ENERGY REGULATION BOARD

GUIDELINES FOR REGULATORY REVIEW AND APPROVAL OF CHARGES FOR

STANDARD CONNECTIONS

MAY, 2023

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1. INTRODUCTION

The Electricity Act of 2019 mandates the Energy Regulation Board (ERB) to regulate all charges and fees in the electricity sub-sector. The period ex ante to the development of this guide has been marred with lack of clarity on the procedure for regulatory approval of electricity standard connection charges and how these fees should be determined. Therefore, these guidelines have been developed to function as a handbook to the Energy Regulation Board (ERB), electricity utilities and consumers on the determination of capital contribution or connection charges.

To both the ERB and utilities, the guide has provided the methodology that should be used in the calculation of fees payable by prospective consumers and it also delineates the procedure and various steps that shall characterise the determination of charges or fees for standard connections[1]. Guidance has been provided on how utilities should determine fees for non-standard connections.

2. ELECTRICITY ACCESS RATE IN ZAMBIA

The vision of the National Energy Policy (NEP) of 2019 is "Universal access to clean, reliable and affordable energy at the lowest total economic, financial, social and environmental cost consistent with national development goals by 2030". The NEP has a policy objective of increasing access to electricity through the formulation and implementation of an Integrated Electrification Pathway (IEP) that will set a baseline on the definition of electricity access, facilitate the construction of stand-alone (off-grids) as a way of increasing electricity access especially in rural areas. In addition, the Government plans to increase the Country's generation capacities as a way of increasing access and meeting the growing demand for electricity.

The Living Conditions and Monitoring Survey of 2015 reported that the national electricity access rate was estimated to be 31.4 percent as shown in Table 1.

Table 1: Zambia's Electricity Access Rate as at 2015

Residence/ Stratum	Proportion Connected to Electricity	Proportion Not Connected to Electricity	Total	Total Number of Households
Total Zambia	31.4%	68. 6%	100%	3,014,965
Residence				
Urban	4.4%	95.6%	100%	1,718,060
Rural	67.3%	32.7%	100%	1,296,905

©Source : Living Conditions and Monitoring Report-2015

[1] A standard connection is one where all relevant infrastructure such as lines and poles are available in the area where a customer seeks connection. Therefore, all that is needed is just a service cable (drop line) from the power lines into a customer's building.

The rural access rate for grid connected households stood at 4.4 percent while an additional 7.4 percent are connected to solar home systems. For urban areas the access rate was estimated to be 67.3 percent.

The national electricity utility company ZESCO Limited (ZESCO) has been failing to make new customer connections promptly within the stipulated timeframes as provided by the Electricity Quality Standards (ZS397)[2] as a result, the number of new customers pending to be connected has continued to rise. As at end of December 2021, a total of about 67,000 new applications for connection to the ZESCO grid were pending as result of lack of financial resources to undertake the connections. This situation was countercyclical to the drive towards increasing electricity access from the current 4.4% to 51% for rural population as envisioned by the Vision 2030.

The low electricity access rate can be attributed to a myriad of factors. The suboptimal electricity tariffs constrict the utilities' capacity to expand the electricity generation, transmission and distribution infrastructure to make electricity accessible to the wider population. Low electricity access rate is correlated to poverty especially in rural areas where it is rife. It is widely opined that connection charges are a barrier to electricity access. Therefore, in determining connection charges there is need to create a balance between cost reflectivity and affordability.

3. LEGAL MANDATE

The Energy Regulation Act, No. 12 of 2019 and Electricity Act of No. 11 of 2019 provide the legal mandate for the ERB to regulate the provision of energy products and services in Zambia. Particularly, section 4(j) and 3(i) respectively provides that the ERB has the mandate to "*determine, regulate and review charges and tariffs in the energy sector*". Further, charges have been defined as;

> "*prices, fees, rates, surcharges, levies, penalties, deposits, connection charges or fees, use of system charges or any other charge made for the provision of any service, commodity or product that a licensee renders in the course of carrying out its licensed activity*".

In that regard, the ERB is responsible for determining or regulating charges levied by licensees on their customers. Although Section 32 of the Electricity Act No.11 of 2019 outlines the review process for electricity tariffs, there are no specific guidelines provided for the review of connection charges.

The tariff review process as contained in Section 32(1) of the Electricity Act No. 11 of 2019 provides that an enterprise that intends to charge a retail tariff shall apply to

[2] The standard is voluntary and therefore not enforceable. The ERB has however, adopted this standard as part of its Key Performance Indicators with ZESCO and failure to meet the target has ramifications .

the ERB in a prescribed manner and form. In addition, Section 32(2) states that the ERB shall within 14 days of receipt of a duly lodged application notify the public and thereafter call for objections or submissions from the public within 30 days.

4. METHODOLOGY FOR DETERMINING CONNECTION/CAPITAL CONTRIBUTION CHARGES

There are various methods and approaches to calculating the connection charges or capital contributions. Principally, they are premised on meeting the cost of making a connection.

4.1 Theoretical Perspective

In this section we present the theoretical discussion on some methods and approaches before we present the actual approach that has been adopted by the ERB.

4.1.1 The cost-revenue-test

One method of computing capital contribution amount is based on the cost-revenue test as presented in the equation:

Capital Contribution (CC) = ICCS + ICSN – IR(n=X)

Where:

ICCS	=	Incremental Cost of Customer Specific
ICSN	=	Incremental Cost Shared Network
IR(n=x)	=	Incremental Revenue

In the case above, a capital contribution will be equivalent to the incremental costs exceeding the incremental revenue, i.e. CC > ZMK0.

In determining the incremental cost components of the cost-revenue-test, a distribution network service provider should:

a) determine the cost of each component in a fair and reasonable manner and ensure that the cost estimates are reflective of the efficient costs of performing the service.
b) calculate the cost of each component based on the least-cost, technically acceptable standard necessary for the connection service; and
c) where a distribution network service provider elects to perform the work to a higher standard than contemplated above then the distribution/supply network service provider must not charge the connection applicant for any cost additional

to the cost of providing the service to the least technically cost acceptable standard.

A distribution network service provider should provide an option of allowing the consumer to seek an independent contractor to undertake connection services that can be provided by a third party.

4.1.2 Pre-calculated Connection charge or capital contribution for basic and standard connections

If a distribution network service provider considers that all connection applicants receiving a particular basic or standard connection offer have substantially the same connection service and expected usage characteristics, then the distribution network service provider may charge a pre-determined capital contribution charge from each connection applicant within the class.

Where, a distribution network service provider chooses to apply a pre-calculated charge as provided above, the amount of the pre-calculated charge must be included in a distribution network service provider's basic or standard connection offers and should:

a) Not create unreasonable cross subsidisation within the class; and
b) be reflective of the average or typical capital contribution that would be charged to connection applicants within the class, if the cost-revenue-test was individually applied to each connection applicant's connection service.

4.1.3 Actual Cost Method

In this approach, the utility charges the actual costs incurred in providing the line extension. The actual costs are determined by adding up the actual material and labour costs incurred to get the new infrastructure to the customer's premises.

4.1.4 Average Cost Method

Under this approach, the utility develops a standard connection charge using the average connection cost based on the applicant's distance from the grid. The average costs can be developed based on historical data (for example, the average of the last three years) and updated for future cost escalations.

A more granular approach would be to set different standard connection charges depending on the distance from a connection point. For example:

a) A fixed charge of X for any connection within 100 meters from the nearest utility connection point.

b) A fixed charge of 2X for connections between 100 and 200 meters.
c) For connections beyond 200 meters, 2X plus the actual cost incurred for connections beyond 200 meters.

An alternative to charging the actual cost for that part of a connection greater than 200 meters from the connection point would be to develop a charge using a formulaic approach (e.g., number of poles used multiplied by per pole cost distribution poles plus meters of cable used multiplied by per meter cable cost etc.) to arrive at the connection charge. The per pole cost or per meter cable cost in the example would be based on the historic average cost and adjusted for future cost escalation. A formulaic approach would be more transparent and easy to understand, especially if the cost elements are standardized.

The Average Cost approach significantly reduces the administrative burden for the utility as it does not have to determine individual cost for each customer, except those beyond a specific distance.

4.1.5 Free Line Extension Method

In this approach, the utility does not charge an individual applicant within X meters for utility connection costs. In the short run, the utility would pay for the infrastructure itself. However, since the utility is allowed to receive a return and depreciation expense on investments that it funds, the connection costs (the book value of the infrastructure) would be included in its regulatory asset base and revenue requirement for recovery. This means that all utility customers would pay through their rates for new connections requiring infrastructure. This approach is used in some jurisdictions. Its benefit is that it makes connecting to the network affordable to more customers.

When a country is trying to increase access to electricity to its population and many customers have an affordability problem, the Free Line Extension method is a powerful tool to assist them in getting access to electricity without having to pay an upfront lump-sum fee for the connection costs. Although the costs are spread among all utility customers, new customers would still pay for part of the charges through their own rates. Further, these customers would similarly pay in rates for the connection costs of subsequent customers connecting to the system.

An approach can be fair if it is non-discriminatory and recovers the costs without burdening other customers. While the methods discussed are non-discriminatory, the actual cost approach is considered to be very fair as it does not lead to any burden on other customers. On the other hand, the free allowance approach does not charge anyone within the free allowance distance; hence it could be argued that

customers taking a greater amount of line extension are burdening customers taking lesser amounts.

4.1.6 Cost sharing model

In this model, a customer pays a fraction of the total capital costs required to connect them to the grid and the other part of the costs are incurred by the distribution network operator. This model could be less costly to the consumer depending on the agreed cost sharing proportions but could have some negative impacts on the Licensee's financial sustainability in the long run.

4.1.7 Partial subsidies model

Under this model, grants can be provided to new customers and the customer only pays a small fraction of the cost. This model is usually used to accelerate connections of low income households however, this may pose a huge burden on the Government treasury.

Table 2 presents some pros and cons of the options for connection charging methodologies.

Table 2: summary of considerations / options

No	Option	Pros & cons	Other considerations
1	Full cost recovery model – consumers will pay the full cost of providing the service	Pros ▪ Financial viability of the Utility will be guaranteed and most likely connections will be done promptly. Cons ▪ The costs may not be affordable to some consumers	To assist in alleviating the huge financial burden on the consumers, a monthly payment plan can be agreed to between the Utility and the consumer. To still maintain the financial viability of the Utility, a Utility can charge a finance cost equivalent to the ERB approved WACC. As these assets will be part of the RAB and as required by the ZS397 Electricity Supply – Quality of Service, these fees are supposed to be refunded to the consumer based on agreed terms.
2	Partial financing - consumers and the Utility share the cost, currently ZESCO's internal capital contribution policy	Pros ▪ Could have some negative impact on the Utility's financial viability	The consumer can be also allowed to pay the connection fees (i.e. 70% portion) over a long period such as 12 months to

	stipulates a 70 percent. In this model the consumer will meet 70 percent of the actual cost and the balance will be borne by the Utility.	Cons ▪ Maybe slightly affordable to consumers	assist lower the financial burden. As these assets will be part of the RAB and as required by the ZS397 Electricity Supply – Quality of Service, these fees are supposed to be refunded to the consumer based on agreed terms.

4.2 Regulatory Consideration for Connection Charging Methodology

The ERB will be guided by the following regulatory considerations in adopting a connection charging methodology:

i. *Cost recovery*. The connection charges to the customer must recover the cost of the connection;

ii. *Cost reflectiveness*. The charges should recover costs to a given customer, without cross subsidies among customer classes or within a customer class. The actual cost approach reflects costs most accurately and will not result in cross subsidies. On the other hand, there will likely be some cross subsidies with the 'free line extension allowance' approach as customers taking service at different distances from a connection point are treated the same;

iii. *Ease of utility administration*: Some approaches are easier to administer than others. For example, the free allowance approach is much easier to administer as the utility does not have to estimate costs, record actual costs, or send and collect bills for every new customer who is within the free allowance distance;

iv. *Ease of customer understanding*: Some approaches are easier for customers to understand than others. The computation of the connection fees must be transparent and understandable to consumers;

v. *Fairness*: there must be no discrimination between customers or classes of customers that are in similar circumstances. Similar customers or classes of customers must bear the same connection charges. The Cost of connection must be based on reasonable costs of materials and other allied costs. Further, it is important for Licensees to consider proportional capital refunds (compensations) of capital contributions to existing customers if there are late joiners to the network for which they made full payments for; and

vi. *Sustainability of fees*: the fees must provide the Utility with sufficient revenues to be able to undertake the connection in the most cost effective manner.

In formulating these principles the ERB aims at striking a balance to ensure the fees that will be determined using this methodology, ensure that the Licensee is able to meet the cost of connecting new customers to their network in a sustainable manner whilst ensuring that the charges are affordable to the customers.

4.3 Energy Regulation Board Approach to Calculating Charges for various types of Standard Connections

As discussed in section 4.2 the calculation of payable fees for standard connection will be characterised by full cost recovery and simplicity. Under the current classification connection charges are classified as either single phase (220 volts) or three phase (380 volts). Further there are separate charges for existing connection upgrades. Generally, there are three (3) standard connection types covered.

4.3.1 Standard Connection charges High density, demarcated and reticulated areas

High density, demarcated and reticulated areas are defined as areas with a high customer base and has an existing distribution network. Table 3 provides a guide on how the connection charge should be calculated.

Table 3: Calculation of standard connection charges for high density demarcated reticulated areas

Material/Equipment required for a connection	Description
Single Phase Overhead New Connection	
A	Cost of Single phase Meter
B	Cost of 30 Metres Duplex Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Single Phase Underground New Connection	
A	Cost of Single Phase Meter
B	Cost of 30m of Single 16mmsq Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
3 Phase Overhead New Connection	
A	Cost of 3 phase Meter
B	Cost of 60 Metres Duplex Cable
C	Cost of Accessories

D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
3 Phase Underground New Connection	
A	Cost of 3 Phase Meter
B	Cost of 30m of 3 phase 16mmsq Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**

For the guidance on how to calculate charges for upgrading of the existing connection see appendix 1.

4.3.2 Connection charges for customers in low density, demarcated and reticulated areas

Low density, demarcated and reticulated areas are defined as areas with a low customer base within a specific area that has an existing distribution network. Table 4 provides a guide on how the connection charge should be calculated.

Table 4: Calculation of Connection Charges for customers in Low Density, Demarcated and Reticulated Areas

Material/Equipment required for a connection	Description
Single Phase Overhead New Connection	
A	Cost of Single phase Meter
B	Cost of 50% of the Cost of 2 Spans 230V Overhead Line
C	Cost of 30 Metres Duplex Cable
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E+ F**
Single Phase Overhead (Servants Quarter)	
A	Cost of Single phase Meter
B	Cost of 30 Metres Duplex Cable
C	Cost of Accessories
D	Cost of Labour
Total Charge	**=A+B+C+D**
Single Phase Underground New Connection	
A	Single Phase Meter
B	Cost of 30m of Single 16mmsq Cable
C	Accessories
D	Labour
E	Transportation
Total Charge	**=A+B+C+D+E**
3 Phase Overhead New Connection	
A	Cost of 3 phase Meter
B	Cost of 50% of the Cost of 2 Spans of 400V Overhead Line
C	Cost of 3 Phase Service Cable
D	Cost of Accessories

E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E+F**
1-Phase Underground New Connection	
A	Cost of Single Phase Meter
B	Cost of 50% of the Cost of 2 Spans of 230V Overhead Line
c	Cost of 30m of 2 Core 16mmsq Cable
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E+F**
3 Phase Underground New Connection	
A	Cost of 3 Phase Meter
B	50% the Cost of 2 Spans of 400V Overhead Line
C	Cost of 30m of 4 Core 16mmsq Cable
D	Accessories
E	Labour
F	Transportation
Total Charge	**=A+B+C+D+E+F**

For the guidance on how to calculate charges for upgrading of the existing connection see appendix 2.

4.3.3 Connection charges for Un-demarcated high density areas

Un-demarcated high density areas are defined as areas with a high population density with no electricity reticulation network. Table 5 provides a guide on how the connection charge should be calculated.

Table 5: Calculation of standard connection charges for un-demarcated high density areas

Material/Equipment required for a connection	Description
Single Phase Overhead New Connection	
A	Cost of Single phase Meter
B	Cost of 25% of the Cost of 1 Span 230V Overhead Line
C	Cost of 30 Metres Duplex Cable
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E+ F**
Single Phase Underground New Connection	
A	Single Phase Meter
B	Cost of 25% of the Cost of 1 span of 230V overhead line
C	Cost of 30m of 16mmsq 2 Core Cable
D	Accessories
E	Labour
F	Transportation
Total Charge	**=A+B+C+D+E+F**

3 Phase Overhead New Connection	
A	Cost of 3 phase Meter
B	Cost of 25% of the Cost of 50m of 400V overhead line
C	Cost of 60m of Duplex
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E+F**
3 Phase Underground New Connection	
A	Cost of 3 Phase Meter
B	Cost of 25% of the Cost of 1 span of 400V Overhead Line
C	Cost of 30m of 16mmsq 4 Core Cable
D	Accessories
E	Labour
F	Transportation
Total Charge	**=A+B+C+D+E+F**

For the guidance on how to calculate charges for upgrading of the existing connection see appendix 3.

5. OWNERSHIP OF CONNECTION ASSETS

The Licensee will own all of the connection assets and network service assets that have been funded by capital contribution regardless of whether the capital contribution is made by the network user as a financial payment or as a contributed asset or both.

6. DISPUTE OVER CAPITAL CONTRIBUTION

Capital contributions or cost of new connections and network upgrade works will be valued at their market quoted costs. However, where disputes occur over the amount of the capital contribution, such disputes will be resolved with reference to prevailing market rates for connection materials and shall be dealt with in line with the ERB's complaint handling procedures.

7. CONNECTION CHARGES APPLICATION PROCEDURE

The determination of connection charges shall be consultative, consistent with the Electricity Act and best regulatory practice. The process shall be triggered by an application from the licensee.

A Licensee intending to charge or vary connection charges must follow the following procedure:

a) A Licensee shall submit an application at least six months before the commencement of its new financial year in the manner and form prescribed herein.

b) The application shall be deemed duly lodged once all the data and information required under these guidelines are submitted to the ERB. The ERB shall notify the applicant whether or not the application is duly lodged within 14 days of receipt of the application.

c) Where the application has not been duly lodged in accordance with these guidelines, the ERB shall reject the application and notify the applicant within 14 days of receipt of the application. The notice shall specify the reasons for such rejection.

d) Where the application has been duly lodged, the ERB shall issue a notice to the public in the daily newspaper of general circulation and electronic media on the applicant's intention to apply for approval or variation of the connection charges and invite submission or objections on the proposed charges. The notice may contain but not limited to the following:

   i. A summary of the salient features of the connection charges application;
   ii. The applicant's proposed charge adjustment in monetary and percentage terms per connection type;
   iii. The applicant's justification for the proposed connection charge adjustment;
   iv. The applicant's recent financial performance and abridged audited financial statements for the past five (5) years;
   v. The applicant's proposed performance improvements and commitment with regards to service delivery and other metering and new connection KPIs.

e) Written submissions or objections must be made in writing to ERB within thirty days of the public notice.

f) Written submissions or objections from the public received by the ERB shall be availed to the applicant before public hearings are held. The applicant shall prepare written responses to the submissions which shall be submitted to the ERB before the hearings.

g) Following receipt of submissions or objections from members of the public, the ERB shall conduct public hearings.

h) After the public hearings, the ERB shall render its decision on the connection charge application within 30 days from the date of the public hearing. Where

no submissions have been received, the ERB shall proceed to consider the connection charges application and render its decision.

i) If dissatisfied with the decision, the applicant may within 30 days of notification of the ERB's decision file an appeal to the Minister outlining reasons for such an appeal.

The ERB shall maintain a record of all meetings held with the applicant and members of the public during the tariff review process.

Notwithstanding the provisions of sub rule (4), an application for revision of connection charges or approval of initial charges shall, at least, be accompanied by the following information:

Schedula A: Application Letter containing the following:

(i) Signature of the Chief Executive or someone authorised;
(ii) registered name of the applicant;
(iii) full address of the applicant to which communications in the matter will be sent;
(iv) full name, title and contact information of the applicant's chief executive officer or authorized person;
(v) verifiable reference of an applicant's license by ERB (or a preceding Authority) to provide a regulated service; and
(vi) a succinct statement of the regulatory action being requested.

Schedule B: Statement containing the existing charges, proposed new charges and justification for the proposed charges and commitments relating to the proposed new charges

Schedule C: Statement on the impact of the proposed charges on the licensee's revenue requirement

Schedule D: Business Plan detailing the applicant's strategic objectives and implementation plan

Schedule C: Audited financial statements for the past five (5) years with the latest being for the base

Schedule D: Management Accounts for the period for which Audited Accounts may not be available

Schedule E: Statement on the Performance of the licensee with regard to KPIs and specifically relating to new connection KPIs

Schedule F: Statement on the implementation status of the previous Energy Regulation Board Directives if any.

Schedule G: Any other information required by the Board or such as considered to be relevant for the review of the application; and

The application submitted shall be in both hard copy and electronic form including a workable and unlocked MS Excel Model that demonstrates how the proposed charges have been calculated in the format shown in Table 6.

Table 6: Format of Data Schedule

Material/Equipment required for a connection	Description	Estimated Cost
Single Phase Overhead New Connection		
A	Cost of Single phase Meter	
B	Cost of 25% of the Cost of 1 Span 230V Overhead Line	
C	Cost of 30 Metres Duplex Cable	
D	Cost of Accessories	
E	Cost of Labour	
F	Cost of Transportation	
Total Charge = A+B+C+D+E+ F		

Appendix 1: calculation of charges for upgrading of the existing connection in a high density demarcated reticulated area

Material/Equipment required for a connection	Description
Upgrade of 1 Phase Overhead to 3 Phase Overhead	
A	Cost of 3 phase Meter
B	Cost of 30 Metres Duplex Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading of 1 Phase Overhead to 3 Phase Underground	
A	Cost of 3 Phase Meter
B	Cost of 30m of 3 phase 16mmsq Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading 1 Phase Underground to 3 Phase Underground	
A	3 phase Meter
B	Cost of 30m of Single 16mmsq Cable
C	Accessories
D	Labour
E	Transportation
Total Charge	**=A+B+C+D+E**
3 Phase Overhead to 3 Phase Underground	
A	Cost of 30m of 3 Phase 16mmsq Cable
B	Cost of Accessories
C	Cost of Labour
D	Cost of Transportation
Total Charge	**=A+B+C+D**

Appendix 2: Calculation of charges for upgrading of connection in low density, demarcated and reticulated areas

Material/Equipment required for a connection	Description
Upgrading 1 Phase Overhead to 3 Phase Overhead	
A	Cost of 3 phase Meter
B	Cost of 30m Duplex
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading of 1 Phase Overhead to 3 Phase Underground	
A	Cost of 3 Phase Meter
B	Cost of 30m of 16mmsq 4 Core Cable
C	Accessories
D	Labour
E	Transportation
Total Charge	**=A+B+C+D+E**
Upgrading of 1 Phase Underground to 3 Phase Underground	
A	Cost of 3 phase Meter
B	Cost of 30m of 16mmsq 2 Core Cable
C	Cost of Accessories
D	Cost of Labour
E	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading of 3 Phase Overhead to 3 Phase Underground	
A	Cost of 30m of 16mmsq 4 Core Cable
B	Cost of Accessories
C	Cost of Labour
D	Cost of Transportation
Total Charge	**=A+B+C+D**

Appendix 3: Calculation of charges for upgrading of connection in high density, un-demarcated areas

Material/Equipment required for a connection	Description
Upgrade of 1 Phase Overhead to 3 Phase Overhead	
A	Cost of 50% of the Cost of Upgrade of 1 Span from 230V to 400V Overhead Line
B	Cost of 30 Metres Duplex Cable
C	Cost of 3 Phase Meter
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading of 1 Phase Overhead to 3 Phase Underground	
A	Cost of 50% of the Cost of Upgrade of 1 Span from 230V to 400V Overhead Line
B	Cost of 3 Phase Meter
C	Cost of Cost of 30m of 16mmsq 4 Core Cable
D	Cost of Accessories
E	Cost of Labour
F	Cost of Transportation
Total Charge	**=A+B+C+D+E**
Upgrading 1 Phase Underground to 3 Phase Underground	
A	3 phase Meter
B	Cost of 30m of Single 16mmsq Cable
C	Accessories
D	Labour
E	Transportation
Total Charge	**=A+B+C+D+E**
3 Phase Overhead to 3 Phase Underground	
A	Cost of 30m of 16mmsq 4 Core Cable
B	Cost of Accessories
C	Cost of Labour
D	Cost of Transportation
Total Charge	**=A+B+C+D**