Forum of Regulators (FOR)

Study on
Evolving Principles of Depreciation for Distribution Assets
and
Operating and Financial norms for Distribution

Assisted by:

Deloitte.

December 2021

Table of Contents

List of Tables

List of Figures

1. Executive Summary

1.1.Introduction

Constitution of the Working Group:

In the 63rd meeting of the Forum of Regulators held in New Delhi on 9th April, 2018, it was decided to constitute a Working Group to evolve standard rates of depreciation for distribution assets by suitably modifying the depreciation rates for generation and transmission assets evolved by CERC, alongwith defining standards for " Return on Investment " and " Operating norms in distribution sector " . The Working Group in its first meeting held on 12.10.2018 met and decided that a detailed analysis of the terms of reference needs to be made and a consultant may be appointed . Accordingly, the Forum of Regulators (FOR) has undertaken this study on evolving principles of Depreciation for Distribution Assets and Operating and Financial norms for the Distribution Sector along with a review of the 2009 FOR report on Distribution Margin.The study aims at analyzing the different ways, depreciation is calculated in the electricity distribution sector and understand the issues, concerns and gaps with respect to tariff determination as well as accounting. The study includes benchmarking and comparative analysis of depreciation norms in power distribution sector with other infrastructure sectors in India as well. Further, the study also covers review of the 2009 FOR Report on Distribution Margin and suggestive actions w.r.t the changes in business and regulatory environment.

Structure and scope of the working group: Based on the decision taken in the aforesaid meeting, a Working Group for "evolving rates of depreciation for distribution assets, Return on Investment, and Operating norms on Distribution Sector" is hereby constituted with the following composition: -

1.	Chairperson, Central Electricity Regulatory Commission	Chairman
2.	Chairperson/ Member, Assam Electricity Regulatory Commission	Member
3.	Chairperson/ Member, Bihar Electricity Regulatory Commission	Member
4.	Chairperson/ Member, Gujarat Electricity Regulatory Commission	Member
5.	Chairperson/ Member, Kerala Electricity Regulatory Commission	Member
6.	Chairperson/ Member, West Bengal Electricity Regulatory Commission	Member

The scope of Working Group is as follows :

a) Examine the issue of rates of depreciation for distribution assets by suitably modifying the depreciation rates for generation and transmission assets evolved by CERC;
b) Evolve appropriate draft guidelines on determination of principles/ rates for distribution assets for consideration of the Forum;
c) Review of different principles for determination of depreciation of distribution assets that have been adopted by different SERCs;
d) Examine Return of Investment and Operating norms for distribution sector as specified under Electricity Act 2003, Tariff policy and various regulations notified by Central ElectricityAuthority or any other statuary body;
e) Identification of best practices and key challenges in implementation of existing norms (based on consumer mix, load mix, state/ private owned distribution utility etc.) and suggesting
measures for effective implementation;
f) Study of prevailing compensation mechanism if any, wherein incentives/disincentives for efficient or inefficient operation of discoms w.r.t specified operating norms in (Sr no 3(a)) are shared with consumers;

g) develop model guidelines on operating norms of distribution sector
any other suggestions related to above

Meetings held by the Working Group:

Sl	Date and Venue	Summary of discussions
1	12-Oct-2018 Upper Ground Floor Conference Hall, , CERC, New Delhi	• Asset salvage value of 10 % , recovery of 70% for debt is recommended tocontinue • As distribution business is different when compared to generation and transmission, ROE approach shall continue • It was decided to update the report (2009 report on Distribution margin) by commissioning a study along with study on depreciation. • Benchmarking of financial norms for the distribution companies
2	Date :18-Aug-2021 Venue: MS Teams	• Working Group (State Commissions) may examine the report and send their comments to the FOR Secretariat within 15 days.
3	Date : 21-Sep-2021 Venue: MS Teams	• There is a need for the distributions companies to havean operable FAR and the report should give reference to the Working group and its constitution • On distribution margin aspect, the members of the working group suggested to develop model guidelines incorporating inter alia a common baseline and suggested trajectory along with weightage for various parameters
4	Date : 01-Nov -2021 Venue: MS Teams	• On the issue of asset life, the report should provide option to SERCs to decide the useful life of the distribution asset as indicated by the OEM or based on past experience / operating conditions after seeking inputs from DISCOMs while framing their Regulations. • For distribution margin, the report should draw reference to the relevant provisions of the Electricity (Rights of Consumers) Rules, 2020, especially on prepaid smart meter for the SERCs to suitably frame their regulations.

A detailed presentation was made by the consultants regarding the findings from the study. It was discussed that the states should appropriately adopt the indicative useful life of distribution assets. Further, the measures related to distribution margin may also be suitably adopted by the states for improved adoption of Consumer Rights Rules (2020).
The forum deliberated on the report in its 77th meeting held on 17 Dec 2021 and finalized recommendation provided in subsequent section.

1.2.Scope of Work

The study consists of three major areas:

- Study and analyze methods and principles used for calculating depreciation in the distribution sector including the useful life of different components of distribution assets.
- Study singular practices in other infrastructure sectors and suggest principles and the appropriate useful life of distribution assets in light of the emerging technological and structural changes in the electricity sector.
- Study the FOR Report of 2009 on Distribution Margin and suggest suitability of the principles of availability based cost recovery in the context of the current and emerging scenario in the distribution sector

1.3. Principles of Depreciation

Depreciation is determined by using various guidelines/regulations. The distribution sector follows the following regulations while calculating depreciation of an asset:

a) **Companies Act 2013:** The Companies Act 2013 provides depreciation rates for various assets. The Act specifies the way an asset can be depreciated and lays down rules for depreciation of assets. Companies Act also specifies that a regulatory authority may specify depreciation rates and useful life of an asset. This provision empowers regulatory bodies in the sector to determine the depreciation norms of assets used by the various distribution utilities.

b) **Tariff Policy:**The Tariff Policy notified by the Ministry of Power lays down principles / framework based on which tariff shall be determined by the Regulatory Commissions.

1.4. Aspects of Depreciation

Based on the Depreciation requirements spelt out in the Companies Act, the Accounting Standards and the Tariff Policy, for systematic and rational calculation of asset depreciation for the distribution business, there are four major aspects. These are – Asset grouping, useful life, salvage value and calculation method.

1.5. Depreciation practice of States

Majority of the Regulatory Commissions have followed similar depreciation methodology and rates as prescribed by the Central Commission without any changes. Few tariff regulations consider specific aspects related to distribution business. It is seen that utilities use Straight Line Method of calculation and are following the norms specified by the SERCs. Most of the assets have a residual life of 10 %. The useful life of assets also vary across StatesFurther, the assets classification/categorization is similar to the CERC's asset grouping.

On similar lines as prescribed under CERC regulations, SERCs have provided for higher depreciation rate for initial 12 years and balance depreciation to be spread over balance useful life of the assets. This methodology is adopted to match the depreciation with the repayment of loans and avoid any cash flow issues,. Some SERCs like OERC, HPERC and TNERC prescribe uniform depreciation across the useful life of the asset.

1.6. Key issues in charging depreciation

Some of the issues observed in utilities are:

- **Absence of Fixed Asset Register (FAR):** Most utilities currently do not have FAR in place. This restricts the utilities to accurately determine age of each asset class/category.
- **Classification and categorization of assets:** Utilities generally are classifying most of the electrical network including , LT lines, HT lines and Substations under "plant and machinery" and use uniform rates of assets as approved for transformers / overhead lines.
- **Useful life:** The useful life of distribution assets is not specifically prescribed for all asset categories in many tariff regulations. As a result, the utilities continue to levy the depreciation rates on overall asset categories at similar rates prescribed in the tariff regulations

1.7. Depreciation in Distribution

With the inputs of stakeholders, useful life of major equipments and asset groups were reviewed and the following useful life is suggested:

Table 1: Proposed useful life of key assets in distribution

Sl.	Equipment	Useful Life (in years)
1	Power Transformers	25
2	Distribution Transformers	20
3	Switchgears	10-15
4	11 kV Lines	25
5	LT Lines	20
6	Underground cables	25
7	Meters	10-15

1.8. Key recommendation on Depreciation

A review of the issues and existing practices prevalent in the distribution companies indicates that some areas may require improvement. Based on this, the following recommendations are made:

Asset categories and subcategories should be based on the principles of asset componentization as per the Companies Act 2013 and the Accounting Standards needs to be identified. This involves defining the right grouping of assets and determination of the useful life of the assets under these asset categories / subcategories

It is advisable to have depreciation rates based on the useful life of the asset. Such useful life determination may be periodically reviewed especially in cases where there are technological developments in the asset that impacts their usage

To the extent possible, the depreciation rates by all State Regulatory Commissions may be standardised. This would help in normalising the distribution tariffs across all States. The useful lives

proposed for various categories / subcategories of assets in this report may be used to determine the uniform depreciation rate. The percentage of salvage value (normally at 10%) may also be reviewed considering that costs of removal / disposal of assets and the realization of scrap for these assets is not so significant in distribution.

For all assets which are not specific to distribution business such as IT and communication systems, buildings, civil works, office equipment, furniture and fixtures, vehicles etc, the Regulations may specify that the rates / useful life for these assets as per the Companies Act may apply.

The SERCs may review the current practice of having depreciation rates for initial 12 years, post which the balance depreciation is required to be spread over the remaining useful life of the assets, taking into consideration the debt repayment during the initial period of the project.

All distribution companies may be directed by the State Regulatory Commissions to develop and maintain the fixed asset register as specified above. Such an asset register must contain the following:

- Individual asset item level detail such as date of purchase, date of installation / available to use, asset category / subcategory it belongs to, etc.
- Depreciation charged on each individual asset till it achieves the salvage value threshold
- Record of individual asset de-commissioning / scrapping and thereby, reducing the gross block in the Balance Sheet

1.9. Distribution Margin

In its report on 'Evolving an appropriate model for Distribution Margin' published in 2009, FOR had discussed Distribution Margin approach as a methodology to link returns of Discoms with its performance, measured through power and network availability of Discom. In line with those discussions, a detailed analysis is performed in this report to formulate a framework for Distribution Margins, in context of current power distribution scenario in the country.

Existing practices of incentives/penalties on discoms on performance basis include FOR model regulations for MYT distribution tariffs. Several SERCs have also established different mechanisms for rewarding/ penalizing Discom on their performance, in either Tariff Regulations or SOP Regulations. Such States include Himachal Pradesh, Haryana, Delhi, Maharashtra, Madhya Pradesh, Andhra Pradesh, Telangana and Tamil Nadu.

1.10. Recommendations on distribution margin

The SERCs may continue to use RoE based margin determination. This will be dependent on availability of adequate and accurate data from the utilities. Further, the SERCs may carry out detailed diligence of existing performance parameters and fix suitable limits of performance parameters for determination of ROE.

As the adoption of smart meters increases, the implementation of Consumer Rights (Rules) becomes easier. To achieve this, the SERCs may develop a roadmap for gradual transition into consumer level performance indices. Simultaneously, SERCs may phase out RoE based distribution margin and retain only consumer level performance parameters as a mechanism for rewards/penalties

2. Introduction

2.1. Background

1.1.1. The Forum of Regulators (FOR) has been constituted in 2005 by the Government of India in terms of Section 166 (2) of the Electricity Act, 2003. The Forum consists of Chairperson of the Central Commission as Chairperson of the Forum and the Chairpersons of the State and Joint Electricity Regulatory Commissions as Members of the Forum. Secretarial assistance to the Forum is provided by the Central Commission. The Forum is responsible for harmonization, coordination and ensuring uniformity of approach amongst the Electricity Regulatory Commissions across the country to achieve greater regulatory certainty in the electricity sector.

1.1.2. The Forum of Regulators (FOR) has undertaken this study on evolving principles of Depreciation for Distribution Assets and Operating and Financial norms for the Distribution Sector.

1.1.3. Depreciation is a measure of the wearing out, consumption or other loss of value of a depreciable asset arising from use, effluxion of time or obsolescence through technology and market changes. Depreciation is allocated so as to charge a fair proportion of the depreciable amount in each accounting period over the expected useful life of the asset.

1.1.4. In power sector, the Tariff Policy enacted under the Electricity Act 2003, acts as guiding principle for determination of Tariff which is worked out after considering all costs incurred by the Discom including depreciation.

1.1.5. The study aims at analyzing differentmethods of calculation of depreciation in the electricity distribution sector and understand the issues, concerns and gaps with respect to tariff determination as well as accounting. The study includes benchmarking and comparative analysis of depreciation norms in power distribution sector with other infrastructure sectors in India as well.

1.1.6. The study also examinesthe FOR report on Distribution Margin conducted in 2009 and evaluates its recommendation with respect to proposed framework for implementing Distribution Margins for power distribution companies in India.

2.2. Scope of Work

2.2.1. The scope of work envisaged as per the terms of reference is as follows:

- Study and analyze methods and principles used for calculating depreciation in the distribution sector including the useful life of different components of distribution assets.
- Study singular practices in other infrastructure sectors and suggest principles and the appropriate useful life of distribution assets in light of the emerging technological and structural changes in the electricity sector.
- Study the FOR Report of 2009 on Distribution Margin and suggest suitability of the principles of availability based cost recovery in the context of the current and emerging scenario in the distribution sector

– Any other task required in pursuance of achieving the above

3. Principles of Depreciation

3.1. Depreciation principles as per Companies Act 2013.

3.1.1. Section 123 of the Companies Act 2013 while covering the declaration of Dividend prescribes that dividend is payable only after providing for depreciation and specifies that such depreciation shall be provided in accordance with the provisions of Schedule II. Part A of Schedule II defines depreciation as:

"Depreciation is the systematic allocation of the depreciable amount of an asset over its useful life. The depreciable amount of an asset is the cost of an asset or other amount substituted for cost, less its residual value. The useful life of an asset is the period over which an asset is expected to be available for use by an entity, or the number of production or similar units expected to be obtained from the asset by the entity."

3.1.2. Part A of the Schedule II further states that "In case of such class of companies, as may be prescribed and whose financial statements comply with the accounting standards prescribed for such class of companies under section 133 , the useful life of an asset shall not normally be different from the useful life and the residual value shall not be different from that as indicated in Part C, provided that if such a company uses a useful life or residual value which is different from the useful life or residual value indicated therein, it shall disclose the justification for the same. Accordingly, Part C prescribes the useful life for various asset types."

3.1.3. Part B of Schedule II of the Companies Act 2013, provides that where a Regulatory Authority prescribes a useful life/ rate of depreciation, the same could be used for accounting purposes.

"PART 'B'

"The useful life or residual value of any specific asset, as notified for accounting purposes by a Regulatory Authority constituted under an Act of Parliament or by the Central Government shall be applied in calculating the depreciation to be provided for such asset irrespective of the requirements of this Schedule."

3.1.4. Power sector in India is governed under Electricity Act 2003, with regulatory powers given to Central Electricity Regulatory Commission (CERC) and to State Electricity Regulatory Commission (SERC) in their respective States. Also,the Commissions have specified the useful life or residual value of the distribution assets. Therefore, as per Companies Act, 2013 requirements, it can be concluded that for the power sector, depreciation needs to be ascertained based on useful life provided by the respective State Regulatory Commissions and part C of the Schedule is not applicable.

3.2. Depreciation Accounting Requirements under Companies Act 2013

3.2.1. Under Section 133, the Central Government may prescribe the standards of accounting or any addendum thereto, as recommended by the Institute of Chartered Accountants of India, constituted under section 3 of the Chartered Accountants Act, 1949 (38 of 1949), in

consultation with and after examination of the recommendations made by the National Financial Reporting Authority.

3.2.2. The Institute of Chartered Accountants of India (ICAI) recommends Accounting Standards to National Financial Reporting Authority (NFRA) and the Standards are notified under section 133 of the Companies Act, 2013 by the Ministry of Corporate Affairs, Government of India after considering the recommendation of the National Financial Reporting Authority (NFRA)constituted under the Companies Act, 2013, in the Official Gazette as "Rules" made under the Companies Act, 2013. The Indian Accounting Standards (Ind AS) have been notified as the Companies (Indian Accounting Standards) Rules, 2015.1

3.2.3. Ind AS 16 on Property ,Plant and Equipment prescribes the requirements on Depreciation. Some of the definitions applicable for this study as defined in this Standard are:

- Depreciable amount: is the cost of an asset, or other amount substituted for cost, less its residual value.
- Depreciation: is the systematic allocation of the depreciable amount of an asset over its useful life.
- Residual Value: The residual value of an asset is the estimated amount that an entity would currently obtain from disposal of the asset, after deducting the estimated costs of disposal, if the asset were already of the age and in the condition expected at the end of its useful life.
- Useful life is defined as:
  (a) the period over which an asset is expected to be available for use by an entity; or
  (b) the number of production or similar units expected to be obtained from the asset by an entity.

3.2.4. Para 43 of Ind AS 16 specifies that each part of an item of property, plant and equipment with a cost that is significant in relation to the total cost of the item shall be depreciated separately.

3.2.5. Para 45 of Ind AS 16 specifies that a significant part of an item of property, plant and equipment may have a useful life and a depreciation method that are the same as the useful life and the depreciation method of another significant part of that same item. Such parts may be grouped in determining the depreciation charge.

3.2.6. Para 51 of Ind AS 16 specifies that the residual value and the useful life of an asset shall be reviewed at least at each financial year-end and, if expectations differ from previous estimates, the change(s) shall be accounted for as a change in an accounting estimate in accordance with Ind AS 8 on "Accounting Policies, Changes in Accounting Estimates and Errors".

3.2.7. Para 55 of Ind AS 16 specifies that depreciation of an asset begins when it is available for use, i.e. when it is in the location and condition necessary for it to be capable of operating in the manner intended by management. Depreciation of an asset ceases at the earlier of the date that the asset is classified as held for sale or the date that the asset is derecognised. Therefore, depreciation does not cease when the asset becomes idle or is retired from active use unless the asset is fully depreciated.

[1] Most Indian power sector utilities have already migrated to the new IND AS Accounting Standards. There are however a few utilities which still prepare financial statements based on the earlier Accounting Standards, these are also expected to migrate to the new IND AS Accounting Standards soon. Therefore, in this document, only the provisions of the IND AS Accounting Standards as regards depreciation have been considered.

3.2.8. Para 56 of Ind AS 16 specifies that the following factors be considered in determining the useful life of an asset:

a. expected usage of the asset. Usage is assessed by reference to the asset's expected capacity or physical output.
b. expected physical wear and tear, which depends on operational factors such as the number of shifts for which the asset is to be used and the repair and maintenance programme, and the careand maintenance of the asset while idle.
c. technical or commercial obsolescence arising from changes orimprovements in production, or from a change in the marketdemand for the product or service output of the asset.
d. legal or similar limits on the use of the asset, such as the expirydates of related leases.

3.2.9. Para 60 of Ind AS 16 specifies that the depreciation method used shall reflect the pattern in which the asset's future economic benefits are expected to be consumed by the entity.

3.2.10. Para 62 of Ind AS 16 specifies that a variety of depreciation methods can be used to allocate the depreciable amount of an asset on a systematic basis over its useful life. These methods include the straight-line method, the diminishing balance method and the units of production method. Straight-line depreciation results in a constant charge over the useful life if the asset's residual value does not change. The diminishing balance method results in a decreasing charge over the useful life. The units of production method results in a charge based on the expected use or output. The entity selects the method that most closely reflects the expected pattern of consumption of the future economic benefits embodied in the asset. That method is applied consistently from period to period unless there is a change in the expected pattern of consumption of those future economic benefits.

3.3. Depreciation Requirements under the Tariff Policy

3.3.1. The Tariff Policy notified by the Ministry of Power lays down principles / framework based on which tariff shall be determined by the Regulatory Commission. Depreciation being a key element has been addressed in the Tariff Policy as below:

"5.3 c) Depreciation

The Central Commission may notify the rates of depreciation in respect of generation and transmission assets. The depreciation rates so notified would also be applicable for distribution with appropriate modification as may be evolved by the Forum of Regulators.
The rates of depreciation so notified would be applicable for the purpose of tariffs as well as accounting.
There should be no need for any advance against depreciation.
Benefit of reduced tariff after the assets have been fully depreciated should remain available to the consumers."

3.3.2. Based on the principles defined under the Tariff Policy, useful life and depreciation rates for various generation and transmission assets have been determined by CERC in their Tariff Regulations notified from time to time.

3.3.3. The current useful life for various types of assets in generation and transmission business, followed by CERC (Terms and Conditions of Tariff) Regulations, 2019 is as follows:

Table 2: CERC prescribed useful Life of Generation and Transmission assets

Sl.	Particulars	Useful Life
1	Coal/Lignite based thermal generating station	25 years
2	Gas/Liquid fuel based thermal generating station	25 years
3	AC and DC sub-station	25 years
4	Gas Insulated Substation (GIS)	25 years
5	Hydro generating station including pumped storage hydro	40 years
6	Transmission line (including HVAC & HVDC)	35 years
7	Communication system	15 years

3.3.4. CERC also prescribesdepreciation rates for various generation and transmission assets which are applicable for initial 12 years, post which the balance depreciation is required to be spread over the remaining useful life of the assets.This arrangement considers the debt repayment during the initial period of the project i.e. 10-15 years based on the terms of the loan agreement. This practice of two-phase depreciation was introduced to promote investments in the generation and transmission assets, as the depreciation amount can be used to offset for principal repayment of the capex.

3.3.5. Tariff Policy provides that the depreciation rates notified by the CERC for generation and transmission assets, are to be adopted by SERCs for distribution assets, with modifications considering their appropriateness with respect to distribution business. Accordingly, as part of this study, a detailed review has been conducted to identify various asset categories and sub-categories under distribution business along with assessment of their useful life.

3.4.Aspects of Depreciation

3.4.1. Based on the Depreciation requirements spelt out in the Companies Act, the Accounting Standards and the Tariff Policy, the following aspects need to be defined for systematic and rational calculation of asset depreciation for the distribution business:

A. Asset Grouping
B. Useful Life
C. Allocation Method
D. Salvage Value

A. Asset Grouping

3.4.2. In case of distribution business, individual assets are difficult to classify as all assets are interconnected and it becomes difficult to classify assets in terms of depreciation. Further, for each identified asset, there are many variations in place. For example, in a distribution utility there may be dozens of types of distribution transformers in operation. Further, due to continuous addition of assets in an area, there are multiple assets with varying age in a single area. This is one of the differentiating factors of distribution wrt Generation and Transmission. Individual assets are not always identified by the year of installation. Therefore, it is difficult to calculate depreciation individually for each asset/ item. In a distribution company, most capital asset additionsare undertaken on turnkey basis, for which cost break-up of various equipment types may not be available. This causes difficulties in formulating a standard norm to classify assets in distribution business.

3.4.3. Group depreciation is the practice of assembling several similar fixed assets into a single group, which is used in aggregate as the cost base for depreciation calculations. Asset grouping can be performed on the following basis:

i. **Asset type:** Assets of similar type such as poles, conductors etc. are kept in same group (Lines)
ii. **Asset vintage:**Assets placed into service in the same year are kept in same group
iii. **Asset Life:** As per paragraph 45 of IND 16, separate parts that have the same useful life and depreciation method can be grouped together to determine the depreciation charge.

3.4.4. As per Ind AS 16 component approach, while grouping can be done for depreciation purposes, an item with significant cost must be depreciated separately

"Para 43 of Ind AS 16 specifies that each part of an item of property, plant and equipment with a cost that is significant in relation to the total cost of the item shall be depreciated separately."

3.4.5. Component approach is required for Discoms adopting IND AS Accounting standards. However, the same is applicable only if the Regulator prescribes the same as the electricity entities are covered under Part B of the Schedule II of the Companies Act 2013 (See section 2.1 above for requirements under Companies Act. Components of an asset in distribution can be a subject of interpretation and practicality. For example, can we consider poles as a component of distribution lines? Or can we consider lightning arrestor as a separate component in a distribution line or substation? . These aspects of componentisation come with added issues of segregation of values and components of an asset.

B. Useful Life

3.4.6. As per Schedule II of the Companies Act 2013, useful life is defined as the period over which an asset is expected to be available for use by an entity. Depreciation is calculated by spreading the depreciable value of asset over its useful life, using an appropriate allocation method.

As per para 56 of Ind AS 16, the useful life of assets is dependent on following factors:

- Expected usage of asset
- Expected wear and tear
- Technical or commercial obsolescence
- Legal or similar limits on the use of the asset

3.4.7. In distribution business, useful life depends on various factors including the operating conditions, which vary across each circle in a Discom. For example, overloading of assets combined with lower maintenance activities is a major concern in many areas which tend to reduce the useful life of distribution assets. Further the possibility of assets becoming obsolete through technological change (HVDS, Smart metering, UG Cabling), network redesign (feeder change, UG cabling etc) andpolicy changes add to the complexities of defining useful lives of assets. Few types of assets may have their service lives continually extended, even after being fully depreciated.

3.4.8. In most cases, the equipment manufacturers indicate useful life of the equipment they manufacture, subject to the desired level of maintenance and operating conditions.

3.4.9. Detailed assessment forcategorization of power distribution assets and their useful life is performed later in this report, based on consultations with various State-owned utilities as well as manufacturers and contractors of power distribution systems.

C. Calculation Method

3.4.10. There are several accounting methods that can be used to charge deprecation on the useful life of assets as follows:

i. Straight Line Method (SLM)

Depreciation is calculated by taking an equal amount of the asset's cost as an expense for each year of the asset's useful life, allocating the cost equally over the useful life

ii. Written-Down Method (WDV)/ Annuity/ Declining Balance Method

A (fixed) percentage of the remaining value of the fixed asset is charged as depreciation every year. This method is useful for assets which are subjected to high wear and tear

iii. Accelerated

More depreciation is allocated in early years of asset life. Such method is generally used for tax purposes, to incentivize investors

iv. De-Accelerated

More depreciation is allocated in later years of asset life. Such method is generally used for valuation exercises

v. Production unit depreciation

Calculation of depreciation for each year is based on the asset's output. As per the Units of Production Method, depreciation is charged as per expected use or output of asset. Under this method the depreciation charge can be zero when there is no production.

3.4.11. Calculation of depreciation in distribution assets is essential, as the assets are used on a continuous basis and incur wear & tear and require regular maintenance. A reasonable allocation of depreciation along the life of asset is required, otherwise current consumers could pay lower or higher than their fair share, thereby causing future ratepayers to pay more (or less). Simultaneously, it needs to be ensured that the utility cash flows are also not impacted as the revenue of Discoms is based on cost plus approach and there are no significant surpluses available to attend to loan repayments or other expenses.

3.4.12. As per Ind AS 16, the depreciation method used should reflect the pattern in which the asset's economic benefits are consumed and not how revenue is generated from the asset. Ind AS 16.62 allows for following types of depreciation methods:

- Straight Line Method (SLM)

- Diminishing Balance Method (or Written Down Value, WDV)
- Units of Production Method

3.4.13. As per depreciation methods adopted by international regulators, methods adopted in other infrastructure sectors and considering the uniqueness of the power distribution sector, the appropriate method for depreciation allocation in discussed later in this report.

3.4.14. The provisions of the Tariff Policy and the regulations of CERC prescribes depreciation rates for various generation and transmission assets which are applicable for initial 12 years, post which the balance depreciation is required to be spread over the remaining useful life of the assets. The provisions with respect to depreciation of generation and transmission assets prescribed under the Tariff Regulations notified by CERC also takes into consideration the debt repayment during the initial period of the project i.e. 10-15 years based on the terms of the loan agreement. These however, are not prescribed in the Companies Act or the Accounting Standards.

D. Salvage Value

3.4.15. Salvage value is the residual asset value left at the end of useful life. The depreciable value of asset is the difference between gross asset value less its salvage value. This depreciable value is allocated over the useful life of asset, using one of the many available allocation methods.

3.4.16. Consideringthat many distribution assets such as poles, lines etc. may be installed in areas with low accessibility or high population density, there might be a cost associated in retiring these assets as well. For such asset types/ groups, net salvage value needs to be estimated which is gross salvage value minus costs for removing/ retiring/ disposal of the asset.

3.4.17. Net salvage value can be determined as % of gross asset value. As per section II of the Companies Act 2013, the residual value should ordinarily be not more than 5% of asset's original cost.

3.5. Depreciation practices adopted by SERCs for Distribution Business

3.5.1. Detailed study of tariff regulations of respective State Regulatory Commissions (SERCs) was done in order to understand the existing methodology, depreciation rates across various States. A brief snapshot of existing practices across various SERCs are highlighted below:

Table 3: Comparison of Depreciation Methodology across State Tariff Regulations

SERC's	Methodology	Depreciation Rate	Salvage Value		Years of Accelerated Dep	Depreciation as per useful life
			All Assets	IT related Assets		
CERC		As specified in the Regulations	10%	Nil	12	NA
MERC	SLM	As specified in the Regulations	10%	Nil	-	Yes 70% of the Asset
UERC	SLM	As specified in the Regulations	10%	Nil	12	NA
RERC	SLM	As specified in the Regulations	10%	NA	12	NA
JSERC	SLM	As specified in the Regulations	10%	NA	-	Yes 70% of the Asset

APERC	SLM	As Per CERC Regulations	10%	Nil	12	NA
HPERC	SLM	As specified in the Regulations	10%	Nil	NA	Yes
DERC	SLM	As specified in the Regulations pre	10%	Nil	12	NA
OERC	SLM	up-valued assets(Apportioned) at pre-1992 rates as notified by the Govt. of India	10%	NA	NA	Yes
KERC	SLM	As specified in the Regulations	10%	NA	NA	Yes
TNERC	SLM	As specified in the Regulations	10%	NA	NA	Yes
AERC	SLM	As specified in the Regulations	10%	NA	12	NA
GERC	SLM	As specified in the Regulations	10%	NA	12	NA

3.5.2. While majority of the Regulatory Commissions have followed similar depreciation methodology and rates as prescribed by the Central Commission without any changes, few tariff regulations consider specific aspects related to distribution business as highlighted below:

a. All the State Regulatory Commissions have followed Straight Line Methodology for approving depreciation

b. Some State Regulatory Commissions do not allow depreciation on assets funded through consumer contribution and capital subsidies/grants

c. In tariff regulations of all State Regulatory Commissions reviewed, the salvage value of the asset is considered 10% and depreciation is allowed up to maximum 90% of the capital cost of the asset

d. The salvage value for IT equipment and software is considered as Nil and 100% value of the assets is considered depreciable, in SERC tariff regulations for States including Maharashtra, Uttarakhand, Delhi, Himachal Pradesh, etc. No separate provision is provided in other States

e. On similar lines as prescribed under CERC regulations, SERCs have provided for higher depreciation rate for initial 12 years and balance depreciation to be spread over balance useful life of the assets. This methodology is adopted to match the depreciation with the repayment of loans andto avoid any cash flow issues. However, few SERCs such as OERC, HPERC and TNERC prescribe depreciation rates which are applicable uniformly for the useful life of the asset. MERC and JSERC in their tariff regulations have modified the CERC framework slightly and prescribed higher depreciation rates to be applicable on individual asset upto 70% of the cost and remaining value to be spread over the balance useful life.

The asset categories and the depreciation rates across the various States have been reviewed. The depreciation rates in case of most of the SERCs including Maharashtra, Uttarakhand, Rajasthan, Andhra Pradesh, Karnataka, Tamil Nadu, Gujarat and Assam follow CERC Tariff Regulations 2019. However, in few SERCs such as Jharkhand, Himachal Pradesh, Delhi and Odisha, the depreciation rates differ across categories as indicated in respective sections below:

Table 4: Depreciation rates for Building & Civil Engineering Works of permanent character

Particulars	CERC	JSERC	HPERC	DERC	OERC
Offices & showrooms	3.34%	3.02%	1.80%	-	3.02%
Offices, showrooms & residential Buildings	-	-	-	1.80%	-
Buildings other than Offices,	-	-	-	3.00%	-

Particulars	CERC	JSERC	HPERC	DERC	OERC
showrooms & residential Buildings					
Temporary erection such as wooden structures	100%	33.40%	18.00%	100%	33.40%
Others	3.34%	3.02%	1.80%	1.80%	3.02%

Table 5: Transformers, transformer (Kiosk) sub-Station equipment & other fixed apparatus (including plant foundations)

Particulars	CERC	JSERC	HPERC	DERC	OERC
Transformers (including foundations) having a rating of 100 kilo volt amperes and over	5.28%	7.81%	3.60%	5.83%	7.81%
Others	5.28%	7.84%	3.60%		7.84%
Switchgear including cable connections	5.28%	7.84%	3.60%		7.84%

Table 6: Lightning Arrestors

Particulars	CERC	JSERC	HPERC	DERC	OERC
Station type	5.28%	7.84%	3.60%	5.83%	7.84%
Pole type	5.28%	12.77%	6.00%	5.83%	12.77%
Synchronous condenser	5.28%	5.27%	2.57%	5.83%	5.27%

In the case of type and station type lighting arrestors, regulations of JSERC and OERC follow the Ministry of Power (MoP) prescribed depreciation norms in view of the lower useful life of such asset class.

Table 7: Batteries

Particulars	CERC	MERC	JSERC	HPERC	DERC	OERC
Batteries	5.28%	18.00%	33.40%	18.00%	18.00%	33.40%

3.5.3. While CERC considers useful life of batteries as 25 years, JSERC and OERC follow the five year useful life for this asset and have prescribed higher depreciation rates in line with MoP prescribed depreciation rates of 1994. Other State commissions such as DERC, MERC and HPERC follow the 2004 CERC tariff regulations for useful life (five years).

Table 8: Overhead lines including supports

Particulars	CERC	JSERC	HPERC	**DERC**	OERC
Lines on fabricated steel operating at nominal voltages higher than 66 kV	5.28%	5.27%	2.57%	5.83%	5.27%
Lines on steel supports operating at nominal voltages higher than 13.2 kilovolts but not exceeding 66 kilovolts	5.28%	7.84%	-		7.84%
Lines on steel supports operating at nominal voltages higher than 11 kV but not exceeding 66 kV	-	-	3.60%		-
Lines on steel or reinforced concrete supports	5.28%	7.84%	3.60%		7.84%
Lines on treated wood supports	5.28%	7.84%	3.60%		7.84%
Lines on fabricated steel operating at nominal voltages higher than 66 kV	5.28%	5.27%	-		5.27%

3.5.4. Depreciation rates for overhead lines are similar in majority of the States, with exception of Jharkhand and Orissa. While OERC and JSERC regulations follow the MoP guidelines of 1994,

HPERC has uniform depreciation rates which spread over the useful life of 25 years. DERC has depreciation rates which accommodate 70% of loan repayment during 12 years.

Table 9: Depreciation rates for Meters

Particulars	CERC	MERC	JSERC	HPERC	DERC	OERC
Meters	5.28%	9.00%	12.77%		6.00%	12.77%
Electro Mechanical	-	-	-	6.00%	-	-
Electronic	-	-	-	9.00%	-	-

3.5.5. While all the States have a common depreciation rate for meters, HPERC continues to prescribe different depreciation rates for electro mechanical and electronic meters. Higher rates of depreciation are prescribed under JSERC and OERC which consider a useful life of 15 years as per MoP prescribed depreciation rates in 1994.

Table 10: Depreciation rates for Self-propelled Vehicles

Particulars	CERC	JSERC	HPERC	DERC	OERC
Self-propelled vehicles	9.50%	33.40%	18.00%	9.00%	33.40%

3.5.6. For self propelled vehicles, higher rate of depreciation is provided in tariff regulations in line with MoP prescribed depreciation rates in 1994 which considers a useful life of 5 years for such vehicles as against 10 years considered by CERC.

Table 11: Depreciation rates for Office furniture and related equipment

Particulars	CERC	JSERC	HPERC	**DERC**	OERC
Office furniture and fittings	6.33%	12.77%	6.00%	9.00%	12.77%
Office equipment	6.33%	12.77%	6.00%		12.77%
Internal wiring including fittings and apparatus	6.33%	12.77%	6.00%		12.77%
Street light fittings	5.28%	12.77%	6.00%		12.77%

3.5.7. Common rate of depreciation have been prescribed by DERC for all office furniture and related equipment.

Table 12: Depreciation rates for Communication equipment

Particulars	CERC	JSERC	HPERC	DERC	OERC
Radio and high frequency carrier system	6.33%	12.77%	6.00%	6.00%	12.77%
Telephone lines and telephones	6.33%	12.77%	6.00%	6.00%	12.77%
Fibre Optic	6.33%	-	-	6.00%	-

Table 13: Depreciation rates for IT Equipment and Software

Particulars	CERC	MERC	RERC	JSERC	HPERC	DERC	OERC	TNERC	GERC
I.T. equipment & software	15.00%			-	-	16.67%			
IT hardware		15.00%	15.00%					15.00%	15.00%
IT Software		30.00%	9.00%						30.00%

3.5.8. While CERC prescribe common depreciation rate for IT hardware and software, Regulatory Commissions in Maharashtra, Rajasthan and Gujarat have prescribed different rates of depreciation. In few Tariff regulations asthat in Jharkhand, Odisha, etc., useful life or rate of depreciation for IT equipment and software are not prescribed.

3.6. Key issues in charging of Depreciation

3.6.1. There are several issues currently with respect to charging of depreciation by the utilities in accordance with the provisions in the regulations. Some of the key challenges are highlighted below:

i. **Absence of Fixed Asset Register (FAR):** Most utilities currently do not have FAR in place. This restricts the utilities to accurately determine age of each asset class/category. As a result, it is difficult to charge the differential rates prescribed in the regulations post completion of 12 years. Many utilities therefore undertake adjustments or continue to levy higher depreciation rates as prescribed in the tariff regulations. In most cases, the utilities have applied the depreciation rate applicable for the 12 years assuming that the useful life is only 12 years and have not (a) identified the balance useful life beyond 12 years and (b) applied new rates accordingly

ii. **Classification and categorization of assets:** Utilities generally are classifying most of the electrical network including , LT lines, HT lines and Substations under "plant and machinery" and use uniform rates of assets as approved for transformers / overhead lines. Utilities do not follow the rigor of accounting procedures to achieve a proper classification and categorization of assets. This is mainly because the assets are added under various funding schemes and are operationalised as one project. Further, there are practical difficulties in segregating various assets/equipment commissioned under one capex scheme. Example, in a HT line with Distribution transformer, the utility may struggle to separate cost of transformer if the costs are not segregated in a detailed BOQ.

iii. **Useful life:** The useful life of distribution assets is not specifically prescribed for all asset categories in many tariff regulations. As a result, the utilities continue to levy the depreciation rates on overall asset categories at the similar rates prescribed in the tariff regulations.

4. Review of other sectors and countries

4.1. Review of Depreciation norms across key infrastructure sectors in India

4.1.1. In infrastructure sector, charging of depreciation is an important determinant in asset financing, due to long asset life and significant part of funding from long term loans with extended repayment periods.

4.1.2. Several methods have been employed for depreciation in infrastructure sector, with dual objectives of incentivising investors and to ensure enough cash flows for long term debt repayments. Accelerated depreciation is one of such methods,used particularly in wind power generation sector, as a key incentive during initial years to incentivise capacity addition.

4.1.3. However, the Government of India is working towards gradually reducing the use of such mechanisms, coupled along with reduction of overall corporate tax rate. In 2016, the Government of India, provided an option to new manufacturing companies, to be taxed at a base tax rate of 25% (instead of 30% prevalent rate) provided they do not avail benefits like accelerated depreciation.In this section, depreciation methods followed in various infrastructure sectors of India, are reviewed to compare them against power distribution sector.

Petroleum and Natural Gas

4.1.4. Petroleum and Natural Gas Regulatory Board (PNGRB) regulates utilities involved in downstream activities of City Gas Distribution (CGD), natural gas pipelines and petroleum product pipelines business. PNGRB has formulated following regulations for determination of tariffs:

a. City Gas Distribution | Determination of Network Tariff for City or Local Natural Gas Distribution Networks and Compression Charge for CNG Regulations, 2008
b. Natural Gas Pipelines | Determination of Natural Gas Pipeline Tariff) Regulations, 2008
c. Petroleum Product Pipelines | Determination of Petroleum and Petroleum Products Pipeline Transportation Tariff Regulations, 2010

4.1.5. Under the regulations for City Gas Distribution and Natural Gas Pipelines, tariffs are determined on basis of Discounted Cash Flow basis. In both these regulations, PNGRB has not created any separate method/ rates for regulatory depreciation and has adopted rates provided under Schedule VI to the Companies Act 1956 (now Schedule II of Companies Act 2013) and Income Tax Act, on straight line basis.

4.1.6. For the sector of petroleum product pipelines, the tariffs are determined basis benchmarking with other alternate modes of product transportation, without need for calculation of asset depreciation.

Ports

4.1.7. Tariffs for services provided at 11 major ports in the country, are determined by Tariff Authority for Major Ports (TAMP).

4.1.8. TAMP has issued overall Tariff Guidelines of 2005, along with individual guidelines for different types of ports/ services including - Upfront Tariff Guidelines (for PPP projects at Major Ports) 2008, Tariff Policy 2015 and 2018 (for Major Ports), Tariff Guidelines 2019 (for BOT operators) etc.These guidelines have not created any separate method/ rates for asset depreciation and have adopted rates provided under Schedule VI to the Companies Act 1956 (now Schedule II of Companies Act 2013) and Income Tax Act, on straight line basis.

4.1.9. However as per Tariff Guidelines of 2005, if different useful life norms are prescribed under concession agreements for PPP projects than ones prescribed under Companies Act, whichever norm for life is higher, shall be taken.

'2.7.1 For the purpose of depreciation of assets, straight line method following the life norms adopted as per the Companies Act will be allowed in the case of port trusts. In the case of private terminals, depreciation will be allowed, on straight-line method, with life norms adopted as per the Companies Act or based on the life norms prescribed in the concession agreements whichever is higher.'

4.1.10. Also, the Tariff Guidelines of 2005 states, that if an asset is replaced during the concession period, the depreciation of entire asset shall be recovered over the remaining concession period, on a straight line basis.

'2.7.2 In the case of private terminals, if the assets are replaced during the concession period in accordance with the Agreement, depreciation of the entire capital cost will be allowed over the remaining concession period if (i) assets would have residual life at the end of concession period and (ii) no compensation is payable by the landlord port to licensee when such assets are taken over at the end of the concession period.'

Telecom

4.1.11. Telecom Regulatory Authority of India (TRAI) is the regulatory body for telecommunications sector in India. TRAI initiated tariff regulations for the telecommunication services in India with the notification of Telecommunication Tariff Order, 1999 issued on 09.03.1999 ("TTO"). The TTO has been amended from time to time considering the changes in sector landscape.

4.1.12. Being a competitive sector, the consumer tariffs for telecom and broadcasting services are not determined by the regulator. TRAI has moved over the years from a stage of "fixation of tariff rates" to a stage of "forbearance with prior Approval stage" and finally to a stage of "forbearance regime with post-facto reporting obligation" with regulatory oversight. Tariffs for all other telecommunication service are under forbearance, except for a small list of regulated tariff products including (i) rural fixed line services; (ii) national roaming services; (iii) international private leased circuits and domestic leased circuits; (iv) mobile number portability charges and (v) Interconnection Usage Charges (IUC).

4.1.13. Out of the regulated charges determined by TRAI, ceiling tariffs for leased circuits, Interconnection Usage Charges (IUC) and National Roaming Chargesare determined on cost plus basis. The methodology adopted for determination of these charges is as follows:

a. **Ceiling Tariffs for leased circuits:**The leasing of circuits is a popular mode of purchasing bandwidth by user industries from the telecommunication service providers and other infrastructure service providers. The Tariff Order for setting ceiling tariffs for Domestic Leased Circuits was issued in 2004 by TRAI. In the Order, depreciation rates of 5.28% and 11.88% were assumed for asset categories of cables and equipment respectively. For the purpose of depreciation, life of cables was taken as 18 years and for other assets, life was taken as 8 years. **Straight-line depreciation method was applied**.

b. **Interconnection Usage Charges (IUC):** IUC are wholesale charges payable by a Telecom Service Provider (TSP) to another Telecom Service Provider (TSP) for origination, transiting or termination of the calls. These charges are usually based on cost and indicate a fair compensation for use of one service provider's network resources by another service provider. The termination charges/ IUC are determined by TRAI using a Long Run Incremental Cost (LRIC) basis. Under this method, Annualised Revenues are determined on a cost plus basis,assuming costs that an ideal Telecom Service Provider would bear for creating and operating an efficient network.TRAI notified the first Interconnection Usage Charges (IUC) Regulation on 24.01.2003, amended subsequently 15 times since inception in years 2003, 2006, 2008, 2009, 2015, 2017, 2018, 2019 and 2020.Under these regulations, TRAI has **adopted a Straight Line Method (SLM) for depreciation**.

c. **National Roaming Charges:** The 18th Amendment to TTO of 2002, adopted an incremental cost approach while deciding the national roaming tariffs, taking only directly attributable incremental costs associated with roaming facility into consideration. For capital expenditure recovery, the regulator takes an **annual depreciation of 10% on straight line basis, assuming 10 years of asset useful life**.

4.1.14. Apart from regulatory tariff calculations, the Telecom Industrythrough Tower and Infrastructure Providers Association (TAIPA), has recently requested Finance Ministry to allow accelerated depreciation on batteries, for the purpose of tax calculation. This is suggested to allow for faster adoption of batteries, to replace diesel gensets for power backup at tower sites.

4.1.15. The telecom industry is acomplex amalgamation of businesses wherein one licensee operates various separate businesses, eg Telecom, leased line, wireless services, DTH services. It was therefore necessary to identify each business unit and separate the accounts to determine the costs associated with each business. One of the objectives of the Authority is to ensure fair and level playing field for the participants of the sector. This required understanding the costs of the operators and analysis of the capital employed by the Telecom Operators. In consideration of this, TRAI had notified Accounting separation regulations 2016. With this , TRAI has shifted from Historical Cost Accounting (HCA) to Replacement Cost Accounting (RCA) or Current Cost Accounting (CCA). These regulations are applicable to operators with aggregate annual turnover of more than Rs 100 Cr .

The guidelines for the ASR gives the reason for moving ahead with RCA:

> *Historical Cost Accounting (HCA) is the conventional accounting method, wherein assets are valued and depreciated at the cost recorded at the time of their purchase. The Replacement Cost Accounting (RCA) methodology prescribes valuation of assets at current costs. However, in the context of telecom industry, where cost trends rapidly leave historic accounts out of step with current realities, RCA is considered equally relevant for analyzing costs and revenues. In view of this, the ASR 2016*

provides that Accounting Separation Reports shall be generated on Historical Cost as well as on Replacement Cost basis.

4.1.16. With the introduction of the Accounting separation regulation, TRAI has shifted from the traditional depreciation determination towards a more comprehensive depreciation mechanism. Concept of supplementary depreciation arising out of loss or gain due to difference of HCA cost and RCA cost of asset has been introduced[2]. As discussed earlier, this was necessitated by the nature of telecom business.

Aviation

4.1.17. Airports Economic Regulatory Authority of India (AERA) regulates the tariff charged by airport operators in line with the guidelines issued and has issued Airports Economic Regulatory Authority of India (Terms and Conditions for Determination of Tariff for Airport Operators) Guidelines, 2011 in which the provisions for depreciation are provided as below:

"5.3. Depreciation (D)

5.3.1. Depreciation shall be allowed for calculating Aggregate Revenue Requirement on a forecast basis for each Tariff Year in a Control Period, for assets included in the scope of RAB, and shall be ***calculated using the straight line method*** *of depreciation on the amount of original cost of the existing fixed assets together with forecast additions less disposals of fixed assets:*

5.3.2. Depreciation rates shall be based on reasonable estimates of the ***useful economic life of the assets*** *and may be referenced to the* ***depreciation rates provided in the Companies Act, 1956*** *or to any other empirical evidence.*

5.3.3. The minimum ***residual value of the asset shall be considered as 10%*** *and depreciation shall be allowed up to maximum of 90% of the original cost ofthe asset."*

4.1.18. AERA also conducted a study in 2018 to identify the airport specific assets which were not covered as part of the Part-C of Schedule II of the Companies Act 2013 and prescribe a useful life for these assets in-line with the industry practice and accounting principles. An important aspect also discussed as part of the study was to consider the lower of the lease period of the airport or useful life prescribed as per Companies Act for the purpose of depreciation.

Summary of the review of depreciation practices in other sectors

4.1.19. Based on the review of other sectors, it is observed that regulators have adopted Straight Line Method (SLM) for calculation of depreciation.

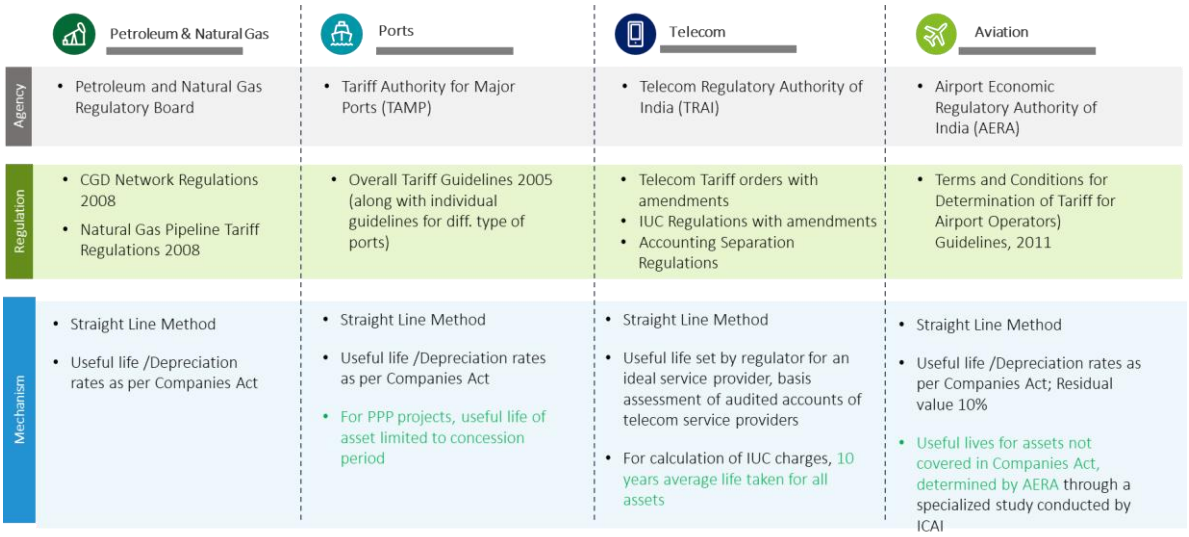
4.1.20. Regulators have mostly adopted depreciation rates/ useful lifes suggested under the Companies Act. In Telecom sector, TRAI calculates ceiling tariffs for some of the regulated activities, on the basis of cost plus approach, assuming costs that an ideal Telecom Service Provider would bear for creating and operating an efficient network. These efficient network costs are estimated based on assessment of audited accounts of telecom service providers.

4.1.21. Further, in Aviation and Ports sectors where PPP models are adopted, the regulators have limited the useful life of assets to the concession period, allowing full cost recovery to private investors during the operational period of the asset.

[2] ASR Guidelines (https://www.trai.gov.in/sites/default/files/Guidelines_Accounting_Separation_Regulations.pdf)

4.1.22. A summary of mechanisms followed for charging depreciation for tariff purposes is given below :

Figure 1: Summary of depreciation methods followed in other sectors



4.2. International Review

4.2.1. Several regulators and power utilities across the world have commissioned studies on depreciation rates and useful life for power distribution assets. In this section, review of depreciation methods followed in power distribution sector of USA, Australia and Philippines is given.

USA (California)

4.2.2. Federal Energy Regulatory Commission (FERC) in its Code of Federal Regulations 18, part 101 defines following certain provisions for depreciation:

'A. Method:=. Utilities must use a method of depreciation that allocates in a systematic and rational manner the service value of depreciable property over the service life of the property.

B. Service lives:- Estimated useful service lives of depreciable property must be supported by engineering, economic, or other depreciation studies.

C. Rate:- Utilities must use percentage rates of depreciation that are based on a method of depreciation that allocates in a systematic and rational manner the service value of depreciable property to the service life of the property. Where composite depreciation rates are used, they should be based on the weighted average estimated useful service lives of the depreciable property comprising the composite group.'

California Public Utilities Commission (CPUC) has issued Standard Practice (SP U-4), titled "Determination of Straight-Line Remaining Life Depreciation Accruals". The Commission in its Standard Practice has suggested remaining life based on straight line depreciation method which is designed to recover cost of plant, less net salvage and less depreciation reserve, over the remaining life of plant. The following formula is prescribed in SP U-4 for calculation of depreciation:

$$Annual\ Depreciation = \frac{Plant - Future\ Net\ Salvage - Accumulated\ Depreciation}{Remaining\ Life}$$

Values of 'Plant' and 'Accumulated Depreciation' are taken as per accounts of the Utilities. The values for 'Future Net Salvage' and 'Remaining Life' are suggested by Utilities through a Depreciation Study, performed as part of the General Rate Case / Tariff Setting process. The Depreciation Study by utilities proposes changes to these values vis-à-vis the authorised values by the Commission, based on their assessments.

In its General Rate Case assessment for 2021, Southern California Edison (SCE) has suggested negative net salvage value for some of the assets, which signifies that cost of removal is more than gross salvage value of the asset (without adjusting the original cost of asset for cost escalations).

Historical retirement costs are used as basis for estimating the future net salvage values. Some of the factors used by SCE in its depreciation study for estimate the net salvage values are:

- Retirement Age – impact of cost escalations
- Asset Retirement Mix – expected changes in asset mix to be retired from a group
- Other considerations for each specific asset group

Australia

Australian Energy Regulator (AER) is responsible for determining tariffs for power distribution utilities in Australia. Clause 6.5.5 of the National Electricity Rules (NER) specifies the conditions that utilities need to follow for preparing their depreciation schedules. AER has not determined any specific depreciation rates, but accepts the depreciation schedules proposed by utilities, if they conform to the requirements of National Electricity Rules. The conditions as per clause 6.5.5 of NER are as follows:

- Depreciation schedules must depreciate using a profile that reflects the nature of the assets or category of assets
- Recovery of depreciation must maintain net present value neutrality over the economic life of the asset or category of assets
- Economic life of the relevant assets, and the depreciation rates and methods underpinning the calculation of depreciation for a given RCP must be consistent with those determined for the same assets on a prospective basis

As per these requirements, the asset classes and their standard asset life used by SA Power networks in Australia are as follows:

Table 14: Australia SA Power Asset Life

Asset Class	Asset Life	Asset Class	Asset Life
Sub-Transmission Lines	55 years	Vehicles	10/ 15 years
Distribution Lines	55 years	Vehicles – light fleet	5 years
Distribution Transformers	45 years	Buildings	40 years

Asset Class	Asset Life	Asset Class	Asset Life
Substations	45 years	Metering	15 years
Low Voltage Supply	55 years	Public Lighting	28 years
Communications	15 years	Information Systems	5 years
Plant and tools/Furniture & fittings	10 years		

Source: SA Power Networks, Regulatory Proposal for 2020-25

While Straight Line Method is followed for calculating depreciation, the depreciation for existing and new assets is treated differently by AER under the Regulatory Asset Base (RAB) approach.

The depreciation for existing RAB is determined by dividing the net asset value by remaining life of assets. The remaining life of assets is determined for each regulatory period based on the weighted average remaining life of all individual assets in the class. As depicted in the figure, the weighted average remaining life is dependent on assets added during the regulatory period and their respective standard life.

Philippines

Energy Regulatory Commission (ERC) determines tariff for power distribution utilities in Philippines, in accordance with its 'Rules for Setting Distribution Wheeling Rates (RDWR) Regulations'.

The regulations follow a straight line method for depreciation.As per regulations, a Regulatory Asset Base (RAB) Handbook is prepared which provides standard rates and useful lives of various assets, grouped into following asset categories:

Table 15: Asset group classification as per RDWR regulations in Philippines

Distribution Service Assets	General/ Non-Network Assets	Others
Land and Land Rights Structures and Improvements Substation Equipment Poles, Towers and Fixtures Overhead Conductors and Devices Underground Conduits Underground Conductors and Devices Distribution transformers Power conditioning equipment Meters, Metering Instruments & Metering Transformers Information technology equipment	Land and Land Rights Structures and Improvements Office Furniture and Equipment Transportation Equipment Stores Equipment Tools, Shop and Garage Equipment Laboratory Equipment Information systems equipment Power-operated Equipment Communication Plant and Equipment Miscellaneous Equipment	Materials and Supplies, including spares Transferred Sub-transmission Assets

Further the assets are classified separately for distribution network business, connection service business and retail service business in the RAB handbook.

The RDWR regulations, allows two methods for calculation of annual depreciation by power distribution utilities, as follows:

Method 1 $|\frac{Optimized\ \ Replacement\ \ Cost}{Regulatory\ \ Asset\ Life} + Disposal - Income\ from\ Disposal$

Method 2 $|\frac{Optimized\ \ Depreciated\ \ Replacemen\ t\ Cost}{(Regulatory\ \ Asset\ Life - Age\ of\ asset)} + Disposal - Income\ from\ Disposal$

The regulations define the regulatory asset life as the economic life of asset i.e. when the costs of maintenance and repair of that asset exceeds the efficient replacement cost of it on a project comparison basis.

Also, the regulations define that assets remaining in service beyond their regulatory life, will remain part of the regulatory asset base and will be valued at 5% of their optimized replacement cost.

European Union

As per a recent report by Council of European Energy Regulators (CEER)[3], almost all National Regulatory Agencies (NRA) have adopted straight line approach for depreciation allocation. Only Estonia uses accelerated approach in electricity and gas distribution sector.

Also, the report states that majority of the NRAs use the individual depreciation rate for each type of asset, except for few countries like Finland where average rate for all companies and all assets is applied.

Summary of international review

The table below summarises the approach adopted for depreciation by regulators/ utilities in the countries reviewed as part of this report.

Table 16: Summary of international review

Country/ Region	Asset Grouping	Allocation Method	Useful Life	Salvage Value
USA (California)	Broad asset type grouping adopted by utility	Straight Line Method	Remaining Life suggested by Utility through Depreciation Study	Net salvage value suggested by utility through Depreciation Study
Australia	Broad asset type grouping adopted by utility	Straight Line Method	Adopted by utility for asset groups in line with NER Rules	Proceeds from disposal in previous regulatory period, reduced by RAB
Philippines	Broad asset type grouping as per Regulations	Straight Line Method	Regulatory asset life defined by ERC in the RAB handbook basis a Depreciation Study	5% of optimised replacement cost
European Union	Broad asset type grouping as per Regulations	Straight Line Method (in majority countries)	Useful economic life defined by National Regulatory Agencies	RAB adjusted for disposals

[3] CEER - Report on Regulatory Frameworks for European Energy Networks, Jan 2019

5. Depreciation in Distribution Business

5.1. Depreciation characteristics

5.1.1. In distribution business, the utilities are following the norms set by the State Regulatory Commissions. One of the key variables in charging a depreciation rate for asset is the useful life of the asset. In the previous chapters ,we have seen that for the same class of asset, utilities are adopting wide range of useful life. This leads to variation in calculation of depreciation for same asset in different utilities. For maintaining similar standards, an asset should have similar useful life across all distribution utilitiesgiven that the design of network follows similar principles.

5.1.2. Further, the depreciation norms of distribution sector are based on CERC norms of depreciation for Generation and Transmission Assets. The CERC norms were based on certain principles and objectives. One of the principles was to assure adequate offset for loan repayment against creation of asset due to which the depreciation method was adjusted to cover for loan repayment period of 12 years. In the context of distribution, there are some differences, especially in the way distribution assets are funded. In the last 10 years, due to lack of sound financials, discoms have relied heavily on State and Central grant funds. Considering this, the depreciation norms of distribution sector may be revised.

5.1.3. The next section analyses the useful life of assets used in distribution business as per various equipment manufacturers and Discoms.

5.2. Useful life for Distribution Assets

5.2.1. A significant number of components and equipment are used in the power distribution business which have varying useful life and therefore are required to be replaced at different intervals. Even for a substation, life of the parts could vary significantly, thus causing concerns for identifying a single useful life for the overall system. On the other hand, defining each component based on the useful life would create so many asset components in the asset break-up that it would be difficult for the utility for recordkeeping. The costs of compliance would significantly outweigh the benefits of the entire exercise.

5.2.2. Therefore, various categories and sub-categories of distribution assets have been prepared for estimating their useful life of these assets. While identifying the various categories / sub-categories, the number of assets have been limited with respect to the significance of each part in terms of overall cost, as also prescribed in the Companies Act:

"Useful life specified in Part C of the Schedule is for whole of the asset. Where cost of a part of the asset is significant to total cost of the asset and useful life of that part is different from the useful life of the remaining asset, useful life of that significant part shall be determined separately."

5.2.3. Accordingly, a detailed list of assets was developed for assessing the useful life in view of the voltage level (HT/ LT), type, etc. of various distribution related assets. Further, consultations with various State-owned utilities as well as manufacturers and contractors of distribution

system was undertaken to assess the useful life of these assets. Based on the responses received, the list was further scrutinized for reducing the number of asset categories / sub-categories based on identical useful life.

The key asset categories identified as part of distribution business were as follows:

A. Transformers

As a significant capital expenditure item of the distribution business, useful life of transformers needs to be prescribed separately. Depending upon the type of service in the power system, the transformers can be classified in two major types i.e. Power Transformers(PT) and Distribution Transformers (DT). The useful life for these two types of transformers have been evaluated. In case of DT, additional sub-categories were considered based on the varying capacities of the DTs being installed by the distribution utilities. The useful life (in years) provided by different manufacturers of Power and Distribution Transformers are as follows: -

Table 17: Manufacturers response with respect to power and distribution transformers

Sl.	Particulars	Useful Life (in years)						
1	**Power Transformers**	**Nucon**	**Toshiba**	**Tesla**	**Century Infra**	**MP Discoms**	**JVBNL**	**UP**
i.	Power transformers	25	25-30	25	25	25t-40	15-20	20
2	**Distribution Transformers**	**Sudarshan Transformers**	**Sai Electricals**	**SJ Transformers**	**Sarvoch India**	**MP Discoms**	**JVBNL**	**UP**
i.	<=25 kVA (Single Phase)	15	20	15	20	15-25	10	5
ii.	<=25 kVA (Three Phase)	15	20	20	20	20-25	10	5
iii.	>25- <100 kVA	15	20	20	20	20-25	10	7
iv.	>100 - < 500 kVA	15	25	20	20	20-25	10	7
v.	> 500 KVA	15	25	20	20	20-25	10	7

In 1994 ,Ministry of Power issued guidelines for depreciation in which it prescribed 25 years of useful life for transformers with rating of 100kVA and above as well as for other transformer capacities. The standard bidding documents prepared by REC under DDUGJY scheme also prescribe 25 years of useful life for transformers.

It is seen that the failure rates of DTs in the country is about 13%[4], indicating a life of about 20-22 Years. In contrast, Power Transformers show higher reliability[5] and show a life of about 30 years.

The operating conditions of distribution transformers also play an important role in determining the useful life. This is reflected in the wide range responses received from discoms on useful life.In locations where there is high population density and high load growth, the distribution transformers are prone to frequent failures thereby leading to reduction in useful life. Similarly, in rural areas, the DTs fail mainly due to lack of supervision

[4] Distribution Transformers -Energy Efficiency and Reliability by Mayur Karmakar <link>
[5] Assessment of Power Transformer reliability <link>

and maintenance. It must be noted that these factors can be controlled by the utility by adequate load management and monitoring. Further, it is not advisable to prescribe separate useful life for same class of asset in different areas of the same distribution company. Considering these factors, following useful life is proposed for various types of transformers:

Table 18: Proposed useful life for Transformers

Sl.	Particulars	Useful Life (in years)
1	**Power Transformers**	25
2	**Distribution Transformers**	
i	<100 kVA	15
ii	>=100 KVA	20

B. Substation Switchgear

Apart from power transformers, a typical power sub-stations (PSS) of a distribution utility comprises of switchgear such as circuit breakers, bus couplers, isolators and lighting arresters. Responses received from key manufacturers in terms of useful life are summarized below:

Table 19: Manufacturers response with respect to Switchgear useful life (in years)

Sl.	Particulars	Wellman power	Powerline	JM Electricals	Rashtriya Electrical	Lamco Industries	MP Discoms	JVBNL	UP
i	Circuit Breakers (33kv S/s)	7	10	5	7-10	10	5-10	7	10
ii	Isolators	7	7	5	7-10	10	5-25	6	10
iii	Bus couplers	7	7	5	7-10	10	5-25	7	10
iv	Lightning Arrestor	10	10		5-7	10	5-25	7	10

The life span of switchgear depends on the size of the load and the number of switching cycles. For switchgear, the mechanical and electrical life spans are separately defined. The mechanical life span states the number of possible operations without electrical loading, while the electrical life span states the number of operations for a certain size of electrical loading and a certain utilization category. In a typical substation, such operations are limited as the utilities are now moving towards higher reliability and high network availability As per the useful life prescribed by Ministry of Power in 1994, 25 years of useful life has been prescribed for switchgear in general. Further, the switchgear may not outlive the power transformer it is associated with. Accordingly, the life of switchgears can be taken as 25 Years.

It is observed that the circuit breakers and bus couplers typically last for 10-15 years and therefore can be considered to have useful life of 15 years. It may be noted that circuit breakers in lower voltage installation experience higher failure, thereby a lower useful life. As per CEA's input, a useful life of 10 years may be considered for LV Circuit breakers. However, isolators and lighting arrestors at substation last for 10 years as also confirmed by the

suppliers/ manufacturers. Therefore, the following useful life has been proposed for switchgear components:

Table 20: Proposed useful life for Switchgear

Sl.	Particulars	Useful Life (in years)
1.	Circuit Breakers (33kv S/s),	15
2.	Circuit Breakers (LV)	10
3.	Isolators	10
4.	Bus couplers	15
5.	Lightning Arrestor	10

C. Other Substation Components

Apart from the switchgear instruments discussed above, a power sub-station (PSS) of distribution sub-stations have control and protection equipment such as relays and instrument transformers used for system parameter's measurement. The sub-station may also house capacitor banks as per requirement in its supply area. Further, distribution utilities nowadays are also deploying SCADA system in their network. Substation components, typically comprise of instrument transformers, insulators, ring main units and SCADA system and are a part of the much needed capital expenditure by all distribution utilities on a continuous basis. Responses received from select manufacturers related to useful life of different substation components are summarized below:

Table 21: Manufacturers response with respect to substation components useful life (in years)

Sl.	Particulars		Rashtriya Electrical	Lamco Industries	Wellman power	Powerline	C&S Electric
i	Instrument Transformer	CT	10	15	15	15	
		PT	10	15	15	15	
ii	Insulators	HT					
		LT	5-7	10	10	10	
iii	Ring Main Unit					20	20
iv	SCADA						

No specific useful life is prescribed by Ministry of Power for the above assets. However, the standard bidding documents for procurement under DDUGJY prescribe 20 years of useful life for ring main unit. For other identified assets, no useful life is prescribed.

Based on the responses received from various manufacturers, it could be inferred that instrument transformers have a useful life of 15 years irrespective of CT/PT. Similarly, for insulators, irrespective of voltage level, the useful life is for 10 years. The ring main unit is designed to last for 20 years as per thespecifications in the standard bidding documents under DDUGJY. However, the life of RMU is dependent on the useful life of the circuit breakers inside it, which typically lasts for about 2000 cycles. Further, the RMU tank is sealed for life, which rules out repairs. As per CEA, a useful life of 10 years may be considered for the RMU. Accordingly, following useful life has been proposed for substation components:

Table 22: Proposed useful life for Substation Components

Sl.	Particulars	Useful Life (in years)
1.	Instrument Transformer and relays	15
2.	Insulators	10
3.	Ring Main Unit	10
4.	SCADA	20

D. Capacitor Banks

Capacitor banks are installed in substations to correct the power factor, consequently minimising the voltage drop at the load end. This helps in improving the power quality in the system. Based on our analysis, it is observed that the useful life of capacitor banks varies from 15-20 years and therefore, the following useful life has been proposed:

Table 23: Proposed useful life for Substation Components

Sl.	Particulars	Useful Life (in years)
1.	Capacitor Banks	20

E. Batteries

Battery banks are installed in sub-stations to supply DC to the control panel used for operating sub-stations switchgear. In case of substation batteries, the MoP prescribed useful life of 5 years which has been adopted by CERC as well and is also considered reasonable.

F. Wires and Cables with support structures

Electricity can be distributed either by overhead conductor and cable systems or by underground cables. The cables are different from the bare overhead conductors as they are provided with insultation. The proper selection of the cables in the distribution network is crucial so as to assure required level of operational reliability with due consideration of the cost aspects. Further, sub-categorisation has been done based on operating voltage level.

The responses of manufacturers with respect to useful life of wires and cables along with support structures are as follows:

Table 24: Manufacturers response with respect to Overhead/ Underground Lines

Sl.	Particulars	Useful Life (in years)								
1.	Overhead lines	**Apar Conductors**	**Indoalusys**	**Havells**	**Mahavir Transmission**	**Lumino**	**Gupta Power**	**MP Discoms**	**JBVNL**	**UP**
i	33kV and above lines	30	25	25	28-30	30	25	15-40	15	50
ii	11kV lines	30	25	25	28-30	30	25	15-40	15	50
iii	LT lines	25	25	30	25-30	20	20	15-40	15	50
2.	Undergroun	**KEI**	**Polycab**	**Havell**	**Avocab**			**MP**	**JBVN**	**U**

Sl.	Particulars	Useful Life (in years)								
	d lines			s				Discoms	L	P
i	33kV and above lines	30	40	35	30-35			20	15	50
ii	11kV lines	30	40	35	30-35			20	15	50
iii	LT lines	30	40	35	30-35			5	15	10

Ministry of Power in consultation with CEAprescribes the following useful life in its amendment dated 27.03.1994:

Sl.	Particulars	Useful Life (in years)
1	**Overhead lines including supports:**	
i	Lines on fabricated steel operating at nominal voltages higher than 66 KV.	35
ii	Lines on steel supports operating at nominal voltages higher than 13.2 kilovolts but not exceeding 66 kilovolts	25
Iii	Lines on steel or reinforced concrete supports	25
iv	Lines on treated wood supports	25
2	**Underground lines**	
i	Underground Cable including joint boxes and disconnected boxes	25

It is observed that all lines and cables on wooden/ steel/ concrete support structures have been prescribeduseful life of 25 years.

As per CEA's input on this study, the lifetime of a power cable depends on its ability to carry the rated current safely at the rated voltage without excessive loss or failures.The cables fail when the insulating properties deteriorate leading to loss of integrity of the cable system causing repeated failures. The life of cable is also dependent on the operating conditions and installation parameters. Highly urbanised place with extreme weather accelerates degradation in useful life, whereas areas with moderate to cool climates show lower degradation in useful life.

As per the responses of the manufacturers, there is little or no significant difference across the voltage level of lines for 11kV and above. However, the useful life for LT lines may be kept lower at 20 years. For underground cables, MoPhas revised the useful life to 25 years as the life reduces in higher temperature regions. Accordingly, following useful life has been proposed for cables and wires:

Table 25: Proposed useful life for Overhead and Underground lines

Sl.	Particulars	Useful Life (in years)
1.	**Overhead lines including supports:**	
i.	11kV and above	25
ii.	LT lines	20
2	**Underground lines including join box and disconnected boxes**	**25**

G. Meters

The requirement for meters in case of distribution business is substantial. Along with metering network elements, distribution companies need meters at each sale point (Consumer). With the changes and evolution of metering technology, the useful life of meters in case of distribution business needs to be ascertained keeping in mind technological obsolescence. Therefore, significant number of categories were initially prepared for understanding the variation in useful life. While predominantly twometer categories were formed i.e. Consumer meters and Interface /Energy Accounting meters, various sub-categories including HT/ LT meter and Electronic /Smart meters were developed for the review.

The responses of manufacturers with respect to useful life of the identified meter categories are as follows:

Table 26: Manufacturers and discoms response with respect to useful life of Meters (in years)

Sl.	Particulars		Secure	Genus	HBL	L&T	MP Dicosm	JBVNL	UP
1	**Electronic Meters**								
i.	Interface meter		10	7	10	10	7-15	10	10
ii.	Energy Accounting meters		5	7	7	10	7-15	10	10
iii.	Consumer meters	HT	5	5	7	10	7-15	10	10
		LT	5	5	7	10			
2.	**Electronic Smart Meters**								
i.	Consumer meters with communication infrastructure	HT	5	5	7	10	10	10	10
		LT	5	5	7	10	10	10	10

While Ministry of Power prescribes 15 years of useful life in its amendment dated 27.03.1994, the same was in view of the existing technology and useful life of meters being used at that time. The standard bidding documents issued with respect to procurement of meters under DDUGJY prescribe 10 years useful life for meters.

While the types of meters being used within the distribution utilities would be diverse, the useful life of various electronic meters have reduced to 5-7 years as also indicated by the responses of the manufacturers. Few of the SERCs such as MERC, JSERC, etc. are following useful life of 7-10 years in case of meters. Therefore, in view of the continuous advancement in metering technology and requirement to replace existing meters with smart meters as per the Tariff Policy, the following useful life could be considered in case of meters:

Table 27: Proposed useful life for Meters

Sl.	Particulars	Useful Life

		(in years)
1.	**Consumer Meters**	
i.	Electronic meters	10
ii.	Smart meters	10
2	**Interface/ Energy Audit Meters**	**10**

H. IT Equipment including software, etc.

With the growing adoption of information technology and focus on data centres, disaster recovery centre, etc. for bringing efficiencies in distribution business, significant share of IT related assets (both hardware as well as software) is being added by the distribution utilities. It is important to determine an adequate useful life of these assets as the CERC regulations do not currently provide a single rate of depreciation for these assets.

In case of hardware, Companies Act provide for useful life of computers and data processing units. Under this category, useful life of 6 years is prescribed for servers and network while a useful life of 3 years is prescribed for end use devices such as desktops, laptops, etc.

With a view to ease the requirement to differentiate various kinds of IT hardware and software, the various asset classes under this category have been reduced and common depreciation rates have been prescribed based on the average usage of these assets.In case of IT software, every type of software (whether inhouse developed or licensed ready software) undergoes significant changes or upgrades every 4 to 5 years. Therefore, software costs are normally amortized over this period, and new software developed or procured is then capitalized.

Table 28: Proposed useful life for IT equipment and software

Sl.	Particulars	Useful Life (in years)
1.	**I. T Equipment including software**	
i.	Information and Communication system including communication hardware	7
ii.	IT hardware (server equipment)	6
iii.	IT hardware (end use i.e. desktops / laptops)	3
iv.	IT software (amortization of software licensing costs OR in house developed software)	5

I. Safety equipment and Tools

In distribution business, safety equipment and various tools need to be maintained at the substation level which are also required to be replenished from time to time. Based on the discussion with utilities, the same have been categorized under two heads for the purpose of useful life:

Table 29: Proposed useful life for Safety equipment and tools

Sl.	Particulars	Useful Life (in years)
1.	**Safety and Tools**	
i.	Tools and Tackles (wire strippers, pliers, flash arc equipment, drill, hammer etc)	10

ii.	Personal protective equipment PPE (shoes, gloves, glasses, protective gear etc)	5

J. Buildings and Civil Engineering works

Buildings and offices, showrooms, and other civil engineering works can be classified in similar manner as done under Companies Act as provided below. No major differentiation is required for buildings / civil works constructed for the distribution business:

Table 30: Proposed useful life for Buildings and Civil engineering works

Sl.	Particulars	Useful Life (in years)
1.	Buildings and Civil Engineering Works of permanent nature	
i.	Office and showrooms	60
ii.	Buildings other than Offices & showrooms	30
iii.	Others	30
2.	Temporary structures and erections	1

K. Office furniture, equipment, fixtures, etc.

Office furniture, equipment, etc. can be classified in similar manner as done in Companies Act and provided a common useful life as provided below:

Table 31: Proposed useful life for Office furniture, equipment, etc.

Sl.	Particulars	Useful Life (in years)
1.	Office furniture, equipment, fixtures, etc.	
i.	Office furniture and fittings	10
ii.	Office equipment	10
iii.	Internal wiring including fittings and apparatus	10
iv.	Street Light fittings	10

L. Self-propelled vehicles

Incase of self propelled vehicles, the useful life could be retained as determined by CERC in its tariff regulations as well as specified by MoP in its notification of useful life in 1994:

Table 32: Proposed useful life for self-propelled vehicles

Sl.	Particulars	Useful Life (in years)
1.	Self propelled vehicles	5

5.3. Suggested Approach

The figures suggested in the above sections are based on discussions and inputs from CEA, OEMs and users (Discoms). The State Commissions may make necessary adjustments in the values as per the operating norms of the State. In order to make these adjustments ,the State

Commissions may take necessary inputs from the OEMs and Discoms to arrive at suitable values for useful life.

5.4. Key Recommendations on Depreciation

5.4.1. Asset categories and subcategoriesshould be based on the principles of asset componentization as per the Companies Act 2013 and the Accounting Standards needs to be identified. This involves defining the right grouping of assets and determination of the useful life of the assets under these asset categories / subcategories. For implementing this, discoms may need to standardise the Bill of Quantities (BOQ) of all capex programs which will help in componentization of the various sub-groups.

5.4.2. It is advisable to have depreciation rates based on the useful life of the asset. Such useful life determination may beperiodically reviewed especially in the cases where there are technological developments in the asset that impacts their usage. Such periodic determination of the useful life must be done keeping in mind the following factors as per the Accounting Standards:

a. expected usage of the asset.
b. expected physical wear and tear including the expected repair and maintenance.
c. technical or commercial obsolescence
d. legal or similar limits on the use of the asset

5.4.3. To the extent possible, the depreciation rates by all State Regulatory Commissionsmay be standardised. This would help in normalising the distribution tariffs across all States. The useful life proposed for various categories / subcategories of assets in this report may be used to determine the uniform depreciation rate. The percentage of salvage value (normally at 10%) may also be reviewed considering that costs of removal / disposal of assets and the realization of scrap for these assets is not so significant in distribution.

5.4.4. For all assets which are not specific to distribution business such as IT and communication systems, buildings, civil works, office equipment, furniture and fixtures, vehicles etc, the Regulations may specify that the rates / useful life for these assets as per the Companies Act may apply.

5.4.5. The existing system of using SLM for calculating depreciation may be continued as prescribed by the Companies Act. The Companies Act prescribes only a minimum depreciation rate and gives flexibility to companies to charge a higher rate of depreciation. This is in line with the conservative accounting policy of accounting for expenses / losses as they occur and not have an asset value in the Balance Sheet which is not represented by actual assets on the ground. The same flexibility may be provided by the State Regulatory Commissions to the distribution utilities in case they have a genuine case of reduced asset life given the manner of its usage, prevailing local conditions and maintenance practices. Such higher rate of depreciation, if required, may be justified based on a study conducted by the Utilities and accordingly approved by the respective State Regulatory Commission.

5.4.6. The SERCs may review the current practice of having depreciation rates for initial 12 years, post which the balance depreciation is required to be spread over the remaining useful life of the assets, taking into consideration the debt repayment during the initial period of the project. As could be observed in this report, other than Power Transformers and Overhead lines which have a useful life of 25 years plus, all other asset categories have useful life within

20 years. Therefore, having a single rate may not have a major impact in the recoupment of cash through tariff to settle debt repayment obligations. At the same time, this removes the need for the distribution companies to maintain records and calculate different depreciation rates for the same asset based on its age. In any case, given the non-availability of the fixed assets register and adequate systems for fixed assets and depreciation calculation, most distribution companies have not been able to implement the above.

5.4.7. When the revised useful life / depreciation rates are taken up for recommendation, transition rules may be put in place to ease the implementation issues, given that most distribution companies do not have a fixed asset register and will not be able to re-adjust the already charged depreciation as per the new useful life. Therefore, it is recommended that the new rates be made applicable only for new assets procured from the cut-off date with the distribution companies complying with the requirement of a fixed assets register for all new assets from that date. Old assets may continue to be charged at the existing rates till the end of their useful life. Distribution companies having fixed asset records for the assets procured before the cut-off date may be given a one-time option to adopt the new rates for the older assets, if they so desire.

5.4.8. All distribution companies may be directed by the State Regulatory Commissions to develop and maintain the fixed asset register as specified above. Such an asset register must contain the following:

- Individual asset item level detail such as date of purchase, date of installation / available to use, asset category / subcategory it belongs to, etc.
- Depreciation charged on each individual asset till it achieves the salvage value threshold
- Record of individual asset de-commissioning / scrapping and thereby, reducing the gross block in the Balance Sheet

6. Distribution Margin

6.1. Distribution tariff determination

6.1.1. In its report on 'Evolving an appropriate model for Distribution Margin' published in 2009, FOR had discussed Distribution Margin approach as a methodology to link returns of Discoms with its performance, measured through power and network availability of Discom. In line with those discussions, a detailed analysis is performed in this report to formulate a framework for Distribution Margins, in the context of current power distribution scenario in the country.

6.1.2. Globally, the methodologies for power distribution tariffs have evolved from historical/ negotiation based tariff setting by Government to market based competitive determination, moving along with the stage of sector reforms.

6.1.3. Section 62 of the Electricity Act 2003, gives power to State Electricity Regulatory Commissions (SERCs) to determine tariffs for power distribution utilities, guided by the Tariff Policy published by Central Government. The Tariff Policy 2006 laid down the framework for tariff determination, using a Multi Year Tariff (MYT) approach. The MYT framework brings in elements of both Cost Plus methodology and Performance Based Regulations. The MYT framework adopted by regulators in India, determines Annual Revenue Requirement (ARR) for utilities, on cost plus basis for non-controllable parameters like fuel costs, sales etc. and using targets/ norms for controllable parameters like AT&C losses, O&M costs, capex benchmarking, ROE etc.

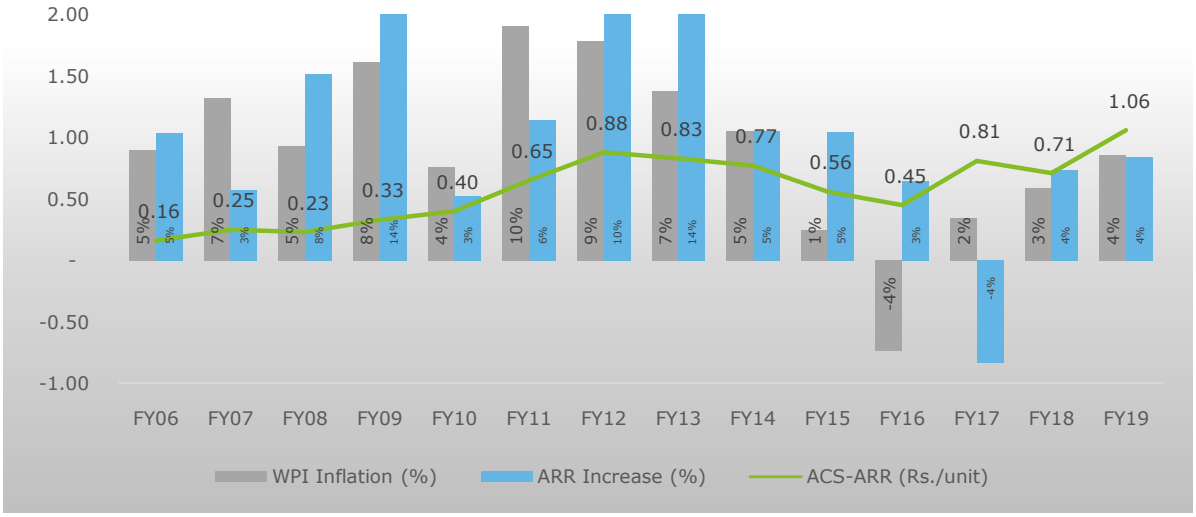
Figure 2: Evolution of tariff determination methodologies

	Historical/ Negotiation	Cost Plus	Hybrid/ MYT	Performance Based Regulation	Market Competition
Description	Tariff set based on historical & socio-political trends	Utilities allowed to recover their costs plus returns	Uncontrollable costs allowed on Cost Plus basis while Controllable costs on Target/ Norm basis	Cost/ tariff for a ideal utility determined with recovery linked to inflation and performance of utility	Multiple utilities exist in market, competing among themselves to supply electricity
Sector Reform Stage	Government Owned/ monopoly	← Independent Regulator with single utility, publically or privately owned →			Multiple competing utilities
Tariff Setting Agency	Government	Government/ Regulator	Regulator	Regulator	-
Countries following this regime	Lao PDR, Myanmar	Nepal, Sri Lanka, Cambodia, Thailand etc.	**India**	Malaysia, Brazil, Philippines, UK for networks business	United Kingdom, Australia for power supply business

6.1.4. Performance-based regulations for tariff determination aim to improve the operational performance of power utilities though the tariff determination process. Power distribution tariffs are determined by regulators in India using targeted/ normative parameters, while costs of utilities are reflective of actual performance of utilities. In an ideal scenario, the gap between cost and recovery (ACS-ARRgap) of Discoms, should reduce gradually indicating that actual performance of Discoms is converging towards targeted performance levels. At the same

time approved ARR of Discoms should grow in alignment with overall inflation.If the ARR is growing higher than inflation, it could mean that the utility is performing poorly and its inefficiency is being reflected in its ARR.

Figure 3: ACS-ARR Gap and inflation vs tariff increase



Source: PFC reports on performance of State utilities; WPI as per RBI annual reports

6.1.5. The above chart shows the growth in ARR wrt to WPI inflation plotted against the national ACS-ARR gap in Rs/kWh. In FY 12 and FY 13, utilities have seen major hikes in tariffs, may be due to pending hikes. No clear co-relation can be observed from the above chart between increase in ARR and WPI inflation, barring few years. At the same time ,increasing ACS-ARR gap signifies that Discoms have missed performance targets/ standards set by regulators and used for tariff determination. Therefore, a ***new mechanism of implementing performance based regulations in power distribution tariffs is required in India***, which can appropriately reflect performance of power utilities and guide them towards performance improvement.

6.2.Distribution Margin approach for regulated returns

6.2.1. There are two probable approaches for implementing Performance Based Regulations in power distribution tariff determination –

a. **Price Cap:**The tariffs are capped for a regulatory period, with suitable accounting for inflation, efficiency improvement and investment requirement. This practice has been adopted in United Kingdom for setting of power distribution network tariffs.

Price = Po x [1 + (I – X)] + Q
Where,
Po – Base Price
I – Inflation index
X – Factor for efficiency improvement
Q – Factor for incremental costs

6.2.2. As per this approach, the power utility has incentive to reduce its cost, increasing its gap between approved price-cap, leading to higher returns

a. **Incentive/ Penalty in costs:** Based on performance of utility on pre-determined parameters, a reward or penalty amount is determined and adjusted from the overall allowed revenues of power utilities. This practice has been adopted in Philippines under Performance Incentive Scheme. As per this approach, the power utility risks losing out on its full cost recovery, in case of non-achievement of performance targets

6.2.3. The Tariff Policy discussed the inherent difficulties in going beyond regulated returns on the basis of scrutiny of costs for power distribution business, and instead proposed a MYT based framework. Section 5.3 of the Tariff Policy 2006 also states that State Commissions may consider 'Distribution Margins' as one of the methods for implementing performance-based returns for Discoms. The Policy mentioned directions to Forum of Regulators (FOR) to evolve a comprehensive approach on "Distribution Margin".

6.2.4. Accordingly, a Group was established in the Forum of Regulators (FOR) in April 2006 to give its recommendations on Distribution Margin, as provided in the Tariff Policy. The Group suggested that the MYT framework could incorporate some essential features of the Distribution Margin approach. The concept of Distribution Margins, allows an incentive/ penalty on revenue recovery of Discoms (in % terms), based on its performance over pre-determined performance standards. The suggested formula under the report for Distribution Margins is also included by the FOR in its Model Regulations for MYT Distribution Tariffs, discussed in next sub-section.

6.3. Existing practices of incentive/ penalty on Discoms basis performance

FOR Model Regulations for MYT Distribution Tariffs

6.3.1. FOR in its report 'Study on evolving an appropriate model for Distribution Margin 2009 ' and Model Regulations for MYT Distribution Tariffs has suggested a mechanism for adjustment to Discom's ARR on the basis of their targeted availability, as discussed below.

6.3.2. FOR Model Regulations for Multi Year Distribution Tariffs provides for adjustment to Discom's ARR based on achievement of target power availability metrics (measured through SAIDI/ SAIFI). As per these model regulations, incentive or penalty in form of adjustment of +/- 0.2% of ARR may be provided against such performance attributes.

> *'Sec 34. Target Availability and Recovery of ARR*
>
> *(a). Recovery of the Annual Revenue Requirement determined as per the norms under these regulations shall be based on achievement of the target availability index as under:*
>
> *The Availability index shall be computed for both Wheeling Business and Supply Business of the Distribution Licensee on yearly basis as per following*
>
> *For Wheeling Business:*
>
> *Wheeling Network Availability Index (%) = (1-(SAIDI/8760)) X 100*
>
> *Where,*
>
> *SAIDI = Sum of all customer interruption durations/Total number of consumers served*
>
> *For Supply Business:*
>
> *The Supply Availability shall be measured on the basis of power contracted by the Distribution Licensee on a long-term basis as per the power procurement plan under following heads:*

Base Load Supply Availability = ((Actual Contracted Base Load Supply (MW)) X (Number of Off-Peak hours)) / ((Base Load in MW) X (Number of Off-Peak hours))

Peak Load Supply Availability = ((Actual Contracted Peak Load Supply (MW)) X (Number of Peak hours)) / ((Peak Load in MW) X (Number of Peak hours))

Supply Availability Index = 75% of Base Load Supply Availability + 25% of Peak Load Supply Availability

……

(e) The additional ARR shall be considered as +/- 0.2% of ARR for every percentage point increase/decrease in Availability vis-à-vis the normative levels of availability. Provided that the maximum additional return that can be earned/reduced shall be +/- 2% of ROE.'

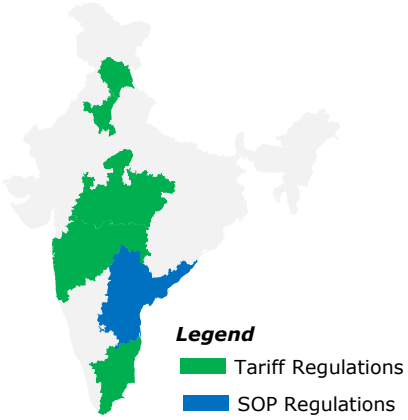
6.3.3. HPERC in its 'Terms and Conditions for Determination of Wheeling Tariff and Retail Supply Tariff)' Regulations of 2011, amended in 2013, has adopted this mechanism suggested under FOR model regulations, for incentivising/ penalising Discoms on basis of their availability.

Mechanisms for incentive/ penalty in ARR under Tariff Regulations

6.3.4. Several SERCs have also established different mechanisms for rewarding/ penalizing Discom on their performance, in either Tariff Regulations or SOP Regulations. Such States include Himachal Pradesh, Haryana, Delhi, Maharashtra, Madhya Pradesh, Andhra Pradesh, Telangana and Tamil Nadu.

6.3.5. **Controllable Factors in ARR:** Following a cost-plus approach, SERCs have defined controllable factors for calculating the Discoms' revenue requirement. Norms or targets are defined for these controllable factors, using which tariffs are determined. If Discoms perform worse/ better than these norms or targets, it shall lead to under/ over recovery of their costs. This is the primary mechanism specified in the tariff regulations to ensure performance improvement of Discoms and to incentivise/ penalize them for the same.

Figure 4: States with incentive/ penalty provisions in ARR



6.3.6. **MYT Tariff Determination:** To effectively utilize the mechanism of controllable parameters in ARR towards performance improvement of Discoms, it is important that ***tariffs are determined for a complete regulatory period (Multi Year Tariff)***, with no change on account of variations in controllable parameters. SERCs in States like ***Maharashtra, Andhra Pradesh and Telangana[6] have followed this MYT approach***.

6.3.7. Apart from this approach of controllable factors in ARR, few SERCs have also employed additional mechanisms to incentivize/ penalize Discoms on their performance, as follows:

A. Base + Additional RoE | Maharashtra

6.3.8. MYT regulations of 2019 by MERC provide for two part RoE – Base plus Additional. This additional RoE is provided by MERC at the time of true-up, based on prudence check by the Commission.

[6] Only for wheeling business in Andhra Pradesh and Telangana

6.3.9. Additional RoE for Wires Business of Discoms is linked to ***Wires Availability***, as follows:

'29.8 In case of Distribution Wires Business, an additional rate of Return on Equity shall be allowed on Wires Availability at the time of true-up as per the following schedule:

The target Wires Availability for recovery of base rate of return on equity shall be 95 percent for MSEDCL and 98% for other Distribution Licensees;

For every 0.50% over-achievement in Wires Availability, rate of return shall be increased by 0.50%, subject to ceiling of additional rate of Return on Equity of 1.50%;

Wires Availability shall be computed in accordance with the following formula:

Wires Availability = (1- (SAIDI / 8760)) x 100:

……..'

6.3.10. Additional RoE for Supply Business of Discoms is linked to ***Collection Efficiency and % of Assessed Bills***, as follows:

'29.9 In case of Retail Supply Business, an additional rate of Return on Equity shall be allowed at the time of true-up, as per the following schedule:

a) *If the percentage of assessed bills is less than 1.5% of the total number of bills issued during the year, then rate of return shall be increased by 1%;*

b) *If the percentage of assessed bills is more than 1.5% of the total number of bills issued during the year, for every 0.5% reduction in the percentage of assessed billing, rate of return shall be increased by 0.25%, subject to ceiling of additional rate of Return on Equity of 1.00%.*

c) *If overall collection efficiency for the year is above 99 %, then rate of return shall be increased by 1%;*

d) *If overall collection efficiency for the year is below 99 %, for every 0.5% improvement in the overall collection efficiency, rate of return shall be increased by 0.25%, subject to ceiling of additional rate of Return on Equity of 1.00%.'*

B. Penalty on RoE | Tamil Nadu

In March 2009, TNERC issued 'Terms and Conditions for determination of Tariff for Transmission / Distribution of Electricity under MYT framework' Regulations. These were amended in 2011, to include provision for penalty on DiscomsRoE, as follows:

'11. The Distribution Licensee shall achieve various indices related to supply availability as given by the Commission from time to time. For every under achievement on 0.1% in composite availability for urban and rural areas, ROE shall be reduced by 0.1%;'

C. Incentive/ Penalty basis collection efficiency | Delhi and Haryana

Sections 158 to 165 of DERC Tariff Regulations 2017 provide for incentive/ penalty to Discoms on the basis of collection efficiency. Similar provision is adopted in section 57 of the HERC MYT Regulations of 2019:

'163. The financial impact on account of over or under achievement of Collection Efficiency target shall be computed as under:

*Incentive or (Penalty) = (C1 – C2) * A_b*

Where,

C1 (Actual Collection Efficiency)…

…

A_b = Actual amount billed excluding electricity duty…

C2 = Target Collection Efficiency in %;'

D. Incentive/ Penalty for metered sales | Madhya Pradesh

MPERC in its MYT Tariff Regulations of 2009 for the control period of FY 2010-11 to FY 2012-13, had provided for a Rupees Crore incentive/ penalty on Discoms, basis their achievement of metered sales as follows:

'32.11 ……

1. *In case of MP PoorvKshetraVidyutVitaran Co. Ltd., for every 1% increase in metered sales, expressed as percentage of total sale, from 80 % (present level of metered sale), an incentive of Rs.3.27 Crore shall be provided. Similarly, a disincentive for every 1% increase in un-metered sale from 20% shall also be applicable at the rate of Rs.3.27 Crore.*

2. *In case of MP Madhya KshetraVidyutVitaran Co. Ltd., for every 1% increase in metered sales, expressed as percentage of total sale, from 81% (present level of metered sale), an incentive of Rs.2.88 Crore shall be provided. Similarly, a disincentive for every 1% increase in un-metered sale from 19% shall also be applicable at the rate of Rs.2.88 Crore.*

3. *In case of MP PaschimKshetraVidyutVitaran Co. Ltd., for every 1% increase in metered sales, expressed as percentage of total sale, from 70% (present level of metered sale), an incentive of Rs.3.48 Crore shall be provided. Similarly, a disincentive for every 1% increase in un-metered sale from 30% shall also be applicable at the rate of Rs.3.48 Crore.'*

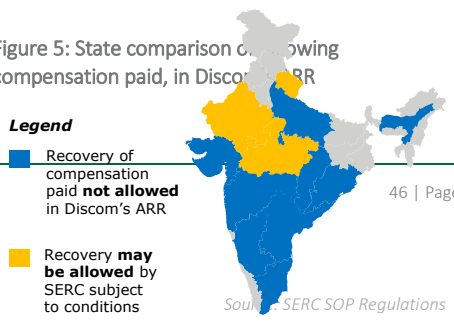
6.3.11. No separate provision for incentive/ penalty on Discom's performance was found in the latest tariff regulations of Gujarat, Uttar Pradesh, Odisha, Karnataka, Andhra Pradesh, Rajasthan, Himachal Pradesh, Punjab and Jharkhand apart from the mechanism of controllable parameters in ARR. Even in States discussed above where incentive/ penalty mechanisms are defined in regulations, they are not implemented in tariff orders.

Mechanisms under SOP Regulations

6.3.12. In most of the States, Standards of Performance Regulations issued by SERCs determine two types of Standards – Guaranteed Standards and Overall Standards. The treatment for under achievement of these standards, results into a penalty system for Discoms.

6.3.13. ***Guaranteed Standards*** define the timelines within which Discoms are required to service different types of

Figure 5: State comparison of allowing compensation paid, in Discom's ARR



Source: SERC SOP Regulations

consumer requests or rectify consumer complaints. As mandated by section 57 of the Electricity Act, the ***SOP regulations define the compensation amount*** which Discoms are required to pay to consumers for not meeting these guaranteed standards. This ***compensation, when not allowed in ARR of Discoms, acts as a penalty on Discoms for under performance***. SOP Regulations in States like Delhi, Uttar Pradesh, Assam, Gujarat, Maharashtra, Chhattisgarh, Karnataka, Andhra Pradesh, Telangana, Odisha and Tamil Nadu do not provide for recovery of such compensation paid to consumers in Discom's ARR.

6.3.14. On the other hand, the FOR Model SOP Regulations and Regulations in States like Rajasthan, Madhya Pradesh and Himachal Pradesh allow Discoms partial recovery of the compensations paid in their ARR (subject to approval of SERC), in case the Discom meets the overall Standards of Performance and reports accurately the SOP performance.

6.3.15. Consumers are required to individually file compensation claims for under-performance of Discoms on guaranteed standards of performance. As per the reports compiled by FOR forsubmission to APTEL, it is observed that in very few cases, compensation has been awarded to consumers. This could be due to consumers being unware of their rights or process to file for compensation. Also, claiming compensation is a lengthy affair with multiple levels of Discom, CGRF and Ombudsman or even SERC involved.

6.3.16. ***Overall performance standards*** define the minimum level of performance to be achieved at aggregate Discom level instead of each individual consumer request/ complaint. Some of the overall standards defined across States, classified under key heads are as follows:

Table 33: Overall performance standards across select States

State	Power Supply/ Outage	Power Quality	Reliability	New Connection	Others	Penalty Provision for under performance
DL	Power failure calls to be addressed within timelines, *95% of the time*	Voltage Imbalance does not exceed 3%; maintain supply frequency	*SAIFI, SAIDI, CAIDI* to be maintained within target set by SERC	-	Percentage of bills requiring modifications less than 0.2%	Decided by DERC on case to case basis
AP	Period of scheduled outages should exceed limit in *95% of cases*	Voltage Imbalance does not exceed 3%; maintain supply frequency	*SAIFI, SAIDI, MAIFI* to be maintained within target set by SERC	-	Percentage of bills requiring modifications less than 0.1%	Decided by APERC on case to case basis
TN	Scheduled outages to be restored within time limits in *75%cases*	Achieve *90%* of the standards specified for Voltage fluctuation and voltage complaints	*SAIFI, SAIDI* to be maintained within target set by SERC	New connection to be provided within time limits in *95%cases*	Resolution as per specified timelines for complaints in Billing, replacement of DT, shifting of service, change	

State	Power Supply/ Outage	Power Quality	Reliability	New Connection	Others	Penalty Provision for under performance
					of tariff, replacement of meters for *95% of the cases*	
KA	Scheduled outages to be restored within time limits in *99%cases*	Voltage variation does not exceed +/- 6% for LT, +6% & -9% for HT, +/- 12.5% for EHT systems	*SAIFI, SAIDI* to be maintained within target set by SERC	New connection to be provided within time limits in *95%cases*	Resolution of complaints on Consumer's bills *99% of cases.* Resolution for DT failure,meter complaints*95% of the cases*	
TL	Scheduled outages to be restored within time limits in *95%cases*	Voltage Imbalance does not exceed 3%; maintain supply frequency within 49-50 Hz	*SAIFI, SAIDI and MAIFI* to be maintained within target set by SERC	-	Percentage Billing mistakes not exceeding 0.1% of total cases. Resolution for DT failure*95% of the cases*	Decided by TSERC, not exceeding 2% of ROE
CG	Scheduled outages to be restored within time limits in *95%cases*	Voltage variation does not exceed prescribed limits in *90%-95% of the cases*	-	New connection to be provided within time limits in *95%cases*	Resolution of complaints on Consumer's bills, meter complaints*90% of cases.* Resolution for DT failure*95% of the cases*	
OD	Scheduled outages to be restored within time limits in *90%cases*	Voltage Imbalance does not exceed 3% & supply frequency should remain within +/-3% of 50 Hz	*SAIFI, SAIDI and MAIFI* to be maintained within target set by SERC	-	Percentage Billing mistakes should not exceed 0.1% of total cases. Defective meters should not be > 5% of total meters in service	
MP	Scheduled outage not to exceed more than 12 hours	-	Reliability Index should be within 98%-99.5%	New connection to be provided within time limits in *100%cases*	Resolution of complaints on Consumer's bills *99% of cases.* Resolution for meter complaints*99.5 % of the cases*	
RJ	Scheduled	Voltage	*SAIFI, SAIDI* to	New	Resolution of	

State	Power Supply/ Outage	Power Quality	Reliability	New Connection	Others	Penalty Provision for under performance
	outages to be restored within time limits in *90%cases*	variation does not exceed prescribed limits in *90% cases*	be maintained within target set by SERC	connection to be provided within time limits in *90%cases*	complaints on Consumer's bills *95% of cases.* Resolution for meter complaints*90% of cases*	
UP	Scheduled outages to be restored within time limits *95%* of the cases		*SAIFI, SAIDI,MAIFI* to be laid down by the SERC	New connection to be provided within time limits in *95%cases*	% Billing mistakes should not exceed 0.1%. Resolution to be provided within specified time for complaints in Billing, replacement of DT, shifting of service, change of tariff, meter replacement in *95% cases*	

Source: SERC SOP Regulations

6.3.17. In States like Delhi, Andhra Pradesh and Telangana, the SOP regulations provide that SERC may penalize Discom for under-performance on these overall standards, on a case to case basis. Such penalties are not allowed to be recovered in Discom's ARR, and therefore keeps a check on Discoms to improve their performance.

6.3.18. In States like Gujarat and Maharashtra, separate overall performance standards are not defined for Discoms.

Electricity (Rights of Consumers) Rules, 2020

6.3.19. The Union Government has notified (in Dec 2020) the Electricity Rights of Consumer Rules. These Rules provide guidance to discoms for meeting the minimum service standards. These Rules have laid emphasis on Automatic Compensation and use of IT systems for determination of reliability parameters. The Rules cover the following key areas:

a) Rights of consumers and Obligations of Distribution licensees
b) Release of new connection and modification in existing connection
c) Metering arrangement
d) Billing and Payment
e) Disconnection and Reconnection
f) Reliability of supply
g) Consumer as Prosumer
h) Standards of Performance of licensee
i) Compensation Mechanism

j) Call Centre for Consumer Services
k) Grievance redressal mechanism

On **reliability of supply**, the Rules specify that :

(1) The distribution licensee shall supply 24x7 power to all consumers. However, the Commission may specify lower hours of supply for some categories of consumers like agriculture

(2) The Commission shall specify the following parameters to maintain the reliability of supply by the distribution licensee; namely:- (a) total duration and frequency of outages per consumer in a year - i. System average interruption duration index (SAIDI); ii. System average interruption frequency index (SAIFI); (b) the minimum outage time (in minutes) that the distribution licensee shall consider for the calculation of SAIDI or SAIFI, as the case may be (3) The distribution licensee shall put in place a mechanism, preferably with automated tools to the extent possible, for monitoring and restoring outages.

On **Compensation mechanism**, the Rules specify that :

*(1) Consumer shall be **automatically compensated** for those parameters **which can be monitored remotely** when it can be successfully established that there is a default in performance of the distribution licensee.*

(2) The Commission shall notify regulations for establishment of mechanism, by the distribution licensee, for automatic payment of compensation amount determined under the provisions of sub-section (2) of section 57 of the Act within six months from the notification of these rules.

(3) The Commission shall oversee that the distribution licensee designs and maintains its distribution system in such a way that there is a gradual increase in the list of parameters, which can be monitored remotely and for which automatic compensation can be made to the consumer.

(4) The standards of performance for which the compensation is required to be paid by the distribution licensee include, but are not limited to, the following, namely:-

(i) no supply to a consumer beyond a particular duration, to be specified by the Commission;
(ii) number of interruptions in supply beyond the limits as specified by the Commission;
(iii) time taken for connection, disconnection, reconnection, shifting;
(iv) time taken for change in consumer category, load;
(v) time taken for change in consumer details;
(vi) time taken for replacement of defective meters;
(vii) time period within which bills are to be served;
(viii) time period of resolving voltage related complaints; and
(ix) bill related complaints.

Considering the new Rules regarding automatic compensation, it is now imperative that the discoms provide compensation through monthly energy bills. Automatic compensation can be provided only when the parameters ofsupply reliability are mapped to a consumer. This will require realignment or upgrade of existing metering and billing systems of the utilities. Further, with the increased

penetration of smart meters and advanced billing systems, the utilities can work towards it, provided the SERCs lay down adequate mechanism for addressing this.

6.4.International Review

6.4.1. Regulators in several countries have adopted mechanisms for incentive/ penalty on Discoms linked to their performance levels. Setting financial deterrents to limit power outages has also been prescribed as a good practice under World Bank's Ease of Doing Business Report. The report states that cities served by distribution utilities facing compensations or penalties for power outages, had on average twenty hours of power cuts in 2017. Those without any such financial deterrents to limit power outages, experienced interruptions lasting 50% longer. Incentive/ penalty mechanism adopted in some of the countries are discussed in this sub-section.

6.4.2. Philippines | Performance Incentive Scheme (PIS)

6.4.3. Energy Regulatory Commission (ERC) of Philippines has issued Rules for Setting Distribution Wheeling Rates (RDWR). The regulations set out the performance indicators, performance targets and reporting arrangements with which all regulated entities must comply with. Under these regulations, the Price Cap formula for Maximum Allowable Price (MAP) of distribution utilities is defined as follows:

$MAP_t = [MAP_{t-1} \times \{1 + CWI_t - X\}] + S_t - K_t + ITA_t$

Where

t represents this year and t-1 represents previous year

MAP is price per unit of electricity

CWI is index of consumer prices

X is smoothing factor

St is performance incentive factor

K is correction for under/ over recovery of revenue in previous years

ITA is correction for tax on under/ over recovery of revenue in previous years

S_t is performance incentive factor, which penalizes/ rewards distribution utilities for not meeting/ meeting targeted performance levels on following metrics –

a. **Network performance metrics:** SAIFI, SAIDI, CAIDI, Voltage Regulation, System Losses
b. **Service Performance metrics:** time to process applications, time to connect premises, % of calls answered within prescribed timelines

The formula for calculating this performance incentive factor St is as follows:

$$S_t = \frac{\left[S_{SAIFI} + S_{CAIDI} + S_{SAIDI} + S_{Volt\ Var} + S_{Sys\ loss} + S_{Proc} + S_{con} + S_{call}\right] \times 0.025ARR}{FQt}$$

Where

S_{xx} refers to performance of Distribution Utility on individual metrics, multiplied by their weights;

Volt Var refers to Voltage Variation performance metric;

Sys loss refers to System Losses performance metric;

Proc refers to metric of time to process applications;

Con refers to metric of time to connect premises;

Call refers to metric of % of calls answered within prescribed timelines;

ARR is allowed revenue recovery for year;

FQ is total amount of energy forecasted to be delivered;

Individual performance indices like S_{SAIFI}, S_{CAIDI} etc. are calculated by multiplying performance score of Distribution Utility on the respective parameter with the weight given to the parameter. The performance score is given by assessing utilities achievement against 5 discreet bands as follows:

Table 34: Performance assessment bands for Distribution Utilities in Philippines

Performance Band	Description	Performance Score
1	Performance greatly below target	-1.0
2	Target not achieved	-0.5
3	Performance as per expectation	0.0
4	Target achieved	+0.5
5	Target greatly exceeded	+1.0

Also, as per Rules for Setting Distribution Wheeling Rates (RDWR), Distribution Utilities are required to compensate a Customer directly if certain service delivery performance thresholds (for guaranteed standards) are not met. Targets for following Guaranteed Service Levels are defined by Energy Regulatory Commission -

- Time of sustained interruptions
- Number of sustained interruptions
- Restoration of service
- Providing connection

The penalty amount for each individual GSL is determined by allocating 5% of DU's ARR, dividing into various targets in the ratio of their weights, and finally dividing them by projected instances of faults in a year.

United Kingdom | Quality of Service Incentives

Under the RIIO (Revenue=Incentives + Innovation + Outputs) framework, OFGEM has established certain incentive schemes for improving Distribution Network Operators (DNOs) performance. Some of these key incentive schemes are as follows:

a. **Interruption Incentive Scheme (IIS):** DNOs are incentivized to reduce the impact of supply interruptions, through rewards and penalties on the allowed revenue recovery, basis their interruptions performance against set targets. The targets are set for the number of customers interrupted per 100 customers (CI) and the number of customer minutes lost (CML). The proportion of revenue exposed under the scheme is 1.2% for CI and 1.8% for CML. DNO interruption performance (CI and CML) are audited each year and an audit report is published detailing the accuracy of measurements and any adjustments if applied to their annual performance.

b. **Time to Connect (TTC) incentive:** DNOs are incentivized to connect customers in a timely and efficient manner through the Time to Connect (TTC) incentive. For smaller connections customers (connections at the lower voltages), the Time to Connect Incentive pushes the DNOs to reduce connection times. Connection time is measured in two ways – 1) "time to quote" is the time from the DNO receiving the initial application to issuing a quotation; and 2) "time to connect" is the time from the customer accepting the quotation to the connection being completed.

6.4.4. Apart from these, OFGEM calculated incentives such as Broad Measure of Customer Service incentive (BMCS), Totex Incentive Mechanism (TIM), Network Innovation Allowance (NIA) and the Network Innovation Competition (NIC) under its RIIO framework for DNOs, designed towards parameters such as overall consumer satisfaction and R&D by utilities.

6.5. Formulating and Functionalizing Distribution Margin Framework for India

Constraints of RoE Based Approach

6.5.1. In the 2009 FOR report, RoE based approach for Determination of Distribution Margin is discussed. As can be seen from the above sections, some States in India have already adopted this approach. Further, as the distribution margin approach is dependent on system data, the utilities find it difficult to furnish accurate and timely data to SERCs. Further, the determination of RoE is an annual process and the changes in RoE reflects on the tariff for next financial year. Due to provisions of cross subsidies and subsidies, these penalties do not actually provide any financial relief to the consumers effected by the shortfall/deficiencies in the performance parameters of the discoms.

6.5.2. Due to the systemic nature of the RoE calculation, reduction in RoE due to underachievement of performance parameters results in the reduction of ARR. This treatment of RoE effects the entire consumer base irrespective of whether an individual consumer has been affected or not due to the shortfall in services of the discom.

6.5.3. Some utilities are unable to report the SAIFI ,SAIDI values accurately due to various issues, ranging from improper metering, consumer indexing errors and failure to update network details etc on a regular basis. Since SAIDI and SAIFI indices are the base for calculating Distribution margin, it is essential that these indices are reliable and accurate. Further, these indices are recorded on HT feeder level in discomsie at 11 kV level. Due to this, the actual fluctuations/outages in LT network may not be recorded at the feeder meter accurately. As an when discoms achieve 100% DT metering along with accurate consumer indexing, these indices should be measured at LT level only. Further, the SAIFI, SAIDI values for the utilities show wide variations. Due to this, each SERC would need to develop State specific range of SAIFI ,SAIDI values for implementing ROE based margin.

Table 35: SAIFI SAIDI for select utilities Oct 2020 (Source: NPP)

Sl	Utility	No of Interruptions per month	Duration of Interruptions (Hrs)
1	Assam Power Distribution Company Ltd	39.05	16.43
2	North Bihar Power Distribution Company Ltd	29.97	18.19
3	South Bihar Power Distribution Company Ltd	29.38	8.12
4	Dakshin Haryana BidyutVitran Nigam Ltd	19.96	11.52
5	Uttarakhand Power Corporation Ltd	18.14	7.23
6	Uttar Haryana VidyutBitaran Nigam Ltd	15.92	11.23
7	Electricity Department Goa	7.6	5.09
8	Mizoram Power Department	6.51	5.06
9	Punjab State Power Corporation Ltd	6.14	10.44
10	Tripura State Electricity Corporation Limited	5.88	4.06
11	West Bengal State Electricity Distribution Corporation	5.75	3.43
12	Chhattisgarh State Power Distribution Corporation	4.92	2.53

13	Mangalore Electricity Supply Company	4.48	3.34
14	Kanpur Electricity Supply Company	4.14	4.47
15	Dakshin Gujarat Vijli Company	3.77	0.41
16	Telangana State North power Distribution Company Ltd	2.4	1.37
17	PaschimVidyutVitaran Nigam Limited	2.28	6.35
18	Andhra Pradesh Southern Power Distribution Company Ltd	2.08	2.3
19	Uttar Gujarat Vijli Co. Ltd	1.95	2.03
20	MP Madhya KshetraVidyutVitran Co Ltd.	1.91	0.37
21	Kerala State Electricity Board	1.8	2.12
22	Maharashtra State Electricity Distribution Company Ltd	1.65	1.18
23	Andhra Pradesh Eastern Power Distribution Co. Ltd.	1.01	1.03
24	Madhya Gujarat Vijli Co. Ltd.	0.69	0.17

6.5.4. Further, some States in India do not claim Return on Equity(eg Sikkim, Arunachal Pradesh) Due to this, RoE based approach may not be universally adopted in the country. These two factors – Non availability of RoE in tariff orders and unreliable indices makes the RoE based approach difficult to adopt universally. Further, some States already have SOP regulations which puts penalties on non-achievement of performance parameters. Adding another layer of mechanism through RoE would be tantamount to duplication of penalties for the same error/deficiency.

6.5.5. Performance of the distribution utilities on system level are also being monitored through third party surveys. The report on Annual Integrated Rating of Utilities released by Ministry of Power/PFC measures the performance of the utilities on much broader framework. These ratings eventually effect the lending rates of the utilities, which has similar effect as compared to increase/decrease of RoE.

6.5.6. Given theprovisions of Consumer (Rights) Rules 2020, the factors for distribution margin would be eventually covered under the SOP regulations and under these consumer rights Rules. As per these rules, the consumers are expected to be compensated automatically. RoE based approach for Distribution margin may not be suitable in the long run as the compensation for the consumers is neither direct nor automatic.

Smart Meters and Distribution Margin:

6.5.7. Smart meters have the ability to record supply hours to a consumers. This is one of the major parameters for recording utilities service standards.

6.5.8. With the increased availability of smart meters, the Govt of India ispushing many polices and schemes for increased penetration of these smart meters. Some of the developments in the area of smart meter penetration in the country are :

Table 36: Smart metering progress

S.N.	State	Utility	Project Area	Consumers / Nodes
1	Andaman & Nicobar	Dept. of Power	Andaman	13,800
2	Assam	APDCL	Guwahati and Dibrugarh	34,715
		APDCL	Guwahati	14,259
3	Bihar	NBPDCL, SBPDCL	130 towns	90,327
		SBPDCL	Gaya (mostly rural area)	17,000
4	Chandigarh	CED	Chandigarh (Sub Div-5)	5,480

S.N.	State	Utility	Project Area	Consumers / Nodes
5	Delhi	TPDDL	North Delhi	1,95,000
		NDMC	NDMC Area	59,186
6	Gujarat	UGVCL	Naroda	23,760
7	Haryana	UHBVN	Panipat	10,188
		SGKC Lab	Gurugram	10
		DHBVN, UHBVN	Gurugram, Karnal, Panipat, Panchkula	2,31,883
8	Himanchal Pradesh	HPSEB	Kala Amb	1,335
9	Karnataka	CESC	Mysore	20,916
10	Kerala	CPT	Cochin port area	800
11	Madhya Pradesh	MPWZ	Indore	1,20,000
12	Odisha	OPTCL	Across Odisha	4,000
13	Puducherry	PED	Puducherry	28,910
		PED	Puducherry	1,658
14	Rajasthan	JVVNL	Kota	70,000
		AjVVNL	66 Towns	29
		JVVNL	6 Towns	404
		AVVNL	Satguru Colony, Ajmer	1,000
		JdVVNL	Jodhpur	456
15	Telangana	TSSPDCL	Jeedimetla	8,882
16	Tripura	TSECL	Aragtala	43,081
17	Uttar Pradesh	IIT Kanpur Lab	IIT Kanpur Campus	28
		UPPCL	Across UP	11,20,145
18	West Bengal	WBSEDCL	Siliguri	5,164
		CESC	Kolkata, WB	10,000
		Total		**21,32,416**

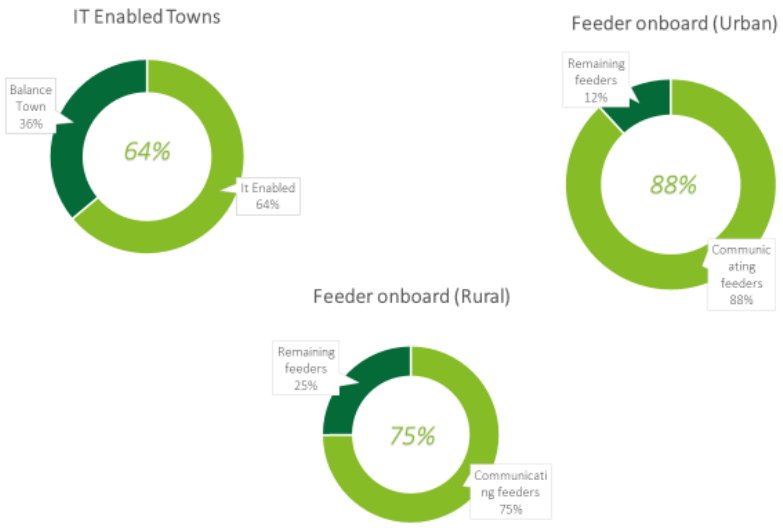
Source : NSGM Website

6.5.9. The future of discoms is in Smart metering and AMI. Most of the utilities have already started their journey of smart metersand ,soon about 250 million consumers are expected to under the smart metering umbrella. Further, the Government is planning to replace all consumer meters by smart pre-paid meters by 2022. This indicates that sooner or later most of the consumers will be metered through a smart meter. Accordingly, thefuture SOP regulations and reliability measurements of utility should consider these developments.

6.5.10. Features of smart meters include power quality monitoring, load survey, maximum demand, remote disconnection etc.One of the most important features of a smart meter is two-way communication and rich data. The smart meters are equipped with adequate features to monitor supply hours and power quality. With proper meter reading and billing system integration, a consumer can be automatically compensated on account of shortfall in guaranteed parameters of supply as per applicable SOP regulations in the state.

6.5.11. In case of post-paid consumers, the penalty for not achieving the performance standards (SAIFI SAIDI, Supply hours, Power quality etc) could be adjusted in the monthly energy bills. Further, in case of pre-paid metering, the compensation mechanism needs to be devised. This could be in termsof additional energy or by adjustment of thevalue of next recharge. The utilities would need additional resources in terms of IT system upgrade/modification to reflect the changes for reliability monitoring and automatic compensation based on smart meter data.

Figure 6: Status of feeder metering and IT enablement in India



The above figure suggests that major part of the country's feeders are already meteredwhich indicates that the reliability indices can be monitored for these feeders provided the discoms have enabled the supporting infrastructure for reliability reporting. Further, IT systems have reached most towns in the country. This indicates that most towns are ready with integrationof feeder data with IT systems.

6.6. Suggested Framework for Direct Compensation

6.6.1. In line with the recommendation of Consumer (Rights) Rules (2020) by the Govt of India, a direct compensation mechanism may be developed by the SERCs. However, for implementation of such a mechanism, it is to be ensured that the existing technology around metering and the IT landscape/network is adequate. One such pre-requisite is smart meter with appropriate communication capability and integration of smart meter data with billing system.

6.6.2. A detailed framework for implementation of direct compensation is provided in Figure 7. Asuitable direct compensation mechanism is offering rebates/adjustments in monthly energy bills of the consumer. The data for parameters like supply hours and number of interruptions are captured in a smart meter. As the data in smart meter is captured at consumer level, this data may be used fordetermining consumer level supply quality. The data related to the actual supply hours and interruptionscan be integrated in the billing system for calculation of rebates/adjustments in monthly bills of the consumer.

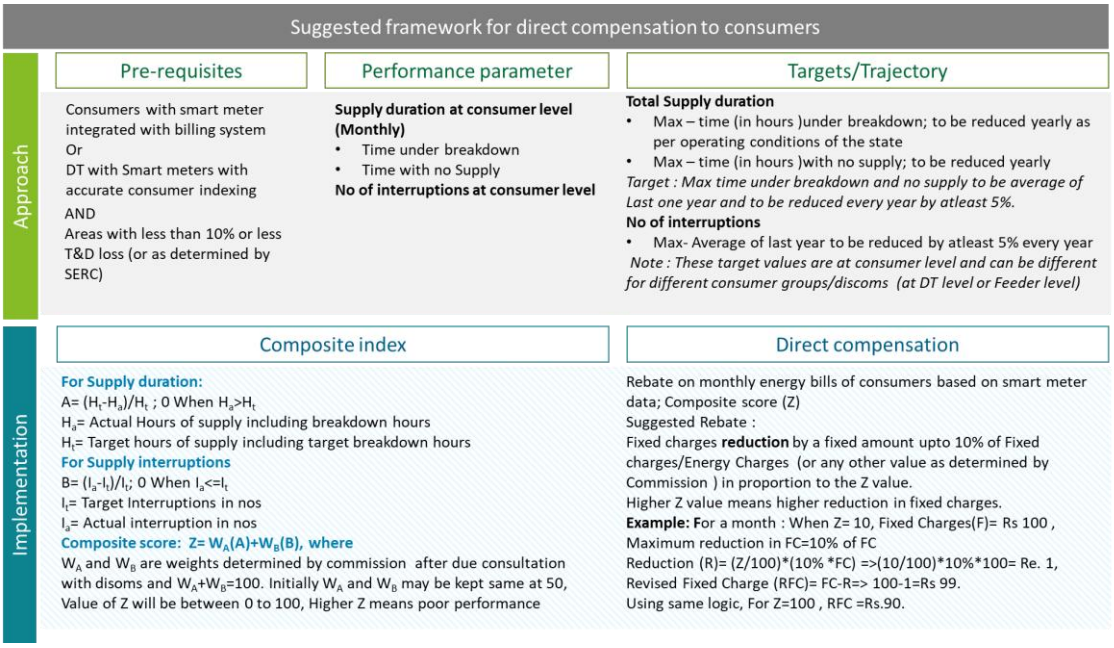


Figure 7: Suggested Framework for direct compensation

6.6.3. The smart meter can record supply hours and number of interruptions in a given period. These two parameters may be used to determine the quality of supply to the consumers. Both these parameters can be compared with a target and deviations from the target may be used to determine an index or score. This index or score can be then used for subsequent compensation mechanism (rebate in monthly energy bills). The framework is explained below:

Composite Z score(Supply index) of discom for a consumer:

$Z=W_A(A)+W_B(B)$

Where

W_A*= Weight for performance index related to Hours of Supply*

W_B *= Weight for performance index related toNo of Interruptions*

And $W_A + W_B = 100$

A *= Performance index of hours of supply for a consumer*

Where

$A= (H_t-H_a)/H_t$ *; 0 When* $H_a>=H_t$

H_t*= Target supply hours inclusive of breakdown hours (For the month)*

H_a*=Actual supply hours inclusive of breakdown hours (For the month)*

A will be zero when the supply hours are more than or equal to the target.

B= Performance index of no of interruptions for a consumer

Where

$B=(I_a-I_t)/I_t$ *; 0 When* $I_a<=I_t$

I_t*=Target no of interruptions inclusive of planned interruptions (For the month)*

I_a*=Actual no of interruptions inclusive of planned interruptions (For the month)*

In this case, B will be zero when the no of interruptions is less than or equal to the target.

Value of Z will be between 0 to 100, Z=0 means no deviation from target and Z=100 means maximum deviation from target.

Note :W_A and $W_B$may be kept at 50 initially. Subsequently, the State Commissions may explore assigning different weights as per the operating conditions of the Discoms. Further, these weights and targets may be made specific for each consumer category. Eg for an industrial consumer with continuous process, more weightage on interruption index would be preferred.

Adjustment/Direct compensation

The consumer may be provided compensation in case the supply parameters fall short of the targets. In such a case the consumer may be provided rebate as a percentage of fixed tariff. The Commissions may start with a maximum of 10% of fixed charge as a rebate in monthly bills. The actual rebate in fixed charge would be proportionate to Z Score.

Let us assume theFixed Charges(FC) are Rs 100 per month. In this case the maximum deduction is 10% of 100 i.e., 10. Further, in a month consumer's Z score is 50. The reduction in fixed charges is calculated as below :

Reduction (R)= (Z/100)(10% *FC)*
*=>(50/100)*10%*100= Rs.5/- ;*
Revised Fixed Charge (RFC)= FC-R=> 100-5=Rs. 95.
Using same calculations , For Z=100 , RFC =Rs. 90.
In this example the consumer pays a reduced amount in monthly bills, thus the consumer is compensated according to the supply quality/conditions of the Discom.

Alternatively
Reduction of fixed charges may be calculated by considering slabwiserates as below :

For Z values	*Reduction in Fixed Charges*
0-10	*2% of Fixed charges subjected to maximum of Rs 5*
10-30	*5% of Fixed charges subjected to maximum of Rs 30*
30-50	*7% of Fixed charges subjected to maximum of Rs 50*
50-100	*10% of Fixed charges subjected to maximum of Rs 100*

This framework may be suitable for implementation in ideal situations when there is no consumer induced interruptions/outages. In high loss areas it is highly likely that the SOP parameters are not in control of discoms. Therefore, such a framework may be applied first in areas having low losses (10% or below or as determined by SERC).

In case of prepaid meters, suitable adjustments through "cash back" may be explored.

The SERCs may need to set the targets for Supply duration and number of Interruptions at consumer level. The following table provides indicative targets and a trajectory for the supply quality

Table 37: Targets and Trajectory for Supply parameters

Parameter	Target	Trajectory
Supply hours	24 hours in a day excluding breakdowns and maintenance. OR As per targets of the Discoms	**Breakdown hours including scheduled and unscheduled** outages • For first year : Average monthly breakdown hours for last year or existing targets of Discom • Subsequent years : atleast 5% reduction of monthly average of outage/no-supply/breakdown hours of preceding year.
Supply Interruptions (No)	Maximum no of interruptions in a month = Last year's monthly average no of interruption. OR As per targets of the Discoms	**No. of Interruptions** • For first year : Average monthly no of interruptions of last year or existing targets of Discom • Subsequent years : Minimum no of interruptions required as per planned outage schedule of discom.

6.7. Recommendations

6.7.1. The SERCs may continue to use RoE based margin determination. Further, the SERCs may carry out detailed diligence of existing performance parameters and fix suitable limits of performance parameters for determination of ROE. It is seen that utilities show wide range of SAIFI SAIDI values. The SERCs may consider developing a framework for updating State level performance parameters through appropriate studies on a regular basis.

6.7.2. As the adoption of smart meters increases, the implementation of Consumer Rights (Rules) 2020becomes feasible. To achieve this, the SERCs may develop a roadmap for gradual transition into consumer level performance indices. Simultaneously, SERCs may phase out RoE based distribution margin and retain only consumer level performance parameters as a mechanism for rewards/penalties. Model guidelines may be drafted to reflect the changes necessary in SOP regulations and distribution code regulation which will enable the mechanism of direct compensation and migration to smart meter and pre-paid meters.

6.7.3. This means that the utilities must develop strong data management systems wherein the performance of the utility is monitored through IT based systems without human intervention. These data points should be accessible to the SERC on demand for effective monitoring., The SERCs may develop a mechanism for effective implementation of the SOP regulations. Issues related to quality and regularity of data should be known to the SERC and corrective actions must be taken by Discom under the supervision of the SERCs.

6.7.4. SERC may reframe the SOP for maintaining performance parameters based on the new Rules of Consumer Rights issued by the Ministry of Power.The SOP may address the provision of automatic compensation to the consumers in case of failure to meet the specified performance standards. This may require additional monitoring from SERC to check the compliance status.

6.7.5. It is expected that much of the performance related data will flow from IT systems. Considering this, SERCs may direct the discomsto carry out periodic audit of the IT systems used to ensure compliance of the regulation along checking the integrity of the system.

******

7. Annexures

A. Accounting policies of some utilities

Utilities	Accounting Policy for Depreciation
Himachal Pradesh – HPSEBL, HP	Depreciation is charged at rates notified by the H.P. State Electricity Regulatory Commission for the purpose of fixation of tariff. In respect of asset, where rate has not been notified by regulation of HPERC, depreciation shall be provided at the rates corresponding to the rates laid down under the Companies Act 2013 except in case of Computer and peripherals, which are depreciated @15%. Depreciation on vehicles is charged by the units to the extent of 90% of the cost of the asset, life of vehicle is taken as 7 years.
APSPDCL, AP	The Company is charging Depreciation at the rates notified under G.O No.265 (SE) dated 27.03.1994 issued under Electricity Supply Act, 1948.
JBVNL, Jharkhand	Depreciation on fixed assets is calculated at the rate prescribed in JSERC MYT Regulations, 2015 vide notification no. 33 & 34, dated 27th October 2010, notification no. 35 dated 1st November 2010 and notification no 46 dated 10th November, 2015.
JVVNL, JdVVNL, AVVNL Rajasthan	Depreciation on fixed assets is charged on Straight Line Method at the rates prescribed in RERC Tariff Regulations.
DGVCL, Gujarat	Depreciation is charged at the rates prescribed in GERC (MYT) Regulations, 2011.
MSEDCL, Maharashtra	The company has estimated the useful life of an item of PPE based on the techno-commercial evaluation. This estimation includes the pattern of usage of the PPE item. Accordingly, the company provides depreciation on Straight Line Method. The techno-commercial evaluation of the useful life, residual value and pattern of depreciation is reviewed annually. The present estimation is similar to the method used by MERC to determine tariff through MERC

Utilities	Accounting Policy for Depreciation
	(MYT) Regulation, 2015.
BESCOM, Karnataka	Depreciation is charged at the rates prescribed and notified by CERC.

B. Some mechanisms for incentives and penalties in states

Existing Mechanisms of incentive/ penalty by SERCs

Study of States

FOR Model MYT Regulations

Adjustment to ARR based on target availability

- Incentive or penalty in form of adjustment of +/- 0.2% of ARR based on availability of Discoms
- Availability index shall be computed for both Wheeling Business and Supply Business of Discoms on yearly basis:

  Wheeling Network Availability Index (%) = (1-(SAIDI/8760)) X 100

  Supply Availability Index = 75% of Base Load Supply Availability + 25% of Peak Load Supply Availability

  Where base/ peak load supply availability is based on power contracted by Discom vis-a vis their base/ peak demand

SERC Regulations

1. **Additional ROE | MERC**
   Base RoE + Additional RoE for each % point improvement in Wires Availability, Assessed Billing and Collection Efficiency
2. **Penalty on ROE | TNERC**
   For every under-achievement of 1% in composite availability (urban and rural areas), ROE shall be reduced by 0.1%
3. **Incentive/ Penalty in ARR | DERC & HERC**
   Incentive/ penalty on Discoms basis collection efficiency
4. **Incentive for metered sales | MPERC**
   For control period of FY11 to FY13, a rupees crore incentive was provided for each percentage point increase in metered sales, over the base level
5. **Incentive/ penalty based on availability | HPERC**
   Similar to formula prescribed by FOR model MYT regulations adopted
6. **Penalty for not meeting overall SOPs | DERC, APERC and TSERC**
   Regulations in DL, AP and TL have penalty provisions for not meeting overall SOPs

States with provision for incentive/ penalty