework for Consumer Interface and Grievance mechanism in Maharashtra.



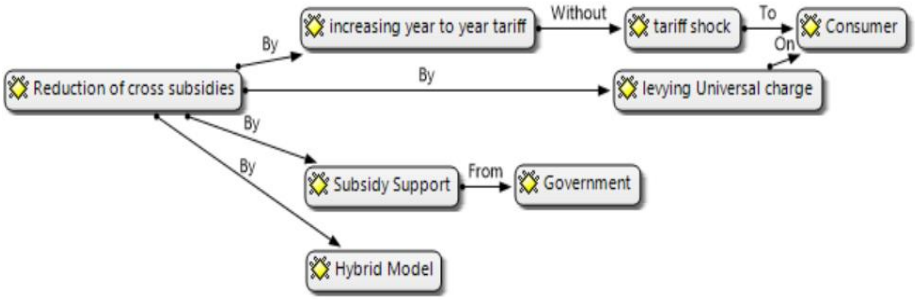
13. Tariff setting mechanism for retail supply competition in Maharashtra.



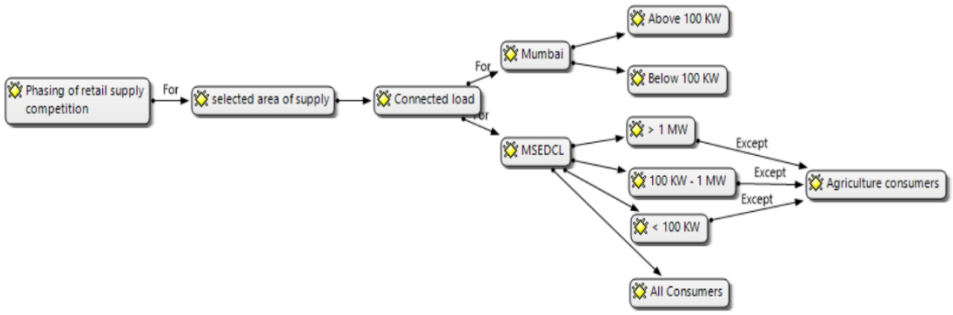
14. Responsibility of Universal Service Obligation and Duty to connect.



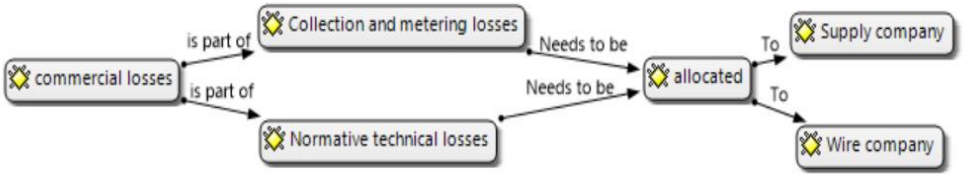
15. Reduction of cross subsidies of Maharashtra's Discoms.



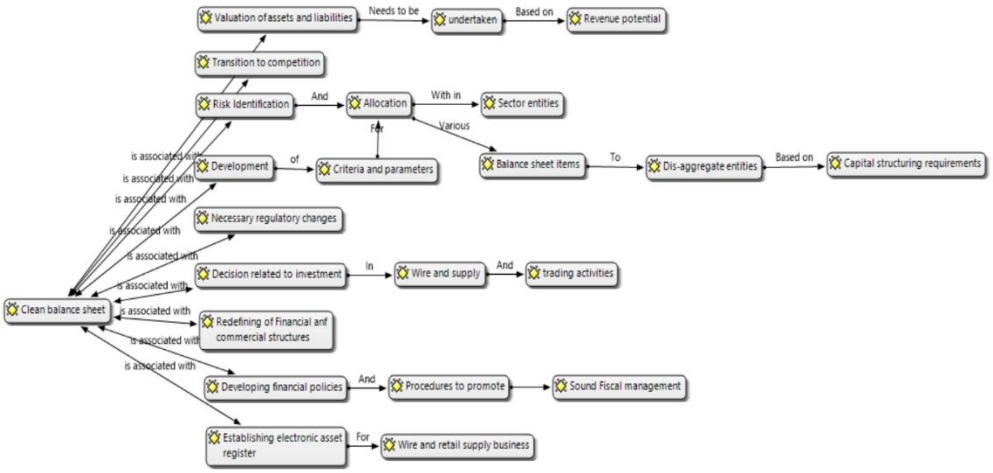
16. Phasing of Retail Supply Competition.



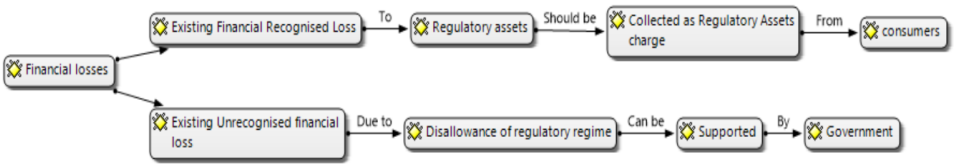
17. Allocation of Technical and Commercial losses between proposed distribution and supply companies in Maharashtra.



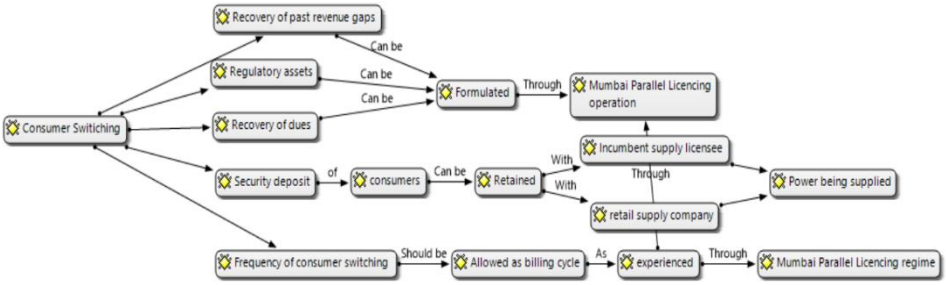
18. Balance sheet segregation of current Distribution business among new entities for Maharashtra's transfer scheme.



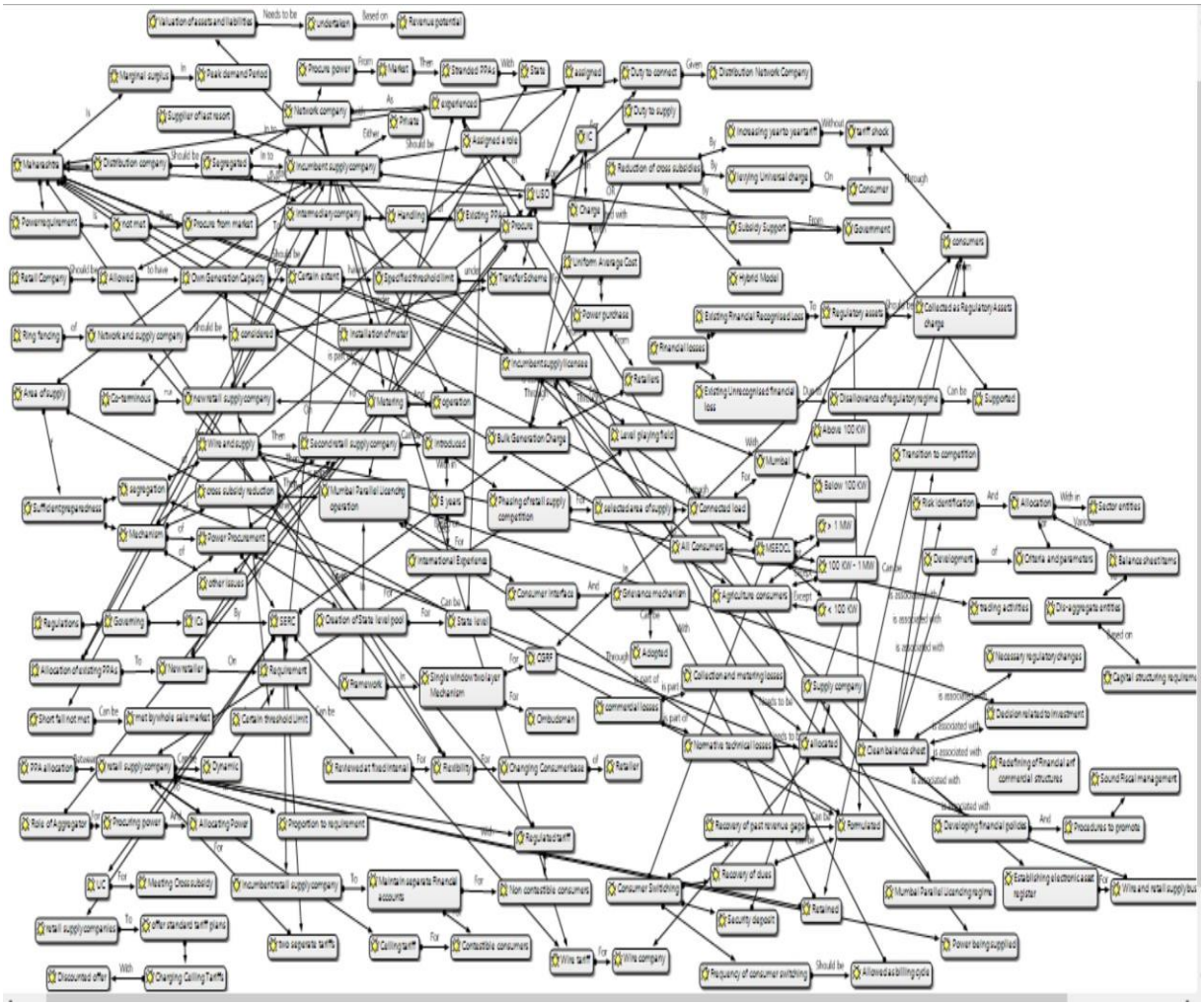
19. Treatment of existing financial losses (recognised and unrecognised both) for Maharashtra's transfer scheme.



20. Consumer switching mechanism.



Transfer Scheme and Rollout Plan of introducing retail competition in electricity distribution sector of Maharashtra:



CURRICULUM VITAE WITH LIST OF PUBLICATION

Prafulla Shrihari Varhade, presently working with Maharashtra Electricity Regulatory Commission (MERC), Mumbai as Director (Elect. Engg.), have completed graduation in Electrical Engineering in the year 1997 from the University of Amravati and postgraduation in Electrical Engineering with specialized areas of power systems in the year 1999 from Govt. College of Engineering, Pune (University of Pune).

After completing the post-graduation study, I have worked at BSES Ltd, Mumbai (now known as Adani Electricity Mumbai Ltd.-an integrated power generation, transmission and distribution company in Mumbai) for about 9 years in the areas of power distribution systems, operating in the suburban areas of Mumbai City and later in the year 2008 I have joined at MERC as Director (Elect. Engg.) in the areas of implementation of Electricity Act, 2003. The MERC is an independent Electricity Regulatory institute in the State of Maharashtra formed by Government of Maharashtra for implementation of Electricity Act, 2003, which described as a manifesto for power sector reforms

With present working in MERC from last 13 years as a Director (Electrical Engineering), my professional experience rose to 21 years in the Electricity Sector and its Regulatory regime which has familiarized me on various aspects of power distribution utility's network planning, design & engineering to operation and maintenance of system and its related regulatory aspects.

I have got good understanding of Electricity Act, 2003, Rules, Regulations, and few important Key Orders and development of restructured power system of issues involved for granting of licenses (Transmission, Distribution and Trading), Mumbai Parallel Distribution Licensing, Open Access, Tariff determination and future regulatory challenges. In order to familiarize the power sector professionals with Electricity Regulatory regime and with the principles, concepts and theories in microeconomics,

post graduate diploma course in Electricity Regulations and a six-month certificate studied for understanding of microeconomics theory for betting understanding of power sector economics. Further to these courses, I have also undergone few one-week courses on infrastructure regulatory and electricity market development at IIM, Ahmedabad.

Details of List of Publications							
S. No	**Title**	**Journal Title**	**Volume (Issue)**	**Page No.**	**DOI**	**Published Digital Link**	**Submitted to UPES repository (Y/N)**
1	**Study of Introducing Competition in Retail Supply of Electricity across Developed Countries and its Framework for India"**	International Journal of Management Studies ISSN(Print) 2249-0302 ISSN (Online)2231-2528	Volume V, Issue 1(2), January 2018	15	Journal No. 44925DOI DOI: 10.18843/ijms/v5i1(2)/15	http://www.researchersworld.com/ijms/	Y
2	**Introducing Retail Electricity Supply Business in India – Lesson learned from UK**	International Journal of Academic Research and Development ISSN: 2455-4197	Volume 3, Issue 1, Jan-Feb 2018	1122-1127	UGC Journal No.: 48808	www.academicsjournal.com	Y

3	***Future Policy of Electricity Sector in India: Electricity Amendment Bill 2020***	Water and Energy International ISSN: 0974-4207 E-ISSN: 0974-4711	VOLUME 63/RNI, NO. 2 May 2020	15	Publisher - Central Board of Irrigation and Power	www.cbip.org	Y
4	***Financial Health of MahaDiscom: A Root Cause Analysis***	Water and Energy International ISSN: 0974-4207 E-ISSN: 0974-4711	VOLUME 64/RNI, NO. 5 August 2021	47	Publisher - Central Board of Irrigation and Power	www.cbip.org	Y