MAHARASHTRA ELECTRICITY REGULATORY COMMISSION

EXPLANATORY MEMORANDUM

ON

DRAFT GUIDELINES FOR UNIFORM VOLTAGE WISE ALLOCATION OF ASSETS AND COST IN DISTRIBUTION BUSINESS, 2022

April, 2022

World Trade Centre, Centre No.1, 13th Floor,

Cuffe Parade, Colaba, Mumbai-400005

Table of Content

LIST OF TABLES

LIST OF FIGURES

LIST OF ANNEXURES

LIST OF ABBREVIATIONS

ABB	Details
A&G	Administrative & General Expenses
AEML	Adani Energy Mumbai Limited - Distribution Business
AERC	Assam Electricity Regulatory Commission
AMR	Automatic Meter Reading
ANRE	National Energy Regulatory Authority, Romania
APTEL	Hon'ble Appellate Tribunal for Electricity
ARR	Annual Revenue Requirement
ATMD	Any Time Maximum Demand
ACOS	Average Cost of Supply
BEST	Brihanmumbai Electric Supply and Transport
CoS	Cost to Serve
CPD	Coincident Peak Demand
CSS	Consumer Substation
DCOS	Distribution Cost of Service
DERC	Delhi Electricity Regulatory Commission (DERC)
DISCOM	Distribution Companies
DMS	Distribution Management System
DSS	Distribution Substation
DT	Distribution Transformers
EA	Electricity Act 2003
EHT	Extra High Tension
EHV	Extra High Voltage
EM	Explanatory Memorandum
GEPL	Gigaplex Estate Private Limited
GERC	Gujarat State Electricity Regulatory Commission
GFA	Gross Fixed Assets
HT	High Tension
HV	High Voltage
IoWC	Interest on Working Capital
JERC	Joint Electricity Regulatory Commission for Goa & Union Territories
KERC	Karnataka Electricity Regulatory Commission
KRC	KRC Infrastructure and Projects P. Ltd.
kVA	kilo Volt Ampere
kVAh	kilo volt ampere hour
kW	kilo Watt
kWh	kilo Watt hour
LT	Low Tension
LV	Low Voltage
MERC	Maharashtra Electricity Regulatory Commission

ABB	Details
MPERC	Madhya Pradesh Electricity Regulatory Commission
MSEDCL	Maharashtra State Electricity Distribution Company Limited
MU	Million Units
MVA	Mega Volt Amp
MYT	Multi Year Tariff
NARUC	National Association of Regulated Utility Commissioners of the United States
NCPD	Non-Coincident Peak Demand
NEP	National Electricity Policy
NERSA	National Energy Regulator of South Africa
NTP	National Tariff Policy
NUPLLP	Nidar Utilities LLP
OMS	Outage Management System
PSERC	Punjab State Electricity Regulatory Commission
PUC	Public Utility Commissions
R&M	Repair & Maintenance
RD	Reduced Depreciation
RERC	Rajasthan Electricity Regulatory Commission
RND	Reduced Network Diagram
RoCE	Return on Capital Employed
RoE	Return on Equity
SAP - ERP	Enterprise Resource Planning Software
SCADA	Supervisory Control and Data Acquisition
SEZ	Special Economic Zone
T&D	Transmission & Distribution
TPC	Tata Power Company – Distribution Business
TSERC	Telangana State Electricity Regulatory Commission
UPERC	Uttar Pradesh Electricity Regulatory Commission
USA	United States of America

1 Background and Regulatory Framework

1.1 Regulatory Framework

1.1.1 The Distribution Licensee undertakes two distinct businessesi.e.Wheeling (Wires) and the Supply (Retail) . The business of owningand operating the distribution network is called as the Distribution Wires Business (Wires Business), as distinct from the Retail Supply Business, which has a contract with the end consumer for supply of electricity and enters into long-term and short term power purchase contracts with generators/traders for the required quantum of electricity. These two functions of the Distribution Licensee is evident from following definition under the Electricity Act 2003 (hereinafter referred to as "EA 2003") as follows:

> *"2 (17) "distribution licensee" means a licensee authorised to* ***operate and maintain a distribution system*** *for* ***supplying electricity*** *to the consumers in his area of supply";*

1.1.2 Section 61 of the EA 2003 empowers the Appropriate Commission to specify the terms and conditions for the determination of Tariff and is guided by the factors to be considered while determining tariff. Section 62 of the EA 2003 requires the State Electricity Regulatory Commission (SERC) to determine the tariff for Wheeling and Retail supply of electricity. Section 42 of the EA 2003 requires the SERC to introduce open access in the distribution system in a phased manner and stipulates that the duties of the distribution licensee with respect to such supply shall be of a common carrier providing non-discriminatory open access. Also, under Section 9 of the EA 2003, captive consumers are required to pay wheeling charges for availing open access. Therefore, wheeling charges are to be paid by any person for availing open access using the distribution licensee's network.

1.1.3 The Commission in its Multi Year Tariff Regulations and various Tariff Orders for distribution licensees, has directed the distribution licensees to separate the accounting of wires related costs and supply related costs and also file separate Annual Revenue Requirement (ARR) for Wires and Supply Business, which is essential for un-bundling of cost and tariff components and forms a pre-requisite for appropriate determination of Wheeling Charges.The wires cost is further segregated into different voltages of the distribution network for determination of the voltage wise wheeling charges. Accordingly,Wheeling Charges, so determined, are shown separately for every consumer of distribution licensee as a part of tariffso that consumers are aware of tariff for Wire Business of a Distribution Licensee.

1.1.4 Sections 42, 62 and 86 of the EA 2003 allows Commission to determine the Wheeling Charges. Also, Regulation 73 of MERC (MULTI YEAR TARIFF) REGULATIONS, 2019, (hereinafter referred as "MYT Regulations 2019"), allows the Commission to determine the Wheeling Charges of the Distribution Licensee in terms of Rupees/kWh or Rupees/kVAh or Rupees/kW/month or Rupees/kVA/month, for the purpose of recovery from the Distribution System User.

"73.2 The Wheeling Charges of the Distribution Licensee shall be determined by the Commission on the basis of a Petition for determination of Tariff filed by the Distribution Licensee in accordance with Part B of these Regulations:

Provided that the Wheeling Charges may be denominated in terms of Rupees/kWh or Rupees/kVAh or Rupees/kW/month or Rupees/kVA/month, for the purpose of recovery from the Distribution System User, or any such denomination, as may be stipulated by the Commission:

Provided further that the Wheeling Charges shall be determined separately for LT voltage, HT voltage, and EHT voltage, as applicable:"

1.1.5 Consumption at a particular voltage level utilises the network at that voltage as well as at all higher voltages. Accordingly, as HT network is used for supply power to LT consumers, cost of HT network is appropriately apportioned to LT consumers while computing LT wheeling Charges. Whereas as LT network is used only for LT consumers, while computing Wheeling Charges, cost of LT networkis allocated to LT consumers only. Accordingly, the Commission is approving voltage wise Wheeling Charges (EHT, HT & LT) for the consumers.

1.2 Need for Uniform allocation for Determination of Wheeling Charges

1.2.1 The assets of the distribution functionare primarily bifurcated into Wheeling (Wires) and Retail (Supply) business activity. However,considering the different voltage-wise supply to consumers, there was also a need to segregate the cost related to supply of power to their respective voltage of the distribution network.

1.2.2 For computing such voltage wise Wheeling Charges, Wheeling ARR of Distribution Licensee is first allocated to each voltage level based on contribution of such voltage level to the total Gross Fixed Assets (GFA) of Distribution Licensee. Thereafter, wheeling cost/ARR of each voltage level is further allocated to lower voltage level based on usage arrived at as per the energy sales on each voltage level and thereafter based on total wheeling cost/ARR allocated to each voltage level, per unit rate of Wheeling Charge is determined. Therefore, in this process, GFA allocation across voltage level is critical input parameter which can change the resultant per unit Wheeling Charge.

1.2.3 Average Wheeling Charge depends upon total Wheeling ARR and wheeled units (utilisation of distribution network), voltage wise wheeling charges which ultimately gets levied to end consumers depends upon voltage wise GFA and sales.While energy sale is a metered parameter, voltage wise GFA is currently based on practice adopted by the Distribution Licensee while accounting its distribution assets. The Commission is aware of the fact that some of the Distribution Licensees do not have practice of accounting its asset/GFA voltage wise and hence in their Tariff Order the

Commission was compelled to make some assumption about GFA allocation so as to determine voltage wise Wheeling Charges. In the opinion of the Commission, continuing practice of assuming voltage wise GFA in future years without any efforts to correctly account voltage wise asset is not appropriate. Also, there are Distribution Licensees who claim to maintain voltage wise GFA, but principle used for accounting the asset to respective voltage level may not be necessarily the same as that of its competing licensee. This is because there is no standard practice available for its computation.

1.2.4 Tata Power Distribution Company (TPC-D) had filed Case No. 133 of 2020 seeking uniform principles for allocation of Distribution Assets across all Distribution Licensees operating in the State of Maharashtra. Main contention was that different Discoms are adopting different principles for allocating Gross Fixed Asset (GFA) across different voltages which impacts determination of voltage wise wheeling charges

1.2.5 During the proceedings of the case, all DISCOM in the State has support the need of having uniform principles for allocating distribution asset to specific voltage level and requested the Commission to initiate study for the same.

1.2.6 Accordingly, the Commission in its order dated 9 December, 2020 in Case No 133 of 2020 has stated that a separate study will be initiated to devise the uniform methodology for allocation of voltage-wise assets. The relevant extract is as given below:

> ***"The Commission will initiate a study to address various issues raised in the present Petition about voltage wise accounting of asset and would come out with uniform principles/guidelines through public consultation process. While doing so, the Commission may also include other factors which affects consumer tariff."***

1.2.7 In addition to the above, it has been also observed that due to non-availability of the data, there is indistinct demarcation principles for cost allocation to different voltage level and lack of rationale for allocation of common business assets to different voltage level or supply business. Though 100% network cost is recovered through ARR of wire business, but share of recovery from consumers at different voltages is different.

1.2.8 Taking the above facts and developments into consideration, the Commission is of the view that for computation of voltage wise Wheeling charges, allocation principle of GFA at each voltage level needs to be defined as both are interlinked.Thereforethere is a need to provide the guidelines so as to have uniform approach for allocation of assets and cost to respective voltagesto determine wheeling charges for recovery of wheeling charges from the consumers of that particular voltage level.

1.2.9 Therefore, the Commission has formulated the "Draft Guidelines for Uniform Voltage Wise Allocation Of Assets And Cost For Distribution Business, 2022".

1.2.10 The Commission has proposed the guidelines based on its experience in the past while determining the wheeling charges of the licensees, study of the approach adopted in the other States within India and internationally and the submission made by the licensees on the approach adopted by them. The rationale for the approach adopted for allocation of the assets and cost to the specific voltage of distribution business has been elaborated in this Explanatory Memorandum (EM).

1.2.11 The Commission while formulating the guidelines has endeavored to balance the interest of Consumers and the Distribution Licensees.

1.2.12 Before the issuance of the final guidelines, appropriate consultation with all stakeholders is required so that the proposed Guidelines are effective, practical, ensure consumer interest is protected, while balancing the same with the various operational requirements of the distribution business. Hence, the 'Draft Guidelines for Uniform Voltage Wise Allocation Of Assets And Cost For Distribution Business, 2022' are being issued, along with this EM. The intent of this EM is to explain the need and justification for issuance of this guidelines alongwith the principle of allocation, so that appropriate stakeholder participation can be ensured.

2 Submission of the Licensees

2.1 Existing Approach

2.1.1 In Maharashtra, Average Cost of Supply (ACoS)is considered for retail tariff design and same is being followed by the Commission in the past tariff orders. However, for the purpose of determination of wheeling charges, which represent distribution network costs, the Commission follows a methodology of voltage-wise allocation of costs over EHT, HT and LTvoltage to determine wheeling charges for consumers.

2.1.2 Regulation 73.2 of the MYT Regulations, 2019 provides the determination of the wheeling charges for three voltage classes – Extra High Tension (EHT), High Tension (HT) and Low Tension (LT). the Voltage level as defined in Regulations 2 of MYT Regulations 2019 is provided as below:

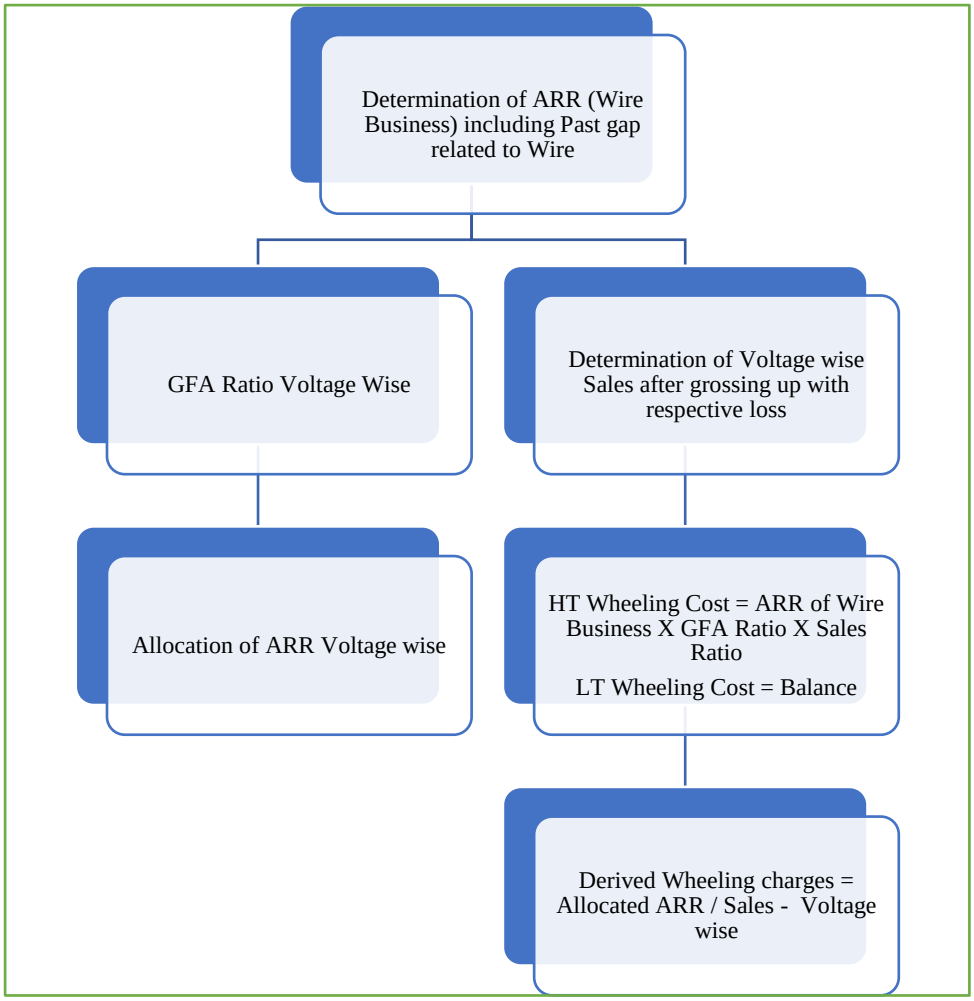
- *Regulations 2 (34) - "Extra High Tension" (or "EHT") means all voltages above 33 kiloVolt;*
- *Regulations 2 (46) - "High Tension" (or "HT") means all voltages above and including 650 Volt and up to and including 33 kiloVolt;*
- *Regulations 2 (52) - "Low Tension" (or "LT") means all voltages below 650 Volt;*

2.1.3 For the purpose of determining the ratio of asset values at respective voltages, the Distribution Licensees have been providing the data of EHT/HT/LT asset value ratio to the Commission during each tariff determination process and the same data is employed by the Commission, with prudence check, for allocating Wires ARR to EHT, HT and LT voltage leveland to determine the Wheeling Charges of the respective voltage level. It is pertinent to note that the issue of levy of Wheeling Charges for EHT category of TPC-D is presently sub-judice before the Hon'ble Supreme Court. However, the Commission in its tariff order dated 30 March, 2020 in Case No 326 of 2019 for TPC-D has determined wheeling charges for EHT category, the same will be operational after the issuance of the Judgment by the Hon'ble Supreme Court.

2.1.4 Also, at present there is no direct cost attribution available or provided by any Distribution Licensee in Maharashtra for attributing its network costs i.e. Depreciation, Return, Interest, O&M expenses, etc. directly to any voltage level. That is to say, that these costs are not recorded in the books of accounts of the Distribution Licensees under specific voltage based cost centers. Therefore, in absence of direct recording of voltage wise costs in accounts, the Commission has been employing a method of cost allocation, which first allocates the cost into Wire and Supply business as per Regulation 71 of the MYT Regulations 2019 and then the network / wire costs is allocated into EHT, HT and LT voltages based on the ratio of historical value of assets at these voltage levels.

2.1.5 The Existing approach is outlined in the following figure:

Figure 1: Existing approach on allocation on determination of wheeling charges for different voltage level



2.1.6 As has been elaborated in the initial section of this report, the need has arisen to arrive at a uniform approach for working out the voltage wise asset ratios so that all distribution licensees follow the same method across the State and accordingly the principles of determination of wheeling charges are standardized.

2.2 Data sought from Licensee

2.2.1 To initiate the process of deciding the uniform methodology for the allocation of the cost of assets at different voltage levels, it was felt appropriate to understand the existing approach of the Distribution Licensee for allocation of such cost based on which the submission was made by the licensee in their tariff petition.

2.2.2 Accordingly,the first and foremost issue in allocation / segregation of assets in distribution business is their bifurcation between Wires and Supply functions of distribution licensees. The Commission notes that distribution business comprises of assets dedicated to network function of licensees which are directly allocated to Wire business, assets and facilities that are dedicated to Supply function and

common assets and facilities, which are used in the business as a whole and no clear demarcation to either function can be made.

2.2.3 Therefore, the Commission vide email dated 5 August 2021 has sought data in the specified format as provided in **Annexure 1**for FY 2018-19 to FY 2020-21, from the Distribution Licensees in respect of existing practice of allocating the assets between Wires and Supply business and further bifurcation into EHT, HT and LT. Also, the Commission stated that the data as provided in the formats is required to be reconciled with the audited block of assets as specified in the financial statements of the respective years.

2.2.4 The assets of the distribution business can be bifurcated as follows:

- Bifurcation of assets into Wires and Supply;
    - Wires – Network related assets
    - Supply - related to retail supply business such as Consumer Meters, cash collection centers, customer care, payment kisoks, AMR, etc
- Voltage Identifiable Assets – clearly related to wire business and identifiable / rated for particular voltage level such as Distribution Lines, incl. overhead line supports, plinth, insulators, etc
- Common to Voltage (Boundary Assets – Dual Voltage) – clearly related to wire business and the assets are serving to more than one voltage level - Distribution S/S (33kV/11kV), Consumer S/S (11 kV/0.4kV)
- Common to Business –
    - Related to wire business but not attributable to any particular voltage level - Fault Testing Vehicles, SCADA, Tools, Equipmentsetc
    - Related to Wire and Supply business - Administrative offices, Vehicles (office use and general purpose), furniture & fixtures, IT etc

2.2.5 Therefore, the Distribution Licensee's portfolio of assets and network costs include assets and cost which are directly allocable to respective voltages and Supply business, in addition to Common to Business and Boundary assets (Dual Voltage) and cost, for which principles of allocation are required. Accordingly, based on the above classification, the Commission has circulated the format seeking data of classification / allocation of assets with the rationale / justification for such allocation:

- Assets Allocation – Directly attributable to Voltage specific or Supply;
- Assets Allocation - Attributable to more than one voltage or Supply;
- Common Cost Assets – Allocated to Wire and Supply business

2.3 Analysis on Submission of the Licensee

2.3.1 Based on the direction of the Commission, all the licensee except MSEDCL, has submitted the allocation of the assets as per their existing approach. The prima facie observation / issues in Wire-Supply division of assets as can be gleaned from the data supplied by the Licensees is outlined as below:

Table 1: Observation on the submission of the Distribution Licensee

AEML	TPC	BEST	SEZs
Grid meters also included in Supply	Grid meters considered in Wires, consumer meters in Supply	All meters considered in Supply	No assets shown under Supply business. Asset Allocation has been based on certain assumption rather than with any rationale *(NidarUtilities have shown certain common assets under Supply)*
In FY 19-20, small value for U/G cables shown under supply		Cables and control panels shown under Supply	
Most common to business assets considered under Wires, except where specific identification to supply business exists	Allocated common assets between Wires and Supply – basis not clear from submission	Portion of Administrative office land and building, office equipment, etc. allocated to Supply	
	In FY 18-19, portion of power transformers, DSS/CSS building, DMS, OMS allocated to Supply business	**Business process Automation** shown under Supply	

2.3.2 With respect to MSEDCL, due to non-availability of data related to asset bifurcation into voltage wise, no submission was made.

2.3.3 The summary of the issues related to submission made by the licensee and as observed by the Commission is outlined as below:

- Boundary Assets (DSS/CSS) either considered under Primary or Secondary Voltage.
- Grid Meters either considered under Wires or Supply
- Common to Business assets have been categorized under LT Wires only and/or LT Wires and Supply – basis or rationale for the same is not clear
- Some SEZs (GEPL, KRC) have divided common assets in ratio of 76:24 or 65:35 between HT and LT without any rationale provided.
- Certain assets related to supply business has been allocated to Wire and Vice versa

2.3.4 As evident from above, there does not seem to be a common ground between licensees with respect to allocation of common assets. There are clear differences in approaches in classifying asset base into Wires, Supply and Common assets and hence it requires standardization.

2.3.5 The overall approach to standardization and achieve uniformity in this aspect is classification of assets based on purpose of existence. For example, while AEML has considered Grid meters in Supply business, TPC have classified Grid Meters

under Wires business and only consumer meters are considered under Supply business. None of the SEZs, except Nidar, have shown any assets under Supply business, which cannot possibly be the case as SEZs, like other distribution licensees, also have consumer metering, billing and other consumer interface functions, under their retail supply function. Similarly, there are differences in the allocation of common assets and facilities between Wires and Supply functions of Distribution Licensees, which are required to be standardized.

2.3.6 Therefore, the primary activity is to classify the entire asset base of distribution into the three groups of Wires, Supply and Common and then to provide the principles for the allocation of the assets to different voltage level and Supply function.

2.3.7 However, before going forward with the allocation principles to be determined for the assets and cost, it is also necessary to assess the normal practice adopted by other State Electricity Regulatory Commission while determining the wheeling charges and also to review the international experience so as to adopt the best practice adopted in the industry for appropriate methodology for allocation of the cost.

3 Domestic and International Experience

3.1 Need to review the Domestic and International experience

3.1.1 The Commission feels that it is also essential to take a look at the overall approach of determination of wheeling charges and not just limit to reworking the principles of classification of assets among voltages. This is a first of its kind study that the Commission has undertaken and hence it is required to encompass a large scale research on various domestic and international practices on cost allocation for the purpose of tariff design.

3.1.2 Also, considering the various approach adopted by the Licensee for allocation of the cost with no clear demarcation on the cost allocation to the various voltage level and to supply business, it is necessary to review the standard best practice adopted in the market by similar industry.

3.1.3 Therefore, the allocation principles dealt with in these other jurisdictions provide valuable learnings, which could assist in addressing other key issues in cost allocation such as allocation of cost of various common assets facilities and cost on different voltage classes.

A. Domestic Experience

3.1.4 In India, barring a few Electricity Regulatory Commissions, most regulators have not attempted any comprehensive analysis and determination of wheeling charges at different voltage levels or for different consumer categories.

3.1.5 Hon'ble APTEL in its judgment dated 26 July 2012 in Appeal No. 13 of 2010& batch in the matter of ISPAT Industries Ltd. Vs. MERC &Orshas ruled on the issue of determination of tariff and cross-subsidy with reference to the Voltage wise Cost of Supply (VCoS), as reproduced below:

> *"15.4 The issue relating to voltage-wise cost of supply andcross subsidy has been decided in the judgment dated30.05.2011 in Appeal nos. 102 of 2010 and batch in thematter of Tata Steel Ltd. Vs. Orissa ElectricityRegulatory Commission & Another. The relevantextracts of the judgment are reproduced below:-.*
>
> *"22. After cogent reading of all the above provisions of the Act, the Policy and the Regulations we infer the following:*
>
> *i.* ……..
>
> *ii.* ***The tariff for different categories of consumer may progressively reflect the cost of electricity to the consumer category but may not be a mirror image of cost to supply to the respective consumer categories***.
>
> *iii.* ……..
>
> *iv.* ***The tariffs should be within ±20% of the average cost of supply by the end of 2010-11 to achieve the objective that the***

tariff progressively reflects the cost of supply of electricity.

v. ……..

vi. The tariffs can be differentiated according to the consumer's load factor, power factor, voltage, total consumption of electricity during specified period or the time or the geographical location, the nature of supply and the purpose for which electricity is required."

……..

28. Of the above Judgments of this Tribunal, 2007 APTEL 931 Siel Limited vs. PSERC &Ors. has a clear finding on the cost of supply. The relevant extracts of the Judgment are reproduced below:

109. ……..

110. Keeping in view the provisions of Section 61 (g), which requires Tariff to ultimately reflect the cost of supply of electricity and the National Tariff Policy, which requires Tariff to be within ± 20 per cent of the average cost of supply, it seems to us that the Commission must determine the cost of supply, as that is the goal set by the Act. It should also determine the average cost of supply. Once the figures are known, they must be juxtaposed, with the actual tariff fixed by the Commission. This will transparently show the extent of cross subsidy added to the tariff, which will be the difference between the tariff per unit and the actual cost of supply".

…….."

41. Summary of our findings

41.1. After considering the provisions of the Act, the National Electricity Policy, Tariff Policy and the Regulations of the State Commission, we have come to the conclusion that if the cross subsidy calculated on the basis of cost of supply to the consumer category is not increased but reduced gradually, the tariff of consumer categories is within ±20% of the average cost of supply except the consumers below the poverty line, tariffs of different categories of consumers are differentiated only according to the factors given in Section 62(3) and there is no tariff shock to any category of consumer, no prejudice would have been caused to any category of consumers with regard to the issues of cross subsidy and cost of supply raised in this appeal.

41.2. We do not agree with the findings of the State Commission that cost to supply a consumer category is the same as average cost of supply

for the distribution system as a whole and average cost of supply can be used in calculation of cross subsidy instead of actual cost of supply. This is contrary to Regulation 7 (c)(iii) of the State Commission and findings of this Tribunal in the Judgment reported in 2007(APTEL) 931 SIEL Limited, New Delhi v/s PSERC &Ors.

41.3. The State Commission has expressed difficulties in determining cost of supply in view of non-availability of metering data and segregation of the network costs. In our opinion, it will not be prudent to wait indefinitely for availability of the entire data and it would be advisable to initiate a simple formulation which could take into account the major cost elements. There is no need to make distinction between the distribution charges of identical consumers connected at different nodes in the distribution network. It would be adequate to determine the voltage-wise cost of supply taking into account the major cost element which would be applicable to all the categories of consumers connected to the same voltage level at different locations in the distribution system. We have given a practical formulation to determine voltage wise cost of supply to all category of consumers connected at the same voltage level in paragraphs 31 to 35 above. Accordingly, the State Commission is directed to determine cross subsidy for different categories of consumers within next six months from FY 2010-11 onwards and ensure that in future orders for ARR and tariff of the distribution licensees, cross subsidies for different consumer categories are determined according to the directions given in this Judgment and that the cross subsidies are reduced gradually as per the provisions of the Act."

*15.6**<u>The ratio in the above judgments of the Tribunal will squarely apply to the present case. Accordingly, the State Commission is directed to undertake the exercise of determination of voltage-wise cost of supply within six month of the date of this judgment and ensure that in tariff orders passed subsequent to that, cross subsidies for different categories of consumers are determined based on the voltage-wise cost of supply and tariffs are determined based on the settled principles</u>."*

3.1.6 Also, Hon'ble APTEL in its judgment dated 7 June 2014 in Appeal No. 248 of 2012 in the matter of West Central Railway Vs. Rajasthan Electricity Regulatory Commission & Jaipur Vidyut Vitran Nigam Ltd., has stated that voltage-wise cost of supply has to be determined to compute and reflect the cross subsidy transparently and categorywise tariff with respect to overall average cost of supply has also to be

determined to satisfy the provision of the Tariff Policy:

> *"14. We do not agree with the contention of the Appellant that the tariff has to be determined according to the cost of supply or voltage-wise cost of supply. This Tribunal in the various judgments including judgment dated 30.5.2011 in Appeal no. 102 of 2010 & batch in the matter of Tata Steel Vs. Orissa Electricity Regulatory Commission has clearly held that the tariff need not be the mirror image of actual cost of supply or voltage-wise cost of supply. The voltage-wise cost of supply has to be determined to compute and reflect the cross subsidy transparently and to ensure that the cross subsidy is not increased but only reduced gradually. However, the variation of categorywise tariff with respect to overall average cost of supply has also to be determined to satisfy the provision of the Tariff Policy that the tariffs are within ±20% of the average cost of supply (overall) by FY 2010-11."*

3.1.7 Therefore, most SERC's have, for the purpose of compliance, opted for allocation of input energy into different voltages considering the losses of the respective voltage level. This leads to allocation of energy costs at different voltage levels considering the loss levels, while no attempt is made to allocate network costs on different voltages. The States which have attempted to allocate network costs over voltages have adopted approaches ranging from the very simple adhoc allocation of total network cost over HT and LT, to the more sophisticated way of identifying purpose of assets and allocating them accordingly. The approaches adopted by different SERCs in India for determination of Wheeling Charges are summarized in the subsequent para.

3.1.8 Also, MERC is the only Commission which has determined the tariff under Section 62 of the Electricity Act 2003 in three parts, i.e. Fixed Charges, Energy Charges and Wheeling Charges whereby Wheeling Charges as determined is common for open access consumers and the consumers of the licensee. However, other SERCs determine the Wheeling charges only for the applicability and recovery from the Open Access consumers.

3.2 Madhya Pradesh Electricity Regulatory Commission (MPERC):

3.2.1 Different Tariff Orders of MPERC overtime have repeatedly held that the present accounting practices of distribution licensees in Madhya Pradesh does not permit direct determination of Gross Fixed Assets of the Licensee at different voltages. As a result of this limitation, the MPERC has opted for determination of "notional" or "representative" cost of assets at different voltages and used the same to allocate network costs.

3.2.2 The notional cost of assets is thus determined for electrical assets only, and within electrical assets, for lines and transformers only. This is again largely due to data limitation.

3.2.3 In case of Lines and Transformers, physical numbers for line length in ckt-km and transformation capacity in MVA are normally available with all distribution licensees and are also updated from time to time. This physical data can be converted to financial data and notional cost can be determined. However, similar data for civil assets, say, in terms of number of buildings, or sqt. Meter area occupied or built up, etc. is not easily available and hence the notional cost of other type of assets in the Licensee's asset is not determined.

3.2.4 Accordingly, the MPERC has employed the physical data of line length at different voltages and transformation capacity of different types of transformers and converted the same to financial data by multiplying with Rs./Ckt-km and Rs./MVA rates as available from the cost data book maintained by the Distribution Licensees. This way, the notional cost of 33kV, 11kV and LT lines and notional cost of 33/11kV and 11/0.4 kV transformers is determined.

3.2.5 Further, MPERC has assigns the cost of 33/11kV transformers to 33kV and 11/0.4 kV transformers to 11kV. However, this is important to note as transformer, being a boundary asset, is common to two voltage levels. The Hon'ble MPERC does not seem to have classified transformers to 33kV or 11kV, based on purpose of existence, but has considered the same based on primary winding voltage.

3.2.6 Thereafter, the notional cost of assets is grouped into two blocks only – at 33kV and Below 33kV. The ratios so obtained are used to divide the total network cost into the two groups. Thereafter, similar to Maharashtra, the cost of network so obtained at 33kV is further shared with below 33kV group based on energy sales ratio at the two levels. No determination of wheeling charges at 11kV or LT level is done in Madhya Pradesh.

Table 2: Illustration of Computation of Wheeling Charges of Madhya Pradesh

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		7,500.00
B	GFA attributable to 33 kV	%	Calculated GFA Ratio	20.00%
C	GFA attributable to lower than 33 kV	%		80.00%
D	Charge recoverable from 33 kV consumers	Rs. Crs	D = A x B	1,500.00
E	Charge recoverable from lower than 33 kV consumers	Rs. Crs	E = A x C	6,000.00
F	Sales at 33 kV	MU		7,200.00
G	Total Sales {excluding EHV System}	MU		53,000.00
H	Proportion of 33 kV sales to total sales	MU	H = F / G	13.58%
I	Wheeling cost of 33 kV allocated to 33 kV users only	Rs. Crs	I = D x H	203.77
J	33 kV Wheeling Charges	Rs./kWh	J = I / F * 10	0.28

* - Numbers are illustrative

3.3 Telangana State Electricity Regulatory Commission (TSERC)

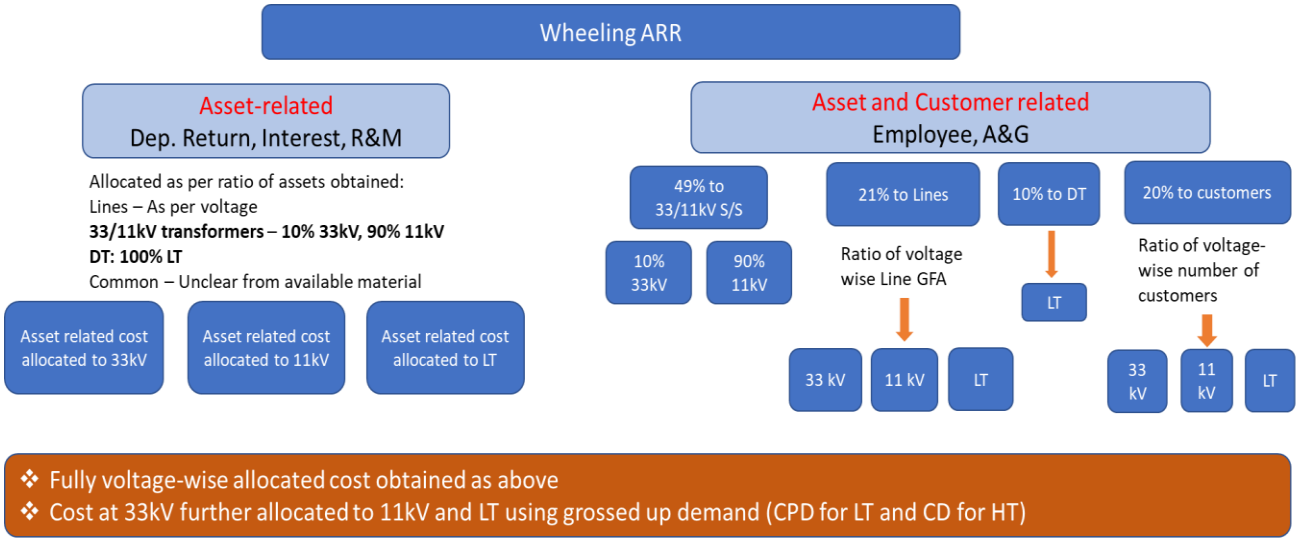
3.3.1 In the State of Telangana, Utilities follow the most complex method of allocation of network cost over different voltages. The method employed classifies cost into asset

related and consumer related whereby asset ratios is used for allocation of asset related cost only(R&M expenses, depreciation, RoCE and Taxes & other expenses) and for Employee and A&G expenses are allocated based on number of consumers, DTRs, substations and line lengths.

3.3.2 For voltage allocation of assets, the Utilities allocate the boundary assets of 33/11kV substations and 11/0.4 kV distribution transformers between 33kV, 11kV and LT. The method is explained in detail as below:

1) The distribution lines are identified to voltages as per rated voltage.
2) 33/11kV substations cost is allocated as 10% to 33kV and 90% to 11kV.
3) Cost of Distribution transformers is fully allocated to LT.
4) Out of the wheeling ARR, R&M cost, Interest, Depreciation, Return and Non-Tariff Income are considered asset-related and are therefore allocated to voltage levels as per the voltage-wise asset base identified as above.
5) Employee cost and A&G cost are considered driven by both the physical assets and number of customers. The allocation is explained through schematic as below:

Figure 2: Allocation of Wire ARR to different voltage level in Telangana



6) Capitalised O&M cost is allocated to each voltage in proportion to gross O&M cost as allocated to each voltage as per above.
7) Thereafter, Contract Demand at 33kV and 11 kV and Coincident Demand at LT is determined and grossed up by approved voltage level losses.
8) Using the grossed up demand, the ARR identified with three voltages is further divided (re-shared) between the three voltages. So, allocated ARR at 33kV will be shared between all three voltages based on proportion of grossed up demand of 33kV to the total grossed up demand of three voltage levels, 11kV allocated ARR will be shared similarly between 11kV and LT.
9) Finally, the fully allocated ARR at three voltages is again converted

to Rs./kVA/month Wheeling Charges using the grossed up demand at the three voltages.

Table 3: Illustration of Computation of Wheeling Charges of Telangana

Sr.	Particulars*	Units	Formula	Amount
A	ARR for Wires Business	**Rs. Crs**		2,100.00
B	Wheeling Demand At 33 kV from all Voltages	**MVA**	Computed by grossing up loss of respective voltage level	750.00
C	Wheeling Demand At 11 kV from all Voltages	**MVA**		1,000.00
D	Wheeling Demand At LT Voltages	**MVA**		2,100.00
E	Asset Base Utilisation at 33 kV	**Rs. Crs**	Allocated based on principle of allocation of transformers	200.00
F	Asset Base Utilisation at 11 kV	**Rs. Crs**		2,000.00
G	Asset Base Utilisation at LT	**Rs. Crs**		7,300.00
H	Total Asset Base	**Rs. Crs**	H = E + F + G	9,500.00
I	ARR Apportioned at 33kV	**Rs. Crs**	I = A X E / H	44.21
J	ARR Apportioned at 11kV	**Rs. Crs**	J = A X F / H	442.11
K	ARR Apportioned at LT	**Rs. Crs**	K = A X G / H	1,613.68
L	**Wheeling Tariffs at 33 kV**	**Rs./kVA/Month**	**L = I/B/12X10000**	49.12
M	**Wheeling Tariffs at 11 kV**		**M = J/C/12X10000**	368.42
N	**Wheeling Tariffs at LT**		**N = K/D/12X10000**	640.35

* - Numbers are illustrative

3.4 Joint Electricity Regulatory Commission (JERC) for Goa & UTs:

3.4.1 The JERC has also expressed its intent to allocated distribution network costs among various voltages. However, in absence of data of assets at respective voltages available from the books of accounts of the Licensees, the JERC has, on an adhoc basis, considered 30% asset cost towards LT, while the remaining 70% is considered towards HT and EHT.

3.4.2 The JERC has further divided costs between those that are driven by assets and those that are driven by customers. Costs that are considered asset linked are Interest, Depreciation, Return and Income Tax. These costs are allocated to the two voltage groups in the ratio of 30:70 for LT:HT&EHT. O&M is considered as customer related and is allocated to voltage levels based on the number of customers at LT and HT&EHT combined. No detailed break-up of voltage-wise assets is made available by the Licensees to the Commission.

3.4.3 In the next step, the costs allocated to HT-EHT group are further allocated to LT based on the ratio of energy input. Thereafter, the cost allocated to the two groups is converted to wheeling charges using energy sales at these levels.

Table 4: Illustration of Computation of Wheeling Charges of JERC

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		78.31
B	Consumers at LT Level	No		66,194
C	Consumers at HT / EHT Level	No		811
D	Total Consumers	No		67,005

Sr.	Particulars	Units	Formula	Computation
E	Total O&M Cost of Wire Business	Rs. Crs		29.17
F	O&M Cost allocated to LT Level	Rs. Crs	F = B / D x E	28.82
G	O&M Cost allocated to HT / EHT Level	Rs. Crs	G = C / D x E	0.35
H	GFA allocation to LT Level	%	Assumed	30%
I	GFA allocation to HT / EHT Level	%		70%
J	Balance Cost related to Wire Business	Rs. Crs	J = A - E	49.14
K	Balance Cost allocated to LT Level	Rs. Crs	K = J x H	14.74
L	Balance Cost allocated to HT / EHT Level	Rs. Crs	L = J x I	34.40
M	Sales at LT Level	MU		442.67
N	Sales at HT / EHT Level	MU		2155.94
O	Distribution Loss at LT Level	%		12.83%
P	Distribution Loss at HT / EHT Level	%		1.96%
Q	Input at LT Level	MU	Q = M / (1 - O)	507.82
R	Input at HT / EHT Level	MU	R = N / (1 - P)	2199.04
S	Wheeling Charges at LT Level	Rs. /kWh	S = (F + K) / Q	0.86
T	Wheeling Charges at HT / EHT Level	Rs. /kWh	T = (G + L) / R	0.16

* - Numbers are illustrative

3.5 Gujarat State Electricity Regulatory Commission (GERC)

3.5.1 GERC determines Voltage-wise Wheeling Charge for 11 kV and LT level consumers only. While determining the wheeling charges, ARR of Wire business of all 4 State DISCOMs are combined to maintain uniformity of wheeling Charges in the State.

3.5.2 ARR of Wire Business is apportioned between the 11 kV and LT Voltage level in the ratio of 70:30 (assumed ratio of GFA of 11 kV:LT). Accordingly, No voltage-wise asset identification is carried out and adhoc proxy is used for allocation.

3.5.3 Total cost so determined is divided by the input energy of the respective voltage (Sales grossed with voltage level loss) to determine the wheeling charges of 11 kV and LT.

Table 5: Illustration of Computation of Wheeling Charges of Gujarat

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business of four DISCOMs	Rs. Crs		5,420
B	Distribution cost at 11 kV level - 30% of total distribution cost	Rs. Crs		1,626
C	Distribution cost of the four DISCOMs at LT level - Balance	Rs. Crs		3,794
D	Energy input at 11 kV	MU		97,861
E	Energy input at LT	MU		52,231
F	Wheeling charges at 11 kV	Ps./kWh	F = B / D x 1000	16.61

* - Numbers are illustrative

3.6 Punjab State Electricity Regulatory Commission (PSERC)

3.6.1 Punjab is perhaps the only State in the Country where the State Commission follows a category-wise cost of supply. PSPCL had hired TERI to conduct the study back in 2013-14 and since then the methodology II (as it is termed) is in vogue for determination of category-wise CoS.

3.6.2 In category-wise cost of supply, the cost differentiation between categories is based on the nature of cost and the category's causation in terms of its contribution to the demand / connected load. In Punjab, in this method, there is no voltage-wise asset allocation, because cost causation is assessed in terms of usage of resources - power, transmission and distribution system - and not on the basis of voltage.

3.6.3 Therefore, in the method being followed in Punjab, the CoS so determined varies between categories connected at the same voltage and the differentiation in CoS for the same type of consumer (say, industrial) connected at different voltages is only due to different losses and the demand imposed by the category.

3.6.4 The usage of system assets at different voltages is, apparently, not factored in this study. The entire distribution system cost is recognised as "demand-related" and "customer-related" cost (depending upon wire or retail) and gets allocated to categories based on the demand imposed / connected load of the category.

Approach for Cost of Supply Computation

Functionalisation

- Identification and segregation of costs between Power Procurement, Transmission and Distribution

Classification

- Power Procurement (fixed) –Demand related
- Power Procurement (Variable) – Energy related
- Transmission – Completely Demand related
- Distribution – Demand related and customer related

Allocation

- Demand related - Allocated using information on voltage wise utilization of assets / effective connected load / CPD and NCPD.
- Energy related – Allocated among consumer categories based on their share in Input energy (grossed up with Loss)
- Customer related – Allocated among consumer categories based on their share in purchased energy

3.6.5 However, this exercise is undertaken based on the direction of the Hon'ble APTEL and the approach for computation of wheeling charges is totally different.

3.6.6 PSERC determines the Wheeling Charge for whole Distribution Network irrespective of voltage level whereby Wheeling Charges are determined for Short term (Rs./MWh.) and Long / Medium term (Rs./MW/month).

3.6.7 Long Term Wheeling charges are determined based on Distribution capacity of the

licensee (net of transformation losses and auxiliary consumption) and Short Term Wheeling charges are determined based on the total input energy at distribution periphery

3.6.8 Asset Utilization is not considered for determination of wheeling charges

Table 6: Illustration of Computation of Wheeling Charges of Punjab

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		3,940.22
B	Input Energy at the distribution periphery	MU		57,813
C	Distribution capacity of PSPC (net of transformation losses/ auxiliary)	MW		14,025
D	Wheeling charges for using distribution network of PSPCL	Rs./MWh	D = A / B X 10000	681.55
E		Rs./MW/month	E = A / C / 12 *10^7	2,34,119

* - Numbers are illustrative

3.7 Other States:

3.7.1 In addition, practices in some of the other states were also analysed, where there is no direct or indirect allocation of distribution network cost or wheeling (wires) cost, but cost of supply or differentiated cost of supply method has been used:

- **Karnataka Electricity Regulatory Commission (KERC):**

3.7.2 In Karnataka also, voltage-wise wheeling charges are determined. However, there is no scientific method of asset or cost allocation between voltages. Karnataka simply uses an adhoc ratio of 30:70 (HT:LT) for allocation of wheeling cost and then using the allocated cost and sales at each level, wheeling charges are determined for HT and LT levels.

Table 7: Illustration of Computation of Wheeling Charges of Karnataka

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		2,939.83
B	Total Sales	MU		28,566
C	Total Wheeling Charges	Ps./kWh	C = A / B X 1000	102.92
D	Wheeling Charges for HT - 30%	Ps./kWh	D = C X 30%	30.87
E	Wheeling Charges for LT - 70%	Ps./kWh	E = C X 70%	72.04

* - Numbers are illustrative

- **Assam Electricity Regulatory Commission (AERC):**

3.7.3 In the State of Assam also, there is no scientific method of allocation of assets or cost into various voltage levels. The AERC has commented in its Tariff Orders that the Licensees are yet to provide any allocation of assets into various voltages and are also yet to complete segregation of distribution losses among voltage levels.

3.7.4 In absence of any logical method of allocation, AERC assumes 35% of total Wheeling ARR as that pertaining to 33 kV level and the balance to 11kV level. The wheeling charges of only 33 kV level is determined, considering the 35% allocated cost and dividing the same by total energy input into the Distribution system.

Table 8: Illustration of Computation of Wheeling Charges of Assam

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		770.50
B	Energy Input into Distribution system	MU		9,455
C	Distribution Cost for 33 kV voltage level - 35%	Rs./kWh	C = A x 35%	269.68
D	Wheeling charges for 33 kV/11 kV level	Rs./kWh	D = C / B X 10	0.29

* - Numbers are illustrative

- **Uttar Pradesh Electricity Regulatory Commission (UPERC):**

3.7.5 In UP, there is no allocation or cost based segregation of wheeling charges at different voltage levels.

3.7.6 The wheeling charges are determined on an average basis considering the entire Wheeling ARR divided by the total energy sales. However, in order to give benefit of voltage-level to open access consumers, the UPERC considers 80% of Average Wheeling Charges for consumers connected at 11 kV and 50% of Average for consumers connected above 11 kV. This is entirely adhoc and has been in vogue for several years.

Table 9: Illustration of Computation of Wheeling Charges of Uttar Pradesh

Sr.	Particulars	Units	Formula	Computation
A	ARR for Wires Business	Rs. Crs		8,994.62
B	Total Sales	MU		95,420
C	Total Wheeling Charges	Rs./kWh	C = A / B X 10	0.94
D	Wheeling Charges for 11 kV - 80%	Rs./kWh	D = C X 80%	0.75
E	Wheeling Charges for above 11kV - 50%	Rs./kWh	E = C X 50%	0.47

* - Numbers are illustrative

- **Delhi Electricity Regulatory Commission (DERC):**

3.7.7 DERC determines voltage-wise wheeling and retail supply cost for above 66 kV, 33/66 kV, 11 kV and LT levels. For this purpose, the Commission only determines distribution losses at different voltage levels. Wherever losses are clearly available for the year in question, the same are considered. Where not available, the same are derived by prorating the available losses of any past year using the target overall distribution losses.

3.7.8 Using the energy losses at different voltage levels, the energy input at each level is

worked out by grossing up sales at each level by the corresponding losses.

3.7.9 The total wheeling ARR as approved by the Commission for the year is then allocated to each voltage level considering the ratio of energy input at that voltage level to the total energy input.

3.7.10 In the exact same manner, the Retail Supply ARR is also allocated to different voltage levels. The Wheeling ARR and the Retail Supply ARR so allocated at different voltage levels are then added to determine the total Voltage-wise cost of supply at that voltage level.

Table 10: Illustration of Computation of Wheeling Charges of Delhi

Sr.	Particulars	Units	Formula	33/66 kV	11 kV	LT	Total
A	Energy Input into Distribution system	MU		555	1,754	11,128	13,437
B	ARR for Wire Business	MU	Allocated in ratio of Energy Input	58	182	1,154	1,394
C	Distribution Loss	%		1.01%	2.21%	9.41%	8.00%
D	Energy Sales at respective voltage	MU		549	1,715	10,081	12,362.00
E	Wheeling charges at respective level	Rs./kWh	E = B / D*10	1.048	1.061	1.145	1.128

3.8 Summary of the State-wise approach

3.8.1 Based on the above analysis on the approach adopted by different SERC in India, the computation of wheeling charges is summarized as below:

Table 11: Summary of the approach of State for computation of Wheeling Charges.

State	Single Voltage	Multiple Voltage	GFA allocation	Cost allocation	Base	Distribution Transformer
Madhya Pradesh	33 kV	X	Notional cost of Lines and based on cost data	Wire Business - as per Assumption / Regulations	Sales (Excluding EHV)	33/11kV Transformers under 33kV
Telangana	X	33 kV, 11 kV and LT	Notional cost of Lines and based on cost data books • Lines – As per voltage • 33/11kV transformers – 10% to 33kV and 90% 11kV • DT: 100% LT	• Employee/A&G expenses - no of consumers, DT, S/Sn, and line lengths. • Other expense - asset utilization at the respective voltage levels.	Demand in MVA	at LT Level
JERC	X	LT, HT and EHT	70: 30 / 60:40 Ratio	• O&M cost –no. of Customer • Balance cost - GFA Ratio	Input Energy	Not Applicable
Gujarat	X	11 kV and LT	70: 30 Ratio	**Wire Business - Assumption / Regulations**		
Punjab	Common for all Network	X	**Not considered for Allocation**		• Input Energy and Distribution Capacity • Short Term = Total ARR for Wire business / Input energy • Long Term based on	

State	Single Voltage	Multiple Voltage	GFA allocation	Cost allocation	Base	Distribution Transformer
					Distribution capacity	
Karnataka	X	HT / LT			Sales - 30: 70 of wheeling charges	
Uttar Pradesh	X	11 kv and 11 kv Above			Sales - 80% / 50% of wheeling charges	
Assam	Uniform for 33/11 kv	X			Sales - 35% of Wire Business	
Delhi	X	33/66 kV, 11 kV and LT			ARR allocated in ratio of energy input and wheeling charges determined by dividing the same with sales	

3.9 Learning from Domestic Experience

3.9.1 The research carried out with respect to identification and analysis of existing practice of wheeling charge determination in different states revealed the following :

- The voltage wise approach has been considered based on the Hon'ble APTEL Judgments which specifies determination of tariff on Voltage wise CoS;
- In absence of actual data of voltage-wise technical losses / network costs / assets, voltage- wise cost of supply worked out based on methodology as per Hon'ble APTEL, which does not provide true reflection and also results in tariff shock to LT Consumers.
- State like Maharashtra has already specified in their Tariff Regulations, to calculate Retail Supply Tariff based on the ACoS.
- Some States like Telangana have attempted a more comprehensive allocation method, while others have intended to do so but have been challenged by data availability.
- States like Madhya Pradesh have addressed the issue of non-availability of adequate asset registers and records by determining notional asset cost or present cost of assets by converting physical network data to financial data, while the others have used adhoc asset ratios between HT and LT, which have no scientific basis and perhaps have been used based on guesstimates.
- With respect to the Dual Voltage Asset (Boundary Assets), it has been analysed that in Madhya Pradesh the same is allocated to Upstream/primary voltage level whereas in Telangana, the same is allocated to secondary / lower voltage level.
- No standard approach of determination of wheeling charges has been adopted.Charges are either computed on uniform basis irrespective of voltage level like in Punjab and Assam or only for single voltage level like in Gujarat or calculated for each voltage level i.e. for EHT/HT and LT.

A. International Experience

3.9.2 The research carried out to identify existing practices of asset / distribution cost allocation to different voltages of electricity distribution also focused on some of the

key international jurisdictions which have examples relevant to Indian context and the context under which this study has been carried out.

3.9.3 In most international jurisdictions where network pricing is still conventionally regulated, using embedded cost approach, the allocation of network costs and retailing costs over various consumer classes is based on the Cost to Serve approach where the total costs of distribution and supply are allocated to various consumer categories based on functionalization and classification approach, where all costs are ultimately classified as "demand" related, "energy" related or "customer" related.

3.9.4 This type of allocation does not necessarily involve a voltage-wise asset or cost allocation approach as the same is rendered redundant when the various costs are directly allocated on individual categories of consumers based on cost causation principle, using demand, energy and customer related requirements (cost drivers). Hence, while some of these jurisdictions did form part of the study, the majority of learnings are derived from those jurisdictions where direct voltage-wise distribution cost allocation has been done. These examples are discussed in detail as below:

3.10 Tasmania, Australia –TaS Networks (Integrated T&D utility of Tasmania):

3.10.1 In Australia, TaS Networks is an integrated transmission and distribution utility operating in the region of Tasmania. The Australian Energy Regulator in whose jurisdiction TaS Networks operates, requires the utilities to develop and present a Distribution Cost of Service (DCoS) approach on a regular basis, for allocation of transmission and distribution costs to the various customer groups served by the utility. For this purpose, TaS Networks allocates its distribution costs among three cost groups –

- Network Service,
- Common Service and
- Connection Service.

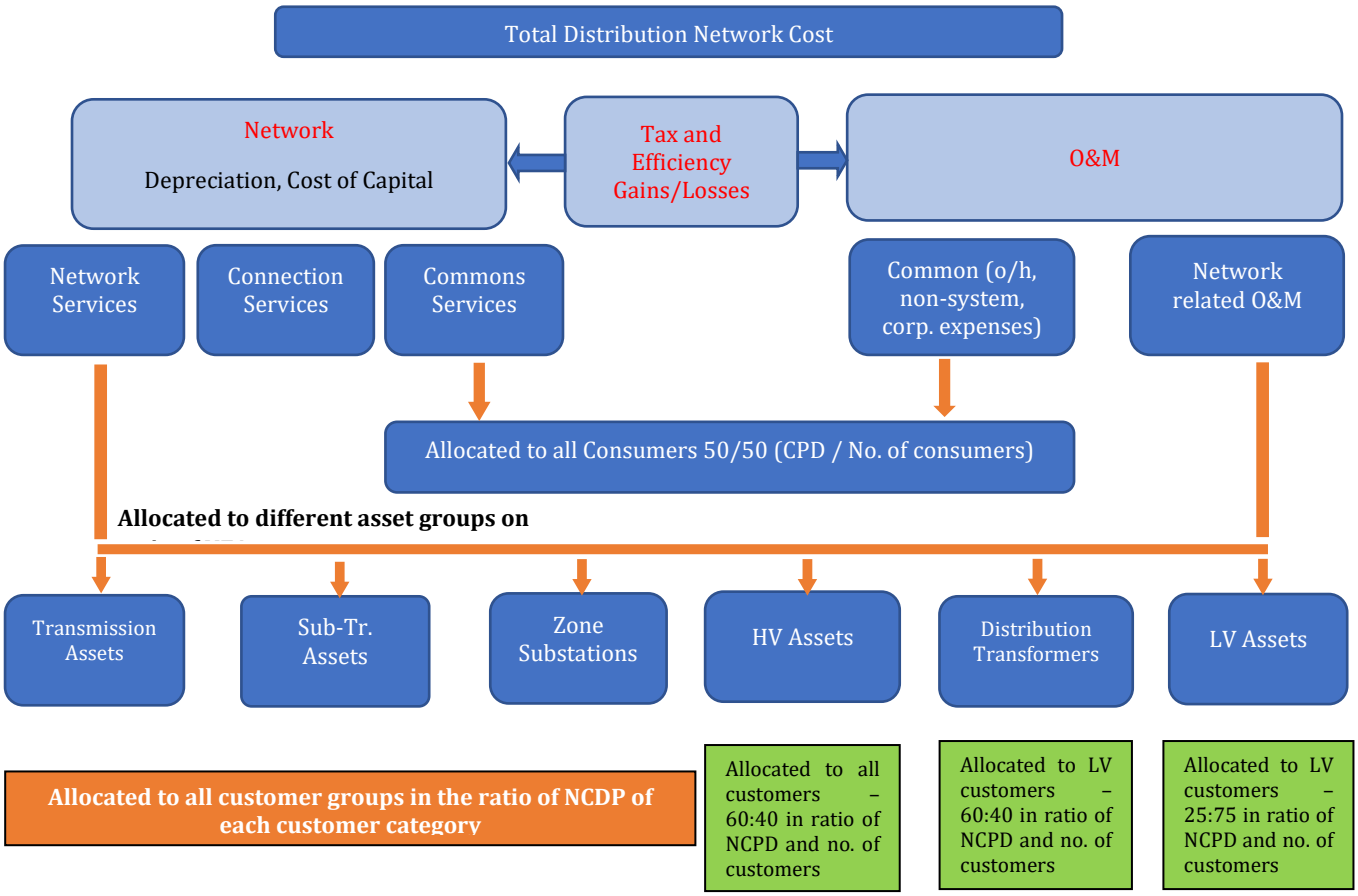
3.10.2 Thereafter, the costs allocated to Network Service are then sub-allocated to different Asset classes as outlined below:

- Transmission assets;
- Sub-transmission assets;
- Zone substation;
- HV assets;
- Distribution Transformer and
- LV assets.

3.10.3 In the last step, the costs allocated to asset classes are further allocated to different types of customers basis parameters of maximum demand and number of customers.

3.10.4 Subsequently, the costs allocated to Common Services (building, fleet, etc.) are allocated to all customers on the basis of the parameters of maximum demand and number of customers. The cost related to Connection Service are the shallow costs expended directly on providing individual connection to a customer and hence the recovery of these costs is direct from the customer concerned and not through the common pooled cost.The whole process of allocation of distribution costis explained diagrammatically as below:

Figure 3: Allocation of Distribution Network Cost of TaS



3.10.5 As the above figure indicates, the Tax and Efficiency Gains / Losses are allocated back to Return, Depreciation and O&M in the proportion of revenue share of these costs in the total distribution cost.

3.10.6 The Return on Capital and Depreciation are recognised as Network related (asset driven) costs and allocated to the main groups of NETWORK, COMMON SERVICE and CONNECTION SERVICE. This is a direct identification of cost i.e. the RoE and Depreciation on Network assets, common assets and connection assets is determined separately.

3.10.7 The O&M cost is allocated to NETWORK and COMMON SERVICE group. The O&M identified with Network is the actual O&M on network assets and that identified with common facilities is the O&M cost related to common assets and services, including overheads, administration costs, corporate allocations, etc. No O&M is allocated to CONNECTION SERVICE group.

3.10.8 The total cost identified with NETWORK group is then allocated to Asset classes of (1) Transmission assets (2) Sub-transmission assets (3) Zone substation (4) HV assets (5) Distribution transformer (6) LV assets. This is done in the ratio of remaining useful life of the asset.

3.10.9 The cost allocated to Transmission, Sub-transmission and Zone Substation asset classes are allocated to all consumers, based on the ratio of Any Time Maximum Demand (ATMD – which is similar to NCPD):

a. The cost allocated to HV assets is allocated to all customers in the ratio of 60% ATMD and 40% No. of customers in urban areas and 20% ATMD and 80% no. of customers in Rural areas.

b. The cost allocated to Distribution Transformers is allocated only to LV customers who do not have dedicated distribution transformer of their own. The ratio of allocation is 60:40 ATMD : No. of customers.

c. The cost allocated to LV assets is reallocated only to LV customers who do not have dedicated LV assets of their own. This is done in the ratio of 25:75 (ATMD : No. of customers)

d. The cost identified with COMMON SERVICE group is allocated to all customers in the ratio of 50:50 (ATMD : No. of customers).

e. This way the total cost gets allocated to all types of customers. This type of allocation results in cost differentiation between customer classes not only on the basis of voltage, but also on the basis of demand and no. of customers.

3.10.10 The weights 60/40, 25/75, etc. depend on which parameter drives the cost for which type of asset class. For example, LV asset cost is felt to be largely driven by the number of customers and not so much by demand and hence the weight of 75% is assigned towards number of customers for cost allocated to LV assets. Similarly, for other asset classes.

3.11 ANRE (Romanian Energy Regulator for Electricity and Gas):

3.11.1 In Romania, the energy regulatory body, namely, National Energy Regulatory Authority (ANRE), has published a tariff methodology, where the need for voltage-wise allocation of cost is identified in order to allocate costs on consumers in a fair and justified manner, corresponding to their voltage of installation and consequent usage of network assets. The Tariff methodology provides as under:

> *"Each category of consumers should cover the real costs related to purchase of electricity, cost of transmission service, technological consumption of electricity in transmission and distribution networks, consumptions and costs related to distribution and supply of* ***electricity up to boundary or consumption points of the final consumers according to voltage level*** *of the networks, to which are connected theirs electrical installations.*

Fair and justified costs allocation between voltage levels, represents the primary prerequisite to diminish and eventually to exclude the cross subsidies, which are still partially included in electricity and natural gas tariffs."

3.11.2 On the basis of the stated tariff methodology, ANRE carried out a study in association with USAID and NARUC (National Association of Regulated Utility Commissioners of the United States), where the following was recommended with respect to allocation of various distribution and supply costs onto respective voltage levels:

1) Assets are classified into (a) those directly related to voltage and (b) common assets with Three voltage classes were formed viz., HV, MV and LV.
2) Depreciation of group (a) assets is directly determined for HV, MV and LV assets. Total Depreciation of group (b) assets is allocated to HV, MV and LV levels basis ratio of book value of group (a) assets.
3) O&M costs are allocated to HV, MV and LV based on the ratio of book value of group (a) assets.
4) Metering costs are allocated over HV, MV and LV levels proportionally to the amount of electricity distributed to consumers whose installations are connected to specific voltage level
5) Other common costs, supply costs: are allocated based on energy distributed at HV, MV and LV levels

3.12 United States of America– NARUC Manual, 1992:

3.12.1 In the United States of America, individual States have their respective Public Utility Commissions (PUC), which have jurisdiction over electricity, gas and water utilities of the respective State. National Association of Regulated Utility Commissioners of the United States (NARUC) is the umbrella organization of PUCs of different States.

3.12.2 In the USA, cost allocation and recovery of costs of electricity are largely guided by the Bonbright Principles of electricity rate design of 1961 and the Public Utility Regulatory Policy Act of 1978. These are summarized as below:

3.12.3 Dr. James C. Bonbright was on the faculty of the Columbia University School of Business from 1919 to 1960. He published the widely cited book "Principles of Public Utilities" in 1961. Bonbright's principles are often summarized as three objectives –

- Revenue requirement
- Fair apportionment of production costs among customers
- Optimal efficiency

3.12.4 The General principles of cost allocation adopted by the NARUC are largely based

on Bonbright principles. NARUC published a cost allocation manual in 1992, which laid down the principled of causality and common good as below:

- Causality Principle: Assets used individually shall be charged individually (in other words, assign costs to customers who cause a utility to incur them)
- Common good principle: Assets used jointly shall be covered by contributions from all users

3.12.5 In most of the States in the USA, general cost to serve approach is followed, where costs are first functionalized into generation, transmission and distribution and then distribution costs are sub-functionalized into Lines, Transformers, Substations, etc.

3.12.6 As per the cost causality principle, where cost is directly attributable, it is directly allocation to respective cost center. For example, if cost is directly identifiable with a particular voltage class, then it is recorded directly under that voltage class. For example, certain costs that are dedicated to specific consumer categories are charged only to that category, such as street lighting costs, which are charged only to street light consumer category. Similarly, High Voltage consumers do not use Low Voltage assets, so LV costs are not charged to HV users and so on. The exact principles of cost causality probably vary from State to State in the USA.

3.12.7 In the next step, the functionalized costs are classified into Demand, Energy and Customer related costs. The exact proportions of these also vary from State to State depending upon the views of analysts in different states at different points in time. The three types of classified costs are then allocated to consumer categories based on the allocation factors such as:

- Demand related – uses mostly Coincident Peak Demand
- Energy related – uses proportion of energy consumed
- Customer related – uses ratio of number of customers in each group

3.12.8 This cost is similar to the cost approach adopted in India in relation to Cost to Serve Model has been adopted by Bihar, Punjab, Gujarat, Tamil Nadu, etc, but tariff is determined on the basis of AvCoS. However, the basic difference in the capturing of the cost whereby in India the same is made on the assumption basis as no specific data is available with the licensee but in USA, a detailed systematic approach with proper allocation of assets and the demand of the respective categories is identified.

3.13 National Energy Regulator of South Africa (NERSA) - South Africa

3.13.1 South Africa follows the Embedded Cost of Supply approach with a four-step process defined as revenue requirement, cost functionalization, cost classification and cost allocation which is similar to Cost to Serve model.

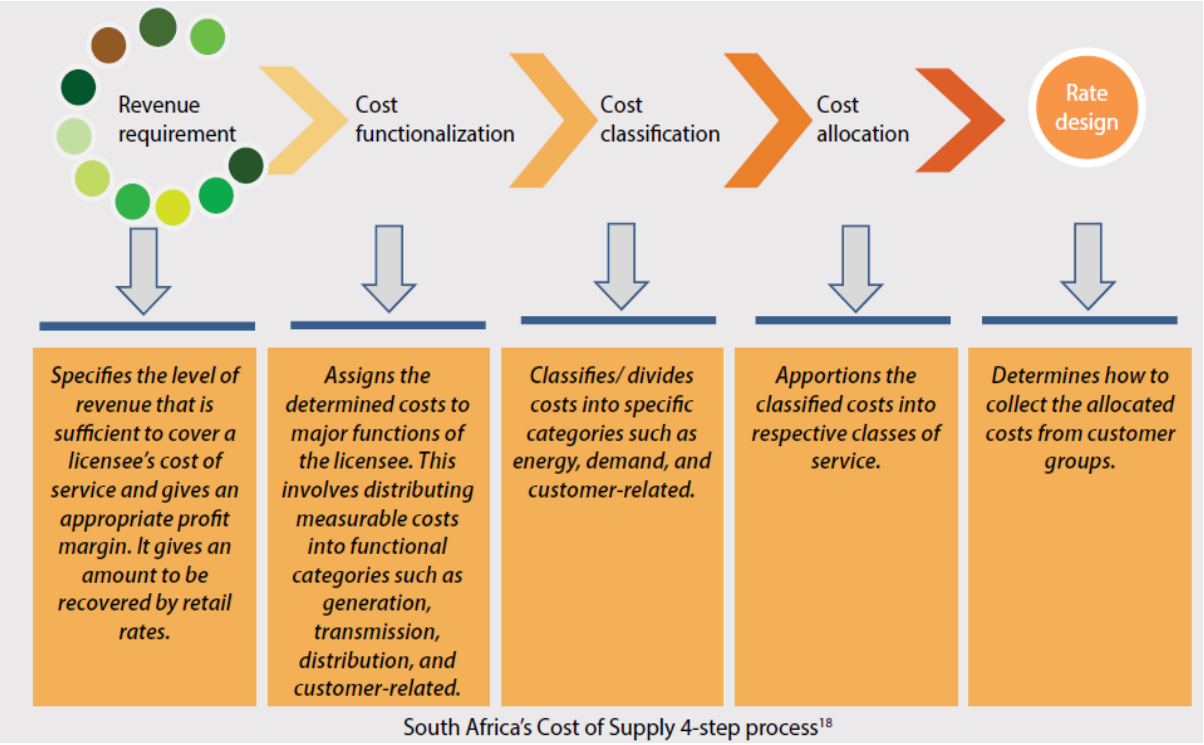
3.13.2 South Africa adopted the cost-plus methodology to determine the revenue requirement which is further assigned to different functional groups, such as generation, transmission, distribution, and customer-related costs to facilitate in

terms of which consumer groups are responsible for such costs. After the functional separation, these costs are classified into cost components. Cost classification is a two-step process. First, functionalised costs are classified as either fixed or variable costs. Then, fixed and variable costs are classified as demand, usage or energy and customer-related.

3.13.3 The sum of these three types of costs within a given class is the cost to serve to that class of consumers. The cost drivers and classification are indicated in the tables, as given below:

- Demand related costs are those that are Triggered by peak demand and are largely fixed in nature.
- Energy costs Vary with volume of energy utilized
- Customer related cost Depends on the number and type of consumer served.

Figure 4: South Africa Cost of Supply Approach



South Africa's Cost of Supply 4-step process[18]

3.13.4 Also, **<u>Reduced Network Diagram (RND)</u>** is prepared to position the customers at different voltage levels on the network whereby all distribution network related cost, including network related O&M is considered as Demand Related cost and is allocated to customers based on RND and Demand Responsibility Factor (Average & Excess method).

3.13.5 Purpose of RND is to position customers based on voltage level of use whereby RND creates asset pools, according to voltage level and asset type. Once the reduced network is determined, the customers are positioned in the network to do cost allocation.

3.13.6 Further, as stated above, Energy and Customer related costs are allocated to

customer classes based on energy distributed and number of customers in each class.

3.14 Philippines:

3.14.1 The Philippines utilities also follow the Embedded Cost of Supply approach in order to determine their cost of service. Their cost components are similar to that of South Africa. Utilities in the Philippines also follow the same steps in determining their revenue requirement, cost functionalization, cost classification, and cost allocation. However, the uniqueness in the Philippines CoS is that the cost functionalization consists of generation, transmission, system loss, distribution and universal charges which are defined as follows:

- **Generation Charge** refers to the cost of power generated and sold to the distribution utility by the National Power Corporation (NPC) as well as the Independent Power Producers (IPPs).
- **Transmission Charge** refers to the regulated cost or charges for the use of a transmission system, which may include the availment of Ancillary Service.
- **System Loss Charge** represents recovery of the cost of power lost due to technical and non-technical losses currently pegged at 9.5% for private distribution utilities and 14% for electric cooperatives, including company used power.
- **Distribution Charge** is the regulated cost of building, operating and maintaining the distribution system, which brings power from high voltage transmission grids, to commercial/ industrial establishments and to residential end-users. It also includes metering and billing costs.
- **Universal Charge** refers to the charge, if any, imposed for the recovery of stranded debts, stranded contract costs of NPC, and other mandated purposes. It is a non-bypassable charge, which shall be passed on and collected from all end-users on a monthly basis by the distribution utilities.

3.15 Learning From International Study

3.15.1 The research carried out with respect to identification and analysis of existing practice internationally, the inferences are as given below:

- Assets having dual voltage (boundary assets) such as Power Transformers/Distribution Transformers are allocated to lower voltage considering the usage of the asset for supply to consumers. For Eg: DT having ratio of 11 kV/ 0.4 kV is installed for supply to LT consumers, accordingly, the asset will be classified under LT.
- Common Assets are allocated based on Coincident Peak Demand, Number of Consumers or in the ratio of voltage identified assets or a mixture of more than

one parameter.

- Usually Cost to Serve approach has been adopted by maximum countries whereby the cost has been allocated based on Demand, Energy and Customer related cost.
- Cost causality principle has been adopted whereby the Assets used individually for a specific category of consumers is charged to those respective consumers only - assign costs to users who cause utility to incur those costs.
- Asset allocation is done based on usage and business parameters.

4 Proposed Methodology

4.1 Identification of nature of assets

4.1.1 It was observed that one of the discrepancies identified in the data submitted by Licensee was that a similar asset has been either classified as assets belonging to Wire or Supply function. Such discrepancies at identification level is not desirable and hence on the basis of the above analysis, the Commission feels that it is necessary to identify the basic grouping and bundling of the assets.

4.1.2 Accordingly, the Commission proposes the following guidelines for classification of assets under Wires, Supply and Common groups and further allocation of Common group assets again into Wires and Supply functions so as to achieve the uniform and standard approach of all the licensee:

1) **Supply assets should include -**

- All assets related to end consumers including consumer meters and associated metering accessories including CT/PT, assets related to billing and payment facilities such as IT hardware and software for consumption analysis, billing, etc. softwares, apps, cash collection centers, payment kiosks, customer care centers, etc. if any, for allocation of meter readers, meter reading devices and instruments, AMR, meter communication devices, etc.
- It can always be argued that all consumer meters, billing and payment facilities are also meant to record energy wheeled and payments include payments for wheeling as well and therefore, these assets and facilities also serve Wires business. To test the validity of this argument, one has to imagine a theoretical scenario of bifurcation between Wires and Supply business and formation of two separate companies for the same. In such a situation, it can be imagined that the responsibility of metering, meter reading, billing, and for all customer interfaces shall rest with the retailer of electricity and the Wires provider shall simply bill the retailer for recovery of its wheeling charges, instead of billing the consumers directly. The example of AEML-D/TPC-D change-over arrangement attests to that fact. Therefore, in the present context, it is correct to consider all retailing and end consumer assets as enumerated above as part of Supply function.
- The purpose of Grid meters i.e. meters installed at various positions along the distribution network exist primarily for recording of energy at various interfaces for the purpose of energy accounting. This purpose cannot be classified as related to supply function of a distribution licensee. Therefore, **Grid Meters should be considered part of Wires business**.

2) **Common to business assets:**

- This will comprise of those assets and facilities that cannot be earmarked either to Wires business or to Supply business.
- These assets could include assets such as administrative offices of Licensees, furniture and fixtures, common vehicles for use by officers or employees, electrical and electronic appliances in offices, etc.
- These assets are required to be allocated to Wires function and Supply function of distribution licensees based on appropriate drivers / purpose of existence. The guidelines for the same are proposed in the appropriate section herein.

3) **Wire Assets:**

- All other assets and facilities of the Distribution Licensee after identifying and segregating Supplydedicated assets and Common assets, shall be classified under Wires function.

4.2 Network Assets grouping and bundling

4.2.1 The assets of distribution dedicated to Wires function, along with the allocated portion of Common assets forms the bundle that is required to be allocated to different voltage levels.

4.2.2 Within the Network Asset Group i.e. for Wire Business, there again exist assets among three categories –

- assets that are voltage identifiable i.e. those assets that clearly and specifically pertain to a single voltage class;
- assets that exist along the boundary of two voltages i.e. power transformers and distribution transformers; and
- assets that belong to network (wires) business, but are not specific to any voltage level and can be utilized across all or multiple voltage levels within the network.

4.2.3 Another important aspect of asset allocation is asset bundling. Bundling imply grouping of same purpose assets into a single bundle. Bundling builds in purpose of use and assists in grouping of assets of same purpose, regardless of their individual voltage ratings. For example, in a Distribution Substation, there are station batteries, which are otherwise rated at Low Voltage, but batteries are an integral part of the substation and therefore it cannot be that batteries are put in Low Voltage, while other equipment in substation is classified under high voltage.

4.2.4 From international research also it is seen that simple asset groups of “Lines”, “Substations”, “Meters”, etc. are formed for the purpose of allocation of these same purpose bundles over individual voltage levels instead of considering each individual item in the asset register and classify the same on the basis of its rated

voltage.

4.2.5 Accordingly, such assets are required to be bundled at the same voltage level related to primary assets to which the assets is an integral part of the overall function.

4.2.6 The following asset groups and bundles are accordingly recommended (suggested inclusions are not exhaustive, but only indicative. Licensees have to identify assets to be included in the suggested bundles):

Table 12: Illustration of Bundling of Assets

Main Group	Suggested bundle	Inclusions
Boundary assets	**Distribution Substation (33/11kV or 22/11kV or 33/22kV or Multi-winding)**	Power Transformer, all associated civil structures, land, cables and wiring, relays, switchgear, control panels, lightning arrestors, capacitor banks, station batteries, station transformers, earthing equipment and all other appurtenant apparatus being part of the substation
Boundary assets	**Consumer Substation (11/0.4kV or 22/0.4 kV or 33/0.4 kV)**	Distribution Transformer, all associated civil structures, land, relays, cables and wiring, if any, switchgear, control panel, capacitor banks, earthing equipment and other appurtenant apparatus, being part of the substation
Voltage Identifiable	**Line – EHT** **Line – HT** **Line – LT** **(depending upon voltage rating)**	Overhead Line and associated towers, tower plinth, insulators, gantry and other installed equipment
		Underground cable and cable ducts, if any
		Relays, if any, installed
Voltage identifiable	**Grid Meters**	Grid Meters as per voltage of installation
		Meter housing
		CT/PT and associated wiring
Common to Voltage	**Others**	Maintenance vehicles
		SCADA, DMS, OMS, Network Planning software and hardware
		Tools and equipment not voltage specific

4.2.7 It is clarified that the above groups and bundles are for the purpose of this exercise of allocation of assets over specific voltage levels only, and do not recommend any change in the maintenance of accounts by the Distribution Licensees. The Commission is only interested in the outputs and does not intend to give directions for specific practices to be adopted by the Licensees. The Licensees have the liberty to either make appropriate modifications to their ERP system in order to analyse and present data as per the regulatory requirements or make the required groups and bundles outside the system. Licensees not having ERP system will necessarily have to organize their asset base data as per these requirements manually, till such time they install ERP system with appropriate modules to handle asset base data.

4.3 Approach for allocation of GFA

4.3.1 Based on the analysis of the approach adopted in the domestic and international scenario and the submission of the licensee with respect to their existing allocation principle (though with data inconsistency), the Commission have tried to identify the key parameters for the allocation of the Assets as identified in the following table:

Table 13: Key parameters for Approach for allocation of GFA

Group	Licensee	Learning	Recommendation
Voltage Identifiable	• Inconsistency in approach • Meters, CT / PT included in Common to business allocation	• Domestic - distribution Transformer / lines either from books or notional value • Internationally - Cost allocated based on cost to serve	• Identification of assets - Lines and associated structures, Switchgear, Relays, Overhead / underground cables, etc. • Value to be determined as per asset register
Boundary Assets – Common to Voltage	• Allocated Transformers as per voltage of primary winding • TPC has allocated Transformers as per secondary winding • Licensee preferred to allocate the value to single voltage level	• In MP, transformers allocated to 33kV • In AP, allocation principle of transformers identified • Rajasthan allocates transformers on secondary side voltage • International jurisdictions under study allocate DTs to LV	• Cost of CSS (DT) including cost of transformers and associated civil structures to be allocated to LT • Cost of DSS (33/11 kV, 22/11kV), including associated civil structures, should be allocated to HT (11 kV)
Common Assets	• All common assets identified under LT or LT and supply • Some SEZs adopted ratio of 76:24 or 65:35 between HT and LT	• No specific approach of allocation • Internationally: ➢ On basis of CPD and number of customers ➢ On ratio of voltage identified assets. ➢ Cost to Serve	• Common assets need to be allocated on the basis of cost driver • Allocation on the basis of weightage to Consumer and Distribution Network

4.4 Proposed Allocation Principle of GFA

A. Voltage identifiable Assets

4.4.1 In the said category of assets, only Wire related assets are required to be identified and shall include only the distribution lines and associated meters (not including consumer meters, as they are part of retail supply business).

4.4.2 These assets shall be allocated to individual voltages depending upon the voltage rating of the line. These assets are clearly earmarked to specific voltage and exist for distribution of power at that specific voltage or for the purpose of recording energy travelling at that specific voltage, as the case may be. This may include Distribution Lines, incl. overhead line supports, plinth, insulators, etc.

B. Boundary Assets

4.4.3 The corresponding asset bundles, as shown above, will be Distribution Substation or Consumer Substation or Power / Distribution Transformers.

4.4.4 It is noted from the data submitted by the Licensees that AEML has classified Distribution Transformers into HT voltage, while Tata Power has classified these assets as LT. It is also to be noted that TPC-D had filed the Petition in Case No. 133 of 2019, which is a precursor to this study, wherein they prayed for DTs to be considered as LT assets.

4.4.5 From the practices adopted by the Regulatory Commissions of Madhya Pradesh and that of Rajasthan, that MPERC has considered Power Transformers as part of 33kV system and Distribution Transformers of 11/0.4 kV as part of 11kV system. The RERC has, on the other hand, considered 33/11kV transformers as part of 11kV system and 11/0.4 kV transformers as part of LT system. While no logical reason could be gleaned, it is understood that the RERC has considered purpose of existence or use as the criterion for classification, while the MPERC has simply considered the rated voltage of primary winding.

4.4.6 The TSERC has adopted a hybrid approach for Power Transformers and considered the same as 10% allocated to 33kV system and 90% allocated to 11kV system, while the Distribution Transformer is fully allocated to LT system.

4.4.7 Experience of international jurisdictions indicates that the cost causality is the primary purpose of classification of costs and assets. There are clear examples from Tasmania, USA where Distribution Transformers are allocated to Low Voltage users only as they exist for the purpose of conversion of power for low voltage supply. Cost causation principle would therefore clearly indicate that the purpose of use or existence should be the basis of classification of assets existing at the boundary of two voltages.

4.4.8 Accordingly, it is proposed that the Distribution Substations of 33/11kV or 22/11kV or 33/22kVshould be identified and allocated as per secondary side voltage. The Distribution Substation refers to the said bundle of assets as shown above i.e. including associated civil and electrical assets and appurtenant apparatus.

4.4.9 Similarly, the Consumer Substations of 11/0.4 kV or 22/0.4 kV or 33/0.4 kV, as the case may be, should be identified and allocated to LT voltage level. Again, the Consumer Substation refers to the said bundle of assets as shown above i.e. including associated civil structures, electrical assets and other appurtenant apparatus.

C. Common to Voltage network assets

4.4.10 Apart from the above assets, there are some other assets that exist for the various purposes of electricity network business but cannot be classified as identifiable with any specific voltage. These assets serve and exist for the purpose of network as a whole, rather than being dedicated to any specific voltage level.

4.4.11 Some examples could include Vehicles used in network maintenance, in general, or SCADA / DMS / OMS, which exist for the whole of distribution network, or could

serve only the HT network common to all voltages of HT. Network planning software could also be categorized under this block, as such assets are again not dedicated to any specific voltage class.

4.4.12 The Commission is not in a position to analyse each Licensee's individual asset registers threadbare and identify assets that could fall in this category. Therefore, the Licensees themselves are advised to do so and exercise their wisdom for classification of such assets over two voltages or more than two voltages or over all voltages of distribution, as the case may be. However, the basic principles which needs to be considered while identifying such assets are that those assets serves the network assets.

4.4.13 The allocation of these assets to specific voltage levels is proposed to be done in the same proportion as the proportion derives from the summation of the voltage identifiable + boundary assets put together bears over different voltages, as obtained from above.

D. Common Assets and Allocation:

4.4.14 This block includes those assets and common facilities such as buildings, furniture, vehicles, electrical fittings and appliances, etc. which are common to the entire business of distribution of electricity i.e. both Wires and Supply business of the Distribution Licensee. These assets and facilities exist and serve the purposes of distribution business in general and are not earmarked to Wires function or Supply function.

4.4.15 The data presented by the Licensees in Maharashtra indicates that different Licensees allocate these assets to Wires function or Supply function based on different approaches. Further, within Wires function, the allocation to voltage level is again based on adhoc principles, which are different across the Licensees. AEML, for example, has stated that it allocates its Administrative buildings to Wires function and within Wires function to LT voltage level, as most consumers pertain to LT level. Tata Power, on the other hand, has apparently allocated its Common assets into Wires and Supply, but the basis for the same is not clear from the data submitted by TPC. BEST has allocated some of its Common assets into Wires and Supply, but again the basis of allocation is not apparent from its submissions.

4.4.16 As these assets include assets common to both Wires and Supply function, the first task is to identify basis of allocation of these assets over Wires function and Supply function. Thereafter, the allocated portion of Wires needs to be further allocated to different voltage levels of Wires function.

4.4.17 In this regard, experience from international jurisdictions indicates that these assets and the corresponding costs are generally allocated to all consumers as they exist for the purpose of serving all consumers. Experience from Australia, Tasmania, indicates that these assets and costs are allocated to all consumers on the basis of their Demand and Number of customers. Experience from Romanian study indicates

that common costs are allocated to voltage classes using the ratio of voltage-differentiated cost. There is no experience in this regard available from domestic practices as most State Commissions have dealt only with the major asset classes of Lines and Transformers only and have not address the question of how to allocate other common asset classes.

4.4.18 Therefore, for the first step of allocation, it is proposed that the GFA pertaining to Common assets and facilities as identified by the Licensees as per the guidelines herein, be allocated to Wires and Supply groups based on the ratio obtained from assets fully differentiated between Wires and Supply (i.e. ratio of dedicated Wires and dedicated Supply assets).

4.4.19 Thereafter, the wires allocation so obtained needs to be further segregated into Voltage levels, which is the main focus of this study. In this regard, the fundamental principle of cost driver needs to be employed. As per the principles adopted in some of the international jurisdictions, common assets, facilities and cost are considered driven by demand and number of customers of individual consumer category. In the case of TaS Networks, Australia, the ratio of allocation of common assets and facilities to different consumer categories is 50% towards category demand and 50% towards number of consumers in that category. When this principle is applied to only the portion of common assets allocated to network business (wires business), the cost of such allocated portion of assets gets divided only over EHV, HV and LV users.

4.4.20 In the instant case, the issue is allocation of cost of common assets and facilities pertaining to the network business (as supply business portion has already been set aside in step 1 as specified in Para 4.4.18) over the different voltage levels of network. The common assets and facilities can be considered driven by the number of consumers as a larger utility with a more diversified and spread out consumer base would need more administrative offices and common facilities spread across the area, compared to a utility with a smaller set of consumers. Similarly, various common network assets such as fault testing vehicles, stores, network related tools and equipment, etc. are expected to be driven by the physical expanse of distribution network, as opposed to the demand that the network serves.

4.4.21 It can be argued that demand required to be served by the network drives the network capacity and therefore the primary driver is “Demand”. However, it is evident that while demand is a potential driver of network capacity and consequent line length, but once the network is built, the common costs will be more closely correlated to physical size of the network and will be incurred in response to the same, regardless of whether the said network actually serves the demand for which it was constructed or not.

4.4.22 Accordingly, it is recommended that the cost associated with these common assets be allocated over voltage classes of number of consumers and physical volume of asset base measured in terms of line length in Ckt-km. A ratio of 50/50 is considered appropriate considering that both network length and number of consumers would

be expected to equally responsible for construction of common assets and incurrence of common costs. Hence, 50% of the value of these assets will be considered as related to number of consumers and 50% of the value will be considered as related to the line length in ckt-km. Thereafter, the value so obtained towards consumers will be allocated to the different voltage levels (EHT, HT and LT) on the basis of the ratio of number of customers at these levels and the value so obtained towards line length shall be allocated to the said voltage levels basis in the ratio of line length in Ckt-km at corresponding voltage levels.

4.4.23 The illustration is provided as below:

Table 14: Illustration of Common assets allocation Voltage wise

Particulars	Formula	EHT	HT	LT	Total
No. of Consumers	A	100	500	9400	10000
	B	1%	5%	94%	100%
Line Length	C	1000	33000	66000	100000
	D	1%	33%	66%	100%
Weightage	**E = B X 50% + D X 50%**	**1%**	**19%**	**80%**	**100%**

4.5 Steps for allocation of GFA and determination of Ratio

4.5.1 Based on the above allocation of voltage identifiable, boundary assets and common to network / business assets, the following steps to be undertaken for allocations of GFA are proposed under the guidelines:

Step 1 – Allocation of all assets and facilities of distribution between Wires, Supply and Common

Figure 5: Step 1 of Allocation of assets into Wire, Supply and Common

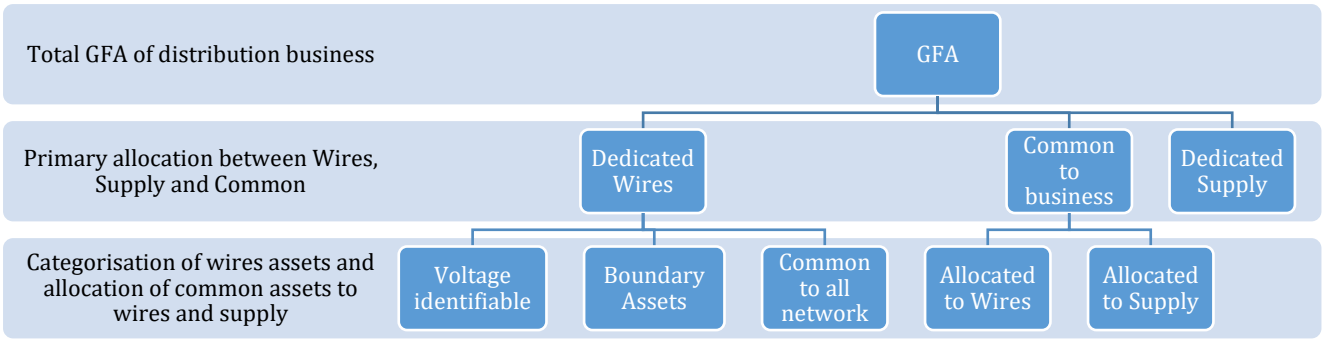


Table 15: Allocation of GFA based on the above principles

Sr.	Particulars	Units	Wire	Supply	Common to Wire	Common to business	Total
1	GFA	Rs. Crs	80	20	8	2	**110**
2	GFA Ratio	%	73%	18%	7%	2%	**100%**

Step 2: Allocation of Common to Business Assets to Supply Business

GFA pertaining to Common assets and facilities as identified by the Licensees as per the guidelines herein, be allocated to Wires and Supply groups based on the ratio obtained from assets fully differentiated between Wires and Supply (i.e. ratio of dedicated Wires and dedicated Supply assets which is 80:20 ratio as per Table 15).

Accordingly, 20% of Rs. 2 Crores to be allocated to Supply business and balance Rs. 1.60 Crore (i.e. 80% of Rs. 2 Crores) to be allocated to Wire business as specified in Step 3.

Step 3: Allocation of assets among voltage levels

Table 16: Allocation of assets among Voltage level

Sr.	Main Group	Asset bundle	EHT	HT	LT	Remarks
A.	**Boundary assets**	"Distribution Substation" 33/11kV or 22/11kV		+		As per Usage / Cost causation principle, allocated based on secondary side voltage
B.	**Boundary assets**	"Consumer Substation" (33/22/11)/0.4 kV			+	
C.	**Voltage Identifiable**	"Lines and Grid Meters"	+	+	+	Depending upon voltage rating of line
D.	**Voltage Wise Ratio derived from the summation of the above specific Allocation**		**%**	**%**	**%**	Ratio of summation of (A+B+C)
E.	**Common to Network (viz. SCADA, Maint. Vehicles, tool and equipment, DMS/OMS)**	"Common Wire"	In the Ratio as derived from Voltage + Boundary Assets i.e. as per ratio derived in Sr. D.			
F.	**Common to Business (viz. administrative offices, associated land, furniture, appliances, office-use vehicles)**	"Common Business Allocated" (allocated to Wires from Step 1)	To be allocated to respective voltages using allocation ratio (weightage of number of Customers and Line length in ckt-km at 50:50 at respective voltage level) and as per illustration provided in Table 14			Based on cost causation principle, Cost Drivers to be identified

4.5.2 On the basis of the above allocation principles of uniform voltage wise GFA, various assets ratio will be derived / computed which will be applied for allocation of the cost component of the wire business. The steps to be undertaken to determine the assets ratio is identified as follows:

Step 4: Allocation of Assets to different voltage

Based on Step 1 to 3, the GFA has been allocated to Wire (Voltage wise) and Supply

Table 17: GFA allocation to Wire and Supply

Voltage	Network Asset Group	Non-network asset	Supply	Total

	Voltage Identifiable	Boundary assets	Common to Network	group Common to Business Customer / Network – 50:50		
EHT	A_1	B_1	C_1	D_1	-	**A_1 to D_1**
HT	A_2	B_2	C_2	D_2	-	**A_2 to D_2**
LT	A_3	B_3	C_3	D_3	-	**A_3 to D_3**
TOTAL Wire	**A**	**B**	**C**	**D**	-	**A to D**
Supply				**D_4**	**E_1**	**D_4 +E_1**
Total	**A_Σ**	**B_Σ**	**C_Σ**	**D_Σ**	**E_Σ**	**A_Σ+E_Σ**

Step 5: Computation of Assets ratio

Based on the allocation of assets as defined in Step 4, the assets ratio will be determined which will be considered as base for allocation of cost of ARR of Wire business

Table 18: Computation of Assets Ratio

Asset Ratios	EHT	HT	LT	Supply
Network Assets (P)	(A1+B1+C1)/(A+B+C)	(A2+B2+C2)/(A+B+C)	(A3+B3+C3)/(A+B+C)	-
Non-Network Assets (Q)	(D1)/(D)	(D2)/(D)	(D3)/(D)	-
Total Wire (T)	**T_{EHTW}= (A+B1+C1+D1)/(A+B+C+D)**	**T_{HTW}= (A2+B2+C2+D2)/(A+B C+D)**	**T_{LTW}= (A3+B3+C3+D3)/(A+B+C+D)**	-
Total GFA (T_{GFA})	**T_{EHTT}= (A+B1+C1+D1) / (A_Σ+B_Σ+C_Σ+D_Σ+E_Σ)**	**T_{HTT}= (A2+B2+C2+D2) / (A_Σ+B_Σ+C_Σ+D_Σ+E_Σ)**	**T_{LTT}= (A3+B3+C3+D3) / (A_Σ+B_Σ+C_Σ+D_Σ+E_Σ)**	**T_{ST} = (D_4+E_1) / (A_Σ+B_Σ+C_Σ+D_Σ+E_Σ)**

4.6 Illustration for Allocation of Assets voltage wise

Table 19: Illustration on Calculation of Allocation of assets voltage wise

Sr	Particulars	Units	Formula	Wire	Supply	Common to Wire	Common to business	Total	
1	GFA	Rs. Crs	As per Data	80	20	8	2	**110**	
2	GFA Ratio								
A	Total	%		73%	18%	7%	2%	**100%**	
B	Wire Supply	%		80%	20%			**100%**	
	Particulars	**Units**	**Formula**	**EHT**	**HT**	**LT**	**Wire**	**Supply**	**Total**
3	Voltage	Rs. Crs	As per Data	10	20	20	50	0	50

4	Boundary Assets	Rs. Crs	As per Data		10	20	30		30
5	Supply Business	Rs. Crs	As per Data	0	0	0	0	20	20
6	**Total directly identifiable Wire assets**	Rs. Crs	6 = 3+4+5	**10**	**30**	**40**	**80**	**20**	**100**
7		**%**	Proportion to Total (6)	**10.00%**	**30.00%**	**40.00%**	**80.00%**	**20.00%**	**100.00%**
8	Common to Network - Wire	Rs. Crs	8 = 1 x7	0.80	2.4	3.2	8		8
9	Common to Business	Rs. Crs	9 = 1 x 12 - W 9 = 1 x 2B - S	0.02	0.30	1.28	1.60	0.40	2.00
10	Total GFA allocation	Rs. Crs	10 = 8 + 9	10.82	32.70	44.48	89.60	20.40	110.00
11	**Arrived GFA Ratio**	**%**	Proportion to Total (10)	**9.83%**	**29.73%**	**40.44%**	**81.45%**	**18.55%**	**100.00%**
12	Weightage Ratio of Consumers / Network	%	As per Table 14	1%	19%	80%			

4.7 Determination of voltage-wise costs allocation

4.7.1 At present, the allocation of costs pertaining to Wires business of a distribution licensee among the voltage levels of HT and LT is based on ratio of assets at these voltage levels or as per Regulation 71 of MYT Regulations 2019. This is a proxy approach, as voltage-wise costs are not directly available from the books of accounts of the Licensees.

4.7.2 The objective of this exercise is to improve upon the said proxy, while ensuring that the methodology employed by the distribution licensees to categories assets among different voltages is uniform, so that wheeling charges are determined for all distribution licensees using uniform principles.

4.7.3 The earlier part of these explanatory notes provide the approach and proposed guidelines of categorizing different assets of distribution licensees among different voltage levels. However, even while doing so, the primary objective of any cost allocation exercise, which is – identification of direct costs – should not be lost sight of, as to that extent, no allocation or proxy is required and the result so obtained would, obviously, be that much closer to actuals. Experience from international jurisdictions also indicate the following in this regard:

- Directly attributable costs should be determined as such, without any allocation;
- those assets which are meant for use by identified group of consumers should be segregated and corresponding costs should be recovered from the concerned user(s) or user group(s) only
- Cost causality should be the guiding principle for allocation of common costs

4.7.4 On the basis of the above principles, the proposed asset allocation guidelines can now be translated to cost allocation principles to be adopted for determination of

wheeling charges.

A. CAPITAL COST COMPONENTS:

1. Depreciation:

i) <u>Voltage Identifiable and Boundary Assets (Asset Bundle Names – "Distribution Substation", "Consumer Substation", "Lines and Grid Meters"):</u>

- Depreciation is determined from the remaining depreciable value of individual assets. Hence, if asset values at respective voltage levels is known, depreciation can be computed directly. In the instant case, the proposed guidelines would require separate identification of voltage-identifiable asset bundle and Boundary Asset bundle, which is wholly allocated to secondary side voltage. The total put together will be the voltage-identified asset bundles, which will include whole asset items whose historical cost will be known directly from the books of accounts of the Licensees. As the asset items will be clearly known, the depreciation for such assets is directly obtainable and no allocation or ratio is then required to be applied to that extent.
- After determining the above, the Remaining Depreciation (RD) shall relate to Common to Network Assets and Common to Business assets, further allocable to different voltage levels.

ii) <u>Common to Network assets (Asset Bundle name – "Common Wire"):</u>

- In case of these assets, although the total value of assets and asset items shall be directly available from the Fixed Asset Register, the value at different voltages is only allocated from total, thereby allocating the value and not the asset itself.
- Hence, depreciation at different voltages cannot be directly determined. Therefore, for these assets, the RD as obtained from above can be divided into voltage classes using ratio Ci/(C+D)*RD, where i = 1, 2 or 3 as per EHT, HT and LT voltages. (as defined in **Error! Reference source not found.**)

iii) <u>Common to Business assets (Asset Bundle name – "Commission to Business Allocated"):</u>

- In case of these assets, again the historical value of assets is allocated first to Wires business and thereafter to different voltages based on line length and number of customers. Therefore, only the allocated value of assets will be available at different voltages in financial terms, rather than the asset item itself.
- Hence, depreciation will not be directly computable, but will have to be

determined using the asset ratio. In this case, again the RD as obtained from above can be divided into voltage levels using ratio (Di)/(C+D)*RD where i = 1, 2 or 3 as per EHT, HT and LT voltages. (as defined in **Error! Reference source not found.**)

2. Interest on Loans and Return on Equity:

- Both these components are taken together as essentially both relate to return of capital – to borrower or to shareholder.
- Ideally, if individual items of asset blocks were identified with respective loans taken by the Licensee or the equity deployed by the Licensee to finance the same, the Interest and RoE for such asset could be computed directly.
- However, in case of normative loans and equity deployed by the Distribution Licensee, it would not be possible to determine the extent of outstanding loan and corresponding interest thereon associated with any given asset(s), or the extent of actual deployed as actually associated with any given asset(s). This is unlike depreciation, which is a direct computation from asset value considering the Gross Fixed Asset Value and hence if asset can be allocated to a voltage class, depreciation can be directly known.
- In case of cost of capital, each asset or asset block's associated cost of capital cannot be determined as assets are both old and new and over the financed with normative debt or with licensee's own reserves or with a combination.
- Therefore, Interest on Loans and Return on Equity cannot be directly attributed from asset value at different voltage levels. These are therefore to be apportioned using asset ratios.
- Again, as loans are not taken for network or non-network assets separately, no specific asset ratio can be applied and the total voltage-wise ratio as obtained can only be applied logically to allocate the amount of interest and RoE on different voltage levels. Therefore, Interest on Long-Term Loans and Return on Equity should be allocated over different voltage levels using ratios T_{GFA}, T_{EHTT}, T_{HTT} and T_{LTT}. (as defined in Table 17)

3. Contribution to Contingency Reserve:

- As per MYT Regulations, the Contribution to Contingency Reserves is determined as a percentage of opening GFA. Now, as per the above, the whole of asset base can be classified into different voltage levels and hence this cost, being a percentage of asset value, can be directly obtained at

specified percentage of allocated asset value at each voltage level.

B. OPERATING COST COMPONENTS:

4.7.5 The next block of cost in Wires ARR pertains to the O&M cost related to distribution wires business. This cost is not identified or allocated to any specific voltage.

4.7.6 Among the Licensees, AEML has submitted that it is in a position to identify some of its R&M cost directly with the voltage of assets on which the same is incurred and hence can be termed to be the cost attributed directly with such voltage. Other licensees have not presented such data, but it should be generally possible to identify, at least some portion of R&M costs, such as fault repair, etc. pertaining to specific voltage.

4.7.7 However, given the fact that this is presently not the practice adopted by the Licensees as also the various changes it may entail in recording of costs, if such costs are to be recorded directly voltage-wise cost centers, the Commission directs that Licensees should attempt to identify directly voltage-attributable O&M costs in their respective systems and record them as such, to the extent possible. As a matter of general practice, it will be a fairer system of cost allocation if at least some, if not all costs, can be directly attributed to voltages.

4.7.8 This will also remove cross-subsidisation across voltage classes that may presently exist due to absence of direct cost attribution leading to allocation, which, regardless of the principle chosen, always introduces some level of cross subsidization.

4.7.9 That being said, the above system could be adopted at a later stage when the Licensees are sufficiently prepared to implement the same, as a lot of system changes and accounting changes might be required in the process. Also, given that only one or two licensees may have the capability to directly attribute some portion of O&M cost to voltages at present, while others do not, uniformity in cost allocation across Distribution Licensees cannot be achieved, which is the main purpose of the present study. Therefore, at this stage, the proposed guidelines do not require any direct attribution of operating costs and income (Non-Tariff Income) to any specific voltage and such costs may therefore be treated as common.

1. Allocation of O&M cost to Voltages:

- The O&M costs are related to network maintenance and overheads, including employees and the various establishments of the Distribution Licensees. The suggested guidelines already provide that Non-network assets should be classified into different voltage levels by first breaking the asset base 50/50 towards Customers and Network Length and then allocating the 50% customer related cost to different voltage levels using

the ratio of customer numbers at each voltage level and the remaining 50% network related cost be allocated to different voltage levels using ratio of line length in ckt-km at each voltage level.

- As O&M costs are also common costs which are driven by the actual physical drivers of the distribution business mainly number of customers and network length, the proposed guidelines recommend allocation of O&M cost over different voltage levels using the same principles as used for allocation of Non-network assets.

Table 20: Allocation principle of O&M Cost

O&M COST			
Customer Related (50%)		**Network Length related (50%)**	
HT (% of HT customers on network)	LT (% of LT customers on network)	HT (% of HT ckt-km line length, including service lines)	LT (% of LT ckt-km line length, including service lines)
J	K	L	M
Total O&M * HT (J+K) = HT O&M		**Total O&M * LT (L+M) = LT O&M**	

2. INTEREST ON WORKING CAPITAL and PROVISION FOR DOUBTFUL DEBTS:

- Interest on working capital (IoWC) is dependent on cash flows, which in turn are a function of revenues.
- Provision for bad debts are directly related to revenue.
- Hence, in order to allocate this on different voltages, simply use the ratio of overall Voltage-wise Wires ARR (capital plus operating cost) as determined using the principles above.

Table 21: Allocation principle for IoWC and Bad debts

ARR element	**HT**	**LT**
Interest on Working Capital and Provision for Doubtful debts	Sum of HT component of all other cost / Total of all other cost	Sum of LT component of all other cost / Total of all other cost

3. Income Tax:

- As per the present MYT Regulations, 2019, Income Tax is not a separate component in ARR, but is allowed by grossing up RoE itself by the relevant Income Tax rate.
- However, these guidelines are futuristic and hence, in future, if Income Tax is allowed separately, the same shall be allocated over different voltages using the same principles as applied for allocation of RoE.

5 Way Forward and Implementation

5.1 Approach of the Commission

5.1.1 Basis of the various issues discussed in the previous sections, the international and domestic experience gathered through research and the data provided by the Licensee about allocation of respective assets into voltages and the issues emerging therefrom, the Commission has analysed the various issues with classification of assets and allocation of costs into different voltage levels of distribution and has proposed uniform guidelines for Distribution Licensees for them to update and organize their accounting records, design systems and procedures as may be required to implement the same, so that wheeling charges can be determined using uniform principles for all distribution licensees.

5.1.2 Through the proposed guidelines, the Commission has attempted to present a comprehensive and logical approach to allocation of network costs among different voltage classes. At present, the only defined voltage classes, as per MYT Regulations, 2019, are EHT, HT and LT, where HT includes all voltages of 33kV, 22kV and 11kV. Therefore, at present, through the application of the proposed guidelines, the assets and cost will get classified into EHT, HT and LT distribution voltages only.

5.2 Preparedness of licensee

5.2.1 The proposed guidelines depend a great deal on the quality and granularity of asset and cost data available with the distribution licensees. The Commission understands the fact that some of the principles of allocation enunciated through the proposed guidelines may not be readily implementable, while some others may require time for Licensees to audit and organise their asset registers.

5.2.2 Licensees such as BEST have conveyed that they do not have ERP system, while MSEDCL have not provided any data at all in response to Commission formats for seeking voltage-wise asset information. Though ERP/SAP system is available with other licensee viz., TPC-D, AEML-D and SEZs, the Information provided shows inconsistency in data maintenance and also unavailability of information as may be required to implement these proposed guidelines.

5.2.3 The Commission has analysed the preparedness of the licensee based on the following questionnaire raised and discussed with all the licensee:

1. Licensee to provide the details of the ERP / SAP Package under which the assets are determined alongwith the fields of data entry, which are been considered as input for maintaining the Asset Register.
2. Licensee to provide the details on the classification of assets in the Assets Register with standard block of assets as provided in the Annual Report.

3. Requested to provide that booking of the assets in the assets register is as per type of assets / as per scheme / as per both,
4. Requested to clarify whether the existing data of asset base from the ERP System provides the following details: Wires Asset or Retail Asset or Common Asset and Voltage Level of the said asset – EHV, 33/22/11 kV HT or LT
5. If no, is it possible for customisation in the ERP / SAP module and maintain the data going forward as per Sr. No. 4 above.
6. Estimated Time required to make the changes in the ERP system for maintaining database as per Sr. No 4 above.

5.2.4 Based on the above questionnaire the replies of the Licensee is summarized as below:

Table 22: Replies of the Licensee on the readiness of customization

Licensee	ERP / SAP	Legacy Issue	Method	Voltage wise details	Type of Assets identified as Wire / Supply	Possibility of Customisation	Time-Period
SEZ	YES for some / Some used Tally	No	Fixed Asset - Group wise or item wise	Few maintain it. Others will customize	No	YES	6 months to 1 year
BEST	Coding Software – Separate Module	YES	Assetwise / Scheme wise	Maintain but Legacy assets to be identified	No – Bifurcation is as per MYT Regulations	No answer	No answer
TPC	YES	Minor due to Migration		Maintained	YES – from Profit Centre the same is identified	YES but impact may be prospective	4 to 6 months – based on customization
AEML	YES						
MSEDCL	YES	YES	Assetwise / Scheme wise available but Data not identified Voltage wise / Type of asset wise	Provision available for voltage level bifurcation. Authencity cannot be ascertained as entry is in system without detail of voltage as per WCR	YES but at present Asset is booked in NA due to no information	Yes with retrospective impact	Mammoth task to organize / segregate the past data based on voltage level.

5.2.5 Based on the above submission, in general, implementation problems appear to fall in the following buckets (indicative and not exhaustive):

a) No SAP / ERP system for recording of asset related information (BEST);

b) Lack of identification of civil structures between network asset related and general business related or segregation of maintenance vehicles and office vehicles, and so on;

c) Lack of ability to group similar purpose assets into bundles as assets are recorded as individual items and not as purpose based bundles hence allocation of individual asset to different segment not possible;

d) Licensee with limited data may not be able to allocate the assets capitalized in past due to non-availability of data

e) Due to system constraint, Allocation of Boundary Assets can be only to Primary / Secondary Voltage level and cannot be allocated in different proportion as it may result in change in value every year.

f) With respect to MSEDCL, following concerns were raised:

- Though SAP is implemented in MSEDCL and provisions of assets bifurcation into voltage wise and Wire / Supply wise is available, certain scheme is closed without such details based on Work Completion Report – Technical User not able to identify the allocation of the asset
- Mammoth task to organize/segregate the past data based on voltage level

5.3 Way Forward

5.3.1 The Commission understands and recognizes the fact that most of these issues are legacy issues and it may not be possible to resolve them immediately. Issues such as non-availability of SAP / ERP or inadequacy of the same, while not necessarily a hindrance as manual systems could still accomplish the purpose, are, however, expected to be addressed by the concerned Licensee(s) as soon as possible.

5.3.2 Accordingly, the Commission is issuing the draft guidelines alongwith the EM on the allocation of Gross Fixed Assets and the Cost. In general, all distribution licensees are expected to analyse the implementation issues with these guidelines and present their comments on the same, along with indicative timeline for implementation of the same, within 3 weeks of the issue of this Draft Guidelines.

5.3.3 Based on the suggestion as provided by the Stakeholder including the licensee, the Commission will issue the Final Guidelines providing the final methodology for Uniform Voltage wise Allocation of assets and cost in distribution business alongwith the adequate time for regrouping of the assets as per appropriate voltage level.

5.3.4 Also, considering the readiness of the licensee, the implementation aspects of these Guidelines and modifications, if any, required for any particular licensee(s), will be considered at the time of next control period i.e. from April 2025 onwards whereby the guidelines will be required to be adhered by all the licensees.

Annexure 1: Formats for submission of Data

Voltage Wise – Assets – Directly attributable

Name of Assets to be populated as per Asset Register	Block of Assets as per Audited Acconts	Wire or Retail (please specify below)	FY 2018-19 to FY 2020-21 Voltage Bifurcation - Year Closing Value						
			EHT	HT -33 kV	HT -22 kV	HT -11 kV	LT	Supply	Total
Overhead lines	Lines & Cables								-
Support for O/H lines									-
Underground Cables									-
Switchgear									-
Panels									-
Pillars									-
Load Control Relays									-
Street Light Fittings (Poles, lamps, sockets, etc.)*									-
Earthing conductors									-
Interface (grid) meters									-
Lightning arrestors on lines									-
Meters									-
Total			-	-	-	-	-	-	-

Boundary Assets –Attributable to more than one voltage

Type	Name of Assets to be populated as per Asset Register	Block of Assets	Wire or Retail (please specify	Ratio if bifurcated (Wire: Supply)	FY 2018-19 to FY 2020-21 Voltage Bifurcation - Year Closing Value						
					EHT	HT -33 kV	HT -22 kV	HT -11 kV	LT	Supply	Total
DT / CSS	Distribution Transformers (33/22/ 11/ 0.4kV)	Plant & Equipments									
	Civil housing, including foundation, for DTs (33/22 / 11 / 0.4 kV)										-
	Land (plot) for DTs (33/22/11/0.4 kV)										-
											-
PT / Receiving Station / DSS	Power Transformers (33/22/11 kV)										-
	Substation / Receiving Station building, including any other civil structure, for PTs (33/22/11 kV)										-
	Land (plot) for Receiving station / DSS (33/22 /11 kV)										-
											-
Others	Lightning Arrestors at CSS and DSS										-
	SCADA and Communication System										-
	DMS, OMS										-
	Vehicles for network maintenance										-
	Others (please list down along with justification)										-
Total					-	-	-	-	-	-	-

Common cost – Allocated to Network and / or Supply

Name of Assets to be populated as per Asset Register	Block of Assets as per Accounts	Wire or Retail (please specify below)	Ratio if bifurcated (Wire: Supply)	FY 2018-19 to FY 2020-21 Voltage Bifurcation - Year Closing Value						
				EHT	HT -33 kV	HT -22 kV	HT -11 kV	LT	Supply	Total
Administrative office buildings	Building									-
Customer Care Center buildings										-
Cash collection center buildings										-
Payment Kiosks										-
Temporary / Permanent housing for payment kiosks										-
Freehold Land for all the above										-
Softwares										-
IT Hardware										-
Office Communication hardware										-
Furniture & Fixtures										-
Vehicles (non-maintenance)										-
Meters										-
CT/PT and other allied metering equipment										-
Meter housing / board										-
Board wiring										-
Internal wiring including fittings and apparatus										-
Office equipment										-
MS Boxes										-
Other Hardware and Accessories										-
Nuts, Bolts, Plain washers and other accessories										-
Pump Room										-
Allocated Corporate Assets										-
Intangible assets										-
Assets not in use										-
Others not included above										-
Total				-	-	-	-	-	-	-