ENERGY REGULATORY COMMISSION • PHILIPPINES

VALUATION HANDBOOK FOR OPTIMIZED DEPRECIATED REPLACEMENT COST VALUATION OF SYSTEM FIXED ASSETS OF PRIVATELY OWNED DISTRIBUTION UTILITIES OPERATING UNDER PERFORMANCE-BASED REGULATION (THIRD REGULATORY PERIOD)

FINAL

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TABLE OF CONTENTS

SECTIONS

GLOSSARY OF TERMS:

Term	Definition
Asset Category	A grouping of all assets in the asset base that perform a similar function. The different Asset Categories are identified in clause 3.10. Whereas, asset classes refer to the asset type breakdown within an asset category, for example the line items found in Appendix B.
Asset Class	See definition for Asset Category.
Brownfields	The 'Brownfields' cost basis assumes construction occurs for a new electricity network in a particular area, but installed around existing infrastructure and developments, with the bulk electricity supply to the area drawn from the most efficient existing bulk supply points in the vicinity of the area. (Such points can be an existing Point of Supply, or access point to a DU's existing electricity bulk-supply network.) By comparison, the 'Greenfields' cost basis assumes that construction occurs in an area free of any prior development, where the bulk electricity supply would be drawn from an optimal access point, the location of which would be part of the overall installation.
Central Business District (CBD)	A location where a high density of significant business activity occurs. These locations typically have significant commercial or retail businesses, such as large shopping malls, office complexes and high rise hotels.
Consumer Price Index (CPI)	The All Items Consumer Price Index published by the National Statistics Office of the Philippines.
Customer	In respect of a Regulated Distribution System: (a) a person whose User System or Equipment is directly connected to the Regulated Distribution System and who purchases or receives, or who is seeking to purchase or receive, Regulated Distribution Services in respect of that Regulated Distribution System; and (b) any other person who purchases or receives, or who is seeking to purchase or receive, Regulated Distribution Services in respect of that Regulated Distribution System. For the avoidance of doubt, this may include a person who operates an Embedded Generator, a Retail Electricity Supplier (RES) or an End-user.
Delivery Point Substation	A substation from where a DU takes electrical supply. These substations typically transform transmission voltages to subtransmission voltages, for example, 230/115kV and 230/69kV substations.
Depreciation or Regulatory Depreciation	The Depreciation calculated in respect of the Regulatory Asset Base as described in Section 4.10 of the RDWR, being one of the building blocks which form the basis for calculating the Annual Revenue Requirement for a Regulated Distribution System.
Distribution Network Assets	In respect of a Regulated Distribution System, the components

	of that Regulated Distribution System that are used to provide Regulated Distribution Services, as defined in the Rules for Setting Distribution Wheeling Rates (RDWR) (as updated).
Distribution Substation	A substation that transforms subtransmission voltages to primary distribution voltages, for example, 69/23kV and 115/34.5kV substations.
Distribution System	In respect of a Regulated Entity, a system of wires and associated facilities extending between the delivery points on the Grid and any Sub-transmission System operated by a person other than the Regulated Entity, on the one hand, and the points of connection of User Systems and Equipment of End-users, on the other hand.
Distribution Utility(DU)	An private corporation that has an exclusive franchise to operate a Distribution System in accordance with the EPIRA. For the purposes of this Valuation Handbook, DUs and Regulated Entities have the same meaning.
EPIRA	Republic Act No. 9136, otherwise known as the Electric Power Industry Reform Act of 2001.
Equipment	All apparatus, machines, conductors, etc. used as a part of, or in connection with, an electrical installation, as defined in the Distribution Code.
ERC	The Energy Regulatory Commission created by Section 38 of the EPIRA.
Greenfields	See definition for Brownfields.
Labour Cost	Part of wage-bill or payroll that can be specifically and consistently assigned to or associated with the manufacture of a product, a particular work order, or provision of a service.In the Valuation Handbook,this includes survey, design and construction, and labour on-costs incorporating holiday pay, actual sick leave, training, other unproductive time, workers compensation payments, pension/retirement plans, payroll tax and other direct labour costs.
Maintenance Work	Work done on an asset or group of assets to ensure that these assets are able to perform normally for the duration of their Standard Lives.
Modern Equivalent Asset (MEA)	Electrical equipment that would be installed at the current date, replacing older assets that are already in place and would fulfil the same function of those being replaced. MEA would be those widely accepted by efficient DUs to be the most technically and economicallyeffective assets currently available to fulfil a particular function, that can be practically installed in the field by DUs.
Non-Network System Fixed assets	Fixed assets that are required by a DU to efficiently supply Regulated Distribution Services or Distribution Connection Services, but that are not Distribution Network Assets or Regulated Distribution Connection Services Assets. Examples include construction vehicles and equipment, office buildings, depots, warehouses, furniture and computers used for non-network related applications.
Overhead Costs	Costs directly associated with the creation of Distribution Network Assets or Distribution Connection Services Assets but are not directly incurred for the acquisition, transport and handling, installation, testing or commissioning of the materials and equipment associated with those assets. Such costs includes planning and design (including the use of consultants

	for this), supervision or project management, capital rationing processes, project approval and budgeting, contract administration, site supervision and construction related corporate administrative overhead, asset register data processing including new asset data input, retirements for replaced assets and associated procedures. These costs, in the normal course of business, would be capitalised against an asset by a DU in terms of the International Accounting Standards (IAS) adopted in the Philippines, and would not be treated as operating or maintenance costs.
Planning Period	The maximum period, in years, on which a DU may base its forecast future electrical demand in order to justify the existing and planned DU network in terms of this Valuation Handbook.
Plant Cost	Transport and other plant costs incurred for delivery and erection.
Point of Supply (POS)	A network location where a DU takes supply of electricity from an external provider for distribution to internal electric consumers. Typical POS include Delivery Point Substations.
Primary Distribution Feeder	A network of primary distribution lines/cables which is usually supplied via one circuit breaker. It is usual for the feeder to consist of: > larger lines/cables that supply Distribution Substations (referred to as “the backbone”); and > smaller distribution lines/cables that emanate from the backbone and are referred to as radials.
Primary Distribution System	Medium voltage (MV) network assets which are downstream of the Distribution Substations and do not include low voltage lines. These network assets usually supply multiple consumers and typically include, for example, 34.5kV, 23kV and 13.8kV lines/cables.
Quality of Supply	In its broadest sense, is a set of criteria to allow electrical systems to function in their intended manner without significant loss of performance notwithstanding a possible fault on the Distribution System.
Refurbishment	Work done on an asset or group of assets that result in a material extension of normal service life.
Regulated Distribution Connection Services Assets	In respect of a Regulated Distribution System, the components of that Regulated Distribution System that are used to provide Distribution Connection Services, as defined in the Rules for Setting Distribution Wheeling Rates (RDWR) (as updated).
Regulated Distribution Services Assets	The components of the Regulated Distribution System which are used to provide Regulated Distribution Services as defined in the Rules for Setting Distribution Wheeling Rates (RDWR)
Regulated Distribution System	A Distribution System which is located in a Qualified Franchise Area and that is operated under an exclusive franchise, together with such Sub-transmission Systems as are connected to that Distribution System and as are operated only by the Regulated Entity that operates that Distribution System.

Regulated Entities	Collectively, any entity or entities who provide any Regulated Distribution Services in respect of a Regulated Distribution System, but excluding such persons as the ERC from time to time determines (such exclusion may identify the relevant persons specifically or by description and may be made subject to such conditions as the ERC considers appropriate). The entity or entities that comprise Regulated Entities for the purposes of these Rules and their respective Qualified Franchise Areas are such entities as are included in the RDWR as updated.
Regulated Retail Services Assets	The components of the Regulated Distribution System which are used to provide Regulated Retail Services for the distribution business segment defined in the Business Separation Guidelines that relates to the provision of Retail Services pertaining to the sale of electricity to end-users who are included in the Captive Market.
Regulated Transmission Entity	Refers to the private corporation which has assumed the electricity transmission functions of the National Transmission Corporation. The entity has an exclusive franchise to operate the Philippines transmission system.
Regulatory Asset Base (RAB)	Those assets employed by a Regulated Entity to provide efficient Regulated Distribution Services. It covers the Regulated Distribution ServicesAssets as well as the Non-Network System Fixed Assets required to support the delivery of Regulated Distribution Services.
Regulatory Period	A four-year period covered by a Regulatory Reset Process as described in the RDWR, wherein price control arrangements that will apply to a regulated entity for the provision of regulated distribution services for the next regulatory period, are established.
Regulatory Reset Process	Refers to the series of actions prior to the start of any Regulatory Period, through which the price control arrangements for the applicable Regulatory Period are established.
Revaluation Date	A date determined by the ERC during the Regulatory Reset Process for which the valuation is prepared. This date will be no later than 15 months prior to the start of the Regulatory Period for which a valuation is being conducted.
Rules for Setting Distribution Wheeling Rates (RDWR)	A document published by the Energy Regulatory Commission which sets out the rules for determining distribution wheeling rates for privately owned distribution utilities operating under performance-based regulation. A new set of these rules are issued for each entry point of groups of Distribution Utilities entering performance-based regulation, or entering a subsequent regulatory period.[1]
Secondary Distribution System	Low voltage (LV) network assets, which are generally used to supply consumers and are <1kV. For example, 480/277Volt, 398/230Volt and 380/219Volt distribution lines/cables)
Stakeholders	Refers to a person or a group with direct interest, involvement, or investment in a Distribution Utility, including consumers, shareholders and regulators.

[1] Initially promulgated based on the ERC Resolution "Adopting a Methodology for Setting Distribution Wheeling Rates", dated December 10, 2004, subsequently amended.

Standard Lives	Weighted average economic life of assets, where the economic life of an asset is assumed to expire because the costs of maintenance and repair of that asset exceed its efficient replacement cost on a project comparison basis, using a forward-looking discounted cash flow analysis. For the purposes of this Valuation Handbook, standard values are ascribed to these lives, based on the average efficient lives of equivalent assets experienced across the Philippines.
Subtransmission System	High voltage (HV) network assets, which are used to transport electricity from Points of Supply to major/Distribution Substations. The network assets typically include, for example 138kV, 115kV and 69kV lines/cables.
System Fixed Assets	Refer to assets forming part of the Regulatory Asset Base that are required to provide Regulatory Distribution Services. For this Valuation Handbook, these assets can be further broken down into Regulated Distribution Services Assets, Regulated Connection Services Assets, Regulated Retail Services Assets and Non-Network System Fixed Assets.
Third Regulatory Period	The Regulatory Period which immediately follows the Second Regulatory Period; the period covered is as defined in the RDWR.
Valuation Handbook	This handbook, which sets outs the rules for an optimized depreciated replacement cost valuation of the Regulatory Asset Base of Distribution Utilities, operating under Performance Based Regulation, for the Third Regulatory Period, and the manner in which the valuation is to be audited and presented to the ERC.
Valuation Report	A report prepared to reflect the value of the Regulatory Asset Base at the Revaluation Date.
Valuer	The person or party conducting an ODRC asset valuation, or part thereof, in terms of this Valuation Handbook.
Note : For a comprehensive list of definitions of terms associated with the setting of distribution rates for distribution utilities operating under performance-based regulation, refer to the RDWR. Definitions for capitalised terms used in this Valuation Handbook that are not listed above will also be found in the RDWR.	

SECTION 1 :INTRODUCTION

PURPOSE OF THE VALUATION HANDBOOK

1.1 This Valuation Handbook describes the Energy Regulatory Commission's (ERC's) requirements for the valuation of the Regulatory Asset Base (RAB) using the Optimized Depreciated Replacement Cost (ODRC) methodology. ODRC asset valuations are used by the ERC for setting the distribution wheeling rates of privately owned Distribution Utilities (DUs) in accordance with Section 43(f) of Republic Act No. 9136, otherwise known as the Electric Power Industry Reform Act of 2001(EPIRA), and Rule 15, Section 5(a) of the Implementing Rules and Regulations issued pursuant to that Act.

1.2 The ERC promulgated rules for the setting of distribution wheeling rates for privately owned DUs operating under performance based regulation (PBR), based on Annex B of ERC Resolution No. 12-02 Series of 2004 "Adopting a Methodology for Setting Distribution Wheeling Rates", dated December 10, 2004. These rules have been reissued by the ERC as the Rules for Setting Distribution Wheeling Rates for Privately-Owned Distribution Utilities (RDWR) and have subsequently been amended by the ERC to include specific requirements for DUs entering PBR at the third entry point. Clause 4.8 of the RDWR describes the requirements for the valuation of the Regulatory Asset Base of DUs prior to the regulatory reset for each regulatory period. The Valuation Handbook has been developed as much as possible in accordance with the current version of the RDWR, but should there be inconsistencies, the requirements of the relevant version of the RDWR shall prevail.

1.3 In terms of clause 4.8.2 of the RDWR, a DU's asset valuation is to be undertaken by either:

a) an independent appraisal company engaged by the DU, in which case the ERC must also retain a Regulatory Reset Expert or Regulatory Reset Experts to review the valuation results and the Valuation Report; or

b) a Regulatory Reset Expert or Regulatory Reset Experts retained by the ERC pursuant to Article XIV of the RDWR for purposes of undertaking the valuation (and preparing the Valuation Report).

1.4 Regardless of which of the above options applies to an entry group, the ODRC asset valuation shall be undertaken in accordance with the requirements of this Valuation Handbook.

1.5 This Valuation Handbook supersedes the Asset Valuation Policy Guidelines for Privately-Owned Distribution Utilities Subject to Performance Based Regulation Final, dated August 9, 2006, and Guidelines for Preparing Asset Schedules for Performance Based Regulatory Initial Asset Valuations, dated March 2, 2009.

IMPACT ON THE REGULATORY RESET PROCESS

1.6 In accordance with the RDWR, a revaluation of the RAB must be undertaken for each DU, which will culminate in a Valuation Report describing the ODRC of the System Fixed Assets making up its RAB at the valuation date (Re-valuation value). The Valuation Report is to be completed at least fifteen (15) months before the start of the Third Regulatory Period or as otherwise specified by the ERC.

1.7 For the Third Regulatory Period, the opening value of the RAB for a Regulated Distribution System will be based on the asset revaluation described in clause 4.8, rolled-forward as described in clause 4.9.1 of the RDWR.

1.8 This opening value of the RAB will be used as an input parameter for the building block model used to derive the price-control arrangements that will apply during the Third Regulatory Period for DUs operating under PBR.

SECTION 2 : ODRC PRINCIPLES

THEORY UNDERPINNING THE ODRC VALUATION METHODOLOGY

2.1 The Valuation Handbook describes a consistent and transparent approach to network asset valuation based on independently determined and generally accepted valuation principles, using the ODRC valuation approach.

2.2 One of the objectives of the ERC under the EPIRA is to adopt a regulatory process which eliminates monopoly pricing, provides a fair return to network owners, and creates an incentive for utility managers to pursue ongoing efficiency gains. This allows DUs to earn a reasonable (risk adjusted) return on their investment capital provided that the market continues to value the services produced from the capital invested. The ODRC valuation method is used to assess the value of the RAB in a manner that is consistent with these objectives. Hence the ODRC method assumes a hypothetical operating environment where the relevant market is contestable and there are no material barriers to entry into that market by an alternative service provider or an efficient new entrant.

2.3 In assessing the value of System Fixed Assets, the ODRC methodology assesses the service potential required of the assets and therefore identifies redundant assets and potential asset over-design or over-capacity. This approach is based on the principle that new entrants entering a contestable market[2] will endeavour to minimize their costs by installing only those assets needed to provide the required level of service and would not necessarily replicate exactly the existing asset base. Also, if an existing, efficient DU was deprived of its assets, and then took action to minimize losses, it would not necessarily replicate its existing asset base but would strive to provide the optimal replacement configuration that would meet the required service level, allowing for a reasonable planning window. For this reason, the ODRC methodology requires optimization of the DU's existing System Fixed Assets.

2.4 The ODRC method requires the replacement cost of a System Fixed Asset to be based on the minimum cost to replace the existing asset with a technically modern equivalent new asset, for which a similar service potential could be obtained in the normal course of business. For assets that deteriorate in service, the replacement cost needs to be depreciated to reflect the remaining life of the existing asset.

2.5 Replacement costs are derived assuming a "Brownfields" installation situation, in terms of which a new network would be erected, but within an already developed area, where it is assumed that other infrastructure (apart from the assets being replaced) already exists. This is as opposed to a "Greenfields" installation which assumes the replacement assets are installed in an undeveloped area.

2.6 Optimization is undertaken on an incremental basis, where the focus is on removing redundant assets and over-capacity, as well as inefficient design and "gold-plated" engineering within the existing network. The location of existing Points of Supply (POS), major subtransmission substations and line routes, as well

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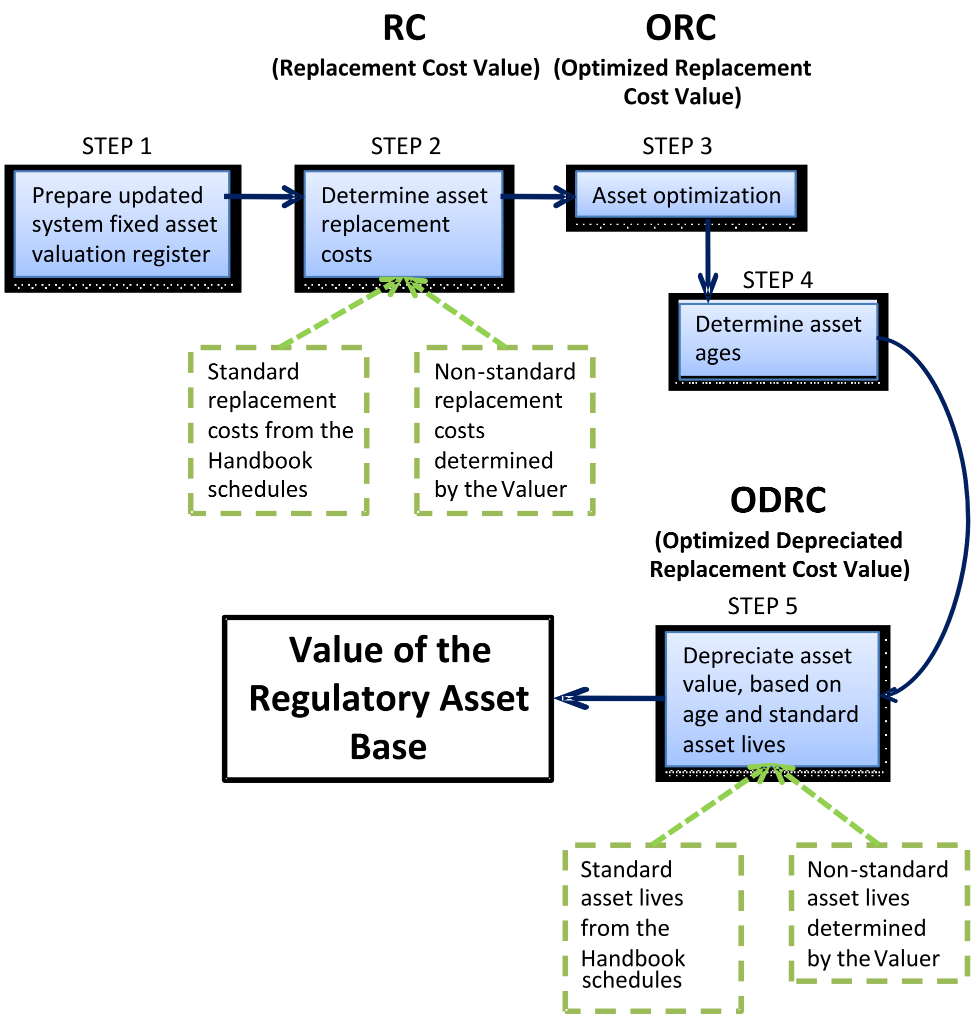
[2] Refers to amarket dominated by few utilities but with nominal barriers to entry, such that potential competition causes existing firms to operate on a competitive basis.

as points of supply to existing customers can be assumed to be fixed[3]. Existing standard voltage levels may be assumed.

OVERVIEW OF THE ODRC VALUATION PROCESS

2.7 The steps involved in the ODRC valuation process is summarized in the diagram below. These are described in more details in the rest of this Valuation Handbook.



MATERIALITY

2.8 For purposes of the valuation and the application of the Valuation Handbook in preparing the Asset Valuation, materiality will be defined as a value variance of more than 5%.

VALUE ADDED TAX

2.9 Value added tax (VAT) should be excluded from all RAB valuations.

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3 This does not preclude the removal of existing lines and substations that are not needed to provide the required level of service.

SECTION 3 :VALUATION ASSET REGISTERS

ASSET REGISTER

3.1 It is required that the DU will maintain an accurate record of its System Fixed Assets to support the ODRC valuation, in the form of an asset register. This register should include all the information on each individual asset that is required to effectively complete the valuation and will include at a minimum the following:

i. the location of the asset;

ii. the date of installation[4]; and

iii. properties relevant to determining the appropriate asset replacement cost, such as material type, size and quantity.

3.2 The asset register must be constructed in such a way that the accuracy of any asset entry can be determined from a field inspection. Thus any asset recorded in the asset register must be able to be uniquely identified in the field. This may require some assets used in large quantities, such as poles, to each have a unique number or identifier.

3.3 The DU should have verifiable processes to continuously populate and keep the asset register up to date. At a minimum, this process must ensure that the register is up to date at the time an ODRC valuation is required.

3.4 In cases where accurate historical asset information is not available, asset information will have to be based on assumptions or estimates. The DU should base these assumptions or estimates on the best data available, using verifiable and robust analysis. Information regarding all new System Fixed Assets should be captured in the format required in this Valuation Handbook and therefore the completeness and accuracy of System Fixed Asset information should improve over time.

ASSETS TO BE INCLUDED

3.5 System Fixed Assets owned by the DU or subject to a finance lease, that will be used or is intended to be used for the conveyance of supply of electricity, are to be included in the RAB. These assets may include reasonable quantities of spares relevant to the existing network assets, if owned by the DU.

3.6 The RAB shall exclude assets used for generation of electricity for resale or to provide ancillary services for which income is derived by a DU. However, DUs may include generators that are used only for distribution purposes; for example generators providing voltage support, reactive VAR compensation, demand peak lopping or providing standby power during planned interruptions or emergency situations. Generally, these generators could be included under the RAB if there is no direct revenue derived from selling energy or ancillary capacity from them.In the event that the DU is unclear on the inclusion of generator assets in the RAB, it is advised to separately discuss with the ERC the possible inclusion of these assets in the RAB.

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4 Care should be taken to use the first date of installation for any asset moved from one location to another and for which there may be multiple installation dates.

3.7 For the purpose of determining the interface with embedded generation plant, the high voltage terminals of the generating unit transformer are considered to be the point at which energy enters the network, or the point of entry.[5] Any equipment between the point of entry and the DU's distribution network, which is used to transfer energy from the generation plant, is considered as dedicated generator entry equipment and should not be included in the RAB.

3.8 The boundary between the Regulated Transmission Entity and the DU is to be determined in accordance with the ownership of the assets.

ASSET CATEGORIES AND SUB CATEGORIES

3.9 The following is the required asset classification and, as a minimum, these categories should be separately included in the asset register:

Regulated Distribution Services Assets

- Land and Land Rights (dedicated to distribution purposes)
- Structures and Improvements (dedicated to distribution purposes)
- Substation Equipment
  - Power transformers
  - Switchgear
  - Protective equipment
  - Metering and control equipment
  - Communications equipment
  - Other station equipment
- Poles, Towers and Fixtures
- Overhead Conductors and Devices
- Underground Conduits
- Underground Conductors and Devices
- Distribution transformers
- Power conditioning equipment[6]
- Meters, Metering Instruments & Metering Transformers (dedicated to distribution purposes)
- Information Technology Equipment (dedicated to distribution purposes)
- Regulated Entity property on Consumers' Premises (not forming part of Distribution Connection Assets)
- Street Lights and Signal Systems
- Submarine Cables
- Materials and Supplies, including spares
- Transferred Sub-transmission Assets

Distribution Connection Services Assets

- Poles, Towers and Fixtures

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5 If the generator does not have a dedicated transformer, then the point of entry should be viewed as the terminals of the generator.

6 This refers to equipment such as capacitor banks for power factor correction, voltage regulators, generators used for voltage stability, VAR compensators etc.

- Overhead Conductors and Devices
- Underground Conduits
- Underground Conductors and Devices
- Distribution Transformers
- Information Technology Equipment (dedicated to Distribution Connection Services)
- Materials and Supplies, including spares

Regulated Retail Services Assets

- Meters, Metering Instruments & Metering Transformers – Consumer consumption metering

and other Asset Categories that may be specified by the ERC.

3.10 Asset information in the RAB must be disaggregated into individual assets in a manner that will assist in verifying the accuracy of the asset register. Furthermore, the disaggregation should be meaningful from a network operations and management (as distinct from financial) perspective. In cases where the DU does not have a well maintained valuation asset register, this requirement generally implies that the DU will have to develop the asset register from more than a single source of information, which will typically include information from financial records, engineering and design records, geographic information systems and more. As a guide, individual entries in the asset register could be identified as follows:

- Poles;
- Pole Top Hardware;
- Conductors;
- Overhead Line Devices;
- Distribution Transformers;
- Metering Transformers;
- Meters;
- Service Drops;
- Substation Equipment; and
- Spares.

3.11 Asset categories must be assigned in such a way that the valuer is able to adequately apply the standard replacement costs provided in this Valuation Handbook, refer to Appendix B.

PREPARATION OF THE VALUATION

3.12 The decision on who will conduct the valuation at each entry point for the Third Regulatory Period (see clause 1.3) will be made by the ERC.

3.13 Should the ERC decide that DUs are required to perform their own asset valuation, this should be undertaken by a suitably qualified independent appraisal company, as its expert, appointed directly by the DU for this purpose. Should the ERC decide that it will conduct the asset valuation, it will appoint a suitably qualified Regulatory Reset Expert(s) to advise and support it in this regard.

3.14 Regardless of the valuation option selected by the ERC, the valuation will rely on the asset register prepared and maintained by the DU. It therefore remains the responsibility of the DU to ensure the completeness and accuracy of this register.

REVIEW AND AUDITING OF INFORMATION – ERC-LED VALUATION

3.15 The ERC's appointed expert will conduct the following tasks:

- undertake a thorough review of the accuracy of the DU's asset register. This will include (but not be limited to) field inspections of randomly selected assets, examination of system diagrams and single-line diagrams and comparison of this with the information included in the asset register; analysis of the valuation evidence supporting the asset register; and verification of the asset age information provided;

- perform network optimization in accordance with the requirements of this Valuation Handbook;

- determine the replacement cost of those assets where standard replacement costs are not provided in Appendix B of this Handbook; and

- conduct the valuation of the RAB and prepare the Valuation Report for the ERC.

3.16 To ensure the effectiveness of this process, the close cooperation and support of the DU is required to facilitate the asset inspections and provide all requested information. Should this cooperation not be provided, the ERC may decide to extend the valuation process into a detailed inspection of all network assets and base the valuation on its own assessment of the remaining life of these assets and its own assessment of the optimal network configuration. This will extend the valuation period and significantly increase the valuation cost. These additional costs, as well as indirect costs resulting from delays in the Regulatory Reset Process will be for the DU's account. The DU will not be entitled to recover such additional costs through its distribution rates.

3.17 The sampling method applied by the expert will be based on a statistically valid sampling methodology, resulting in a confidence level not lower than 95% with a margin of error below the materiality threshold specified in clause 2.8. Where the sampling indicates errors in the asset register that may lead to an error greater than the materiality threshold in the ODRC value of all assets in any asset category or sub-category, the expert may base the total value of all assets in that asset category or subcategory on the results of the sampling rather than the asset register.

3.18 Sampling will be applied to all asset categories where the ODRC of all assets in that category is above the materiality threshold, see clause 2.8, of the total ODRC of the RAB.

3.19 Once completed by the expert, the ERC will review the draft Valuation Report, making changes or including additional information as it may deem necessary.

3.20 The draft Valuation Report will be submitted to the DU for comments prior to presentation to the ERC for formal approval. Reasonable comments or concerns from the DU will be addressed in conjunction with the expert as part of this process before the report is finalized. It is a requirement that the DU indicate its acceptance of the final Valuation Report in writing prior to presentation to the ERC. Should this approval be unreasonably withheld, the ERC may unilaterally finalize the report. In this case, the DU has the right to prepare its own Valuation Report for submission to the ERC, which must be prepared using a process similar to that set out below.

REVIEW AND AUDITING OF INFORMATION – DISTRIBUTION UTILITY-LED VALUATION

3.21 The DU should, as a minimum requirement, ensure that the same level of statistical rigour and accuracy (95% confidence level) as described above, is expected in the preparation of the Valuation Report. Each Valuation Report is to be accompanied by a certificate issued by the independent appraisal company, as an expert(s), who will certify that:

- the expert was responsible for preparing the valuation and the Valuation Report;
- that the valuation and the Valuation Report has been prepared in accordance with the Valuation Handbook;
- that the accuracy of the asset registers have been verified to the stated level of statistical accuracy;
- that the network has been optimized correctly in accordance with this Valuation Handbook; and
- that the Valuation Report represents a fair and accurate reflection of the value of the RAB, based on the methodology described in this Valuation Handbook.

3.22 Any inadequacy in the valuation process, including inaccuracies found in the asset register, must be clearly identified in the Valuation Report. This discussion must describe in detail the approach taken and the assumptions made in all cases where the valuation of assets in a given asset category (or sub category) is based on asset quantities that a different from those recorded in the asset register.

3.23 It is important that valuations are transparent. DUs are therefore required to include sufficient information in each Valuation Report to enable the ERC to independently assess the validity and robustness of the reported valuation in accordance with the ODRC methodology as described in this Valuation Handbook. The ERC will review the valuations provided by the DUs, and may make adjustments to the valuations, including in situations where insufficient supporting information has been provided to substantiate the valuations. Information that must be included in the Valuation Report, at a minimum, is summarized in Appendix A.

3.24 In addition to the expert's certification, a director or the president of the DU is required to certify acceptance of the Valuation Report and the validity of the expert's certificate.

3.25 In reviewing the Valuation Report, the ERC will ensure that all information identified in Appendix A, at a minimum, has been included and that the valuation process described in the report is consistent with the requirements of this Valuation Handbook. It may also decide to conduct further reviews of the calculations and optimization processes performed by the DU or conduct its own asset sampling to verify the accuracy of the asset register. For this, the assistance of the DU will be required. The DU must provide any additional information requested by the ERC to support its review and require the DU to provide a full working copy of its valuation asset register in Microsoft Excel or Access format.

3.26 Should the ERC consider that the information provided in the Valuation Report does not fully meet the requirements of Appendix A, and this Handbook, it will identify those areas where the report is deficient and require the DU to revise the report to fully comply.

3.27 Should the ERC consider as a result of its review that the information provided by the DU may be materially inaccurate, it will escalate the review, in accordance with the following procedure:

- If errors in calculation or analysis are encountered, the report will be returned to the DU for correction. Should the required changes be of a minor nature, the DU can make the corrections and issue an amendment to the original Valuation Report. Should these errors be of a material nature, the DU will have to revise and re-issue the Valuation Report, after a full re-audit and certification thereof. The ERC will advise when returning the report whether a re-audit or recertification is required.

- Sampling of the accuracy of the asset register will initially involve not less than 100 random samples, focusing on those asset categories most material to the valuation. Should this indicate an error rate (arising from any aspect of the asset register, including assets wrongly indicated in the register or incorrectly categorized, inaccurate asset lives or inaccurate replacement values) which is worse than that claimed in the Valuation Report or higher than 5% of the samples taken, a further minimum of 200 random samples will be taken.

- Based on the second sampling performed, should the accuracy rate of the asset valuation register prove to be worse than that specified in this Valuation Handbook, the ERC may decide to reject the valuation and require a new valuation to be conducted and a new report to be submitted (at the cost of the DU, including any indirect costs arising). Alternatively, it may decide to work with the DU to determine an appropriate manner in which the accuracy problems can be addressed that would do away with a full new valuation.

  Any direct or indirect costs[7] arising from a delay to the Regulatory Reset process as a result of the DU having to revise, redo or re-issue the Valuation Report, will be to the account of the DU. DUs will not be entitled to recover such additional costs through their distribution rates.

[7] Indirect costs are those arising as a result of delays to the Regulatory Reset Process.

SECTION 4 : REPLACEMENT COST – SYSTEM FIXED ASSETS

For this Valuation Handbook, the internationally accepted principle of absolute valuation by replacement cost analysis, where required absolute valuation by modern equivalent asset (MEA) analysis, was used to develop the standard replacement costs of System Fixed Assets shown in Appendix B.

REPLACEMENT COST

4.1 The replacement cost of all individual System Fixed Assets is derived from the lowest cost to replace an existing asset with a MEA with an equivalent service potential and capacity. Furthermore, the MEA should be commercially available and should not require re-engineering or redesign of the existing asset.

4.2 For commonly used System Fixed Assets, the standard replacement costs for MEAs are listed in Appendix B. These costs are based on December 31, 2009 costs and escalation of standard replacement costs will have to be applied for years beyond 2009 by using the Consumer Price Index (CPI). The Valuation Report must state the indexation factor used to inflate the standard replacement costs provided in Appendix B and include an analysis of how this indexation factor was derived. The standard replacement costs should be revaluated prior to each reset of the First Entry Group of DUs.

4.3 The MEAs as listed in Appendix B includes costs for all materials[8], labour[9], plant[10] and overheads[11].

4.4 For System Fixed Assets not listed in Appendix B, the Valuer is to determine the MEA for these non-standard assets, including the efficient replacement cost and the standard asset life. This will be based on an asset that:

i. has an equivalent service potential to the existing asset;

ii. can be constructed or purchased at the time of the valuation with current technology; and

iii. has the lowest lifetime cost.

4.5 In developing the replacement cost for non-standard assets, a 'Brownfields' cost basis should be adopted. Also, the replacement cost should correspond to a significant scale of construction and not a gradual addition.

4.6 For non-standard asset replacement costs, equipment purchase costs[12] should be based on quotations from suppliers or manufacturers operating in a competitive

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8 Costs of materials delivered to store inclusive of any taxes paid excluding VAT.

9 Costs of direct labour including survey, design and construction and labour on-costs incorporating an allowance for holiday pay, sick leave, training, other unproductive time, workers compensation payments, superannuation, and payroll tax.

10 Costs associated with transport and plant for delivery and erection.

11 Costs associated with preparation ofmaster-plans, use of consultants, capital rationing processes, project approval and budgeting, contract administration, site supervision and construction related corporate administrative overhead, asset register data processing including new asset data input, retirements for replaced assets and associated procedures, to the extent that these costs relate directly to the RAB.

12 Supra note 8.

market and labour[13], overhead[14] and plant[15] costs will be based on competitive costs based on efficient industry practice.

4.7 The total replacement cost of the RAB is obtained from the aggregation of the replacement costs of the individual System Fixed Assets.

4.8 Full details of the manner in which the value of non-standard System Fixed Assets were derived, including the values themselves, must be included in the Valuation Report.

13 Supra note 9.
14 Supra note 11.
15 Supra note 10.

SECTION 5 :OPTIMIZATION

INTRODUCTION

5.1 Under the deprival approach to asset valuation, an optimized network would theoretically use the most cost-efficient design that would provide the required service potential. This design would completely disregard the design and configuration of the existing asset base. Such an approach, which is cost intensive and likely to result in variable and inconsistent outcomes, is not however required by the optimization rules mandated in this Valuation Handbook, which allow the existing network to be used as the starting point for the optimization process. The process requires a series of optimization tests to be systematically applied to the whole network to identify stranded assets, excess capacity and over-engineering. As a minimum, the optimization tests set out in Appendix C should be performed for each revaluation. Where necessary, the network may be notionally redesigned to provide an optimized network[16]. The Optimized Replacement Cost (ORC) is the undepreciated replacement cost of the optimized network.

5.2 The most cost-efficient design is the one that minimizes the present value of the total costs of installing the System Fixed Assets and using them over their Standard Lives. In undertaking life cycle cost analyses to determine the most efficient design, a DU may take into account:

i. the capital and operating costs over the life of the assets;

ii. other costs that are incurred by the DU as a result of the use of the asset; and

iii. the cost of electrical losses to the extent that these are caused by the existing electrical load and the projected load growth over the allowed planning period. Where a life cycle cost analysis is relied upon to avoid the use of an asset with a lower replacement cost in an optimized network, a general description of the analysis and assumptions used should be included in the Valuation Report.

5.3 Optimization should be undertaken after the Replacement Cost (RC) of the existing network asset base has been calculated.

5.4 The optimized network should:

i. have a quality of supply[17](supply security level) that is similar to that which currently exists within the DU's network, except where this exceeds the DU's standard Quality of Supply criteria as disclosed in the Valuation Report in accordance with clause 5.16; and

ii. have a network capacity that is similar to that of the DU's existing network, except for those situations where capacity is excessive and thus has been optimized down/out.

5.5 Optimization consists of five stages:

i. excluding stranded assets;

ii. optimizing the configuration of the network;

iii. optimizing the capacity/voltage of elements in the network;

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16 i.e. fictitious efficient assets are assumed to exist in place of those un-efficient assets actually in use.

17 This is further described below.

iv. optimizing network engineering; and

v. optimizing stores and spares.

5.6 The determination of MEAs that would replace existing individual network components is not part of the optimization process and should be undertaken prior to calculating the RC. For most network components MEAs will already be reflected in the standard replacement costs contained in Appendix B.

5.7 For the avoidance of doubt, the optimization of projects that have been pre-approved by the ERC is not required, unless demand or other external conditions have changed to such an extent from the time of the initial project application, that this would have materially influenced the ERC's initial decision[18].

CONSTRAINTS ON OPTIMIZATION

5.8 The optimization process shall be carried out subject to the following constraints:

i. the potential level of service of the optimized network shall not exceed that of the existing network, and the performance of any part of the optimized network shall not exceed the DU's standard Quality of Supply criteria, as disclosed in the Valuation Report in accordance with clause 5.16. If non-standard contracts with individual customers exist that require the DU to provide an enhanced Quality of Supply, these assets[19], should be optimized out of the RAB on the basis that these assets are required by the individual customer rather than the DU and that customer-specific rates (falling outside normal distribution wheeling rates) will apply to such installations;

ii. the location of points of connection to other networks or transmission grid exit points should be assumed to be fixed. However, where a fixed point of connection can be readily bypassed and replaced with a more cost-efficient network arrangement, then that fixed point of connection shall be deleted for valuation purposes and the more cost-efficient network included;

iii. the location and number of connection points to consumers should be assumed fixed;

iv. the optimized network should only use the voltage levels used on the existing network. This does not preclude existing equipment being optimized down to a lower standard network voltage, but there is no requirement to optimize down to a non-standard voltage level;

v. the optimized network should use standard equipment/fitting ratings/sizes to optimize construction/maintenance practices. This does not preclude oversized existing equipment being optimized down to standard sizes used by other DU's, but there is no requirement to optimize equipment sizes down to non-standard equipment that is not readily available in the Philippines.

THE PROCESS OF OPTIMIZATION

5.9 Optimization of the network shall be undertaken on a systematic basis. The optimization process must examine the existing network and determine whether a

[18] As a test, it can be considered whether the ERC would have required optimizing down of the original project application had it been known what the actual demand on these assets would be (as opposed to the demand forecast at the time).

[19] Refers to assets used to enhance the quality of supply.

more cost-efficient design could meet the DU's quality of supply criteria throughout the allowed planning period (refer to 6.13). Optimization shall be undertaken systematically across the network and shall include, in particular, the following network components:

i. Points of Supply;

ii. delivery point substations;

iii. sub-transmission lines and Distribution Substations;

iv. primary distribution switching stations;

v. the primary distribution circuits/feeders (including distribution transformers); and

vi. the secondary (low voltage) distribution system.

FUTURE LOAD GROWTH

5.10 The maximum capacity of any part of a DUs optimized network shall be determined by considering the projected future load growth for the relevant planning period in tandem with the DUs Quality of Supply criteria. However, in no case shall the optimized network capacity exceed the existing capacity.

5.11 In order to ensure compliance with clause 5.10, DUs shall disclose in their Valuation Reports both existing peak demand and forecast electrical demand levels that are used as a basis for optimization. The forecast electrical demand values should account for any potential to reduce peak demand through the application of cost-effective demand-side management practices. As a minimum, the existing and forecast electrical demand levels shall be provided for each (i) point of supply, (ii) Distribution Substation, (iii) sub-transmission feeder and (iv) primary distribution feeder. Clear justification and a detailed derivation of the load growth forecasts are required. Both the existing maximum demand and the highest forecast maximum demand during the planning period shall be provided. Allowances should be made, where possible, for different growth rates in different parts of the network. Existing electrical demands, power factors or diversity factors may be estimated where metering or SCADA data is not available. Estimated quantities should be clearly identified in DU's disclosed forecast electrical demand[20].

5.12 The network demand forecast should:

i. be based on peak kVA values and include an indication of the relevant electrical power factors;

ii. clearly outline any diversity factors that may exist in relation to the peak loads on (i) the entire network, (ii) the zone substations and (iii) the primary distribution feeders;

iii. be based on "system normal conditions" and only consider the peak electrical demand on each of the relevant network components without load transfer due to network contingencies; and

iv. include only future electrical loads that can reasonably be expected to be supplied from the DU's network. Any loads that are forecast to emerge outside of a DU's franchise area should be specifically noted in the DU's Valuation Report.

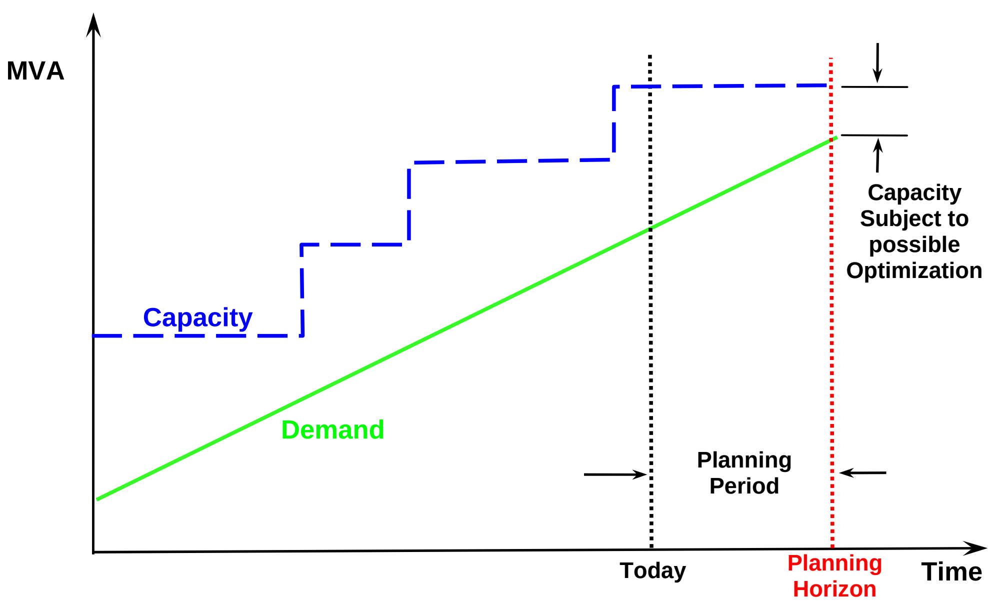
[20] The demand forecast figures presented by DUs should be consistent with those used to forecast the basis of its capital expenditure on network growth, for the upcoming regulatory period.

5.13 DUs shall disclose in their Valuation Reports any separately identifiable new load or load increment that is forecasted to be (i) 5% of the DU's existing maximum demand or (ii) 5 MW (whichever is the lower).

5.14 The planning periods over which future load growth can be allowed for shall not exceed those outlined in the following table.

Network Components	Planning Horizon
Points of connection to the transmission network Delivery Point Substation Sub-transmission (HV) lines/cables Distribution Substations (excluding transformers)	15 years
Distribution Substation Transformers Primary Distribution (MV) lines/cables	10 years
Distribution/Line Transformers Secondary Distribution (LV) lines/cables Other Distribution Assets	5 years

The following figure illustrates graphically the progression of a network asset's capacity and electrical demand. It also shows that the extent of the spare capacity at the end of the planning period and which would be subject to potential optimization under this Valuation Handbook's optimization methodology.



QUALITY OF SUPPLY

5.15 The optimized network shall be designed to supply the allowed future load growth. The Quality of Supply of the optimized network will match the level that currently exists, except where this is greater than the disclosed Quality of Supply criteria.

5.16 A DU shall disclose in its Valuation Report the Quality of Supply criteria that it currently uses as a basis for network design. These will be assessed for reasonableness by the ERC and, if deemed appropriate for a network of the size and nature of that applying for the criteria, will be approved for valuation purposes.[21] The Quality of Supply criteria should be based on:

i. the DU's analysis of customer requirements;

ii. the DU's assessment of network maintenance requirements and costs;

iii. the standards and practices that have historically been used to develop the existing subtransmission and distribution networks; and

iv. the DUs assessment of widely accepted best practice followed by other effective DUs in the Philippines and internationally, for similar distribution networks and customer types.

5.17 Relevant quality of supply criteria include:

i. the degree of security (redundancy) in different circumstances or localities;

ii. target reliability indices for different areas of the network. For example, Central Business, urban and rural districts;

iii. voltage regulation criteria; and

iv. levels of electrical losses.

5.18 The degree of security may be disclosed either in probabilistic or deterministic terms. A deterministic approach could reference the level of in-built redundancy, for example, as (n) or (n-1) or (n-2) component redundancy. An (n) security level implies no component redundancy so that if a component fails, then consumer supply is lost. An (n-1) security level implies that consumer supply is not interrupted in the event of any single component outage[22]. A less reliable (n-1 switched) security level involves the loss of consumer supply subsequent to a single component outage, but with subsequent consumer supply restoration via network switching. Irrespective of whether probabilistic or deterministic criteria are used, it is necessary for a DU to express its degree of security criteria in such a way that the optimization process is transparent and can be shown to have been applied consistently across all sections of the network.

5.19 Existing System Fixed Assets that provide a Quality of Supply greater than that disclosed by the DU shall be optimized out. As per clause 5.8(i), improved levels of Quality of Supply are allowed as part of non-standard contracts but are not to be included in the RAB.

EXCLUDING STRANDED ASSETS

5.20 Any System Fixed Assets not required to supply distribution services to the DU's existing customers, and which could therefore be disconnected, shall be identified and excluded from the optimized network.

[21] To avoid potential reworking and delays, DUs may wish to approach the ERC in advance of submitting their valuation reports, to obtain a ruling on the appropriateness of their proposed Quality of Supply criteria.

[22] A completely uninterrupted supply in the event of a component failure is mostly not feasible and, depending on the definition adopted, supply restoration within 1 minute, 3 minutes or 5 minutes are usually considered to be no-break.

OPTIMIZING SYSTEM CONFIGURATION

5.21 Optimization of the system configuration shall be carried out by considering alternative configurations subject to the constraints on optimization and in accordance with the relevant Quality of Supply criteria in accordance with clause 5.16. The optimized configuration is the one that supplies the forecast load at the end of the allowed planning period and meets the disclosed Quality of Supply requirements in the most cost efficient manner.

5.22 In the process of optimizing the system configuration, certain assets or groups of assets may become excess to requirements and should be assigned a zero value, while other new assets may need to be notionally brought in. The minimum optimization tests to be carried out by DUs in optimizing the system configuration are set out in Appendix C.

OPTIMIZING NETWORK CAPACITY/VOLTAGE

5.23 After the configuration of the system has been optimized, the elements within that system shall be optimized by considering whether lower capacity/voltage, more cost-efficient elements would be adequate. The minimum tests to be carried out by DUs in optimizing the network capacity are set out in Appendix C.

5.24 Civil engineering works such as spare ducts, control buildings, cable tunnels and switchyard bays not currently used shall be optimized out unless they will be required to meet the allowed future load growth within a reasonable growth period, coupled with meeting the disclosed quality of supply criteria.

OPTIMIZING NETWORK ENGINEERING

5.25 As part of the process of optimizing the network, the engineering of the network shall be examined to confirm that the optimized asset base is not over-engineered, given the disclosed Quality of Supply criteria. Over-engineering may occur if parts of the existing asset base are engineered to a standard that exceeds the DU’s current practice or if a more cost-efficient engineering arrangement or configuration would be used if the existing assets were replaced. The DU’s design and construction standards, and the standard of engineering applied to its most recent projects should be used as the benchmark for this test.

5.26 Where a more cost-efficient arrangement would result if the required level of service were provided by applying the DU’s existing engineering standards, the relevant assets shall be replaced by a notional asset arrangement that reflects current best practice. The minimum tests to be carried out by DUs in optimizing the network engineering are set out in Appendix C.

OPTIMIZING NETWORK EQUIPMENT SPARES

5.27 Network equipment spares may be included in the ODV valuation as long as the spares are suitable replacements for the assets installed in the network. However, the quantity of spares in the ODV valuation shall not exceed the reasonable quantity of spares required to meet the DU’s disclosed quality of supply criteria.

5.28 Stranded assets may be valued as network spares, subject to the criteria set out in clause 5.27. Stranded assets not required as network spares shall be assigned a zero value for the purposes of calculating the ODV.

DETERMINING THE OPTIMIZED REPLACEMENT COST

5.29 Once the optimized system has been determined, those parts of the optimized network that are different from the existing network shall be revalued. This entails applying the replacement costs of MEAs to the optimized notional network. A schedule of all network optimizations and details of the valuation impact of each optimization, including details of the assets removed as stranded assets, shall be included in the Valuation Report.

5.30 When assets are notionally brought into the network as a result of the optimization process, they should be valued at their replacement costs in accordance with the relevant requirements of this Valuation Handbook to determine the total replacement cost of the System Fixed Assets.

5.31 Aggregating the individual RCs of the System Fixed Assets in the optimized system will produce the total ORC for the network.

SECTION 6 : DEPRECIATION

APPROACH TO DEPRECIATION

6.1 Where an existing asset's remaining useful life is less than the life that would normally be expected from a new asset, the replacement cost of the asset must be depreciated. Depreciation recognizes the limited remaining useful life of an asset.

6.2 The straight-line method of depreciation is to be adopted. The principles and formulae to be applied in determining depreciation are detailed in Section 4.10 of the RDWR.

DETERMINING ASSET LIVES

6.3 The Standard Lives for standard System Fixed Assets that must be used for purposes of depreciation are listed in Appendix B of this Valuation Handbook.

6.4 Asset lives for non-standard System Fixed Assets are to be determined by the Valuer, based on experience in the field with similar assets. These lives have to be described and justified in the Valuation Report, for review and approval by the ERC. Where non-standard assets are similar in nature to the standard assets listed in Appendix B, the standard lives in Appendix B should normally be used.

6.5 The life of each System Fixed Asset is deemed to start on the day it was installed for the first time, except in the case of a refurbished asset to which a life extension has been applied in accordance with clause 6.8. For spares, the life is deemed to be the total life expectancy of the asset until the first installation date. The age of an asset shall be determined from existing data.

6.6 Where the actual installation or commissioning year of an asset may not be known, these will have to be estimated. These estimated ages are typically applied only to assets for which installation or commissioning dates are not available and not to entire categories of assets. The following guidelines, by no means a definitive list, are provided to assist in the determination of the age of individual assets:

- For older assets, experienced field staff with a long history with the company may assist to provide best estimates of asset ages;
- Some assets may have the year of manufacturing identified physically on them and could therefore be used as the basis for determining the age of the asset; and
- It may be possible to infer the age of an asset using historical engineering and management records. For example, the age of a distribution line may be inferred from the oldest installed distribution transformer on the line.

For groups of assets without known ages, it may assist to use historical annual expenditures to develop an age profile. For past years where expenditure records are not readily available, assumptions should be made to complete the age profile for the entire group of assets.

6.7 In cases where specific assets in the same category are routinely replaced before the end of their Standard Lives, or where justified by the condition of an asset, the total lives of such assets may be reduced from the Standard Life for ODRC valuation purposes. Adequate supporting information for any such reductions and the reasons for them being adopted shall be provided in the Valuation Report.

IMPACT OF REFURBISHMENT

6.8 Where the DU can demonstrate substantial refurbishment, beyond that of normal maintenance work, to extend the life of an individual asset, the DU should assign a new remaining life effective from the time of the refurbishment. Justification for assigning a new remaining life should be based on thorough investigation and should only be adopted if a robust engineering report is available. This new remaining life should not exceed that of the Standard Life assigned to the asset, as indicated in Appendix B.

RESIDUAL VALUE

6.9 A System Fixed Asset, apart from land and easements, should be depreciated, as using the formulae in Section 4.10 of the RDWR. An asset that remains in use, after the end of its expected asset life should be allocated a residual 5% of its ORC value for purposes of determining the value of the RAB.

DETERMINING THE TOTAL DRC AND ODRC

6.10 The total depreciated replacement cost of the RAB is obtained from the aggregation of the depreciated replacement costs of the individual System Fixed Assets physically installed.

6.11 In cases where existing System Fixed Assets are notionally replaced due to the optimization process, the replacement assets shall be depreciated for the same proportion of their asset lives as the existing assets were depreciated. When the optimization involves groups of assets being reconfigured, the replacement assets shall be depreciated as a group to reflect the remaining life of the existing group as a proportion of that group's asset life, calculated on a weighted-average basis, with the weighting factor being replacement cost.

6.12 The total System Fixed Asset optimized depreciated replacement cost is obtained from the aggregation of the depreciated replacement costs of the individual System Fixed Assets in the optimized network.

SECTION 7 : NON-NETWORK SYSTEM FIXED ASSETS

INTRODUCTION

7.1 Non-Network System Fixed Assets comprise those assets owned and utilized by the DU but which do not form part of the physical Distribution System. These assets form part of the RAB and therefore form part of the revaluation and include asset categories as listed below:

- Computers, communication and office equipment;
- Vehicles dedicated to network related activities;
- Plant, tool and equipment;
- Furniture and fittings;
- Commercial buildings;
- Land and easements; and
- Structures and land improvements.

7.2 Full details of all Non-Network System Fixed Assets, that are included in the value of the Regulatory Asset Base, must be summarized on an asset class basis for inclusion in the Valuation Report. These details should include a description of the asset, its age and replacement cost, the extent to which it has been depreciated and the extent to which it has been optimized (if applicable).

METHODOLOGY

7.3 The methodology of the valuation of Non-network System Fixed Assets should be consistent with Philippine Accounting Standard (PAS) 16, which corresponds to International Accounting Standard (IAS) 16 – Property, Plant and Equipment, the primary accounting standard governing the valuation basis adopted for financial reporting.

7.4 Non-Network System Fixed Assets are tangible items that are held for use in the production or supply of goods or services, or for administrative purposes and which are expected to be used during more than one reporting period. Intangible assets are not to be included in the Regulatory Asset Base.

7.5 Non-Network System Fixed Assets are assets for which future economic benefits associated with the asset will flow to the DU and for which the cost of a replacement asset can be measured reliably. The valuation should only include Non-network System Fixed Assets that are necessary and efficient for providing Regulated Distribution Services.

7.6 Should the DU own assets that are only partly used for providing Regulated Distribution Services, a proportional allocation of the value of such assets can be included in the RAB. The justification for the proportional allocation must be described in the Valuation Report and is subject to the approval of the ERC.

OPTIMIZATION POLICIES

7.7 Optimization should also be applied to the valuation of non-network assets in that assets not reasonably required for the provision of Regulated Distribution Services should be optimized out and not included in the RAB. Particular attention should be given to the non-specialized assets that may to be used for personal purposes not related to the DU's operations. These should not form part of the RAB.

7.8 In determining what is a reasonable requirement, the non-network assets can be correlated with the size of the RAB, number of customers, number of employees, nature and location of the franchise area, whichever is applicable. Additionally, benchmarking with other similar DUs may also be performed.

7.9 In reviewing the Valuation Report provided by a DU, the ERC will review the extent to which the non-network asset value included in the RAB is reasonable, and may require additional optimization before the Valuation Report is approved.

LAND VALUATION

7.10 Land is defined as any part of the earth's surface that can be owned as property. Furthermore, the definition is extended to describe that land is a natural resource as a factor of production.

7.11 The revaluation must only include land held for current and reasonably required future use to meet the DUs' requirements for the provision of Regulated Distribution Services as indicated in Section 4.8.11 (a) of the RDWR. This also upholds the definition of land in terms of a natural resource being a factor of production. Land held for other purposes, (not for the provision of Regulated Distribution Services) e.g. as an investment property, should be excluded from the revaluation.

7.12 The most direct evidence for assessing land value is to compare the property being valued with the sale price of comparable vacant land sold around the time of the valuation date.

7.13 Land is valued as being vacant and any building or other structures and improvements are therefore valued separately.

EASEMENT VALUATION

7.14 An easement is an acquired legal right held by one property owner to make use of the land of another for a limited purpose, as in a right-of-passage or right-of-way.

7.15 The revaluation must only include easements held for current and future use to meet the DUs' requirements for the provision of Regulated Distribution Services as indicated in Section 4.8.11 (a) of the RDWR. All easements must also be documented clearly as being owned by the DU to form part of the revaluation.

7.16 Valuation of easements will be based on indexation of the historical easement cost. The historical costs charged on this item of property are the costs of securing permits from local government units and the actual payments if there are any for the right-of-way to landowners, which are covered under Grants of Right-of-way Documents.

NON-SPECIALISED OR SPECIALISED ASSETS

7.17 The Non-Network System Fixed Assets are to be listed and classified as either Non-Specialised Assets or Specialised Assets where these are defined as follows:

- Non-Specialised Assets are those assets that are not specific to the industry and would be readily acquired and disposed of in the ordinary course of business. The valuation of Non-Specialised Assets depends upon the manner in which the assets are acquired. Where assets are normally acquired in a secondary market, the price of a second-hand asset is relevant in determining the value. Where assets are not normally acquired in a secondary market, the price of a new asset (adjusted to take account of service potential and the impact of other obsolescence factors) is relevant in determining the value; and

- Specialised Assets are those that are particular to the industry, and as such, these assets are not normally traded in a secondary market place (except as part of a total entity by reason of their physical characteristics). The valuation of the former is consistent with the Optimized Depreciated Replacement Cost approach where the appropriate value as indicated in the guidelines is the lower of the current replacement cost and the current reproduction cost.

ASSET CATEGORIES

7.18 As a minimum, the ERC has specified that the fixed asset registers of DUs include the following Non-Network System Fixed Asset categories:

General Plant (Non-Network Assets)

- Land and Land Rights (non-network related)
- Structures and Improvements (non-network related)
- Office Furniture and Equipment
- Transportation Equipment
- Stores Equipment
- Tools, Shop and Garage Equipment
- Laboratory Equipment
- Information systems equipment (non-network related)
- Power-operated Equipment
- Communication Plant and Equipment
- Miscellaneous Equipment

7.19 The DUs may have Non-Network System Fixed Assets under the asset categories listed in the section above falling under all, any two or any one of the following distribution services categories:

i. Regulated Distribution Services Assets;
ii. Distribution Connection Services Assets;
iii. Regulated Retail Services Assets; and
iv. Any other Asset Category specified by the ERC.

APPENDIX A :SUMMARY OF ODRC VALUATION REPORT REQUIREMENTS

The DU or the external expert engaged by the ERC in accordance with clause 3.13 is required to provide a comprehensive and transparent ODRC Valuation Report. The Valuation Report should be sufficiently comprehensive to enable Stakeholders to independently assess the validity and robustness of the reported valuation of the RAB in accordance with this Valuation Handbook.

The list below provides items that, at a minimum, should be included in the ODRC Valuation Report. The items in this list should be interpreted by referring back to the relevant, more detailed, sections of this Valuation Handbook:

a. The weighted average age of asset category, replacement cost, optimized replacement cost, depreciated optimized replacement cost and the weighted average asset life (regulatory purposes), at a minimum, for each asset category as identified in the RDWR and this Valuation Handbook;

b. The asset quantities used for the valuation broken down to the asset subclasses used in Appendix B;

c. The escalated replacement costs used for the valuation of standard assets in the subclasses scheduled in Appendix B, including an analysis showing the basis on which the escalation factor used was derived;

d. The non-standard asset quantities used for the valuation, including the replacement cost and asset lives used for these and the method or basis used to derive these costs cost lives;

e. In order to ensure the accuracy and completeness of the asset information the DU is required to perform, and comment on, asset age profiles for all major asset categories;

f. Report on results from the visual inspection and sampling exercise. This should include a schedule showing the total number of assets inspected, broken down by asset category, as well as the number of errors found in each category;

g. The required certificates from the independent expert and the DU director or president that must accompany the Valuation Report;

h. A list of asset categories where asset quantities have been estimated and a detailed description of the methodology used to develop these estimates;

i. A list of asset categories where asset ages have been estimated and a detailed description of the methodology used to develop these estimates;

j. Where the valuation approach differ in any way from the requirements of the Handbook, the DU should provide clear reasons why a different approach was necessary and also provide comprehensive descriptions of these difference;

k. Where the DU extends the remaining lives of an asset or group of assets as a result of refurbishment, the report must include a detailed explanation of the refurbishment work performed as well as the basis for determining the new remaining life, including any engineering reports;

l. Where the DU assigns reduced total lives to an asset or group of assets, the report must include adequate supporting information for any reductions applied and the reasons for these reductions;

m. Where land is held for future use, the DU should indicate the purpose for the Land and the expected date of land use for the said purpose;

n. The DU should, as part of the Valuation Report, provide itsQuality of Supply criteria;

o. The DU must, as part of the Valuation Report, provide a load forecast for the planning period. The methodology used to develop the load forecast should also be included;

p. The report must include a general description of the methodology used to optimize the network;

q. The report must include a list of all assets that have been optimized and the reason for the optimization; and

r. The report must include a list of those situations where non-standard contracts exist with consumers that specifically require quality levels that exceed the DU's disclosed Quality of Supply criteria.

APPENDIX B :STANDARD ASSET REPLACEMENT COSTS AND LIVES

DISTRIBUTION TRANSFORMERS

Asset Class	Unit	Notes	Standard Value (PhP '000)	Standard Value (PhP '000)	Standard Value (PhP '000)	Standard Life (Years)
			Single Transformer	Two Transformers	Three Transformers	
Pole Mounted, Single Phase, up to 7.62kV Primary Voltage, 480V and lower Secondary Voltage						
up to 10kVA	No.	b	59	100	155	30
15kVA	No.	b	75	127	196	30
25kVA	No.	b	95	161	247	30
37.5kVA	No.	b	107	181	279	30
50kVA	No.	b	124	210	323	30
75kVA	No.	b	159	269	415	30
100kVA	No.	b	177	300	462	30
167kVA	No.	b	257	435	669	30
250kVA	No.	b	297	*	*	30
Pole Mounted, Single Phase, 13.2 or 13.8kV Primary Voltage, 480V and lower Secondary Voltage						
up to 10kVA	No.	b	77	130	200	30
15kVA	No.	b	90	143	218	30
25kVA	No.	b	100	173	263	30
37.5kVA	No.	b	112	197	298	30
50kVA	No.	b	138	236	366	30
75kVA	No.	b	167	282	449	30
100kVA	No.	b	186	314	486	30
167kVA	No.	b	270	458	704	30
250kVA	No.	b	342	*	*	30
333kVA	No.	b	382	*	*	30
Pole Mounted, Single Phase, 19kV and above Primary Voltage, 480V and lower Secondary Voltage						
up to 15kVA	No.	b	108	184	283	30
25kVA	No.	b	121	205	316	30
37.5kVA	No.	b	134	227	350	30
50kVA	No.	b	150	254	392	30
75kVA	No.	b	187	316	487	30
100kVA	No.	b	218	370	569	30
167kVA	No.	b	292	495	762	30
250kVA	No.	b	363	*	*	30
333kVA	No.	b	405	*	*	30
Pole Mounted, Single Phase, 34.5kV and above Primary Voltage, 480V and lower Secondary Voltage						
up to 15kVA	No.	b	113	192	295	30
25kVA	No.	b	126	214	329	30
37.5kVA	No.	b	131	222	342	30
50kVA	No.	b	175	296	456	30
75kVA	No.	b	194	328	506	30
100kVA	No.	b	216	366	563	30
167kVA	No.	b	345	584	899	30
250kVA	No.	b	453	*	*	30
333kVA	No.	b	535	*	*	30
Padmounted 3Phase Transformer, 34.5kV Primary Voltage						
75kVA	No.	a	618	**	**	30
300kVA	No.	a	967	**	**	30
500kVA	No.	a	1226	**	**	30
750kVA	No.	a	1298	**	**	30
1000kVA	No.	a	1514	**	**	30
1500kVA	No.	a	1845	**	**	30
2000kVA	No.	a	2270	**	**	30

Note:
a - Single three phase transformer. Includes all costs to establish transformer (i.e. equipment, installation, plant and overhead costs) including HV fuses and furge arrestors.
b - Includes all costs to establish transformer (i.e. equipment, installation, plant and overhead costs) including HV fuses and surge arrestors.

* - Non-Standard Asset

** - Not Applicable

OVERHEAD LINES :CONDUCTORS

Asset Class	Unit	Notes	Standard Value (PhP '000)	Standard Life (Years)
Aluminium Bare or ACSR				
795 MCM Bare ACSR Conductor	km	a	323.0	30
556 MCM Bare ACSR Conductor	km	a	255.8	30
477 MCM Bare ACSR Conductor	km	a	191.9	30
397.5 MCM Bare ACSR Conductor	km	a	161.0	30
336.4 MCM Bare ACSR Conductor (30/7)	km	a	175.5	30
336.4 MCM Bare ACSR Conductor (26/7)	km	a	148.3	30
#4/0 AWG Bare ACSR Conductor	km	a	100.7	30
#3/0 AWG Bare ACSR Conductor	km	a	68.0	30
#2/0 AWG Bare ACSR Conductor	km	a	58.5	30
#1/0 AWG Bare ACSR Conductor	km	a	52.2	30
#2 AWG Bare ACSR Conductor	km	a	33.7	30
#4 AWG Bare ACSR Conductor	km	a	29.2	30
#6 AWG Bare ACSR Conductor	km	a	27.6	30
Aluminium Insulated or ACSR (Aerial)				
477 MCM AWG Insulated ACSR Cable	km	a	190.3	30
397.5 MCM AWG Insulated ACSR Cable	km	a	159.7	30
336.4 MCM AWG Insulated ACSR Cable	km	a	160.5	30
#4/0 AWG Insulated ACSR Cable	km	a	99.9	30
#3/0 AWG, Insulated ACSR Cable	km	a	67.5	30
#2/0 AWG, Insulated ACSR Cable	km	a	58.0	30
#1/0 AWG Insulated ACSR Cable	km	a	51.7	30
#2 AWG Insulated ACSR Cable	km	a	33.4	30
#4 AWG Insulated ACSR Cable	km	a	29.0	30
#6 AWG Insulated ACSR Cable	km	a	27.4	30
Copper Bare				
#4/0 AWG Bare Copper Conductor	km		377.9	30
#2/0 AWG Bare Copper Conductor	km		288.0	30
#1/0 AWG Bare Copper Conductor	km		247.1	30

Note:
a - Applies to single conductor and includes all costs to erect/establish/string a single overhead conductor, but excludes the costs associated with poles and pole top hardware.

OVERHEAD LINES :POLES

Asset Class	**Unit**	**Notes**	**Standard Value** (PhP '000)	**Standard Life** (Years)
Wooden Poles				
7.5 M (25 FT)	No.	a	7.6	20
9.0 M (30 FT)	No.	a	9.7	20
10.5 M (35 FT)	No.	a	12.8	20
12.0 M (40 FT)	No.	a	19.4	20
13.5 M (45 FT)	No.	a	27.4	20
15.0 M (50 FT)	No.	a	38.0	20
16.5 M (55 FT)	No.	a	49.1	20
18.0 M (60 FT)	No.	a	65.7	20
19.5 M (65 FT)	No.	a	82.2	20
21.0 M (70 FT)	No.	a	92.5	20
22.5 M (75 FT)	No.	a	102.7	20
Concrete Poles				
7.5 M (25 FT)	No.	a	10.4	30
9.0 M (30 FT)	No.	a	12.7	30
10.5 M (35 FT)	No.	a	18.0	30
12.0 M (40 FT)	No.	a	21.5	30
13.5 M (45 FT)	No.	a	27.7	30
15.0 M (50 FT)	No.	a	37.3	30
16.5 M (55 FT)	No.	a	43.0	30
18.0 M (60 FT)	No.	a	65.1	30
20.0 M (65 FT)	No.	a	109.7	30
21.5 M (70 FT)	No.	a	157.7	30
23.0 M (75 FT)	No.	a	172.3	30
24.5 M (80 FT)	No.	a	197.4	30
27.5M, (90 FT)	No.	a	288.3	30
Steel Poles				
7.5 M (25 FT)	No.	a	12.2	40
9.0 M (30 FT)	No.	a	16.1	40
10.5 M (35 FT)	No.	a	19.3	40
12.0 M (40 FT)	No.	a	27.8	40
13.5 M (45 FT)	No.	a	34.2	40
13.5 M (50 FT)	No.	a	43.8	40
16.5 M (55 FT)	No.	a	77.9	40
18.0 M (60 FT)	No.	a	112.2	40
18.0 M (65 FT)	No.	a	131.8	40
21.0 M (70 FT)	No.	a	152.7	40
22.5 M (75 FT)	No.	a	172.3	40
24.0 M (80 FT)	No.	a	217.1	40
24.0 M (85 FT)	No.	a	248.3	40
27.5 M (90 FT)	No.	a	266.8	40
27.5 M (95 FT)	No.	a	400.0	40
Galvanised Iron				
20 FT	No.	a	5.4	30

Note:
a - Includes all costs to erect/establish poles and the associated support structures. The costs include earth rods and mats but exclude aerial earth wires.

OVERHEAD LINES :POLE TOP HARDWARE

Asset Class	**Unit**	**Notes**	**Standard Value** (PhP '000) Straight, Light to Medium Angle(0-60 deg)	**Standard Value** (PhP '000) Corner (60-90 deg)	**Standard Value** (PhP '000) Dead End	**Standard Life** (Years)
One Wire						
7.65kV	No.	a	1.2	3.1	3.6	30
13.2 or 13.8kV	No.	a	1.3	3.4	4.1	30
Single Phase (Two Wire)						
7.65kV	No.	a	4.4	22.4	11.6	30
13.2 or 13.8kV	No.	a	5.0	25.3	13.0	30
Three Phase						
7.65kV	No.	a	6.8	26.6	17.3	30
13.2kV or 13.8kV	No.	a	7.6	30.0	19.5	30
19kV	No.	a	10.3	40.7	25.9	30
34.5kV	No.	a	13.4	40.4	24.7	30
69kV	No.	a	36.2	62.0	49.2	30
115kV	No.	a	125.5	155.2	98.2	30
138kV	No.	a	125.5	155.2	98.2	30

Note:
a - Includes all the pole top hardware required to support the overhead conductor, but excludes the pole structure. Double dead end construction can be accounted for by using two dead end Standard Values, the costs includes any suspension and post insulators.

CUSTOMER SERVICE CONNECTIONS

Asset Class	**Unit**	**Notes**	**Standard Value** (PhP '000)	**Standard Life** (Years)
Copper Cable, 600V				
Single 1000MCM	m	a	2.851	30
Single 750MCM	m	a	2.453	30
Single 500MCM	m	a	1.227	30
Single 350MCM	m	a	0.957	30
Single 300MCM	m	a	0.667	30
Single 250MCM	m	a	0.632	30
Single #4/0	m	a	0.462	30
Single #3/0	m	a	0.448	30
Single #2/0	m	a	0.362	30
Single #1/0	m	a	0.268	30
Single #2	m	a	0.170	30
Single #4	m	a	0.150	30
Single #6	m	a	0.092	30
Single #8	m	a	0.062	30
Single #10	m	a	0.049	30
Single #12	m	a	0.033	30
Single #14	m	a	0.028	30
Duplex #8	m	a	0.111	30
PDX #10	m	a	0.053	30
PDX #12	m	a	0.066	30
Aluminium Cable, 600V				
Single #6	m	a	0.027	30
Single #8	m	a	0.025	30

Notes:
a - The costs are per meter to install a customer service connection including all accessories, but excludes the costs associated with meters and relays.

METERS AND METERING ACCESSORIES

Asset Class	Unit	Notes	Standard Value (PhP '000)	Standard Life (Years)
Meters				
Single Phase Class 100 (ElectroMechanical)	No.	b	2.3	25
Single Phase Class 100 (Electronic)	No.	b	2.2	15
Single Phase Class 200 (ElectroMechanical)	No.	b	3.2	25
Single Phase Class 200 (Electronic)	No.	b	2.1	15
Single Phase CT meter	No.	b, c	20.1	25
Three Phase CT meter	No.	a, c	35.5	25
Current Transformers				
69 kV single or two core	No.		309.1	25
13.2kV or 13.8 kV single core	No.		54.3	25
220 V single core	No.		5.7	25
Potential Transformers				
69 kV	No.		304.8	25
13.8 kV	No.		54.1	25

Notes

a - Three Phase Unit cost. Includes installation, plant and overhead costs for meter and accessories required for installation.

b - Single Phase Unit cost. Includes installation, plant and overhead costs for meter and accessories required for installation.

c - The standard life for electromechanical meters are listed in the table, however a standard life of 15 years could be applied for electronic meter of this type.

OVERHEAD LINE DEVICES

Asset Class	Unit	Notes	Standard Value (PhP '000)	Standard Life (Years)
Capacitors				
Single Phase Unit, Line, 13.2kV or 13.8kV, 200kVAr	No.	a	49.5	30
Single Phase Unit, Line, 13.2kV or 13.8kV, 100kVAr	No.	a	42.9	30
Single Phase Unit, Line, 13.2kV or 13.8kV, 50kVAr	No.	a	35.4	30
Lightning Arresters				
Single Phase Surge Arrester, Station Class, 69kV	No.	a	72.6	30
Single Phase Surge Arrester, Station Class, 34.5kV	No.	a	37.5	30
Single Phase Surge Arrester, Station Class, 23kV	No.	a	36.5	30
Single Phase Surge Arrester, Station Class, <=13.8kV	No.	a	35.6	30
Single Phase Surge Arrester, Distribution Class, 34.5kV	No.	a	5.9	30
Single Phase Surge Arrester, Distribution Class, 23kV	No.	a	4.7	30
Single Phase Surge Arrester, Distribution Class, <=13.8kV	No.	a	3.4	30
Fuses				
Cut-out Fuse, Distribution Type, 7.8 kV & below	No.	a	3.7	30
Cut-out Fuse, Distribution Type, Rated 15 kV 100A	No.	a	4.5	30
Cut-out Fuse, Distribution Type, Rated 15 kV 200A	No.	a	4.8	30
Cut-out Fuse, Distribution Type, Rated 27 kV	No.	a	5.4	30
Cut-out Fuse, Distribution Type, Rated 34.5 kV	No.	a	9.0	30
Load Break Fuse Cut-out, Rated 15 kV 100A	No.	a	14.6	30
Load Break Fuse Cut-out, Rated 15 kV 200A	No.	a	16.1	30
Switches, Circuit Breakers and Disconnectors				
Single Phase Disconnect Switch, Rated 15 kV 600 A	No.	a	12.0	30
Fault Indicators				
Fault Indicator, 13.8 kV	No.	a	22.6	30
Fault Indicator, 23 kV	No.	a	22.7	30
Fault Indicator, 34.5 kV	No.	a	28.4	30
Reclosers				
Three Phase Circuit Recloser, Rated 34.5KV 560A or 630A	No.	a	1306.3	30
Three Phase Circuit Recloser, Rated 15KV 630A	No.	a	805.4	30
Three Phase Circuit Recloser, Rated 15KV 560A	No.	a	663.4	30

Notes

a - Includes installation, plant and overhead costs for unit and accessories required for installation.

APPENDIX C :OPTIMIZATION

OPTIMIZATION

C.1 Introduction

The optimization of a Distribution Utility's (DU's) System Fixed Assets shall be undertaken in accordance with the requirements of Section 6. The general approach is to systematically test (i) the network configuration, (ii) the network capacity/voltage and (iii) the network engineering against the DU's disclosed Quality of Supply criteria. The network is adjusted in an incremental fashion in situations where it is found that a more cost-efficient design will meet the pre-determined criteria. This section describes the **minimum tests** that shall be applied in all cases in order to optimize a DU's network in accordance with the requirements of this Valuation Handbook.

Note that the intent is to arrive at the most cost effective DU supply network that meets with (i) the DUs Quality of Supply and (ii) the forecast electrical demand for the allowed planning period, within the boundaries of the optimization method.

OPTIMIZATION OF NETWORK CONFIGURATION

C.2 Points of Supply and Delivery Point Substations

Issue (a): Whether all the existing Points of Supply (POS) and Delivery Point Substations are required, given the allowed quality of supply criteria.

Approach: The location and supply voltage for the existing POSand Delivery Point Substations may be considered fixed. All POS shall be tested to determine whether a more cost-efficient DU network would result if the POS were eliminated and the load supplied from adjacent POS. If possible, the POS shall be optimized out and replaced with a notional and more cost-efficient DU network. For example, an existing DU network is supplied via 4 x 69kV lines emanating from two POS. The network loading levels are light and there is little prospect of significant future load growth within the allowed planning periods outlined in clause 5.14. The existing and future electrical load can be comfortably supplied using a more economic arrangement, involving only 2 x 69kV lines emanating from one POS, which still meets with the DU's disclosed Quality of Supply criteria. The other 2 x 69kV lines (and any associated Delivery Point Substation termination equipment, land and easements owned by the DU) should be optimized out.

C.3 Subtransmission (HV) Circuits

Issue (a): Whether the number of subtransmission lines/cables exceeds the number required given the DU's Quality of Supply criteria and the forecast future load growth within the allowed planning period.

Approach: The route of each line/cable may be considered fixed. Assess the required number of subtransmission lines/cables in relation to the allowed quality of supply criteria and future load growth within the allowed planning period. Optimize out those lines/cables that are not required. For example, an existing DU's subtransmission network is supplied from a single Delivery Point Substation via 3 x 69kV lines. Given the projected loading levels (over the entire planning period) the existing DU network is afforded with (N-2) security, whilst the DU's quality of supply criteria indicates only (N-1) security is required. One of the 69kV lines, together with any associated Delivery Point Substation termination equipment, land and easements owned by the DU should be optimized out and the other two 69kV lines should be considered for optimization down to a lower conductor size. In extreme cases it may be necessary to consider supplying consumer demand at a lower operating voltage whilst still meeting with the DU's Quality of Supply critera. The notional/optimized network should be based on an achievable and acceptable network design.

C.4 Distribution Substations

Issue (a): Whether the number of Distribution Substations exceeds that which is required to meet the DU's quality of supply criteria and projected future load growth within the allowed planning period.

Approach: The location of all Distribution Substations may be considered fixed. Each substation shall be tested to determine whether a more cost-efficient network would result if Distribution Substations (and their associated supply/tie-lines) were eliminated whilst still meeting with the DU's Quality of Supply criteria. Network assets that are not required should be optimized out. For example, a DU's network includes a 69/23kV substation that was built to supply a factory that has closed down. With the loss of the factory the substation has been reconfigured to supply the surrounding 23kV distribution network, but is still lightly loaded. If the 69/23kV substation is removed from service and the 23kV network reconfigured the adjacent 69/23kV substations can comfortably supply the network demand whilst still meeting with the DU's allowed Quality of Supply criteria. The 69/23kV substation should be optimized out. Again the notional/optimized network should be based on an achievable and acceptable network design. In this situation it may also be necessary to optimize out the subtransmission circuits supplying the substation in accordance with C.3 above.

Issue (a): Whether the busbar/switchboard arrangements and configurations are required to meet the DU's quality of supply criteria and projected future load growth within the allowed planning period.

Approach: Consider whether double bus and/or double breaker arrangements should be optimized to breaker-and-a-half or single-bus arrangements. In those locations where the redundancy associated with dual busbar/switchboard arrangement is not required optimize out the duplication.

C.5 Primary (MV) Distribution Circuits

Issue (a): Whether the number of primary distribution lines/cables exceeds the number required given the DU's quality of supply criteria and the forecast future load growth within the allowed planning period.

Approach: The route of each line/cable may be considered fixed. Assess the number of primary distribution lines/cables in relation to the allowed quality of supply criteria and future load growth within the allowed planning period. Optimize out those lines/cables that are not required. For example, a DU's network contains a 13.8kV feeder that consists of a lightly loaded line that traverses from one Distribution Substation to another Distribution Substation. The feeder/line follows a path that contains other 13.8kV lines and it would be possible to transfer the distribution/line transformers (loads) from the lightly loaded feeder to other lines without exceeding the DU's security criteria (given the load forecast for the allowed planning period). The lightly loaded feeder should be optimized out based on an achievable and acceptable network design.

Another example would be a Primary Distribution feeder built to supply a large industrial load that has been shut down and over subsequent years a small number of Distribution Transformers have been connected to the feeder. If these Distribution Transformers could be more cost-effectively supplied by short spurs connected to a neighbouring feeder then the feeder in question (and its associated circuit breaker) should be optimized out and the affected line transformers assumed to be connected to the neighbouring feeder. The value of the short notional spur lines to the Distribution Transformers should be included in the optimized RAB.

Issue (b): Whether three-phase primary distribution lines are required.

Approach: Where an existing distribution line or a part of it is less than three-phase construction, the line shall be valued accordingly. Three phase primary distribution lateral lines that are in remote/rural areas where consumers have no requirement for three-phase supply shall be optimized to single-phase two wire lines provided the optimization meets with the DU's quality of supply criteria with a two wire arrangement. If significant numbers of three-phase laterals exist which could be optimized to single-phase the optimization can be undertaken by sample (i.e. examining a typical network section and determining the percentage of lines for optimization from three-phase to single-phase). This optimization percentage would then be applied across all the relevant part of the network.

OPTIMIZATION OF NETWORK CAPACITY/VOLTAGE

C.6 Delivery Point Substations

Issue (a): Whether all the equipment located at the Delivery Point Substations is required, given the allowed quality of supply criteria.

Approach: Optimize the size of the equipment used, including transformers, to the lowest standard rating that meets the accepted quality of supply criteria coupled with the projected future load growth for the relevant planning period.

C.7 **Subtransmission (HV) Lines and Cables**

Issue (a): Conductor and cable size and voltage.

Approach: Determine the required capacity and/or voltage of the line/cable given the allowed quality of supply criteria and the predicted load growth within the allowed planning period. Optimize down the size/voltage of the conductor or cable to the most cost-efficient standard size/voltage whilst still meeting with the allowed quality of supply criteria. If possible use the short-term line/cable ratings as appropriate. For example, a remote urban area is supplied via a 138/23kV substation which in turn is supplied via a single circuit 138kV line from a Delivery Point Substation that has both 138kV and 69kV assets. The 138kV supply line well exceeds that required to supply the projected urban area load within the planning period. It would be possible to supply the projected load whilst still meeting the allowed quality of supply criteria using a more economic 69kV single circuit line and associated 69/23kV substation. For valuation purposes the existing supply network should be optimized down to a notional 69kV line coupled with a 69/23kV substation.

Issue (b): Whether underground cables are justified.

Approach: Review the existing underground subtransmission to determine whether underground reticulation is justified.

Possible justifications for undergrounding include:

i. local authority planning criteria prohibit the construction of new overhead circuits;
ii. the use of underground cable is the most cost-efficient means of achieving the disclosed quality of supply criteria;
iii. economic analysis shows that underground cable is the most cost-efficient method of providing the required network service;
iv. consultation with customers affected (including those affected by having to pay higher electricity distribution prices) has demonstrated a willingness to pay the additional cost of the underground service; or
v. the existing underground cable was funded by a capital contribution equal to, as a minimum, the difference in the capital cost of overhead and underground circuits.

If suitable justification for the existing underground cables cannot be provided then optimize the underground circuits to overhead. The justification for retaining underground cable in the optimized network shall be described in general terms in the Valuation Report.

C.8 **Distribution substations**

Issue (a): Under-utilized equipment installed at substations.

Approach: Optimize the size of the equipment used, including transformers, to the lowest standard rating that meets the accepted quality of supply criteria coupled with the projected future load growth for the accepted planning period. For example, a Distribution Substation is equipped with a single 40MVA transformer, whilst the peak projected demand over the planning period is 18MVA. The use of a 20MVA unit would meet with the DU's quality of supply criteria, and the DU has 20MVA units installed in other substations. The 40MVA transformer should be optimized down to 20MVA.

Issue (b): Over-rated equipment installed at substations.

Approach: Optimize the nominal and fault ratings of the equipment used in substations to the lowest standard rating that meets the accepted quality of supply criteria coupled with the projected future load growth and network developments over the accepted planning period. For example, a substation is equipped with 40kA fault rated equipment and the fault level is projected to increase only marginally within the accepted planning period. The DU widely uses 18kA fault rated equipment and it would be adequate for the planning period. The relevant substation should be optimized down to 18kA fault rated MEA.

C.9 **Primary Distribution (MV) Lines and Cables**

Issue (a): Conductor and cable size and voltage.

Approach: Determine the required capacity and/or voltage of the primary distribution lines/cables given the allowed quality of supply criteria and the predicted load growth within the allowed planning period. Optimize down the size/voltage of the conductor or cable to the most cost-efficient standard size/voltage whilst still meeting with the allowed quality of supply criteria. If possible use the short-term line/cable ratings as appropriate. For example, the primary distribution feeders associated with a Distribution Substation are lightly loaded. The distribution lines can be optimized to a lower conductor size (i.e. from 336MCM to 4/0) without breaching the DU's primary distribution line quality of supply criteria (given the forecast demand for the allowed primary distribution line planning period). The primary distribution lines should be optimized down unless the higher capacity can be justified on the basis that it is required to backup an adjacent Distribution Substation or primary distribution feeder in the event of a contingency situation arising.

Issue (b): Whether underground cables are justified.

Approach: Review the existing underground primary distribution cables to determine whether underground reticulation is justified.

Possible justifications for undergrounding include:

i. local authority planning criteria prohibit the construction of new overhead circuits;
ii. the use of underground cable is the most cost-efficient means of achieving the disclosed quality of supply criteria;
iii. economic analysis shows that underground cable is the most cost-efficient method of providing the required network service;
iv. consultation with customers affected (including those affected by having to pay higher electricity distribution prices) has demonstrated a willingness to pay the additional cost of the underground service; or
v. health and safety reasons.

If there is clear evidence that underground cables cannot be justified then optimize them to overhead lines.

Issue (c): Underground cable trenching.

Approach: Optimize the trenching arrangement of existing underground cables. Cables running close together, or on the same side of any road or street shall be optimized to a single trench except where this would not meet the Quality of Supply criteria. Derating factors applicable to cables run in a single trench should be considered when making this assessment. If more than one underground cable is laid in a trench, only the incremental cost of the additional cable(s) may be included in the valuation.

Issue (d): Overhead lines constructed along the same street.

Approach: Optimize the overhead arrangement of existing overhead lines. Overhead lines running close together, or on the same side of any road or street shall be optimized to a double circuit or under-built line except where this would meet with the Quality of Supply criteria. For under-built lines only the incremental cost of the additional conductor and pole-top hardware may be included in the valuation. For example, due to different construction timings a new 23kV overhead line has been installed adjacent to an existing 23kV overhead distribution line. The most economic configuration is a single pole line supporting both 23kV circuits. The two existing lines should be optimized to a notional double circuit 23kV line.

C.10 Distribution Transformers (pole, kiosk, ground types)

Issue: Utilization of transformer capacity.

Approach: Optimize out excess distribution transformer capacity so that the capacity utilization is at a level judged to be efficient for the DU, given its load and supply characteristics.If maximum demand information is available for individual distribution transformers they should be individually optimized to the lowest possible standard size, whilst considering the transformer's projected demand for the allowed planning period. This approach should be applied to all DU owned transformers supplying individual customers.

For those distribution transformers where individual maximum demands are not available the optimization should be based on transformer capacity utilization which is defined as follows:

$$\text{Utilization (\%)} = \frac{\text{Peak Demand (MVA)} \times 100}{\text{Total Distribution Transformer Capacity (MVA)}}$$

If a DU's transformer utilization level is less than 30%, then distribution transformer capacity should be optimized out such that the optimized network has a distribution utilization level that is greater than 30%. Any distribution transformer capacity adjustments that are made shall be disclosed and the methodology used clearly explained in the Valuation Report. Transformer capacity that is optimized out shall be valued at the average DRC per kVA of the DU's transformer equipment.

DUs may separate out segments of the network and apply the above formula (i.e. distribution (MV) feeders). Again, if this approach is taken, details shall be included in the optimization description included in the Valuation Report.

When using the above formula care should be taken to:

i. separate out the capacity associated with privately owned distribution transformers;
ii. ensure that the peak demand value used includes only the electrical load which passes through the distribution transformers being analyzed. The need to remove load that does not pass through the distribution transformers may mean that the peak load used in the analysis has to be estimated and details of the analysis used to arrive at the peak load estimate should be included in the Valuation Report; and
iii. account for embedded generation that would reduce peak network demand levels.

C.11 **Secondary (LV) Distribution**

Issue (a): Whether secondary distribution underground cables are justified.

Approach: Review existing underground secondary distribution (LV) cables to determine whether undergrounding is justified. Possible justifications for undergrounding include:

i. local authority planning criteria prohibit the construction of new overhead circuits;
ii. the use of underground cable is the most cost-efficient means of achieving the accepted quality of supply criteria;
iii. economic analysis shows that underground cable is the most cost-efficient method of providing the required network service;
iv. consultation with customers affected (including those affected by having to pay higher electricity distribution prices) has demonstrated a willingness to pay the additional cost of the underground service; or
v. health and safety reasons.

If there is clear evidence that underground cables cannot be justified then optimize them to overhead lines.

Issue (b): Underground primary distribution trenching.

Approach: Optimize the trenching arrangement of existing underground cables. Cables running close together, or on the same side of any road or street shall be optimized to a single trench except where this would not meet the accepted quality of supply criteria. Derating factors applicable to cables run in a single trench should be considered when making this assessment. If more than one underground cable is laid in a trench only the incremental cost of the additional cable(s) may be included in the valuation.

OPTIMIZATION OF NETWORK ENGINEERING

C.12 System Control And Communication

Issue (a): Degree of sophistication of SCADA equipment.

Approach: Determine whether the equipment is appropriate on the basis of disclosed Quality of Supply criteria. Reduce replacement cost to that of a MEA of the required sophistication. Consideration should also be made regarding the optimization of control centres. For example, a DU consists of the amalgamation of six historical networks that include the associated original six control centres. The MEA would be a notional single control centre with an associated notional emergency backup control centre. There may be reasons to maintain multiple active control centres (i.e. for security reasons) and if this is the case the reasons should be clearly outlined in the Valuation Report. The use of fibre/communication networks for system control should be limited to the amount required to control/operate the electrical network. Underutilized fibre should be optimized out.

C.13 Distribution Substations

Issue (a): Land and buildings.

Approach: Optimize indoor substations to outdoor where land is available and where this will result in a more cost-efficient design unless there are clear technical or security reasons or local authority requirements that prevent this. Optimize out any unutilized or under-utilized land so that the value of the land allowed reflects only the area of land required to meet the accepted quality of supply criteria and projected future load growth for the accepted planning period. Reduce the replacement cost of buildings to that of a simple standard modern structure cost effective design. A higher standard of construction is allowed only where the DU can provide evidence to show that a lower cost design will not meet local authority planning requirements, given the location of the substation. The size of the optimized design should not exceed that required to meet the essential functionality of the building.

Issue (b): Whether substation engineering exceeds DU requirements.

Approach: Review the standard of engineering of each substation. If possible, recent projects undertaken by the DU should be used as a benchmark for this test. If it is found that a more cost-efficient standard of engineering would meet the accepted quality of supply criteria, the existing assets should be notionally re-engineered and the replacement costs reduced accordingly. Compliance with territorial local authority conditions for the substation location should be retained in any notional redesign.

Issue (c): Fire protection and oil retention facilities.

Approach: Include equipment currently installed unless not required for MEA. Again recent projects undertaken by the DU should be used as a benchmark for this test.

C.14 Secondary (LV) Distribution Lines/Cables

Issue (a): Whether the engineering of the secondary distribution network exceeds the standard required to meet the accepted quality of supply criteria.

Approach: Review the standard of engineering of the secondary/LV distribution network, using recent projects undertaken by the DU as a benchmark for this test. If it is found that a more cost-effective standard of engineering would meet the accepted quality of supply criteria, those parts of the low voltage network containing excess asset value should be notionally reconfigured so that they do not exceed the required standard. Assets that are not required should be optimized out. In applying this test, it is not required that DUs examine each individual primary/LV circuit. It is acceptable to estimate the proportion of the DU's low voltage distribution network that is over-engineered and apply an appropriate optimization factor. However details of the approach taken shall be included in the optimization description included in the Valuation Report.

C.15 **Voltage Control Devices**

Issues: (i) Degree of voltage control, (ii) Manual and on-load tap changes, (iii) Line regulators and line drop compensation (iv) Reactive compensation.

Approach: Test requirements for all existing voltage control devices and optimize out where there is no clear justification for the equipment. For example, a DU's Distribution Substation is equipped with a single 40MVA transformer bank with an off-load tap changer. The 13.8kV feeders are all equipped with line regulators adjacent to the substation. A more cost effective design involves the use of 40MVA transformer bank equipped with OLTC and the DU has recently installed a Distribution Substation Transformer with OLTC. If cost effective the line regulators should be optimized out and replaced with a notional 40MVA bank with OLTC capability.

C.16 **Network Spares**

Issue: The extent/quantity of network related spares.

Approach: An assessment should be made of network spares. Those spares which are of inappropriate type, or which for whatever reason are unlikely to be used by the DU within the relevant planning horizon, should be optimized out. Spares would likely be classified as (i) critical contingency spares (for N-1 security), (ii) emergency spares and (ii) routine spares (for maintenance). The extent of the spares will be dictated by (i) equipment procurement lead times and (ii) asset failure rates and (iii) network reliability requirements. Network spares should not be dictated by the DU's inventory associated with capital works. The stores history pertaining to spares shall be taken into account when assessing reasonable levels of spares.