NVE

Gap Analysis of Implementation of the Myanmar Distribution Code

Based on study in Myanmar sept/oct 2015

Gap Analysis

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A02	2015-11-23	Endelig rapport	Jon Arne Øren	Sigmund Hjertvikstein	Jon Arne Øren
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Norconsult AS | Gotfred Lies plass 2, NO-6413 Molde

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Foreword

There is currently a draft Myanmar Distribution Code dated September 15, 2013. The draft Distribution Code consists of five main parts and a part with definitions.

This is: Draft Distribution Code Volumes:

- Introduction

  This outlines the purpose of the Code, its relationship with the Distribution Code (GC), the structure of the electricity supply industry, and how the various parts of the Code are relevant to the different users of the distribution system.

- General Conditions

  This presents provisions which are of general application to all parts of the Code.

- Planning

  This specifies the technical and design criteria and the procedures to be employed in the planning and development of the distribution system.

- Connection Conditions

  These define the minimum standards for methods of connection to the distribution system.

- Operation

  This part addresses various operational issues including load forecasting, planning outages, reporting of operational changes and events, safety matters and procedures for dealing with emergencies.

Distribution Code regulations set forth in these drafts are very detailed. For a future power system of Myanmar a process to have the organisation work with the same objectives for the Distribution Code is the best. The study in Myanmar sept /oct 2015 stated the gap between current practice and the proposed regulations.

Based on discussions with MOEP, visiting installations in Mandalay and Yangon, and interview of staff, this report has been made.

The present practice differs from the Draft Distribution Code. We find parts of the content of present Distribution Code more relevant for a future Distribution

in Myanmar. Those parts have not yet been considered in MOEP and we will not make any comments to them in this report.

On the other hand we must say that the organisation in the distribution organisation are learning very fast and many of the routines are good.

1 Distribution Code and Distribution Code Gap Analysis

Based on the present situation as we got to know during the first days of our visit in Myanmar, we adjusted the Terms of Reference in agreement with NVE:

- To find out what will be the appropriate manner and timeframe for the implementation of Distribution and Distribution Codes, we will obtain information and knowledge about how the current practice differs from the drafted Codes by visiting different sites and have discussions with the site staff as well as MOEP staff in Nay Pyi Taw.
  Interviews/mapping in Myanmar according to a detailed plan.

- Arrange a workshop with relevant staff in MOEP presenting some suggestions for the stepwise introduction of a Distribution Code. MOEP is at the present busy with planning and implementation of many new projects and the introduction of a Distribution Code initially have to be very simplified. The most important issues have to be pinpointed in order to get the best results and to prepare for a safe and well organised operation of existing and new installations.

- Preparation of Final Gap Analysis Report.

We visited a substation in Mandalay city and the head office. In Yangon we visited the head office.

Organisation dealing with Distribution Grid in Myanmar has been reorganized during the last years. Three distribution system operators (DSO) are established. YESB are the present utility in Yangon, MESB in Mandalay and ESE for the rest of the country. Before this time the Distribution have been fragmented and available for just some parts of the country and in the cities. The Distribution utilities have been established to do planning, operate and maintain the Distribution Grid.

The growth in consumption is about 12-15 % a year in the cities.

The job for the MOEP organization to meet this huge growth means a very busy organization.

If this organization are going to deal with a Distribution Code, this Distribution Code have to be simplified and introduced to the organization in a process oriented way.

The present draft Distribution Code are more like a Distribution Code meant for a developed experienced organization.

We will like to thank all the MOEP representatives we met.

Based on this we will concentrate our comments to the parts of Draft Distribution Code relevant for the present MOEP organization. Draft Distribution Code not commented has not been implemented in present organization.

Most of the text in the report are copied from draft Distribution Code. Our comments are highlighted in *cursive* letters in the report.

2 Objectives of present draft Distribution Code

2.1 FOREWORD OF PRESENT DRAFT DISTRIBUTION CODE

The Distribution Code has been developed to define the rules and regulations for various participants for accessing and using the Distribution Grid of the Republic of the Union of Myanmar.

The Distribution System Operators (DSO(s)) are responsible for operating and maintaining secure, reliable and efficient electricity distribution system. The distribution system transports electricity from the transmission system or from embedded generating units to the final customer.

The objective is to establish the obligations of the Distribution System Operator (DSO) and other Distribution Users – Generators, Distribution Entities, and directly connected Customers for accessing and using the Distribution.

The Distribution Code is designed to indicate the procedures for both planning and operational purposes and covers both normal and exceptional circumstances. It is however a live working document. It will be, from time to time, subjected to changes and/or revisions to reflect stages of development of the regulatory framework of the electric power sector and changes to comply with legislations and good industry practices.

CATEGORIES OF USERS OF THE DISTRIBUTION SYSTEM	
A1	Embedded Generator > 10 MW
A2	Embedded Generator > 2 MW <10 MW
A3	Embedded Generator < 2 MW
A4	Customers with Auto-production
A5	Customers with Stand-by Generators
B1	Major Customers connected at High Voltage
B2	Customers connected at Medium Voltage
B3	Industrial and Commercial Customers connected at Low Voltage
B4	Domestic Customers
C	Retailers/ Traders
D	The Distribution System Operator (DSO(s))

Table 1. 1 – Categories of Users of the Distribution System

3 General Conditions

While each part of the Distribution Code presents the rules and provisions relating specifically to that part, the Chapter 1 – Distribution General Conditions (DGC) presents provisions which are of general application to all parts of the Distribution Code.

3.1 IMPLEMENTATION

The Distribution System Operator Licence imposes a duty upon DSO(s) to implement and enforce the Distribution Code. In order to do this, DSO(s) may need access across boundaries, services and facilities from users or to issue instructions to users, for example to isolate or disconnect plant or apparatus. It is considered that these cases will be exceptional and it is not, therefore, possible to envisage precisely or comprehensively what DSO(s) might reasonably require in order to carry out its duty.

All users are required to abide by the Distribution Code and also to provide the DSO(s) rights of access, services and facilities and to comply with such instructions as may be reasonably required to implement and enforce the Distribution Code.

3.2 COMMENTS GENERAL CONDITIONS

In this study we have made no registration on state of the art of this. We consider the MOEP organization to be in a very early stage of dealing with the Distribution Code and regulatory framework.

The organization is still on its way to find the suitable size for the responsible units to deal with the different items in the Distribution Code.

During our visits to Mandalay and Yangon we find that the Draft Distribution Code are not very known in the organization.

We consider the chapter General Conditions in the draft to be a suggestion of how the provisions in general should work for the Distribution Code. This might be helpful for the further work with the Distribution Code.

We have no further comments to this chapter.

4 Planning

4.1 TABLE OF CONTENTS FOR THE DRAFT PLANNING CODE

DPC 1 Introduction

DPC2 Design Standards

DPC3 Transfer of Planning Data

4.2 INTRODUCTION

DPC1.1 Chapter 3 – Distribution Planning Code (DPC) specifies the technical and design criteria and the procedures to be complied with by DSO(s) in the planning and development of the Distribution System. It also applies to users in the planning and development of their installations in so far as they affect the Distribution System.

DPC1.2 The User's requirements may necessitate the reinforcement of, or an extension to, the distribution system and for reinforcement of, or extension to, the relevant Transmission/Distribution interface capacity, such work being identified by DSO(s) or TSO as appropriate.

DPC1.3 The time required for the planning and development of the Distribution System and any consequential requirement of the interface with the Transmission System, will depend on the type and extent of the necessary reinforcement and/or extension work, the time required for obtaining planning permission and right of way, including any associated hearings, and the degree of complexity in undertaking the new work while maintaining satisfactory security and quality of supply.

DPC1.4 Reference is made in Chapter 3 to DSO(s) supplying information or advice to users. For avoidance of doubt, unless the context otherwise requires, such information or advice shall be provided by DSO(s) as soon as practical following a request by the user (whether during the application for connection process or otherwise).

4.3 DESIGN STANDARDS

Frequency. Defined in Grid Code. ***No comments.***

Voltages:
The voltages listed in Table 3.2 shall be used as standard service voltages at the interfaces with power customers. The service voltage shall be maintained within the range defined by the indicated lowest and highest values, under steady state and normal system conditions and over the full loading range of the system.

Where two voltages are listed e.g. 220/127V the lower value refers to the phase to neutral voltages. All other values are phase-to-phase voltages.

Nominal Voltage	Lowest Voltage	Highest Voltage
400/230 V	380/219 V	420/242 V
11 kV	10.5 kV	11.6 kV
33 kV	31.4 kV	34.7 kV
66 kV	62.7 kV	69.3 kV

There is an existing 6.6 kV distribution voltage in some part of Yangon and some areas in the rest of the country, non-standard.

Comment: Standards listed seems reasonable. Instruments and routines for control and follow up are missing.

Harmonics:

The level of Harmonics in the power system shall comply with the limits set out in Table, on a continuous basis.

Nominal Voltage	Total Harmonic Voltage Distortion (%)	Individual Harmonic Voltage Distortion (%)	
		Odd	Even
230-400V	5.0	4.0 for N <14 1.5 for N >14	2.0
11 kV	4.0	3.0	1.75
33 & 66kV	3.0	2.0	1.0

Note: N is the harmonic order, or multiple of the fundamental requency. Voltage distortion is expressed as a percentage of the fundamental voltage. The indicated values refer to maximum continuous levels.

Comment: Standards listed seems reasonable. Instruments and routines for control and follow up are missing.

Power Factor:

Each customer shall maintain a power factor of not less than 0.85 lagging at the interface with DSO(s). No customer shall present a leading power factor to the DSO(s) system.

Comment: Instruments and routines for control are missing. Might not be correct for all installations.

Phase Unbalance:

Under normal system conditions, the three phase voltages shall be balanced at MV, and higher voltages in the system, such that the negative phase sequence voltage does not exceed 2% of the positive phase sequence voltage. Customers with a dedicated transformer or those supplied at 11 kV or a higher voltage shall balance their loads, such that the load phase unbalance at the customer interface meets the above criterion. All other customers shall balance their loads over the three phases to the greatest degree possible. The DSO(s) shall then balance these loads, within the power system, to meet the above criterion.

Comment: Instruments and routines for control and follow up are missing. Most likely no knowledge about Phase Unbalance and how to deal with this in the DSO organization.

Voltage Stability:

Voltage Dips

For non-repetitive voltage variation or voltage dips, such as those associated with motor-starting, welding equipment or power system switching, the voltage variation shall not exceed 7% of the fundamental nominal voltage under normal circumstances. Such variations shall not occur more frequently than 3 times per day.

Comment: Standard listed seems reasonable. Instruments and routines for control and follow up are missing.

Application

No customer shall connect equipment to the power system, which causes voltage fluctuation at the customer interface in excess of these requirements. The DSO(s) shall ensure that the power supply, at each customer's interface, conforms to these requirements.

Comment: Standard seems reasonable. Instruments and routines for control and follow up are missing.

Earthing Requirements:

a. Separation of LV Neutral and MV Earthings. LV neutral earthing and any earthing associated with MV equipment / system (e.g. MV metal work, cable screen, etc.) shall always be kept separate. Primary neutral (if available) shall not be bonded to secondary neutral.

b. Separation between LV neutral earthing and MV equipment / system earthing shall be achieved by earthing LV neutral points which are remote from MV earthings. Minimum distance between any part of MV earthing system and nearest LV neutral earthing shall be 4 meters.

c. Recommended earth resistance limits for different installations should be as under:

System Earth	2 ohms
ALL Distribution Substations	2 ohms
Surge Arresters	2 ohms
LV Distribution Panel	2 ohms

d. LV metering Installations. It shall be essential for the customer to provide earthing at its interface. The customer shall bring the earth wire to the earthing terminals provided in the meter box. The earth wire of the customer shall be connected to the earthing terminal inside the meter box. The earthing terminal shall be short linked with the neutral. For more than one

kWh – meters at one location, four kWh – meters shall be connected to one earth rod. In case of additional kWh – meters at the premises, additional earth rods shall be provided.

e. Earth mounted MV equipment. The equipment covered are RMU, MV switches, etc., when separated from transformer and bulk customer indoor switchgear. All metal work shall be bonded together and to the substation metalwork earthing system. Each continuous piece of metal that could form part of the path of a earth fault current shall be bonded to its neighbours so that continuity of earthing circuit does not depend on mechanical connections between components. Licensed distributors shall advise on the method of earthing of the distribution system, i.e. connected solidly to earth. The specification of associated apparatus and plant of the distribution system user shall meet the voltages that will be imposed on the apparatus and plant as a result of the method of earthing.

Comment: Standard listed important to notice. Routines for control and follow up are missing. Most likely the earthing standard are missing in present orgaisation. Routines for checking and calculating earthing systems must be established.

Notwithstanding the above, the DSO(s) shall provide a complete separate earthing code to define the earthing requirements for safe use of the system. This code shall constitute an integral part of the Distribution Code. Distribution system users shall take precautions to limit the occurrence and effects of circulating currents in respect of the neutral points connected with earth where there is more than one source of electricity.

Notice: Very important notice in the draft Distribution Code.

Rest of the Design standard chapter is not part of present Distribution Code in MOEP.

4.4 TRANSFER OF PLANNING DATA

In the Draft Distribution Code Users of the distribution system are asked for data connected to new installations.

The need of data listed are very detailed, and we think the list could be simplified in order to concentrate to the most important data. Otherwise the busy organization will not get started with a system. The mentioned planning procedure seems to be reasonable.

4.5 INTERVIEWS/MAPPING - PLANNING CODE

4.5.1 Mapping

According to the MOEP planning organisation the present situation are:

1 Distribution planning is not entirely done by DSO. But, it is needed to be done by DSO for the Future after stipulating the Distribution code.

2 The rapid development in the private sector building IPP's shall be developed according to the Distribution Code.

3 The followings are the procedure of the Existing Distribution Planning:

(a) Power Demand Forecast is done up to year 2030 and is mainly based on GDP, Previous Power Demand Growth Rate and Population. Generation Plan is done accordingly by the method of energy security. (Scenario 3; NEMP by JICA).

(b) All the projects of Generation and Transmission are done by MOEP Owned Budget, Loan and Deferred Payment Loan.

(c) The Process of the Project is two type; Direct Contract and Competitive Bidding.

For the Direct Contract Projects of Generation, the process stages are
1 MOU
2 FS
3 MOA
4 JV/ BOT
5 MIC Permit
6 PPA
7 LLA
And then, the project is started.

(d) For the Competitive Bidding Projects of Generation, the process stages are
1 LLA
2 Bid Permit
3 FS
4 MOA
5 MIC
6 PPA
7 LLA
And then, the project is started.

4 The Period for all Planned Projects is based on their type and size.

4.6 FINAL COMMENTS PLANNING CODE

4.6.1 Gap between actual routines and the present Planning Code

MOEP have developed a Distribution Code for planning during some years. This is based on the need for some routines and instruments to deal with the rapid growth in electricity consumption.

Present Distribution Code Planning is not in accordance with the draft Distribution Code, but we have seen that planning of the jobs in the Distribution Grid are working.

5 CONNECTION

5.1 TABLE OF CONTENT DRAFT CONNECTION CODE

DCC 1 Introduction

DCC2 Information Required for Connection

DCC3 Connection Arrangements

DCC4 Technical Requirements for Connections

DCC5 Metering and Telemetry

DCC6 Generator Requirements

5.2 INTRODUCTION

DCC1.1 It is necessary to require certain minimum technical, design and operational criteria to be met by users' plant and apparatus in order to maintain, insofar as is permitted by good industry practice, stable and secure operation of the distribution system for the benefit of all users and for the protection of the distribution system and users' plant and apparatus directly connected to the distribution system.

DCC1.2 The Connection Conditions define the minimum standards for the method of connection to the distribution system and the technical design and operational standards to which users connecting to the distribution system shall comply.

DCC1.3 The Connection Conditions specify the technical arrangements required at the ownership boundary between the distribution system and the installation of the user and are applicable to all voltage levels covered by the Distribution Code.

DCC1.4 The Connection Conditions specify the information to be provided by users to ensure that adequate provision can be made by DSO(s) for new connections or increases in existing load. It also applies to generators who operate in parallel with the distribution system, where a connection is required.

Prospective users shall provide to DSO(s) in good time all the details set out in this section.

DCC1.5 In conjunction with the Connection Conditions, there are connection agreements, which are bilateral agreements between DSO(s) and each user, and which contain the detail specific to each user's connection to and use of the distribution system. The connection agreement requires the user and DSO(s) to comply with the terms of the Distribution Code.

Comment: Standard listed seems reasonable. Connection agreements are made for all new connections. Instruments and routines for control and follow up are missing.

5.3 INFORMATION REQUIRED FOR CONNECTION

DCC2.1 For connections at low voltage, it is possible in most cases to assess whether a proposed connection is acceptable, and to determine the necessary supply arrangements, from analysis of the following data:

a. Maximum kVA requirements.

b. Type and electrical loading of equipment to be connected, such as number and size of motors, cookers, showers, air conditioning, space and water electrical heating loads and nature of disturbing loads e.g. welding equipment.

c. The date when connection is required.

d. Plan covered area and location.

If a preliminary examination of this data indicates that more detailed information is reasonably required, then it shall be provided to DSO(s) upon request.

DCC2.2 Information requirements and timeframes for quotation and connection are provided in the "Customer Service Manual" as prepared by DSO(s) and approved by the Regulatory Body. Copies of this manual are available on request from DSO(s).

DCC2.3 For connections at distribution level, the provisions of Section DCC2.1 also apply. Additionally, the following information may be required:

a. All types of demand:

(i) Maximum active power requirements.

(ii) Maximum and minimum reactive power requirements.

(iii) Type of load and control arrangements (e.g. type of motor start, controlled rectifier or large motor drives).

(iv) Maximum load on each phase.

(v) Maximum harmonic currents that may be imposed on the distribution system.

(vi) Details of cyclic load variations or fluctuating loads (as below).

b. Disturbing loads:

Comprehensive schedule of installed new equipment including details of disturbing loads.

These are loads that have the potential to introduce harmonics, flicker or unbalance to the system. This could adversely affect the supply quality to other customers. Disturbing loads could be non-linear loads, power converters/regulators and loads with a widely fluctuating demand. The type of load information required for motive power loads, welding equipment, harmonic producing/non linear loads and generating equipment can be obtained from DSO(s) on request.

In the case of compensating equipment associated with disturbing loads, details and mode of operation to be provided so as to ensure compliance with emission limits specified in Section DCC4.8.3 below.

c. Fluctuating loads:

Duty cycle, including details of cyclic or other variation of active power and reactive power, in particular:

(i) the rates of change of active power and reactive power, both increasing and decreasing;

(ii) the shortest repetitive time interval between fluctuations in active power and reactive power; and

(iii) the magnitude of the largest step changes in active power and reactive power, both increasing and decreasing.

DCC2.4 In some cases, more detailed information may be required to permit a full assessment of the effect of the user's load on the distribution system. Such information may include an indication of the pattern of build-up of load and a proposed commissioning programme. This information shall be specifically requested by DSO(s) when necessary and shall be provided by the user within a reasonable time.

DCC2.5 Users shall contact DSO(s) in advance if it is proposed to make any significant change to the connection, electric lines or electric equipment, install or operate any generating equipment or do anything else that could affect the distribution system or require alterations to connection.

DCC2.6 Users shall provide to DSO(s) any information reasonably required by DSO(s) about the nature, or use by the user, of electrical equipment on the user's premises.

Comment: Standard listed seems reasonable. Connection agreements are made for all new connections, and most of this information is part of the agreement. Testing and measurement of actual connection are <u>not</u> made by MOEP. Some customers do the testing and control of new installations in the commissioning phase of the project. Instruments and routines for control and follow up are missing.

5.4 CONNECTION ARRANGEMENTS

DCC3.1 Connection Voltage:

DCC3.1.1 During the application for connection process, DSO(s) shall, in consultation with the user, specify the voltage level to which a user will be connected in accordance with normal practice for the type of load to be supplied and network characteristics.

DCC3.1.2 Generally, the voltage level will be the minimum nominal voltage in standard use on the system, assessed against:

a. satisfactory operation of the installation,

b. isolation of disturbance from other customers,

c. lifecycle costs, and

d. cost of connection.

DCC3.1.3 DSO(s) may, on occasion, specify higher connection voltage in order to avoid potential disturbances caused by the user's apparatus to other users of the distribution system or for other technical reasons or may agree alternative methods for minimising the effects of disturbing loads.

DCC3.2 Information Provided by DSO(s):

Based on the information provided by the user for a connection to the distribution system, DSO(s) shall prepare a statement containing as

many of the following elements as are necessary for, or relevant to, the proposed installation:

a. nominal voltage at which connection will be made;
b. method of connection, extension and/or reinforcement details;
c. the normal impedance to source at the point of connection;
d. method of earthing;
e. maximum imported capacity;
f. individual customer limits relating to:
   (i) Harmonic distortion,
   (ii) Flicker,
   (iii) Phase unbalance;
g. expected lead time of providing connection (following formal acceptance of terms for supply); and
h. cost of connection.

DCC3.3 Ownership Boundaries:

DCC3.3.1 The point or points at which supply is given or taken between the distribution system and user's installation shall be agreed between DSO(s) and the user as stipulated in the connection agreement between DSO(s) and the user.

DCC3.3.2 For Low Voltage (LV) supplies, DSO(s) responsibility extends up to the customer's connection point, which is normally at DSO(s) main circuit breaker as further specified in the connection agreement between DSO(s) and the user.

DCC3.3.3 For Medium Voltage (MV) supplies, the ownership boundaries shall be subject to specific agreement between the parties in each case. Changes in the boundary arrangements proposed by either party shall be agreed in advance.

DCC3.3.4 All equipment at the ownership boundary shall meet the design principles contained in Sections DPC2 and DCC3. Connections for entry to and exit from the distribution system shall incorporate a means of disconnection of the user's installation by DSO(s).

Comment: Connection agreements are made for all new connections, and most of this information is part of the agreement.

Testing and measurement of actual technical arrangements in the connection are not made by MOEP. Some customers do the testing and control of new installations in the commissioning phase of the project. Instruments and routines for control and follow up are missing.

5.5 TECHNICAL REQUIREMENTS FOR CONNECTIONS

Comment: All listed elements in the Draft distribution Code are relevant. Instruments and routines for control and follow up are missing.

Relay testing and Relay schemes are made. But the staffing in the internal office are not sufficient, and needed testing are not possible because of this fact.

5.6 METERING AND TELEMETRY

The user may be required to provide such voltage, current, frequency, active power and reactive power pulses as are considered necessary by DSO(s) to ensure adequate system monitoring. Details will be specified in the user's connection agreement.

Centrally dispatched generating units shall provide signals to the TSO as required by the Grid Code (GC).

If it is agreed between the parties that DSO(s) shall control the switchgear on the user's system, DSO(s) shall install the necessary telecontrol outstation. Notwithstanding the above, it shall be the responsibility of the user to provide the necessary control interface for the switchgear of the user which is to be controlled.

Metering principles applying to certain users connected to the distribution system shall be specified in the user's connection agreement.

Specific metering arrangements depend on the load type, size and nature of the installations being connected.

Specific Arrangements:

The specific arrangements for connection, including substation layout requirements, user equipment, and metering are set out clearly in the Distribution Code and/ or "Customer Service Manual" as prepared by DSO(s) and approved by the Regulatory Body. Users must comply with the provisions of the documents relevant to their installations.

Comments: Meters are installed, manually read and telephoned to MOEP. No telecontrol or RTU units available for this installations at the moment. Only kWh consumption are read.

5.7 EMBEDDED GENERATOR REQUIREMENTS

Comment: This is not included in present Distribution Code.

5.8 FINAL COMMENTS CONNECTION CODE

5.8.1 Gap between actual routines and the present Connection Code

MOEP have developed an Agreement Code for connection during some years. This is based on the need for some routines and instruments to deal with the rapid growth in electricity consumption.

Present Distribution Code Connection is not in accordance with the draft Distribution Code. So far all agreements are made by the central organisation of MOEP. This means that the local

Distribution organisations do not have a satisfactory possibility of letting the technical requirements be a part of the agreements.

This is a needed condition to be able to get started with some testing and quality control of new connections.

6 Operation

6.1 TABLE OF CONTENT DRAFT OPERATION CODE

DOC1 Demand Forecasting

DOC2 Operational Planning

DOC3 Demand Control

DOC4 Operational Communications and Liaison

DOC5 Event Reporting

DOC6 System Tests

DOC7 Monitoring Testing and Investigation

DOC8 Safety Co-Ordination

6.2 DEMAND FORECASTING

6.2.1 Introduction

DOC1.1.1 In order for DSO(s) to operate the distribution system efficiently and to ensure maximum system security and system stability, there is a need for those users specified in Section DOC1.2 to provide loading and generation output information to DSO(s).

DOC1.1.2 Section DOC1 – Demand forecasting specifies the information to be provided to DSO(s) by other users of the distribution system so that these requirements can be met.

DOC1.1.3 Section DOC 1 – Demand forecasting sets out the demand forecasting and the generating plant output information to be provided by users to enable DSO(s) to operate the distribution system; and specifies the information to be provided by users to the DSO(s).

DOC1.1.4 Where demand data is required from the user, this means the MW demand of electricity at the connection point. DSO(s) may in certain cases specify that the demand data shall include the MVAR demand.

DOC1.1.5 The means of providing the information to DSO(s) and its confirmation includes any non-transitory written form, or any other suitable means of electronic transfer which enables the recipient to retain information.

DOC1.2 Scope:

Section DOC1 – Demand forecasting applies to the following users of the distribution system:

a. Major Customers connected to the Distribution System and Medium Voltage Customers where DSO(s) considers it appropriate.
b. Embedded Generators with Generating Plant over 2 MW.

DOC1.3 Information flow and co-ordination:

DOC1.3.1 DSO(s) shall co-ordinate demand forecast information for each bulk supply point to meet the requirement of the Grid Code (GC). DSO(s) shall aggregate forecast information provided by users, where appropriate, and provide forecast information to the TSO where demand, or change in demand, is greater than 10 MW at any connection point.

DOC1.3.2 Embedded generator information for generating plant in the distribution system, which is not subject to central dispatch, shall be provided where specified to DSO(s). Customers with CHP and customers with auto-production may also be required to supply information.

DOC1.4 Demand Forecast Data:

DOC1.4.1 Generating units greater than 2 MW and not subject to central dispatch shall provide DSO(s) with information regarding output and planned shutdowns for specified future periods. This shall be provided on an annual basis when requested by DSO(s).

DOC1.4.2 Major customers shall provide to DSO(s) information regarding demand and planned shutdowns for specified future periods. This shall be provided on an annual basis when requested by DSO(s).

Comment: All demand forecasting are made by the Load Dispatch Center (LDC) in the transmission organization, and only for the dry season. There are no information exchange between the customers and the load forecast staff. Lack of available telecommunication systems are part of the reason for this deficient routines.

In order to improve and make the operation safe it is important to establish better system for the demand forecast.

6.3 OPERATIONAL PLANNING

Operational Planning:

a. sets out the operational planning procedure and typical timetable for the co-ordination of outage requirements for plant and apparatus to be provided by users to enable DSO(s) to operate the distribution system; and

b. specifies the information to be provided by users to DSO(s) to allow it to comply with the Grid Code (GC).

Comments: As the organization only are dealing with repair maintenance at the moment, there are no outage planning connected to preventive maintenance.

Most of this code are not implemented at the moment.

6.4 DEMAND CONTROL

Section DOC3 is concerned with provisions to be made by DSO(s) or users of the distribution system, in certain circumstances, to permit reductions in demand. Reductions would be permitted:

a. In the event of insufficient generating plant and transfers from external interconnections are available to meet demand;

b. To avoid disconnection of customers; or

c. In the event of breakdown and/or operating problems (such as in respect of system frequency, system voltage levels or system thermal overloads) on any part of the transmission or distribution system.

Comments: The demand planning are made by LDC Load Dispatch center who are executing the load shedding.

Substations are equipped with frequency protection and undervoltage protection. This means that when available power are deficient, a dedicated bay are switched out in order to avoid grid breakdown.

6.5 OPERATIONAL COMMUNICATIONS AND LIAISON

6.5.1 Introduction:

Section DOC4 sets out the requirements for the exchange of information in relation to operations and/or events on the distribution system or the installation of any user connected to the distribution system which have had or may have had, or will have or may have an operational effect on the distribution system or the installation of any other user.

6.5.2 Scope

This section applies to the following users of the distribution system:

a. Major customers connected to the distribution system where DSO(s) considers it appropriate;

b. Embedded generating plants with a capacity greater than 2 MW;

c. Customers with CHP, customers with auto-production where DSO(s) reasonably considers it appropriate.

6.5.3 Procedure

DSO(s) and users connected to the distribution system shall nominate persons and/or contact locations and agree communication channels for the necessary exchange of information to make effective the exchange of information required by Section DOC4.

SCADA equipment may be required at a user's site for transmission of information and data to and from the DSO(s). The requirement to provide this information shall normally be included in the relevant connection agreement.

Information between DSO(s) and users shall be exchanged on the reasonable request of either party. The request may follow a specific operation, or be in accordance with a prior agreement to exchange information on particular types of event.

This does not preclude the voluntary exchange of information which may be perceived as being relevant to the operation of the distribution or user installation, in accordance with good industry practice.

6.5.4 Significant Incidents

Where an event on the distribution system has had or may have had a significant effect on the user's installation or where an event in the user's installation has had or may have had a significant effect on the distribution system, DSO(s), in consultation with the user, shall deem the event to be a significant incident. Significant incidents shall be reported in writing to the affected party in accordance with the provision of Section below.

Significant incidents shall include events which result in, or may result in, the following:

a. Voltage outside statutory limits;

b. System frequency outside statutory limits; or

c. System stability failure (inducing system loss of supply).

Comments: OPERATIONAL COMMUNICATIONS AND LIAISON presuppose that electronic communication and SCADA system are available.

At the moment this is not the situation and the draft Distribution code is not part of the present code.

The routine described are important to let the staff be able to increase knowledge about how to improve the grid operation.

6.6 EVENT RECORDING

Comment: This is not possible in the present system.

6.7 SYSTEM TESTS

6.7.1 Introduction

Section DOC6 sets out the responsibilities and procedures for arranging and carrying out system tests which have or may have an effect on the systems of DSO(s) or users. System tests are those which involve either simulated or the controlled application of irregular, unusual or extreme conditions on the total system or any part of the total system, but which do not include commissioning or re-commissioning tests or any other tests of a minor nature.

6.7.2 Scope

Tis section applies to the following users of the distribution system:

a. Major customers connected to the distribution system where DSO(s) considers it appropriate;

b. Embedded generating plants with a capacity greater than 2 MW;

c. Customers with CHP, customers with auto-production where DSO(s) reasonably considers it appropriate.

6.7.3 Procedure

If the system test is proposed by DSO(s) or the user connected to the distribution system, then the provisions of Section shall apply.

If the system test will or may have an effect on the transmission system, then the provision of the Grid Code shall apply.

Comment: System tests are not part of present Distribution code.

6.8 MONITORING TESTING AND INVESTIGATION

Comment: Not part of present Distribution code.

6.9 SAFETY CO-ORDINATION

Comment: Not part of present Distribution code. ***Important to implement this in the Distribution Code.***

6.10 FINAL COMMENTS

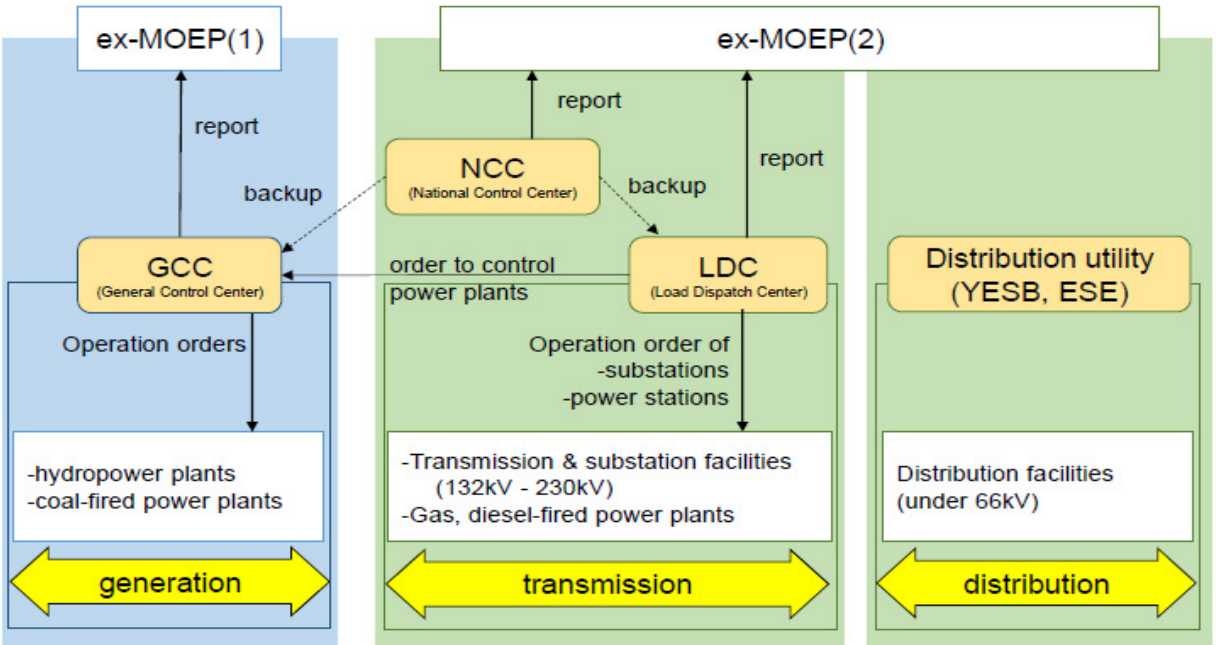
6.10.1 Gap between actual routines and the present draft Distribution Code.

The Distribution organisation in Myanmar are reorganized during the last years. Implementation of Distribution Code will have to be continuously improved for the next years due to the fact of being young organisations.

Distribution Code in present organisations have a gap to the draft Code as briefly described in this report.

The most important Gap are listed here:

1. Preventive Maintenance must be implemented in Distribution Code.
2. Agreements of new connections must be done by the Distribution organisation in order to have all the technical assumptions as part of it. Only the local staff can know which technical assumptions are correct.
3. Low voltage Code must be revised!!
4. Staff operation Safety must be part of the Code.
5. SAT procedures and test routines must be part of the Code.
6. Improvement of Relay staff. More engineers have to be hired. Relay schemes not reliable.



Present organisation of MOEP.