独立行政法人 国際協力機構
ミャンマー連邦共和国 電力エネルギー省 電力計画局

ミャンマー国
送配電系統技術能力向上プロジェクト
（第1フェーズ）

業務完了報告書

平成 30 年 11 月
（2018 年）

独立行政法人
国際協力機構（JICA）

委託先
株 式 会 社 Ｊ Ｅ Ｒ Ａ
日 本 工 営 株 式 会 社

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ミャンマー国送配電系統技術能力向上プロジェクト（第１フェーズ）

業務完了報告書

目　次

図 目 次

表 目 次

添付資料

略　語　一　覧

略 語	英 語 表 記	日 本 語
AD	Assistant Director	アシスタント・ダイレクター
ADB	Asian Development Bank	アジア開発銀行
AE	Assistant Engineer	アシスタント・エンジニア
AM	Assistant Manager	アシスタント・マネージャ
CEO	Chief Executive Officer	最高経営責任者
C-GIS	Cubicle type Gas Insulated Switchgear	キュービクル式ガス絶縁開閉装置
C/P, CP	Counterpart	カウンターパート
DAC	Development Assistance Committee	開発援助委員会
DEPP	Department of Electric Power Planning	電力計画局
DG	Director General	ダイレクター・ジェネラル
DHPI	Department of Hydropower Implementation	水力発電開発局
DPTSC	Department of Power Transmission and System Control	送電系統運用局
EE	Executive Engineer	エグゼクティブ・エンジニア
ESE	Electric Supply Enterprise	地方配電公社
GIS	Gas Insulated Switchgear	ガス絶縁開閉装置
GPS	Global Positioning System	GPS、全地球測位システム
JCC	Joint Coordinating Committee	合同調整会議
JICA	Japan International Cooperation Agency	独立行政法人国際協力機構
MD	Managing Director	マネージング・ダイレクター
MESC	Mandalay Electricity Supply Corporation	マンダレー配電公社
MOEE	Ministry of Electricity and Energy	電力・エネルギー省
M/M	Man-Month	人月（作業量を表す）
M/P	Managing Person	プロジェクト管理者
NPT	Nay Pyi Taw	ネピドー
OJT	On the Job Training	OJT（職場内教育）
OW	Outdoor Weatherproof Polyvinyl Chloride Insulated Wires	OW 電線（屋外用ビニル絶縁電線）
PCB	Polychlorinated Biphenyl	ポリ塩化ビフェニル
PDCA	Plan – Do – Check – Act (Cycle)	PDCA（サイクル）、 Plan（計画）⇒ Do（実行）⇒ Check（評価）⇒ Act（改善）
PDM	Project Design Matrix	プロジェクト・デザイン・マトリックス
PJ	Parallel Joint	パラレル・ジョイント
PMU	Project Management Unit	事業管理ユニット
R/D	Record of Discussions	政府間技術協力プロジェクト合意文書
SAE	Sub Assistant Engineer	サブ・アシスタント・エンジニア
SE	Superintending Engineer	管理統括エンジニア

SOG	Storage Over Current Ground	短絡及び地絡継電器（開閉器の機能）
TC	Trainer Candidate	講師候補生
TCPC	Training Center Preparation Committee	研修制度構築準備委員会
TOT	Training of Trainers	トレーナー研修
VCB	Vacuum Circuit Breaker	真空遮断器
WB	World Bank	世界銀行
WG	Working Group	ワーキンググループ
YESC	Yangon Electricity Supply Corporation	ヤンゴン配電公社

第１章　　プロジェクトの概要

１．１　プロジェクトの背景

ミャンマーでは、政府の経済社会開発の最優先課題として電力分野が掲げられており、工業化が進むヤンゴンやマンダレーといった都市部での安定的な電力供給及び全国各地での電化推進が喫緊の課題とされている。発電能力は段階的に増強されつつあるものの、20%前後の高いロス率、送電容量不足や機器の老朽化ならびに鳥獣・樹木接触・落雷による事故停電の多発等の問題が生じている。JICA が策定支援した「国家電力マスタープラン案」（2014 年）で、ミャンマー電力需要は、経済発展に伴い 2015 年の約 2,500MW から 2030 年断面で最大約 14,500MW に増加することが想定されており、電源に加えて送配電網の強化が不可欠となっている。

かかる状況の中、JICA は、円借款事業「貧困削減地方開発事業フェーズ１（2013 年度）」及び「ヤンゴン配電網改善事業フェーズ１（2015 年度）」で配電網整備を、「全国基幹送変電設備整備事業フェーズⅠ（2014 年度）」及び「全国基幹送変電設備整備事業フェーズⅡ（2015 年度）」で送電網整備を支援している。他方、ミャンマー国電力・エネルギー省（以下、MOEE）では、送配電網の整備・運用・保守管理に関する技術者の能力向上について、体系的な制度・体制や研修施設の下で実施されておらず、また設備の整備・保守管理等に関する技術基準・仕様に関しても十分な標準化がなされていない状況にある。そこで JICA は 2012 年から 2015 年までヤンゴン配電公社（以下、YESC）に長期専門家を派遣し、技術者の能力向上及び研修体系構築への支援を行ってきた。全国の送配電網を担う技術者の能力向上には、継続した取り組みが必要とされている。MOEE としても、開発パートナーの支援の下、段階的に設備整備・増強を進めると共に、MOEE 自身の送配電研修施設を設置し、技術者の能力強化や技術の標準化を通じた設備の信頼性・安定性の向上を進めたいとしていた。

上記の状況から、送配電網の計画・建設・運用維持管理に従事する技術者の能力向上は緊急性が高く、ミャンマー政府は、日本政府に対し「送配電系統技術能力向上プロジェクト（以下、本技術協力プロジェクト）」に関する技術協力を要請した。

JICA は、本技術協力プロジェクトの必要性、妥当性を確認し、協力内容を検討するために 2015 年 4 月に詳細計画策定調査を行い、同調査結果に基づき 2016 年 1 月にプロジェクトの枠組みについて先方政府と Record of Discussions（以下、R/D）により基本合意した。

本技術協力プロジェクトは、MOEE の送配電系統技術に関わる人材育成計画、研修プログラム、及び研修機能を構築することにより、送配電系統の開発、運用維持管理に従事する人材の能力向上を図り、もって電力供給の信頼性、効率及びエネルギーアクセスの向上に寄与するものである。

本技術協力プロジェクトは、人材育成制度構築及び研修プログラム実施段階にあたる第 1 フェーズと、プロジェクト評価及び改善段階にあたる第 2 フェーズに分けて実施する。

本技術協力プロジェクト第 1 フェーズ（以下、本プロジェクトという）は、上記のうち、人材育成計画の枠組みを策定し、研修を 1 サイクル実施し、その結果を踏まえて、第 2 フェーズへの提言を行うところまでを想定した。

１．２　本プロジェクトの目的及び目標

（1）プロジェクトの目的

組織及び財務課題の特定、送変電及び配電システムの技術的課題の特定、既存の人材開発計画・方針・研修システムのアセスメント、研修プログラムの検討・計画、研修のためのカリキュラム・テキスト作成及び研修の実施などの活動を実施することにより、送配電系統能力向上に係る成果を発現し、プロジェクト目標を達成する。

（2）プロジェクト目標

送変電及び配電システムに従事する技術者及び技能者の能力が向上する。

（3）上位目標

ミャンマーの電力設備の増強が促進され、電力供給の信頼性と効率及びエネルギーアクセスが向上する。

（4）期待される成果

成果１：人材育成計画の枠組みが策定される。
成果２：研修プログラムが整備され、実施される。
成果３：研修システムのPDCA (Plan, Do, Check, Action) サイクルが構築され実践される。

本プロジェクトは、人材育成制度構築及び研修プログラム実施段階にあたる第１フェーズと、プロジェクト評価及び改善段階にあたる第２フェーズに分けて実施する。
第１フェーズは、上記成果のうち、人材育成計画の枠組みが策定され、研修が１サイクル実施された結果を踏まえて、第２フェーズへの提言を行うところまでを想定している。

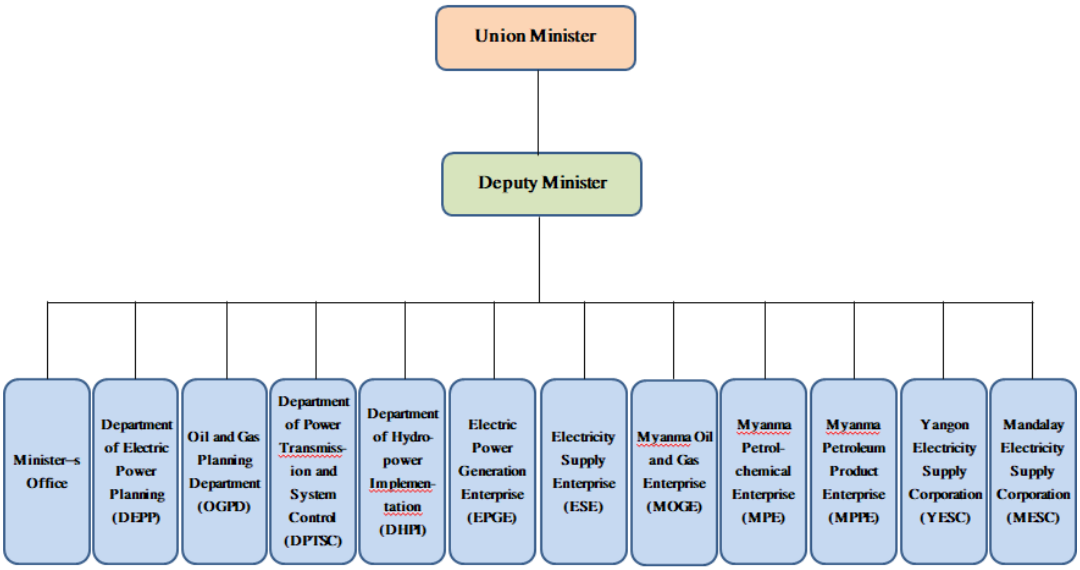
１．３　対象地域

ネピドー（主なプロジェクト拠点)、ミャンマー全域

１．４　相手国実施機関

・実施機関：Ministry of Electricity and Energy: MOEE
・MOEE内の関係部局：
関係部局調整：電力計画局（Department of Electric Power Planning: DEPP）
実施関係部局：地方配電公社（Electricity Supply Enterprise: ESE）
送電系統運用局（Department of Power Transmission and System Control: DPTSC）
ヤンゴン配電会社（Yangon Electricity Supply Corporation: YESC）
マンダレー配電会社（Mandalay Electricity Supply Corporation: MESC）

なお、参考までに、MOEEの部局構成を**図１-１**に示す。



［出所］MOEE ホームページ

図１-１　MOEE の部局、組織

１．５　活動実績

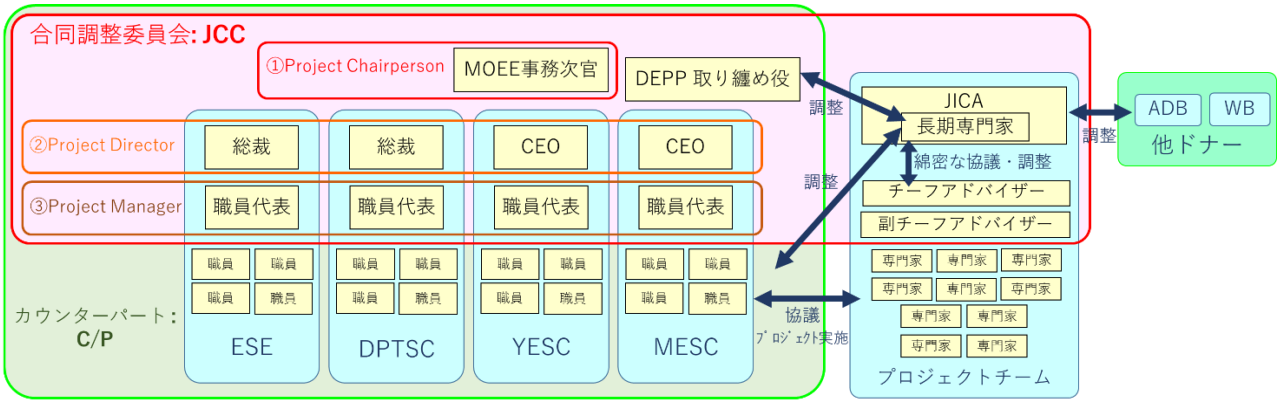
本技術協力プロジェクトは協力期間を 5 年間（2016 年 5 月～2021 年 4 月までの計 60 か月）とし、制度構築･実施段階となる第 1 フェーズと、評価･改善段階となる第 2 フェーズに分けて実施される。このうち、第 1 フェーズは、2016 年 5 月～2018 年 11 月（計 30 か月）の期間で実施された。業務フローと活動内容を添付資料 1 に示す。

１．６　プロジェクト実施体制

本プロジェクトの実施体制を**図１－２**に示す。JICA 側から、長期専門家（研修機能強化／業務調整）が 2016 年 8 月から 2018 年 8 月までの 2 年間派遣され、長期専門家と短期専門家が協同でプロジェクトを実施した。短期専門家は活動全般について長期専門家の助言を得ながら、それぞれの専門分野の必要な時期に現地活動を行った。

MOEE 側は DEPP が全体のとりまとめの役割を担いつつ、本プロジェクトの活動には DEPP の技術者も参加した。実質的には、ESE の Chief Engineer が運営主体となって本プロジェクトを進めた。

MOEE との合同調整会議（JCC）を年 1 回以上開催して、プロジェクトの計画に係る協議・承認、進捗状況・達成状況の確認や重要事項に関する審議を行った。委員構成は**表１－１**の通り。



［出所］JICA 専門家チーム

図 1－2　プロジェクト体制

表 1－1　合同調整会議（JCC）メンバー

構成員	本プロジェクトとの関連性
MOEE 事務次官	Project Chairperson
DEPP 局長、ESE 総裁、DPTSCD 総裁、YESC の CEO 及び MESC の CEO	Project Director
各組織の実務責任者（Senior Engineer クラス以上）	Project Manager
DEPP の副局長（Deputy Director General）	Project Administrator JCC 取り纏め役（ミャンマー側）
JICA 長期専門家	JCC 取り纏め役（プロジェクトチーム側）
プロジェクトチームのチーフアドバイザ、 副チーフアドバイザ	プロジェクトの実施チーム代表
各組織からの講師候補生	プロジェクトメンバー（ミャンマー側）
JICA 専門家チーム	プロジェクトメンバー（日本側）

［出所］JICA 専門家チーム

第２章　　プロジェクト活動内容

現地活動に従事した専門家の派遣期間は添付資料 2 のとおりである。

２．１　講師候補生の選出

技術移転の対象となる講師候補生は、**表２-１**に示す選出基準をもとに 2016 年 8 月に ESE、DPTSC、YESC 及び MESC の各部局が主体的に人選を行った。募集人員は当初 20 名程度を予定していたが、MOEE の意向を受け、DEPP からの参加者を併せて合計 27 名の講師候補生が選出された（**表２-２**参照)。選出された講師候補生は後述のとおり 5 つのワーキンググループ（WG）に分けられて活動を開始した。

表２-１　講師候補生の選出基準

選出人数	総計 20 名（ESE10 名、DPTSC3 名、YESC4 名及び MESC3 名）
選出条件	①第一線事業場での業務経験を有し、現場での実業務を理解していること。 ②日本人専門家と英語でのコミュニケーションが可能であること。 ③本プロジェクト期間中は基本的にプロジェクト業務に注力できること。 ④将来コア講師として期待できる人材であること。 ⑤設備別（送電、変電、配電）や業務別（計画、設計、建設、運用、保守管理等）の選定は行わない。

［出所］JICA専門家チーム

表２-２　講師候補生リスト

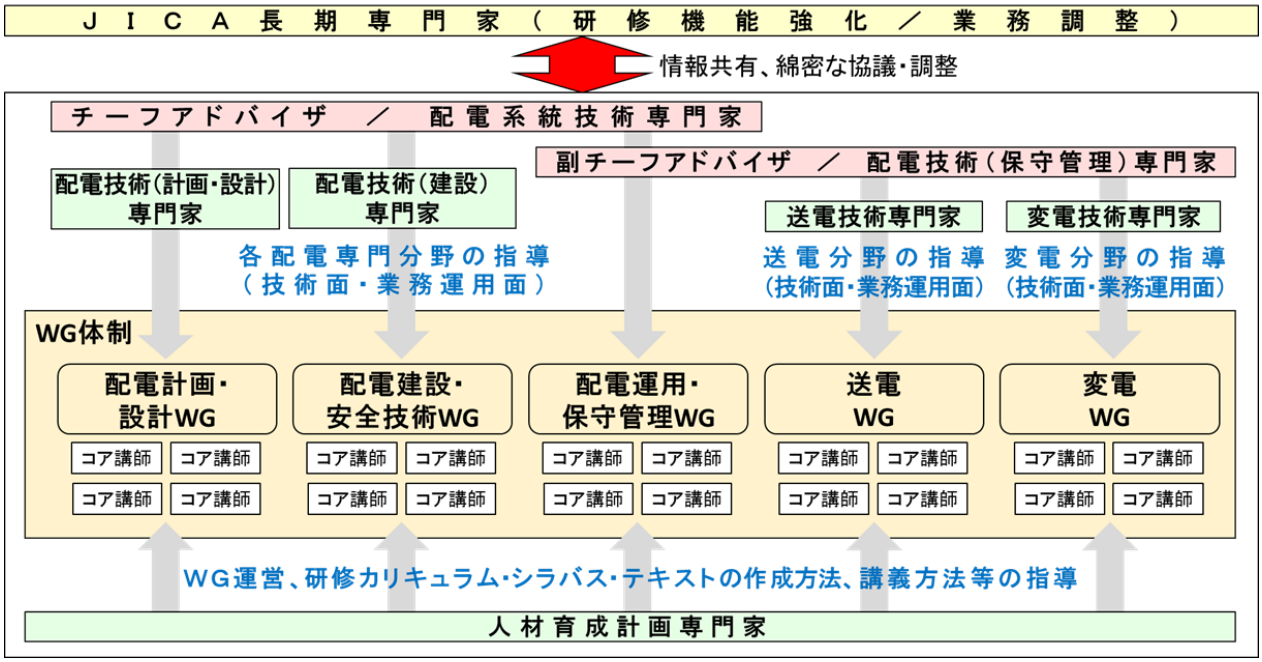
No.	Name	M/P and TC*	Designation	Organization
Working Group I (Distribution Planning & Design)				
1.	Mr. Naung Win Htoo	M/P and TC	Staff Officer	DPTSC
2.	Mr. Myo Min Aung	TC	AE	ESE (Magway)
3.	Mr. Aung Tun	TC	EE	ESE (Kachin)
4.	Mr. Bo Bo	TC	AE	ESE (Gangaw in Magway)
5.	Ms. Phyo Thiri Aung	TC	SAE	YESC
6.	Mr. Soe Ko Ko Aung	M/P and TC	EE	DEPP
Working Group II (Distribution Construction Work & Safety Technology)				
7.	Mr. Si Thu Aung	TC	EE	ESE (Ayeyarwaddy)
8.	Mr. San Myo Aung	TC	EE	ESE (Hakha in Chin)
9.	Mr. Min Thiha	TC	EE	ESE (Tanintharyi)
10.	Ms. Yi Mon Aye	TC	SAE	DEPP
11.	Mr. Zaw Htike	M/P and TC	AM	MESC
Working Group III (Distribution Operation & Maintenance)				
12.	Mr. Naing Lin	TC	EE	Minister Office
13.	Mr. Lin Ko Ko	TC	EE	ESE (Naypyitaw)
14.	Mr. Kyaw Soe Lin	M/P and TC	SAE	YESC
15.	Mr. Khun Saw Naung Htwe	TC	AE	ESE (Hpa An in Kayin)
16.	Mr. Kyaw Kyaw	M/P and TC	AM	MESC
Working Group IV (Transmission Line)				
17.	Mr. Than Naing Lin	M/P and TC	SE	DEPP
18.	Mr. Win Kyaw	M/P and TC	Staff Officer	DPTSC
19.	Mr. Myint Oo	TC	EE	ESE (Sittwe, Rakhine)
20.	Mr. San Yu Maw	TC	EE	ESE (Taunggyi)
21.	Ms. Shwe Yee Win	TC	SAE	ESE (Head Office)
22.	Ms. Kyawt Kyawt Hlaing	M/P and TC	AE	YESC
Working Group V (Substation)				
23.	Mr. Myo Thant Zin	M/P and TC	AD	DEPP
24.	Ms. Soe Yupar Thein	M/P and TC	Staff Officer	DPTSC
25.	Mr. Than Htike Oo	M/P and TC	EE	ESE (Head Office)
26.	Mr. Zaw Zaw Htet	M/P and TC	EE	ESE (Head Office)
27.	Dr. Tayzar Lin	M/P and TC	AE	YESC

*: TC は講師候補生、M/P and TC は Managing Person と講師候補生の兼任であることを示す。

［出所］JICA専門家チーム

２．２　ワーキンググループ設立

本プロジェクトを効果的に進めるため、技術テーマごとに WG を設立し、**図２－１**に示すように「配電計画・設計」、「配電建設・安全技術」、「配電運用・保守管理」、「送電」及び「変電」の 5WG の体制で、それぞれ各短期専門家が技術移転を行う体制とした。5 つの WG には講師候補生 27 名を振分け、WG 単位で活動を進めた。



［出所］JICA 専門家チーム

図２－１　ワーキンググループ体制

当初の WG の活動方針では、各分野の専門技術や業務運用といった面での技術移転のみならず、ミャンマー側のオーナーシップ醸成のために研修に必要なカリキュラム・シラバス・テキストブックを、JICA 専門家と講師候補生とが協働して作成することとしていた。こうした活動を通して、WG 運営ノウハウ、研修カリキュラム・シラバス、テキストブックの作成ポイントや方法を習得することをねらいとしていた。しかしながら、後述する MOEE 副大臣からの方針変更要請を受け WG 活動の内容を変更した。

２．３　Managin Meeting の開催

本プロジェクトの遂行において、MOEE の意見を反映し、MOEE が主体的に進めるために、MOEE 側との協議体として Managing Meeting を設定し適宜開催した。本プロジェクトで実施した Managing Meeting の日程及び主要項目は以下のとおり（開催場所は全てネピドーの MOEE（本館もしくは研修所建屋））である。本プロジェクトの運営に可能な限り MOEE の主体性を持たせるため、Managing Meeting には MOEE 側のカウンターパートが参加し、意見を十分取り入れて本プロジェクトでの取り組みを協議した。Managing Meeting は**表２-３**の通り開催し、それぞれの議事メモを添付資料 3 に示す。

表２-３　Managing Meeting 開催実績

回	開催日	主な協議事項
第 1 回	2016.7.21	プロジェクトの方針及び概要
第 2 回	2016.7.26	・全体スケジュール ・ベースライン調査及びアセスメント調査の概要 ・JICA 専門家の体制
第 3 回	2016.8.11	・講師候補生の選定 ・ベースライン調査及びアセスメント調査の進捗 ・本邦研修概要
第 4 回	2016.8.24	WG の概要及び活動内容説明
第 5 回	2016.9.9	・ワーキンググループ活動報告 ・本邦研修スケジュール ・第 1 回 JCC の概要 ・PDM 及びモニタリングシートの説明
第 6 回	2016.10.5	・ベースライン調査及びアセスメント調査の進捗 ・第 1 回 JCC アジェンダ ・WG 活動計画
第 7 回	2016.10.17	・プロジェクト指標協議 ・JCC 資料協議
第 8 回	2016.10.27	・JCC プレゼン調整 ・研修プログラムに関する協議
第 9 回	2016.11.29	・プロジェクトスケジュール ・プロジェクト指標の協議 ・本邦研修行程説明
第 10 回	2016.12.20	・プロジェクトスケジュールの変更（MOEE 副大臣要請を受けて)、 ・プロジェクト指標詳細協議、 ・ベースライン調査及びアセスメント調査の進捗
第 11 回	2017.3.9	・時期ワーキンググループの研修予定 ・幹部級本邦研修計画 ・研修資機材調達計画
第 12 回	2017.10.9	・ワークプランの変更（MOEE 副大臣要請を受けて） ・WG の活動内容 ・エンジニアクラス向け本邦研修の概要説明
第 13 回	2017.12.14	・ワークプランの説明 ・地方セミナーの概要説明 ・エンジニアクラス向け本邦研修のスケジュール説明
第 14 回	2018.1.16	・モニタリングシート及びプロジェクト指標の説明 ・地方セミナーの詳細協議 ・研修資機材調達計画及び実運用配電線への導入機器の説明
第 15 回	2018.3.9	・地方セミナーの詳細協議 ・実運用配電線への導入機器設置スケジュール ・研修システム制度構築支援の進捗 ・マネージャークラス向け本邦研修の視察内容、スケジュール説明
第 16 回	2018.5.2	・地方セミナーの詳細協議 ・実運用配電線へ導入した開閉器の効果検証 ・単相変圧器導入サイト選定

［出所］JICA専門家チーム

２．４　ベースライン調査

（１）ベースライン調査の目的

本プロジェクトの具体的な数値目標をプロジェクト・デザイン・マトリックス（Project Design Matrix、以下、PDM という。）上に設定するため、ならびに本プロジェクトの最初の段階で、「安全」、「効率」及び「品質」に関する項目について研修による技術や知識の向上を測定するため、現状レベルの把握としてミャンマー国主要都市でベースライン調査を実施した。

（２）ベースライン調査の概要

本プロジェクトのカウンターパート(以下、C/P という)との会議である Managing Meeting において、JICA 専門家チームと MOEE 職員間でベースライン調査の方向性を協議し、調査の詳細について協議したのち、調査を開始した。ベースライン調査の概要を**表２-４**に示す。

表２-４　ベースライン調査の概要

調査の目的	プロジェクト開始時の C/P の電力分野の安全、効率、品質に関する現状レベルの把握
調査実施者	ミャンマー人専門家をリーダーとし、他 5 名の現地要員（ESE 担当 2 人、YESC 担当 2 人、MESC 担当 1 人を登用）にて調査団を結成、調査実施には特殊傭人を雇用
調査対象	ESE, YESC, MESC の本部、支店、地域・州事務所及び DPTSC
調査方法	調査団による説明後、調査団が作成した質問票に基づきデータを収集
調査期間	2016 年 7～11 月（7 月に説明訪問、7～10 月先方データ取り、11 月データ集約）

［出所］JICA専門家チーム

（３）ベースライン調査のスコープ

ベースライン指標と調査項目を**表２-５**に示す。

（４）主な調査結果

ベースライン調査結果を報告書としてまとめ、2016年12月にJICAに提出した。

調査の結果、ミャンマーの各配電公社とも、設備データや故障実績などのデータ収集方法や保管方法が社内で統一されておらず、ミャンマー語による手書き管理も多いことから、過去のデータが確認できず収集できないデータも多くあることが分かった。また、収集されたデータの中にも、各所での測定基準が同一でないことから、定量比較できない値も多いことが分かった。

表２-５　ベースライン指標と調査項目

指標	調 査 項 目	備 考
作業災害	・作業災害数（2015 年度及び 2016 年 7～9 月） ・災害防止安全策知識の有無	災害種類（感電、交通、墜落等）
公衆災害	・作業災害数（2015 年度及び 2016 年 7～9 月）	災害種類、被災具合を分類
停電回数	・配電用変電所の停電回数、停電時間 （2015 年度及び 2016 年 7～9 月） ・停電回数削減対策知識の有無	停電種類（事故・計画）及び 停電原因別
供給電圧	・変電所送出電圧と需要家受電電圧 （2016 年 7～9 月） ・電圧低下改善対策知識の有無	サンプリング調査
送配電ロス	・配電用変電所の電力総計と需要家使用量総計 （2015 年度及び 2016 年 7～9 月） ・送配電ロス改善対策知識の有無	―
作業時間	・設備施設数と作業人数（2016 年 7～9 月）	施設数／作業時間×人を比較
建設	・施工時に必要な工程管理知識の有無 ・作業用車両使用回数	―
工事費	・設備費及び作業費 （2015 年度及び 2016 年 7～9 月）	作業者の属性（直営、委託）
保守管理	・設備台帳の有無、設備台帳記録の内容及び活用方法 ・機器点検実施の有無、点検実施回数 ・故障、点検記録の有無、故障実績活用の有無 ・保護継電器整定知識の有無(整定値、整定方法) （2015 年度及び 2016 年 7～9 月）	設備管理の実態及び活用状況を把握 故障実績管理の状況及び活用方法を把握

［出所］JICA 専門家チーム

ベースライン調査結果の概要は以下のとおり。

(a)　作業災害・公衆災害

感電、墜落等の作業災害、公衆災害により、毎年多くの命が失われている。作業災害及び公衆災害の削減は、MOEEの主要課題である。

特に公衆感電災害は、全ての州・地域に渡り発生しており、その削減のためには、配電線設備対策のみならず、一般住民の電気危険知識の向上も必要と考えられる。地方の都市では、一般住民に対する電気安全知識の説明会開催など、電気の基礎知識向上活動も行われている。

(b)　停電回数・停電時間

停電回数、停電時間は、各地方事務所が記録している。しかしながら、基本的に手書き管理されており、測定フォーマットも統一されていないことから、データ集約は困難であった。地域によっては、データが収集できないところもあった。

得られたデータからは、故障停電継続時間が半日以上に渡るケースも多くみられる。

他方、停電故障削減に向けた技能や知識向上活動も実施している。一部の地方事務所では、

電力技術者に対し、配電線の保護装置や配電線機器に関する研修も実施している。

(c)　電圧降下

配電線電圧降下に対して、改善の必要性を認識しており、その主要な対策を知識として把握しているものの、電圧降下対策知識の教育はほとんど実施されていない。

(d)　配電ロス

今回の調査では、送電線のロスは調査の対象外としている。送配電ロスは５~６％と言われている。また、配電ロスにおいてもオフグリッド地域は除いている。配電ロスは一部地域では10%程度の値となっているが、多くの地域が20%前後の値となっている。

配電ロス削減はMOEEの主要テーマであるが、配電ロス削減のための技術者に向けた教育はほとんど実施されていない。

２．５　アセスメント調査

（１）アセスメント調査の目的

本プロジェクトでは、日本の人材育成システムを参考にしつつ、MOEE の将来的な人材開発フレームワークを創り出す支援を行うことを目的としている。そのために、ミャンマーの既存の人材育成システムを確認するためのアセスメント調査を実施した。本調査は、DEPP、DPTSC、ESE、YESC ならびに MESC にて実施した。

（２）アセスメント調査の概要

アセスメント調査の項目及び手順を**図２−２**に示す。アセスメント調査は、本プロジェクト専門家による関係者へのインタビューにより実施した。アセスメント調査の主な項目として、組織体制、人材育成方針、人材育成にかかる予算、社外研修及び第三国研修の有無を設定した。

アセスメント対象組織

DEPP　DPTSC　ESE　YESC　MESC

主なアセスメント項目

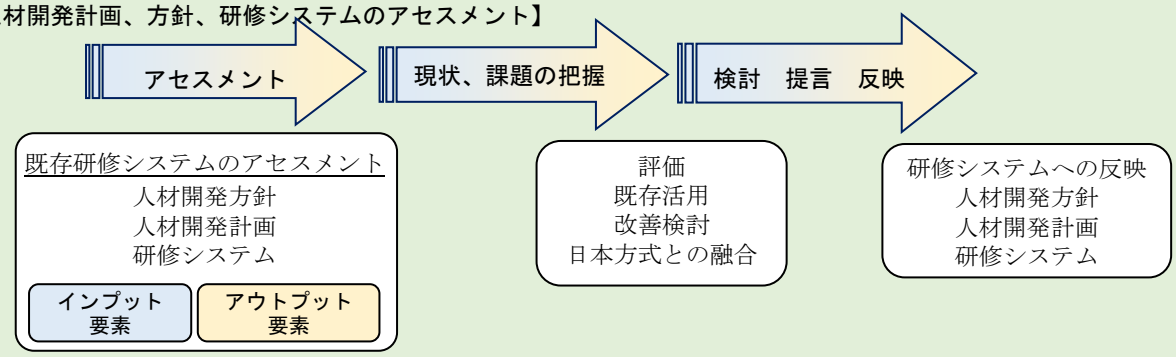
【インプット要素】

人材開発担当組織（組織名、人数、役職）	部署ごとの技術者の職務（技術分野、0JT、安全管理）
研修方針（有無、内容）	技術者の異動方針（異動間隔、職歴経験加味方針）
研修計画（有無、内容、期間、作成、地方対応）	研修施設（有無、場所、施設数、施設内容、計画、宿泊所）
人材育成予算（額、予算元、使用実績、旅費、日当）	研修テキスト（有無、技術内容、カリキュラム）
外部研修（有無、内容、実績）	講師（専任可否、人数、役職、職種、指名方法）
第三国研修（有無、内容、実績）	研修と人事評価とのリンク（有無）

【アウトプット要素】

受講生（勤務先、職種、人数、選定方法、役職、研修評価）	研修生評価（有無、手法、試験、結果の反映）
研修効果（職種、発現内容、効果確認方法）	研修評価（有無、手法、評価内容、改善方法）

【人材開発計画、方針、研修システムのアセスメント】



［出所］JICA 専門家チーム

図２−２　アセスメント調査の項目及び手順

（３）主な調査結果

アセスメント調査の結果を報告書として、2016 年 12 月に JICA に提出した（添付資料 4 参照）。主な調査結果を以下に示す。MOEE 全体で統一された人材育成計画が策定されておらず、各組織によって研修方針の統一性がないことが明らかとなった。そこで、MOEE の状況に合わせた体系的かつ持続的な研修システムの枠組みを策定することが必要であり、それらを検討する研修制度構築委員会の立ち上げを支援した。

(a) 人材育成所管組織及び研修方針

現状	各機関とも人材育成を担当する部署は決められており、研修の必要性も理解している。
課題	MOEE全体での統一された人材育成方針が定められていないため、体系化された人材育成計画の策定や教育が行われていない。
支援方針	体系的かつ持続的な研修システムの枠組み策定のための人材育成に係るWG立ち上げを支援する。

(b) 研修プログラム

現状	・次年度の研修プログラムが提案された後、上層部が重要度や予算額に基づき取捨選択している。 ・第三国で学ぶ研修や外部講師を招く研修が計画・実施されている。 ・一つのプログラムが終わる度に、講師や講義内容の質をレビューしている。
課題	・予算の制約によりアドホックに研修が行われており、各年度によって開催される研修が異なる。 ・年度末に予算が不足し、研修が中止となることがある。
支援方針	体系的かつ持続的な研修システムの枠組み策定のための人材育成に係るWG立ち上げを支援する。

(c) 人材育成予算

現状	・各機関とも人材育成のための予算を毎年申請している。 ・国から食費として1日1,000 Kyatsが各機関に支給される。（全省庁共通）
課題	・毎年予算額が異なる。 ・国からの食費支給額が十分でなく、各機関が補填している。 ・旅費や日当に予算が割かれ、新たな研修を行うための設備や機材確保の予算が十分でない。
支援方針	一定の予算を継続的に確保するための、体系的かつ持続的な研修システムの枠組み策定を支援する。

(d) 人材評価

現状	・各機関とも研修における受講者評価の仕組みを設けている。 ・研修における試験で優秀な成績を収めると、昇進が早まる・第三国研修を優先的に受けられる、などのインセンティブが働いている。
課題	MOEE全体で統一された評価基準でない。
支援方針	日本の人材育成システムとともに他省庁の事例をインプットする。

(e) 研修施設及び設備

現状	ヤンゴン及びネピドーに研修所建屋があり、MOEE全体の集合研修はネピドーで行っている。ヤンゴンの研修所には、模擬配電線や変電所の模擬設備が設置されている。
課題	ネピドーの研修所にトレーニング用設備が配置されていない。
支援方針	ネピドーにトレーニング用設備を配置する。

(f) 研修テキストブック及び講師

現状	・特定の分野及びレベルのテキストブックがある。 ・フルタイムで研修業務に従事する講師はおらず、技術者がパートタイムで講師を担当している。
課題	テキストブックは体系的に作成されたものではなく、カタログのコピーなども含まれている。
支援方針	日本の人材育成システムとともに他省庁の事例をインプットする。

(g) 技術者の異動方針

現状	異動のタイミングは通常3～5年であり、発電部門から配電部門といった部門をまたいだ異動がある。
課題	特定の部門のエキスパートを長期的に育成することが困難である。
支援方針	短期的かつ効率的に育成するシステムの枠組みを協議する。

２．６ ワーキンググループ活動（2016 年 7 月～11 月）

JICA 専門家からの講義に加え、結成した 5 つの WG により、作成するテキスト骨子の選定のためのグループディスカッションを行った。加えて、各グループでの情報共有と講師としての能力向上のために、適宜ディスカッション結果のプレゼンテーションを行った。

これらの活動により、講師候補生のディスカッション力及びプレゼンテーションでの資料作成、話す技術両方の向上を図ることができたと考えている。他方、JICA 専門家にとっても、講師候補生の英語力、電力基礎技術力等を把握することができた良い機会であった。

主な活動期間及び内容は以下のとおり。

開催回	開催期間	主な活動
第 1 回	2016 年 9 月 5 日～9 月 9 日	日本の電力技術の講義（研修システム、建設、保守等） テキスト・プログラム作成に向けたディスカッション
第 2 回	2016 年 10 月 17 日~11 月 4 日	

２．７　第 1 回合同調整委員会（JCC）

第 1 回 JCC が 2016 年 11 月 3 日に実施された。

JCC 開催に先立ち、MOEE 関係幹部、各配電公社総裁全員に事前説明を行い、効率的な JCC 開催に努めた。JCC 当日は、出席を予定していた事務次官(Permanent Secretary)ほか複数名の幹部が、業務都合により当日の会議を欠席したが、電力計画局局長の Mi Mi Khaing 氏をはじめ、多数の幹部メンバーが出席した。（アジェンダ及び出席者リストは添付資料 5 参照）

JCC では、講師候補生より 2 名が代表して、MOEE 幹部へのプレゼンテーションを実施した。講師としての訓練も兼ね、JICA 専門家と共に、事前に発表者によるプレゼンテーション練習を数回実施した。プレゼンテーションでは、プロジェクトの概要から、PDM、モニタリングシートの説明まで、会議資料に従い落ち着いて説明することができた。JCC では、MOEE におけるプロジェクト実施体制、プロジェクト指標項目が合意された。

JCC 後に、同会場で電力計画局局長である Mi Mi Khaing 氏と 27 名の講師候補生との意見交換が行われた。その中で、講師候補生が研修を受けるにあたってのネピドーまでの交通費と日当が MOEE から支払われていない者がいること及び支払われている場合でも事務所によって差があるとの意見が出され、電力局局長が対応を表明した。

結果、その後のネピドーでの活動に対し、JICA からもネピドーでの活動費を支援することとなった。

［出所］JICA 専門家チーム

図２−３　第 1 回 JCC の様子

（左：JCC ミーティング、右：電力計画局長と講師候補生との懇談）

２．８　ワークプラン及び MOEE 副大臣からの方針変更要請

２．８．１　ワークプラン策定に係るこれまでの経緯

プロジェクトのワークプランは、MOEE が主体となって管理することを想定している。ワークプラン案は、プロジェクト当初に JICA 専門家チームにより作成し、7 月以降 Managing Meeting により MOEE 内の関係者に説明し、同時にワークプラン案に対するコメントを求めた。MOEE からのコメ

ントは無く、第 1 回 JCC にてその内容を確認し承認を得て、2016 年 12 月に、ワークプランを最終版化することとしていた。

第 1 回 JCC ののち、下記のとおり MOEE 副大臣よりワークプランの方針変更要請があった。2016 年 12 月に JCC 時点のワークプランを JICA に提出したうえで、引き続き方針変更について協議することとした。

２．８．２　MOEE 副大臣からの方針変更要請

2016 年 9 月に新たに就任した MOEE 副大臣より、2016 年 12 月に本プロジェクトの技術移転活動方針の変更ならびに技術移転を目的とし協働で作業を行う WG 活動の中止を要請された。MOEE 副大臣の意向は以下のとおり。

- ミャンマー技術者は受け身の研修しかできず、ディスカッションによりアイディアを産み出し、研修システムを構築することはできない。習慣が日本とは根本的に異なる。講師が徹底して知識を教えるべきである。
- テキストブックは MOEE の電力エンジニアと協働で作成するのではなく、JICA 専門家が全て作成すべきである。ミャンマーの電力技術者はテキストブックを作成できる知識を持っていない。
- 講師候補生を、少なくとも 3 か月以上はネピドーに滞在させ、集中して研修を実施すべきである。

MOEE 副大臣の要請を考慮して、後述の WG 活動のとおり 2017 年 1 月以降の方針を変更した。

２．９　本邦研修（2017 年 1～2 月、2017 年 5 月）

２．９．１　技術者級本邦研修（2017 年 1～2 月）

（１）研修期間

第一回：　2017 年 1 月 15 日　～　2017 年 1 月 28 日

第二回：　2017 年 1 月 29 日　～　2017 年 2 月 11 日

（２）研修員人数

第一回：　一般研修員 14 名

第二回：　一般研修員 13 名

計：　一般研修員 27 名　（講師候補生　27 名を招聘）

（３）研修概要

研修目標：ミャンマー国送配電系統技術者の能力向上のため、日本の電気事業・電力設備の概要ならびに日本企業の技術を学ぶ。

目標１ 日本の電気事業について理解できる。	目標２ 日本の変電・送電・配電の歴史及びこれらのシステムの概要について理解できる。	目標３ 日本企業の技術紹介から、ミャンマーへ移転可能な変電・送電・配電機器や施工技術を知る。
【講義】 （共通） 日本の電気事業の概要	【講義】 （共通） ・変電業務の概要 ・配電業務の概要 【視察】 （共通） ・中部電力人財開発センター ・中部電力石薬寺変電所、霞変電所 （第一回） ・中部電力名古屋支店北営業所 （第二回） ・中部電力岐阜支店岐阜営業所	【視察】 （共通） ・富士電機株式会社 ・株式会社明電舎 ・株式会社東光高岳 ・日本コンクリート工業株式会社 ・株式会社フジクラ ・株式会社トーエネック教育センター （第一回） ・日本ガイシ株式会社 ・エナジーサポート株式会社 （第二回） ・愛知電機株式会社 ・日本高圧電気株式会社 【セミナー発表】 （共通） 日本企業の技術紹介セミナー （１０社参加）

（４）研修結果及び所見

i）講義

JERA の母体のひとつである中部電力株式会社（以下、中部電力という）の概要を説明し、製造業を多く抱える中部地域での電力安定供給の取組を理解した。また、本研修で視察した変電所、営業所、研修施設の業務や施設概要を説明し、電力設備の運用保守ならびに人材育成体系への理解を得ることができた。

ii）討論・実習・演習・発表

研修員は送配電系統技術能力向上プロジェクトで育成を目指す講師の卵であり、研修員技術レベルを勘案しつつ、限られた期間で効果的な視察・講義内容を選定した。

最終日に本邦研修の総括討論を行った。研修員から得た感想やコメントは以下のとおり。

- 日本企業の技術紹介セミナーでは、実用的な知識を得られた。ミャンマーでの使用が有効と考えられる多くの製品を知ることができた。
- 工場視察や電力設備視察では、詳細な仕様の提供や写真撮影に制限が多かったのが残念だった。
- より理解を深めるために、施工方法についての実技があると良かった。

iii）見学（視察）及びセミナー

ミャンマーに移転可能な本邦企業の電力機器・技術を勘案し、以下の本邦企業の工場及び研修施設を視察した。

・富士電機株式会社（変電用変圧器、開閉器など）
・株式会社明電舎（変電用変圧器、開閉器、移動変電所など）
・株式会社東光高岳（変電用変圧器、開閉器、自動電圧調整器など）
・日本コンクリート工業株式会社（コンクリート柱など）

・株式会社フジクラ（架空送配電線、地中送配電ケーブルなど）
・株式会社トーエネック教育センター（研修システム、研修用設備など）
・日本ガイシ株式会社（送配電用がいしなど）
・エナジーサポート株式会社（配電用開閉器、カットアウトスイッチなど）
・愛知電機株式会社（変電用変圧器、配電用柱上変圧器、自動電圧調整器など）
・日本高圧電気株式会社（配電用開閉器、カットアウトスイッチ、低圧ヒューズなど）

上記の工場視察に加え、視察ができなかった本邦技術を紹介するために、本邦技術紹介セミナーを開催した。

日本企業の技術について、研修員が理解した主な内容や感想は以下のとおり。

- 日本企業の優れた技術を学ぶことができ、ミャンマーでの使用が効果的な製品を知ることができた。
- セミナー時に配電資機材の実物に触れる機会があり、理解が深まった。
- 各メーカの説明や製造工程見学を通じて、日本製品のライフサイクルコストが優れている理由がよくわかった。
- 事業所での OJT だけでなく、教育施設での集合研修を充実させることは全体の技能の底上げにつながり、高い施工能力を維持するためにも非常に有効である。
- 日本の研修システムは体系付けられた長期持続可能なものとなっており、是非ミャンマーにも導入したい。
- 停電時間の短縮に移動変電所が有効であることが分かった。また、日本の移動変電所が非常にコンパクトであることに驚いた。
- 中部電力の変電所の視察が勉強になった。停電の未然防止策や、停電が起きた際の対応策を学ぶことができ、日本の高い電力品質が維持されていることに納得した。

（5） テキスト・機材・施設

研修員は講師候補生であるため、研修所で使用されている機材、施設に触れる機会も重視し、電力会社の工務研修所、配電研修所、電力設備施工会社の研修所を視察した。蓄積された知識をもとに整備された施設、教育体系を学び、多くの研修員から今後の人材育成計画策定の参考になったとの意見があったことからも効果的な研修であったと考えている。


［出所］JICA 専門家チーム

図２−４　技術者級本邦研修風景

（左：中部電力営業所視察、右：コンクリート柱工場視察）

２．９．２　幹部級本邦研修（2017 年 5 月）

（１）研修期間

2017 年 5 月 21 日　～　2017 年 5 月 27 日

（２）研修員人数

準高級研修員 1 名、一般研修員 9 名　合計 10 名

（３）研修概要

研修目標：ミャンマー国送配電系統技術者能力向上プログラム理解のため、日本の電気事業・電力設備の概要ならびに日本企業の技術を学ぶ。

目標１	目標２	目標３
日本の歴史及び日本の変電・送電・配電の概要について理解できる。	日本の電力会社における人材育成、研修システムの概要について理解できる。	日本企業の技術紹介から、ミャンマーへ移転可能な変電・送電・配電機器を知る。
【講義】 ・日本の電気事業の概要 ・日本の電気事業の歴史 ・変電業務の概要 ・配電業務の概要	【視察】 ・中部電力 配電研修所 工務研修所 名古屋給電制御所 電力史料館 ・株式会社トーエネック 教育センター	【講義】 ・富士電機株式会社 ・株式会社明電舎 ・日新電機株式会社 ・三菱電機株式会社 ・日本高圧電気株式会社

（４）研修結果及び所見

ｉ）講義

技術者研修と同様、日本の電気事業の概要及び日本における電気事業発展の歴史を説明するとともに、中部電力における送変電や配電等に関する設備、技術内容を説明した。

ii）討論・実習・演習・発表

研修中は常に研修生と同行することで、タイムリーに質疑応答や意見交換を行うとともに、最終日には総括的に討論した。全体を通して、実設備を用いた研修状況の視察や講義形式による知見により全員が基本的には満足したようであるが、さらに多くの電力技術を学びたいという意見が多く出された。また、日本の研修システム、日本製電力機器への期待感が高く、ミャンマーへ日本の研修システム、最先端の日本製電力設備を導入したいという意見が多かった。

iii）見学（視察）及びセミナー

電力会社の工務研修所、配電研修所において実際の研修風景を視察し、日本の電力会社の人材育成、研修システムへの理解を高めてもらうことができた。また、日本の電力設備の施工品質、安全体制を理解するため、電力設備施工会社の研修センターを視察した。実際の施工現場で視察することが少ないため、施工内容の視察中は熱心に見入っていた。

日本を代表する下記の電力機器メーカにより、本邦製品・技術の紹介セミナーを実施した。全ての製品・技術に対して研修生の関心は高く、日本の高度な技術に関しても熱心に聞き入っていた。前述の総括的なアンケート結果でも各企業の本邦製品を導入したいとの意見が得られた。

・富士電機株式会社（GIS、C-GIS など）
・株式会社明電舎（変電所変圧器、移動用変電所等）
・日新電機株式会社（缶型・タンク型変電調相設備等）
・三菱電機株式会社（電力系統保護継電器等）
・日本高圧電気株式会社（カットアウトスイッチ、配電用開閉器、低圧用ヒューズ等）

（5）研修期間・配列・内容

今回、準高級研修員を含む研修員は送配電系統技術能力向上プロジェクト実施機関に所属する幹部技術者であり、各部署の責任者として業務に多忙ななか、1 週間で、日本製品・技術の良さを示す効果的な視察・講義内容を選定した。

今回の研修員からの意見では、知識や技術をより多く学ぶため研修期間を長くして欲しい、という意見があったが、実技研修は技術者研修で集中して実施し、幹部級研修では、日本技術・製品の照会を中心に実施すべきと考えている。

（6）テキストブック・機材・施設

研修ではできる限り実際の本邦機材、施設に触れることができる機会を重視し、電力会社の工務研修所、配電研修所ならびに電力設備施工会社の研修所を視察先に選定し、安全に現場と同様の機材、施設を視察した。また、研修所での日本の研修状況を実感できるように、研修や訓練が実施されている期間に実際の研修、訓練風景の見学に配慮した。視察の結果、特に研修所に関して、研修員からミャンマーの研修所にこのやり方をそのまま導入してほしいとの意見があった。


［出所］JICA 専門家チーム

図２−５　幹部級本邦研修風景

（左：中部電力工務研修所視察、右：中部電力名古屋給電制御所視察）

２．９．３　研修成果の活用

（１）研修で得られた成果

研修員は講義、視察ともに熱心に興味深く聞き、質問も多く出され、本邦製品や技術への理解とともに本プロジェクトへの期待感、信頼感をより一層深めることができた。研修中には、本邦製品や研修システムなど本邦技術をミャンマーに導入したいとの意思表示も受けた。

ミャンマー帰国後に研修生による報告会が開催された。報告会では、MOEE の主要メンバーも参加し、日本製品・技術の良い点を MOEE 主要メンバーに伝えることができた。

（２）成果の活用方法について

本邦セミナーや帰国後の報告会により、ミャンマー国において本邦製品・技術への関心が広まるとともに、幹部技術者からの積極的な導入へ向けての意欲が高められたと考えている。引き続き、本邦製品・技術がミャンマー国に実際に導入され、設備改善に貢献できるように、長期信頼性など費用対効果などの面からも提言し、引き続きフォローしていくこととした。

［出所］JICA 専門家チーム

図２−６　帰国後の報告会の風景

２．１０　　ワーキンググループ活動（2016 年 12 月～2017 年 6 月）

全述の MOEE 副大臣からの意向を受け、WG 単位でのディスカッションは中断し、当面 JICA 専門家から講師候補生に対して講義を行うこととした。

1~2 月にかけての本邦研修実施後、3 月~4 月水祭り前まで、配電技術について、JICA 専門家より講師候補生への講義を実施した。その中では、配電ロス低減に向けた技術や、実配電線での GPS 位置測定器を用いた設計演習も実施し、受講者から好評を得た。同時に新しいラップトップ PC を購入し、PC を用いた、GPS 位置測定器データ取り込み及び設計の演習も実施した。

2017 年 3 月より講師候補生を対象とした講義を再開している。2017 年 3 月以降の WG における講義内容及びスケジュールは添付資料 6 を参照されたい。

［出所］JICA 専門家チーム

図２−７　ネピドーでの講義の様子

２．１１　　専門家によるテキストブック作成と講義

２．１１．１　　専門家によるテキストブック作成

新たに就任した MOEE 副大臣に対して、技術移転を根付かせるためには本プロジェクトでの講師候補生の自主的な取り組みが欠かせないということを機会あるたびに説明し、理解を求めてきた。しかしながら、2016 年 12 月に MOEE 副大臣から技術移転方針の明確な変更指示があり、JICA 本部や JICA ミャンマー事務所とも協議のうえで、初版のテキストブックは JICA 専門家のみで作成する方針へ変更した。ただし、講師候補生が自分たちでミャンマーの実情に沿った実用的なテキストブック

に改善していくことができるようにするため、講師候補生が初版テキストブックを参照する中で日本とミャンマーでの異なる技術や変更すべきと気づいた内容は、必要に応じ専門家へ相談しながら、講師候補生が積極的にテキストに反映し、改善していくように伝えている。

上記に示したMOEE副大臣からの指示に従い、JICA専門家は5つのWGのテーマに沿って日本の電力技術を基本とした「配電計画・設計」、「配電建設・安全」、「配電運用・保守」、「送電」及び「変電」の初版テキストブック案（英語版）を速やかに作成し、MOEEへ提出した。テキスト案はMOEE副大臣から支持を受けたMOEE上層部に提出され、チェックを受けた後（結果的に指摘等なし）、初版テキスト（添付資料7）として2017年末までにMOEE上層部、講師候補生27名、図書館等に対し、各テーマにつき50部程配布した。

２．１１．２　　専門家による講義

テキストブック作成後の講義では、主にそのテキストブックを用い、分かりにくい内容については補助的にパワーポイント資料等の図や写真を用いて引き続き実施した。5つのWGテーマに沿ったJICA専門家からの一連の講義は2017年12月までに一通り終了した。その後の講義に関しては、講師候補生が地方セミナー・研修を実施し、また、ミャンマーでの実情に沿って活動していく中で、マルチトランスフォーマーシステムの適用に関するOJTと組み合わせた講義など、具体的に必要と判断される技術をより一層詳しくサポートする形で実施している。

２．１２　　講師候補生による講義受講成果のプレゼンテーション

２．１２．１　　受講成果プレゼンテーションの背景、計画・準備

これまでのプロジェクトの成果として、講師候補生が修得した知識や講師としての成長を確認したいというMOEEからリクエストがあり、2018年1月にMOEE副大臣及び各組織の上層部に対し、講師候補生によるプレゼンテーションを計画した。MOEE副大臣らの聴講時間の制約や、講師候補生にとって初めての講師経験ということに配慮して、5つのテーマに対し、各WGから代表者1名を選抜し、各代表者がプレゼンテーションを実施した。

将来、講師候補生はプレゼンテーションだけでなく、研修開催のための様々な計画、準備能力が必要となることから、基本的に講師候補生が今回の上層部向けプレゼンテーションに必要な調整、準備を実施し、JICA専門家は計画漏れや進捗管理に絞ってフォローした。計画・準備においては、早めに資料を作成し、プレゼンテーションの練習に時間を確保する予定であったが、準備期間が1週間程度しかなかったことから、結果的にはほとんどの時間を資料作成に費やした。

２．１２．２　　プレゼンテーションの実施結果

2018年1月23日にMOEE副大臣以下、5つのMOEE組織代表者に対し、講師候補生による講義受講成果のプレゼンテーションを実施した。MOEE副大臣からの自らの研修受講当時の状況や研修生に対する激励の挨拶の後、**表２−６**に示す各WG代表者が質疑応答を含めて各40分間、研修を受講して得た成果を披露した。

表２−６　プレゼンテーション実施者

WG	発表テーマ	発表者
WG 1	「配電計画・設計」	Mr. Soe Ko Ko Aung
WG 2	「配電建設・安全」	Mr. Zaw Htike
WG 3	「配電運用・保守」	Mr. Kyaw Soe Lin
WG 4	「送電」	Mr. Myint Oo
WG 5	「変電」	Mr. Tayzar Lin

［出所］JICA 専門家チーム

MOEE 副大臣は WG1 と WG2 の発表を聴講した後退席されたが、MOEE 副大臣及び MOEE 各組織上層部から各 WG 発表内容についてコメントをいただいた。比較的多かったコメントとして、日本のチェックリストではどうなっているか、チェックリストを受領するようにといったリクエストが複数の WG で出された。これから、日本の技術基準・運用を取り入れて速やかな改善につなげたいとの意識が感じられる。その後の評価･反省会ではチェックリストがほしいというリクエストが多く、可能なものは提供した。ただし、提供の際は、日本とミャンマーでは設備も環境も異なり、そのままでは活用できないため、今後の地方セミナー・研修に向けて、ミャンマーの実情に合わせて変更して活用するよう提言した。また上層部からの技術的な質問で講師候補生が回答できなかった内容については、既に講義を実施している内容については再度わかりやすく説明したり、講義を実施していない項目についてはミャンマー側の必要度に応じて内容を詳しく説明したり、各 WG 担当の専門家よりフォローした。

講師候補生はこれまで長期に亘り講義を受講してきたが、MOEE 副大臣など上層部へ発表する立場としては初めての経験であった。WG 毎の発表内容に若干のレベル差が感じられた。理由として今回は WG を代表して一名が発表したため、各 WG リーダー的なメンバーの存在有無が影響したと考える。発表資料では基本的に JICA 専門家側が講義した内容を説明できるレベルまで理解できずに羅列したものに近い部分や、あるいは理解できていないため、他国の資料を一部抜粋し、上層部から指摘を受けた部分もあった。ただし、これまで教えられる立場であった講師候補生全員が今回教える立場になり、発表資料の準備から関わり、同じ発表者の立場で代表者のプレゼンテーションや上層部からのコメントを見聞することで、講師としての見方、考え方、姿勢などを学ぶことができた。この経験は、地方セミナー・研修の準備、プレゼンテーションの実施に大いに生かされている。

２．１３　　研修システム構築に係る取り組み

2017 年 12 月 19 日の MOEE 副大臣説明及び 12 月 20 日の JCC を通じて、今後の研修システム検討支援について承諾を得た。MOEE 副大臣には、研修システム構築ワーキンググループを立ち上げる意向があるため、その活動への助言を通じて活動を支援することとした。なお、MOEE 副大臣は他省庁の研修システムに興味を示していることから、調査団は他省庁の研修設備の視察結果を共有化する

こととした。

２．１３．１　　MOEE 研修所の制度構築に係るワークショップ

2018 年 2 月 1 日に MOEE 研修所の制度構築に係るワークショップを実施した。出席予定であった MOEE 副大臣及び Permanent Secretary は欠席した。一方、DEPP, DPTSC, ESE, EPGE, DHPI の DG 及び MD は全員出席した。

調査団より、研修制度構築の準備委員会（Training Center Preparation Committee (以下 TCPC という)）設立について提案したところ、理解を得た。そこで後日 MOEE 副大臣宛にレターを発出し、正式に TCPC 設立に向け支援することとなった。

２．１３．２　　研修制度構築準備委員会でのワーキンググループ活動

2018 年 6 月 4 日に TCPC 設立に向けた WG のキックオフミーティングを開催した。資料は専門家の作成したものを使用した。MOEE 管内の電力側部局だけでなくエネルギー側部局も参加し、組織構造について重点的に議論された。

２．１３．３　　研修制度構築に係る報告書の提出

WG キックオフミーティング以降、WG は開催されなかった。なぜなら、キックオフミーティングではトレーニングセンターを別組織として設立する案を基に検討を進めることとした一方で、予算的制約のため困難であることが全省庁に通達されていたためである。しかしながら、新組織は設立できないものの、トレーニングセンターの運営体制やプログラム等、検討すべき事項があることに加え、DEPP へのインタビューにより、短期的には既存組織の中での新トレーニングセンターの運用方法及び、中長期的な研修プログラムのフレームワーク構築といったニーズが MOEE にあることを確認した。

そこで、これまで WG にて検討を予定していた課題について、組織設立に係る項目を除いた検討（方針、研修プログラム、講師選定、教科書、予算、インセンティブ制度）の継続を提案することとし、これまでの活動をまとめた報告書を 2018 年 11 月に DEPP へ提出した。（添付資料 8 を参照。）

２．１４　　第 2 回合同調整委員会（JCC）

第 2 回 JCC を 2017 年 12 月 20 日に開催した。

なお、第 2 回 JCC に先立ち、前日の 12 月 19 日に 2018 年 1 月以降のワークプランを MOEE 副大臣に説明した。副大臣から、特に反対意見はなく、2018 年 1 月以降に講師候補生による研修活動と人材育成システムの枠組み作りの支援を行うことについて承認を得られた。

JCC 当日は JCC Chairperson の U Tin Maung Oo 事務次官を始めとして MOEE 各機関の幹部が出席した（アジェンダ及び出席者は添付資料 5 参照）。

［出所］JICA 専門家チーム

図２-８　第 2 回 JCC の様子

これまでの専門家によるテキスト作成と講義実施について説明した上で、2018 年 1 月以降のワークプラン案を説明し、了承を得た。同時に 2018 年 6 月~7 月に予定している地方都市セミナー計画について説明した。JCC の質疑において、MOEE 幹部より、12 月までに受講した講義の成果を講師候補生自身から幹部に発表して欲しいとの要請があった。調整の結果、講師候補生をネピドーに招集し、1 月 23 日（火、予定）に５つの WG テーマごとに、講師候補生から幹部向けに成果発表を行うこととした。

JCC 終了後、JCC Chairperson である Permanent Secretary の U Thin Maung Oo より講師候補生に向け、本邦研修でしっかりと技術を学んで来るようにとの訓示があった。

２．１５　　本邦研修（2018 年 2～3 月、2018 年 5 月）

２．１５．１　　技術者級本邦研修（2018 年 2～3 月）

（１）研修期間

第一班：　2018 年 2 月 4 日（日）　～　2018 年 2 月 17 日（土）

第二班：　2018 年 2 月 18 日（日）　～　2018 年 3 月 3 日（土）

（２）研修員人数

第一回：　一般研修員 14 名

第二回：　一般研修員 13 名

計：　一般研修員 27 名　（講師候補生　27 名を招聘）

（３）研修概要

研修目標：ミャンマー国送配電系統技術者能力向上のため、日本の電力設備の概要、環境対策ならびに日本企業の技術を学ぶ

目標１ 日本の電力会社における人材育成、研修システムの概要について理解する。	目標２ 日本の電力システム技術ならびに電力分野における環境対策技術を学ぶ	目標３ 日本企業の技術紹介から、ミャンマーへ移転可能な変電・送電・配電機器を知る。
【視察】 ・中部電力 基幹給電制御所 ・株式会社トーエネック 教育センター 安全創造館 ・株式会社シーテック 研修センター	【視察】 ・中部電力 東清水変電所･周波数変換所 275kV 駿河変電所･地下送電線 275kV 松ヶ枝変電所（地下） 半田営業所(配電建設・運営) 絶縁油リサイクルセンター ・株式会社トーエネック 大高営業所（配電工事）	【視察】 ・富士電機株式会社 ・日新電機株式会社 ・矢崎ｴﾅｼﾞｰｼｽﾃﾑ株式会社 ・日立 IE システム株式会社 ・株式会社古川電機製作所 ・日本ガイシ株式会社 ・中部精機株式会社

（４）研修結果及び所見

ｉ）見学（視察）

(a)研修施設視察

電力分野における研修システムをより深く理解するため、以下の本邦企業の施設を視察した。これらの視察、体験を通して、本邦企業の研修システム、作業訓練の方法、安全教育を実感した。

・株式会社トーエネック教育センター・安全創造館（配電線接続作業体験・作業上の危険状況の模擬体験）

・株式会社シーテック研修センター（変電保護制御装置点検作業の模擬体験）

(b)電力施設視察

ミャンマーに移転が有用な技術及び今後有用となると考えられる電力機器・技術を勘案し、下記に示す電力設備を視察した。2017 年 1 月の視察では、77kV 以下の配電系統設備を視察したことから、今回の視察では、将来的にミャンマーの電力系統に有用と考えられる、275kV 基幹系統システムの設備や周波数変換所設備の視察を組み入れた。

近年ミャンマーにおいても送電線敷設に対する住民からの要求レベルが高くなってきており、超高圧変電所から地下洞道に敷設された 275kV 送電ケーブルの視察において、環境対策、河川地下横断箇所への適用技術などの説明に深い関心を示した。

全ての視察に渡って、研修員の関心は非常に高く、ミャンマーでの現状の課題解決や将来への電力設備構築に向けた参考とすべき知見の習得に熱心に取り組んでいた。

・中部電力基幹給電制御所（基幹電力系統変電所及び送電線の監視・制御）

・275kV 東清水変電所･周波数変換所（275kV_GIS 機器、50/60Hz 周波数変換所）

・275kV 駿河変電所･地下送電線（275kV 気中絶縁変電所、275kV 架空・地中送電線）

・275kV 松ヶ枝変電所（都市部地下変電所）

・半田営業所配電建設課・配電運営課（配電線自動化システム、33kV 配電線、33kV/6.6kV 変電所）

・株式会社トーエネック大高営業所（配電線路建設工事、施工管理）

・絶縁油リサイクルセンター（PCB 含有絶縁油再処理）

(c)電力機器メーカ視察

2017年1月の本邦研修での視察､またはセミナーを受けた企業とは別の本邦企業を中心として、下記に示す本邦主要電力機器メーカを視察した。製品自体の視察に加え、ソフトウェアの検証作業状況や工場試験での製品信頼度確認状況を視察することにより、日本製品の品質の高さと信頼性の高さを感じることができたとの意見が聞かれた。

・富士電機株式会社（配電自動化システム　ソフトウェア設計、シミュレーション）
・日新電機株式会社（GIS 機器）
・矢崎エナジーシステム株式会社（電線、ケーブル）
・日立 IE システム株式会社（配電用変電所保護制御盤）
・株式会社古川電機製作所（PJ コネクタ（配電線接続コネクタ））
・日本ガイシ株式会社（がいし）
・中部精機株式会社（電力量計、スマートメータ）

ii）討論・発表

本邦研修中は常に JICA 短期専門家が同行し、逐次質疑応答や意見交換を実施し、最終日のラップアップミーティングにおいて総括的な意見交換を行った。メンバー全体から、今回の視察により多くの新技術を学ぶことができたとの意見とともに、視察先選定に対する感謝の言葉をいただいた。また同時に、日本の研修システム、電力機器への関心が高く、日本の研修システム、電力設備・技術をミャンマーに導入したいという意見が多く聞かれた。

（5） テキスト・機材・施設

今回、研修全体を通じて、ミャンマー語と日本語の通訳者が同行した。ミャンマー語で説明することにより、技術の詳細な理解が進んだとともに、質疑応答が活発に行われたと感じている。研修生からも、前回は英語の説明であったが、今回ミャンマー語の説明となったことで、大きく理解が進んだとの意見が多く聞かれた。

研修では実際の作業や研修設備を学ぶ機会を重視することとし、施工者のために研修プログラムを構築し、研修を実施している電力工事会社（中部電力のグループ会社）の研修所を視察先に選定した。電力工事会社の研修所では、工事作業の研修だけでなく、安全意識向上のための作業危険状況の体験も実施した。

電力機器メーカ工場では、製品試験を視察したいとの要望が多かったことから、メーカの協力を得て、GIS 工場の試験装置や PJ コネクタの実際の製品試験を視察することができた。
環境対策関連視察として絶縁油リサイクルセンターを視察した。MOEE では一部の油入機器で絶縁油調査を行っていることもあり、高い関心を示し質問が多く発せられた。絶縁油処理をはじめとした環境対策への関心が非常に高いことを実感した。


［出所］JICA 専門家チーム

図２−９　技術者級本邦研修風景

（左：中部電力基幹給電制御所視察、右：配電線工事現場視察）

（６）　研修成果の活用

ｉ）　研修で得られた成果

研修員は講義、視察ともに熱心に興味深く聞き、質問も多く出され、本邦製品や技術への理解とともに本プロジェクトへの期待感、ミャンマー電力設備改善への意欲を高めることができた。また、積極的に本邦製品や研修システムなど本邦技術を取り込みたいという意見も多く聞かれた。

ミャンマー帰国後に研修生による、MOEE 副大臣及び幹部メンバーへの報告会が開催された。報告会では、日本製品・技術の良い点を MOEE 主要メンバーに伝えることができた。

帰国後に研修員がセミナー内容を再学習していること、これまでの JICA 専門家からの講義の知見による理解向上も図れていると期待されることから、本邦製品・技術や日本の研修システムへの理解が進んだと考える。

ｉｉ）成果の活用方法について

日本製品・技術のミャンマーへの導入意欲が見られ、加えて帰国後の幹部報告や追加学習により、幅広い関係者の本邦製品・技術への関心が高まったものと考える。本邦製品・技術がミャンマー国に実際に導入され、設備改善に貢献できるように、引き続き技術移転を進めていくこととした。

研修実施後、ネピドー研修所と 11kV/6.6kV 実運用配電線への変圧器、区分開閉器の実機器導入を研修生と共に進めた。また、2018 年 6 月からの地方都市でのエンジニアを対象とした技術セミナーにおける講義資料の作成及び講義実施に研修の成果を活用した。

２．１５．２　　幹部級本邦研修（2018 年 5 月）

（1）研修期間

2018 年 5 月 13 日（日）　～　2018 年 5 月 23 日（水）

（2）研修員人数

幹部級研修員 6 名

（3）研修概要

研修目標：ミャンマー国送配電系統技術者能力向上のため、日本の電気事業・電力設備の概要ならびに日本企業の技術を学ぶ

目標１	目標２	目標３
日本の電力会社の歴史及び日本の送電・変電・配電の概要について理解する。 また、電力設備における環境配慮を学ぶ。	日本の電力会社における人材育成、研修システムの概要について理解する。	日本企業の技術紹介から、ミャンマーへ移転可能な送電・変電・配電機器を知る。
【講義】 ・日本の電気事業の概要 ・日本の電気事業の歴史 【視察】 ・中部電力 名古屋給電制御所 東清水変電所･周波数変換所 275kV 駿河変電所・地下送電線 北営業所(配電建設・運営) 電力史料館	【講義】 ・電力会社の研修制度の概要 【視察】 ・中部電力 六郷訓練所 配電研修所 送変電研修所 ・株式会社トーエネック 教育センター 安全創造館	【視察】 ・矢崎ｴﾅｼﾞｰｼｽﾃﾑ株式会社 ・株式会社明電舎

（4）研修結果及び所見

準高級研修員を含む研修員は送配電系統技術能力向上プロジェクト実施機関に所属する幹部技術者であり、各部署の責任者として業務に多忙ななか、10 日間で、日本製品・技術の良さを示す効果的な視察・講義内容を選定した。

i）講義

日本の電気事業の概要及び日本における電気事業発展の歴史を説明するとともに、株式会社 JERA の母体の一つである中部電力における送変電や配電等に関する設備・技術ならびに人材育成に関する研修制度等について説明した。ミャンマーと日本の電気事業の共通点や違い、日本の送電・変電・配電技術に基づく供給信頼度の高さ、安全性等を理解した。

ii）見学（視察）

(a) 研修施設視察

電力分野における研修制度をより深く理解するため、以下の本邦企業の施設を視察した。これらの視察、体験により、日本の電力会社の研修制度、作業訓練の方法、安全教育を理解した。

・中部電力　　配電研修所（地中・架空配電研修設備）
　　送変電研修所（送電線・変電機器・保護装置研修設備）

電力史料館（電気事業の歴史、技術の変遷）
名古屋給電制御所（訓練シミュレータ）
六郷研修所（地中・架空配電研修設備）
北営業所 配電建設課・配電運営課（配電自動化システム）

・株式会社トーエネック 教育センター・安全創造館（配電作業の視察や防護服の着用体験）

(b) 電力設備視察

ミャンマーに移転が有用な技術及び今後有用となると考えられる電力機器・技術を勘案するとともに、総合的な電力技術の理解を目的に、下記に示す電力設備を視察した。

技術者級本邦研修と同様に、全ての視察において研修員の関心は非常に高く、ミャンマーにおける現状の課題解決や将来への電力設備構築に向け、参考とすべき知見の習得に熱心に取り組んでいた。

・275kV 東清水変電所･周波数変換所（275kV GIS 機器、50/60Hz 周波数変換所）
・275kV 駿河変電所･地下送電線（275kV 気中絶縁変電所、275kV 架空・地中送電線）

(c) 本邦企業視察

ミャンマーへの移転に有効と考えられる日本企業の電力機器･技術を勘案し、下記に示す電力機器メーカを視察した。製造工程の視察に加え、製品信頼度確認のための工場試験工程・試験設備を視察することにより、本邦製品の品質と信頼性の高さを感じることができたとの意見が聞かれた。

・矢崎エナジーシステム株式会社（電線、ケーブル）
・株式会社明電舎（GIS 機器、変圧器、避雷装置）

（5）テキスト・機材・施設

今回、研修全体を通じて、ミャンマー語と日本語の通訳ができる研修管理員が同行した。ミャンマー語での説明により、技術の詳細な理解が進んだとともに、質疑応答が活発に行われた。

研修では実際の本邦機材、施設に触れる機会を重視し、電力会社の配電研修所、送変電研修所ならびに電力設備施工会社の研修所を視察先に選定した。

電力機器メーカ工場では、本邦製品の品質の高さを理解できるよう、変電機器やケーブルの試験工程や試験装置を視察した。

［出所］JICA 専門家チーム

図２−１０　幹部級本邦研修風景

（左：電線接続作業体験、右：変電機器工場視察）

（６）　研修成果の活用

研修員は講義、視察とも熱心に興味深く聞き、質問も多く出され、本邦製品や技術への理解、研修制度への関心とともに本プロジェクトへの期待感、信頼感を一層深めることができた。また、積極的に本邦製品や本邦技術を取り入れたいという意見やミャンマーでのトレーニングセンター設立に向けて、日本の研修制度や研修設備を参考にしたいとの意見も多く聞かれた。

２．１６　　資機材調達結果

安全資機材（安全帯・検電器等）と電力資機材（変圧器・電線等）を下記方針の下で選定・調達した。

・ミャンマーへの導入が効果的であること

・JICA 専門家が取り扱いに詳しい機器の導入により、将来ミャンマー技術者のみで取扱ならびに運用指導ができること

・本邦製品の長時間使用性能やメンテナンス性が高いこと

・配電公社（会社）の導入希望との整合が図れ、現場作業と直結すること

・円借款事業での設置機器と同種機器の導入による現場業務支援ができること

調達する資機材の一部は、研修所での実機取り扱いと合わせて、パイロットサイトでの実運用設備として導入する。なぜなら、品質の良い本邦製品を現場に導入することで、電力供給力向上に貢献し、運用しつつその機器の動作や取り扱いを学ぶことができるからである。加えて、本邦製品の

有効性が理解され、その効果や保守技術がミャンマー全体に普及することも期待できる。

２．１６．１　　研修用安全資機材調達結果

配電作業における災害の多くは墜落災害ならびに感電災害であり、その対策が重要である。研修所における集合研修での使用ノウハウの習得、ノウハウの地方への普及を通じて、安全意識の醸成を図る。これにより多くの災害を未然に防止することが可能となる。災害未然防止効果を実感することにより安全資機材の普及が期待される。**表２−７**に示す研修用安全資機材調達し、ネピドー研修所に納入した。

表２−７　研修用安全資機材調達結果

安全資機材	資機材の概要及び期待される効果	購入数量
胴綱（安全帯）	高所作業時の墜落防止として使用 【効果】墜落災害防止	10 個
11kV 検電器（音響式）	作業時の電圧有無確認 電圧ありの場合は音響により確認可能 【効果】感電災害防止	10 個
33-66kV 検電器（風車式）	作業時の電圧有無確認 電圧ありの場合は視覚により確認可能 【効果】感電災害防止	10 個
作業時接地器具	作業前に、架電部を接地し、感電を防止する 【効果】感電災害防止	10 セット
離隔測定器	絶縁性の物差しにより、架電部の離隔距離を測定 【効果】感電災害防止、故障停電未然防止、設計効率化支援	5 個
レーザ式距離測定器	レーザにより、非接触で対象物までの距離を測定 【効果】感電接触災害防止、故障停電未然防止、設計効率化支援	5 個

［出所］JICA 専門家チーム

２．１６．２　　電力資機材調達結果

本邦製品導入による配電ロス低減や故障の削減効果（電線接続器具によるロス・電圧降下の低減、電線離断事故の削減、区分開閉器での迅速な故障区間の切り分けによる停電範囲の縮小）を体験・理解する。これにより、本プロジェクトで設定している、プロジェクト指標の達成及びミャンマー全体における配電ロス低減、故障回数削減等の施策を効果的に拡大できる。**表２−８**に示す研修用電力資機材を調達した。調達した電力資機材は、ネピドー研修所の研修設備として設置するとともに、後述する実運用配電線にも導入した。

表２−８　研修用電力資機材調達結果

電力資機材	概要及び期待される効果	購入数量
過電流遮断機能付 11kV 線路開閉器	負荷電流及び配電線短絡･地絡故障電流を線路途中で遮断可能な開閉器 【効果】的確な故障遮断、停電範囲の縮小 故障点早期発見･復旧	3 台
小容量変圧器 （単相、三相）	小容量 11/0.4kV 変圧器（単相及び三相） 【効果】分散設置によるロス低減、 電圧降下抑制、柱上設置による地上高・離隔確保（公衆保安向上）	25kVA（単相）：6 台 50kVA（単相）：5 台 100kVA（三相）：4 台 200kVA（三相）：3 台 合計 18 台
11kV 絶縁用 がいし （配電用）	日本製 11kV 絶縁 がいし 【効果】絶縁力向上による故障回数削減 破損防止	ピンがいし：9 個 耐張がいし：100 個
耐雷ホーン	高圧電線の雷アーク断線を防止することを目的とした高圧がいし用のアークホーン 【高圧】高圧断線防止による信頼度向上	60 個
コンクリートポール	プレストレス方式により作成されたコンクリート柱 (日本工業規格に準拠) 【効果】配電柱折損事故低減、電線太線化対策等	12m 柱：10 本
密閉式 カットアウトスイッチ	11/0.4kV 変圧器一次側ヒューズ密閉式 プライマリカットアウトスイッチ 【効果】ヒューズ劣化抑制（高信頼度化）	カットアウト本体：50 個 ヒューズ（20A）：80 個 ヒューズ（6A）：8 個
パラレルジョイント コネクタ(PJ コネクタ)	11kV 及び 400V 導線接続器具 【効果】ロス低減、導線離断防止	5mm 銅線相互接続用：300 個 5mm・60mm^2 銅線接続用：50 個 60mm^2 銅線相互接続用：150 個
	コネクタ用カバー	低圧 5mm 用：300 個 低圧 60mm^2 用：200 個
中圧被覆電線 (SAC 電線)	11kV 絶縁体被覆導線 【効果】公衆感電防止、盗電防止	120mm^2 仕様: 500m

低圧被覆電線 (OW 電線)	400V 絶縁体被覆導線 【効果】公衆感電防止、盗電防止	4mm 仕様：200m 5mm 仕様：200m 60mm^2 仕様：300m
絶縁抵抗測定器	配電線路の絶縁性能の良・不良の判定 【効果】工事不良箇所の発見、地絡故障時の故障箇所早期発見・復旧 日常点検時の絶縁確認効率化	5 台
GPS 位置測定器	送電線路･配電線路設計のための現場調査時に位置の特定に使用 【効果】送電線路･配電線路設計の業務　効率化	10 台
赤外線サーモグラフィ	設備稼働中に機器温度を遠隔でチェックし、設備の異常や劣化を調査 【効果】設備異常・劣化箇所の早期発見 導電部の接触不良個所早期発見	5 台

［出所］JICA 専門家チーム

２．１６．３　実運用配電線への資機材導入及び設置に関する OJT

配電ロス低減ならびに信頼度向上に貢献する機器を試行的に実配電線に導入し、その運用効果を MOEE 技術者とともに確認する目的で、機器設置に係る OJT（**表２-９、表２-１０**）を実施し、SOG 遮断器（負荷側の故障を自動的に遮断する開閉器）2 台と三相 100kVA 変圧器 1 台を設置した（SOG は Tatkon と Kyaukpadaung、三相変圧器は Tatkon に設置）。設置場所は JICA 専門家、講師候補生及びタウンシップエンジニアが協議し決定した。

SOG については、導入前後での故障停電範囲・時間削減の有効性を検証するため、実動作を月単位で記録し報告を受けることとした。

表２-９　三相変圧器設置に係る OJT

OJT 実施日	実施場所	OJT の内容
2018 年 4 月 30 日	Dala Township, YESC	マルチトランスフォーマーシステム設計（システム導入による配電ロス低減効果の計算）
2018 年 5 月 16 日	Bagan Township, MESC*	
2018 年 5 月 17 日	Takton Township, ESE	
2018 年 8 月 1 日	Kyaukpadaung Township, MESC	

*：当初 Bagan に機器を設置予定であったが、現場視察及びロス試算の結果、ロス低減効果を高めるため、Kyaukpadaung へ設置場所を変更することとした

［出所］JICA 専門家チーム

表２-１０　SOG 設置に係る OJT

OJT 実施日	実施場所	OJT の内容
2018 年 3 月 19 日	Takton Township, ESE	メーカによる設置前の試験方法指導、設置時の施工・監理方法指導及び運転時の操作・データ取得方法指導
2018 年 5 月 15 日	Kyaukpadaung Township, MESC	設置候補地点の現場確認・選定方法指導、設置前の試験方法指導
2018 年 8 月 1 日		運転時の操作・データ取得方法指導

［出所］JICA 専門家チーム

表２-１１　SOG 設置場所

Township	District	Organization
Tatkon	Nay Pyi Taw	ESE
Kyaukpadaung	Nyaung Oo	MESC

［出所］JICA 専門家チーム

表２−１２　三相変圧器設置場所

Capacity	Voltage	Phase	Township	District	Organization
200kVA	11-6.6/0.4kV	3-phase	Dala	Yangon	YESC
200kVA	11-6.6/0.4kV	3-phase			
200kVA	11-6.6/0.4kV	3-phase			
100kVA	11/0.4kV	3-phase	Kyaukpadaung	Nyaung Oo	MESC
100kVA	11/0.4kV	3-phase			
100kVA	11/0.4kV	3-phase	Tatkon	Nay Pyi Taw	ESE

［出所］JICA 専門家チーム

表２−１３　単相変圧器設置場所

Capacity	Voltage	Phase	Township	District	Organization
25kVA	11/0.4kV	1-phase	Pyinmana	Nay Pyi Taw	ESE
50kVA	11/0.4kV	1-phase			
25kVA	11/0.4kV	1-phase	Pathein	Ayeyarwaddy	
50kVA	11/0.4kV	1-phase			
25kVA	11/0.4kV	1-phase	Magway	Magway	
50kVA	11/0.4kV	1-phase			
25kVA	11/0.4kV	1-phase	Taunggyi	Taunggyi	
50kVA	11/0.4kV	1-phase			
25kVA	11/0.4kV	1-phase	Kyaukpadaung	Nyaung Oo	MESC
50kVA	11/0.4kV	1-phase			

［出所］JICA 専門家チーム

［出所］JICA 専門家チーム

図２−１１　実運用配電線に設置した開閉器と変圧器

（左：Tatkon タウンシップに設置した開閉器、右：Tatkon タウンシップに設置した変圧器）

２．１６．４　　ネピドー研修所における研修用配電設備

ネピドー新研修所敷地内に支持物、中圧線、開閉器、変圧器、低圧線及び支線を設置した。実配電線に設置した機器の同一仕様機器をネピドー研修所に設置することにより、集合研修における操作・メンテナンス技術の習得を可能にしている。

［出所］JICA 専門家チーム

図２−１２　ネピドー研修所に設置した研修用模擬配電線

２．１７　　地方都市セミナーの計画・準備・実施

２．１７．１　　地方都市セミナー・研修の計画

ミャンマー地方部に本プロジェクトの趣旨を浸透させ、将来、地方でも効果的に研修が実施できるように、代表的な地方主要都市での地方セミナー・研修を計画した。全ての講師候補生が所

属 WG のテーマで講師として発表し、また同 WG 他者の発表も聴講・評価できるように、6 都市を選定し、1 都市 1 週間、2 都市を連続して訪問するスケジュールとした。MOEE 責任者及び講師候補生と訪問都市、訪問日時、各都市の担当者等について調整し、2018 年 6 月～7 月にかけて Magway と Monywa、Taunggyi と Mandalay、Bago と Yangon でそれぞれ約 2 週間連続開催するスケジュール（添付資料 6 参照）とした。また、研修を計画する上での設定すべき講義の項目や難易度について講師候補生と協議し、講義の主な受講対象者をアシスタント・エンジニア（AE)、サブ・アシスタント・エンジニア（SAE）とした。

２．１７．２　　地方都市セミナー・研修の準備

2018 年 3 月初旬より 4 月初旬にかけて、講師候補生をネピドーに招集し、５つの各 WG で地方セミナーに向けた講義資料作成を開始した。講義資料には、2017 年に JICA 専門家より学んだ技術をベースとして、本邦研修で蓄えた日本の技術を踏まえ、若手ミャンマー技術者に伝えるべき内容を精査して織り込むよう指導した。さらに、2018 年 5 月 2 日より講師候補生をネピドーへ招集し、6 月 5 日から開催される地方都市セミナー・研修の準備を開始した 2018 年 1 月に MOEE 副大臣らに発表した講義資料は MOEE 上層部向けの資料であったが、今回は地方主要都市の AE、SAE が講義で学んだことを理解し、研修後、実務に少しでも役立つようにするという思いを持って講師候補生は資料作成に取り組んだ。

限られた時間で各 WG が効果的に講義資料を作成でき、かつプレゼンテーション能力も高めることができるように、リハーサルを 3 段階に分けて実施した。

1 回目は 3 日間で各 WG の発表は半日（3 時間以内）とし、全員が集まり、他 WG の良い観点（何が地方都市での実務に直接反映できるかなど）を自 WG に取り込んで講義資料を改善できるようにするため、各 WG 代表者（前回 MOEE 副大臣への発表者以外）が発表し、講義資料に対する自由な意見交換を実施した。全員が他 WG 発表を真剣に聴講し、できるだけ多くの意見が出るように、また、口頭で指摘してその場で課題が忘れ去られないようにするため、各自がよかった点、悪かった点をメモに書き止め、発表 WG へ提出した。指摘事項は各 WG で検討し、必要に応じて資料作成に反映した。

2 回目は WG 毎に集まり、基本的に同じ講義内容について WG メンバー5～6 名が 3 日間で半日毎に発表し、口頭での解説内容、発表姿勢等を中心にお互いに指摘し合い、各メンバーのレベルアップを図った。

3 回目の最終リハーサルの前に、各 WG から JICA 専門家へ講義資料案を提出し、各専門家からのコメントを受けて、地方セミナー・研修用ドラフトファイナルを作成した。2018 年 5 月 28 日に MOEE 各組織上層部に対し、ドラフトファイナルの一部（30 分相当）を代表者が発表した。各組織上層部からのコメントを講義資料に反映し、講義資料は準備できたが、その後も地方セミナー・研修に向けて各 WG で自主的に改善を図った。

２．１７．３　　地方都市セミナーの実施

セミナーは 26 名の講師候補生の講師訓練も含めて実施した。5 テーマ×6 都市=30 講義であり、26 名の講師候補生が 1 回ないし 2 回の講師を努めることができた。事前の WG 活動での綿密な準備と講義演習により、どの講師候補生も概ね滞りなく講義ができた。地方セミナーの聴講生から

は技術的な質問が寄せられ、大部分は講師候補生のみで回答することができた（一部は JICA 専門家が回答内容をフォローした)。聴講生にはセミナー最終日にセミナー受講完了証を発行し、講師、聴講生共に成果が得られたセミナーであった。

表２−１４　地方都市セミナーの開催都市、開催日、講義受講者数

開催回	開催都市	開催日	講義の受講者人数（最大値）
第 1 回	Magway	2018 年 6 月 6 日～8 日	24 名
	Monywa	2018 年 6 月 11 日～13 日	16 名
第 2 回	Taunggyi	2018 年 6 月 27 日～29 日	20 名
	Mandalay	2018 年 7 月 2 日～4 日	29 名
第 3 回	Bago	2018 年 7 月 16 日～18 日	15 名
	Yangon	2018 年 7 月 20, 23, 24 日	36 名

［出所］JICA 専門家チーム

また、地方セミナー終了後の 7 月 30 日～8 月 3 日の 1 週間で WG を開催し、発表方法や姿勢について改善すべき点をレビューし、各自が発表を振り返り良かった点や、他の講師候補生の講義から自分の講義として取り入れるべき点などを洗い出した。

２．１８　　講師候補生の理解度確認試験

講師候補生の理解度及び能力向上度を確認し、より効果的な講義を進めるために、3 つの段階に分けて筆記式試験を実施した。

第 1 段階：JICA 専門家による講義後に理解度を確認

第 2 段階：地方セミナー終了時に各自担当テーマの理解度を確認

第 3 段階：プロジェクト終了時に全 5 テーマの理解度を確認

２．１８．１　　各 WG 活動での JICA 専門家講義内容の理解度確認

2017 年 6 月～12 月の各 WG 活動における講義内容の理解度確認試験結果を**表２−１５**に示す。作業安全については理解度が高い一方で、電力基本理論の理解が不足している、電力ベクトル図が描画できないなど、基本知識が不足していることが把握できた。試験の事前学習により、講義内容の復習を図るとともに、不足している電力基本知識は、継続して講義内容に含めてフォローした。

表２−１５　各 WG 活動における講義内容の理解度確認試験結果

試験日	平均点 / 満点	主な試験対象範囲
2017 年 7 月 10 日	44.7 / 60	日本の技術基準、変圧器計算 配電線設計、配電作業安全、財務基本
2017 年 8 月 25 日	52.3 / 100	弛度計算、電圧改善計算、配電線自動化システム 電力ベクトル作図、系統インピーダンス計算
2017 年 11 月 1 日	81.2 / 100	作業安全、配電計画、配電設計、無効電力計算
2017 年 12 月 5 日	43.5 / 100	送電線弛度・張力計算、送配電線全般の知識
2017 年 12 月 21 日	74.4 / 100	作業安全、変電所機器関連計算、 計器用変流器・変圧器
全試験の平均点	65.2[1]	

1: 2017 年 7 月 10 日の結果を 100 点に換算した上で平均した

［出所］JICA 専門家チーム

２．１８．２　　地方セミナー後の理解度確認

講師候補生がプロジェクトを通じて学習を続け、自身が講師となって講義したことによる理解向上効果を測るため、担当テーマの試験を実施した（2018 年 8 月）。試験結果を**表２−１６**に示す。なお、試験は各自の担当テーマを網羅した内容で実施した。

表２−１６　地方セミナー後の担当テーマの理解度確認試験結果

WG テーマ	平均点 / 満点	点数が低かった内容
WG 1 配電計画・設計	65.0 / 100	基本理論を応用した計算
WG 2 配電建設・安全技術	90.0 / 100	特になし
WG 3 配電運用・保守管理	60.0 / 100	保護リレー整定、電圧管理計算
WG 4 送電技術	64.0 / 100	基本理論を応用した計算
WG 5 変電技術	61.6 / 100	基本理論を応用した計算

［出所］JICA 専門家チーム

理解度確認のため設問の難易度を上げた結果、2017 年度の理解度確認試験に比べて点数は下がったが、当初の理解では解けないレベルの問題が回答できたことは評価に値する。更なる理解度向上のため、試験後 JICA 専門家がフォローした。

２．１８．３　　プロジェクト終了時の全 5 テーマの理解度確認

プロジェクト開始からこれまでの研修に対する、講師候補生の理解度及び能力向上度を確認し、講師としての知識を有しているか確認するために、全講師候補生が全 5 テーマの講義内容を網羅した試験を受けた（2018 年 9 月）。試験結果を**表２-１７**に示す。

基本理論の試験成績は向上したが、配電計画・設計の理解度に個人差が見られた。これはマルチトランスフォーマシステム適用現場指導に同行した講師候補生とそうでない講師候補生との差であると考えられる。基本理論は理解し計算もできるが、実現場への応用力に弱点が見られる。

2018 年 9 月の WG 活動で講師候補生全員が全 5 テーマの理解度確認試験を受けることを事前に周知し、かつ自己研鑽の重要性を伝えて、自己学習に励んだ。その結果、一部点数が低い分野も残るが、理論的に回答できるようになり、総合的な理解は深まったと評価できる。

表２-１７　プロジェクト終了時の全 5 テーマの理解度確認試験結果

WG テーマ	平均点 / 満点	点数が低かった内容
WG 1 配電計画・設計	74.6 / 100	実現場に適用する応用問題
WG 2 配電建設・安全技術	97.0 / 100	特になし
WG 3 配電運用・保守管理	95.2 / 100	特になし
WG 4 送電技術	97.7 / 100	特になし
WG 5 変電技術	97.1 / 100	特になし

［出所］JICA 専門家チーム

２．１９　　講師認定証授与式

講師認定証授与式が 2018 年 9 月 27 日に開催され、26 名の講師候補生全員に認定証が授与された。授与式には MOEE 大臣、MOEE 副大臣、各局長、各部長が大勢出席し、今後の教育を担う講師に対する注目度が高いことが伺えた。

[出所] MOEE

図２−１３　講師認定証授与式の様子

２．２０　　第 3 回合同調整委員会（JCC）

第 3 回 JCC を 2018 年 11 月 6 日に開催し、これまでの活動報告を MOEE 側、専門家側からそれぞれ実施した。C/P の代表として Mr. Soe Ko Ko Aung が活動内容を報告した。活動内容報告の他には、最終版モニタリングシートの説明、研修システム構築に係る報告、フェーズ 2 に向けたワークプラン案の説明を行い合意が得られた。（アジェンダは及び出席者リストは添付資料 5 を参照）

第３章　　プロジェクト実施運営上の課題・工夫・教訓

３．１　プロジェクトの実施運営上の課題・工夫

(1) ミャンマー側の意思決定に係るプロセスの円滑化

WG 活動への研修生（講師候補生）の招集、地方セミナーの実施、JCC の開催等においては、MOEE 側の事前承認が必要であり、多くの場合、副大臣や局長クラスによる実施承認を受けなければならないため、本プロジェクトでは早期にスケジュールを確定し、MOEE 側と調整を図った。その際、MOEE 宛にレターを発出し、そのレターの記載内容をもとに上層部への確認・承認が行われるため、そうした準備において JICA チーム側の時間を短縮できるよう、2 名のミャンマー人専門家を配置し、MOEE 側とのコミュニケーションの円滑化を図ることができた。

(2) 研修用資機材の導入、運用技術の移転

本プロジェクトでは、日本の現場で適用されている本邦技術のうちミャンマーに適する機器や技術の導入を視野に入れて研修用資機材を選定し、使い勝手や導入効果を実感させるべく、研修所のみならず実運用線路から選定したパイロットサイトにもこうした資機材を導入した。パイロットサイトとして、研修所近郊もしくは講師候補生が管轄するエリアから導入効果が期待できるサイトを選定し、定期的に導入後のモニタリングを行うこととした。また、研修所に加え、パイロットサイトでは講師候補生と現地の技術者に対し、製品取付技術、試験方法や取り扱い方法なども技術指導した。

さらに、理解を深めるべく、導入製品のメーカの協力を得て、MOEE にて本邦技術、製品に関する研修や技術セミナーを開催した。

研修所やパイロットサイトへの製品の取り付けにおいては、現地で調達可能な取付用資材、部品等を可能な限り活用し、MOEE の既存の施工方法を踏襲できるよう配慮した。これにより、MOEE 技術者が既存の技術を活用しつつ本邦資機材を導入促進していくことが期待される。

(3) 講師候補生の選定及び講師認定

講師候補生は 20 名を想定していたが、MOEE 側の高い関心から、プロジェクト当初 27 名が招集された。講師候補生は、将来ミャンマー全土で研修活動が展開されることを期待して、全国から招集された。講師候補生の能力にばらつきがあったものの、JICA 専門家による継続的な技術移転に加え、定期的な講師候補生の能力確認試験や受講希望技術要望アンケート結果を踏まえてのテーマ指導及び講師候補生の自助努力により、最終的に講師候補生全員が講師として認定された。なお、本プロジェクト当初は「日本の最新の技術が学べる」とだけ聞かされて参加し、講師になることが不本意だった講師候補生も 2 年間の研修を受け、MOEE 上層部の訓示を受ける等で徐々に講師としての自覚を持ち始め、2018 年 6 月及び 7 月に開催した地方都市セミナーでは全員が講師として地方の技術者に教えることができるまでに成長した。ただし、MOEE は本プロジェクトで導入を目指した PDCA システムの活用による研修システムには馴染んでおらず、今後持続性のある研修システムの定着を図るうえで、MOEE 側が PDCA サイクルの趣旨について一層理解し、MOEE 自らが活動を進めていく

必要がある。

(4) 研修テキストツール作成

研修テキストは、本プロジェクト当初は、講師候補生の WG 活動の中で現行の送配電業務に直結した技術及び研修ニーズを洗い出し、カリキュラム及びシラバスを検討した上で講師候補生と共に作成する計画としていた。しかし、2016 年 12 月に MOEE 副大臣からの方針変更指示があり、JICA と MOEE との協議の結果、JICA 専門家側により日本の技術を反映した研修テキストツールを作成して講師候補生に技術移転する方針に変更となった。

加えて、JICA 専門家による講義ツールは当初視覚的にわかり易いパワーポイント様式としていたが、2017 年 7 月に MOEE 副大臣より文書冊子形式とすべきとの指示があり、最終的に 2017 年 12 月までに文書冊子形式として作成し直した。

本プロジェクトにて、技術移転を効果的に進めるには、JICA 専門家が一通り研修を実施したのち、講師候補生を始めとした MOEE 技術者が、ミャンマーの送配電に係る現状、課題を十分認識した上で、日本の技術を取捨選択してミャンマーで実践的に活用できる技術を取り纏めたテキストブックとすることが有効であるが、当初考えていたテキストツールの作成方法、様式、内容と異なるものとなった。持続的な研修システムを構築するために、MOEE が日本の研修体系や経験を受け入れ、ミャンマーの慣習に照らし合わせつつ、研修を試行する姿勢が有効であると考える。

今後研修で学んだ内容を現場の送配電業務に活用し、成果を具現化させるためには、日本の経験をミャンマーに取り入れていこうとする取り組みが重要である。また今回はテキストブックのみの策定に留まったが、現状分析・課題解決の観点から研修プログラム、カリキュラム・シラバスを構築し、そのうえで必要な項目のみを厳選して反映したテキストツールとすべきであろう。

(5) 本邦研修による技術・製品の理解促進

ネピドー研修所に導入困難な、例えば変電所の機器等の本邦技術に関しては、本邦研修として、日本の機器メーカによる技術説明や工場視察等のカリキュラムを設定した。また、講師候補生は将来 MOEE を担う人材であることから、将来のミャンマーへの技術導入の要望や可能性を鑑みて、超高圧直流送電（周波数変換所）、中性点接地方式等など、送配電分野の応用技術についても紹介した。なお、講師候補生を対象とした本邦研修に加えて MOEE 幹部向けの本邦研修を開催し、本プロジェクトへの理解・協力の向上、研修・人材育成の必要性への理解促進を図るとともに、本邦技術・製品のミャンマーへの導入促進活動を行った。

(6) 人材育成制度構築への取り組み支援

2016 年 12 月の MOEE 副大臣からの方針変更指示以降、本プロジェクトの活動意義について理解が得られず、MOEE における人材育成制度構築への取り組みが停止し、おおよそ 1 年間にわたり、JICA 専門家によるテキストブック作成、講義に特化した活動内容となった。人材育成制度構築にかかる取り組みが再開できたのは 2018 年 1 月のことであり、JICA 専門家として、MOEE への人材育成システム案提案など支援を進めてきた。人材育成制度構築への取り組みは、MOEE が主体的に進める

ようにMOEE副大臣より指示されているが、第1フェーズ終了時点では取り組みが停止したままである。MOEE内部の電力側部局とエネルギー側部局の双方で、研修組織設立や方針に関して調整がうまく進められないというのが要因のようである。

JICA専門家チームは人材育成構築の取り組みに関してMOEEに助言、支援を行っており、第1フェーズでは、今後どういった項目を検討していくべきかを洗い出し、MOEE側に提示した。人材育成構築を促進するためには、第2フェーズにかけて、MOEE側の検討状況及び活動の進捗について確認し、継続して助言をしていくことが必要である。

(7) 研修に係る予算手当

現状、MOEEでの人材育成制度が構築されていないため、研修にかかる予算も十分確保されていない。本プロジェクトでの研修期間は最大で3カ月程度であり、その間地方出身者はネピドーのMOEE研修所に滞在したが、期間の途中で地元に戻る交通費が出ないことや、日当が少ない、支払いが遅延する等の理由で講師候補生から不満が出ていた。当初の取り決め上、これらはMOEEが負担すべき費用であるが、本プロジェクトの実施の重要性を鑑みて、研修時の食事代をJICAが負担する等の措置を取った。

また、地方セミナーの予算手当について、セミナーではできるべく多くの講師候補生が複数回講師を経験できることが望ましいが、予算の制約上、渡航都市はネピドーから一日以内にバスで移動できる都市とし、JICAが傭上するバスの制約上、講師候補生1人当たり一回もしくは二回の参加とした。

加えて、MOEE側が負担すべき研修用資機材の設置にかかる材料、部材の費用もJICAが負担することとした。

現状では、MOEEからの研修生への研修日当、交通費等が十分手当されず、研修に対するモチベーションに悪影響を及ぼすことが懸念される。本プロジェクトの第2フェーズでJICAが潤沢な予算を供与してしまうと、プロジェクト終了以降のMOEE独自の研修の取り組みで十分な予算が確保できず、研修の運営に悪影響を及ぼし持続的な研修制度を中座させる要因となる可能性もあるため、MOEEによる研修予算手当について、JICA側及びMOEE側の双方で十分に協議し、MOEE側が理解して対処することが必要である。

３．２　プロジェクトの実施運営上の教訓

(1) MOEE側の意思決定

本プロジェクトのMOEE側の最高責任者は、JCC Chairpersonである事務次官であるが、MOEEの活動は実質MOEE副大臣の意向が大きく影響する。本プロジェクトでは、R/Dの内容に基づきワークプランを策定したが、副大臣の意向で重要な方針が変更された。したがって、重要な方針や活動事項については、JICA専門家とC/P間の合議で決めずに、副大臣、MOEE上層部に伺いを立てる必要がある。重要な方針や活動事項についてMOEEから変更を指示された際には、専門家チームとJICAで迅速に協議し、対応方針を決める必要がある。

(2) 研修に関するミャンマーと日本の考え方の違い

研修生自身が疑問や課題意識を持って学ぶ姿勢が求められる日本と、講師からの研修を一方的に聞いて学ぶミャンマーとでは研修の考え方に違いがあり、MOEE で研修活動を行う場合にはこうした点に留意し、どうしたら研修生が学んだことを身に付けることができるか留意する必要がある。また、ミャンマーは研修で何を学びどう身に付けたかよりも、受講した研修テーマ、受講回数、受講期間の積み重ねで、その人の研修受講歴が評価されるため、研修内容を習得するとの意識が薄いといった事情も考慮すべきである。

また、上層部からの指示に絶対に従うという反面、上からの指示がないと動かない傾向があり、自ら考えて状況を分析し創意工夫して改善を試みるといった習慣が身についていない。研修制度を持続的に進め状況に応じて改善を進めるといった取り組みに必要な PDCA サイクルの確実な実施という面で決定的な不安材料である。こうした状況を打開するために、現状分析、課題発掘、問題解決といったスキルを、研修のみならず、通常の業務遂行においても指導して定着を図る必要がある。

(3) 技術資料の入手、情報開示の困難性

研修テキストを構築するためには、ミャンマーの現状の業務の方法、技術状況を把握するために MOEE 側からの技術資料入手、情報開示が不可欠であるが、情報提供を依頼してもほとんどの場合提供されない。情報の秘匿性があって外部に開示できない場合や、情報・データ自体が整備・保持されていない場合がある。したがって、こうした資料あるいは情報やデータは入手が困難であるという前提でプロジェクトを進める必要がある。

(4) 本邦製品の調達

本邦製品をミャンマーに輸入する場合は、その輸入手続等にミャンマー独自の複雑なルールがあるようである。したがって、製品の製造工程以上にミャンマーへの輸送、輸入手続き（関税申告等）に時間がかかる場合が多い。本邦製品の調達の際には通常以上に納期を要する場合があることに留意し、特にミャンマーでの取引が浅く、代理店や輸入のノウハウを持っていない場合は注意が必要である。ただし、ミャンマーの国内ルールは最近変更されるケースも多く規制が緩和される可能性もある。

第４章　　プロジェクト目標の達成度

４．１　上位目標、プロジェクト目標

４．１．１　指標の概要

上位目標、プロジェクト目標の達成度を確認するための指標を設定した。当初 MOEE と協議した指標は以下のとおりである。

項目	指標の内容
上位目標	ミャンマー国全体における配電ロスならびに年間故障件数・平均故障時間
プロジェクト目標	講師候補生により実施された訓練数、 作業感電災害事故数、 パイロットサイトにおける配電ロス率ならびに年間故障件数・平均故障時間

これらの指標項目は 2016 年 11 月 3 日に開催した第 1 回 JCC の場で確認した。しかし、その後のベースライン調査などプロジェクトを進めるにつれ、指標に必要なデータが記録されていなかったり、各地域での定義や計測方法・範囲が異なったりして、ミャンマー国全体で統一した指標で評価することが困難であった。このため、ロスに関する上位目標は、国全体で集約できた MOEE の送配電ロス率とした。

また、配電系統の故障回数・年間停電時間数に関しては、第１フェーズの当初から MOEE に対してデータ収集の必要性の説明とデータ収集・統計化を働きかけてきたが、ミャンマー国全体の実績値は提示されず、目標値を設定することができていない。具体的な指標値は設定できていないが本プロジェクトの取組効果を示す項目であるので、上位目標の指標として残すこととした。なお、他の東南アジア諸国では年間停電時間について統計化されており、特にミャンマーに限って統計化が困難な事項ではないと考える。

第２フェーズでも引き続き、停電実績の統計化にかかる働きかけ、支援が必要であり、第２フェーズでの技術移転の対象とすべきであろう。なお、指標値は、他の東南アジア諸国の実績値も参考にして決定すべきであると考える。（下表参照）

【参考】他の東南アジア諸国の停電時間（分／需要家／年）の実績値（2016 年度）（抜粋）

国	停電時間（分／需要家／年）
インドネシア	1,532
ベトナム	1,651
カンボジア	1,370

［出所］アジア諸国の電力統計（2016 年度）（海外電力調査会）

上位目標の指標及びプロジェクト目標の指標をそれらの実績値、目標値とともにそれぞれ**表４－１**及び**表４-３**に示す。なお、**表４－１**の停電に関する指標は、参考値として年間を通して過去データが得られた地域での実績を示す。

表４－１　上位目標の指標

指標	本プロジェクト開始時点の実績値（2015-2016 年）	第１フェーズ終了時点の実績値（2017-2018 年）	第 2 フェーズ終了 3 年後時点の目標値（2024-2025 年）
送配電ロス率（%）（ミャンマー国全体）	15%	14%	11%
配電系統の故障数（回／年）	過去データ有の地域のみ実績値を**表４－２**に記載		
配電系統の年間停電時間数（分／年）	過去データ有の地域のみ実績値を**表４－２**に記載		

［出所］JICA 専門家チーム

表４－２　配電系統の故障数及び年間停電時間数

地域／州	本プロジェクト開始時点の数値（2015-2016 年）	
	配電系統の故障数（1 年あたり）	配電系統の年間停電時間（分／年）
Ayeyarwady	355	1,414
Bago West	95	1,210
Kayar	324	929
Mon	269	904
Nay Pyi Taw	389	1,014

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表４-３　プロジェクト目標の指標

指標	本プロジェクト開始時（2015－2016 年度）	2018 年時点値（フェーズ 1 終了時点）	2021 年時点の目標値（フェーズ 2 終了時点）
認定された研修員による研修の実施回数	0 回	0 回	10 回以上
配電線路作業における作業災害者数(ミャンマー国全体で 1 年間あたり)	12 人 (2016 年)	11 人 (2017 年)	7 人未満
パイロットサイトにおける配電ロス率			

パイロットサイト	2015-2016 年実績値	2017-2018 年実績値	2021-2022 年目標値
Dala Township (YESC)	25.5%	22.5%	16%
Tatkon Township (ESE)	11.7%	14.3%	9%
Kyaukpadaung Township (MESC)	27.4%	24.3%	18%

1 年当たりの変電所故障停電回数（回）及び故障停電時間（時間）	パイロットサイト	変電所停電回数・時間		
		2016 年 実績値	2017 年 実績値	2021 年 目標値
	11kV distribution feeders in TatkonTownship (ESE)	37 回 9 時間	27 回 6 時間	16 回 3.5 時間
	11kV distribution feeders in Kyaukpadaung (MESC)	235 回 100 時間	140 回 57 時間	74 回 30 時間

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４．１．２　上位目標、プロジェクト目標の達成度

表４－１に示した上位目標の指標値については、本プロジェクト開始時点の実績値をもとにプロジェクトが終了し、3 年が経過した年次の目標値を定めた。プロジェクト開始時の 2016-2017 年のロス率 15%は第 1 フェーズ終了時点の 2017-2018 年には 14%へ低下しているが、本プロジェクトによる効果は、現状ではまだ直接関わりのあるプロジェクト関連の範囲にとどまり、上位目標への効果は今後、ESE、YESC 及び MESC による円借款プロジェクトの進展を含めて表れてくると考えられる。**表４-３**に示したプロジェクト目標については、指標ごとに以下に述べる。

認定された研修員に拠る研修の実施回数については、2018 年 6～7 月の地方セミナーで C/P 自身が講師として研修を実施したが、彼らが講師として認定されたのは 2018 年 9 月であるので、実績は 0 回である。ただし、YESC は認定講師によるセミナーを独自に 2018 年 12 月に企画しており、MOEE 上層部も認定講師を今後の MOEE 独自の研修で十分に活用することを考えている等、第 1 フェーズ終了以降に実績が進展していくものと見込まれる。

配電作業における MOEE 災害者数については、国全体での実績が報告されているため、国全体で 1 年間あたりの災害者数をプロジェクト目標値とし、本プロジェクトにおいても安全関連技術は重点的に技術移転を行った。2016 年の 12 人から 2017 年は 11 人に減少した。

パイロットサイトにおける配電ロス率に関して、ミャンマー全域へのロス低減技術の普及は短期間では困難であることから、C/P が担当するパイロットサイトの選定により、地域を絞って配電ロス低減を支援し、その後、その技術が他の地域に普及することを目指した。プロジェクトにおいて、OJT が容易、あるいは高い効果が期待できるサイトとして、ESE、YESC 及び MESC 管内の Tatkon、Dala 及び Kyaukpadaung タウンシップを選定した。対象タウンシップは、事前にマネージング・ミーティング等で C/P（講師候補生）と検討を行い、ESE、YESC 及び MESC と協議して決定している。2015-2016 年及び 2017-2018 年の実績値は**表４-３**のとおりである。Dala 及び Kyaukpadaung タウンシップでは 2 年間で 3%程度ロス率が低下している。

前述のとおり、年間故障停電回数及び年間故障停電時間については、各地域での定義や記録方法・対象範囲が異なり、国全体の統一指標で評価することはできなかった。したがって、配電ロスの場合と同様に、パイロットサイトを選定し、地域を絞ってプロジェクトの効果を確認した。故障区間を限定する SOG-VCB 導入対象のパイロットフィーダとして、電源側には病院等の重要負荷があり、負荷

側は故障が多いなどの条件から、Tatkon Ngwe Taung 変電所 11 kV Agri Farm フィーダと Chauk main 変電所 11 kV Feeder(1)フィーダを選定した。2016 年及び 2017 年の実績値は**表４-３**のとおりであり、停電回数・時間ともに大幅に削減されている。SOG-VCB 設置後は、電源側エリアの停電回数が低減され、重要負荷等への供給信頼度が改善されてきている。

なお、パイロットサイトのモニタリングは、C/P（講師候補生）から担当者を設定し、定期的に実績を報告させる方法を採った。

４．２　成果に関する達成状況

各成果に関する達成状況は下記のとおり。

４．２．１　成果１に関する達成状況

「成果１：人材育成計画の枠組みが策定される。」に関する指標及び達成状況を**表４-４**に示す。

表４-４　成果１の指標及び達成状況

指標	達成状況
(1)資金面及び制度面に関する改善について 1 件以上 MOEE に提言する。	- 研修制度構築準備委員会(Training Center Preparatiion Committee)を提案し、設立について副大臣からの承認を得て MOEE が主体的に取り組むこととなった。
(2)送配電システムに関する技術面での取り組み（技術標準化を含む）について 1 件以上 MOEE に提言する。	- 小容量の変圧器を用いるマルチトランスフォーマーシステムを中圧配電線に導入することを提案し、幾つかのタウンシップで実際に導入された。 - 配電線路保護のため遮断機能を有した開閉器(SOG-VCB)を中圧配電線に導入することを提案し、幾つかのタウンシップで実際に導入された。 - 現在のところ技術標準化に関する動きはない。
(3)人材育成計画／方針が提案される。	-人材育成計画／方針の方向性が提案された。

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４．２．２　成果２に関する達成状況

「成果２：研修プログラムが整備され、実施される。」に関する指標及び達成状況を**表４−５**に示す。

表４−５　成果２の指標及び達成状況

指標	達成状況
(1) 1 件以上の研修プログラムが承認される。	- Yangon、Mandalay、Taunggyi、Bago、Magway 及び Monywa の 6 都市の技術者を対象とした地方セミナーの実施が MOEE で承認され、実施された。
(2) 研修シラバス、カリキュラム及びテキストブックがそれぞれの研修について作成される。	- JICA 専門家によって 2017 年 12 月までに 5 テーマのテキストブックスが作成された。 - 上記のテキストブックをもとに、講師候補生によって地

	方セミナー用の研修資料が作成された。 - 体系化した研修プログラムに基づいた研修シラバス、カリキュラム及びテキストブックは作成に至っていない。
(3) トレーナー研修(TOT)が 1 回以上実施される。	- JICA 専門家による講師候補生向けの集合教育が、TOT の一環として 2017 年 3 月～12 月の間に延べ 7 ヶ月間実施された。 - 講師として教える技術の習得のために技術セミナーを実施した。
(4) 26 名以上の講師が認定される。	- 2018 年 9 月 27 日に講師認定証授与式が行われ、26 名の C/P が新たに MOEE の講師として認定された。（当初の 27 名の講師候補生のうち 1 名は人事異動によって本プロジェクトの活動から離脱したため認定対象外）
(5) 講師認定制度が承認される。	- MOEE による人材育成制度構築の取り組みが中断しているため、講師認定制度に関する検討は未実施である。
(6) 研修に必要な設備及び資材が導入される。	- 研修用の電力用資機材（電柱、変圧器、開閉器、電線等）及び安全用資機材（安全帯、検電器等）が調達され、ネピドーの MOEE 研修所に設置された。
(7) 技術標準化の活動に関するテキストブックが 1 冊以上作成される。	- JICA 専門家チームは技術標準化に関する諸情報をテキストブックに反映し、TOT の活動において講師候補生にそれらの情報を伝えた。

［出所］JICA 専門家チーム

４．２．３　成果３に関する達成状況

「成果３：研修システムの PDCA (Plan, Do, Check, Action) サイクルが構築され実践される。」に関する指標及び達成状況を**表４−６**に示す。

表４−６　成果３の指標及び達成状況

指標	達成状況
(1) 研修に対する評価を 1 回以上実施する。	- JICA 専門家と講師候補生は 2018 年 8 月の WG 活動で 2018 年 6～7 月の地方セミナーでの研修について振り返りを行い実施状況について評価した。
(2) 評価結果について時期の研修計画にフィードバックする。	- JICA 専門家と講師候補生は地方セミナー実施に関する評価結果について、次回の研修にどう活用するかを話し合った。 - JICA 専門家と講師候補生は、評価結果に基づき将来計画する研修について内容や方法を改善点を提案した。 - ただし、次の研修の時期、場所、期間等については MOEE 内で決定されていない。
(3) PDCA サイクルを継続して実践する。	- 地方セミナーの振り返り、評価を行う過程で、PDCA サイクルの実践の重要性について C/P（講師候補生）及び MOEE に説明し理解を得たが、地方セミナー1 回のみの実施で第 1 フェーズが終了したため、PDCA サイクルを

	継続して実践するまでには至っていない。

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４．３　プロジェクトの評価

本プロジェクトは、モニタリングシートによって C/P とともに定期的に合同モニタリングを実施してきた。ここでは、第 1 フェーズ（2016 年 5 月～2018 年 11 月）の期間について、DAC５項目（妥当性、有効性、インパクト、効率性及び持続性）に基づき行った評価の結果を示す。

４．３．１　　妥当性

「妥当性」は、下記の理由から「高い」と判断される。

優先度	・ミャンマー国では、電力設備の一層の拡充が必要とされるなかで、電力事業に従事する人材（技術者、技能者）の能力向上が急務になっており、本プロジェクトの目標と合致している。
開発政策・目標	・ミャンマー国新政権の経済政策（2016 年 7 月）においては、「電力、道路、港湾といった基礎的経済インフラの迅速な整備」が重要政策とされており、電力の供給能力の改善はミャンマーの重要な課題と位置付けられている。本プロジェクトは電力セクターの諸課題を解決すべく人材育成に取り組むものであり、ミャンマー政府の政策・目標と合致している。 ・日本政府は「質の高いインフラパートナーシップ」を掲げ、アジアのインフラ分野向けの支援を重点的に実施している。本プロジェクトで人材育成を実施することで、電力セクターのインフラ整備（送変電及び配電）の円滑実施及び効果の発現に大きく寄与できるため、日本政府の政策と合致している。
戦略面	・MOEE が実現していない人材育成の持続可能な制度構築に向けた講師育成、PDCA サイクルの定着を目指した本プロジェクトのアプローチは妥当である。 ・本プロジェクトでは、適切な本邦技術の導入による質の高い電力設備の形成を目指した研修設備の導入や研修内容の設定を図っており、この取り組みは日本の技術の優位性をミャンマーに展開するうえで有効である。
JICA 他プロジェクト及び他ドナーとの役割分担	・JICA 他プロジェクトや世界銀行やアジア開発銀行が実施する、ミャンマー電力セクターの送配電に係るプロジェクトは、主に設備拡充計画、設備形成（設計、資材調達、工事等）の内容である。本プロジェクトで人材育成を主題として活動することで、これらプロジェクトの円滑実施及び運用保守のスキル強化による設備導入効果の発現が期待できるため、本プロジェクトの妥当性は高い。

４．３．２　有効性

「有効性」は、下記の理由から「低い」と判断されるが、現時点では第１フェーズが終了したところであり、結果を判断し評価するのは時期尚早であると考える。

・第１フェーズ終了時点で、プロジェクト目標が十分に達成できたとはいえない。

・第１フェーズ終了時点で、「期待される成果」のうち、成果１、成果３については達成されていない。また、成果２についてもJICA専門家が作成した日本の技術に特化したテキストブックであって、ミャンマー国の実情に合ったものに変更していく必要があり、十分達成できたとはいえない。

４．３．３　インパクト

「インパクト」は、下記の理由から「やや低い」と判断される。

上位目標の達成予測	・第１フェーズ終了時点では、上位目標達成の見通しはまだ立っていない。ただし、電力設備の増強、電力供給の信頼性の向上及び電力ロス低減に資する研修活動を展開してきたため、上位目標達成に向けてのアプローチはできていると考える。 ・円借款事業「ヤンゴン配電網改善事業（フェーズ１）」及び「地方主要都市配電網改善事業」が上位目標達成に貢献する外部要素として挙げられる。前者は開始して１年未満、後者は未開始の段階であり、現段階では効果は発現していないが、将来事業完了により、設備改善が進むことにより、上位目標達成の大きなインパクトになる。 ・第１フェーズの講師候補生が、日本の技術をもとにした能力向上を図ったことをプロジェクト内でも確認できており、講師となった彼らが地方都市に帰任し、中央からのみでなく、地方都市から送配電技術向上を推し進める効果により大きなインパクトが期待できる。
波及効果関連	＜政策・制度への波及効果＞ 特になし。 ＜対象地域への波及効果＞ 電力設備の増強がミャンマー国内で進むことによって、当該地域の社会基盤整備による産業開発・育成及び地域住民の生活レベルの向上が期待される。 ＜その他の波及効果＞ 適切な本邦技術の導入による質の高い電力設備の形成を目指した研修用設備の導入や研修テーマの設定を図っており、こうした取り組みがミャンマー国における電力設備の技術変革をもたらす可能性がある。また、この場合、ミャンマーにおける本邦技術の一層の活用につながることが考えられる。

４．３．４　効率性

「効率性」は、下記の理由から「やや低い」と判断される。

アウトプットの達成見込み	＜成果１＞ 人材育成制度の枠組みを策定する取り組みは、第１フェーズの途中で中断されて 2018 年 1 月に再開したが、MOEE 側での研修制度構築準備委員会の WG 活動が進んでおらず再開予定もないため、現時点で達成見込みが立たない。 ＜成果２＞ 第１フェーズで JICA 専門家によるテキストブック作成・研修実施、地方セミナー開催、研修用設備の設置を行った。ただし、本プロジェクトで目標としていた、体系化された研修プログラムに基づいた研修カリキュラム・シラバスを念頭としたテキストブック作成、研修実施ではなく、当初期待したレベルが達成できるかどうかは現段階では想定できない。 ＜成果３＞ 第１フェーズの C/P に PDCA サイクルの考え方を説明し理解を得られたが、今後 MOEE の組織として、研修システムに PDCA サイクルの考え方が定着するかどうかは現段階では想定できない。
投入（インプット）	＜事業期間、事業費＞ ・事業期間はほぼ計画通りに進められた。ただし、2018 年 11 月時点で第２フェーズの開始時期が未定であり、第１フェーズと第２フェーズの活動の継続性の面で懸念が残る。 ・MOEE からの要望に基づき、JICA 専門家による研修テキストブック作成を効率的に行う必要が発生したため、事業費については既存の技術専門書の英訳費用として約 1,300 万円の増額となった。 ＜専門家、相手国 C/P、資機材投入＞ ・現地活動での協働作業で研修テキストツールを作成する計画が変更となり、JICA 専門家のみで研修テキストブック作成を行うことになったため、当初予定分と比較して約 10M/M を現地活動から国内作業に振り替えた。（トータルの M/M は変更なし） ・当初予定していた渡航期間を予算の範囲内で分割することによって日本人専門家の渡航回数を増加させ（当初予定 56 回⇒実績 80 回）、よりきめ細かな研修活動をタイムリーに行えるように工夫した。これによって、専門家の渡航毎の活動内容がより集中的でかつ明確なスケジュール配分を伴うものになり、効率的な現地活動が展開できたと考える。

４．３．５　持続性

「持続性」は、下記の理由から「低い」と判断されるが、現時点では第１フェーズが終了したところであり、結果を判断し評価するのは時期尚早であると考える。

効果の持続性	第１フェーズの成果として、26 名の講師候補生に対し、JICA 専門家による技術移転による研修を実施し、講師認定を得たことが挙げられる。しかし、人材育成制度が MOEE 内で構築されていないことから、講師を認定した効果が持続できる見込みはない。さらに次の要因が考えられる。 ・研修プログラムが構築されていないため、効果的な研修テーマの設定がされない可能性ならびに定期的に研修が実施されない可能性がある。 ・研修予算を確保するルールがないことから、現状、研修の実施可否が研修費用を確保できるかどうかに大きく関わっているものの改善できておらず、決まった研修が毎年行われるかどうかも不明である。 ・講師認定制度が構築できていないため、第１フェーズで講師認定された 26 名以降、講師を育成し、能力評価し、認定する仕組みが展開されない可能性がある。 ・PDCA サイクルの実施が組織レベルで定着していない。MOEE のオーナーシップが十分に醸成できたといえず、自ら現状分析・評価し改善に取り組むといった動きが見られない。

第５章　　上位目標の達成に向けての提言

５．１　上位目標達成へのアプローチ

本プロジェクトの上位目標は、

「ミャンマーの電力設備の増強が促進され、電力供給の信頼性と効率及びエネルギーアクセスが向上する。」

であり、上位目標の指標として、**「送配電ロスの低減」**及び**「停電時間・停電回数の削減」**の２項目が掲げている。

本プロジェクトは直接設備形成を行うものではなく、送変電及び配電システムに従事する技術者及び技能者の能力を向上させるものである。したがって、上位目標達成には業務従事者のスキルアップと同時に、MOEE が送配電の設備形成及び保守運用を適切に行う必要がある。上記２項目の実現には具体的に下記の取り組みが必要である。

送配電ロスの低減	【テクニカルロスの低減】 ・送電線路、中圧及び低圧配電線路新設・太線化 ・配電用変圧器の新設及び取替時の容量適正化、低圧配電線路亘長の短縮化・太線化（マルチトランスフォーマーシステム） 【ノンテクニカルロスの低減（盗電防止）】 ・裸電線から被覆電線（絶縁電線）への張替 ・配電線路巡視の強化による盗電箇所の発見 ・デジタル型電力量計の整備と精度確保 ・盗電発覚時の罰則強化と確実実施
停電時間・停電回数の削減	【停電発生の抑制】 ・設備の信頼度強化（配電線新増設時の絶縁電線、高信頼資機材採用等） ・送配電線路巡視の強化による不良箇所の早期発見・改修 【停電範囲の縮小化】 ・配電用変圧器の新設及び取替時の容量適正化、分散設置（マルチトランスフォーマーシステム） ・時限順送システム、SOG といった機器の導入による健全区間の送電継続 ・配電線路への開閉器の導入による故障停電発生時の停電範囲縮小化 ・送電線路及び配電線路の連系強化による系統切替 【停電時間の削減】 ・変電所リレーの的確な動作、故障停電発生時の即時故障個所除去 ・保守体制強化（復旧班、連絡体制整備）による故障停電発生時の早期対応、早期復旧 ・上記に関する故障復旧訓練の適宜実施

５．２　上位目標達成に向けての提言

MOEE が政策面、制度面で実施すべき事項を提言として纏める。

(1) 人材育成制度の強化

前述のとおり、人材育成制度の枠組みを策定する取り組みは、2018 年 11 月時点で中断されており、それを踏まえて第 3 回 JCC で次のような項目の策定を提言した。これらを速やかに検討し、実施することが重要となる。

Step 1: 人材育成・研修方針策定
Step 2: 能力育成レベル設定
Step 3: 階層別研修（ライフサイクル・トレーニング）プログラムの検討
Step 4: 年度研修のスケジュール化
Step 5: 講師の選定、研修用テキストブックの作成
Step 6: 研修予算の確保

こうした取り組みによって、質のある研修を確実に実施することで、MOEE の技術者、技能者の能力を向上させ、送配電の業務のレベルを向上し、送配電の設備形成、保守運用を確実に行うことができる。

(2) 技術基準の策定

電力設備の保安上、電力設備の技術基準を策定し、その規定内容に基づいた設備形成、保守を行う必要がある。しかし、現状ミャンマーでは技術基準が策定されておらず、電力設備の保安を十分確保しているとはいいがたい。技術基準では、どういった種類、性能の用品や資機材を用いるという点を規定するのではなく、電力設備の電気的強度、機械的強度、他物との離隔、地上高、接地抵抗値等に関する具体的な数値規定を設けることが必要である。供給信頼度向上や公衆保安確保の側面から技術基準は極めて重要であり、早急な策定が必要である。

(3) 各業務に係る指針・手引類の整備

ミャンマー全体の送配電技術者、技能者が精度の高い業務を実施し、質の高い電力供給を実現するためには、日々の業務の実施方法に一律のルールを設け、さらにそれを纏めた指針・手引類を整備することが望ましい。実際の業務の指針・手引類から内容は、テキストブックに反映し、社内研修等で、技術者への理解浸透を図るべきである。指針・手引類の整備は喫緊の課題であり、質の高い業務の遂行を全国に浸透させるためにも必要不可欠である。

(4) 円借款事業との連携

ミャンマーでは、下記の内容で「ヤンゴン配電網改善事業フェーズ１」及び「地方主要都市配電網改善事業」が進められており、さらに次期配電網整備・改善に係る円借款事業も計画されている。

円借款事業	内容
ヤンゴン配電網改善事業フェーズ１	Component 1: Installation of 66kV substations (C-GIS type) Component 2: Introduction of multi-transformer system Component 3: Replacement of distribution line, including time-sequential auto-sectionalizers Component 4: Introduction of utility vehicles
地方主要都市配電網改善事業	Component 1: Construction and Reinforcement of 33/11kV Substations and 66/11kV Substations Component 2: Construction and Replacement of 66kV and 33kV Transmission Line Component 3: Procurement of Reliability Improvement Equipment for Distribution Line Component 4: Utility Vehicles

本プロジェクトでの研修内容がそのままこれらの円借款事業で実施される事業の技術と直結しており、円借款事業で実現する配電網改善によって、電力設備の増強が促進され、電力供給の信頼性と効率及びエネルギーアクセスが向上する。したがって、MOEE 及び円借款事業の実施機関（YESC、ESE 及び MESC）は、上位目標達成の意味でも、本プロジェクトで向上した技術力を活かして、円借款事業の確実な実施に向けて諸事取り組むべきである。

また、これら円借款事業と本プロジェクトの相乗効果を図るべく、次の項目を提案する。

(a) 事業管理ユニット（Project Management Unit，以下、PMU という）メンバーの研修への参加

円借款事業の PMU のメンバー（YESC, ESE 及び MESC の技術者）を本プロジェクト第２フェーズの研修に参加させる。

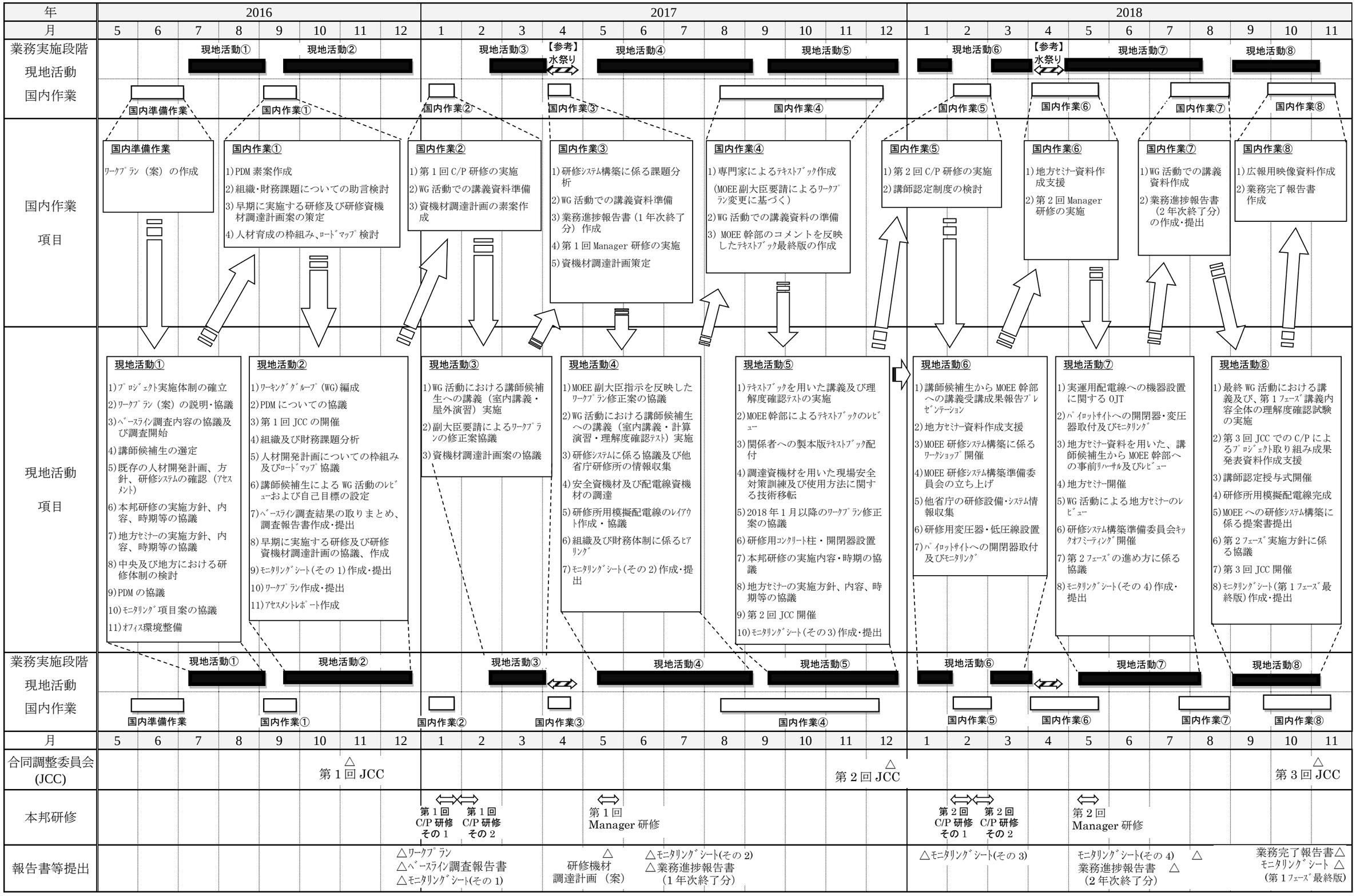
(b) 第１フェーズで認定された講師の円借款事業への参加

第１フェーズで認定された講師は、現場での OJT を受講して技術レベルも向上しており、円借款事業の担当者として参画することで円借款事業実施促進を図ることができる。

(c) 円借款で導入予定の技術の深掘

円借款で導入予定の技術について、第２フェーズの研修テーマとして取り上げて保守運用の方法等を更に深く掘り下げて技術移転を行う。

業務フローおよび活動内容



出所：JICA 専門家チーム

短期専門家の派遣実績

本プロジェクトに従事した短期専門家、その派遣期間及び業務従事 M/M（現地／国内）は以下のとおりである。

担　当	氏　名	現地業務従事期間 （移動期間を含む）	業務従事 M/M		
			現地	国内	合計
チーフアドバイザ／ 配電系統技術	加藤　友英	2016 年 7 月 18 日～ 8 月 13 日（27 日間） 2016 年 9 月 25 日～11 月 5 日（42 日間） 2016 年 12 月 18 日～12 月 24 日（ 7 日間） 2017 年 2 月 26 日～ 3 月 18 日（21 日間） 2017 年 5 月 14 日～ 6 月 10 日（28 日間） 2017 年 7 月 9 日～8 月 12 日（35 日間） 2017 年 11 月 13 日～12 月 9 日（27 日間） 2017 年 12 月 18 日～12 月 23 日（6 日間） 2018 年 1 月 30 日～2 月 3 日（5 日間） 2018 年 4 月 1 日～4 月 13 日（13 日間） 2018 年 6 月 2 日～6 月 23 日（22 日間） 2018 年 7 月 22 日～8 月 18 日（28 日間） 2018 年 9 月 2 日～9 月 22 日（21 日間） 2018 年 10 月 7 日～10 月 20 日（14 日間） 2018 年 10 月 28 日～11 月 10 日（14 日間）	10.33	4.30	14.63
副チーフアドバイザ／ 配電技術（保守管理）	谷畑　治	2016 年 7 月 18 日～ 7 月 30 日（13 日間） 2016 年 9 月 6 日～ 9 月 17 日（12 日間） 2016 年 10 月 23 日～12 月 1 日（40 日間） 2017 年 3 月 19 日～ 4 月 5 日（18 日間） 2017 年 6 月 25 日～7 月 15 日（21 日間） 2017 年 8 月 13 日～8 月 29 日（17 日間） 2017 年 10 月 22 日～11 月 11 日（21 日間） 2017 年 12 月 10 日～12 月 23 日（14 日間） 2018 年 3 月 4 日～3 月 13 日（10 日間） 2018 年 11 月 4 日～11 月 10 日（7 日間）	5.77	4.50	10.27
配電技術 （計画・設計）	式町　浩二	2016 年 8 月 7 日～ 9 月 10 日（35 日間） 2016 年 12 月 4 日～12 月 24 日（21 日間） 2017 年 3 月 19 日～ 4 月 8 日（21 日間） 2017 年 6 月 11 日～7 月 8 日（28 日間） 2017 年 8 月 13 日～8 月 26 日（14 日間） 2017 年 10 月 8 日～ 10 月 28 日（21 日間） 2018 年 1 月 14 日～ 1 月 27 日（14 日間） 2018 年 3 月 11 日～ 3 月 31 日（21 日間） 2018 年 4 月 29 日～ 5 月 18 日（20 日間） 2018 年 7 月 29 日～8 月 11 日（14 日間） 2018 年 11 月 4 日～11 月 10 日（7 日間）	7.20	4.10	11.30
配電技術（建設）	中川　郁雄	2016 年 10 月 15 日～11 月 5 日（21 日間） 2017 年 6 月 25 日～7 月 15 日（21 日間） 2017 年 10 月 8 日～10 月 21 日（14 日間） 2017 年 11 月 26 日～12 月 9 日（14 日間） 2018 年 3 月 11 日～3 月 24 日（14 日間） 2018 年 5 月 27 日～6 月 16 日（21 日間）	3.50	2.30	5.80
送電技術	吉田　俊貴	2017 年 7 月 9 日～7 月 29 日（21 日間） 2017 年 11 月 5 日～11 月 11 日（7 日間） 2018 年 6 月 24 日～7 月 7 日（14 日間） 2018 年 7 月 15 日～8 月 4 日（21 日間） 2018 年 9 月 9 日～9 月 22 日（14 日間）	2.57	3.35	5.92

担　当	氏　名	現地業務従事期間 （移動期間を含む）	業務従事 M/M		
			現地	国内	合計
変電技術	中村　光宏	2016 年 10 月 15 日～11 月 5 日（21 日間） 2017 年 7 月 23 日～8 月 19 日（28 日間） 2017 年 11 月 13 日～11 月 23 日（11 日間） 2017 年 12 月 10 日～12 月 16 日（7 日間） 2018 年 3 月 11 日～3 月 24 日（14 日間） 2018 年 7 月 15 日～8 月 4 日（21 日間） 2018 年 9 月 2 日～9 月 8 日（7 日間）	3.63	1.30	4.93
人材育成計画１ （研修システム）	小林　美奈	2016 年 8 月 21 日～ 9 月 3 日（14 日間）	0.47	0.10	0.57
	三井　真一	2016 年 10 月 15 日～11 月 12 日（28 日間） 2017 年 7 月 30 日～ 8 月 26 日（28 日間） 2017 年 12 月 18 日～ 12 月 23 日（6 日間） 2018 年 1 月 14 日～ 1 月 27 日（14 日間） 2018 年 3 月 4 日～ 3 月 24 日（21 日間） 2018 年 5 月 13 日～ 5 月 27 日（15 日間） 2018 年 7 月 15 日～ 7 月 28 日（14 日間） 2018 年 8 月 26 日～ 9 月 8 日（14 日間） 2018 年 9 月 23 日～ 10 月 6 日（14 日間） 2018 年 10 月 28 日～ 11 月 10 日（14 日間）	5.57	2.20	7.77
財務・組織分析	山下　興一	2016 年 8 月 28 日～ 9 月 10 日（14 日間） 2016 年 11 月 6 日～11 月 12 日（7 日間） 2017 年 6 月 11 日～ 6 月 24 日（14 日間） 2018 年 1 月 21 日～ 2 月 3 日（14 日間） 2018 年 3 月 4 日～3 月 17 日（14 日間） 2018 年 5 月 20 日～ 5 月 26 日（7 日間） 2018 年 6 月 3 日～6 月 5 日（3 日間） 2018 年 9 月 2 日～ 9 月 8 日（7 日間） 2018 年 9 月 23 日～10 月 6 日（14 日間） 2018 年 10 月 14 日～ 10 月 18 日（5 日間） 2018 年 10 月 28 日～11 月 10 日（14 日間）	3.77	0.50	4.27
電力・配電開発政策	斎藤　芳敬	2016 年 10 月 23 日～11 月 4 日（13 日間） 2018 年 9 月 9 日～9 月 21 日（13 日間） 2018 年 11 月 4 日～11 月 9 日（6 日間）	1.07	0.05	1.12
電力技術１（計画）	片岡　琢士	2016 年 8 月 9 日～ 8 月 12 日（ 4 日間） 2016 年 10 月 23 日～11 月 4 日（13 日間） 2018 年 9 月 9 日～9 月 21 日（13 日間）	1.00	0.05	1.05
電力技術２ （地方都市）	Hoke Shein	2016 年 8 月 1 日～8 月 5 日、8 月 9 日～8 月 19 日及び 8 月 22 日～8 月 26 日（計 21 日間） 2016 年 10 月 17 日～11 月 11 日（26 日間） 2017 年 3 月 13 日～3 月 17 日（5 日間） 2018 年 1 月 15 日～1 月 26 日（12 日間） 2018 年 4 月 2 日～4 月 12 日（11 日間） 2018 年 6 月 4 日～6 月 15 日（12 日間） 2018 年 6 月 25 日～7 月 6 日（12 日間） 2018 年 7 月 15 日～7 月 18 日（4 日間） 2018 年 8 月 13 日～8 月 17 日（5 日間） 2018 年 9 月 3 日～9 月 10 日、9 月 13 日～9 月 21 日（17 日間） 2018 年 10 月 1 日～10 月 4 日、10 月 8 日～10 月 19 日（16 日間） 2018 年 10 月 31 日～11 月 9 日（10 日間）	5.03	0.50	5.53

担　当	氏　名	現地業務従事期間 （移動期間を含む）	業務従事 M/M		
			現地	国内	合計
人材育成計画２ （地方都市）	Wah Wah Han Su Yin	2016 年 7 月 20 日～7 月 22 日、7 月 25 日～7 月 29 日、8 月 9 日～8 月 12 日、8 月 15 日～8 月 19 日及び 8 月 22 日～8 月 26 日（計 22 日間） 10 月 17 日～10 月 21 日、10 月 24 日～10 月 28 日、10 月 31 日～11 月 4 日及び 11 月 7 日～11 月 8 日（計 17 日間） 2017 年 6 月 12 日～6 月 23 日（12 日間） 2017 年 7 月 10 日～7 月 14 日（5 日間） 2017 年 12 月 4 日～12 月 22 日（19 日間） 2018 年 3 月 5 日～ 3 月 16 日（12 日間） 2018 年 5 月 14 日～5 月 25 日（12 日間） 2018 年 6 月 4 日～ 6 月 15 日（12 日間） 2018 年 6 月 25 日～7 月 6 日（12 日間） 2018 年 7 月 15,16,18 日（3 日間） 2018 年 7 月 30 日～8 月 3 日（5 日間） 2018 年 8 月 27 日～9 月 7 日（12 日間） 2018 年 9 月 17 日～9 月 21 日（5 日間） 2018 年 10 月 1 日～10 月 4 日、10 月 8 日～10 月 19 日（16 日間） 2018 年 10 月 29 日～11 月 9 日（12 日間）	5.83	0.85	6.68
		（合計）	**55.73**	**24.10**	**79.83**

2016 / 2017 / 2018（5月〜翌年11月）

現地業務

氏名	格付		日数合計	人月合計
加藤　友英 チーフアドバイザ／ 配電系統技術	2	計画	336	11.20
		実績	310	10.33
谷畑　治 副チーフアドバイザ／ 配電技術（保守管理）	3	計画	266	8.87
		実績	173	5.77
式町　浩二 配電技術 （計画・設計）	3	計画	266	8.87
		実績	216	7.20
中川　郁雄 配電技術 （建設）	4	計画	140	4.67
		実績	105	3.50
吉田　俊貴 送電技術	4	計画	140	4.67
		実績	77	2.57
中村　光宏 変電技術	4	計画	140	4.67
		実績	109	3.63
三井　真一 人材育成計画１ （研修システム）	4	計画	182	6.07
		実績	167	5.57
小林　美奈 人材育成計画１ （研修システム）補助	4	計画	14	0.47
		実績	14	0.47
山下　興一 財務・組織分析	4	計画	98	3.27
		実績	113	3.77
斎藤　芳敬 電力・配電開発政策	4	計画	28	0.93
		実績	32	1.07
片岡　琢士 電力技術１ （計画）	4	計画	28	0.93
		実績	30	1.00
Hoke Shein 電力技術２ （地方都市）	4	計画	168	5.60
		実績	151	5.03
Wah Wah Han Su Yin 人材育成計画２ （地方都市）	4	計画	168	5.60
		実績	175	5.83
現地業務小計		計画	1974	65.80
		実績	1672	55.73

国内作業

氏名	格付		日数合計	人月合計
加藤　友英 チーフアドバイザ／ 配電系統技術	2	計画	56	2.80
		実績	86	4.30
谷畑　治 副チーフアドバイザ／ 配電技術（保守管理）	3	計画	42	2.10
		実績	90	4.50
式町　浩二 配電技術 （計画・設計）	3	計画	42	2.10
		実績	82	4.10
中川　郁雄 配電技術 （建設）	4	計画	26	1.30
		実績	46	2.30
吉田　俊貴 送電技術	4	計画	26	1.30
		実績	67	3.35
中村　光宏 変電技術	4	計画	26	1.30
		実績	26	1.30
三井　真一 人材育成計画１ （研修システム）	4	計画	21	1.05
		実績	44	2.20
小林　美奈 人材育成計画１ （研修システム）補助	4	計画	8	0.40
		実績	2	0.10
山下　興一 財務・組織分析	4	計画	14	0.70
		実績	10	0.50
斎藤　芳敬 電力・配電開発政策	4	計画	2	0.10
		実績	1	0.05
片岡　琢士 電力技術１ （計画）	4	計画	2	0.10
		実績	1	0.05
Hoke Shein 電力技術２ （地方都市）	4	計画	8	0.40
		実績	10	0.50
Wah Wah Han Su Yin 人材育成計画２ （地方都市）	4	計画	8	0.40
		実績	17	0.85
現地業務小計		計画	281	14.05
		実績	482	24.10

凡例：業務従事計画　業務従事実績　自社負担

合計	
計画	79.85
実績	79.83

報告書等：ベースライン調査 中間報告／第1回JCC／ワークプラン、ベースライン報告書、モニタリングシート／第1回C/P研修（その1,2）／研修機材調達計画（案）／第1回Manager研修／業務進捗報告書（1年次）、モニタリングシート／第2回JCC／モニタリングシート／第2回C/P研修（その1,2）／第2回Manager研修／業務進捗報告書（2年次）、モニタリングシート／第3回JCC／業務完了報告書

The Project for Capacity Development of Power Transmission and Distribution System in The Republic of The Union of Myanmar (Phase I)

Meeting Record

Date:	2016/07/22	Time:	10:00 – 11:00
Meeting with	Project C/Ps of Ministry of Electricity and Energy (MOEE)		
Participants:	**JICA Expert Team** Mr. Tomohide KATO (Chief Advisor, Distribution System Technology) Mr. Osamu TANIHATA (Deputy Chief Advisor, Distribution Technology (Operation and Maintenance)) Ms. Wah Wah Han Su Yin (Human resource development planning 2 (Regional Cities)) **Counterpart Team** Mr. Thar Soe (DyCE, ESE) Mr. Zaw Zaw Htet (EE, ESE) Mr. Than Htike Oo (EE, ESE)		
Purpose:	▪ To discuss on the Project		

Main Discussion Points:

※How to proceed the Project was discussed between JICA experts and ESE members in Mr. Thar Soe's room. (Ms. Wah Wah interviewed with ESE members, and Chief Advisor and Deputy Chief Advisor answered.)

1. Formulation of WG organizations

(Managing Person;MP) Taking into account the opinion of ESE that "Transmission WG" and "Substation WG" should be combined to Distribution, and the Project should consist of 3 WGs.

JICA expert teams and MOEE members will continue to discuss the formulation of WG organizations so that WGs would become suitable for MOEE's situation.

2. Preparation of training textbooks

(JICA Experts; JICA)It is suggested that trainer candidates prepare textbooks for trainings by themselves, because one of the Project's purposes is that each trainer candidate plays main role so that MOEE can establish its sustainably manageable training system.

3. Training on sites

(JICA)It is suggested that training on sites be adopted in training program because the comments and discussions based on training on sites are very useful for trainer candidates.

4. Trainer Certification

(JICA)In future, MOEE will certificate trainers by themselves. As the first step, trainer certification system will be discussed and established in cooperation with JICA expert team, but the system will be managed by MOEE after the second step.

5. Basic policy on "Design"
(MP)We understand that the theme of "Design" includes the specific standardization for conductors or transformers that are frequently ordered for distribution facilities.
(JICA)JICA expert team is thinking that it would be difficult to deal with the specific standardization for substation equipment because the scopes of the Project are very wide.

6. Proposal of training themes
- "Measures for voltage stabilization" and "Measures for power outage reduction" should be included.
- How to formulate WG organization effective for training "Safety" should be discussed later.
- Technologies for "methods of acceptance inspection in substation" and "measuring equipment" should be transferred as an effort of training.
  → JICA expert team is thinking that what kind of training is appropriate to Myanmar's situation should be considered based on the information about Myanmar's current contents or methods, and that it is necessary to conduct training for measurement work by means of measuring equipment that MOEE can deploy.

7. How to progress with WG activities
(MP)Presentations should be made between WGs so that WG members can confirm other members' ideas, technologies and progress that are very useful for upskilling of WG members.
(JICA)We agree.

8. Assignment of trainer candidates from each organization on MOEE
(MP)YESC is thinking that three staffs will be assigned to trainer candidates, two of the three staffs are engaging in a trunk transmission line construction project in Nay Pyi Taw and one is working in Yangon.
ESE would like to assign trainer candidates from each region or division, 2 staffs from headquarters (Nay Pyi Taw) and 15 staffs from regions and divisions, total 17 staffs.

9. Reference
(MP)MOEE and MOI (Ministry of Industry) members are now receiving vocational training with support from NSSC (National Skill Standard Council) of German. The vocational training courses includes technical transfer about distribution conductor installation. Technical transfers in the Project should be conducted while obtaining other donors' information so that Myanmar sides may not become confused.

end

The Project for Capacity Development of Power Transmission and Distribution System in The Republic of The Union of Myanmar (Phase I)

Meeting Record

Date:	July 26, 2016	Time:	10:00 – 13:30
Meeting with	Managing Persons of Ministry of Electricity and Energy (MOEE)		
Participants:	**Managing Persons of Ministry of Electricity and Energy** Refer to Contacts List below **JICA Expert Team** Mr. Tomohide KATO (Chief Advisor, Distribution System Technology) Mr. Osamu TANIHATA (Deputy Chief Advisor, Distribution Technology (Operation and Maintenance)) Ms. Wah Wah Han Su Yin (Human resource development planning 2 (Regional Cities))		
Purpose:	▪ To explain about the Project ▪ To discuss on the details of the Project		
Main Agenda	▪ Tentative schedule of the Project ▪ Request for nomination of Trainer Candidates ▪ Contents of Baseline survey and Assessment. ▪ Request for preparing Work Plan by C/Ps		

Main Discussion Points:

Remarks (MOEE : Managing Persons, JICA: JICA experts)

JICA Chief Advisor explained the Schedule of the Project based on this attached document.

[Overall schedule of the Project]

（JICA）This draft overall schedule is prepared because the Director General of DEPP (Ms. Mi Mi Khaing) made a request at the Kick-Off meeting that the image of activity schedule of trainer candidates be indicated. Each activity schedule can be adjusted as needed according to the progress of the Project.

Each trainer candidate doesn't necessarily have to attend all WG activities. The work content, schedule and the allocation of the roles will be managed in each WG.

[The contents of training textbooks]

（JICA/MP）Trainer candidates will understand present situation in Myanmar, list up necessary items and content of training textbooks and prepare them in cooperation with JICA experts through WG activities.

(MP) MOEE members are eager to learn new technologies from JICA experts, because Myanmar engineers cannot prepare textbooks in which new technologies are reflected.

(JICA) JICA experts will provide Train Candidates with new technologies. But JICA experts are considering that the contents of textbooks should be prepared on the basis of actual use and what technologies are necessary to be reflected in textbooks should be deeply discussed in WG activities. One of the purposes of the Project is “Training of Trainers” and the preparation of textbooks is also one step of “Training of Trainers” process.

As one of the policies of the Project, the contents of training textbooks are mainly fundamental technologies that Myanmar should introduce now in order to improve the situation. It is important to unify and to deploy fundamental technologies in Myanmar. And project team should consider the time restriction in the Project and carefully choose the contents of textbooks.

JICA experts are willing to introduce new technologies to Myanmar side, but new technologies will not be necessarily reflected in training textbooks.

[WG activities in Nay Pyi Taw]

(MP) How long is one WG activity in Nay Pyi Taw?

(JICA) JICA expert team is thinking that trainer candidates will gather together in Nay Pyi Taw once or twice a month, and work for one week or two weeks. In the other period, they will conduct their ordinary tasks in their offices and consider the issues of next activity and prepare documents.

(MP) It is quite difficult for trainer candidates to conduct their ordinary tasks and activity related to WG simultaneously after going back to their offices. We propose that WG activities be limited to the collective activities in Nay Pyi Taw. And we propose that several WG activities be conducted continuously in one month for the purpose of reducing transportation expense for trainer candidates.

(JICA) JICA expert team understood that trainer candidates cannot conduct WG activities in their offices. We would like to consider that they will conduct WG activities only in collective activities in Nay Pyi Taw. We think that it is possible to concentrate WG activities period in one month. Later let us adjust activities schedule.

(MP) Who will train trainer candidates?

(JICA) They will learn fundamental knowledge and training skills for themselves through WG activities.

(MP) Who will train whom in collective training in main cities?

(JICA) In collective training in main cities, trainer candidates will train engineers in ESE, YESC or MESC. JICA experts will also visit main cities for the purpose of improving trainer candidates' training skills.

Trainings in regional cities are also planned in which trainer candidates will perform technical guidance to engineers and technicians in regional cities through training activities. And a seminar in each regional city will be also planned during the first half of the Project so that MOEE members can understand main purposes and significance of the Project. We cannot conduct trainings and seminars in all cities. We would like to decide by discussion later.

(MP) Who bears training expenses?

(JICA) According to the decision in R/D (Record of Discussion), we ask MOEE to bear transportation expense and accommodation fee for trainer candidates. And also we ask MOEE to decide who of trainer candidates goes to each regional city, to reserve training place and to conduct logistics such as the invitation of trainees.

(MP) Certainly.

[Other requests related to WG]

(MP) We would like to learn effective utilization, operation method of software such as CAD.

(JICA) JICA expert team hope that MOEE side will understand that the main activity in the Project is not utilization of software, but transferring fundamental technologies necessary

on sites.

(MP) Please inform us of concrete schedule of future WG activities.

(JICA) The concrete schedule of future WG activities will be decided while managing WG activities. Therefore we cannot decide the concrete schedule at this time.

[JICA expert allocation]

(MP) What tasks does Mr. Yamashita dispatched as a JICA short-term expert "Financial and Institutional Analysis" do in Myanmar? Does he tell us "IRR" as of the completion of the Project?

(JICA) Mr. Yamashita will not directly conduct technical transfer activities to trainer candidates. He will make a discussion with MOEE members and make a suggestion about improvement of institutional framework and budget allocation related to training system. For these purposes, he will investigate and grasp the present situation about institution and organization, budget allocation and budget application procedure to perform engineer training in MOEE.

[Baseline survey and Assessment]

(MP) Many of proposed survey items for "Baseline survey" or "Assessment" are managed not by local offices of each MOEE organization, but by DEPP.

(JICA) JICA expert team would like to discuss with MOEE to confirm what survey items can be collected and whether there are other collectable values or not. After that, we will prepare questionnaire sheets and ask related organization to answer.

In this Project, it is necessary to set value of each evaluation indicator based on the result of baseline survey. The values of an evaluation item before commencement and after completion of the Project are compared to check how degree by the Project to evaluate how degree the situation has been improved. We would like you to provide us with other ideas about evaluation indicators.

(MP) Certainly.

[Next Managing Meeting]

Next managing meeting will be scheduled as follows;

- Date / Time : August 11th (Thu) 10:00 –
- Place : JICA expert room on the 3rd floor of No.27 building
- Agenda :
  (1) Selection of trainer candidates
  (2) Formulation of Working Groups
  (3) Discussion about the contents of baseline survey

  and others

[Meeting Materials]

- Tentative Work Schedule
- Nomination Sheet for Trainer Candidates
- Draft survey items for baseline survey and assessment
- Draft Work Plan

(end of document)

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	11/08/2016	Time:	10:30 – 12:00
Meeting with	DEPP, YESC,ESE, DPTSC (MESC was absent.)		
Participants:	(DEPP) : Please see the meeting attendance list below. (JICA Expert Team) : Mr. Tomohide Kato (Chief Advisor), Mr. Koji Shikimachi (Distribution Technology, Planning and Designing), Mr. Takuji Kataoka (Power Technology 1 (Planning)), Mr. Hoke Shein (Power Technology (2) Regional Cities), Mrs. Wah Wah Han Su Yin (Human Resource Development Planning 2 (Regional Cities))		
Agenda:	▪ Opening remarks by Kato, Chief advisor ▪ Introduction of project members (JICA experts, Counterparts and Trainer Candidates) ▪ Presentation of outline of project activities for new members ▪ Discussion for necessary baseline survey in electric field ▪ Discussion for necessary assessment of training system		

Main Discussion Points:

（DEPP） A list of Trainer Candidates from each organizations have been just received and they are requested to fill nomination form for Trainer Candidates from now on.
A list of Counterparts, Trainer Candidates and nomination form for Trainer Candidates will be given to JICA expert team by next Friday (12 Aug).

（ESE） Does it takes two and a half years to become a trainer?

（Expert） No, it does not. After implementation of the first collective training, trainer candidates are assessed to certify or not. If he/she is certified, he/she becomes a trainer and he/she will go to regional cities together with JICA experts to conduct a training by a certified trainer. We will foster his/her skills of teaching. And a trainer leaves this project, and he or she will train other engineers and technicians for himself or herself.

（DEPP） In Myanmar, it takes two years and three years to get Master degree and PhD degree respectively. The period of the Project is two and a half years and Certificates like a Certificate approved by ASEAN instead of a paper certificate should be given to motivate Trainer Candidates to work hard.

（Expert） In the future, Certificates of this training program shall be prepared by the Ministry of Electricity and Energy (MOEE). This time, JICA expert team will present a Certificate by monitoring the performance of Trainer Candidates carefully. We will discuss with DEPP the trainer certification system in detail later.

（ESE） There are four Senior Assistant Engineers (SAE) from YESC as Trainer Candidates and it is not suitable to teach their senior engineers such as AE or EE when they become trainers in the future.

（DEPP） Mr. Than Naing Lin told SAE from YESC that they should have confidence to become Trainers in the future. Inside the training class room, they can teach their senior engineers of AE and EE with confidence regardless of their position.

（Expert） The expert explained the purpose of Baseline Survey, which is to know the present condition of safety, efficiency and quality in MOEE, how to conduct it and who will conduct it.

（ESE） It may be difficult to compare indicators at the beginning of the training and at the end of the training since there are some indicators which are not improved significantly due to this Project.

（Expert） Please give your opinion on the draft questionnaires which JICA expert team prepared. After getting opinion, questionnaire will be finalized and submitted to DEPP. DEPP then delivered them to related offices in each organization to give information requested. Surveyors who will be employed by JICA expert team will go and collect data after that.

（Expert） How do you think extending the stay of Trainer Candidates in Naypyitaw from one week to two weeks instead of giving homework when they go back to their work place.
（DEPP） It is better to extend the stay to two weeks in Naypyitaw. At their work place, they cannot do homework for this project. They will stay at the Training Center in Naypyitaw during their stay in Naypyitaw for the training. They will do their homework at the Training Center even JICA expert team is not at the Training Center.

（DEPP） Are there any plan to provide personal computers to Counterparts and Trainer Candidates?
（Expert） Yes, there is a plan.
（DEPP） We would like to request to provide personal computers with reasonable price of USD 600 for Counterparts and Trainer Candidates as a part of training facilities. Only hardware is necessary and software for personal computers is not necessary to provide.
（Expert） The reason of providing computers can be that computers are necessary to prepare textbook, syllabus and curriculum.

【Delivered Documents】
- Agenda of the Managing Meeting (3)
- Modified Working Group
- Outline of the Project (Presentation File)
- Draft Contents of Baseline Survey
- Draft Contents of Assessment of a Training System
- Questionnaire for Baseline survey regarding Human Resource Development in MOEE (Draft)
- Assessment sheet regarding Human Resource Development in MOEE

-end-

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	24/08/2016	Time:	10:00 – 15:15
Meeting with	Department of Electric Power Planning (DEPP)		
Participants:	(DEPP)：Mr. Than Naing Lin (DyD), Mr. Myo Thant Zin (AD) (DPTSC)： Mr. Naung Win Htoo (AE), Ms. Soe Yupar Thein (Staff Officer) (ESE)：Mr. Tha Soe (DyCE), Mr. Zaw Zaw Htet (EE) (MESC)：Mr. Soe Ko Ko Aung (EE), Mr. Zaw Htike (Assit. Manager), Mr. Aung Nay Oo (AE) (YESC)：Mr. Kyaw Kyaw (EE), Mr.Kyaw Soe Lin (SAE), Ms. Kyawt Kyawt Hlaing (SAE) (JICA Study Team)：Ms. Kuri Orui (JICA long-term expert), Mr. Koji Shikimachi (Distribution Technology, Planning and Designing), Ms. Mina Kobayashi (Human Resource Development Planning 1 (training system)),Mr. Shinichi Mitsui (same as Ms. Kobayashi), Mr. Hoke Shein (Power Technology 2 (Regional Cities)), Ms. Wah Wah Han Su Yin (Human Resource Development Planning 2 (Regional Cities))		
Purpose:	・ To organize WGs ・ To make sure the different roles and responsibility of Managing Persons and Trainer Candidates ・ To understand the project deeply ・ To modify the questionnaire of baseline survey based on opinion from Managing Persons ・ To discuss the topic of # 1 Working Group activities		

Main Discussion Points:

The meeting was held according to the agenda as follows. (Refer to Attachment I)

1. Opening Remark

Mr. Than Naing Lin, Deputy Director of DEPP and a delegate of Mr. Myint Oo, Deputy Director General of DEPP, who could not attend the meeting as he had to attend another meeting of a JICA loan project, gave his opening remarks including that each trainer candidate was assigned to one of the five WGs considering his/her request as far as possible.

2. New managing persons of each organization (Refer to Attachment II)

All organizations: DEPP, DPTSC, ESE, YESC and MESC participated the managing meeting. MESC participated the meeting for the first time. All of the Managing Persons (or) the Counterparts in this project, were fixed this time. (Only a managing person from DPTSC, Mr. Win Kyaw never attended the managing meetings yet but will attend from next time.) The representative managing persons in each organization were selected; Mr. Than Naing Lin for DEPP, Mr. Tha Soe for ESE, Ms. Soe Yupar Thein for DPTSC, Ms. Kyaw Kyaw Hlaing for YESC and Mr. Soe Ko Ko Aung for MESC.

3. Project outline (Refer to Attachment III)

Mr. Than Naing Lin of the counterpart of Myanmar explained the outline of the tentative work plan briefly, so that MESC would understand it and other Managing Persons understand it deeply.

4. Roles of managing persons and trainer candidates (refer to Attachment IV)

Each role of Managing Persons and Trainer Candidates was explained and agreed. It was explained that one of the main roles of managing persons was reviewing and revising a draft Work Plan and finalizing it by the end of this year 2016.

5. Formation of five Working Groups (WG-1, 2, 3, 4 and 5) (Refer to Attachment V)

The draft Trainer Candidates in each WGs were introduced with the explanation of each role and each JICA expert in WG-1, 2, 3, 4 and 5. Three pairs of trainer candidates were exchanged respectively, according to Managing Persons' opinions. The revised five WGs composing the twenty-seven Trainer Candidates were approved as the fixed one. (Refer to Attachment VI)

6. Questionnaires of Baseline survey revised by Managing persons

Additional questionnaires are proposed by ESE, DEPP, DPTSC and YESC. They will be reflected in the questionnaire and the modified questionnaire will be distributed to each organization. (Refer to Attachment VII)

7. Schedule for support answering Questionnaire (Refer to Attachment VIII)

The schedule for dispatching surveyors to support answering the Questionnaire was explained, and the responsible and contact person(s) in each regional/ state office were confirmed, caring the trainer candidates and managing persons will be absent from their offices from 5th to 9th SEP when #1 WG activities and #5 managing meeting will be held.

8. Agenda for #1 WG Activities

The agenda for the first WG activities was discussed after the presentation of an education system in CEPCO (Refer to Attachment IX). A draft schedule of the first WG activities were proposed. JICA experts will present the distribution power system, the detailed training system in Japan, target management system, etc. on the first and the second days of # 1 WG activities. The Trainer Candidates will discuss how to create Myanmar style training system in the following two days.

The first WG activities was scheduled from 5th to 8th SEP, and the next fifth managing meeting was scheduled on 9th SEP instead of 8th SEP scheduled previously. (Attachment X)

< Managing Persons' opinions >

- Managing persons expressed their willingness that the Trainer Candidates will have WG activities such as discussing among different WGs for one week for example in addition to the training schedule by JICA Expert Team.
- Furthermore, Managing Persons requested to include showing video as one of the media for training in order to learn Japanese technology visually.
- According to the training schedule prepared by JICA Expert Team, there are meetings with Managing Persons when there are Working Group activities in Naypyitaw. The schedule should be revised as most of the Managing Persons are also Trainer Candidates.

9. Closing remarks

Deputy Chief Engineer Mr. Tha Soe gave his closing remarks with the importance of Trainer Candidates' initiative.

The long-term expert, Ms. Orui gave her closing remarks with her thanks that there is a progress of this training due to Managing Persons, comparing to the last meeting she attended.

*After the meeting

JICA experts requested YESC and MESC to answer the Assessment sheet as far as they can in a short time after the managing meeting. But they will answer the sheet by 26th SEP as they will require some survey.

*Group photo

A group photo of attended managing persons and JICA experts were taken in front of a Building of No.27.

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Attachment

I: Agenda for the Managing Meeting (4) [Delivered]
II: List of Managing Persons (Counterparts) [Delivered]
III: Outline of the Tentative Work Plan of the Project [Delivered]
IV: (Draft) Roles of Counterparts (Managing Persons) and Trainer Candidates [Delivered]
V: List of Trainer Candidates [Delivered]
VI: Revised list of Trainer Candidates
VII: Revised Questionnaire of Baseline Survey
VIII: Schedule of surveyor team (1), (2), (3) [Delivered]
IX: Education system in CEPCO [Delivered]
X: Work schedule of project [Delivered]

-end-

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	09/09/2016	Time:	10:20 – 14:30
Meeting with	5th Managing Meeting		
Venue	Training Center in Nay Pyi Taw		
Participants:	(DEPP)：Mr. Than Naing Lin (DyD), Mr. Myo Thant Zin (AD) (DPTSC)：Mr. Naung Win Htoo (AE), Mr. Win Kyaw(AE), Ms. Soe Yupar Thein (Staff Officer) (ESE)：Mr. Tha Soe (DyCE), Mr. Than Htike Oo(EE) (MESC)：Mr. Soe Ko Ko Aung (EE), Mr. Zaw Htike (AE), Mr. Kyaw Kyaw(AE) (YESC)：Mr. Tayzar Lin(AE), Mr.Kyaw Soe Lin (SAE), Ms. Kyawt Kyawt Hlaing (SAE) (JICA Study Team)：Ms. Kuri Orui (JICA long-term expert), Mr. Osamu Tanihata (Distribution Technology, Operation & Maintenance)		
Purpose:	・To discuss about management of the Project		

Main Discussion Points:

1. Opening Remarks by Mr. Tha Soe (DyCE of ESE)

2. Review of the 1st Working Group Activity

(Managing Person(MP)) We would like to conduct 3 weeks per Working Group instead of 2 weeks. We also would like to gather all 5 WGs in Nay Pyi Taw at the same time. We want to conduct work activities 2 weeks out of 3 weeks for working with experts and another one week for working activities by ourselves.

(Expert) We provide revised project schedule which extend WG activities from 2 weeks to 3 weeks instead in next managing meeting.

(MP) We consider to develop our skill and knowledge not only technical skill but English and presentation skill.

(Expert) Skill up of your knowledge and technology needs small step for big step up.

(MP) Opinion from WG 4 (Transmission line)

We would like to know how to select appropriate conductor (specifications, size etc.) in transmission and distribution line.

(Expert) It's not easy to select proper specification of conductor, because it has deep relationship between specification of conductor and power flow forecast, protective relay, operation policy etc.

(MP) Opinion from WG5 (substation)

We, WG 5 , will conduct self-survey on data base of substation facilities.

(Expert) We will make some comments and assist on your activity and prepared sheet。

(MP) We would like to know initial inspection for transformer, circuit breaker, CT, VT etc. which are needed at the time of installation

(Expert) We would provide with basic information

(MP) We have so many electrical accidents. We would like to learn connection technology of conductor and treatment of underground cable.

(Expert) We have no working skill because we work only in desk work, so we cannot teach that skill to you. We would like to consider the way to transfer that skill by joining other JICA project etc.

(MP) We want to introduce the design that transformer mounted upper of concrete poles. We want to learn Japanese specification of transformer and concrete pole and so on.

(Expert) We would like to provide you about specification later.

(MP) We would like to proceed introduction of un-maned substation. Please teach us how to proceed from manned-substation into un-maned substation.

(Expert) So many consideration will be needed to proceed into un-maned substation.

(MP) We would like to know what kind of facilities will be installed into new training center.

(Expert) We plan to prepare the design of installation facilities into training center by the end of March 2017 by discussing with MOEE Person.

We ask you to procure Myanmar manufactured facilities such as concrete poles etc. by MOEE in local tender.

(MP) We agree.

3. Progress and next action of Baseline Survey

(Expert) We would like to share you progress of baseline survey and would like to decide indicators of the Project which stated in PDM(Project Design Matrix).

Contents of indicators of the Project will be explained at 1st JCC.

(MP) We will provide by 15th September.

4. Schedule and preparation for Training in Japan

(Expert) We would like you to decide concrete term of training in Japan which will be held in January and February.

(MP) We would like to visit construction site and some manufactures of power facility.

(Expert) We have few construction site, we believe it's difficult to visit construction sites. We would like to make effort to seek distribution construction site.

5. Planning 1st Joint Coordination Committee

(Expert) We want to hold 1st JCC on 3rd November, 2016 for explanation of progress of the Project and indicators of the Project etc.

(MP) We agree. We would like to make arrangement.

6. Project Design Matrix

(Expert) Ms.Orui explained about PDM.

7. Discussion about Monitoring Sheet

(Expert) This project need to be monitored at every 6 months. It start from July 2016, and 1st monitoring will be done at December 2016.

Please prepare monitoring sheet by MOEE person with reference to JICA form.

Target matters to be achieved are set into the monitoring sheet by MOEE and experts.

(MP) We have no experiences about monitoring sheet. Please show us examples.

(Expert) We share you example of monitoring sheet at 12 September, 2016.

(MP) We understand.

8. Introduction of purchasing power electrical engineering technical books

(Expert) We plan to purchase technical books on power sector. Please select some text books from our recommendations.

Since budget is limited, please make priority to book list. And we cannot purchase soft data because of copy right consderation and so on.

9. Next Managing Meeting

(Expert) Next Managing Meeting will be held on 4th October 2016 at training center in Nay Pyi Taw.

10. Providing information of Institution and financial matters

（Expert）Please provide us with financial and institutional data.

（MP）Now we are arranging. Contract of franchise has NDA, so we cannot provide it.

（Expert）Please provide us as possible as you can.

In financial data, please share us past 3 year's data.

（MP）We try it.

【Delivered Documents】

- Agenda for the Managing Meeting (5)
- Time Table of 1st Working Group Activity
- Work Schedule
- Introduction of Target Management
- Monitoring Sheet(tentative)
- Project Design Matrix
- Draft purchasing power electrical engineering technical books

-end-

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	05/10/2016	Time:	10:00 – 11:40
Meeting with	6th Managing Meeting		
Venue	JICA Expert Room in Nay Pyi Taw No.27 Building		
Participants:	(DEPP)：Mr. Than Naing Lin (DyD), Mr. Myo Thant Zin (AD) (DPTSC)：Mr. Naung Win Htoo (AE), Mr. Win Kyaw(AE), Ms. Soe Yupar Thein (Staff Officer) (ESE)：Mr. Tha Soe (※)(CE), Mr. Than Htike Oo(EE) (MESC)：Mr. Soe Ko Ko Aung (EE), Mr. Zaw Htike (AE), Mr. Kyaw Kyaw(AE) (YESC)：Mr. Tayzar Lin(AE), Mr.Kyaw Soe Lin (SAE), Ms. Kyawt Kyawt Hlaing (SAE) (JICA Study Team)：Ms. Kuri Orui (JICA long-term expert), Mr. Tomohide Kato (Chief Advisor, Distribution System Technology) (※)He promoted from Deputy Chief Engineer to Chief Engineer on 30 Sep, 2016		
Purpose:	・To discuss about management of the Project		

Main Discussion Points:

1. Opening Remarks by Mr. Than Naing Lin (DyD, DEPP)
Mr. Kato (JICA short-term expert)

2. Progress and next action of Baseline Survey

（Expert）We appreciated your cooperation in conducting Baseline Survey. We are preparing report now. And if we need additional information regarding Baseline Survey, please assist us.

（MOEE）We want to see results of Base Line survey.

（Expert）We would show you the results of Baseline survey after preparing report.

3. Draft Contents of Monitoring Sheet

Ms. Orui explained about Monitoring Sheet to Managing Person.

（Expert）Monitoring Sheet will be prepared every 6 months by MOEE person with assistance of JICA Experts. “Monitoring Sheet” includes “Target” relating the project in every 6 months.

（MOEE）We agree it.

4. Discussion about the evaluation items reflected in Project Design Matrix (PDM)

（Expert）We would like you to discuss about preparing PDM sheet.

（MOEE）We will discuss with our member.

5. Tentative agenda of the 1st Joint Coordinating Committee (JCC) / Deciding presentation speakers

(Expert) Expert explained to MOEE person about agenda of JCC.

（Expert）JCC will take about 2 hours.

Managing person of the Project should make all presentation in JCC to main person of MOEE.

Expert will follow you in Answer to Question.

（MOEE）Mr. Than Naing Lin (DEPP) and Mr. Tayzar Lin(YESC) will male presentation at JCC.

（Expert）Please make practice before presentation on 3rd November.

（Expert）We would like to confirm you that JCC should be meeting for approval by main person of MOEE not for discussion the related matters.

6. Contents of 2nd Working Group Activities

（Expert）In 1st week of WG, we plan to make presentation on Safety Technology, Facility Maintenance. And we also would like to give trainer candidates discussion time and presentation time in order to develop their trainer's skill.

7. Next schedule of Working Group

・As trainer candidates requested us, 3 weeks for one WG activities instead of 2 weeks activities until end of December 2016.

8. Closing remarks by Mr, Tha Soe (CE, ESE)

Ms. Kuri Orui(JICA long-term expert)

【Delivered Documents】

(1) Work schedule
(2) Monitoring Sheet (Draft)
(3) Project Design Matrix (PDM) (Draft)
(4) Tentative Agenda of the 1st Joint Coordination Committee
(5) Draft Time schedule of the 2nd Working Group

-end-

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	17/10/2016	Time:	15:50 – 16:00
Meeting with	Managing Persons		
Participants:	(DEPP) : Mr. Than Naing Lin (DyD) (DPTSC) : Mr. Win Kyaw (AE), Mr. Naung Win Htoo (AE), Ms. Soe Yupar Thein (Staff Officer) (ESE) : Mr. Zaw Zaw Htet (EE), Mr. Than Htike Oo (EE) (MESC) : Mr. Soe Ko Ko Aung (EE), Mr. Zaw Htike (Assit. Manager), Mr. Aung Nay Oo (AE) (YESC) : Mr. Tay Zar Lin (AE), Mr. Kyaw Soe Lin (SAE), Ms. Kyawt Kyawt Hlaing (SAE) (JICA Study Team) : Ms. Kuri Orui (JICA long-term expert), Mr. Tomohide Kato (Chief Advisor), Mr. Shinichi Mitsui ((Human Resource Development Planning 1 (training system), Mr. Hoke Shein (Power Technology 2 (Regional Cities)), Ms. Wah Wah Han Su Yin (Human Resource Development Planning 2 (Regional Cities))		
Purpose:	・ To confirm indicators to set up ・ Discussion about the first draft Presentation for the first JCC meeting ・ Appointment with CEO of YESC and MESC to explain about the first JCC meeting ・ To request DEPP for a site visit to two substations on 20 Oct		

Main Discussion Points:

1. Confirming Indicators to set up

Ms. Orui explained that the purpose of setting Indicators is to evaluate the effectiveness of this Project. In addition, she explained that the meaning of verification is the source of data and Important Assumption is some conditions to meet the goals.

JICA expert team will prepare the table of indicators first by selecting indicators and putting target value for each indicator based on the result of Baseline Survey and Managing Persons will finalize it.

2. Discussion about the first draft presentation for the first JCC

(i) Invitation to JICA Myanmar Office

JICA expert team will prepare an invitation to JICA Myanmar Office and DEPP will send the invitation to JICA Myanmar Office. The name of attention is not necessary for invitation.

(ii) Presentation from Project Team

Managing Persons will do the presentation. Slide about indicators will be prepared by JICA expert team first and Managing Persons will finalize it.

3. Appointment with CEO of YESC and MESC to explain about the first JCC meeting

Managing Persons from YESC and MESC recommends to go to YESC and MESC to explain about the first JCC meeting to CEO of YESC and MESC. Ms. Orui plans to go to YESC on 31 Oct and Mr. Tay Zar Lin will make an appointment with CEO of YESC through Ms. Yee Mon Mon.

4. Site visit to Substations

Mr. Than Naing Lin, will arrange a site visit to Substations near Naypyitaw including a mini bus for all Trainer Candidates on 20 Oct. JICA expert team will go there by their project cars. Two numbers of old Substations are planned to visit.

[Delivered Documents]
I. The first draft Presentation for the first JCC meeting
II. What is indicators and what kind of indicators.

-end-

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	27/10/2016 (additional confirmation was made at 28/10/2016)	Time:	9:00 – 11:30
Meeting with	DEPP, YESC, MESC, ESE, DPTSC		
Participants:	(DEPP) : Please see the meeting attendance list as attached. (JICA Study Team) : Ms. Kuri Orui (Training Program/Coordinator), Mr. Tomohide Kato (Chief Advisor), Mr. Osamu Tanihata (Distribution Technology (Operation and Maintenance), Mr. Shinichi Mitsui (Human Resource Developing Planning 1 (Training System)), Mrs. Wah Wah Han Su Yin (Human Resource Development Planning 2 (Regional Cities))		
Agenda:	▪ To discuss about the presentation of JCC ▪ To discuss about training program		

Main Discussion Points:

(Expert) Presentation of JCC is explained. Type of indicators such as distribution loss ratio, number of accidents, outage number and duration to be set target value in this Project are discussed. The target value is set based on the result of Baseline survey.

(MOEE) ESE wants to set up the target value of the number of outage with 300 instead of 350 in Mandalay pilot area.

(Expert) This figure is based on Baseline Survey and yearly total number.
If you set less figure of target, we can change the figure.

(MOEE) We understand. We agree to set 350 Nos of outage as target.

(MOEE) What is the meaning that the target number of certified trainers is 20? How to evaluate to give certification to certified candidates? Could you change the target 27 certified trainer instead of 20?

(Expert) It is possible that all 27 numbers of Trainer Candidates get certification, the number of certified trainers was targeted to 20 due to the possibility of change of Trainer Candidates due to various reasons for eg;
But we agree to set target as 27 instead of 20.

(MOEE) We want to change the title of Group V to "33 kV and 66 kV (Operation, Maintenance, Design and Construction)". Substation design knowledge is necessary in Myanmar.

(Expert) Basic design of a substation can be included in the working group V as the scope of substation design is very wide. Deciding regulation in power sector is not include in this project.

(MOEE) According to the schedule, there is no JICA expert for Group V in the next Working Group Activities. We would like to request JICA expert together with us during Working Group Activities.

(Expert) Mr. Tanihata will be at the next Working Group Activities and he can discuss about substation with Group V although there is no JICA expert at that time.

(MOEE) What percentage is planned to do for theory and practical work. Practical work is necessary to do so that we have confidence when we become trainers. We want to learn 50 % and 50 % or 60% and 40 % for theory and practical work respectively.

(Expert) By going to Japan, Trainer Candidates can also learn practical work.

(MOEE) The period of stay in Japan for each Trainer Candidate is only 10 days and it is not enough. DEPP will arrange a site visit to five numbers of substations which are under construction. At that time, JICA expert is requested to show practical works such as how to connect cable with control panel, how to keep the cables neatly, etc…

(Expert) In Japan, Engineers usually do design, desktop work and management. We are not used to do practical work. We don't have much experience about practical work and the schedule of practical works is not considered. But we can give advice and discuss about substations when we visit substations.

(MOEE) In such case, you are requested to show a lot of videos to show how to do practical works in reality.

(Expert) We will try to find it in Japan.

(MOEE) When showing video, you are requested not only to show but also to give it to us.

(MOEE) What is the schedule of purchasing training facilities?

(Expert) We need to prepare the design of training facilities by discussing in detail. We are planning to finish the design of training facilities until March, 2017. After finishing it, it is submitted to JICA to get approval. After getting an approval from JICA, they are planned to purchase.

(MOEE) When can training facilities be arrived to the training center? We are worried that they will arrive at the end of this Program and there is no JICA expert to show us how to operate and apply it.

(Expert) The duration of time necessary for delivery depends on the type of facilities. We cannot say anything about the timing now. But we will try to purchase as early as possible before finishing Phase I but we need to discuss in detail to prepare design of training facilities. We should not be hurry to prepare it as it needs time to discuss.

(MOEE) We asked JICA Expert five numbers of books and only three numbers of books were received. What happened to other two books?

(Expert) We already ordered them but there is no stock at the book shop for these two books and we need to wait.

(MOEE) We cannot wait for such long time. We will cancel them and we will buy another books instead of these books.

(Expert) We already ordered and we cannot cancel them. If you want to buy another books, they will be ordered in addition.

(MOEE) We will give book titles to buy in addition.

(MOEE) Regarding explanation method, JICA experts are requested to explain the concept and theory with exact calculation. For example, when explaining about Step Voltage Transformer in the presentation, where to install and how many numbers should be installed with which distance, etc… by clear explanation. Another example is when explaining about Mutli-transformers, you are requested to explain how much loss can be reduced by showing calculation. It includes calculation about Ω and it was not clear calculation. We know that it is difficult to calculate Ω but it would be appreciated if certain explanation is given. We need to know concept in detail and new technology so that we can apply them when we become trainers.

(Expert) The concept of the program is the Capacity Development. The establishment of training program such as preparing textbooks, management method of training, teaching method, etc… as there is no training program in MOEE recently. At the same time, technical transfer is also carried out.

(MOEE) We are engineers and we want to concentrate on technology.
(Expert) In Japan, engineers prepare training program for capacity development of junior engineers, preparing training schedule.
(MOEE) When we conduct trainings in the future, we will explain in Myanmar language to Engineers and Linemen by using power-point in English. We have knowledge how to teach to be understandable in Myanmar language. Therefore you do not need about our teaching methods. JICA experts are requested to concentrate on technical transfer.
(Expert) We understand your request but establishment of training program is also very important. We will transfer our technology when preparing the training program in parallel.

(MOEE) When we asked questions, JICA expert replied that he will reply later. But there is no reply from him after that if we did not ask him again.
(Expert) JICA expert is not expert for all fields. We need to find information to answer your questions. Please give us some time and we will try our best to answer your questions.
-end-

Minutes of Meeting

Managing Meeting (9)

On the Project for Capacity Development of Power Transmission and Distribution System (Phase I) in the Republic of the Union of Myanmar

1. Date: 29th November (Tuesday), 2016

2. Time: 10:00 Am to 12 Noon

3. Venue: Building No. 27, Nay Pyi Daw

4. The attended participants are as follows:

Sr. No.	Name	Designation	Department
1	U Tha Soe	CE	ESE
2	Osamu Tanihata	Deputy Chief Officer	JICA
3	Kuri ORUI	Coordinator	JICA
4	Mrs. Soe Yupar Thein	Staff Officer	DPTSC
5	Mr. Myo Thant Zin	Assistant Director	DEPP
6	Mr. Than Naing Lin	Deputy Director	DEPP
7	Mr. Tayzar Lin	Assistant Manager	YESC
8	Mr. Naung Win Htoo	Staff Officer	DPTSC
9	Mr. Soe Ko Ko Aung	Manager	MESC
10	Mr. Zaw Zaw Htet	Executive Engineer	ESE
11	Mr. Aung Tun	Executive Engineer	ESE

5. The tasks were taken by the meeting are as follows:

(a) The revised tentative work schedule of the project for capacity development of power transmission and distribution system Phase (I) is explained by JICA team and discussed the progress between the counterparts.

(b) Data of Kachin, Rhakain & Chin concerned with total number of faults and average duration of faults in distribution system is needed to supply by MOEE.

(c) Five or more number of Pilot areas choosing are to be proposed by ESE, YESC and MESC and have to submit on coming working group.

(d) The two session schedule for the workshop in Japan for engineers are explained by JICA team.

(e) The date for the next counterpart meeting (10th) is assigned as December 9, 2016.

Prepared by
Mr. Tayzar Lin
Assistant Manager (YESC)

Minutes of Meeting

Managing Meeting (10)

On the Project for Capacity Development of Power Transmission and Distribution System (Phase I) in the Republic of the Union of Myanmar

1. Date: 20th December (Tuesday), 2016
2. Time: 10:00 Am to 4 Pm
3. Venue: Building No. 27, Nay Pyi Daw
4. The attended participants are as follows:

Sr. No.	Name	Designation	Department
1	U Tha Soe	CE	ESE
2	Mr. Kato	Chief Advisor	JICA
3	Mr. Shikimachi		JICA
4	Ms. Kuri ORUI	Coordinator	JICA
5	Mr. Kyaw Soe Lin	SAE	YESC
6	Mr. Than Htike Oo	Executive Engineer	ESE
7	Mrs. Soe Yupar Thein	Staff Officer	DPTSC
8	Mr. Myo Thant Zin	Assistant Director	DEPP
9	Mr. Than Naing Lin	Deputy Director	DPTSC
10	Mr. Tayzar Lin	Assistant Manager	YESC
11	Mr. Naung Win Htoo	Staff Officer	DPTSC
12	Mr. Soe Ko Ko Aung	Manager	MESC
13	Mr. Zaw Htike	Assistant Manager	MESC
14	Mr. Kyaw Kyaw	Assistant Manager	MESC
15	Mr. Zaw Zaw Htet	Executive Engineer	ESE
16	Ms. Kyawt Kyawt Hlaing	SAE	YESC

5. The tasks were taken by the meeting are as follows:

(a) As the representative of DEPP, Mr. Than Naing Lin gave the opening remark and told that Deputy Minister agreed to continue the project by revised schedule and syllabus procedure in accordance with his instruction. After that, Mr. Kato gave the opening remark as the representative of JICA Expert team.

(b) The instructions for the project by Deputy Minister were explained by Mr. Than Naing Lin are as follows:

- The time schedule for coming working group must be continuously and not to be separate as the few weeks.

-The working group for November was postponed by Deputy Minister decision for the letter of complaint from one candidate concerned with daily allowance (2500 kyats) for everyone and would like to get a support from MINISTRY arrangement. And then, need to change the responsibility to prepare the syllabus for training and wish to JICA for making it and thought that candidates have low experience to do it.

Regarding to JICA TEAM opinion, the responsibility ratio or task to do syllabus will be discussed directly with Deputy Minister.

On the other hand, a TV meeting have to hold between JICA Headquarters and MOEE.

(c) According to the tentative revised schedule, 3rd working group will open for the period between 22 February to 11 April and 4th Working group will open for the period between 15 May to 14 July.

Regarding to schedule, actively discussed about the function of coming working group. The intended tasks for doing within 3rd working group period are

-Bring the too much questions by JICA for making the syllabus to be compatible with the Myanmar Situation

-Will give the lecture in relation with SAFETY

-Will discuss the things what we have learned from workshop in JAPAN

-Will discuss about the indicators and target value identification for selected pilot areas depend on the available data based

-will make countermeasure that how to reduce the losses and how to considerate for getting the improvement

According to the highly changes (such as responsibility to make syllabus) to project, **2nd JCC will hold on coming February or March** to make confirmation for changes.

(d) At the end of this year 2016, JERA have to submit Baseline survey and assessment sheet reports to JICA and distributed the draft report to the attended participants for reading it.

(e) After that, discussed about the project monitoring sheet and made the confirmation what we have done for last 6 months targets and what we have to set targets for next 6 months.

(f) As the next agenda, revised schedule for the workshop in JAPAN for engineers (1st session and 2nd session) was explained by Mr. Shikimachi and discussed the items of schedule. Also, Mr. Than Naing Lin was chosen by the U THA SOE decision (CE) as the leader of 1st session and Mr. Myo Thant Zin was chosen as the leader of 2nd session of the workshop in JAPAN. Moreover, distributed the duty to Mr. Myo Thant Zin for collecting the information concerned with food uneatable or intolerance condition of everyone to be flexible in Japan .

(g) As the last item of meeting, discussed and confirmed for the transportation and daily allowance of candidates. Regarding to meeting result, JICA will give daily allowance (3000 kyats) to candidates come from outside of the NAYPYITAW area (more than 100 km from Naypyitaw) and which will include for weekends and holidays. However, the candidates from Naypyidaw have to be supplied only for lunch and will have no allowance for weekends and holidays. For the transportation allowance (later will use TA), every candidate who come from outside of Naypyitaw have to submit the air tickets (Kachin, Sittwe, Dawei) or express tickets (other regions) and receipts to JICA. A format to fill the starting site and destination for TA was distributed to everyone and meeting was successfully concluded.

Prepared by
Mr. Tayzar Lin
Assistant Manager (YESC)

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	09/03/2017	Time:	11:50 – 13:40
Meeting with	11th Managing Meeting		
Venue	JICA Expert room in No.27 building		
Participants:	(DEPP)：Mr. Myo Thant Zin (AD) (DPTSC)：Mr. Naung Win Htoo (AE), Mr. Win Kyaw(AE), Ms. Soe Yupar Thein (Staff Officer) (ESE)：Mr. Tha Soe (CE), Mr. Than Htike Oo(EE), Mr. Zaw Zaw Htet(EE), Ms. Than Than Aye (EE) (MESC)：Mr. Soe Ko Ko Aung (EE), Mr. Kyaw Kyaw(AE) (YESC)：Mr. Tayzar Lin(AE), Ms. Kyawt Kyawt Hlaing (SAE) (JICA Study Team)：Ms. Kuri Orui (JICA long-term expert), Mr. Tomohide Kato (Chief Adviser, Distribution System Technology) ※Mr. Than Naing Lin was absent because of attendance to another meeting		
Purpose:	・To discuss how to proceed training		

Main Discussion Points:

U Tha Soe:

（From U Tha Soe, DEPP showed alternative schedule to Expert Team, instead of time table of Working Activity (from Mar 13 to Apr 7) shown by Expert Team.）

・MOEE cannot accept Expert's concept which shows transfer leadership in managing and operating training activities including preparing textbooks. Expert team must transfer only Japanese flagship knowledge and technologies. MOEE don't need basic electric power technologies.

・MOEE want JICA to introduce Japanese latest technology and facilities into new training center, we don't need existing technology and facility.

・MOEE want Expert Team to conduct MOEE's proposed schedule.（Expert Team express the time schedule cannot accept because of shot periods for preparing training materials.）

・MOEE want Expert Team to launch next training from beginning of May. (Expert Team explained that it is not acceptable because Japanese calendar has holiday week in May and JERA Expert Team need to invite MOEE managing person to Seminar in Japan in middle/end of May.)

・These comment is not request but command from Deputy Minister.

＜U Tha Soe left the meeting＞

【WG in March and April】

（C/P）We don't need review of Workshop in Japan for several days, one day will be enough.

（Expert Team(ET)）We did not answer to your questions enough in Japan, so we would like to make additional explanation about Japanese technology.

（C/P）We have no questions. We already studied about Japanese technologies obtained in Seminar in Japan.

（C/P）Since we already deeply understood about previous lectures, we don't need review of

previous lecture. We need new knowledges.

（ET）It's difficult for us, because we have not enough time for preparing training materials. And review of previous lecture is very important for well understanding for you.

（C/P）We need theory and examination with calculation. Expert Team can conduct a lecture using Purchased technical books.

（ET）Expert Team should transfer practical use knowledge based on Japanese power sector to you. We did not come here to teach about general knowledge in purchased technical books.

（C/P）・・・・・

（C/P）Deputy Minister want to know about contents of lecture. We have to report the contents of lecture at the time of receiving request from Deputy Minister.

【Next schedule】

（C/P）When start next training? We want you to start training earlier as possible.

（ET）Since we need to prepare and invite for your training in Japan, we will start next training from early June.

（C/P）Is it expected 3 months continuous training?

（ET）Expert Team will make a lecture for 3 months by several Experts.

【Training facilities in Nay Pyi Taw training center】

（C/P）We don't need existing distribution power facilities such as concrete pole and conductor wire. Who talk about the installation the general facilities into new training center?

（ET）Daw Mi Mi Khaing expressed us that some power facility need to new training center by April 2017 (Training center will be open). And she also express us the opening ceremony will be held at new training center.

（C/P）・・・・

（ET）We understand your intention. If you don't need general facilities in new training center, we can withdraw the propose to install concrete pole into new training center.

【Procurement of training facilities】

（ET）It takes long time to procure the training facilities, because procurement procedure will take longtime.

（C/P）How long does it take to install the facilities?

（ET）We think it takes several Months.

-end-

13th Counterpart Meeting Memo
On the Project for Capacity Development of Power Transmission and Distribution System Phase – I

Date - 9th October, 2017

Time - 13:00 – 14:30

Venue - Training Center (Naypyitaw)

Participants - U Tha Soe, U Myint Oo
Managing Persons from DEPP, DPTSC, ESE, YESC and MESC
JICA Experts (Ms. Shibata, Dr. Shikimachi, Mr. Nakagawa)

Comment to Textbook

- Each organization will give the comment
- DyDG, Mr. Myint Oo commented no problem.
- JICA side requested the deadline to the textbook is the end of OCT.

Request by U Tha Soe

- The Revision of textbook and development of syllabi, curricula through WG activities should be started earlier.
- -> These preparations should be started after consideration of the deliberation about institutional and financial challenges related HRD framework. Therefore, the schedule cannot be shortened.
- Installation of Equipment should be started earlier.
- -> Considering your opinion, we are trying to procure them as soon as possible. Some of the OJT trainings in the field of the training center will be conducted during this training period.
- When will all the equipment procured?
- -> Probably, MAR 2018.

Scheme of Human Resource Development

- JICA team needs to submit a proposal letter by the end of this month to decide a member of working group for the framework of human resource development. It may take several months to get approval because establishment of new organization should be approved by parliament.
- In phase 2, new engineers will be selected as trainer candidates. Trainer candidates in phase 1 will have a lecture as main teacher in local cities after completion of phase 1.

2nd JCC

- 2nd JCC will be held around 20th December. Detailed will be discussed.
- Establishment of organization for human resource development will be added to agenda.

Facilities of training center in NPT

- MOEE would like JICA to pay cost of concrete basement for pole, if possible.
- -> We confirm whether we pay cost of it, but the construction should be done by ESE.

Workshop in Japan

- Workshop for engineer class will be held after January because some SAEs will take an examination to promote in January.

(end)

14th Counterpart Meeting Memo
On the Project for Capacity Development of Power Transmission and Distribution System Phase – I

Date - 14th December (Thursday), 2017
Time - 13:00 – 15:00
Venue - Training Center (Naypyitaw)
Participants - Managing Persons from DEPP, DPTSC, ESE, YESC and MESC and JICA Experts (***Attended list will be attached by JICA***)

In this meeting, the following topics were discussed with the name of

(a) Revised Work Plan (From Jan 2018-Nov 2018)
(b) Holding Regional Seminar and Training in regional and main cities
(c) Tentative Schedule of Workshop 1 and 2 in Japan for Engineers
(d) JCC Holding Date

(A) Regarding to revised work plan discussion for coming year - 2018,

- From ***3rd to 17th February***, have to attend for 1st workshop in Japan for **13** Engineers (trainer candidates) of MOEE and have to attend for 2nd workshop in Japan for **14** Engineers (trainer candidates) of MOEE within the period of ***17th February to 3rd March***.
- From ***5th March to April 1st week***, all trainer candidates have to gather again at training center (Naypyitaw) and start to conduct for preparation and discussion for training in Main Cities. The same task has to conduct continuously again in May, 2018.

  (a) Through the working group activities (5 WGs), the extracted items of each are aggregated and teaching materials for each field are prepared for each 5 themes in Myanmar Language.

  (b) For the working group period, JICA is going to provide meals (breakfast, lunch and dinner for weekdays) for all candidates as usual.

(B) Regarding to discussion for holding Regional Seminar and Training in regional and main cities,

- Seminar and Training in Major Cities will be started in ***June, 2018***. At the moment, following (6) cities are roughly selected to hold from the view point of travel expenses and shortening of travel time from Naypyitaw.

  YESC Area - Yangon

  MESC Area - Mandalay

  ESE Area - Bago, Magway, Taunggyi, Monywa (or Sagaing)

  (a) From the view point of saving accommodation cost, respective trainers from YESC and MESC have to take the responsibility for holding training or regional seminar in these two places and 2 or 3 JICA Experts will take part with the team. For going to ESE areas, the member of teams from respective city are selected one from each working group (WG) and JICA is going to arrange for providing transportation cost and daily allowances for meals.

(C) Regarding to discussion for tentative schedule of Workshop 1 and 2 in Japan for Engineers,

- Have to stay 3 days in Tokyo and 9 days in Nagoya and then the following places will be visited (*by tentative schedule draft*)

  (FUJI Electric Co., Ltd, Nissin Electric Co., Ltd, Maebashi Works, GIS system, Substations, CHUBU SEIKI Co., Ltd, Furukawa Electric Works Co., Ltd, NGK insulators, TOENEC corporation, CEPCO)

  (a) The counterparts from MOEE proposed at the last counterpart meeting to get the chance for visiting to coal fired power plant and railway power supply substation. However, JICA replied that it couldn't be arranged with the reason of not relating with project title for first option and didn't get the permission to see and observe form respective company for the last one though they tried it.

(D) Regarding to JCC Holding date discussion, it is going to hold on 20th December 2017 at Office No. (27) Naypyitaw.

15th Counterpart Meeting Memo
On the Project for Capacity Development of Power Transmission and Distribution System Phase – I

Date - 16th January (Tuesday), 2018
Time - 10:00 – 12:00
Venue - Training Center (Naypyitaw)
Participants - Managing Persons from DEPP, DPTSC, ESE, YESC and MESC and JICA Experts (***Attended list will be attached by JICA***)

In this meeting, the following topics were discussed with the name of

(a) Explanation about the third monitoring sheet
(b) Explanation about the activities till March 2018
(c) Explanation about proposed training organization and system formation
(d) Explanation about seminar and training in regional and main cities
(e) Explanation about discussion about the site installation of SOG switchgears
(f) Explanation about the second trainings in Japan

At the beginning of the meeting, U Tha Soe (CE from ESE) gave the opening remarks. According to his remarks, Deputy Minister instructed to all responsible persons including trainer candidates to conduct effectively for getting project progress improvement. Also, it is needed to be efficient and the best for 2018 work plan. Every responsible managing person has to submit and inform to respective higher officials (GM or CEO) about the discussed issues and resultant outcome of the meeting after the task.

(A) Regarding to Project Monitoring Sheet, the facts were expressed as follows;

- The procurement condition of safety equipment and power distribution materials, the titles of lecture given by JICA Experts through 2017 working group activities, the measurement of working group activities progress by the average score of each exam, Achievement of Output 1, 2 and 3 set up my JCC meeting. According to the expression of indicator No.1 for project purpose achievement, the number of accidents will change to appropriate number instead of described digit (28) based on actual work condition. (***the soft copy of monitoring sheet will be***

distributed by JICA side)

JICA: Switchgear has been already arrived and one has been already used at training center (Nay Pyi Taw) and another one might be installed at training center but the remaining two should be installed at actual sites to be supportive for project progress improvement.

MOEE: When all facilities arrive at training center, try to install as soon as possible. After the installation had finished, JICA experts need to give practical training to trainer candidates about one or two weeks.

JICA: Accepted the idea for practical training.

(B) Regarding to activities till March 2018 plan discussion, 5 working groups have to prepare presentation material for 23rd Seminar will hold at Office No. 27 with higher officials of MOEE. After that, candidates have to go Japan for Workshop in Japan No.2 by dividing two groups from 3rd February to 3rd March 2018. From 5th March to 6th April 2018, all trainer candidates have to come to NPT training center and need to conduct continuously for presentation material preparation for regional seminar.

(C) Regarding to training organization and system formation discussion, JICA side proposed a structure of Training Center preparation Committee (TCPC) and asked how they have to continue for proceeding. MOEE side replied that this issue should be discussed by DG or DDG of DEPP.

(D) Regarding to seminar and training in regional and main cities discussion, six pilot sites has been already selected with the name of Yangon, Mandalay, Bago, Magway, Taunggyi and Monywa. Each trainer candidate has to go two regional cities and one time is for teaching and one time is for getting teaching knowledge of others. Training candidate and regional city to be gone will allocated by JICA and proposed to DEPP with a list. Seminar dates are fitted as follows:

Trip No.	Date	Regional Cities
1st	4th June to 15th June	Yangon & Bago
2nd	25th June to 7th July	Mandalay & Taunggyi
3rd	16th July to 28th July	Magway & Monywa

Each training should be about 3 hours including a break. Activities at each day shall be on weekly basis and shall be as follows.

Date	Monday	Tuesday	Wednesday	Thursday	Friday
AM	Moving from NPT to regional city by car	Regional seminar	Training 2 (Distribution Construction and Safety technologies)	Training 4 (Transmission Technologies)	Moving from the regional city to NPT by car
PM		Training 1 (Distribution Plan and Design)	Training 3 (Distribution Operation & Maintenance)	Training 5 (Substation Technologies)	

JICA will provide for transportation cost and will be discussed later with DEPP for accommodation and daily allowance.

(E) Regarding to site selection and installation of SOG switchgear discussion, JICA side explained about the function of SOG switchgear as a load break switch. For getting the reflection of project indicators, pilot sites to be installed will be selected later based on frequently/mostly fault occurrence distribution line at the moment.

(F) Regarding to second training in Japan, JICA distributed the edited tentative schedule of workshop 1 and 2 in Japan for engineers and explained about the changes from the previous one. (***JICA will be distributed later soft copy of tentative schedule for second workshop in Japan)***

(G) As the last discussion title, JICA side requested to provide Statistics 2017 of each department (MESC, YESC, ESE and so on) to be supportive for consideration of training organization and formation. MOEE side replied that request is needed to respective departments by official letter (JICA) for getting the data.

Prepared by

Dr. Tayzar Lin

Assistant Manager (YESC)

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Meeting Record

Date:	2018/3/9	Time:	9:00 – 11:30
Meeting with	DEPP, YESC, MESC, ESE, DPTSC		
Participants:	(MOEE) : Please see the meeting attendance list as attached. (JICA Study Team) : Mrs. Kuri Orui Shibata (Training Program/Coordinator), Mr.Osamu Tanihata(Distribution Technology (Operation and Maintenance)), Mr. Shinichi Mitsui (Human Resource Developing Planning 1 (Training System)), Mr. Koichi Yamashita (Financial and Institutional Analysis), Mrs. Wah Wah Han Su Yin (Human Resource Development Planning 2 (Regional Cities))		
Agenda:	▪ To discuss about the installation of SOG (Storage Overcurrent and Grounding Type) at Tatkone Township ▪ To discuss about the installation of SOG at Kyaukpadaung Township ▪ To discuss about training program in regional cities ▪ To inform the progress of preparation of Training Center's institutional organization ▪ To discuss about the second workshop for Managers in Japan		

Main Discussion Points:

(MOEE) U Thar Soe, Chief Engineer made the opening address.

(JICA) Expert explained to install to SOG to one feeder at Tatkon Township on 19th March 2018. The starting time will be from 9:00 am and blackout for two hours shall be informed. A Japanese technician from NKE, the company where SOG has been bought, will come to the site to instruct the installation. Workers are requested at Tatkon Township on that day for installation. All Trainer Candidates (TCs) will also go to Tatkon Township on that day.
Another SOG will be installed at Kyaukpadaung Township in Nyaung Oo district and Township Engineer from Kyaukpadaung Township is requested to come to Tatkon Township to learn this installation on 19 March so that he can instruct SOG in Kyaukpadaung Township.

(MOEE) Mr. Zaw Zaw Htet informed Tatkon Township Engineer about the schedule of installation of SOG on 19 March.
In order to invite Township Engineer from Kyaukpadaung Township, please send email to CEO of MESC.

(JICA) Yes, we will send email for permission of installation of SOG in Kyaukpadaung Township and to send Kyaukpadaung Township Engineer to Tatkon Township on 19 March.

(JICA) Mr. Tanihata discussed about the main purpose of Major Cities Seminar. Expert explained to conduct the training materials and handout preparation by TCs in May in Naypyitaw. The starting date of training activities in Naypyitaw is from 7 May. Training program in regional cities is in June and July. Presentation materials should be arranged and printed by MOEE side.

(MOEE) Please submit a letter about the training program in regional cities to DEPP. DEPP then issues a letter to all organization to inform the training program in regional cities so that each organization can have time to select trainees and logistic.

How many number of trainees are expected for these training in regional cities?

(JICA) We would like to request TC to prepare a detailed training program for each group and it will be attached to the letter to DEPP before the water festival.
In terms of the number of trainees, each organization shall decide by itself.

(MOEE) How about the food and accommodation for TCs when they go to regional cities. Cost for Trainees in regional cities will be provided by related Township or Organization.

(JICA) Transportation will be provided by JICA and if possible we would like MOEE to bear cost for them.

(MOEE) It would be grateful if JICA will bear the food and accommodation for TCs.

(JICA) We will consider giving allowance to TCs. Please arrange the accommodation by yourself. The main important thing is to concentrate to conduct trainings in the regional cities.

(JICA) JICA explained about a visit to AGE Co., Ltd to study Factory Test with one person from each WGs including two experts from JICA on 12 March.

(JICA) JICA explained to install Low voltage line, Transformer Installation, Pin insulators and Guy Wires at the Training Center in Naypyitaw during 21st to 23rd March, 2018.

(MOEE) Regarding installation of remaining facilities in the Training Center, it should be done after all training facilities such as middle voltage facilities are arrived.

(JICA) As Mr. Nakagawa, Line Expert will come to Myanmar coming week, we would like to conduct the installation according to his instructions.

(MOEE) We accepted this point. Vice Minister said that he wanted to check the practical training conducted in the training center. Please let U Thar Soe know when the date of installation is confirmed.

(JICA) Regarding the institutional arrangement of our training center, Mr. Yamashita explained about the presentation made by JICA in February to DG of DEPP, DG of DPTSC, MD of ESE, CEO of YESC and CEO of MESC. The committee is proposed to establish the preparation committee and PS is now considering to establish the preparation committee including the energy sector and it seems that it takes some time to establish it.

(MOEE) Today meeting, the training institution is the main point. We need to make further discussion how to operate the training center. U Thar Soe will also remind PS to consider for establishment of a preparation committee.

(JICA) Thank you very much.

(JICA) JICA explained tentative schedule of the second workshop for Managers in Japan. JICA did not receive the application forms from MOEE although the deadline is over. The procedure is MOEE submits a list of participants to JICA Myanmar Office which then issues an invitation letter for these participants to MOEE. MOEE then continues to get permission from MOFA. We would like to request MOEE to explain MOFA not to reduce the number of participants and to reduce the length of stay in Japan. It the length of stay in Japan is shortened, the schedule will be changed.

(MOEE) We will explain to MOFA regarding the length of stay in Japan to prevent the change of schedule.

-end-

17th Counterpart Meeting Memo
On the Project for Capacity Development of Power Transmission and Distribution System Phase – I

Date - 2-5- 2018
Time - 11:30 – 13:30
Venue - Training Center (Naypyitaw)
Participants - Managing Persons from DEPP, DPTSC, ESE, YESC and MESC and JICA Experts (***Attended list will be attached by JICA***)

In this meeting, the following topics were discussed with the name of

(a) Explanation and discussion about the activities and preparation of regional seminar/ training
(b) Explanation and discussion about the working schedule toward the regional seminar
(c) Explanation about verification of SOG-VCB installation effect
(d) Explanation about the site selection for the single-phase transformer installation in the five cities
(e) Explanation about discussion about the second workshop for managers class in japan

(A) Regarding to the activities and preparation of regional seminar/ training, it is going to conduct as proposed schedule for Training Trip (Plan 1, 2 and 3) and the first trip will start from 5th June 2018 and last trip will finish on 25th July and training will be proceed as expressed in detailed schedule. JICA has already submitted the invitation letter to DEPP, and DEPP will distribute it again to respective departments and then to the state/ regional.

(B) Regarding to Activities of working schedule, have to continue for presentation material preparation in first week, and will make a rehearsal for teaching practice on second week and have to submit finalized version of teaching material on 18th June 2018 and have to make the presentation to CE and higher official of respective departments under MOEE on 28th June at Naypyitaw Training Center. Besides, the questionnaire proposed by JICA to evaluate the trainer and trainees in regional seminar has to be edited for required items or used in the program. After that, U Tha Soe (CE- ESE) told to remove

the program of presentation to Deputy Minister from schedule of this working group activity.

(C) Regarding to verification of SOG Installation effect, provided the data format by JICA and it is needed to modify to be compatible with probable data collectable situation and then collect the data by modified one and also compare the effect between before and after installation.

(D) Regarding to site selection of Single Phase Transformer discussion, ESE Head office (Naypyitaw) instructed to respective Division Engineer to choose the suitable location and the selected location point will be presented to JICA on coming week. Like the same to Dala, somemembers (a few from each organization) will go to Bagan for the OJT of designing MXrS.

(E) Regarding to Manager workshop in Japan discussion, it will be conducted as tentative schedule of JICA from May 12th to 23rd 2018. It is noted that 6 members for Manager were proposed and arranged by JICA and Deputy Minister reduced two members from them due the FAPC objection.

(F) As the last discussion title, JICA will be supported the daily allowance to each trainer candidate for regional seminar trip with the range of 23 US$ per day for staying at the region and 5 US$ for staying at Naypyitaw and the cost for three meals (breakfast, lunch and dinner) will be included in this amount.

Prepared by
Mr. Than Htike Oo
Executive Engineer (ESE)

Ministry of Electricity and Energy
Department of Electric Power Planning
Republic of the Union of Myanmar

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Assessment Report of Existing Human Resource Development Policy, Plan and Training System in Myanmar

December 2016

Japan International Cooperation Agency (JICA)

JERA Co., Inc.
Nippon Koei Co., Ltd.

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Energy for a New Era

NIPPON KOEI

Table of contents

Figures and Tables

<Figures>

<Tables>

ABREVIATIONS

Word	Original
ADB	Asian Development Bank
ADE	Assistant District Engineer
ASEAN	Association of South East Asian Nations
AE, A.E	Assistant Engineer
CE, C.E	Chief Engineer
CNG	Compressed Natural Gas
CT	Current Transformer
DE	District Engineer
DEPP	Department of Electric Power Planning
DG	Director General
DHPI	Department of Hydro Power Implementation
DPTSC	Department of Power Transmission and System Control
DyCE	Deputy Chief Engineer
EE	Exective Engineer
EPGE	Electric Power Generation Enterprise
ESE	Electric Supply Enterprise
GE	General Manager
GMS	Greater Mekong Sub-region
IFC	International Finance Corporation
JEPIC	Japan Electric Power Information Center
JICA	Japan International Cooperation Agency
MD	Managing Director
MEPE	(Former) Myanma Electric Power Enterprise
MESC	Mandalay Electricity Supply Corporation
MMK	Myanmar Kyat
MOEE	Ministry of Electricity and Energy
MOEP	(Former) Ministry of Electric Power
NEDA	Neighboring Countries Economic Development Cooperation Agency (Thailand)
NEP	National Electrification Plan
OJT	On the Job Training
SAE	Sub Assistant Engineer
YESC	Yangon Electricity Supply Corporation

Chapter 1 Overall of the Assessment

1.1 Purpose of the Assessment

"The Project for Capacity Development of Power Transmission and Distribution System" (hereinafter referred to as "the Project") has been implemented by JICA since July 2016 and the Project will be implemented for 5 years.

In the Project, the Project team will prepare draft of future human resource development frameworks and draft roadmaps (human resource development policies, and development plans) in Myanmar in light of existing human resource development policies, plans and training system in Myanmar and training system in Japan. For this purpose, the project team conducted the assessment of existing human resource development policy, plan and training system (hereinafter referred to as "the Assessment") in Myanmar. The Assessment was conducted by interviewing MOEE staff who was in charge of human resource development in each of MOEE, ESE, YESC, MESC and DPTSC.

1.2 Outline of the Assessment

The items and procedures of the Assessment are shown in Figure 1-1.

Organizations to be assessed

MOEE | ESE | YESC | MESC | DPTSC

Major assessment items (proposal)

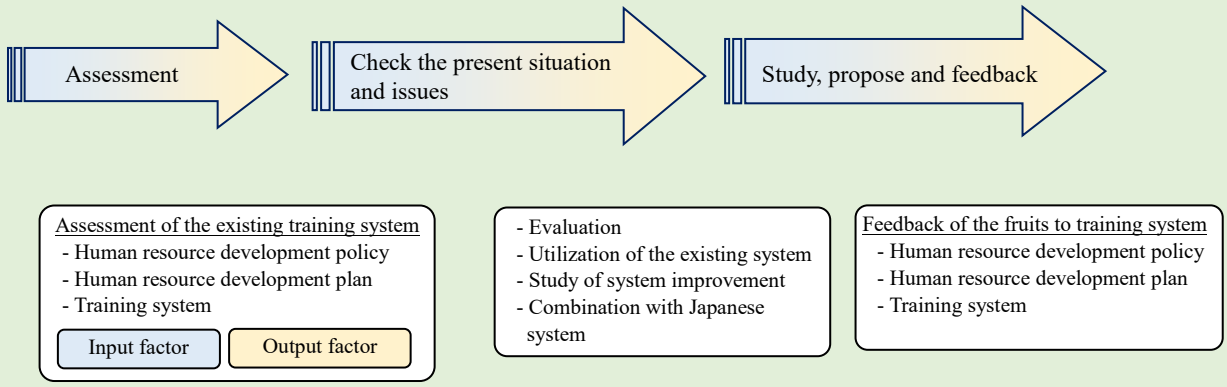
【Input factors】

Organizations in charge of training & human resource development (name of organization, number of staff members, titles)	Job assignment of engineers for each section or department (technology area, OJT, safety control)
Training policy (yes or no, details)	Transfer policy for engineers (transfer interval, policy on considering job experience history)
Training plan (yes or no, details, period, preparation, arrangements for local regions)	Training facility (yes or no, location, number of facilities, details of facility, plan, accommodations)
Budget for human resource development (amount, source of budget, actual usage, travel expenses, daily allowances)	Training textbook (yes or no, technology details, curriculum)
External training (yes or no, details, actual records)	Trainer (possibility of full-time work, number of trainers, titles, type of job, how to nominate)
Training in a third country (yes or no, details, actual records)	Linkage between training and job performance assessment (yes or no)

【Output factors】

Trainees (company, type of job, number of trainees, how to select, titles, training assessment)	Assessment of trainees (yes or no, method, test, reflection of results)
Training effects (type of job, details of effects, how to check the effects)	Assessment of training (yes or no, method, details of assessment, how to improve)

【Assessment of human resource development plan, policy and training system】



(Source: JICA Expert Team)

Figure 1-1 Assessment items and procedures

Chapter 2 Results of the Assessment

2.1 Human Resource Development Framework

(1)Training Organization, Policy and Priority Work Category

Table 2-1: Results of hearings of each MOEE organization about Training Organization and Policy

MOEE organization	Organization in charge of Training and Human Resource Development	Training Policy and/or Priority Work Category to be trained
DEPP	DG of DEPP	(No Answer)
DPTSC	DG of DEPP	(No Answer)
ESE	Administration Department 93 Numbers of Employees in Administration Department (Permanent: 78, Daily: 15) 40 Numbers of Employees are responsible for a training and human resource development.	Training is held as necessary according to the proposal by departments in ESE. Training for distribution is the priority one.
YESC	Engineering Planning Deparment 8 Staffs (1 section Head (GM), 2 Assistant GMs, 1 Assistant Manager, 1 Senior Assistant Manager, 3 Office staffs)	- To become a skillful employees and to be familiar with advanced tools and equipment and to apply and perform it technically and systematically in the field area. - To become ASEAN level competency standard. Engineering training is the first priority in YESC training plan. Others departments (admin, finance and material planning) has also respective training as usual.
MESC	(No Answer)	(No Answer)

(2)Training Plan/Program

Table 2-2: Results of hearings of each MOEE organization about Training Plan/Program in fiscal year 2016-2017

MOEE organization	Training Plan/Program in fiscal year 2016-2017
DEPP	There is no plan and training program in 2016-2017. (Training course is implemented by proposal based.)
DPTSC	There is no plan and training program in 2016-2017. (Training course is implemented by proposal based.)
ESE	For the time being, there is no plan/program for training program conducted by ESE in 2016-17 fiscal year. There was three numbers of trainings in 2015-2016 fiscal year because of budget limitation. But there is a plan to send employees from ESE to Central Civil Service University conducted by the Union Civil Service Board and to oversee training conducted by international donors and private companies in 2015-2016 fiscal years.
YESC	In 2016-2017 fiscal year, 5 training programs are planned for 4 different level position who do not conduct with training as for engineering planning department. There are Grade 1 to 5 (Grade 1 is the highest). Technicians are qualified by the exam, performance of their technical skills, experiences and interview.
MESC	(No Plan)

(3)Training Budget

Table 2-3: Results of hearings of each MOEE organization about the amount and content of training budget information (in each of fiscal year 2013-2014, fiscal year 2014-2015 and fiscal year 2015-2016)

MOEE organization	The amount and content of training budget information (fiscal year 2013-2014, fiscal year 2014-2015 and fiscal year 2015-2016)
DEPP	**2016-2017 fiscal year: MMK about 30 million** 1. Almost the cost is food for trainees. Small accessories and lecture room maintenance fee is also include but very few. 2. Accommodation, dormitory is provided by MOEE, so it's not included in budget. 3. Transportation fee is paid by each organization's budget. The transportation fee is included all the fee for work, so it is difficult to distinguish the fee which is only used for training. 4. There are no daily allowance for training. 5. It's is not enough to conduct the all proposed trainings.
DPTSC	**No budget for human resource development for DPTSC, but DEPP has budget for DPTSC.** All the training is proposed base. Even the budget is not enough for training courses, some training course is implemented. At that time trainee have to pay the food and transportation.
ESE	**2015-16 fiscal year: MMK 12,711,184** (Example in 2015-16 fiscal year: 1. 2.5 months long training for 50 trainees, the budget used is MMK 8,023,334 including food for trainees, refreshment for guests who come to ceremonies, arrangement for ceremonies, block stamps, etc… 2. 9 months long training, the budget MMK 320,000 is used only for food. 3. 21 days long training, the budget used is MMK 674,950.) **2016-17 fiscal year: MMK 9, 500,000** Mostly, the budget for trainings is used for food and transportation charges is not included in it. The unit price of food per person for a day approved by Myanmar Government is 500 kyats. There is Travelling Allowance in ESE and transportation charges by bus to attend a training can be claimed by trainees from ESE. There is no daily allowance in MOEE.
YESC	**Budget sharing for training is 50% for Engineering Training and the rest 50% is for the other 3 departments.** Finance department have allocated the budget for training.
MESC	(No answer)

Table 2-4: Results of hearings of each MOEE organization about the procedure for acquiring training budget

MOEE organization	Procedure for acquiring training budget
DEPP	MOEE allocate the budget to each organization. Budgetary request is not done annually. Private companies or other donor such as JEPIC or ADB proposed to some trainings courses to MOEE. Almost all the cost including equipment and facilities is covered by them.
DPTSC	Anyone who wants to hold a training programs can propose the training course. And if ministry office of MOEE or DG of DEPP permit it, the training cost is allocated from the budget. The permission authority is depend on the size of training courses.
ESE(*1)	Regarding budget for a training in ESE, there are only two types of budget: transportation for trainees and trainers allowance including catering for trainers. As far as transportation for trainees and trainers in a training is concerned, it is included in the budget for all transportation charges. Administration department in the Head Office of ESE is responsible to request the budget allocation of all transportation charges including that of training to Revenue and Budget Department, which then submits request of all budget to the Union Government, in ESE. Administration Department estimated transportation budget based on the actual cost for transportation in the previous year. Actual transportation for a training is requested to Revenue and Budget Department by Administration Department in the Head Office of ESE to provide to trainees and trainers. Moving onto allowance for trainers, it is included in the subject of catering of guests. Administration Department in ESE estimated allowance budget based on actual cost in the previous year. When food expense for Trainees in a training is concerned, there is no budget provided by ESE Head Office. Regional and State Offices have to provide food expense by themselves for their respective trainees from corresponding Regional and State Offices in response to invoice from Administration Department in the Head Office of ESE. Administration Department pay first for food expense for trainees in a training. In addition, expenses of food for Trainees from the Head Office of ESE is provided by Regional and State Offices.
YESC	Head of Training Department and Head of Engineering Budget Department are the person in charge in YESC.
MESC	No answer

(*1) Remark: Based on an interview to Mr. Tin Bote San (Deputy Director, Revenue and Budget Department in ESE Head Office) on 31 Oct, 2016.The person in charge of in ESE for budget in a training is Mr. Myint Oo (Deputy Director) from Administration Department.

(4)External Training Course

Table 2-5: Results of hearings of each MOEE organization about external training courses

MOEE organization	External training courses in Myanmar	External training course in overseas countries
DEPP	Astron, Siemens, ADB, JEPIC, Fujikura Siemens: circuit breaker (equipment is also provided by Siemens) ABB: Previous Deputy Minister requested the training courses, Relay setting (1-2 days lecture) JEPIC: 40-50person every 2 years in Yangon, 4 days lecture and 5-10 person go to Japan for 2-3 weeks.	Please See Attachment 2 "Overseas Training List".
DPTSC	-	
ESE	Yes. For example: Fujikura, JICA. (Please See Attachment 1 "Fujikura")	
YESC	Linemen who work at local and foreign companies are assigned the training and are trained and participated practical and demonstration how to use line equipment and tools.	Mostly China, Vietnam, Japan, Thailand and India, etc. invite to conduct the training program at their countries. Not regularly.
MESC	(No answer)	(No answer)

2.2 Personnel management system

(1) Assignment of engineers

Table 2-6: Results of hearings of each MOEE organization about how to assign engineers to each work

MOEE organization	Method for assigning engineers in regional offices (For example; technical area (design, planning, construction, maintenance, distribution, etc…), On Job Training (OJT), safety management, etc…) or Criteria for designation of engineers to each work
DEPP	No.
DPTSC	No.
ESE	Engineers are assigned according to their experience. There is no position of safety management. Engineers work for their main work together with safety management. Engineers instruct linemen. [Criteria for designation of engineer] Years of experience, educational qualification and competence at work. Daily contract employees, Assistant Engineers (AE) and Executive Engineers (EE) are promoted periodically by making an interview by a board composed of responsible persons from each department. Above EE position, Executive committee decide them.
YESC	Engineers are only assigned to each work in regional offices and depend on the allocation of workforce from the Head of Office in Nay Pyi Taw. According to the rules and regulations, engineers are assigned to each work in different area. However they already have been trained since they start to work in this ministry. Generally, engineers from the whole ministry have to transfer after 2 years later in one place by the assignment of the ministry. According to the organizational structure of YESC, there is a difference of total number of engineers, admin staffs, finance staffs and office staffs in each regional offices depends on the land area, population and consumers of that regions. [Criteria for designation of engineer] Engineers are evaluated by the performance of their technical skills, competency and how much they can effort and how they can apply the technical knowledge at their work.
MESC	Engineers to each work in regional offices Two Staff Officers – (1) Engineers (EE, AE, SAE) (2) Admin (Staff Officer) Engineers (EE, AE, SAE)_ (design, construction, maintenance, distribution, etc…), Admin (Staff Officer) - (_planning,) On Job Training (OJT), We don't have. Safety management – Distribute to the Public or consumers as a safety note sheet. We Have criteria for designation of engineers to each work experienced years, career history, qualifications,

Table 2-7: Results of hearings of each MOEE organization about No. of assigned engineers to each work

MOEE organization	No. of engineers assigned to each work in regional offices (For example; technical area (design, planning, construction, maintenance, distribution, etc…), safety management, etc…)
DEPP	No. There are no work for safety management, because safety is included in each works.
DPTSC	MOEE has criteria. (Ex. First 3year Sub A.E -> 5year A.E -> E.E) The speed of promotion is different.by certification which employee has. Interview is held by senior person included C.E. the number of interviewer is around 10. Senior person nominates employees as promotion candidate referring their willingness, experience, certification and some qualification.
ESE	The numbers of engineers assigned in each regional office depend on the size of the office; how big or how small. There is one District Engineer (DE), Deputy Chief Engineer and one Assistant District Engineer (ADE), Senior Engineer are in each State/Regional office. There are enough engineers under DE and ADE in each State/Region.
YESC	-----
MESC	-----

Table 2-8: Results of hearings of each MOEE organization about evaluation system for engineers

MOEE organization	Whether the evaluation system for engineers from the view point of technical skill exists or not (Yes: exists, No: not exist)
DEPP	Yes
DPTSC	----
ESE	Yes
YESC	Yes
MESC	Yes

(2) Personnel transfer policy

Table 2-9: Results of hearings of each MOEE organization about transfer policy for engineers

MOEE organization	Transfer policy for engineers (frequency of personnel transfer, consideration of work experience)
DEPP	Employees have to work at same workplace at least 3 years. Normally 3-5 year, we work at same workplace. If employee get a punishment, it shall not be applied to.
DPTSC	-----
ESE	Yes. Every two years, transfer request can be submitted to a committee. Working experience is included when considering transfer.
YESC	Have different circumstances; (a) Promotion (if one of Engineers get promotion, they have to transfer) (b) After 2 years serving in one place (c) Working experience (if he/she have appropriate and skillful at one subjets) (d) Work requirements
MESC	Transfer policy for engineers in MESC is depend on technical skill , experienced years, career history, qualifications.

2.3 Resources for training

(1) Training facilities

Table 2-10: Results of hearings of each MOEE organization about training facilities

MOEE organization	Training facilities (Information about such as location, number of facilities, plan and accommodation)
DEPP	Yes. MOEE training center. There are concrete poles, lineman installation.
DPTSC	Yes. In Nay Pyi Taw, previous MOEP2 training facilities -> MEPE -> DPTSC
ESE	Yes. There is an existing Training Center in Nay Pyi Taw including accommodation for 30 trainees, a seminar room, a dining room and a new three-storey building is under construction for all employees in MOEE.
YESC	Yes. Hlaing Thar Yar Training center Tools and equipment to practice and demonstrate to the trainees. Line installation equipment Safety equipment Transformer and substations equipment and so but not much more.
MESC	There is no Training facilities in MESC.

(2) Training textbooks

Table 2-11: Results of hearings of each MOEE organization about training textbooks

MOEE organization	Training textbooks (Information about technologies, curriculum)
DEPP	Yes.
DPTSC	Yes. Trainees has the textbook, we some time photocopy to share the knowledge. No library for training text book.
ESE	Yes. Please see the email sent from Mr. Zaw Zaw Htet about the presentation file of one the trainings Please see Attachment 3 "Training Schedule of a Training in ESE" as a sample of training schedule in ESE. There are some training text book for Generating, Underground, Distribution standard, and Siemens training. When a training course is proposed, a schedule is mentioned on it.
YESC	Technical textbooks for different engineering sections such as underground, overhead line, substation construction and maintenance, 24 hours maintenance and repairing (safety, line fault and breakdown), metering and testing, street lighting and distribution line. However, above textbooks cannot support for all level of engineering positions. These textbooks only compile from the experienced old service senior Engineers from related session. There is no syllabus and format for textbooks systematically in detailed.
MESC	There is no Training textbook in MESC.

(3) Trainers

Table 2-12: Results of hearings of each MOEE organization about trainers

MOEE organization	Trainers (Full-time / Part-time) (No. of trainers, trainer's designation and type of job (For example; design, planning, construction, operation, maintenance, etc…) and method for nomination of trainers.
DEPP	There are some temporary trainers. No full-time trainers. Normally, trainers come from other office to provide lectures.
DPTSC	No full-time trainers. Normally, trainers come from other office or DEPP to provide lectures.
ESE	They are temporary trainers; DyCE, CE, EE, do as trainers by doing together with their actual work based on instruction by MD and DG of each organization.
YESC	Section Heads from different sections and technical experts are giving lecture as part time trainers. To become assigned training is now planning but not yet complete.
MESC	(No answer)

Table 2-13: Results of hearings of each MOEE organization about linkage between training and job performance assessment

MOEE organization	Linkage between training and job performance assessment
DEPP	Yes. Trainees can apply their knowledge to their work in practical.
DPTSC	Yes. Some of training certifications are reflected to promotion.
ESE	Yes. If he/she is outstanding in the training, he has a chance to be promoted.
YESC	Training for new employees and On-Job Training for experienced workers. All of the new Engineers (including linemen and Grade 3 or 4) have to be given training after assigned to work in different offices. For experienced workers, OJT is assigned.
MESC	There is no linkage between a training and job performance assessment in MESC.

2.4 Evaluation of a Training and Evaluation to Trainees

(1) Trainees/Training Result

Table 2-14: Results of hearings of each MOEE organization about Trainees

MOEE organization	Trainees (organization they are from, their job type (for eg; design, planning, construction, operation, maintenance, etc…), their designation, the number of trainees, the method of selection and assessment/evaluation of a training by trainees.)
DEPP	Depend on each training course. Not standard matters. Criteria for a training is mentioned on that training program.
DPTSC	Criteria for a training is mentioned on that training program.
ESE	Employees from ESE attend the training conducted not only by ESE but also by other Ministries such as Union Civil Service Board, etc…
YESC	Trainees Linemen, Grade 3 or 4 from different township offices of YESC. All of the employees who work at YESC have to be trained. When one of the training program is planned to start, training department select the employee to conduct from all of the townships. Therefore, department choose the trainees according to their service. Training center cannot train all of the new employees in one time because of the size and space of training center. So, by selecting the workers from different townships according to their service and plan to train.
MESC	Mandalay Electricity Supply Coporation Planning (Engineer work section)

Table 2-15: Results of hearings of each MOEE organization about Training Result

MOEE organization	Training result (effect of training to trainees) Job type (for eg; design, planning, construction, operation, maintenance, etc…), actual training results and method of confirmation of training result.
DEPP	Presentation or progress report submits to DEPP
DPTSC	Criteria for a training is mentioned on that training program.
ESE	There is no specific follow up in the performance of trainees in their actual work after a training.
YESC	Construction, operation and maintenance sections, trainees get more technical and safety knowledge to apply.
MESC	(No answer)

(2) Evaluation to trainees

Table 2-16: Results of hearings of each MOEE organization about evaluation to trainees

MOEE organization	Whether evaluation to trainees is conducted or not.(Yes: conducted, No:Not conducted) (If yes, evaluation method, examination and feedback method of results to trainees)
DEPP	Yes Sharing the knowledge which trainees get from a training course, they submit report. In the report they mentioned how to apply the knowledge to their works. There are no typical format. (It's not for all training courses) At the end of training courses, trainees have examination and have to pass it to get certification. (It's not for all training courses and normally all the trainee pass it). Some training courses give a prize to a trainee who got highest result.
DPTSC	Yes. At the end of training courses, trainees have examination and have to pass it to get certification. (It's not for all training courses and normally all the trainee pass it). Some of training course evaluate by attendance
ESE	Yes. There is an evaluation sheet on each Trainee in ESE. Please See attachment 4 "Evaluation Sheet of Training"
YESC	After the training period, trainees need to answer the written exam and practical skills. Prizes are given for qualified trainees.
MESC	(No answer)

(3) Evaluation to trainees

Table 2-17: Results of hearings of each MOEE organization about evaluation to trainees

MOEE organization	Whether assessment/evaluation of a training is conductted or not. (Yes: conducted, No:Not conducted) (If yes, evaluation method, evaluation subjects, improvement method of a training, etc…)
DEPP	Yes. There is a comment sheet on a training to be filled by trainees to improve the training courses. The suggestion are submitted to MOEE.
DPTSC	Yes. Some training has questionnaire for a training
ESE	Yes. There is a comment sheet on a training to be filled by trainees in ESE. Please see attachment 5 "Evaluation by Trainee (Example)" Based on the comments on a training by trainees, evaluation of a training is conducted. Based on these comments, the next training is improved.
YESC	Daily workers are assigned to become permanent workers when they reach limited service. But before assigned them as permanent, YESC assign that workers to conduct the relevant training.
MESC	No answer

MOEE has form for evaluation of trainees and form for receiving comments from attended trainees. Table 2-18 shows the form for evaluation of trainees and Table 2-19 shows the form for squeezing comments from trainees respectively.

Table 2-18 Form for evaluation of trainees

Confidential

Ministry of Electricity and Energy

No.(5) upgrading Electrical Engineering Training

Evaluation on each Trainee

1. Name: _____
2. Designation: _____
3. Department: _____

4. Evaluated Marks: _____

Mark		
Dutiful and Taking responsibility of assignment work	(	)marks
Competence at work	(	)marks
Reliable	(	)marks
Study skill	(	)marks
Hardworking	(	)marks
Creative skill	(	)marks
Comply with Training rules and regulation	(	)marks
Volunteering	(	)marks
Communication	(	)marks
Leadership	(	)marks
Total	(	)marks

Training Supervisor:

Sign:

Name:

Designation:

Department:

Date:

Confidential

Table 2-19 Form for squeezing comments from trainees

Ministry of Electricity and Energy

Comment on Training by Each Trainee

Training Seminar Room

1. ---

Accommodation

2. ---

Food and Dining Room

3. ---

Among Trainers, the best trainer and the best subject

4. ---

Evaluation on the best Trainer and training subject

5. ---

The weak Trainer and Training Subject

6. ---

Evaluation on the Trainer who is weak in teaching and Training Subject

7. ---

Training Subject which should be included in the Training Schedule

8. ----------

The best site visit which you like the most

9. ----------

Evaluation on the best site visit you like the most

10. ----------

General suggestion

11. ----------

Signature ----------

Name ----------

Department ----------

2.5 Structure and cycle related budget

(1) Budget cycle

Budget cycle in MOEE is shown in Fig.2-1 according to interview.

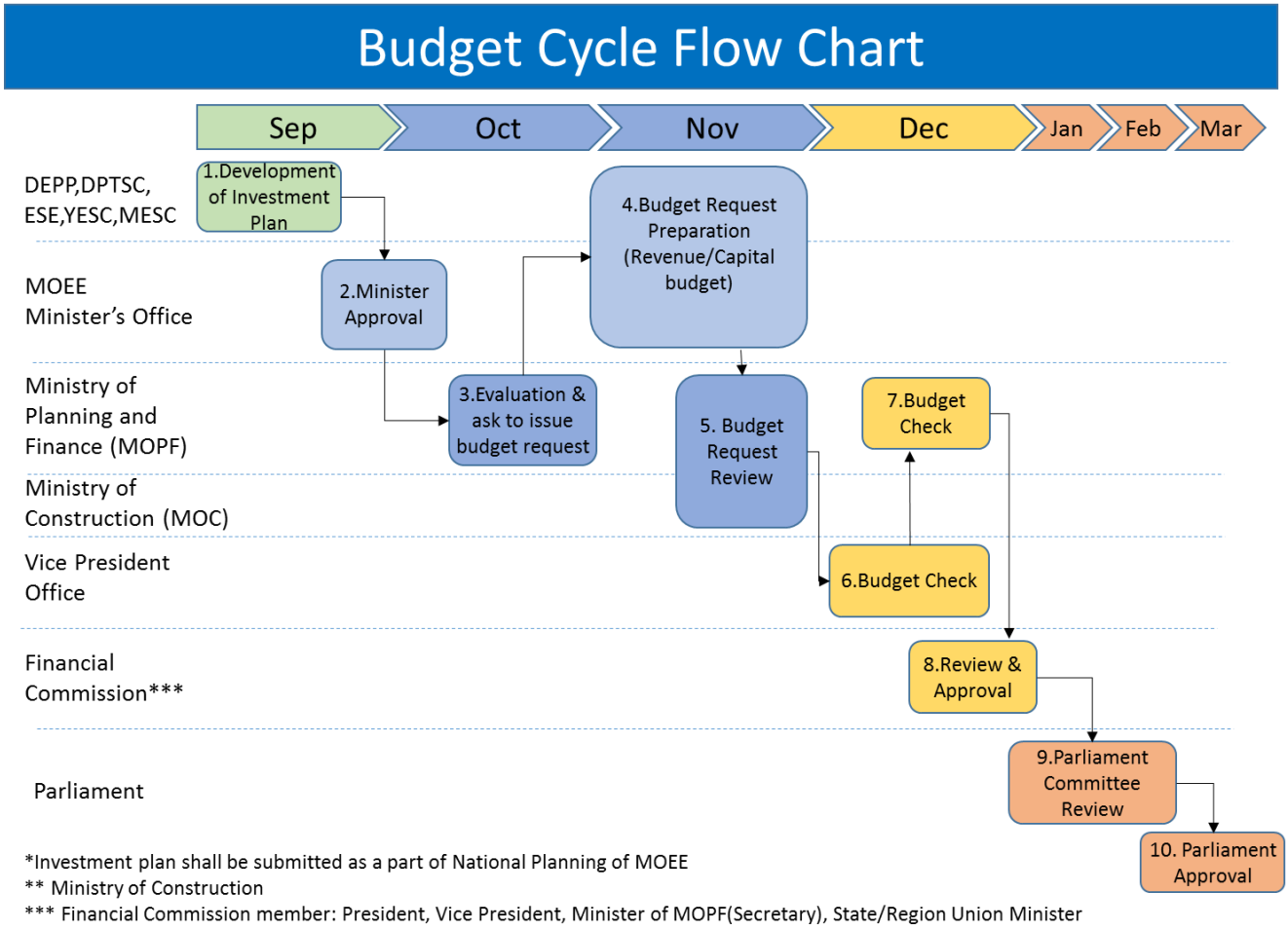


Figure 2-1 Budget Cycle flow chart

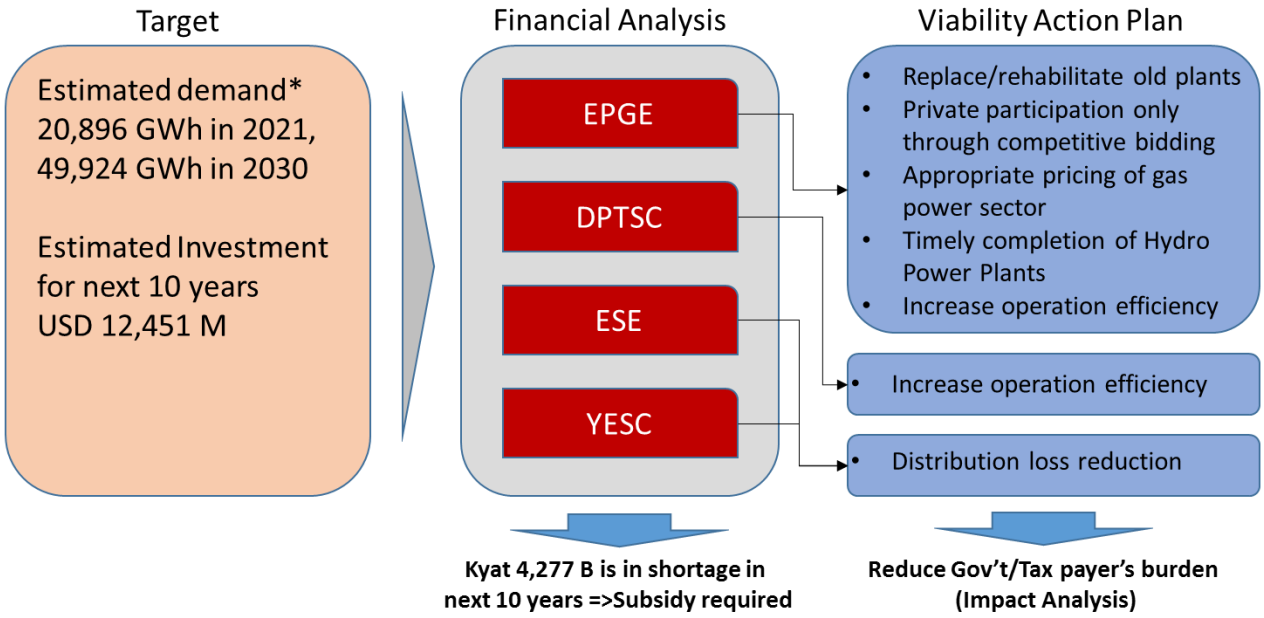
Description of above budget flow is as below.

1. Each organization in MOEE prepares Investment Plan (The plan is prepared by based on 5-year plan under 20-year plan staring from 2010-2011 fiscal year). Each plan includes three parts: the policy, objectives and implementation. Each organization in MOEE submit National Planning of MOEE including Investment Plan to the Minister's office.
2. Minister review and approve the National Planning of MOEE including Investment Plan. Minister's office submits National Planning of MEE including Investment Plan to the Ministry of Planning and Finance (MOPF).

3. Revenue department of MOPF asks to issue budget request with prioritized list under budget ceiling considering actual cost of last year, current year budget and next year plan to each Ministry.
4. Each Ministry submits budget including revenue budget and capital budget request by giving priority to each plan as there are a lot of plans submitted and there is not enough budget to implement all plans. Capital budget includes construction, machines and other expenditure such as machine installation, expense.
5. Ministry of Construction (MOC) checks construction plan, ECC (Equipment) in MOPF checks investment plan and Planning DThe items and procedures of the Assessment are shown in Figure 1-1.epartment in MOPF checks other expenditure submitted by each Ministry. And Revenue Department in MOPF reviews the budget.
6. Vice President (1) and (2) check the Union budget and State/Region budget respectively.
7. Budget is checked by MOPF.
8. Budget is then approved by Financial Commission where the President is the Chairman, the secretary is the Minister of MOPF, members include Vice President (1) and (2) and State/Region Union Minsters.
9. Parliament Committee reviews and checks the budget.

(2) Action Plan designated in Deloitte report

Recently Financial Analysis has been done by MOEE through Deloitte. Based on the Financial Analysis result, the following Action Plan was proposed.



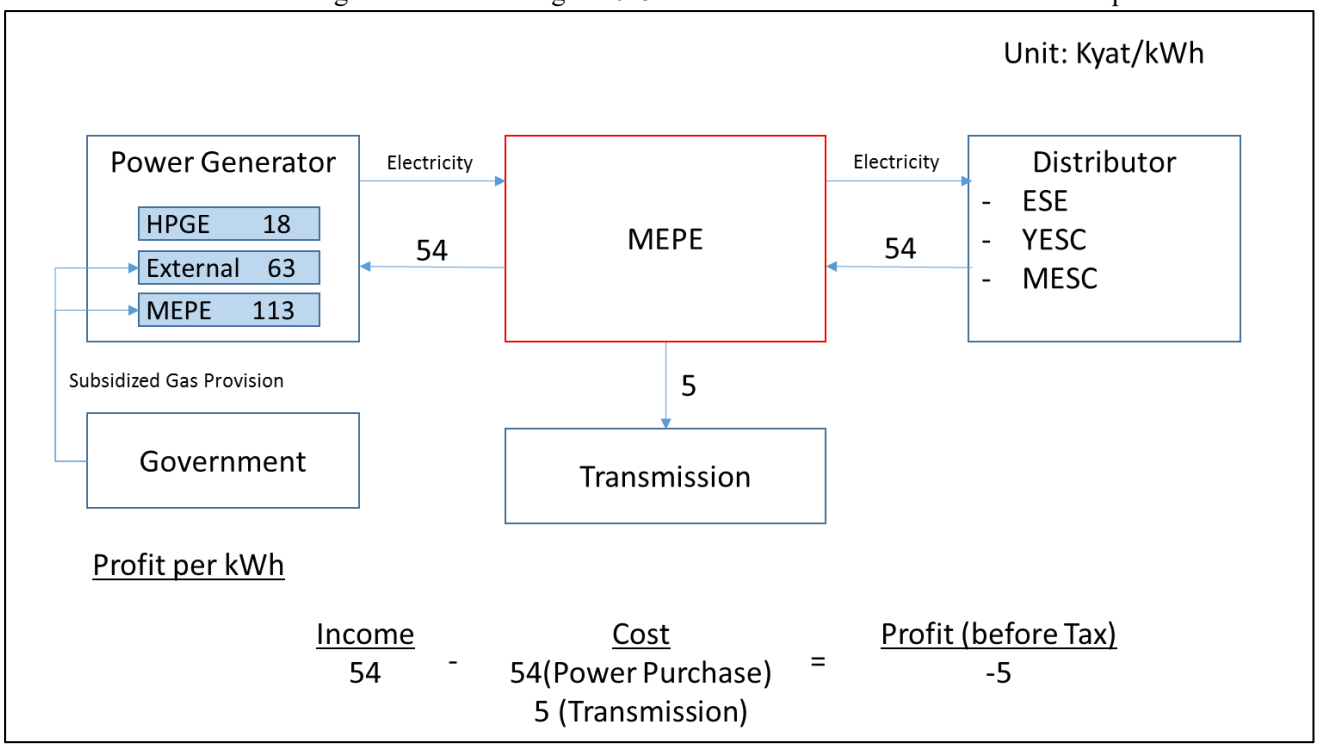
*"Myanmar Energy Master Plan" prepared under ADB support in 2016

(Source) "Myanmar Power Sector Financial Analysis and Viability Action Plan – Third Financial Viability Action Plan", Deloitte, March.2016

Figure 2-2 Action plan in MOEE

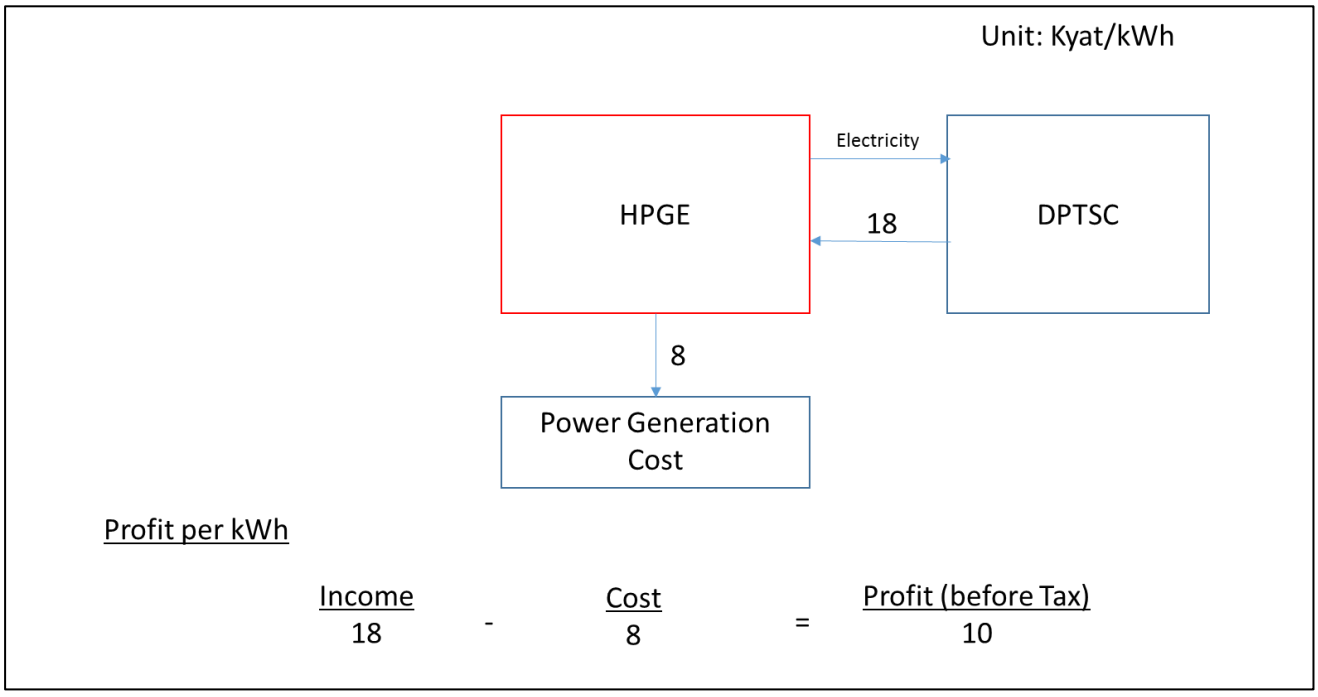
(3) Financial Outlook

Financial outlook in each organization as of Augist 2015 are shown in below based on Deloitte report.



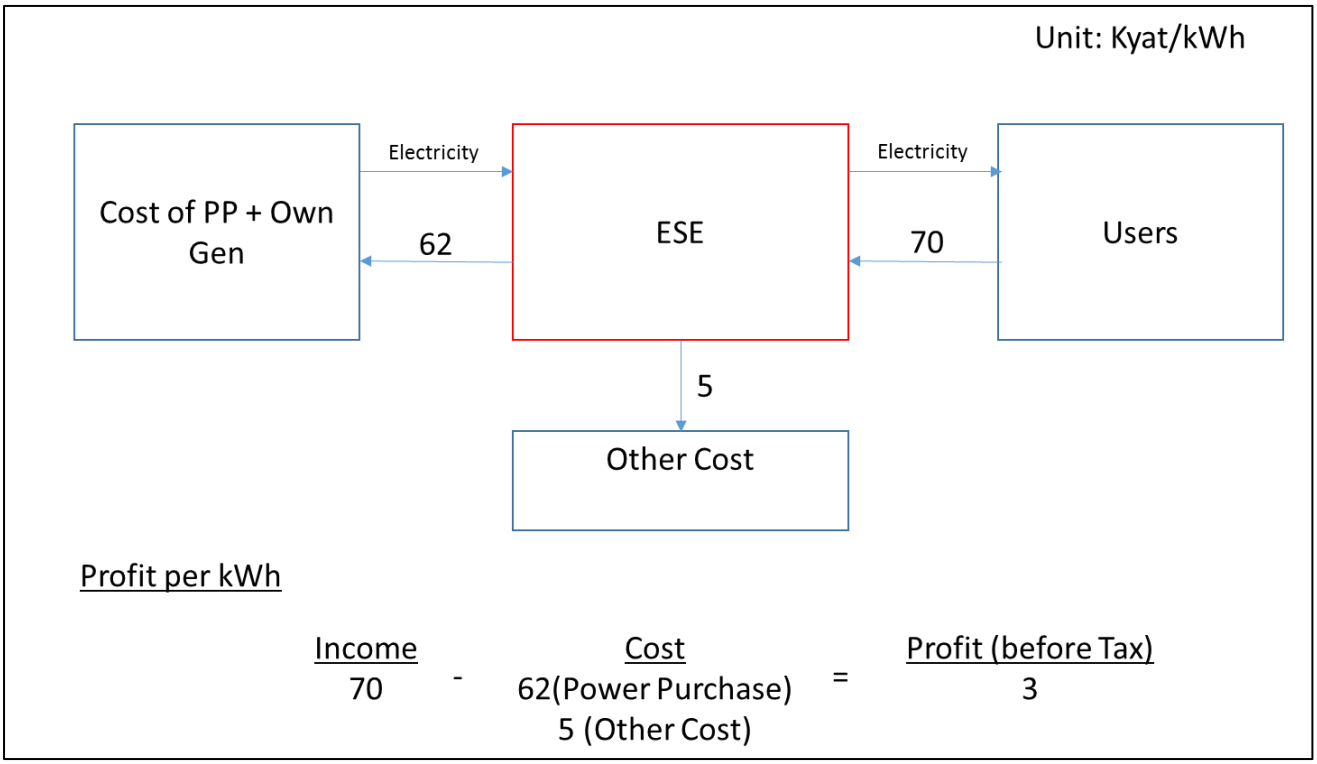
Source: JICA Expert Team
(Data in "Myanmar Power Sector Financial Analysis and Viability Action Plan – Inception Report", Deloitte, Aug.2015 was used)

Figure 2-3 Financial outlook in MEPE



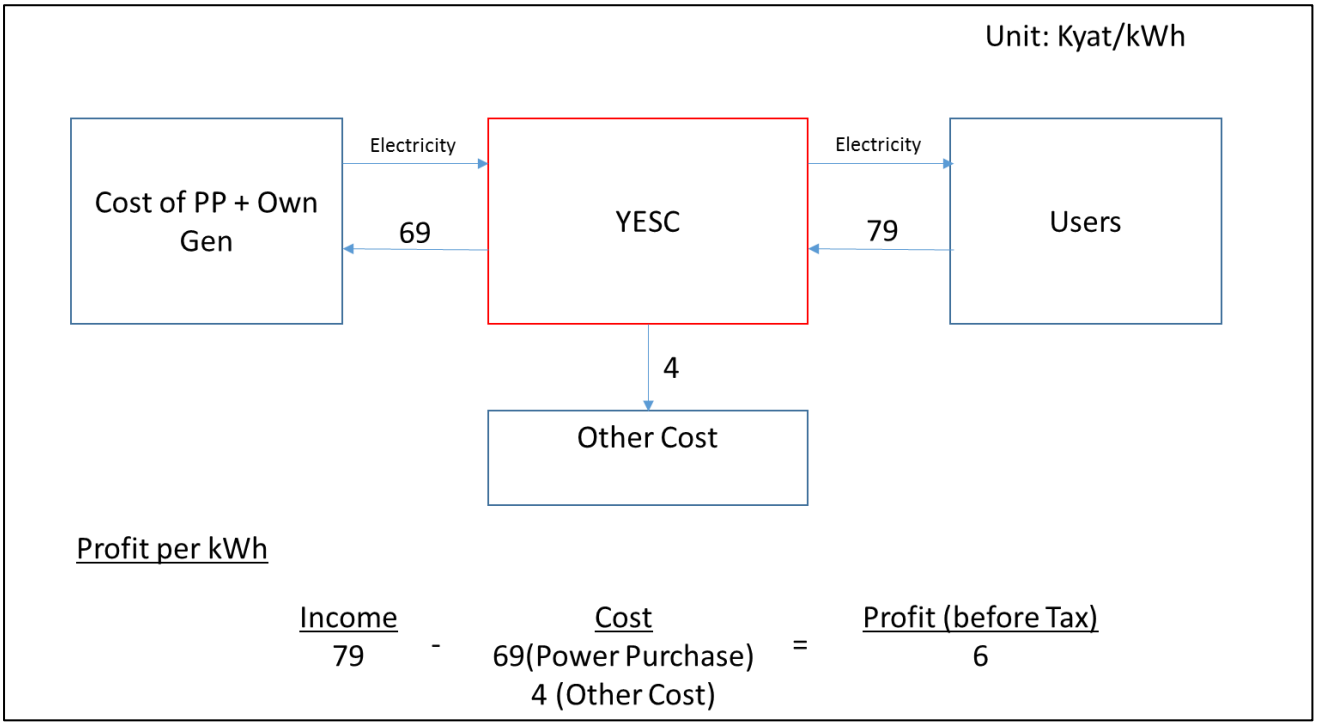
Source: JICA Expert Team
(Data in "Myanmar Power Sector Financial Analysis and Viability Action Plan – Inception Report", Deloitte, Aug.2015 was used)

Figure 2-4 Financial outlook in HPGE



Source: JICA Expert Team
(Data in "Myanmar Power Sector Financial Analysis and Viability Action Plan – Inception Report", Deloitte, Aug.2015 was used)

Figure 2-5 Financial outlook in ESE



Source: JICA Expert Team
(Data in "Myanmar Power Sector Financial Analysis and Viability Action Plan – Inception Report", Deloitte, Aug.2015 was used)

Figure 2-6 Financial outlook in YESC

Appendix

(1) Assessment sheet regarding Human Resource Development in MOEE
(2) Organization Chart
(3) Responsibilities of each organization

JICA Project Team
August 2016

(1) Assessment sheet regarding Human Resource Development in MOEE

Please kindly provide us with information regarding Human Resources Development in MOEE.

Your cooperation in this matter would be highly appreciated.

Please tick and write your office's information in right cell	DEPP of MOEE, DPTSC, ESE, YESC, MESC
Contact person in charge	Name:_____, e-mail:_____, phone:_____,
	Name:_____, e-mail:_____, phone:_____,

The Project for Capacity Development of Power Transmission and Distribution System (Phase I) (Assessment)

JICA Project Team
August 2016

I. Training Experience

No.	Contents of Assessment	Current Situation in MOEE
1.	Name of Organization which is in charge of a training and human resource development in MOEE, ESE, YESC, MESC and DPTSC. Please provide the name of an above organization, number of staff and designation of each staff.	
2.	Are there any Training policy and/or priority work category to be trained in MOEE, ESE, YESC, MESC and DPTSC? If yes, please provide detailed information about training policy and /or priority work category.	
3.	Are there any Training plan/program in this 2016-2017 fiscal year for engineers in MOEE, ESE, YESC, MESC and DPTSC? If yes, please provide detailed information, plan period, preparation, contents, program of training and arrangement for regional area outside of Yangon and Mandalay.	

No.	Contents of Assessment	Current Situation in MOEE
4.	Budget for human resource development in MOEE, ESE, YESC, MESC and DPTSC Please provide Budget amount, source of budget, actual utilization of budget, travel expenses and daily allowances in each 2013-2014 fiscal year, 2014-2015 fiscal year, 2015-2016 fiscal year.	
	Please explain the procedure of acquiring budget for training, and a person in charge in MOEE, ESE, YESC, MESC and DPTSC.	----------
5.	Are there any external trainings conducted by others other than MOEE in Myanmar? If yes, please provide detailed information such as when, where, who conducted, who participated, what is the main subject of training, etc…	

The Project for Capacity Development of Power Transmission and Distribution System (Phase I) (Assessment)

JICA Project Team
August 2016

No.	Contents of Assessment	Current Situation in MOEE
6.	Are there any Trainings conducted in oversea countries? If yes, please provide detailed information such as when, where, who conducted, who participated, what is the main subject of training, etc…	
7	How to assign engineers to each work in regional offices (for eg; technical area (design, planning, construction, maintenance, distribution, etc…), On Job Training (OJT), safety management, etc…) Do you have any criteria for designation of engineers to each work (for eg; experienced years, career history, qualifications, etc.)?	
	How many engineers are assigned to each work in regional offices (for eg; technical area (design, planning, construction, maintenance, distribution, etc…), safety management, etc…)	
	Do you have any evaluation system for engineers from the view point of technical skill?	

The Project for Capacity Development of Power Transmission and Distribution System (Phase I) (Assessment)

JICA Project Team
August 2016

No.	Contents of Assessment	Current Situation in MOEE
8.	Transfer policy for engineers in MOEE, ESE, YESC, MESC and DPTSC How often engineers are transferred? Are there any policy on consideration of work experience?	
9.	Are there any Training facilities in MOEE, ESE, YESC, MESC and DPTSC? If yes, please provide detailed information about training facility such as location, number of facilities, plan and accommodation.	
10.	Are there any Training textbook in MOEE, ESE, YESC, MESC and DPTSC? If yes, please provide information about technology, curriculum.	

No.	Contents of Assessment	Current Situation in MOEE
11.	Are there any Trainers in MOEE? Are they full-time trainers (or) part time trainers working at site and working as trainers? Please provide the number of trainers, his/her designation and his/her type of job (for eg; design, planning, construction, operation, maintenance, etc…) and how to nominate trainers.	
12.	Are there any linkage between a training and job performance assessment in MOEE, ESE, YESC, MESC and DPTSC?	

II. Evaluation of a Training and Evaluation to Trainees

No.	Contents of Assessment	Current Situation in MOEE
1.	Trainees Please describe which organization they are from, their job type (for eg; design, planning, construction, operation, maintenance, etc…), their designation, the number of trainees, the method of selection and assessment/evaluation of a training by trainees.	
2.	Training result (effect of training to trainees) Please describe job type (for eg; design, planning, construction, operation, maintenance, etc…), actual training results and method of confirmation of training result.	

No.	Contents of Assessment	Current Situation in MOEE
3.	Conducting evaluation to trainees? If yes, please provide evaluation method, exam and feedback method of results to trainees.	
4.	Conducting assessment/evaluation of a training? If yes, please provide evaluation method, evaluation subjects, improvement method of a training, etc…	

(End of sheet)

Appendix 2

(2) Organization Chart

(a) Organization chart of Department of Electric Power Planning (DEPP)

Department of Electric Power Planning

DG: Director General
DDG: Deputy Director General
DD: Dupty Director
AD: Assisstant Director
(No): Number of persons

DG	
Ms. Mi Mi Khine	
88	190

Particular	Proposal	Present	Balance
Officer	88	56	32
Staff	190	91	99
Total	278	147	131

DDG	
Mr. Myint Oo	

DDG	
Mr. Hein Htet	

Human Resource Planning	
12	65
Director Mr. San Lwin	
DD (3 No.) Mr. Tin Myo Win, Ms. Su Khin Lay Oo	
AD (4 No.) Mr. Aung Thein, Ms. Cho The New, Mr. Myo Lwin Nyein, Mr. San Oo	
4	65

Electricity Development Planning	
22	35
Director Mr. Saw Sithu Hlaing	
DD (3 No.) Mr. Kyaw Swa, Mr. Than Naing Lin, Mr. Tin Aung Lwin	
AD (6 No.) Ms. Phyu Phyu Khin, Ms. Tin Le Kyaw, Ms. Chaw Thandar Soe, Ms. Ye, Mr. Aung Kyaw Swa, Ms. Mar Lar Aung	
12	35

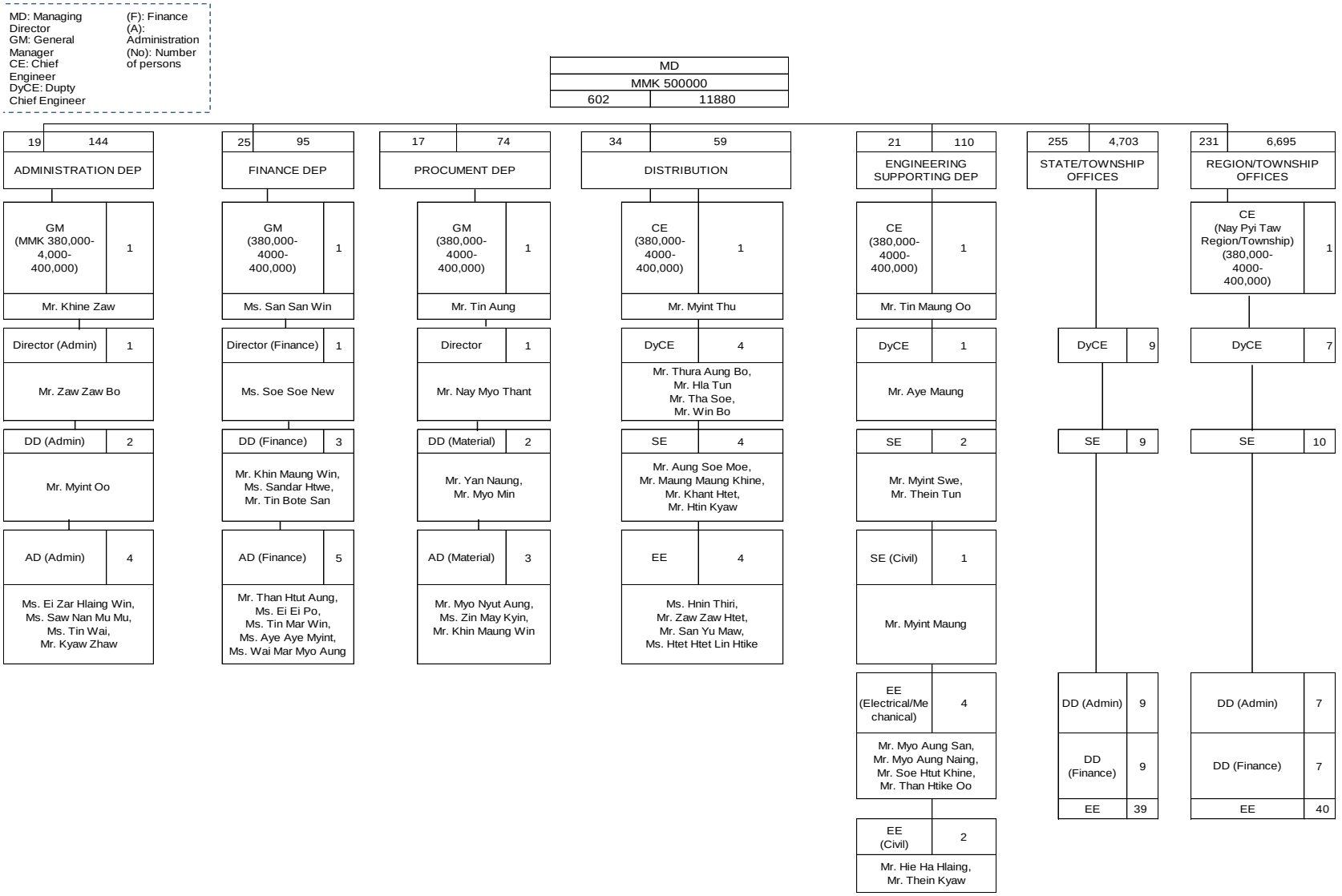
Economic Planning Department	
21	32
Director Ms. Sandar Win	
DD (2 No.) Ms. Thwe Thwe, Mr. San Htya	
AD (6 No.) Mr. Tun Lin Soe, Ms. Mya Thae Lwin, Ms. Kyu Kyu Win, Ms. Ei Ei Swe, Mr. Tun Ko Ko, Ms. Yi Mon Win	
12	35

Thermal Energy Planning	
15	24
Director Ms. Myint Myint Kyi Swe	
DD (2 No.) Mr. Aye Min, Ms. Thida Khine	
AD (4 No.) Mr. Aung Myo Win, Ms. Nan Han Na, Ms. Yin Mar Soe, Mr. Myo Thant Zin	
8	24

Hydro and Renewable Energy Planning	
15	31
Director Mr. Aung Ko Ko	
DD (2 No.) Mr. Tint Lwin Oo, Ms. Su Su Hlaing	
AD (4 No.) Mr. Kyaw Aung Win, Mr. Kyaw Myat Htoo, Mr. Thet Htwe, Mr. Soe Thiha	
8	31

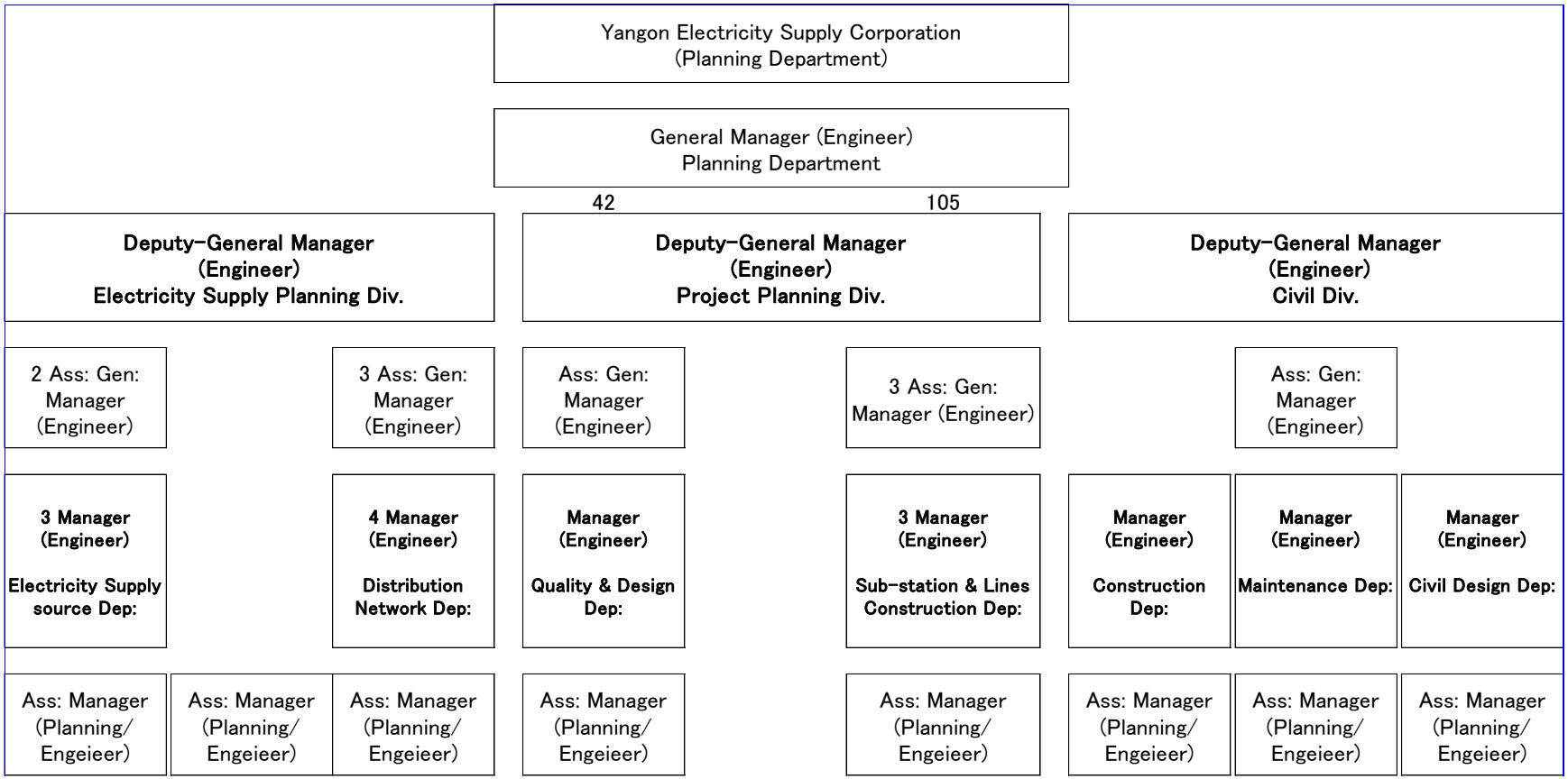
Source: ESE (Aug 2016)

(b) Organization chart of Eelectricity Supply Enterprise (ESE)



(c) Organization chart of Yangon Elctricity Supply Corporation (YESC)

i) Planning Department



(c) Organization chart of Yangon Elctricity Supply Corporation (YESC)

ii) Distribution Department

Yangon Electricity Supply Corporation
(Distribution Department)

General Manager
(Distribution Dep:)

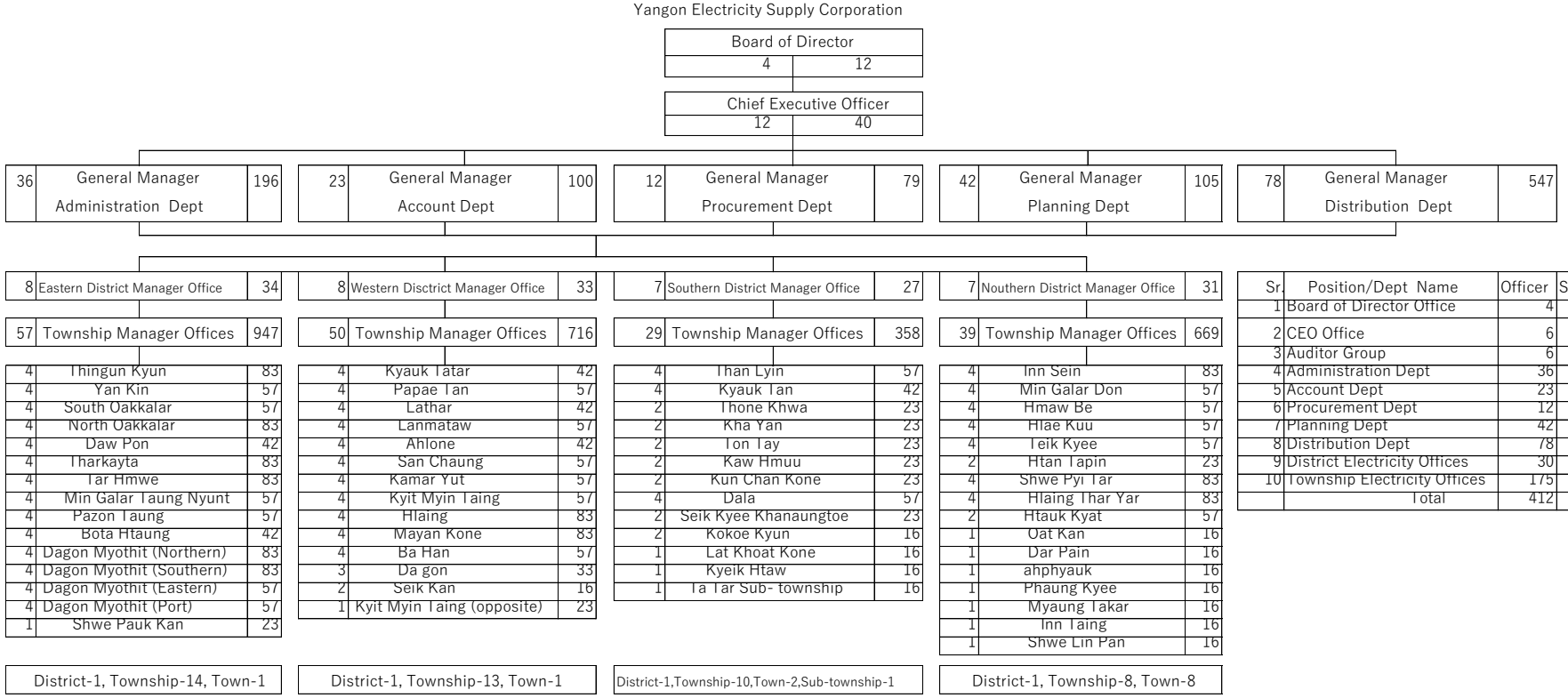
78 547

Deputy-General Manager Distributing Operation Div.			Deputy-General Manager Repairing & Maintenance Div.					Deputy-General Manager Testing & Metering Div.		
Ass:General Manager Distribute Network Control Sec.	Ass:General Manager Techanical Control System Sec.	Ass:General Manager Electric Generating and Street Light Sec.	Ass:General Manager Distributing Development Sec.	Ass:General Manager Transformer Maintenance Sec.	Ass:General Manager Sub-Station Maintenance Sec.	Ass:General Manager O/H Line Sec.	Ass:General Manager U/G Line Sec.	Ass:General Manager Tested Approval Sec.	Ass:General Manager Electrical Losses Contro Sec.	Ass:General Manager Meter Sec.
Manager	Manager	Manager	Manager	Manager	Manager	Manager	Manager	Manager	Manager	Manager
6		3	2	2	4	2	3	2	2	2
Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager	Assi:Manager
9	2	2	2	2	6	2	2	2	3	2

No	Position/Department	Officer	Staff	Total
1	General Manager(Engineer)	1	-	1
2	Deputy General Manager(Engineer)	3	-	3
3	Assistance General Manager(Engineer)	11	-	11
4	Manager(Manager)	29	-	29
5	Assistance Manager(Engineer)	34	-	34
6	Distributing Operator	-	165	165
7	Maintenance	-	325	325
8	Testing & Metering	-	57	57
Total		78	547	625

(c) Organization chart of Yangon Elctricity Supply Corporation (YESC)

iii) Whole organization



Sr.	Position/Dept Name	Officer	Staff	Total
1	Board of Director Office	4	12	16
2	CEO Office	6	24	30
3	Auditor Group	6	16	22
4	Administration Dept	36	196	232
5	Account Dept	23	100	123
6	Procurement Dept	12	79	91
7	Planning Dept	42	105	147
8	Distribution Dept	78	547	625
9	District Electricity Offices	30	125	155
10	Township Electricity Offices	175	2680	2855
	Total	412	3884	4296

(d) Organization chart of Mandalay Elctricity Supply Corporation (MESC)

Mandalay Electricity Supply Corporation

Content	Current	Proposed	Balance
Officer	199	126	73
Staff	2287	1402	885
Total	2406	1528	958

There are 9 No. of Directors and for the first stage, it will be established with 7 No.

BOD

1 Director Office 6

1 Chief Executive Officer

2 Internal Inspection Department 11

3 CEO Office 10

16 Administration Department General Manager 80

9 Financial Department General Manager 43

6 Material Planning Department General Manager 28

16 Planning Department General Manager 40

15 Distribution Department General Manager 48

Employee Management Division	Business and Investment Division	Material Planning Division	Electricity Planning Division	Project Planning Division	Distributing Operation Division	Repairing and Maintenance Division	Testing and Metering Division
Deputy General Manager	Deputy General Manager	Deputy General Manager	Deputy General Manager	Deputy General Manager	Deputy General Manager	Deputy General Manager	Deputy General Manager

5 Mandalay District Manager Office 39	5 Pyinoolwin District Manager Office 25	5 Kyaukse District Manager Office 25	5 Myingyan District Manager Office 25	5 Meiktila District Manager Office 25	5 Yamethin District Manager Office 15	5 Nyaung-U District Manager Office 15
21 Township Manager Offices 533	16 Township Manager Offices 208	14 Township Manager Offices 165	12 Township Manager Offices 135	12 Township Manager Offices 135	7 Township Manager Offices 123	8 Township Manager Offices 138

3	Aungmyaythazan	85
3	Chanayethazan	85
3	Mahaaungmyay	85
3	Chanmyathazi	85
3	Pyigyitagon	85
3	Amarapura	54
3	Patheingyi	54

3	Pyinoolwin	85
3	Mogoke	27
3	Madaya	27
3	Singu	27
3	Thabeikkyin	27
1	Takaung	15

3	Kyaukse	54
3	Sintgaing	27
3	Myintttha	27
3	Tada-U	27
1	Ku Me	15
1	Pa Leik	15

3	Myingyan	54
3	Taungtha	27
3	Natogyi	27
3	Ngazun	27

3	Meiktila	54
3	Wundwin	27
3	Thazi	27
3	Mahlaing	27

3	Yamethin	54
3	Pyawbwe	54
1	Yanaung	15

3	Nyaung-U	54
3	Kyaukpadaung	54
1	Ngathayauk	15
1	Bagan	15

	33 kV Sub-Station	110

	33 kV Sub-Station	90
1	66 kV Sub-Station	17

	33 kV Sub-Station	40

	33 kV Sub-Station	25

	33 kV Sub-Station	35

	33 kV Sub-Station	25

	33 kV Sub-Station	5
4	66 kV Sub-Station	68

District: 1 No., Township: 7 No.
22 No. of 33 kV Sub-Station

District: 1, Township: 5, Sub-Township: 1
18 No. of 33 kV Sub-Station
1 No. of 66 kV Sub-Station

District: 1, Township: 4, Sub-Township: 1, Town Office: 1
8 No. of 33 kV Sub-Station

District: 1, Township: 4
5 No. of 33 kV Sub-Station

District: 1, Township: 4
7 No. of 33 kV Sub-Station

District: 1, Township: 2, Town Office: 1
5 No. of 33 kV Sub-Station

District: 1, Township: 2, Sub-Township: 1, Town Office: 1
1 No. of 33 kV Sub-Station
4 No. of 66 kV Sub-Station

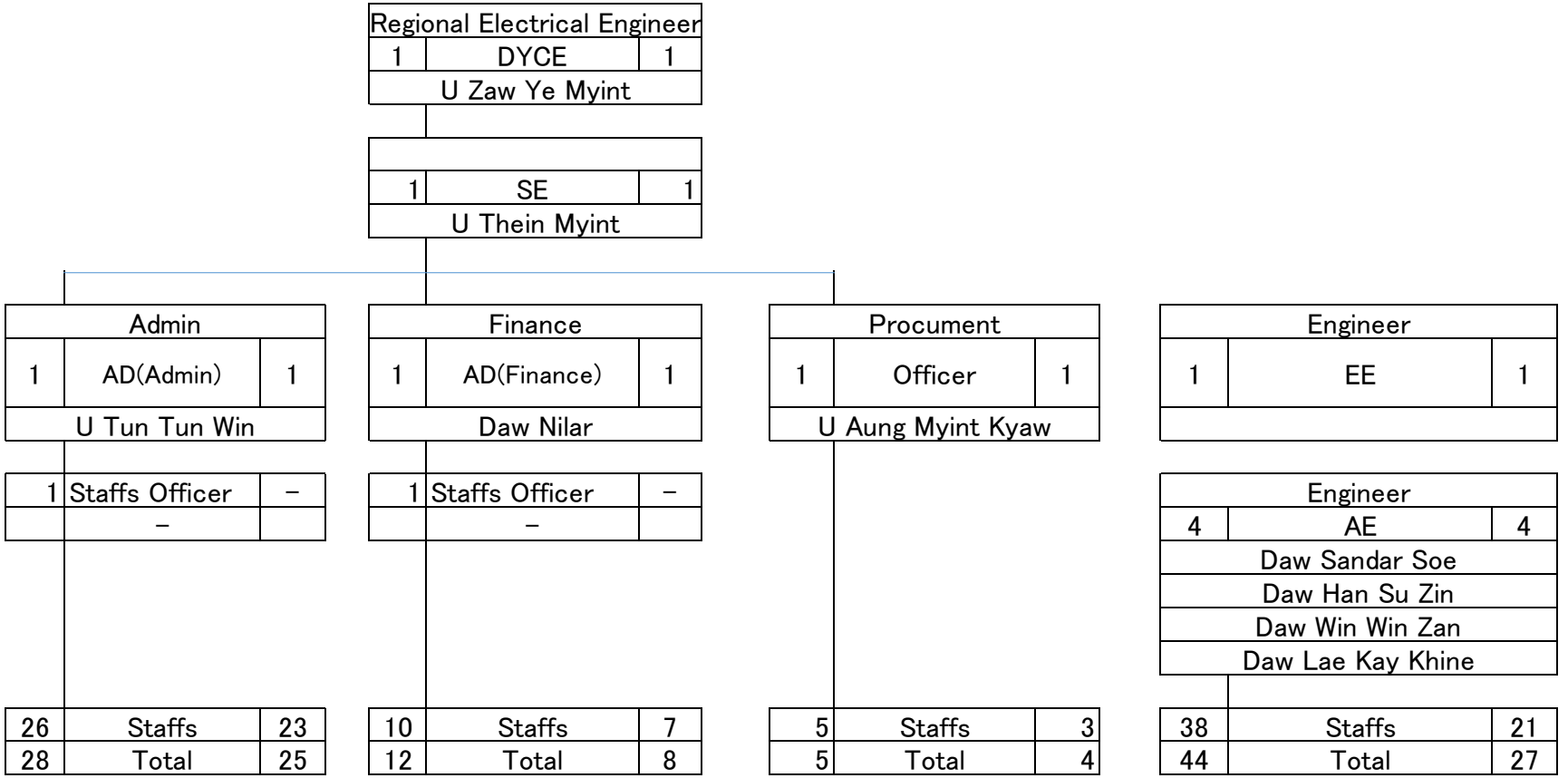
33 kV Substation: 66 No. 66 kV Substation: 5 No.

Received: 29 August, 2016

App.2-6

(e) Organization chart of Regional City (Example of Bago west)

Organization Chart of Electrical Engineer Office of Bago Division (Wastern)



Appendix 3

(3) Responsibility of each organization

(a) Responsibiliy of DEPP

DEPP must implement the following responsibilities.

(a)Participating as a leader for commenting to a feasible study, primary surveying which is possible or not.

(b)Participating in discussion of long term and short term program of Hydropower and Renewable Energy Projects.

(c) Studying in detail regarding new power generation plant project.

(d)Managing yearly generation to get fully amount of generation forecast.

(e)Submitting and advising with the computing of power demand and to construct power generation plant extension according to the increasing of power demand.

(f)Submitting master plan for the whole country to get electricity with considering Power generation, Transmission and Distribution System extension plan.

(g)Inspecting the contracts which following or not following to the Law and Regulation.

(h)Inspecting budget of each project and make decision proper used or not.

(i)Studying power tariff rate and submitting new tariff rate.

(j)Inspecting and commenting on the Loan and Grand Aid.

(k)Case of cooperation between the two countries which can be conducted in the power sector.

(b) Responsibiliy of ESE

Responsibility of Distribution Department

Distribution Department, Northern Department and Southern Department have conducted the following items for the Public from each State and Division of the whole country so that they can use more electricity smoothly and extensively.

a) Distributing electricity to public for lighting and industrial usage
b) Extension of electricity distribution in response to the increase in demand
c) Data collection and making improvement for extension of electricity distribution system.
d) Computing material (equipment) necessary for distribution of electricity
e) Conducting safety from danger of electricity
f) Electrification in villages by NEP
g) Extension of electricity distribution with foreign loan and grant aid
h) Computing and submitting estimated budget account
i) Reporting progress report of electricity distribution for every 3 month and every 4 month
j) Distributing electricity to water pumping stations, Industrial Zones and government industries
k) Damage and fault in transformers
l) Load Shed issues
m) Reducing electricity blackout
n) Electricity black-out issues
o) Reducing electricity losses
p) Getting more income
q) Electricity lines and substations
r) Electric shock issues
s) Matter about procurement and quality checking
t) Matter about management
u) Matter about National planning data

.

(c) Responsibiliy of YESC in each department

Duties and Responsibilities of Staff-Affair Branch, Administration Department

1. Have to serve the management and administration jobs of Yangon Electric Supply Corporation (later called YESC) with Executive officer.
2. Have to work collection, maintaining and announcement function for rules, operational rules and instructions in relation with administration.
3. Have to work for making rules, announcement and giving punishment for the rule violated staff.
4. Have to work the function of recruitment, giving duties allocation, posting transfer, promotion consideration, giving pension, giving the rights of staffs, and compensational cases for staffs.
5. Have to work for the function of leave, service year and transportation cases of the staffs.
6. Have to work the affair of management, making meetings and maintaining cases in concerned with YESC.
7. Have to work collection of staff curriculum vitae, addition information and making maintenance.
8. Have to work personal affair and necessary supporting to staffs.
9. Have to work for telecommunication, trying to get required landscape and infrastructure for corporation.
10. Have to work for making proposal and planning for local/Foreign training to be skillful and development of staffs.
11. Have to make the plan for very important person (later called VIP)'s trip.
12. Have to work for the visa and regional accommodation cases for foreigners.
13. Have to work for making cancel items, ruined by burning, from document and making auction for the items not necessary for department and corporation.
14. Have to work for making and maintaining of corporation logo and flags.
15. Have to work for planning, collection, maintaining, repairing and allocation of corporation's vehicles.
16. Have to fully serve for public serving cases.
17. Have to make report for staffs ability and dutiful condition by making continuously assessment.
18. Have to work for making announcement and expressing corporation's information and activities on News channel, Journal, Television and Web Site and so on.

Responsibilities of General Manager (Admin Department)

1. General Manager (Admin) has to take the administrative tasks as Executive officer also has to work the administrative tasks instructed by Executive officer of Yangon Electricity Supply Corporation (YESC).
2. Has to work the collection, maintaining and announcement of rules, laws, working rules and operational norm in concerned with administration.
3. Has to work the tasks of rules, making rules, announcement and taking action who violate the rule for getting staffs' obedience to law.

Responsibilities of Administration, public relation and Announcement Department

1. Have to work the task of inspection and giving advice concerned with (complaints) letters to the department.
2. Have to work to present the condition by taking information in relation with respective department for giving answer to public-parliament committees questions.
3. Have to answer softly and politely to public complaints in relation to electricity distribution.
4. Have to work for taking photo records and videos records to broadcast and express at Radio, Television, Newspaper and Journal concerned with electricity distribution.
5. Have to try to establish a frequency modulation (FM) radio broadcasting branch to give the information in time to public concerned with electricity distribution.
6. Have to work the data collection, making rules draft and proposing concerned with rules, operational rules of YESC/Corporation.
7. Have to work the proposed function of Announcement, Order and instruction required to announce for corporation.
8. Have to corporate with respective police station and courts for the cases of criminal and (civil case).
9. Have to work the assessment and revise of decisions and commands of the court whether consistent or inconsistent with law by watching continuously for the cases at the court. Moreover, have to decide to be appeal or not for the decision.
10. Have to work for making draft and proposing the commercial contrasts were operated by the members of agreement or contrast as corporation.

Responsibilities of Deputy General Manager (Admin)

1. Have to supervise as representative of department to the superiors and staffs to success department's tasks.
2. Have to propose with recommendation on the complaint letter, anonymous letter and instructions of upper level officer which are received by Administration Department after investigated in the site.
3. Have to submit after getting data from the concerning department to answer for the questionnaire of Parliament Public Affair Committee.
4. Have to conduct keeping and taking video record, photo record and to broadcast on the radio, television and to express newspapers, journals for electricity distribution news concerned.
5. Have to supervise to reply politely by the duty staff to public who have communicated with complaint.
6. Have to supervise the announcement of power distribution news and to inform the case of power blackout, power line repairing and power shutdown to the public.
7. Have to supervise draft legislation of law, regulation, procedure concerning with corporation drown by Law Department and communicating to police station, law office and judicial court for the police case.
8. Have to supervise compiling of Law Department’s draft treaty document which will be signed by the corporation.

Responsibility of Account Department

1. Have to submit compiling of yearly budget report of Yangon Electricity Supply Corporation.
2. Have to register and file for daily receipt and payment.
3. Have to submit of monthly/yearly report.
4. Have to supervise income and expenditure.
5. Have to supervise for increasing and correcting power sale unit to get more income of corporation.
6. Have to conduct bank all income receipt of corporation and other banking work.
7. Have to conduct for the staff and officer's salary, work charge and pension.
8. Have to conduct concerning the account of purchasing materials from inland and abroad.
9. Have to supervise according to the account instruction for the case of work with separate account.
10. Have to conduct supervise and take responsibility on account staff affair of account department.

Responsibility of General Manager (Account)

1. General Manager (Account) has to take responsibility to Chief Executive Officer and have to take responsibility to conduct relation with respect to the account and budget of corporation.
2. Have to lay down method needed and to conduct smoothly with respect to the account and budget works and to supervise for discipline to the account and budget works of district, township, power plant and substations under corporation.

Responsibilities of Planning Department

1. Planning Department is divided into 8 departments such as 1) Statistic Section, 2) Information Technology Section, 3) Inspection of Electricity network, 4) Design and Drawing section, 5) Construction of substations section, 6) Overseas procurement and local procurement, 7) Material selection section and Administration and Material accounting section and 8) Store, Security and Supporting section to operate distribution of electricity sufficiently with high quality to Yangon City and Yangon Region.

1) Statistic Section

Statistic Section is divided into two sub-sections.

a) Finance Planning Sub-Section

- Taking a record of data about substations and transformers
- Taking a record of new construction of substations, transformers and electric lines
- Collecting and including engineering data in the quarterly and three times a year reports
- Collecting statistical data for implementation of economic project
- Collecting, submitting, negotiation and requesting materials necessity for sections under Planning department
- Collecting statistical data

b) Computer Sub-Section

- Taking a record of data about substations and transformers
- Taking a record of new construction of substations, transformers and electric lines
- Taking a record of daily electricity generation and electricity usage data
- Taking a record of receiving electricity unit and sold unit.
- Calculating and submitting losses
- Taking a record of and evaluating voltage and load of substations and transformers
- Taking a record of connection of electrical network in Yangon Region

2) Information Technology Section

There are two sub-sections in it.

a) Information Sub-Section

- Giving comments on and scrutinizing various reports submitted by DP about loan projects and Technical Assistance Grant Aid projects in cooperation with Development Partners such as ADB, World Bank, JICA and NEDA.
- Providing data to projects implemented in collaboration with them.
- Arranging discussion meetings
- Answering questionnaires
- Preparing Agreement
- Preparing Progress Report for each matter and project
- Preparing Contracts with International company for asking service
- Projects implemented in collaboration with ASEAN GMS in local countries
- Changing from YESB to YESC, communication with IFC during appraisal period
- Report to Technical Committee from Planning Department

b) Technology Sub-Section

- Conducting occupational trainings for engineers
- Conducting occupational trainings for other levels.
- Arranging to prepare presentation
- Carrying out administration and managing works

3) Inspection of Electricity network Section

- Taking a record of electrocution
- Evaluate electrocution
- Reporting to issue instruction about electrocution
- Taking a record and evaluate daily electricity generation, electricity usage
- Taking a record and evaluate voltage and load of substations and transformers

4) Design and Drawing Section

- Drawing electricity connection network design in Yangon region
- Study and evaluate on expansion of construction of substations and electricity lines
- Drawing design for expansion construction of substations and electricity lines
- Taking a record of data about main substations and main electricity lines
- Submitting reports about substations and electrical lines materials to Specification Technical Committee

5) Construction of substations Section

There are three sub-sections.

a) Construction of substation sub-section

Study, Evaluate, planning and construction for implementing construction of new substations

b) Underground line sub-section

Carrying out new construction of underground lines related to new constructed substations

c) Overhead line sub-section

Carrying out new construction of underground lines related to new constructed substations

6) Overseas procurement and local procurement section

Arrange to fulfil for purchasing materials from oversea, call a tender price, open the tender, submit for permission to purchase step by step, contract with the company which success to import materials, compile purchasing order, compile contract, open money order, ask for bank guarantee, check in detail to the arrived materials, close the case after payment have already paid for the purchase order materials received.

Submit purchasing order to the related department of government owned factories, workshop for purchasing materials from local, after purchasing permission was get, give the payment;

ask for quotation for the materials to purchase from cooperative societies, cooperative production societies and joint venture, signed contract for purchasing;

ask for quotation from the private business owner when can not purchase materials from government owned factory or workshop, compile price comparison table, get permission to purchase; purchase for emergency requirement of department, close the account after receiving section of Procurement Department received purchasing materials, give payment for the purchasing materials and ask for budget demand for the related department.

7) Material Selection Section, Administration and Material Account Section

According to purchasing order, purchasing treaty, conduct to take out materials which have arrived at airport, port and boarder trade from abroad;

After got invoice sheet, conduct to get permission to take out materials with paying tax, commercial tax;

conduct to take out materials with paying port dues after got permission;

conduct to check arrived materials as the same or not to data of treaty;

conduct to get compensation to the departments for the materials damage, loose and shortage; Export to oversea country for repairing machinery equipment, if needed to get special order to submit to custom department;

conduct to handover to receiving section of procurement department for the selected materials; conduct to register with expenditure in the ledger after received materials according to the purchasing treaty.

Conduct staff affair;

ask for staff salary;

proclaim instruction;

draw up safety plan and proclaim;

open the training class;

give duty for duty officer;

conduct government's special title;

conduct to ask for miscellaneous expenditure;

register the official letters in/out and distribute.

8) Store, Security and Supporting Section

Conduct materials store, preserve, florid and materials for taking out ;

answer to auditory from central audit office and audit department;

delete old material from list;

arrived materials to board on ship

Responsibilities of Distribution Department

Distribution Department of Yangon City Electricity Supply Corporation conduct main responsibility of electricity supply and distribution works to fulfil standard as same as modern capital city of other countries. To implement the job smoothly, quickly and conveniently, divide into (12) sections :-

- Power System Control Section
- Street Lighting Section
- Emergency Diesel Generator Section
- (24) hour Maintenance Section
- Substations Section
- Substation Maintenance Section
- Overhead Power Line Section
- Underground Cable Section
- Laboratory Test and Approve Section
- Electricity Losses Control Section
- Communication Section
- KWh meter Section

1) Power System Control Section

Conduct to get power quickly if power break down occur, and conduct line maintenance; Investigate and allow permission for new transformer applicant; Check and approve system improvement job for the power system development; collect electricity break down list of government owned factories, universities and colleges, embassies, staff houses, CNG filling stations, river water pumping stations; collect reports and register electricity shut down of townships.

2) Street Lighting Section

Conduct to check and repair street lighting regularly for always in good condition including main road of Yangon City; conduct to install extension job at some area if needed.

3) Emergency Diesel Generator Section

Conduct to generate, to assemble and to transport emergency diesel generator to the important ceremonies and programs for no electricity cut.

4) (24) hour Maintenance Section

Conduct to repair and ready for (24) hour duty if electricity lines and substations occur damage in Yangon City power system.

5) Substations Section

Conduct maintenance works for continuous electricity distribution and conduct electricity distribution works regularly.

6) Substation Maintenance Section

Conduct maintenance works and investigate check item of substations monthly, weekly and daily for continuous electricity distribution; conduct to construct substation extension works for Yangon City power system development.

7) Overhead Power Line Section

Conduct maintenance works for the finished overhead power lines.

8) Underground Cable Section

Conduct maintenance works for the finished underground cable lines.

9) Laboratory Test and Approve Section.

Conduct to supply testing equipment and supporting equipment to township offices; conduct to check old kWh meters, new kWh meter, stop/damage kWh meter and site check kWh meters.

10) Electricity Losses Control Section

Conduct to replace stop/damage kWh meter, lock seal and to investigate electricity losses reducing works; check to get receiving unit correctly to install kWh meter needed at substations; investigate illegally use of electricity; investigate different unit between check meter unit and total house used meter unit of high layer condo housing by calculation; check for existing staff electricity allowance unit; disclose no increasing kWh unit due to little electricity usage although install big CT meter.

11) Communication Section

Conduct computer works and communication works smoothly, conveniently.

12) KWh meter Section

Conduct check and give permission for the application of single phase-double wire home used meter, three phase-four wires home used power meter, three phase-four wires industrial used power meter, business used power meter; check and give permission for the temporary meter installation; check and give permission for the application of temporary meter to permanent meter; check and give permission for advertising sign board lighting.

Responsibilities of General Manager (Engineer) (Electricity Distribution)

1. Conduct electricity distribution works in Yangon City and to supervise control operation to power system systematically to development to the international level,
2. Conduct to supervise maintain, operate, transmit electricity and distribution works of electricity lines, substations under Yangon Electricity Supply Corporation regularly.

(d) Responsibiliy of MESC

The Chiarman of Board of Directors shall be responsible for, within theterritory of Mandalay Region,

(a) Managing all kinds of works concerned with electricity to be accordance with the Policy of Union Government.

(b) Managing the implementation processes to distribute good quality electricity to get sufficient electricity and to get 100 percent access to electricity.

(c) Managing to reduce electricity losses.

(d) Managing to increase the income of the Corporation.

(e) Managing to extend the investment in electricity industry.

(f) Managing the human resource development of all Corporation Services Personnel.

(g) Managing to boost the capacity of all Corporation Services Personnel.

(h) Managing the Corporation to become a fully public owned from State Owned Enterprise within five years.

Duties and Responsibilities of Board of Directors

The Board of Directors shall be responsibible for,

(a) Appointing a Chief Executive Officer (CEO)

(b) Determining the plans for type and style of administrative of Corporation to be proper and highly effective.

(c) Determining the plans for enhancing administrative, financial and engineering services of all Services Personnel of the Corporation.

(d) Determining the plans of public relation and releasing news to be more transparent.

(e) Determining the implementation processes to distribute good quality electricit, to get sufficient electricity and to get 100 percent access to electricity.

(f) Determining the staff training plans for the purpose of human resource development and capacity enhancing.

(g) Determining the schemes of wages and salary, compensation, pension and allowances for Corporation Services Personnel.

(h) Determining the plans for the Corporation to make a successful commercial organization.

(i) Determining the plans for the plans for the Corporation to become a fully public owned from State Owned Enterprise wiyhin five years.

(j) Organization the committees for the purpose of implementating the duties and functions of the Corporation.

(k) Scrutinize and guide the short and long terms work plans, investments plans, incomes and expenditures of the Corporation.

(l) Determining the plans to protect frm being wasteful, loss and missing of fixed assets and finance of the Corporation.

(m) Being responsible for the success and loss the Corporation.

Duties and Responsibilities of Chief Executive Officer

The Chief Executive Officer shall be responsible for,

(a) Exercising administration and managing in accordance with the policy of Union Government and be responsible to the Board of Directors, tasks and functions of the Corporation.

(b) Managing to promote the electricity sector of Mandalay City to be accordance with international level, as it is being implemented to become on international standard city.

(c) Managing of all branches and divisions of the Corporation so that their duties and responsibilities to be successful.

(d) Implementing the policy decided by the Board of Directors.

(e) Implementing to distribute good quality electricity, to get sufficient electricity and to get 100 percent access to electricity, within the territory of Mandalay Region.

(f) Planning electricity related industry and development projects in Mandalay City and Mandalay Region.

(g) Sining the contract with the approval of the Board of Directors, of domestic and international electricity related industry.

(h) Implementing to promote the capacity, work related skilled and to be disciplined of all service personnel of the Corporation.

(i) Manaing to plan annual budget and expenditures to be accordance with budget plan

Duties and Responcinilities of Administration Departmant

The Administration Department shall be responsible for,

(a) Administrating all service personnel of the Corporation to abide enacted Laws, By-laws, Procedures, Rules and Regulations.

(b) Administration service personnel affair in accordance with the laws.

(c) Administrating land and building related matters of the Corporation.

(d) Administrating for training course, excursion trip and holding conference for the purpose of promoting human resource development and work related skills of all service personnel of the Corporation.

(e) Administratingassessment and reward-punishment matters of all service personnel with the purpose of promoting their abilities.

(f) Administrating the actionof unnecessary assets of the Corporation and write-off and deletion of the loss.

(g) Administrating the action of unnecessary assets of the Corporation and write-off and deletion of the loss.

(h) Administrating for Defining Seal, Flag and Uniform of the Corporation.

(i) Administrating operation and maintenance of moter vehicles and machinery.

(j) Administrating for all public relation matters upon services of the Corporation.

(k) Administrating for disclosing, with all round efforts, the information of the Corporation to public in time.

(l) Administratinhg the legislature and advising upon laws and Contracts related to the Corporation.

Duties and Responsibilities of the General Manager (Admin)

The General Manager (Admin) shall be responsible for,

(a) Managing all service personnel of the Corporation to abide enacted Laws, By-laws, Procedures, Rules and Regulations.

(b) Managing service personnel affair in accordance with the Laws.

(c) Managin land and building related matters of the Corporation.

(d) Managing for training course, excursion trip and holding conference for the purpose of promoting human resource development and work related skilled of all service personnel of the Corporation.

(e) Managing assessment and reward-punishment matters of all service personnel with the purpose of promoting their abilities.

(f) Managing foreign trip of all service personnel of the Corporation, stay in the country visa related affair and domestic trip of the Foreigner who are working with the Corporation.

(g) Managing the action of unnecessary assets of the Corporation and write-off and deletion of the loss.

(h) Managing to define Seal, Flag and Uniform of the Corporation.

(i) Managing the operation and maintenance of moter vehicles and machinery.

(j) Managing all public relation matters upon services of the Corporation.

(k) Managing for disclosing of, with all round efforts, the information of the Corporation to public in time.

(l) Managing the legislature and advising upon Laws and Contracts related to the Corporation.

Duties and Responsibilities of Finance Department

The Finence Department shall be responsible for,

(a) Draw and Summit the annual budget plan of the Corporation.

(b) Data Entry and Record the daily income and expenditure.

(c) Draw and Summit the monthly and annual Accounting Report.

(d) Controlling the income and expenditure.

(e) Managing to improve the income of the Corporation.

(f) Supervising not to wastage the incme of the Corporation.

(g) Managing to give the privileges of Board of Directors, Chief Executive Officer and Service Personnel.

(h) In accordance with the Myamar Accounting Standard as well as international Accounting Standard, making effort to maintain the financial accounts of the Corporation.

(i) Trying necessary financial management with the purpose of the Corporation to be successful, according to market Economy.

(j) Managing financial matters of local and Foreign procurement.

(k) Managing the expenditures of the Corporation to be in accordance with the financial rules.

(l) Based on the financial statement of the Corporation, Managing for analyzing of investments, revolving funds and other funds.

(m) Managing the Accounts and works of the Corporation to be auditable.

(n) Managing to propose changing the electricity tariff by analyzing income and expenditure of the Corporation.

Duties and Responsibilities of the General Manager (Finence)

The General Manager (Finance) shall be responsible for,

(a) Draw and Summit the annual budget plan of the Corporation.

(b) Data Entry and Record the daily income and expenditure.

(c) Draw and Summit the monthly and annually Accounting Report.

(d) Controlling the income and expenditure.

(e) Managing to improve the income of the Corporation.

(f) Supervising not to wastage the income of the Corporation.

(g) Managing to give the privileges of Board of Directors, Chief Executive Officer and Service Personnel.

(h) In accordance with the Myanmar Accounting Standard as well as International Accounting Standard, making effort to maintain the financial accounts of the Corporation.

(i) Trying necessary financial management with the purpose of the Corporation to be successful, according to market Economy.

(j) Managing financial matters of local ad Foreign procurements.

(k) Managing the expenditures of the Corporation to be in accordance with the financial rules.

(l) Based on the financial statement of the Corporation, Managing for analyzing of investments, revolving funds and other funds.

(m) Managing the Accounts and works of the Corporation to be auditable.

(n) Managing to propose changing theelectricity tariff by analyzing income and expenditures of the Corporation

Duties and Responsibilities of Procurement Department

The Procurement Department shall be responsible for,

(a) Managing domestic and international procurement, storage and issuing of materials are to be in accordance with Directives and Procedures.

(b) Managing for machines, vehicles, heavy machineries, tools and equipment that have to carry back to the country of contractor according to the contract.

(c) Managing for electrical equipment that has to transport to abroad for reparing purposes.

(d) From procurement to issuing processes of the materials, managing not to get wastage.

Duties and Responsibilities of General Manager (Procurement)

The General Manager (Procurement) shall be responsible for,

(a) Managing domestic and international procurement, storage and issuing of materials are to be in accordance with Directives and Procedures.

(b) Managing f that have or machines, vehicles, heavy machineries, tools and equipment that have to carry back to the country of contractor according to the contract.

(c) Managing for electrical equipment that has to transport to abroad for repairing purposes.

(d) From procurement to issuing processes of the materials, managing not to get wastage.

Duties and Responsibilities of Planning Department

The Planning Department shall be responsible for,

(a) Performing recording, analyzing, reporting and proposing the plans for substations, transformers, electric power lines.

(b) Managing to report analyzing future power demand, planning and design for works expansions, estimationg future investments.

(c) Supervising the loans, grants and technical assistances related matters by relation with international monetary organizations, development partners and regional rganizations.

(d) Spervising the implementation works of substations, power lines and related infrastructures for the purpose of electricity distribution.

(e) Supervising the qualitycontrol of electricity related works to be accordance with predefined standards.

(f) Managing for training cources and workshops for the purpose of promoting abilities of engineers, techniciansand skilled workers.

(g) Record and analyze the electric hazard incidents, to circulate the directives for avoiding such an incident and to reduce electricity related hazard.

Duties and Responsibilities of General Mnager (Engineering Planning)

The General Manager (Engineering Planning) shall be responsible for,

(a) Performing recording, analyzing, reporting and proposing the plans for substations, transformers, electric power lines.

(b) Managing to report analyzing future power demand, planning and design for works expansions, estimating and future investments.

(c) Supervising the loans, grants and technical assistances related matters be relation with international monetary organizations, development partners and regional organizations.

(d) Supervising the implementation works of substation, power lines and related infrastructures for the purpose of electricity distribution.

(e) Supervising the quality control of electricity related works to be accordance with predefined standards.

(f) Managing for training courses and workshops for the purpose of promoting abilities of engineers, technicians and skilled workers.

(g) Record and analyze the electric hazard incidents, to circulate the directives for avoiding such an incident and to reduce electricity related hazard.

Duties and Responsibilities of Power Distribution Department

The Power Distribution Department shall be responsible for,

(a) Negotiating amount of electricity receiving for purpose of sustainable distribution of good quality electricity, supervising the operation and control of substations and power lines in the power system.

(b) Testing, regular maintenance and expansion of constructed substations, power lines and transformers.

(c) Supervising the processes for reduction of electricity losses and collecting necessary information and data.

(d) For special circumstances and events, preparing to provide dedicated power distribution plan.

(e) Making efforts to from the high technology power control systems with the domestic and international technical assistance.

(f) Planning systematically to get back to normal as soon as possible if power failure occurs be the unforeseen event.

Duties and Responsibilities of General Mnager (Power DIstribution)

The General Manager (Power Distribution) shall be responsible for,

(a) Negotiating amount of electricity receiving for the purpose of sustainable distribution of good quality electricity, supervising the operation and control of substations and power lines in the power system.

(b) Testing regular maintenance and expansion of constructed substations, power lines and transformers.

(c) Supervising the processes for reduction of electricity losses and collecting necessary information and data

(d) For special circumstances and events, preparing to provide dedicated power distributon plan.

(e) Making efforts to form the hingh technology power control system with the domestic and international technical assistance.

(f) Planning systematically to get back to normal as soon as possible if power failure occurs by the unforeseen event.

(e) Work allocation in each organization of MOEE

66kV(D/L)	ESE, YESC, MESC	ESE, YESC, MESC	ESE, YESC, MESC	ESE, YESC, MESC	ESE, YESC, MESC	ESE, YESC, MESC
66kV(T/L)	DPTSC(PS)	DEPP	DPTSC(PTP)	DPTSC(PTP)	DPTSC(PTP)	DPTSC(PS)
132kV, 230kV, 500kV	DPTSC(PS)	DEPP	DPTSC(PTP)	DPTSC(PTP)	DPTSC(PTP)	DPTSC(PS)

* The 66kV line is categorized as T/L. in case of that it connect Power Plant with National Grid, or S/S with other S/S.

* The design of 66kV Distribution Line is made by ESE, YESC and MESC with technical review by DPTSC(PTP).

Responsible Allocation related with Management of Power Generation Project

	Power Source	Overall Planning	F/S	Design	Procurement	Constructino Superviison	O & M
ODA Project	Hydropower	DEPP	DHPI	DHPI	DHPI	DHPI	EPGE/DHPI
	Coal Fire, Gas Turbine, Wind	DEPP	DEPP	DEPP/EPGE	DEPP	DEPP/EPGE	EPGE
Private Investment	Hydropower	DEPP	DHPI	DHPI	DHPI	DHPI	EPGE/DHPI
	Coal Fire, Gas Turbine, Wind	DEPP	DEPP	DEPP/EPGE	DEPP	DEPP/EPGE	EPGE

* F/S report for hydropower project is submitted to DEPP by Consltant or Invester, and those report is transferred to DHPI for technical evluation and comments.

* O&M of civil structure of hydropower project is managed by the DHPI.

MINUTES OF MEETING
BETWEEN
JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
AND
MINISTRY OF ELECTRICITY AND ENERGY (MOEE)
FOR
THE FIRST JOINT COORDINATING COMMITTEE (JCC)
ON
THE PROJECT FOR CAPACITY DEVELOPMENT OF
POWER TRANSMISSION AND DISTRIBUTION SYSTEMS (PHASE I)

Japan International Cooperation Agency (hereinafter referred to as "JICA") and Ministry of Electricity and Energy (hereinafter referred to as "MOEE") established a Joint Coordinating Committee (hereinafter referred to as "JCC") for the effective and successful implementation of the Project for Capacity Development of Power Transmission and Distribution Systems (hereinafter referred to as "the Project").

The first JCC on the Project was held on 3rd November 2016 at the conference hall of MOEE, Nay Pyi Taw, chaired by Daw Mi Mi Khaing, Director General, Department of Electric Power Planning, Ministry of Electricity and Energy.

As a result, JICA and MOEE agreed on the matters referred to in the documents attached hereto.

Nay Pyi Taw, 16 November 2016

加藤 友英

Mr. Tomohide Kato
JICA Expert / Chief Advisor

Daw Mi Mi Khaing
Director General
Department of Electric Power Planning

坂井 晃

Mr. Mamoru Sakai
Senior Representative
JICA Myanmar Office

U Myint Oo
Deputy Director General
Department of Electric Power Planning

ATTACHMENT

JICA and MOEE 1) reviewed the progress of the Project, 2) confirmed the contents of Project Design Matrix (PDM) and Monitoring Sheet and 3) approved the Project schedule for the effective and successful implementation of the Project, based on the Agenda. (Refer to the ANNEX I and III)

The main points confirmed are stated as below.

1. Project Organization

The Project organization was confirmed as follows.

(1) MOEE

Project Chairperson: Permanent Secretary, MOEE

Project Directors:

- Director General of Department of Electric Power Planning (DEPP)
- Director General of Department of Power Transmission and System Control (DPTSC)
- Managing Director of Electricity Supply Enterprise (ESE)
- Chief Executive Officer of Yangon Electricity Supply Corporation (YESC)
- Chief Executive Officer of Mandalay Electricity Supply Corporation (MESC)

Project Administration: Deputy Director General of DEPP

Counterpart Personnel: Members from DEPP, DPTSC, ESE, YESC and MESC

(2) JICA

Long-term Expert

- Training Program /Coordinator

Short-term Expert (Visiting)

- Chief Advisor / Distribution System Technology
- Deputy Chief Advisor /Distribution Technology (Operation and Maintenance)
- Distribution Technology (Planning and Designing)
- Distribution Technology (Construction)
- Transmission Technology
- Substation Technology
- Human Resource Development Planning 1 (Training system)
- Financial and Institutional Analysis
- Power Development/ Distribution Expansion Policy
- Power Technology1 (Planning)
- Power Technology2 (Regional cities)
- Human Resource Development Planning 2 (Regional Cities)

2. Indicators

The objectively verifiable indicators are described in the revised PDM Ver. 2. (Refer to the ANNEX III 2))

The following points shall be reflected to the PDM Ver.2 and confirmed at the first monitoring.

(1) Overall Goal

The figures of the following indicators will be identified based on the additional data for the baseline survey by the end of December 2016.

- ✓ Distribution loss of seventeen percent (17%) in 2016 will be decreased to more than (xx) percent (xx%) by 2024.
- ✓ Total number (xx) and average duration of faults (xx minutes per fault) in distribution system in Myanmar in 2016 will be decreased to less than (xx) by 2024.

(2) Project Purpose

Pilot sites for the indicators of "faults" and "distribution loss" will be indentified and each target value will be set by the end of December 2016.

ANNEXES:

I. The first JCC Agenda
II. Participant List
III. Presentation Materials
   1) Power Point
   2) Revised PDM (Ver.2)
   3) Monitoring Sheet (Ver.1)
   4) Work Schedule

November 3, 2016

Participant list at the 1st Coordinating Committee

on

The Project for Capacity Development of
Power Transmission and Distribution Systems (Phase I)

	Name	Position, Organization	Signature
1			
2	U Thein Hlaing	CEO, MESC, Mandalay	
3	Daw Mi Mi Khaing	DG, DEPP	
4	U Myint Thu	CE GSE	
5	U Myint Oo	ဒေါက်တာ	
6	Daw Ei Ei Khin	GM.(M.P.) YESC	
7	Li Yin Htun Lwin	Dy Gm YESC	
8	U Ye Wunna	DyGM, MESC	
9	Dr. Tint Soe Win	Dy Director, PSD	
10			
11			
12			
13			
14			
15			

November 3, 2016

Participant list at the 1st Coordinating Committee

on

The Project for Capacity Development of
Power Transmission and Distribution Systems (Phase I)

	Name	Position, Organization	Signature
16	Tomohide Kato	Chief Advisor, JICA Expert	加藤友英
17	KURI OFUI	JICA Expert	[signature]
18	OSAMU TANIHATA	JICA Expert	谷畑治
19	IKUO NAKAGAWA	JICA Expert	中川郁雄
20	MITSUHIRO NAKAMURA	JICA Expert	中村光宏
21	MINA KOBAYASHI	JICA Expert	小林美奈
22	SHINICHI MITSUI	JICA Expert	三井真一
23	YOSHITAKA SAITO	JICA Expert	[signature]
24	TAKUJI KATAOKA	JICA Expert	[signature]
25	HOKE SHEIN	MKI., GM.	[signature]
26	Wah Wah Han Su Yin	JICA Expert	[signature]
27	Mamoru SAKAI	JICA Myanmar Senior Rep	[signature]
28	Kyosuke INADA	=	[signature]
29			
30			

November 3, 2016

Participant list at the 1st Coordinating Committee

on

The Project for Capacity Development of
Power Transmission and Distribution Systems (Phase I)

	Name	Position, Organization	Signature
31	Khun Saw Naung Htwe	AE. (ESE)	3.11.16
32	Win Kyaw	AE (DPTSC)	3.11.16
33	Mr. Kyaw Kyaw	AE (MESC)	3.11.16
34	Mr. Min Thiha	EE (ESE)	
35	Naung Win Htoo	AE (DPTSC)	
36	Than Htike Oo.	EE (ESE)	
37	Shwe Yee Win	SAE (ESE)	Shweyee
38	Mr. Tayzar Lin	A.E (YESC)	3/11/16
39	Li San Yu Maco	EE. (ESE)	
40	Ms. Kyaut Kyaut Hlaing	SAE (YESC)	
41	Ms. Yi Mon Aye	SAE (YESC)	
42	Ms. Soe Yupar Thein	SO (DPTSC)	
43	Mr. Myo Thant Zin	AD (DEPP)	
44	Mr. Soe Ko Ko Aung	EE (MESC)	
45	Ms. Phyo Thiri Aung	S.A.E (YESC)	

November 3, 2016

Participant list at the 1st Coordinating Committee

on

The Project for Capacity Development of
Power Transmission and Distribution Systems (Phase I)

	Name	Position, Organization	Signature
46	U Kyaw Soe Lin	SAE (YESC)	
47	U BO BO	SAE (ESE)	
48	U Myo Min Aung	AE (ESE)	
49	U Aung Tun	EE (ESE)	
50	U Si Thu Aung	EE (ESE)	
51	U Lin Ko Ko	EE (ESE)	
52	U San Myo Aung	E.E (ESE)	
53	U Myint Oo	E.E (ESE)	
54	U Zaw Htike	AE (MESC)	
55	U Than Naing Lin	SE (DEPP)	
56	U Maung Lin.	EE (ESE)	
57	~~U Zaw~~		
58	U Zaw Zaw Htet	EE (ESE)	
59			
60			

(end of document)

MINUTES OF MEETING
OF
THE SECOND JOINT COORDINATING COMMITTEE
ON
THE PROJECT FOR CAPACITY DEVELOPMENT OF
POWER TRANSMISSION AND DISTRIBUTION SYSTEMS
IN THE REPUBLIC OF THE UNION OF MYANMAR

In accordance with Article II. 2. (3) of the Record of Discussions dated 30th January 2016 (hereinafter referred to as "RD"), the Second Joint Coordinating Committee (hereinafter referred to as "JCC") was held on 20th December, 2017.

At JCC, JICA side and Myanmar side exchanged views for the smooth implementation of the Project for Capacity Development of Power Sector Development Planning (hereinafter referred to as "the Project")

As a result of the discussions, both sides agreed on the matters referred to in the document annexed hereto.

Nay Pyi Taw, 20th December, 2017

Mr. Mamoru Sakai
Senior Representative
JICA Myanmar Office

U Tin Maung Oo
Permanent Secretary
Ministry of Electricity and Energy

Mr. Tomohide Kato
JICA Expert/Chief Advisor

U Myint Oo
Deputy Director General
Department of Electric Power Planning
Ministry of Electricity and Energy

ANNEX

1. Progress of the Project

The JICA Expert Team explained the recent achievement of the Project based on the Attachment 2. The both sides confirmed the solid progress in technical transfer from the JICA Expert Team to the trainer candidates, including preparation of text books by the JICA Expert Team.

2. Future Work Plan and Training in Main Cities by Trainer Candidates

In accordance with the progress of the Project confirmed above, the JICA Expert Team explained the contents of the revised Work Plan based on the Attachment 3. The Myanmar side agreed the plan in principle. The JICA Expert Team explained further the detail of the Training in Main Cities by Trainer Candidates which was referred in the confirmed Work Plan, based on the Attachment 4.

3. Main Points Confirmed

✧ Textbook

Textbooks on five themes, Distribution Planning & Design, Distribution Construction Work & Safety Technologies, Distribution Operation & Maintenance, Transmission Line and Distribution Substation, prepared by JICA Expert Team will be distributed to related organizations in MOEE by the end of December 2017.

✧ Intensive Training

Intensive training has been conducted since March 2017 for seven months in total and will be completed on 22nd December 2017. Based on the textbooks, important contents on all five themes have been taught by JICA Expert Team. In addition to the intensive training, Trainer Candidates are requested to read textbooks to learn theory by themselves.

✧ Evaluation

The results of examinations will be shared with MOEE senior managers to evaluate the improvement of each Trainer Candidate by the end of December 2017.

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✧ Presentation by Trainer Candidates

Each Working Group will make a presentation to MOEE senior managers in the third week of January 2018 after the preparation with the support of JICA Expert Team what Trainer Candidates have learnt through the intensive training. MOEE senior managers will evaluate the improvement and suitability of Trainer Candidates. Based on the suitability of each Trainer Candidates, Working Group members will be rearranged.

✧ Regional training in main cities

Regional training in main cities will be conducted by Trainer Candidates. It will be mainly lecture due to limitation of training facilities in regional areas, but It is possible to use portable training equipment such as safety belts when conducting the regional training.

Textbooks for regional training will be prepared under the Working Group Activities in March and May 2018. Textbooks for linemen shall be prepared in Myanmar language but technical terms shall be in English, and those for engineers are not necessary to prepare in Myanmar language.

✧ Support to the Framework of Human Resource Development

The JICA side emphasized the importance of establishing human resource development (hereinafter referred to as "HRD") framework for the implementation of training and for sustainable HRD in power sector in Myanmar. The both sides agreed to consult on future action on this issue.

Attachment 1: Agenda
Attachment 2: Overview of the Project Activities
Attachment 3: Revised Work Plan
Attachment 4: Holding regional seminar and Training in regional and main cities
Attachment 5: Participants List

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2nd JCC of the Project for Capacity Development of Power Transmission and Distribution system

Date 20-12-2017

Place Office-27

Serial No	Name	Responsibility/ Department	Contact PhoneNumber	Signature
1.	U Tha Ng Oo	PS MD	[redacted]	20/12/2017
2	Daw Yee Myint	DPTSC		
3.	U. Saw Win Maung	CE - ESE		20.12.2017
4	U Nyein Oo	DDG, DEPP		
5	U Tin Aung	CE (TSE)		
6	U Sein Win Myint	DGM (MESC)		
7	Saw Si Thu Hlaing	Dir (DEPP)		
8	Daw Zar Zar Tun	EE (YESC)		
9	Kyaw Kyaw.	DG (DPTSC)		
10	Tha Sue	GM ESE		

2nd JCC of the Project for Capacity Development of Power Transmission and Distribution system

Date 20-12-2017

Place Office-27

Serial No	Name	Responsibility/ Department	Contact PhoneNumber	Signature
	Mamoru SAKAI	JICA	[redacted]	
	Kaori Omi Shibata	JICA / MOEE		
	Tomohide Kato	JICA Short-term expert		
	Osamu Tanihata	JICA Short-term Expert		
	Shinichi Mitsui	JICA short-term expert		
	Wah Wah Han Su Yin	JICA Short-term expert		
	Htet Nandar Win	JICA Project Asst		

2nd JCC of the Project for Capacity Development of Power Transmission and Distribution system

Date --20-12-2017

Place --Office-27

Serial No	Name	Responsibility/ Department	Contact PhoneNumber	Signature
၁	U Kyaw Soe Lin	YESC	[redacted]	
၂	Daw Phyo Thiri Aung	YESC		
၃	U Zaw Htike	MESC		
၄	Daw Soe Yupar Thein	DPTSC		
၅	U Than Htike Oo	E.E ESE		
6	U Lin Ko Ko	EE ESE		
7	U Aung Tun	EE ESE		
8	U SANYU MAW	ESE, EE		
9.	U Naing Lin.	ESE, EE		
10	U Khun Sai Naing Htwe	ESE, AE		

PCJ/Attached File/Meeting attended

2nd JCC of the Project for Capacity Development of Power Transmission and Distribution system

Date 20-12-2017

Place Office-27

Serial No	Name	Responsibility/ Department	Contact PhoneNumber	Signature
11	U Win Kyaw	AE, DPTSC	[redacted]	
12	U Soe Ko Ko Aung	AD, DEPP		
13	Dr. Tay Zar Hlaw	AE, YESC		
14.	U Naung Win Htoo	Staff Officer DPTSC		
15.	Daw Yi Mon Aye	SAE, YESC		
16.	Daw Kyawt Hlaing	SAE, YESC		20.12.17
17.	U Kyaw Kyaw	AE, MESC		20.12.17
18.	U Si Thu Aung	E.E. (E.S.E)		2017
19.	U Bo Bo	SAE, (E.S.E)		2017
20.	U Myo Min Aung	A.E (E.S.E)		20.12.17

2nd JCC of the Project for Capacity Development of Power Transmission and Distribution system

Date 20-12-2017

Place Office-27

Serial No	Name	Responsibility/ Department	Contact PhoneNumber	Signature
11.	U San Myo Aung	E.E (E.S.E)	[redacted]	20/12/17
12.	U Myo Thant Zin	A.D (DEPP)		20/12/17
13	U Myint Oo	EE (ESE)		20.12.17
14	Daw Shwe Yee Win	SAE (ESE)		Shweyee 20.12.17
15	U Min Thiha	EE (E.S.E)		20.12.17
16	U Zaw Zaw Htet	EE (E.S.E)		20.12.17

MINUTES OF MEETING
OF
THE THIRD JOINT COORDINATING COMMITTEE
ON
THE PROJECT FOR CAPACITY DEVELOPMENT OF
POWER TRANSMISSION AND DISTRIBUTION SYSTEMS
IN THE REPUBLIC OF THE UNION OF MYANMAR

In accordance with Article II. 2. (3) of the Record of Discussions dated 30th January 2016 (hereinafter referred to as "RD"), the Third Joint Coordinating Committee (hereinafter referred to as "JCC") was held on 6th November, 2018.

At JCC, The Japan International Cooperation Agency (hereinafter referred to as "JICA") and relevant officers of Ministry of Electricity and Energy (hereinafter referred to as "MOEE") discussed on the Project for Capacity Development of Power Sector Development Planning (hereinafter referred to as "the Project"). JICA and MOEE sides summarized the achievements of the Phase I, and agreed on the scope of the Phase II.

As a result of the discussions, both sides agreed on the issues referred to in the document annexed hereto.

Nay Pyi Taw, 6th November, 2018

Mr. Mamoru Sakai
Senior Representative
Myanmar Office
JICA

Daw Mi Mi Khaing
Director General
Department of Electric Power Planning
MOEE

Mr. Tomohide Kato
Leader
JICA Expert Team

ANNEX

1. Achievement of the Phase I of the Project

JICA Expert Team explained the achievement of the Phase I of the Project. Both sides confirmed the substantial achievement in technical transfer from JICA Expert Team to the trainer candidates.

2. HRD Framework

- HRD Policy and Plan

  Japanese side emphasized the importance of establishing the framework for Human Resource Development (hereinafter referred to as "HRD") for ensuring the sustainable capacity development in Transmission and Distribution (hereinafter referred to as "T&D") sector.

  Japanese side explained that, if the training program is implemented as planned, around 30 new accredited trainers would be made every year. These trainers would be expected to contribute to systematically enhancing fundamental technical capacity in T&D operation and maintenance in MOEE by providing trainings. However, hierarchical HRD system as well as training programs is necessary because MOEE needs to develop advanced level engineers.

- Accreditation System

  Both sides confirmed that HRD framework should include accreditation system for engineers and linemen based on their competency and experiences. Japanese side recommended to accredit the trainers who participated in training of trainers (hereinafter referred to as "TOT") in this project, as a pilot to establish a comprehensive accreditation system.

- Responsibility of the Work

  Both sides appreciated that Myanmar side established the working group (WG) for this purpose and agreed to expedite its activities to formulate proper HRD policy and plan in a timely manner. Both sides agreed that Myanmar side would take responsibility of the activities, and Japanese Expert Team would support them by providing advices.

3. Training Center Institutional Development

Japanese side also emphasized the importance of developing institutional framework to operate and manage the training center in Nay Pyi Taw, as this leads to maximum utilization of the benefit of training facilities purchased during Phase I, and also the training program, syllabi, curricula, and textbooks to be formulated by the Project

In this regard, Japanese side welcomed the effort of Myanmar side to develop the framework by establishing WG, and requested to accelerate the process. Both sides confirmed that

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Myanmar side will work on this issue during Phase II with necessary advisory and recommendation from Japanese Experts.

4. Implementation of Training (PDCA Cycle)

Japanese side explained the concept in implementing Phase II of the Project shown in the Attachment 1, and Myanmar side agreed to the concept in general. Both sides confirmed to continue discussion on the detail of the training. The main points confirmed are as follow;

(1) Trainers and Trainees

In Phase I, 26 trainers received TOT under the support from Japanese Experts. Then, some of the trainer candidates trained in the Phase I will be expected to train another trainee of MOEE. In Phase II, MOEE will provide maximum 30 numbers of trainer candidates to receive the TOT in the field of new theme (recent technology) under the support of Japanese Experts.

It is expected that trainer candidates who participated in TOT will be accredited properly according to their competence as trainers.

(2) Scope of Training

There were 5 themes (Distribution Planning & Design / Distribution Work & Safety Technologies /Distribution Operation & Maintenance / Transmission Line /Distribution Substation), whose textbook were prepared during Phase I.

MOEE will propose new themes of the course/syllabus for the phase II and Japanese Experts will prepare the textbooks. Detail contents of the training would be continuously reviewed and updated to meet the training needs, and the textbooks prepared in Phase I would be revised to reflect actual situation in Myanmar. It was agreed that MOEE staffs (some of the 26 trainer candidates trained in Phase I) would take leading role in modifying the text books to meet Myanmar situation in collaboration with senior engineers from MOEE with a support from JICA Experts, if necessary.

(3) Intensive Training at Nay Pyi Taw and Regional Seminar

For utilizing skills and knowledge as trainers acquired through TOT, the trainers would carry out intensive training at Nay Pyi Taw and regional seminars through which they can develop teaching skills as well as deepen technical understanding on each topic. Details of the seminars such as number of participants, topics and places shall be discussed and confirmed after commencement of Phase II.

(4) Evaluation of Training

For grasping the outcome of training properly, effective method for training evaluation should be considered.

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5. Realization of Project Outcome with Trained Human Resource

To achieve the overall goal of the Project, which shall be measured by reduction of electricity loss and enhancement of reliability and safety, knowledge enhanced through the Project needs to be utilized in MOEE's daily operations.

In this regard, Japanese side pointed out that there are number of on-going Japanese ODA Loan projects in distribution sub-sector (e.g. Yangon distribution, Major city distribution), and proposed to make Japanese ODA Loan projects as pilots for establishing a model in which enhanced staff capacity lead to tangible improvement in electricity service; actual loss reduction / enhanced reliability and safety.

Both sides confirmed that the following activities shall be implemented during Phase II to utilize the output of the Project for actual service improvement. Both sides also agreed to discuss the method to monitor contribution of these activities for the outcome of the Project (loss reduction / enhanced reliability and safety).

(1) Participation of Project Management Unit(PMU) member to the Training

PMU Members for Japanese ODA Loan Projects will be invited to the Phase II activity.

(2) Assignment of trainers to PMU

Trainer candidates trained in Phase I can get effective OJT as PMU member for on-going Japanese ODA Loan projects. At the same time, PMU can also benefit from staffs with enhanced knowledge.

(3) Data Collection and Management

In addition to the 5 themes of which training from Japanese Experts to trainer candidates has been already done in Phase I, Japanese Experts will make technical transfer on Data Collection and Management to several trainers in Phase II, for implementing data management on the pilot sites.

(4) Support on Technical Standard Specification

Japanese Experts will support technical standard specification of some equipment, mainly one which will be installed at Japanese ODA Loan Projects.

End

Attachment 1: Work Plan for The Project for Capacity Development of Power Transmission and Distribution System (Record of Phase I and scope of Phase II)

Attachment 2: Participants List

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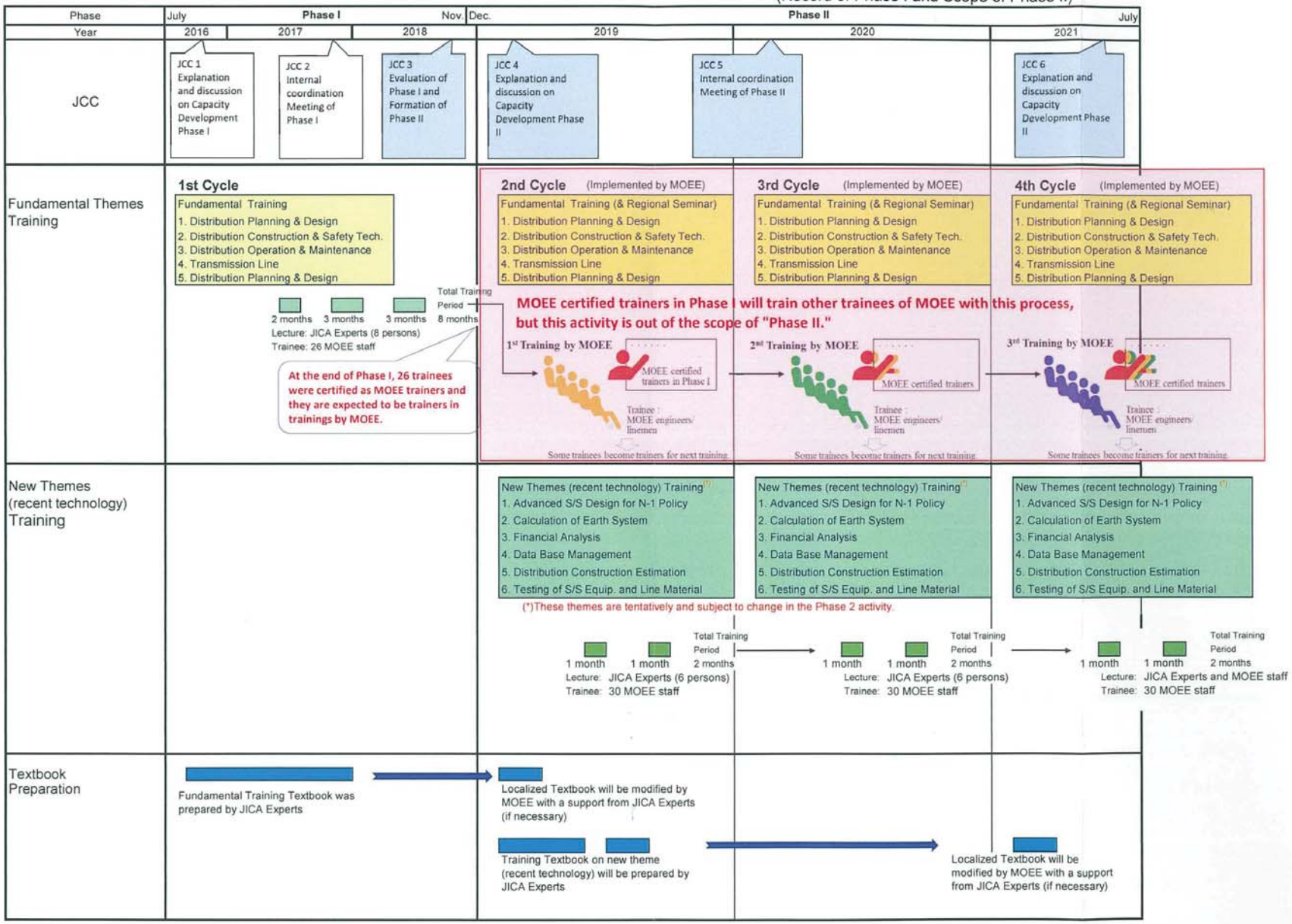
Attachment 1

Work Plan for The Project for Capacity Development of Power Transmission and Distribution System in the Republic of the Union of Myanmar

(Record of Phase I and Scope of Phase II)



Attachment-1

Participants list of the thrid Joint Coordinating Committee Meeting

Pentative Agenda for 3rd Joint Coordinating Committee Meeting

6 Nov, 2018

Date- ၆-၁၁-၂၀၁၈

Yadanar Hall

Place- ရတနာစန်းခေါင်

Serial No	Name	Responsibility/ Department	Email/ Phone Number	Signature
	Daw Mi Mi Khaing	DG DEPP	[redacted]	
	Aye Kyaw	DG / DPTSC		
	Han Zaw	DDG / DEPP		
	Myint Thu	GM / YESC		
	Hlaing Naing	Dir / DEPP		
	Myo Lwin Nyein	DD / DEPP		
	U Sein Win Myint	DGM (MES)		
	Tha Soe	GM (ERE)		
	U Saw Si Tha Hlaing	Director (DEP		
	U Zay Yar Myint	Staff Officer (DEPP)		
	Daw Yo	Assistant Direct (DEPP)		
	Daw Kwin Kwin Aung	UD (DEPP)		
	Daw Khin Wai Kyi	LD (DEPP)		

Pentative Agenda for 3rd Joint Coordinations Committee Meeting

6 Nov, 2018

Date- ၆.၁၁.၁၈

Yadanar Hall

Place- ရတနာဆိုင်းခန်း

Serial No	Name	Responsibility/ Department	Email/ Phone Number	Signature
1.	Daw Kyawt Kyawt Hlaing	AE (YESC)	[redacted]	
2.	Daw Soe Yupar Thein	DPTSC		
3.	Dr. Tayzar Lin	AE (YESC)		
4.	U Soe Ko Ko Aung	AD (DEPP)		
5.	U Zaw Zaw Htet	EE (ESE)		
6.	U Myint Oo	EE (ESE)		
7.	U Bo Bo	SAE (ESE)		
8.	U Zaw Htike	AE (MESC)		
9.	U Than Htike Oo	E.E (ESE)		
10.	U Kyaw Kyaw	BE (MESC)		
11.	Daw Cho The Nwe	A.D (DEPP)		
12.	U Naing Lin	E.E. (FSE)		

Participants List of the third Joint Coordinating Committee Meeting

Pentative Agenda for 3rd Joint Coordinating Committee Meeting

6 Nov, 2018

Date- ၆.၁၁.၂၀၁၈

Yadanar Hall

Place- ရတနာစန်းခေါင်

Serial No	Name	Responsibility/ Department	Email/ Phone Number	Signature
1.	Mamoru SAKAI	JICA	[redacted]	
2.	Kojun Nakashima	JICA		
3.	Tomohide Kato	JICA Expert Team		
4.	Osamu Tanihata	JICA Expert Team		
5.	Koji Shikimachi	JICA Expert Team		
6.	Yoshitaka Saito	JICA Expert Team		
7.	Koichi Yamashita	JICA Expert Team		
8.	Hoke Shein	JICA Expert Team		
9.	Shinichi Mitsui	JICA Expert Team		
10.	Wah Wah Han Su Yin	JICA Expert Team		

研修実績（現地活動分）

1. JICA 専門家による講師候補生向け研修（ネピドーMOEE 研修所での実施分）

2016 年 12 月に MOEE 副大臣から要請を受け、JICA 専門家から MOEE 講師候補生に向けての講義を実施した。実施した研修及びその他の活動実績を示す。

赤字：研修以外の活動，　緑字：研修所以外での現場研修，その他：研修所における講義　を示す。

Actual Records of Training / Other Activities from March to April, 2017>

Date (Day)	Mar 13 (Mon)	May 14 (Tue)	May 15 (Wed)	May 16 (Thu)	May 17 (Fri)	Mar 18 (Sat)	Mar 19 (Sun)
Trainings / Other Activities	Preparation for review of Workshop in Japan assisted by JICA experts Review of Workshop in Japan (supplementary explanation, discussion about applying new technologies to each workplace)				Calculation Method of Wind Pressure Load	Day off	
JICA Expert	Mr. Kato (Lecturer)						

Date (Day)	Mar 20 (Mon)	Mar 21 (Tue)	Mar 22 (Wed)	Mar 23 (Thu)	Mar 24 (Fri)	Mar 25 (Sat)	Mar 26 (Sun)
Trainings / Other Activities	Lecture on Voltage Drop and Loss Reduction Calculation in 11, 0.4kV Distribution Systems Exercise of technical matters about the above lectures					Day off	
JICA Expert	Mr. Tanihata, Dr. Shikimachi (Lecturers)						

Date (Day)	Mar 27 (Mon)	Mar 28 (Tue)	Mar 29 (Wed)	Mar 30 (Thu)	Mar 31 (Fri)	Apr 1 (Sat)	Apr 2 (Sun)
Trainings / Other Activities	Day-off National Holiday in Myanmar	Lecture and Site Survey on actual distribution facilities for Voltage Drop and Loss Reduction Calculation in 11, 0.4kV Distribution Systems				Day off	
JICA Expert	Mr. Tanihata, Dr. Shikimachi (Lecturers)						

Date (Day)	Apr 3 (Mon)	Apr 4 (Tue)	Apr 5 (Wed)	Apr 6 (Thu)	Apr 7 (Fri)
Trainings / Other Activities	Basic theory on power distribution	Lecture and Excise for Practical use of Loss Reduction in 11, 0.4kV Distribution Systems			Wrap-up meeting Breaking up
		Ditto above	Workshop on conductor cable by Manufacturer	Wrap up	
JICA Expert	Mr. Tanihata, Dr. Shikimachi (Lecturers)				

Actual Records of Training / Other Activities from June to August, 2017>

Date (Day)		Jun 5 (Mon)	Jun 6 (Tue)	Jun 7 (Wed)	Jun 8 (Thu)	Jun 9(Fri)	Jun 10 (Sat)	Jun 11 (Sun)
Trainings / Other Activities	AM	Opening remarks by MOEE Distribution Automation system	Distribution Automation system	Regulations for Distribution Lines		Regulations for Distribution Lines	Day off	
	PM	Debriefing session after seminar in Japan				Self-study time		
JICA Expert		Mr. Kato (Lecturer)						

Date (Day)		Jun 12 (Mon)	Jun 13 (Tue)	Jun 14 (Wed)	Jun 15 (Thu)	Jun 16(Fri)	Jun 17 (Sat)	Jun 18 (Sun)
Trainings / Other Activities	AM	Distribution Design				Basic Financial Analysis (1) - Financial Analysis of Project	Day off	
	PM							
JICA Expert		Dr. Shikimachi (Lecturer), Ms.Wah Wah				Mr. Yamashita (Lecturer), Ms.Wah Wah		

Date (Day)		Jun 19 (Mon)	Jun 20 (Tue)	Jun 21 (Wed)	Jun 22 (Thu)	Jun 23(Fri)	Jun 24 (Sat)	Jun 25 (Sun)
Trainings / Other Activities	AM	Basic Financial Analysis (2) - Financial Analysis of Business Entity	Basic Financial Analysis (3) - Case Study: Financial Projection of Institution	Distribution Design		Distribution Design	Day off	
	PM					Exercise of Distribution Design		
JICA Expert		Mr. Yamashita (Lecturer), Ms.Wah Wah		Dr. Shikimachi (Lecturer), Ms.Wah Wah				

Date (Day)		Jun 26 (Mon)	Jun 27 (Tue)	Jun 28 (Wed)	Jun 29 (Thu)	Jun 30 (Fri)	Jul 1 (Sat)	Jul 2 (Sun)
Trainings / Other Activities	AM	Discussion about procurement plan of training facilities	Safety in Distribution Work	Explanation of Concrete Pole (NC & MaGa Co., Ltd.)	Danger foreseeability training by case study	Distribution Substation	Day off	
	PM	Exercise and review of distribution design		Safety in Distribution Work				
JICA Expert		Mr. Tanihata Dr. Shikimachi (Lecturer)	Mr. Nakagawa (Lecturer)		Dr. Shikimachi (Lecturer)	Mr. Tanihata (Lecturer)		

Date (Day)		Jul 3 (Mon)	Jul 4 (Tue)	Jul 5 (Wed)	Jul 6 (Thu)	Jul 7 (Fri)	Jul 8 (Sat)	Jul 9 (Sun)
Trainings / Other Activities	AM	Distribution Substation	Basic theory on power Capacitor	Distribution facility management	5S Activity	Distribution Line Design (using PC)	Day off	
	PM							
JICA Expert		Mr. Tanihata (Lecturer)		Dr. Shikimachi (Lecturer)	Mr. Nakagawa (Lecturer)	Dr. Shikimachi (Lecturer)		

Date (Day)		Jul 10 (Mon)	Jul 11 (Tue)	Jul 12 (Wed)	Jul 13 (Thu)	Jul 14 (Fri)	Jul 15 (Sat)	Jul 16 (Sun)
Trainings / Other Activities	AM	Examination on lecture contents on June	Basic theory on Power Capacitor	Human Error	Outline of overhead transmission line	Outline of overhead transmission line	Day off	
	PM	Self-Check on June Lecture	Human Error	Outline of overhead transmission line		Investigation and insulation design of overhead transmission line		
JICA Expert		Mr. Kato Mr. Tanihata Mr. Nakagawa Mr. Yoshida	Mr. Tanihata Mr. Nakagawa (Lecturer)	Mr. Nakagawa Mr.Yoshida (Lecturer)	Mr.Yoshida (Lecturer)			

Date (Day)		Jul 17 (Mon)	Jul 18 (Tue)	Jul 19 (Wed)	Jul 20 (Thu)	Jul 21 (Fri)	Jul 22 (Sat)	Jul 23 (Sun)
Trainings / Other Activities	AM	Investigation and insulation design of overhead transmission line		Day-off National Holiday in Myanmar	Investigation and insulation design of overhead transmission line	Grounding (Earthing) System	Day off	
	PM							
JICA Expert		Mr.Yoshida (Lecturer)			Mr.Yoshida (Lecturer)	Mr.Kato (Lecturer)		

Date (Day)		Jul 24 (Mon)	Jul 25 (Tue)	Jul 26 (Wed)	Jul 27 (Thu)	Jul 28 (Fri)	Jul 29 (Sat)	Jul 30 (Sun)
Trainings / Other Activities	AM	Distribution System Protection		Distribution System Protection	Abstract of grounding system		Day off	
	PM			Abstract of grounding system				
JICA Expert		Mr.Kato (Lecturer)		Mr.Kato Mr. Nakamura (Lecturer)	Mr. Nakamura (Lecturer)			

Date (Day)		Jul 31 (Mon)	Aug 1 (Tue)	Aug 2 (Wed)	Aug 3 (Thu)	Aug 4 (Fri)	Aug 5 (Sat)	Aug 6 (Sun)
Trainings / Other Activities	AM	Basic practice for fault calculation		Distribution System Protection	Solving exercise problem for distribution operation and maintenance	Class Cancellation (due to MOEE side situation)	Day off	
	PM							
JICA Expert		Mr. Nakamura (Lecturer)		Mr.Kato (Lecturer)				

Date (Day)		Aug 7 (Mon)	Aug 8 (Tue)	Aug 9 (Wed)	Aug 10 (Thu)	Aug 11 (Fri)	Aug 12 (Sat)	Aug 13 (Sun)
Trainings / Other Activities	AM	Meeting with U Tha Soe and others	Relay Setting	Voltage and power factor control	Solving exercise problem for distribution operation and maintenance	Voltage and power factor control	Day off	
	PM	Solving exercise problem for distribution operation and maintenance		Discussion session with Chuo University students coming from Japan		Solving exercise problem for voltage and power factor control		
JICA Expert		Mr.Mitsui (Lecturer)	Mr.Nakamura (Lecturer)	Mr. Kato Mr. Nakamura Mr.Mitsui	Mr. Kato (Lecturer)	Mr. Kato Mr. Mitsui (Lecturer)		

Date (Day)		Aug 14 (Mon)	Aug 15 (Tue)	Aug 16 (Wed)	Aug 17 (Thu)	Aug 18 (Fri)	Aug 19 (Sat)	Aug 20 (Sun)
Trainings / Other Activities	AM	Distribution line design (using PC)	Distribution line constant calculation and Multi Transformer System design	AM: Workshop on concrete pole (3 days) (Mr. Kobayashi of NC & Maga Co., Ltd.)			Day off	
	PM			Power System Design				
JICA Expert		Dr.Shikimachi (Lecturer)		Mr.Tanihata (Lecturer)				

Date (Day)		Aug 21 (Mon)	Aug 22 (Tue)	Aug 23 (Wed)	Aug 24 (Thu)	Aug 25 (Fri)
Trainings / Other Activities	AM	Workshop on Conductor (Day1) (Mr. Terabe and Mr. Koike of Fujikura Ltd.) [Venue: MOEE]			Power System Design	Examination on lecture contents on July and August
	PM				Lecture by U Saw Win Maung (MOEE Chief Engineer) Distribution Planning	Self-Check on July and August lecture
JICA Expert		Mr. Tanihata, Dr. Shikimachi and Mr. Mitsui			Dr.Shikimachi (Lecturer)	Mr. Tanihata Dr. Shikimachi Mr. Mitsui

Actual Records of Training / Other Activities from October to December, 2017>

Date (Day)		Oct 9 (Mon)	Oct 10 (Tue)	Oct 11 (Wed)	Oct 12 (Thu)	Oct 13 (Fri)	Oct 14 (Sat)	Oct 15 (Sun)
Trainings / Other Activities	AM	Managing Meeting	Distribution Planning&Design - Concrete footing for poles at training center	Distribution Planning&Design - Load type and bending moment of pole	Distribution Construction - Safety in Distribution Works	Distribution Construction - Safety in Distribution Works	Day off	
	PM					Discussion on the training in Japan		
JICA Expert		Ms. Orui Dr. Shikimachi Mr. Nakagawa	Dr.Shikimachi (Lecturer)		Mr. Nakagawa (Lecturer)	Dr. Shikimachi Mr. Nakagawa (Lecturer)		

Date (Day)		Oct 16 (Mon)	Oct 17 (Tue)	Oct 18 (Wed)	Oct 19 (Thu)	Oct 20 (Fri)	Oct 21 (Sat)	Oct 22 (Sun)
Trainings / Other Activities	AM	Distribution Planning&Design - Area loss estimation using statistics	Distribution Construction - Safety OJT using safety belt/ step bolts on site	Day off	Distribution Planning&Design -Area loss practice using statistics	Distribution Construction - Safety OJT using safety belt/ step bolts on site	Day off	
	PM				Distribution Planning&Design - Voltage drop calculation with graphs	Distribution Planning&Design - Voltage drop calculation with graphs		
JICA Expert		Dr. Shikimachi (Lecturer)	Mr. Nakagawa (Lecturer)		Dr. Shikimachi (Lecturer)	Mr. Nakagawa Dr. Shikimachi (Lecturer)		

Date (Day)		Oct 23 (Mon)	Oct 24 (Tue)	Oct 25 (Wed)	Oct 26 (Thu)	Oct 27 (Fri)	Oct 28 (Sat)	Oct 29 (Sun)
Trainings / Other Activities	AM	Distribution Planning&Design - Loss calculation using loss coefficient	Distribution Planning&Design - Loss calculation using load factor - Measuring OJT with Laser distance meter,etc.	Distribution Substation - Power Transformer	Distribution Substation - Power Capacitor, Lightning Arrester	Distribution Substation - Battery, Substation Planning	Day off	
	PM							
JICA Expert		Dr. Shikimachi (Lecturer)		Mr. Tanihata (Lecturer)				

Date (Day)		Oct 30 (Mon)	Oct 31 (Tue)	Nov 1 (Wed)	Nov 2 (Thu)	Nov 3 (Fri)	Nov 4 (Sat)	Nov 5 (Sun)
Trainings / Other Activities	AM	Distribution Substation - Substation planning and Design	Distribution Substation - Supervise and Field Test	Examination on lecture contents on October Distribution Substation - Power Transformer Test	Day-off National Holiday in Myanmar	Day-off National Holiday in Myanmar	Day off	
	PM							
JICA Expert		Mr. Tanihata (Lecturer)						

Date (Day)		Nov 6 (Mon)	Nov 7 (Tue)	Nov 8 (Wed)	Nov 9 (Thu)	Nov 10 (Fri)	Nov 11 (Sat)	Nov 12 (Sun)
Trainings / Other Activities	AM	Self-Check on October lecture	Transmission Line Planning& Design (Conductor)			Transmission Line Planning&Design (Tower and Foundation)	Day off	
	PM							
JICA Expert		Mr. Yoshida (Lecturer)						

Date (Day)		Nov 13 (Mon)	Nov 14 (Tue)	Nov 15 (Wed)	Nov 16 (Thu)	Nov 17 (Fri)	Nov 18 (Sat)	Nov 19 (Sun)
Trainings / Other Activities	AM	Day-off National Holiday in Myanmar	Substation Maintenance Protective Relay			Distribution Material and Equipment	Day off	
	PM							
JICA Expert			Mr. Nakamura (Lecturer)			Mr. Kato (Lecturer)		

Date (Day)		Nov 20 (Mon)	Nov 21 (Tue)	Nov 22 (Wed)	Nov 23 (Thu)	Nov 24 (Fri)	Nov 25 (Sat)	Nov 26 (Sun)
Trainings / Other Activities	AM	Substation Maintenance Protective Relay	Distribution Material and Equipment				Day off	
	PM							
JICA Expert		Mr. Nakamura (Lecturer)	Mr. Kato (Lecturer)					

Date (Day)		Nov 27 (Mon)	Nov 28 (Tue)	Nov 29 (Wed)	Nov 30 (Thu)	Dec 1 (Fri)	Dec 2 (Sat)	Dec 3 (Sun)
Trainings / Other Activities	AM	Distribution Material and Equipment	Distribution Construction	Distribution Maintenance	Distribution Construction	Distribution Maintenance	Day off	
	PM							
JICA Expert		Mr. Kato (Lecturer)	Mr. Nakagawa (Lecturer)	Mr. Kato (Lecturer)	Mr. Nakagawa (Lecturer)	Mr. Kato (Lecturer)		

Date (Day)		Dec 4 (Mon)	Dec 5 (Tue)	Dec 6 (Wed)	Dec 7 (Thu)	Dec 8 (Fri)	Dec 9 (Sat)	Dec 10 (Sun)
Trainings / Other Activities	AM	Distribution Construction	Distribution Maintenance Examination on lecture contents on November	Distribution Construction	Distribution Maintenance	Distribution Construction	Day off	
	PM							
JICA Expert		Mr. Nakagawa (Lecturer) Ms. Wah Wah	Mr. Kato (Lecturer) Ms. Wah Wah	Mr. Nakagawa (Lecturer) Ms. Wah Wah	Mr. Kato (Lecturer) Ms. Wah Wah	Mr. Nakagawa (Lecturer) Ms. Wah Wah		

Date (Day)		Dec 11 (Mon)	Dec 12 (Tue)	Dec 13 (Wed)	Dec 14 (Thu)	Dec 15 (Fri)	Dec 16 (Sat)	Dec 17 (Sun)
Trainings / Other Activities	AM	Substation Maintenance Circuit Breaker			Installation of switchgear on pole	Substation Maintenance Current Transformer	Day off	
	PM				Managing Meeting Substation Maintenance Current Transformer	Work Safety		
JICA Expert		Mr. Tanihata, Mr. Nakamura (Lecturer), Ms. Wah Wah						

Date (Day)		Dec 18 (Mon)	Dec 19 (Tue)	Dec 20 (Wed)	Dec 21 (Thu)	Dec 22 (Fri)
Trainings / Other Activities	AM	Day-off National Holiday in Myanmar	Substation Maintenance Disconnector	Site work management	Installation of Switchgear on pole	GW activity for preparation on January's presentation
	PM			2nd JCC GW activity for preparation on January's presentation	Examination on lecture contents on December	
JICA Expert			Mr. Tanihata, (Lecturer)	Mr. Tanihata Mr. Mitsui Ms. Wah Wah	Mr.Kato, Mr. Tanihata Mr. Mitsui, Ms. Wah Wah	

Actual Records of Training / Other Activities on September 2018>

Date (Day)		Sep 3 (Mon)	Sep 4 (Tue)	Sep 5 (Wed)	Sep 6 (Thu)	Sep 7 (Fri)	Sep 8 (Sat)	Sep 9 (Sun)
Trainings / Other Activities	AM	Lecture / Exercise on Financial Analysis		Lecture / Exercise on Substation Technologies		Lecture / Exercise on Financial Analysis	Day off	
	PM					Lecture / Exercise on Substation Technologies		
JICA Expert		Mr. Yamashita (Lecturer) Mr. Mitsui, Mr. Hoke Shein Ms. Wah Wah		Mr. Nakamura (Lecturer) Mr. Mitsui, Mr. Hoke Shein Ms. Wah Wah		Mr. Yamashita Mr. Nakamura (Lecturer) Mr. Mitsui		

Date (Day)		Sep 10 (Mon)	Sep 11 (Tue)	Sep 12 (Wed)	Sep 13 (Thu)	Sep 14 (Fri)	Sep 15 (Sat)	Sep 16 (Sun)
Trainings / Other Activities	AM	Examination on 5 themes to check Trainer Candidates' understanding	Lecture on Distribution line voltage control (SVR technology)			Watching Videos on Work Safety Technologies with JICA Expert's explanation	Day off	
	PM	Lecture on Distribution line voltage control (SVR technology)						
JICA Expert		Mr. Kato (Lecturer), Mr. Yoshida, Mr. Hoke Shein						

Date (Day)		Sep 17 (Mon)	Sep 18 (Tue)	Sep 19 (Wed)	Sep 20 (Thu)	Sep 21 (Fri)
Trainings / Other Activities	AM	[Discussion and Group Work] Reviewing overall activities conducted during Phase I and each trainer candidate's achievements in this Project, summarizing each's ambitions for the future as a certified trainer Preparing presentation material on the 3rd JCC to present above matters				
	PM					
JICA Expert		Mr. Kato (Lecturer), Mr. Yoshida, Mr. Hoke Shein				

2. 配電設備実現場での講師候補生向け OJT 研修

	Date	Place	JICA Expert	Content of Training (OJT)
1	29th March 2017	Suburbs of Nay Pyi Taw	Mr. Tanihata Dr. Shikimachi	Practice of site survey for distribution design using GPS and other equipment
2	19th March 2018	Takton Township, Nay Pyi Taw (ESE area)	Ms. Shibata Dr. Shikimachi Mr. Nakamura Mr. Nakagawa Mr. Mitsui	Installation work of switches on distribution line at site
3	30th April 2018	Dala Township, Yangon (YESC area)	Ms. Shibata Dr. Shikimachi	Method of designing multi-transformer system, and estimating the amount of distribution losses before and after the multi-transformer system is applied
4	15th May 2018	Kyaukpadaung, Mandalay Region (MESC area)	Ms. Shibata Dr. Shikimachi	Site survey on the place where SOG would be installed Withstand voltage test on the SOG-VCB before installation on the site
5	16th May 2018	Bagan, Mandalay Region (MESC area)	Ms. Shibata Dr. Shikimachi	Site survey on the place where the transformer procured by JICA would be installed
6	17th May 2018	Takton Towmship, Nay Pyi Taw (ESE area)	Ms. Shibata Dr. Shikimachi	Method of designing multi-transformer system Method of using measuring equipment (thermal imaging camera, a GPS device and a megger tester) on site where a SOG-VCB would be installed
7	1st, 2nd August 2018	Kyaukpadaung, Mandalay Region (MESC area)	Mr. Kato Dr. Shikimachi	Method of designing multi-transformer system (on Kyaukpadaung Township Office and on site) Site survey on the place where the SOG-VCB procured by JICA was installed, explaining the operation of SOG-VCB to protect part of a distribution feeder against an accident or fault, checking actual number of operations of SOG-VCB

3. 地方セミナー

3.1 第 1 回地方セミナー（Magway, Monywa 実施分）【2018 年 6 月 5 日～6 月 14 日】

(1) Trainer Candidates from each WG participating regional seminar

[WG1] Distribution Planning & Design (Training-1)	[WG2] Distribution Construction & Safety Technologies (Training-2)	[WG3] Distribution Operation & Maintenance (Training-3)	[WG4] Transmission Technologies Group (Training - 4)	[WG5] Substation Technologies (Training-5)
U Naung Win Htoo (AE – DPTSC) Daw Phyo Thiri Aung (SAE – YESC)	U San Myo Aung (EE - ESE) U Si Thu Aung (EE - ESE)	U Lin KoKo (EE - ESE) U Kyaw Kyaw (AE – MESC)	U Myint Oo (EE - ESE) Daw Shwe Yee Win (SAE - ESE)	U Zaw Zaw Htet (EE - ESE) U Than Htike Oo (EE - ESE)

(2) Schedule (: Regional Seminar in Magway, : Regional Seminar in Monywa)

	Date (Day)	Seminar Program		Travelling or Staying
		9:00 – 12:00 am	13:00 – 16:00 pm	
1	5th June 2018 (Tue)	Travelling		NPT to Magway
2	6th June 2018 (Wed)	Introducing the JICA project	Training-1	Staying at Magway
3	7th June 2018 (Thu)	Training-2	Training-3	Staying at Magway
4	8th June 2018 (Fri)	Training-4	Training-5	Staying at Magway
5	9th June 2018 (Sat)	(Day-off) Travelling		Magway to Monywa
6	10th June 2018 (Sun)	(Day-off) Preparation for seminar next week		Staying at Monywa
7	11th June 2018 (Mon)	Introducing the JICA project	Training-1	Staying at Monywa
8	12th June 2018 (Tue)	Training-2	Training-3	Staying at Monywa
9	13th June 2018 (Wed)	Training-4	Training-5	Staying at Monywa
10	14th June 2018 (Thu)	Travelling		Monywa to NPT

(3) No. of Trainees

Magway: 24 persons

Monywa: 16 persons

(4) Participating JICA Experts

Ms. Shibata, Mr. Kato, Mr. Nakagawa, Mr. Hoke Shein and Ms. Wah Wah

3.2 第２回地方セミナー（Taunggyi, Mandalay 実施分）【2018 年 6 月 26 日～7 月 5 日】

(1) Trainer Candidates from each WG participating regional seminar

[WG1] Distribution Planning & Design (Training-1)	[WG2] Distribution Construction & Safety Technologies (Training-2)	[WG3] Distribution Operation & Maintenance (Training-3)	[WG4] Transmission Technologies Group (Training - 4)	[WG5] Substation Technologies (Training-5)
U Bo Bo (SAE - ESE) U Myo Min Aung (AE - ESE)	U Min Thiha (EE - ESE) U Zaw Htike (AE - MESC)	U Kyaw Kyaw (AE – MESC) U Naing Lin (EE - ESE)	U San Yu Maw (EE - ESE) Daw Shwe Yee Win (SAE - ESE)	U Myo Thant Zin (AD - DEPP) Dr Tayzar Lin (AE - YESC)

(2) Schedule (: Regional Seminar in Taunggyi, : Regional Seminar in Yangon)

	Date (Day)	Seminar Program		Travelling or Staying
		9:00 – 12:00 am	13:00 – 16:00 pm	
1	26th June 2018 (Tue)	Travelling		NPT to Taunggyi
2	27th June 2018 (Wed)	Introducing the JICA project	Training-1	Staying at Taunggyi
3	28th June 2018 (Thu)	Training-2	Training-3	Staying at Taunggyi
4	29th June 2018 (Fri)	Training-4	Training-5	Staying at Taunggyi
5	30th June 2018 (Sat)	(Day-off) Travelling		Taunggyi to Yangon
6	1st July 2018 (Sun)	(Day-off) Preparation for seminar next week		Staying at Yangon
7	2nd July 2018 (Mon)	Introducing the JICA project	Training-1	Staying at Yangon
8	3rd July 2018 (Tue)	Training-2	Training-3	Staying at Yangon
9	4th July 2018 (Wed)	Training-4	Training-5	Staying at Yangon
10	5th July 2018 (Thu)	Travelling		Yangon to NPT

(3) No. of Trainees

Taunggyi: 20 persons

Mandalay: 29 persons

(4) Participating JICA Experts

Ms. Shibata, Mr. Yoshida, Mr. Hoke Shein and Ms. Wah Wah

3.3 第３回地方セミナー（Bago, Yangon 実施分）【2018 年 7 月 15 日～7 月 25 日】

(1) Trainer Candidates from each WG participating regional seminar

[WG1] Distribution Planning & Design (Training-1)	[WG2] Distribution Construction & Safety Technologies (Training-2)	[WG3] Distribution Operation & Maintenance (Training-3)	[WG4] Transmission Technologies Group (Training - 4)	[WG5] Substation Technologies (Training-5)
U Soe Ko Ko Aung (AD - DEPP) U Aung Tun (EE - ESE)	U Min Thiha (EE - ESE) Daw Yi Mon Aye (Deputy Staff Officer - DEPP)	U Kun Saw Naung Htwe (AE - ESE) U Kyaw Soe Lin (SAE -YESC)	U Win Kyaw (Staff Officer -DPTSC) Daw Kyawt Kyawt Hlaing (AE - YESC)	Daw Soe Yupar Thein (Staff Officer -DPTSC) Dr Tayzar Lin (AE - YESC)

(2) Schedule (: Regional Seminar in Bago, : Regional Seminar in Yangon)

	Date (Day)	Seminar Program		Travelling or Staying
		9:00 – 12:00 am	13:00 – 16:00 pm	
1	15th July 2018 (Sun)	Travelling		NPT to Bago
2	16th July 2018 (Mon)	Introducing the JICA project	Training-1	Staying at Bago
3	17th July 2018 (Tue)	Training-2	Training-3	Staying at Bago
4	18th July 2018 (Wed)	Training-4	Training-5	Staying at Bago
5	19th July 2018 (Thu)	Travelling		Bago to Yangon
6	20th July 2018 (Fri)	Introducing the JICA project	Training-1	Staying at Yangon
7	21st July 2018 (Sat)	(Day-off) Preparation for seminar next week		Staying at Yangon
8	22nd July 2018 (Sun)	(Day-off) Preparation for seminar next week		Staying at Yangon
9	23rd July 2018 (Mon)	Training-2	Training-3	Staying at Yangon
10	24th July 2018 (Tue)	Training-4	Training-5	Staying at Yangon
11	25th July 2018 (Wed)	Travelling		Yangon to NPT

(3) No. of Trainees

Bago: 15 persons

Yangon: 36 persons

(4) Participating JICA Experts

Ms. Shibata, Mr. Yoshida, Mr. Nakamura, Mr. Mitsui, Mr. Hoke Shein and Ms. Wah Wah

Textbook

for

Distribution Planning and Design

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System
(Phase I)

Table of contents

This textbook was translated and edited by JERA Co., Inc. from the original “Shintei Haidenkogaku Genbanotebiki 1” authored by the Japan Electric Association Chubu Branch.

Textbook

for

Distribution Construction Work and Safety Technologies

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System (Phase I)

Table of contents

Textbook

for

Distribution Operation and Maintenance

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System
(Phase I)

Table of contents

Textbook

for

Transmission Line

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System(Phase I)

Transmission Line

Chapter 1 Planing and Survey for transmission line

Chapter 2 Insulation design of overhead transmission line

Chapter 3 Conductor and ground wire

Chapter 4 Insulators

Textbook

for

Distribution Substation 1

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System
(Phase I)

Distribution Substation 1

Chapter 1 Substation Overview

Chapter 2 Power Transformer

Textbook

for

Distribution Substation 2

Ministry of Electricity and Energy

Republic of the Union of Myanmar

The Project for Capacity Development of Power Transmission and Distribution System
(Phase I)

Distribution Substation 2

The Republic of The Union of Myanmar

The Project for Capacity Development
of Power Transmission and
Distribution Systems (Phase I)

Discussion Material for
MOEE Central Training Center
Institutional Development

November 2018

JICA Expert Team

Table of Contents

Abbreviation

AE	Assistant Engineer
A.G.T.I.	Associateship Government Technical Institute
B.A.	Bachelor of Arts
B.Com.	Bachelor of Commerce
B.E.	Bachelor of Engineering
B.Ecom.	Bachelor of Economic
B.Sc.	Bachelor of Science
B.Tech.	Bachelor of Technology
BOD	Board of Directors
CEPCO	Chubu Electric Power Co., Inc.
CITC	Central Institute of Transport and Communication
CSR	Corporate Social Responsibility
DEPP	Department of Electric Power Planning
DHPI	Department of Hydropower Implementation
Div.	Division
DOH	Department of Highway
DPTSC	Department of Power Transmission and System Control
DUHD	Department of Urban and Housing Development
E.T.E.C	Electrical Training Evening Classes
EC	Executive Committee
EE	Executive Engineer
EPGE	Electric Power Generation Enterprise
ESE	Electricity Supply Corporation
HR	Human Resource
HRD	Human Resource Development
HRDC	Human Resource Development Center
IDCS	Information Development and Cyber Security
JICA	Japan International Cooperation Agency
LPG	Liquefied Petroleum Gas
M.A	Master of Arts
M.B.B.S.	Bachelor of Medicine, Bachelor of Surgery
M.Sc.	Master of Science
MESC	Mandalay Electricity Supply Corporation
MOC	Ministry of Construction
MOEE	Ministry of Electricity and Energy
MOGE	Myanma Oil and Gas Enterprise
MOTC	Ministry of Transportation and Communication

MPE	Myanma Petrochemical Enterprise
MPPE	Myanma Petroleum Product Enterprise
MPT	Myanma Post and Telecommunication
NPT	Nay Pyi Taw
OGPD	Oil and Gas Planning Department
OJT	On the Job Training
PSC	Public Service Commission
SAE	Sub Assistant Engineer
SC	Steering Committee
TC	Training Center
TCPC	Training Center Preparation Committee
TPTC	Telecommunications and Postal Training Center
UNIDO	United Nations Industrial Development Organization
WG	Working Group
YESC	Yangon Electricity Supply Corporation

Chapter 1 Introduction

1.1 Background

JICA Expert Team has its mission for training center institutional development as a part of technical assistance "The Project for Capacity Development of Power Transmission and Distribution Systems (Phase I)". JICA Expert Team conducted Workshop on Training Center Institutional Development on Feb 1st, 2018 proposing the establishment of Training Center Preparation Committee (TCPC). Members of Steering Committee (SC) and Working Group (WG) of TCPC were selected by Minister's Office Order No. (068/2018) on March 12th, 2018. 1st WG of TCPC was conducted on June 4th, 2018 and discussed the following agendas.

- Basic Framework of TCPC (Objective and organizational structure of TCPC, scope of work for SC and WG, issues to be discussed in TCPC, schedule of TCPC)
- Basic Concept of Training Center Organization

Major opinions of 1st WG are the followings.

- Organizational structure of Training Center (TC) should be separated between Electricity and Energy. WG on TCPC also should be separated between Electricity and Energy since the training program is different.

After the 1st WG, it became clear that the establishment of new organization for TC is difficult due to budget constraint. However, it is still important to enhance training system of MOEE even without establishing a new organization in order to maximize the impact of training with limited budget as a short term. As a long-term, it is important to establish TC as an institution to provide necessary training programs systematically and sustainably to the large number of officers/staffs of MOEE.

1.2 Objective of Discussion Material

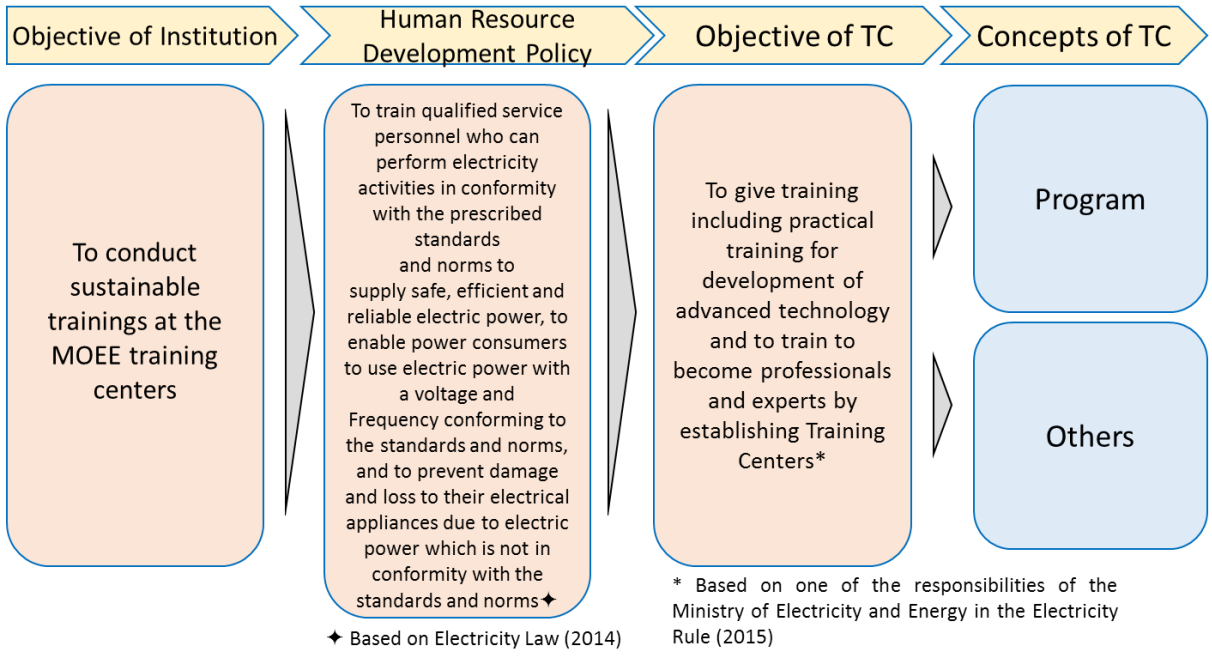
Objective of this discussion material is to provide the information/knowledge to MOEE officers/staffs regarding TC establishment and operation including human resource development policy, TC organizational development, training program, trainer selection, budget and others. JICA Expert team conducted series of interview to the following TCs and the most of information/knowledge described in this discussion material is based on the interview to those TCs.

1) MOEE Paung Laung Training Center (DHPI & EPGE)
2) MOEE No. (1) Refinery Plant (Thanlyin) Training Center (MPE)
3) Ministry of Construction (MOC) Central Training Center
4) Ministry of Transportation and Communication (MOTC) Central Institute of Transport and Communication (CITC)
5) MOTC Myanmar Post and Telecommunication (MPT) Training Center
6) MOTC Information Development and Cyber Security (IDCS) Training Center

Chapter 2 Human Resource Development Policy

2.1 Objective of Training Center

It is important to maximize the impact of training with limited budget for MOEE. In order to maximize the impact of training and development of systematic and sustainable training program, concept of Training Center (TC)) is inevitable. The concepts of Training Center (TC) shall be developed based on the objective of TC, which is levied from the Human Resource Development (HRD) policy in order to achieve the objective of institution. The example of conceptual flow to develop the concepts of TC is shown in Figure 2-1.



Source: JICA Expert Team

Figure 2-1 Example of Conceptual Flow to Develop the Concepts of TC

HRD policy, objective and procedure of some training centers in Myanmar and in Japan where JICA expert team have visited are described below as for references.

2.1.1 MOEE (Electricity Sector)

Currently Electricity Sector of MOEE does not have regulated HRD policy.

2.1.2 MOEE (No. (1) Refinery Plant (Thanlyin) TC Myanma Petrochemical Enterprise)

Training Center of Myanma Petrochemical Enterprise (MPE) of the MOEE is located in No. (1) Refinery Plant (Thanlyin) in Thanlyin Township in Yangon South District. It has been established in 1977. There are three objectives of the training center and they are as follow.

1) To perform duties skillfully and safely.

2) To upgrade technical skill and work efficiency.
3) To cooperate each other enthusiastically and to serve the development of the professional fields.

2.1.3 MOC

Central Training Center of the Ministry of Construction (MOC) is located in Thuwunna Township in East Yangon District. It has been established in 1966. Research and Development center, where test such as mechanical strength of concrete can be undertaken, is existed in the same compound of this training center. However, no regulated HRD policy was found.

2.1.4 MOTC (CITC)

The Central Institute of Transport and Communications (CITC) of the Ministry of Transport and Communications (MOTC) is located in Meiktila Township in Mandalay Region. It has been established in 1972.

The Policy of the CITC is to train the qualified service personnel who are moral, disciplined and capable for transport and communications service sectors of the state.

The long-term objective of CITC is to foster and train good government employees with high mindset, high disciplines, high capacity and enough quality for Myanmar's transportation service sector

There are three objectives of CITC and they are as follow.

1) To train the services personnel to be skillful in their trades in accordance with the procedures of working manual and to catch up advanced technologies.
2) To train the service personnel to undertake their duties successfully by combining, using and managing all of capacities in hand, effectively.
3) To train the service personnel to keep right perception on National Politic Process and to get better public relation.

The procedure of this Central Institute is shown below.

1) Conducting the training courses for instructors, staffs and trainees in order to develop their techniques and work-field skills, and try to keep understanding on civics moral and discipline.
2) Arranging excursions to work related factories, mills and training courses for the sake of exposure not only apart from theory but also to be skilled in their work- fields.
3) Conducting all of the training courses, under the guidance of Ministry, which are actually needed for the service personnel who are serving in the various departments of the Ministry of Transport and Communication.
4) Implementing the Operational Skill Training Courses for the service personnel such as Basic Training Courses, Skill Upgrading Training Courses and Refreshing Training Courses accordingly.
5) Arranging scholarship programs for services personnel in order to develop job-related skills and understand well on advanced technologies, and cooperating with international training institutes.
6) Bringing out the skillful Transporter Driver (Tailer Truck included 22 wheels) to support in Cross Border Transport Industry.
7) Conducting the training courses for Automotive Driver, Automotive Mechanics, Arc Welding and Basic electrical wire installation courses to get Job Opportunities for Local People.

8) Upgrading CITC capacity by conducting more courses, sending instructors abroad and locally to attend skill upgrading training courses.

2.1.5 MOTC (MPT)

Telecommunications and Postal Training Center (TPTC) of Myanma Post and Telecommunication (MPT), which was jointly operated with Sumitomo-KDDI in 2014, of the MOTC is located in Pazundaung Township in Yangon Region. It has been established since 1968 and Computer Skill training, English Language training, Soft-skill training and Technical Training have been recently conducted.

Firstly, Training Master Plan is developed and approval on budget and training plan is requested to Board of Directors (BOD) and approved training plan is announced to all departments every year. Secondly, training implementation plan is prepared to conduct trainings successfully and effectively. Finally, training implementation including training announcement, informing to join training after checking perquisite and their job, conducting training, surveying feedback and reporting bi-weekly is undertaken.

HRD policy has not been found.

2.1.6 MOTC (IDCS)

Information Development Cyber Security (IDCS) Training Center of MOTC is located at Office No. (2) in Nay Pyi Taw. It has been established since 2015 and technical and non-technical trainings such as English, Administration, Finance and Department Orientation have been conducted. In 2017-18 fiscal year, 22 training courses are planned to be implemented not only for employees in MOTC but also for all (22 Ministries and 14 State Organizations). The main purpose of the training center is to share knowledge of E-government and E-participants to reform from paper-based data management system to electronic-based data management system and to share cyber security knowledge and skills to all government employees.

HRD policy has not been found.

2.1.7 CEPCO

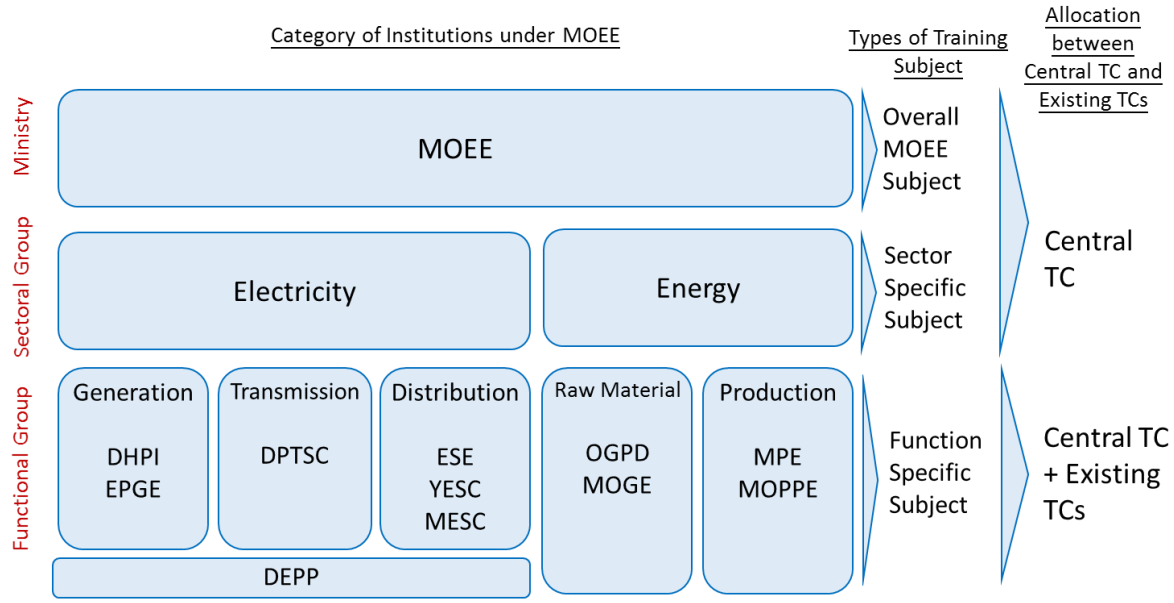
A Training Center of Chubu Electric Power Co., Inc. (CEPCO) is located in Nagoya in Japan. It has been established in 1969. The human resource development policies of this training center are as follow.

1) Pursuing stable supply of electricity and improvement of customer satisfaction
2) Accurate mastery and succession of knowledge and skills necessary for business execution
3) Accurate mastery and succession of knowledge and skills of service, negotiation and suggestion
4) Foster human resources who aggressively challenge new business with broad perspective and new ideas

2.2 Policy on Role Allocation between the Central TC and Existing TCs

Central TC has been established in April, 2018 in Nay Pyi Taw and there are existing TCs in MOEE such as Hlaing Thar Yar TC in Yangon, Paung Laung TC in Nay Pyi Taw, No. (1) Refinery Plant (Thanlyin) TC in Thanlyin Township in Yangon South District, etc… Role allocation policy between Central TC and existing TCs needs to be clarified in the Working Group (WG) and Steering Committee (SC) which was established in March, 2018. Details can be determined in each functional group of institution. An example of role allocation between the Central TC and exiting TCs based on types of training subject is shown in

Figure 2-2.



Source: JICA Expert Team

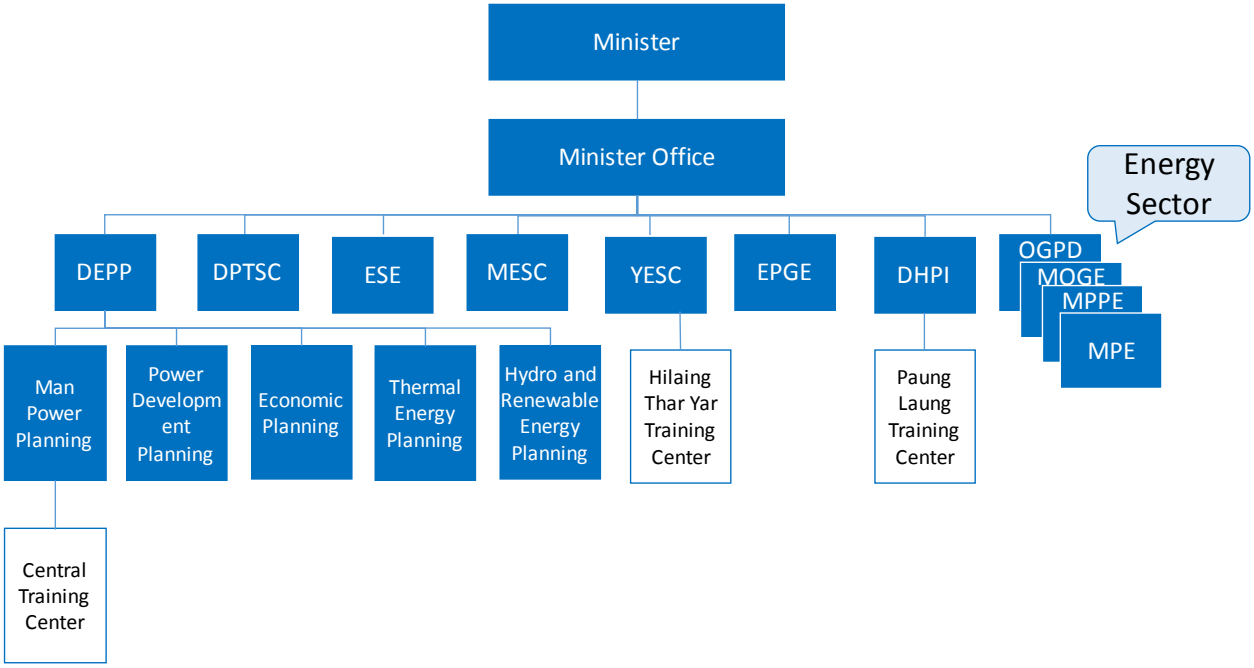
Figure 2-2 Examples of role allocation between Central TC and existing TCs

Chapter 3 Training Center Organizational Development (Long-Term)

3.1 Training Center's Positioning on the Organization

3.1.1 MOEE

Currently electricity sector of MOEE manages three Training Centers (TC), which is Central TC, Paung Laung TC and Hlaing Thar Yar TC (See Figure 3-1). Those TCs have not yet institutionalized; however, Man Power Planning Section of Department of Electric Power Planning (DEPP) manages the Central TC's facilities and logistics. Also, Department of Hydropower Implementation (DHPI) manages Paung Laung TC's facilities and logistics. Hlaing Thar Yar TC is managed by YESC independently.

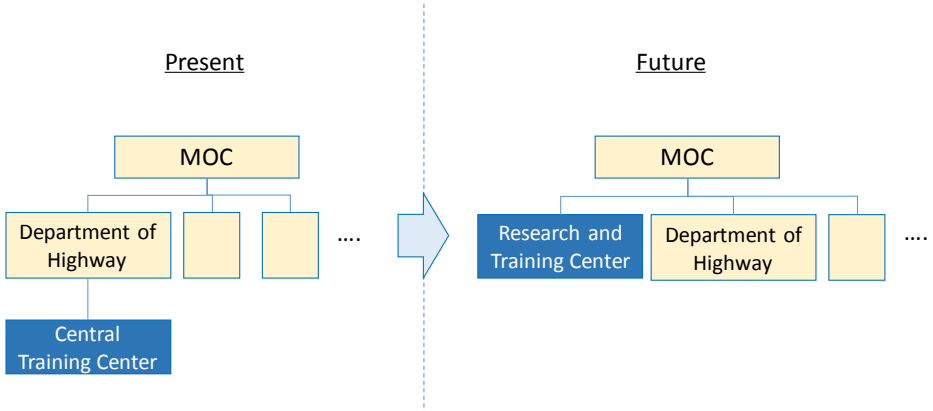


Source: JICA Expert Team based on Interview to MOEE

Figure 3-1 Organizational Structure of Training Centers of MOEE Electricity Sector

3.1.2 MOC

Ministry of Construction (MOC) Central Training Center (TC) which is located at Thuwunna in Yangon Region is currently attached to the Department of Highway of MOC while MOC have three other departments (i.e. Department of Building, Department of Bridge (DOB) and Department of Urban and Housing Development (DUHD)). However, MOC has the plan to upgrade the Central TC to department level as "Research and Training Center". (See Figure 3-2)

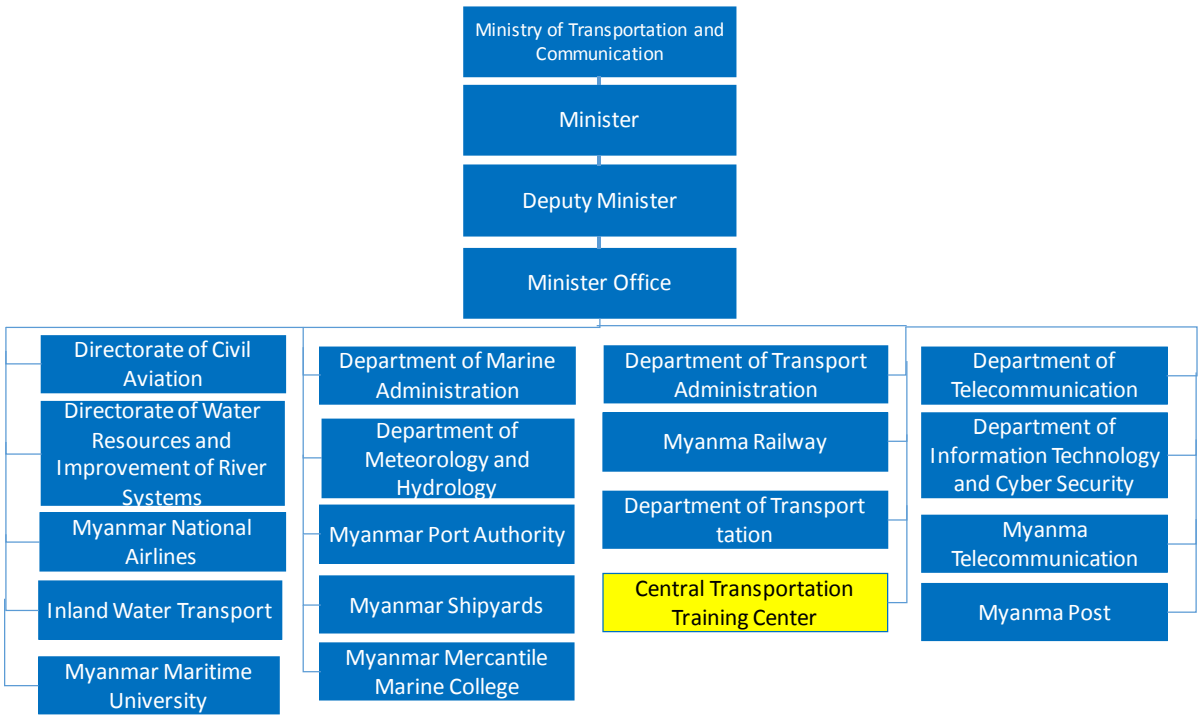


Source: JICA Expert Team based on Interview to MOC Central Training Center

Figure 3-2 Organizational Structure of Central Training Center of MOC

3.1.3 MOTC (CITC)

Central Institute of Transport and Communications (CITC) under Ministry of Transport and Communications (MOTC) which is located at Meiktila Township, Mandalay Region was officially established with other 17 departments in 1972. Based on the organizational chart below, CITC is given the same status of department. CITC mainly deals with the training of railway; however, CITC also provides the training on driving and machine maintenance.

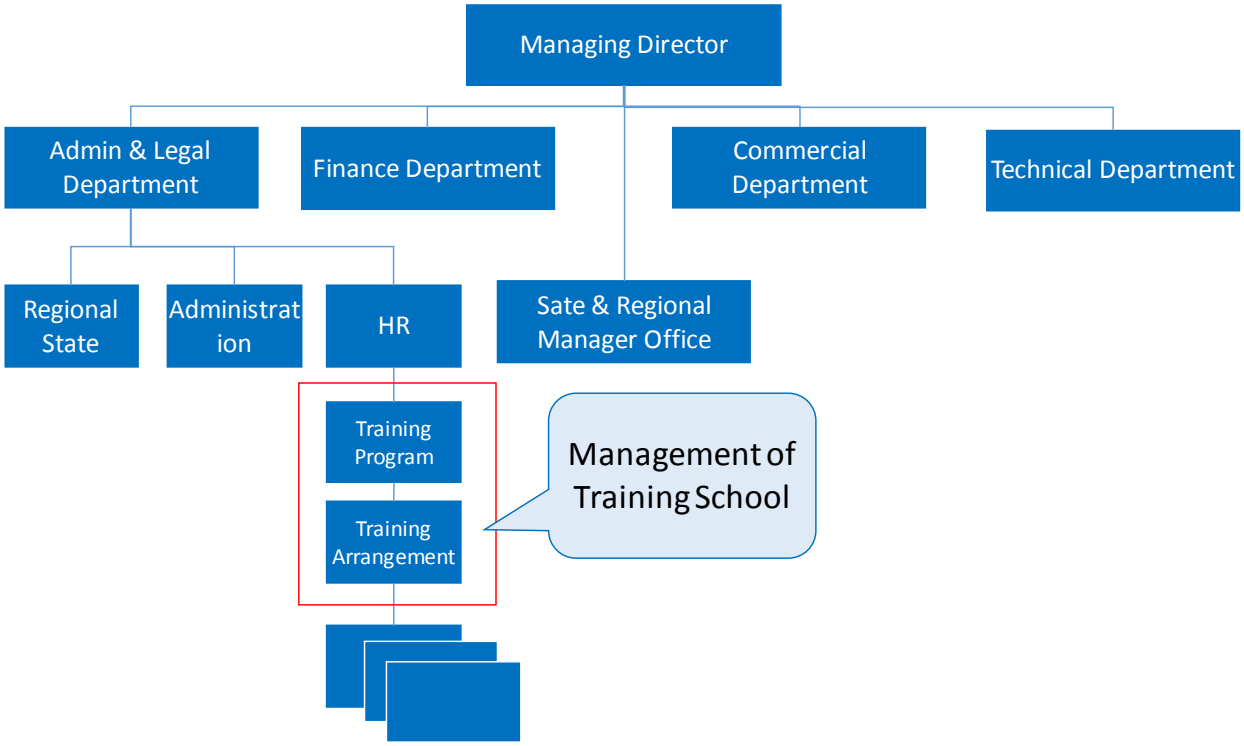


Source: MOTC Website

Figure 3-3 Organizational Structure of Central Training Center of MOTC

3.1.4 MOTC (MPT)

MOTC has another training facility for Myanmar Posts and Telecommunications (MPT) which consists of "Training Program Development Team" and "Training Arrangement & Execution Team" under HR of Administration & Legal Department. 32 trainers and 50 supporting staffs are working at the training center. MOTC (MPT) Training Center does not have a separate organization as training center but above-mentioned 2 teams are managing training.

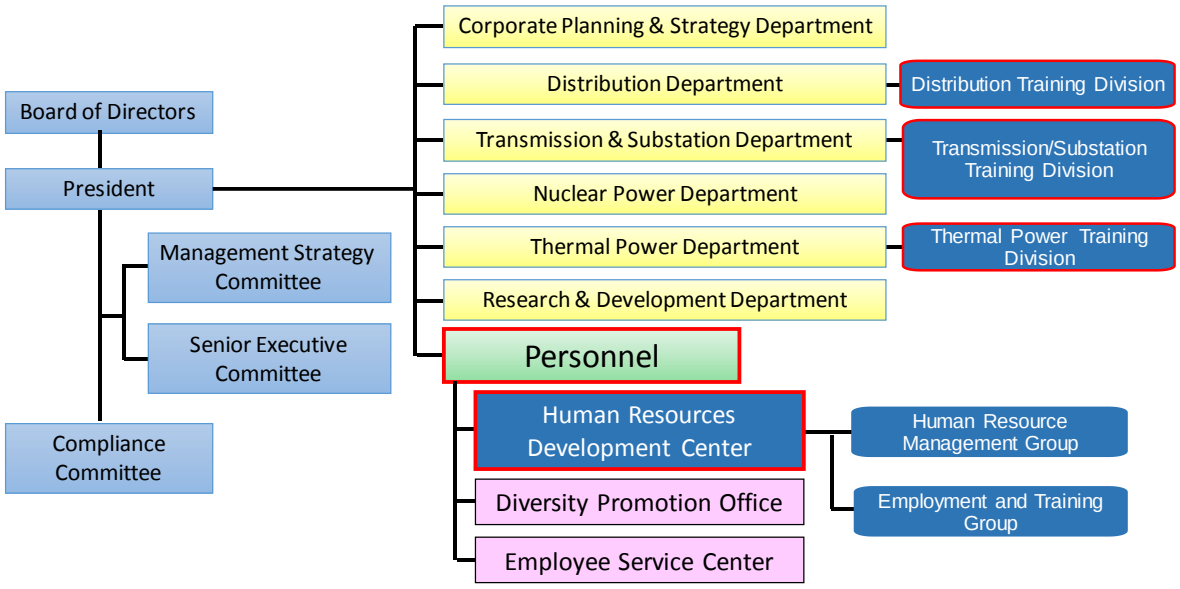


Source: JICA Expert Team based on Interview to MOTC (MPT)

Figure 3-4 Organizational Structure of Central Training Center of MOTC (MPT)

3.1.5 CEPCO

Chubu Electric Power Co., Inc. (CEPCO), which is one of the major electricity companies in Japan and have its electricity sales of 121,431 GWh and 16,461 employees (as of March 2018). CEPCO has its training division under each department. Trainings are conducted at Human Resource Development (HRD) Center which is attached to Personal Department. Logistics is conducted by HRD Center.



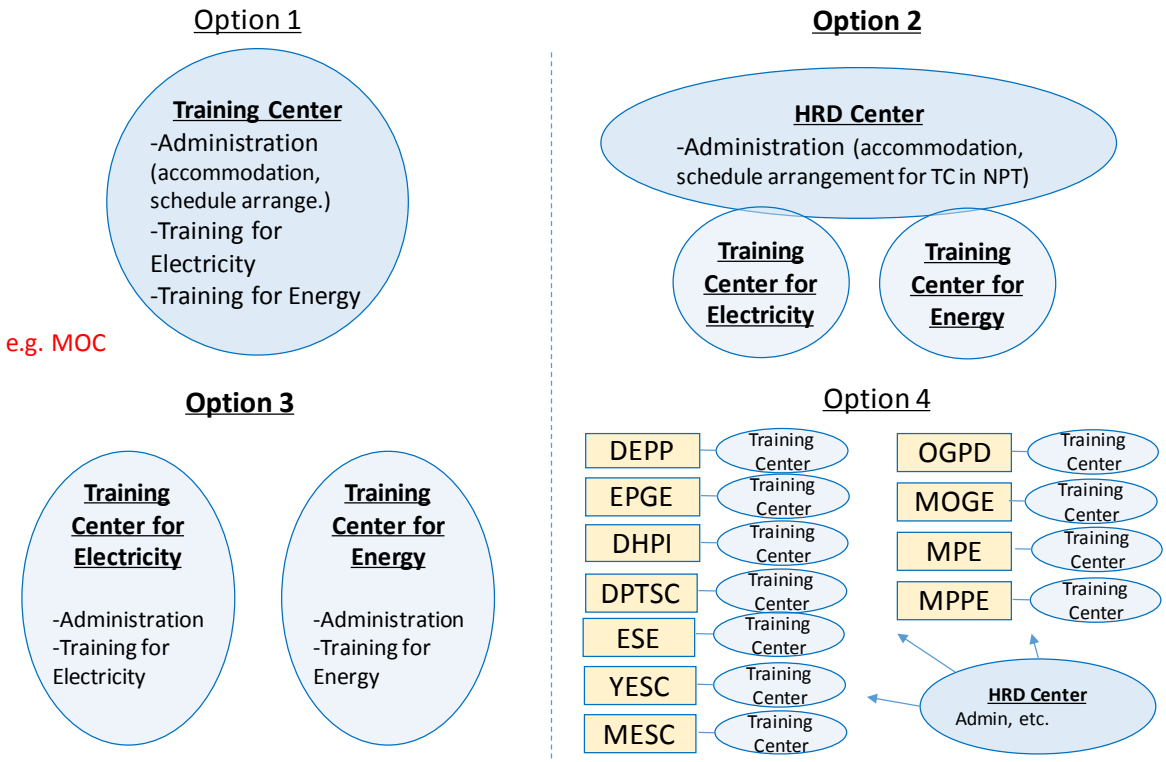
Source: JICA Expert Team based on information of CEPCO

Figure 3-5 Organizational Structure of HRD Center and Training Divisions of CEPCO

3.1.6 Possible Options of MOEE Central TC's Organizational Position

MOEE does not have TC as institution and DEPP is currently managing its facility and logistics. However, it is ideal to have TC as an institution to provide high quality training programs to large numbers of employees of MOEE.

Figure 3-6 shows the four options of organizational structure of MOEE central TC. Option 1 is the unified training center combing Electricity and Energy sector. All the training would be done in Central TC except department specific trainings. Option 2 is the two-separate training center under the Human Resource Development (HRD) Center. While each training center conducts trainings separately, HRD Center conducts administration including accommodation and schedule arrangement of Central Training Center. Option 3 is also two-separate training center. In case of Option 3, there is no HRD Center for administration. The administration shall be done by each training center. Option 4 is to establish eleven separate training centers under each department. HRD Center also would be established for administrative works. Based on the first Working Group for Training Center Preparation Committee (TCPC) conducted on June 4th, 2018, the comments from participants mainly supported Option 2 & 3.



Source: JICA Expert Team

Figure 3-6 Options for TC Institution

Table 3-1 shows the consideration points of options for TC institution. Regarding to the consistency for human resource development as MOEE, Option 1 and 2 would have advantage comparing to Option 3 and 4 since unified TC (Option 1) or two TCs under HR Development Center (Option2) can manage and develop the common program from the view point of MOEE. For administration point of view, Option 1 & 2 can be done by one stop service for the Central TC facility and accommodation management. From the point of the necessity of coordination between Electricity Sector and Energy Sector for the preparation of TC institutional development, Option 1 & 2 are required for the coordination but Option 3 & 4 are not required. Regarding to cost efficiency of TC operation, Option 1 and 2 have higher efficiency than Option 3 & 4 because some of the administrative works can be reduced by integration. Finally from the view point of interdepartmental relation development, Option 1 can expect high effect since Electricity Sector and Energy Sector need to work together for administrative works and program development. On the other hand, Option 4 would have low impact for interdepartmental relation development.

Table 3-1 Consideration Points of Options for TC Institution

No.	Points to be considered	Option 1	Option 2	Option 3	Option 4
1	Consistency for Human Resource Development as MOEE	Consistent	Consistent*	Not Consistent between E & P	Not Consistent among Dept.
2	Administration	One stop Arrangement	One stop Arrangement	One stop each in E & P	Separate Arrangement
3	Coordination between E & P for Preparation of TC	Necessary	Partially Necessary	Not Necessary	Not Necessary
4	Cost Efficiency	High	High(lower than option 1)	Middle	Low
5	Interdepartmental Relation Development	High	Middle	Middle	Low

*it depends on the degree of HR Development Center's involvement for each training center

Source: JICA Expert Team

3.2 Organizational Structure of Training Center

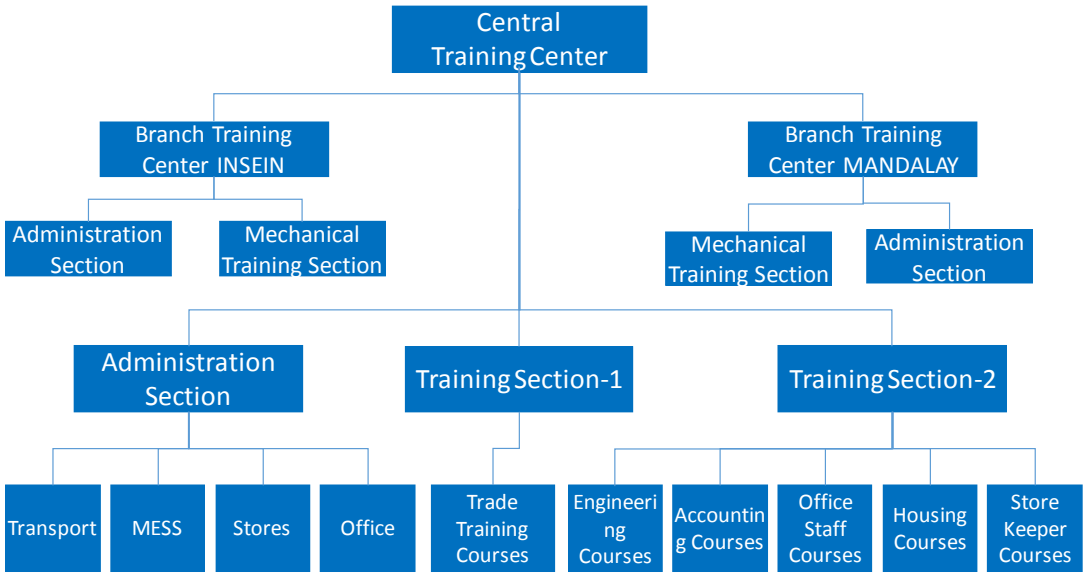
3.2.1 MOEE

MOEE currently does not have separate TC as institution. Man Power Division of DEPP has responsibility of overall management of MOEE Central Training Center.

3.2.2 MOC

MOC has Central Training Center as institution. Central TC has 2 branch training centers in Insein and Mandalay. Main TC is located in Thuwunna Township in East Yangon District and has 3 sections which are Administration Section, Training Section 1 and Training Section 2. Under the Administration Section, there are 4 divisions which includes Transport, MESS, Stores, and Office divisions. Under Training Section 1, there is one division which is trade training courses. Also under Training Section 2, there are 5 divisions including Engineering courses, accounting courses, office staff courses, housing courses, and store keeper courses.

20 staffs are assigned as full-time employee for Central TC (excluding branch TC). Each Department provide trainers. The trainers prepare the textbook(s) for their responsible class(es).

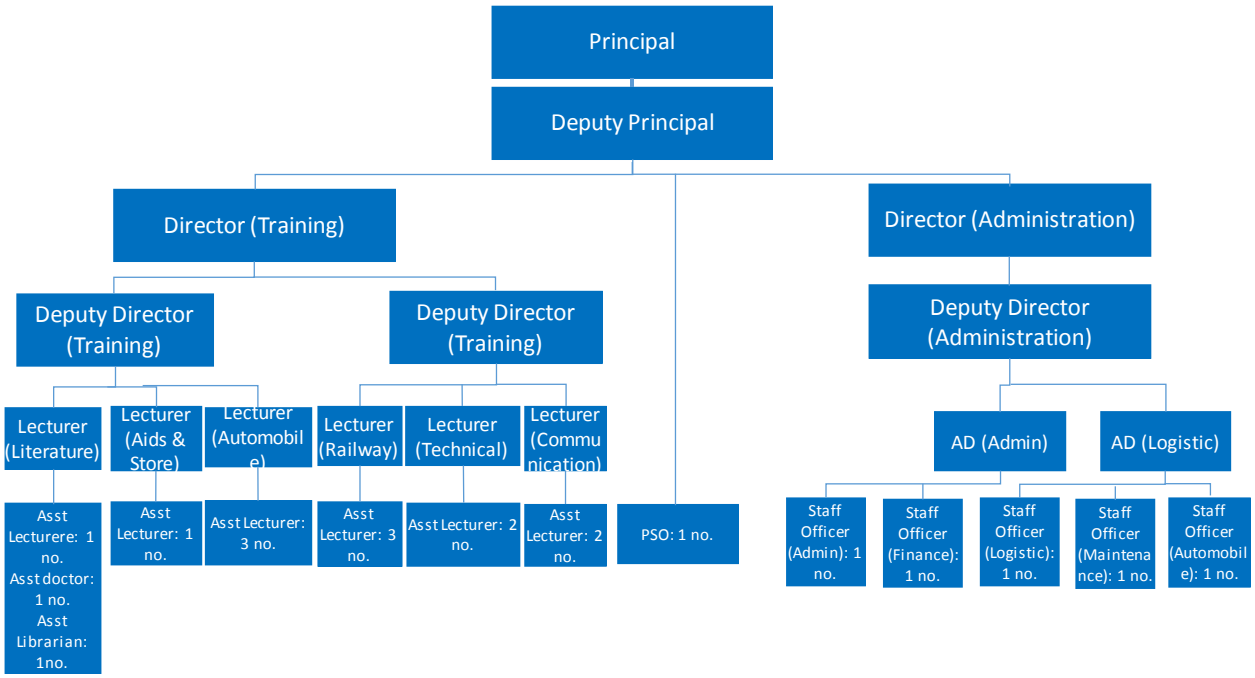


Source: MOC Central TC

Figure 3-7 Organizational Structure of MOC Central TC

3.2.3 MOTC (CITC)

MOTC has Central Institute of Transport and Communications (CITC) as an institution. Under the principal of the CITC, there is one deputy principal and 2 directors (one for administration and another for training). For administration section, there are staffs for administration, finance, logistics, maintenance, and automobile. For training section, there are lecturers (literature, aids & store, automobile, railway, technical, communication).



Source: MOTC CITC

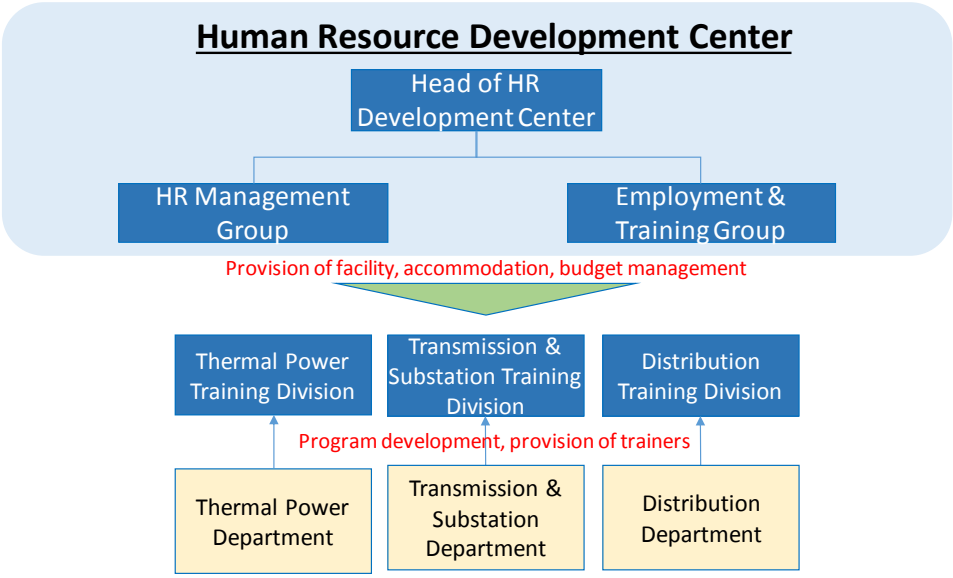
Figure 3-8 Organizational Structure of MOTC CITC

3.2.4 MOTC (MPT)

MOTC (MPT) Training Center does not have separate institution for the training center.

3.2.5 CEPCO

CEPCO has Human Resource Development Center (HRDC). HRDC consist of head of HRDC, HR Management Group and Employment & Training Group. HRDC has responsibility for provision of facility, accommodation, and budget management. The training by itself including program development, trainer selection, textbook preparation would be done by each training division.

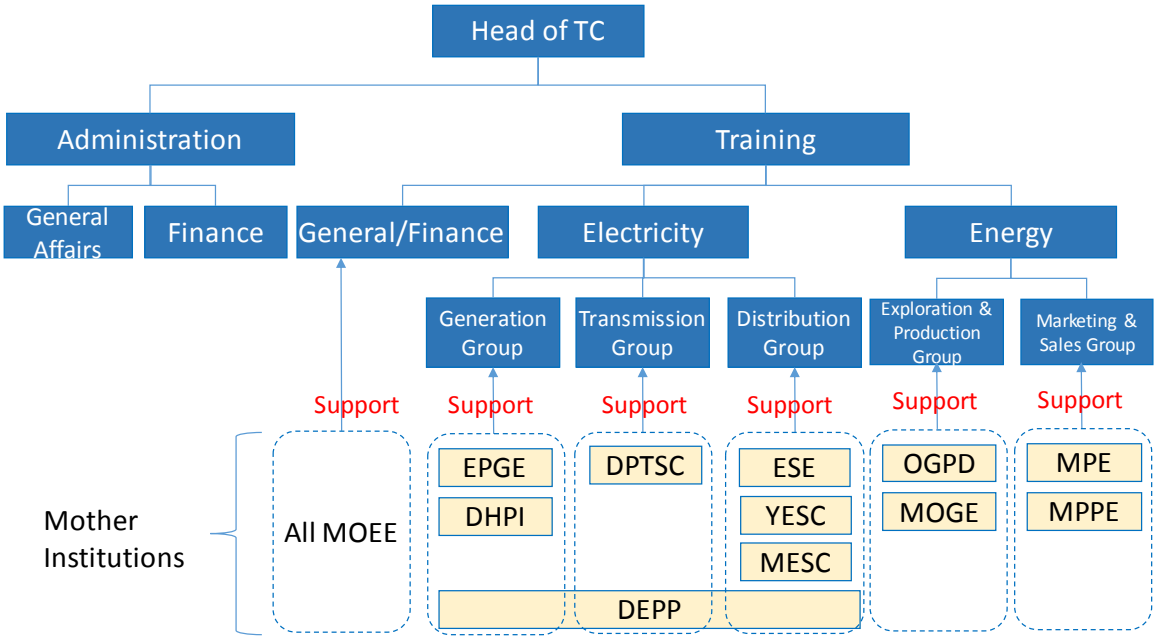


Source: CEPCO

Figure 3-9 Organizational Structure of CEPCO Training Division

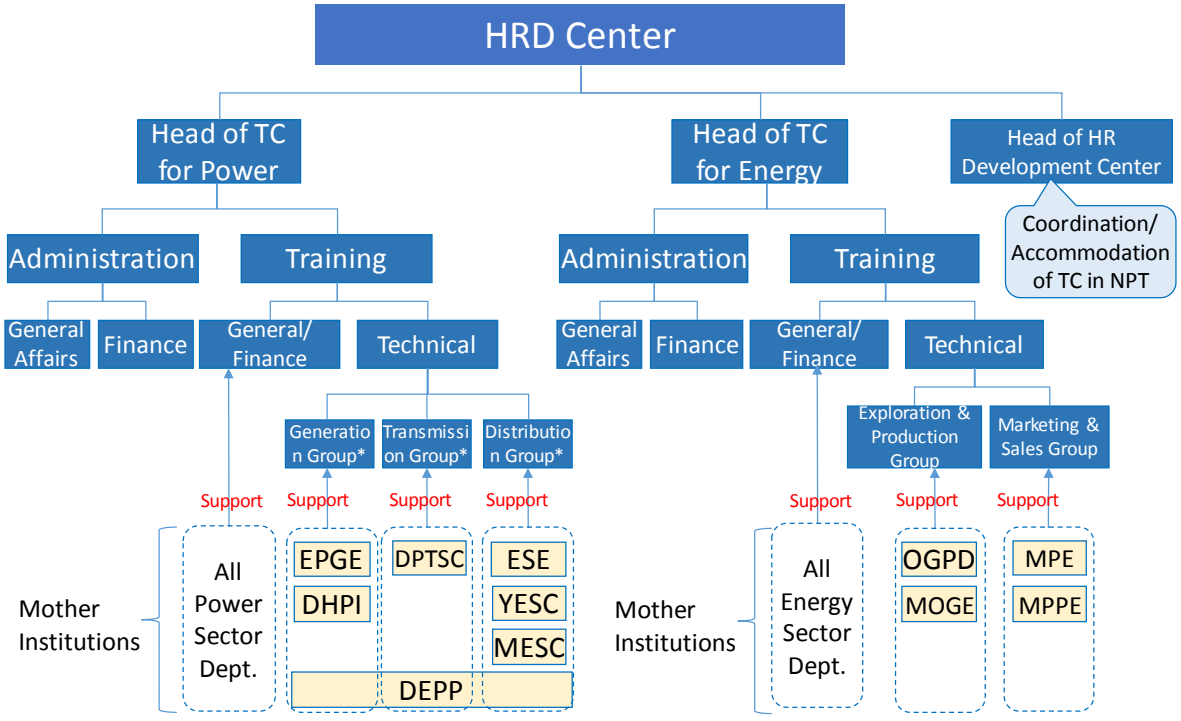
3.2.6 Possible Options of Organizational Structure of MOEE Central TC

The following four figures (See Figure 3-10, Figure 3-11, Figure 3-12and Figure 3-13) show examples of organizational structures for each option.



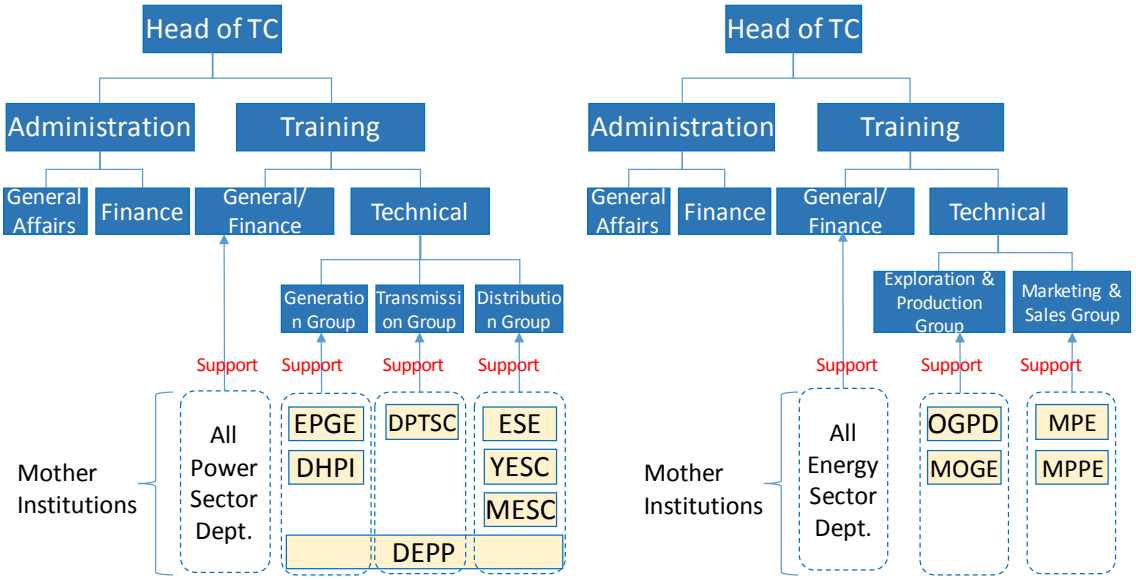
Source: JICA Expert Team

Figure 3-10 Example of Organizational Structure of TC for Option 1



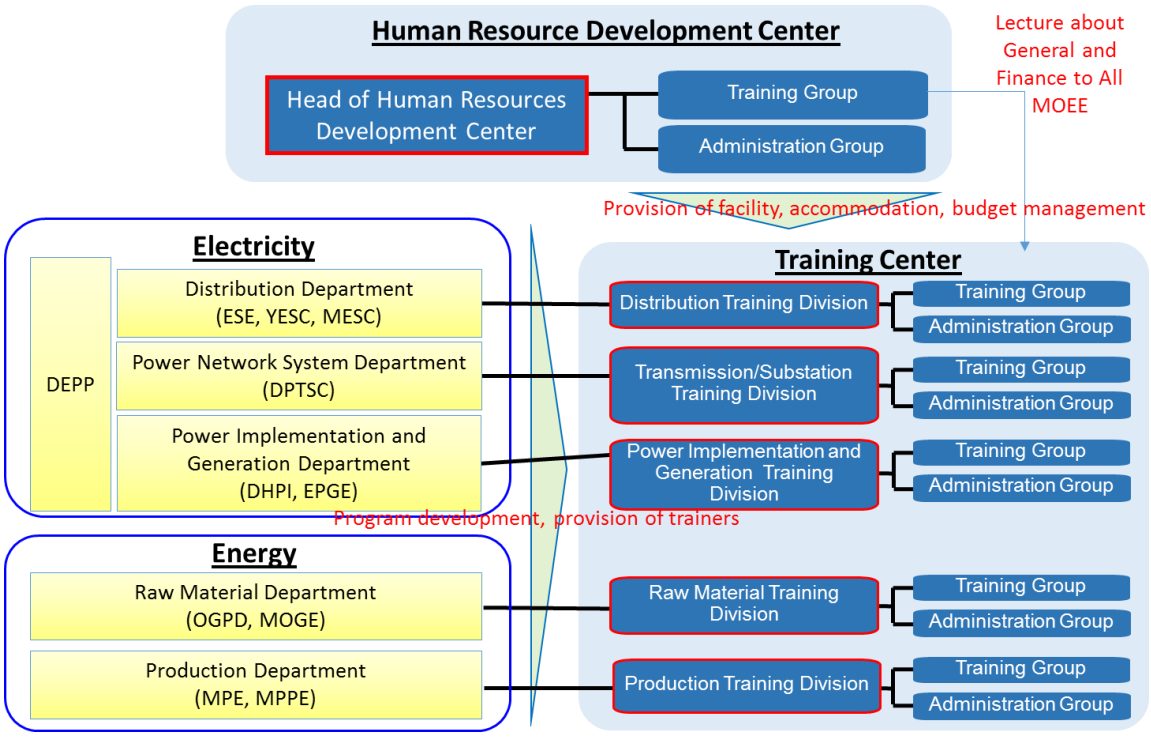
Source: JICA Expert Team

Figure 3-11 Example of Organizational Structure of TC for Option 2



Source: JICA Expert Team

Figure 3-12 Example of Organizational Structure of TC for Option 3



Source: JICA Expert Team

Figure 3-13 Example of Organizational Structure of TC for Option 4

3.3 Work allocation between TC and Department/Institutions

3.3.1 MOEE

MOEE does not have TC as separate institution. DEPP has responsibility of administration related activity for MOEE Central TC. On the other hand, DHPI has responsibility of administration for MOEE Paung Laung TC. Budget for logistics shall be borne by each Department. While DEPP develops the training program for MOEE common training, each Department prepares their own training program for department specific training. The following table shows the current work allocation among departments/Institutions of MOEE regarding TC.

Table 3-2 Current Work Allocation among departments/institutions of MOEE regarding TC

Responsibility / Dept	Administration												Training Program	
	Central TC						Paung Laung TC						MOEE Common	Dept. Specific
	Bld. Mgmt.	Schedule Mgmt.	Logistics		Budgeting		Bld. Mgmt.	Schedule Mgmt.	Logistics		Budgeting			
			Accommodation	Other(printing etc.)	Bld. Mgmt.	Logistics			Accommodation	Other(printing etc.)	Bld. Mgmt.	Logistics		
DEPP	√	√	√	√	√	√							√	√
DHPI						√	√	√	√	√	√	√		√
EPGE						√						√		√
ESE,DPTSC,YESC,MESC						√								√

Source: JICA Expert Team based on the Interview to MOEE

3.3.2 MOC

MOC Central TC manages the administration works including building management, schedule management, logistics and budgeting. Also, training works including provision of program, trainers, textbooks preparation.

3.3.3 MOTC (CITC)

MOTC Central Institute of Transport and Communication (CITC) manages the administration works including building management, schedule management, logistics and budgeting. Also, CITC manages training works including provision of program, trainers and textbooks preparation.

3.3.4 MOTC (MPT)

MOTC (MPT) Training Center manages all the administration and training works.

3.3.5 CEPCO

HRDC manages administration works including accommodation. Each Department manages training works

including program development, provision of trainers and textbooks preparation.

3.3.6 Potential Option of Work Allocation between TC and Department/Institution

Table 3-3 shows an example of work allocation between TC and Department/Institution if Central TC is institutionalized.

Table 3-3 Example of Work Allocation for Central TC (If Central TC is institutionalized) for Option 1&3

Works		Training Center		Department/ Institution
		Admin	Training	
Management	Management of overall TC	√	√	
	Management of training group (e.g. Generation)		√	√
Administration	Training facility provision (including furniture, maintenance, cleaning)	√		
	Accommodation (e.g. dormitory, food provision)	√		
	Transportation of trainees	√		
Training	Life-cycle Training program preparation			√
	Detail training course development		√	
	Overall coordination of the detail training course prepared by each training group	√	√	
	Provision of trainers	(√)	(√)	√
	Training equipment procurement plan		√	
	Training equipment provision		√	
	Preparation of text book		√	
	Selection of trainees			√
	Evaluation of trainees		√	

Source: JICA Expert Team

3.4 Targeted Number of Central TC Staffs (Long-term)

If Central TC is institutionalized as separate organization in the future, the dedicated staffs need to be assigned. The following are the example of number of TC dedicated staffs in other institutions and possible number of TC staff of MOEE in the future.

3.4.1 Comparison of Number of TC Staffs in MOC, MOTC (CITC & MPT) and CEPCO

Table 3-4 shows "Number of staffs in the institution per one TC staff" for each institution to understand the standard staff number required for MOEE. Based on the interview to the institutions, number of staffs in the institution per one TC staff is between 100 to 200. If the number of CEPCO (140 staffs in the institution per one TC staff) is referred for MOEE, the necessary number of staffs in training center would be 300.

Table 3-4 Comparison of Number of TC Staffs in MOC, MOTC (CITC & MPT) and CEPCO

	MOC	MOTC(CITC*)	MOTC(MRT)	CEPCO	MOEE(Example)
(1) Number of staffs in the institution	11,122	23,000 *(Only Myanmar railway)*	8,300	15,700	*40,000+*
(2) Number of staffs in Training Center	55 (Full time: 20 Part time: 35)	195 (Trainers: 97)	82 (Trainers:32)	112 (Total trainer: 64 Generation:20 Transmission:24 Distribution:20)	***300?***
(3) Number of staffs in the institution /TC people = (1)/(2)	200	*117 (only Myanmar railway)*	100	140	*140*
(4) Number of trainee in one year	-	1,172 (2017-2018)	7,400 (2016-2017)	4,480 * (2016-2017)	*12,000* (based on CEPCO ratio)
(5) Number of trainee/TC staffs =(4)/(2)	-	6	90	40*	*40*

* Central Institution of Transport and Communication
**Estimation from the number of trainee in distribution TC (1,454)

Source: Estimation by JICA Expert Team based on Intewevew to MOC, MOTC, CEPCO

3.4.2 Possible Number of Central TC Staffs from the Capacity of Facility

Table 3-5 shows the estimated lecture room capacity of Central TC of MOEE. Estimated lecture room capacity is between 240 and 480 depending on the size of table used in the room.

Table 3-5 Estimated Lecture Room Capacity of Central TC of MOEE

No.	Lecture Room	No. of rooms	Estimated no. of trainees available per room	Total
1.	*Lecture Room on the ground floor*	2	40 ~ 80	80~160
2.	*Lecture Room on the first floor*	2	40 ~ 80	80~160
3.	*Hall room on the first floor*	1	80 ~ 160	80 ~ 160
	Total	4		240~480

Source: Estimation by JICA Expert Team

Table 3-6 shows the estimated dormitory capacity of Central Training Center. Estimated dormitory capacity is total 100 trainees.

Table 3-6 Estimated Dormitory Capacity of New Training Center

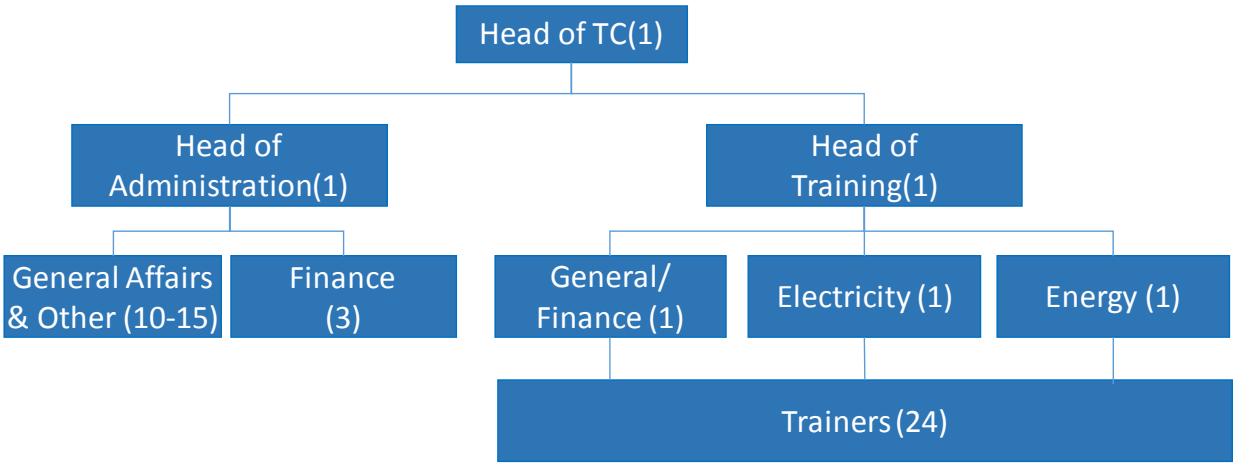
No.	Dormitory	Number of rooms	Capacity (Number of trainees)
1.	*New Male Dormitory*	25	50
2.	*New Female Dormitory*	25	50
	Total	50	100

Note: Existing dormitory(Capacity :32 trainees) would be utilized when the capacity of new dormitory is not enough.

Source: Estimation by JICA Expert Team

If trainings are conducted in 4 rooms with 190-230 trainees while 132 trainees can stay in the dormitory, the following number of trainers are required in case of Option 1.

Example of number of necessary trainers = 1 Team ((Senior Trainer (1 person) + Junior Trainer (1-2 persons)) x Lecture Room (4 rooms) x 2 Team =16-24 trainers.



Source: JICA Expert Team

Figure 3-14 Example of Necessary Number of Staffs and Trainers

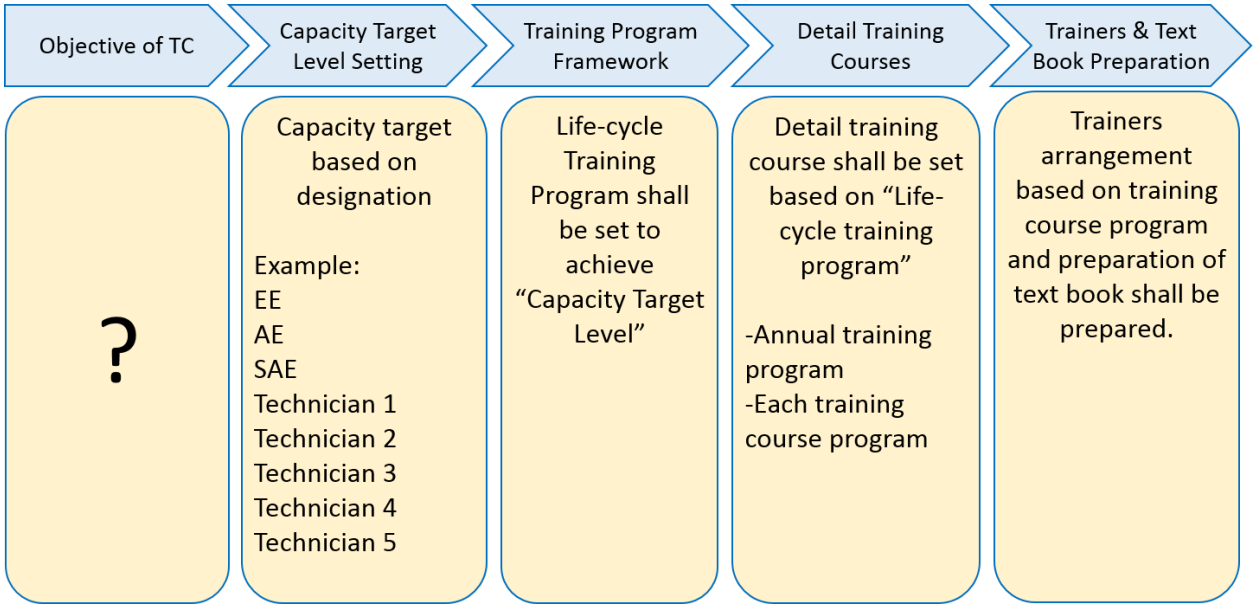
Based on the above-mentioned assumption, total staff number of Central TC would be required between 35-48 (including 16-24 trainers).

Chapter 4 Training Program

4.1 Concept of Training Program Development

Training program shall be developed based on the following procedures.

- The concepts of TC shall be developed based on the Objective of TC, which is based on the Human Resource Development (HRD) policy in order to achieve the objective of institution.
- Capacity target level shall be set based on designation.
- In order to achieve capacity target level, Training Program Framework (life-cycle training program) and detail training course shall be set.



Source: JICA Expert Team based on Interview to MOEE

Figure 4-1 Example of Training Program Development from the Objective of TC

4.2 Inter-Ministerial Training Program for New Employee

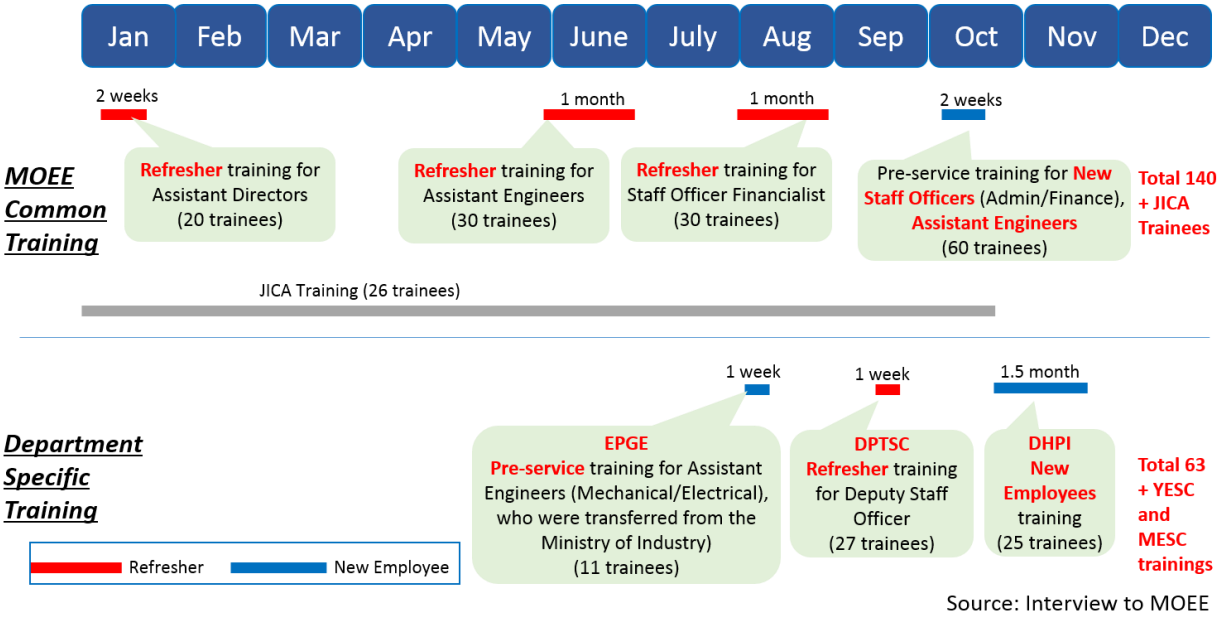
There is a training course "Basic Pre-Service Course for Civil Service Officers" which is common to all ministries. The Union Civil Service Board provides four months training to new employees who passed Public Service Commission (PSC) examination. The contents of the training mainly focus on the policy which is common to all ministries.

4.3 Training Program of Each Institution

4.3.1 MOEE

The trainings have not been conducted systematically due to budget limitation and others. The schedule and

contents of training program are provided based on necessity. basis. A part of MOEE training program of electricity sector in 2018 is shown in Figure 4-2. In October 2018, the staffs who were assigned to MOEE took two weeks training at the Central TC. The contents of the training is an introductory content related to the work of each department of MOEE. Basically, MOEE has a plan to refer to the training contents which was held at the Paung Laung TC. In addition to MOEE overall trainings, specific trainings by each department have been conducted.



Source: Interview to MOEE

Figure 4-2 Part of MOEE Training Program of Electricity Sector in 2018

4.3.2 MOEE (Paung Laung TC)

Paung Laung Training Center which belongs to the Department of Hydropower Implementation (DHPI) of the Ministry of Electricity and Energy (MOEE) as of Oct 2018 is located in Paung Laung village in Lewe Township in Nay Pyi Taw Region. It has been established in 2005 and technical trainings related to hydropower and thermal power have been recently conducted. Soil and concrete laboratory is existed near the Paung Laung training center and physical and mechanical strength test of soil and concrete can be undertaken.

4.3.3 MOC

Training courses have been conducted for civil engineers (building, road, bridge, water supply and sanitation engineers), electrical engineers, technicians, construction workers such as carpenters, masons, reinforcement bar fabrication workers, electricians, plumbers, road construction workers and so on, as well as training for supporting staff such as store keepers, office staff and accounting personnel. An annual training program is prepared for each fiscal year and there are twenty-three numbers of training program in 2017-2018 fiscal year.

(see the Figure 4-3) Employees take lectures according to their designation. All newly employed engineers will take training course of 6 weeks. In addition to establishing a regular course for Junior Engineers, there are also programs specialized in specific fields (bridges, roads, etc.). There are training courses for selected Director, Deputy Director and Assistant Director.

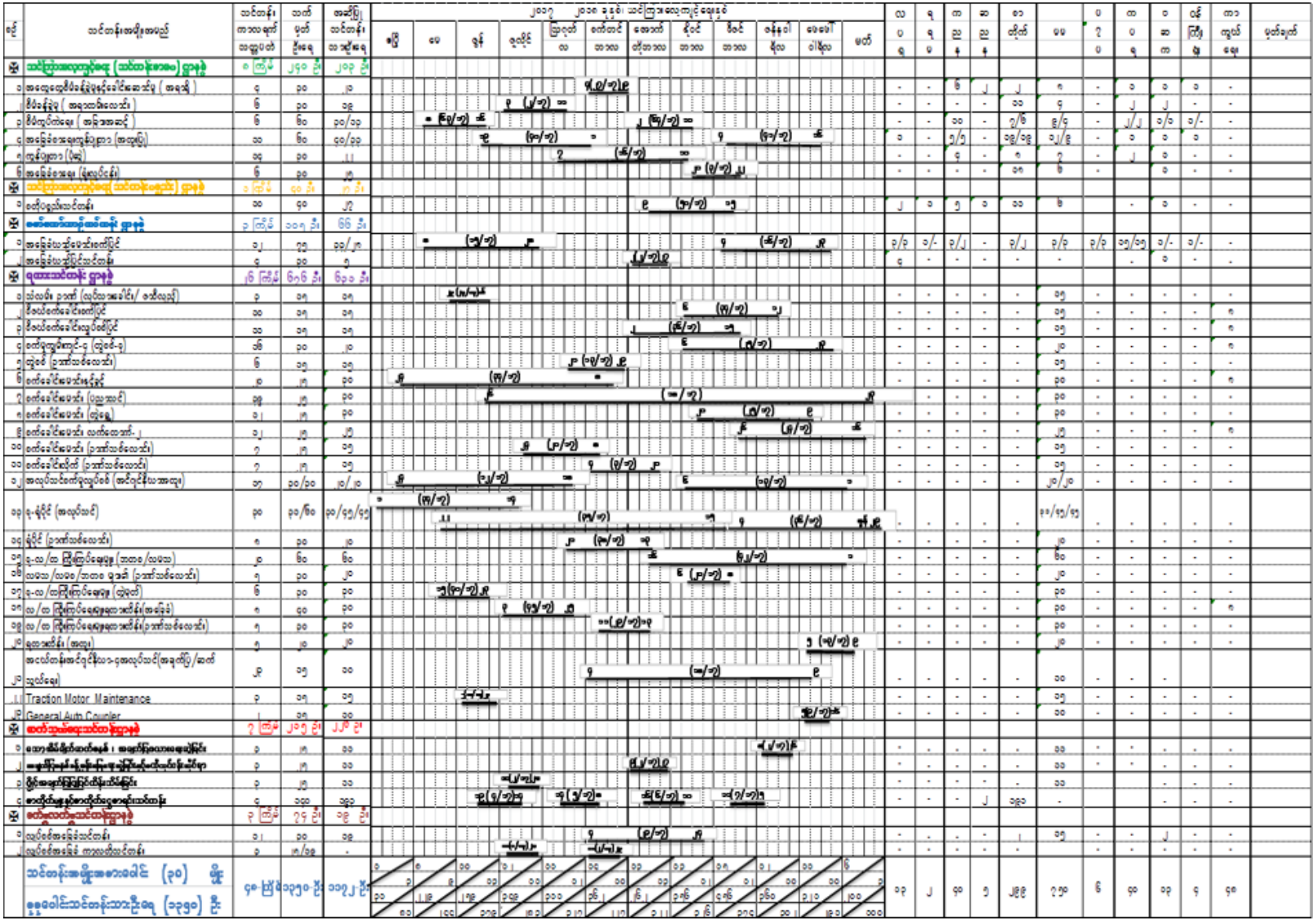
No	Name of Training	Time	Quantity	Week	2017									2018		
					Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar
1	Officer Training Course for Director(Civil) under 50	1	20	2										1---12		
2	Middle Rank officer Training Course for DD & AD under 50	1	20	4			5---30									
3	Officer Training Course for Staff Officer(Civil)	1	40	10				3----------8								
4	Building, Road and Bridge Quality Control Training Course	2	40	4			5---30				2---27					
5	Juiner Engineer (1) Civil Refresher Training Course	1	40	5					7---------8							
6	Juiner Engineer (2) Civil Refresher Training Course	2	40	5					7---------8					15--------16		
7	Juiner Engineer (2) Sanitary Refresher Training Course	1	20	2				3--14								
8	Juiner Engineer (3) Sanitary Refresher Training Course	1	20	4							2---27					
9	Juiner Engineer (3) Civil Refresher Training Course	2	40	6			5---------14							15---------23		
10	Juiner Engineer (4) Civil Entry Training Course	4	114	6		2---------9		3--------11			2-------10			8---------16		
11	Juiner Engineer (2) Electrical Refresher Training Course	1	20	4								6--------1				
12	Juiner Engineer (3) Electrical Refresher Training Course	1	20	4							2---27					
13	Workshop for Financial	1	40	1				3--7								
14	Staff Officer (Finance) & Accountant Refresher Training Course	1	142	4		2---26										
15	Accountant (2) Refresher Training Course	2	50	5				3--------4	21-------22							
16	Accountant (3) Refresher Training Course	2	50	5				3--------4				6--------1				
17	Accountant (4) Refresher Training Course	2	50	5							2-------2			1--------2		
18	Clerical Training Course for Supertendant & Branch Clark	1	20	4					7--------1							
19	Clerical Training Course for UD & LD	1	40	4								6--------1				
20	Housing Management Training Course	1	20	4								6--------1				
21	Store Keeper Training Course	1	20	5										1--------2		
22	Staff Officer(Sanitary)Training Course	1	20	2										1---12		
23	External Training Course(Occasional)															

Source: MOC

Figure 4-3 Annual Training Program of MOC Central Training Center in 2017-2018 Fiscal Year

4.3.4 MOTC (CITC)

Training program is established based on long-term objective, policy, objectives and procedures mentioned in Chapter 2. Figure 4-4 shows training program of MOTC (CITC) in 2017-2018 fiscal year.

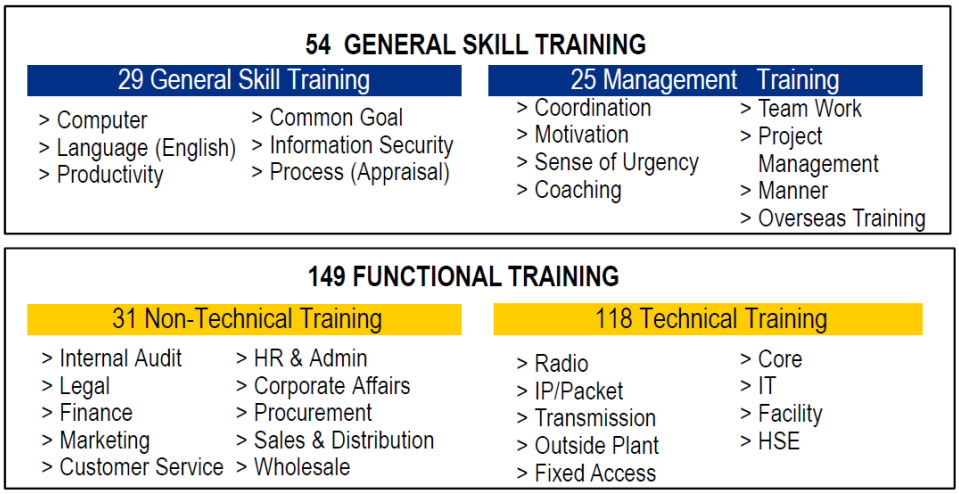


Source: MOTC (CITC)

Figure 4-4 Training program of MOTC (CITC) in 2017-2018 fiscal year

4.3.5 MOTC (MPT)

There is an annual training program, and it is updated once a year during February to April. Training plan has to be reported to Board of Directors. After approval, it is announced to all departments. When the program is updated, feedback on past programs is reflected to it. OJT is implemented independently by each department.



Source: MOTC (MPT)

Figure 4-5 Training Program of MOTC (MPT) in 2017 Fiscal Year

4.3.6 CEPCO

Based on the CEPCO HRD policy mentioned in Chapter 2, the department of transmission / substation and distribution emphasizes the development of personnel who can respond to the trust and expectations of our customers by performing their duties promptly and reliably. To achieve this aim, CEPCO seeks to foster a new generation personnel and improve the required knowledge and skills and inherit them.

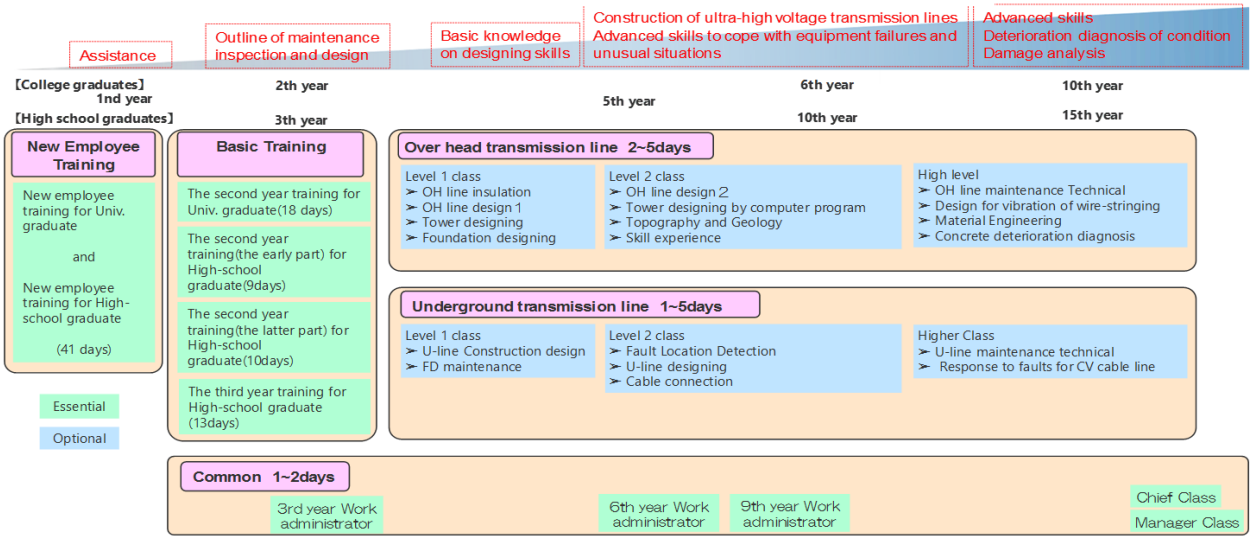
Both departments have various practical facilities that can effectively acquire knowledge and skills such as technology to maintain stable supply of electric power, technology of early supply and restoration. Widely varied practical training is provided to new, general and managing-level employees.

Example of capacity target level of transmission / substation department is shown in Figure 4-6. Life-cycle training program of transmission / substation department which is established based on capacity target level is shown in Figure 4-7. Regarding the way of establishment of capacity target level and life-cycle program, distribution department is similar with transmission / substation department.

Experience		Capacity Target Level
University graduate	High-school graduate	
the 1st year	the 1st year	Understand the basic of business. Assist the routine business.
the 2nd year	the 3rd year	Master the basic of business, operation and patrol. Possess basic skills for maintenance and installation work of standard facilities.
the 6th year	the 10th year	Possess a wide-area of specialty knowledge and skill. Can be the key person in the office.
the 10th year	the 15th year	Possess an advanced skill. Possess leadership in the team. Possess a broad view of the electrical engineering.
⇩ most of them	⇩ some of them	
Assistant manager & Manager		Possess overall decision-making ability as a manager. Can educate & lead the subordinates

Source: CEPCO

Figure 4-6 Example of Capacity Target Level of Transmission / Substation Department in CEPCO



Source: CEPCO

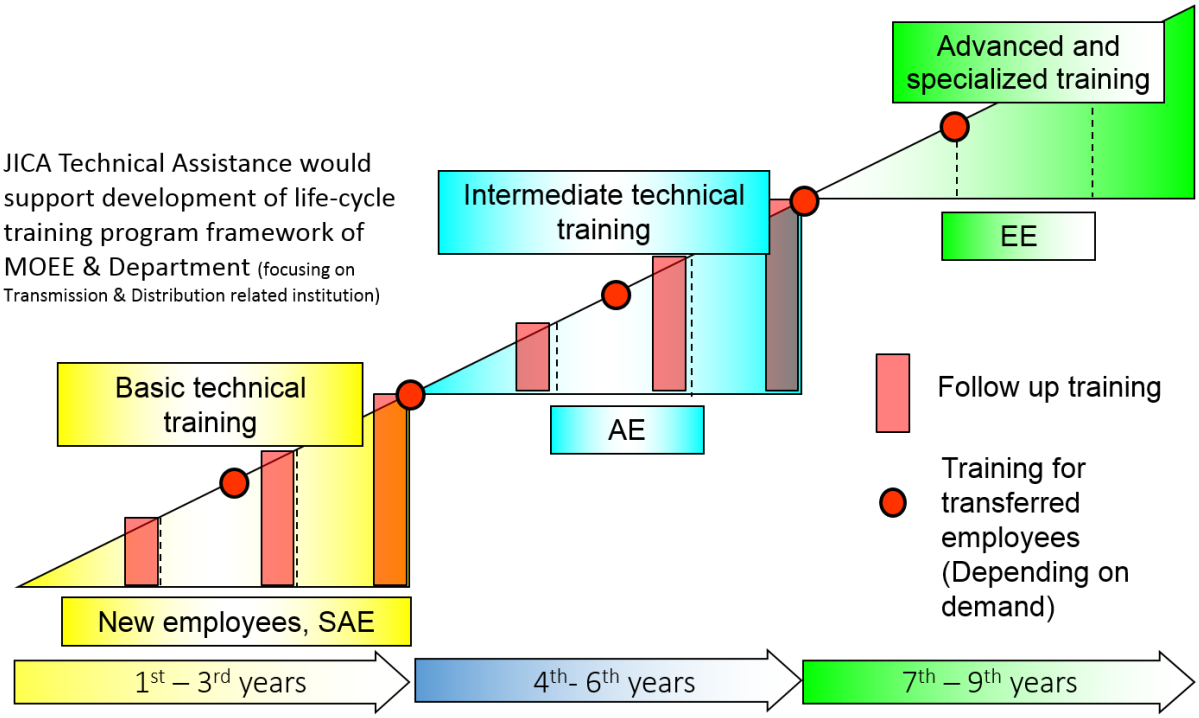
Figure 4-7 Life-cycle Training Program based on Capacity Target Level in CEPCO

4.3.7 MOEE (MPE)

MPE have conducted ten training courses such as Plant Operator Training Course, Plant Safety Training Course, Troubleshooting Techniques Training Course, Industrial Pollution Control Training Course, Energy Management Training Course, Instrumentation and Process Control Training Course, Welder Training Course, Fitter Training Course, Basic LPG Handling and Safety Training Course and Laboratory Training Course. The training program was prepared in 1977 by United Nations Industrial Development Organization (UNIDO) and has been used until now.

4.4 Option of Life-cycle Training Program Framework

Option of life-cycle training program is shown in Figure 4-8. MOEE employees are sometimes transferred from/to other institutions. Then, "Training for transferred employees" shall be provided. Additionally, "Follow up training" shall be conducted for new employees, Sub Assistant Engineer (SAE) and Assistant Engineer (AE), so that all employees can reach their capacity to target capacity level.



Source: JICA Expert Team

Figure 4-8 Option of Life-cycle Training Program

Chapter 5 Trainer Selection Policy

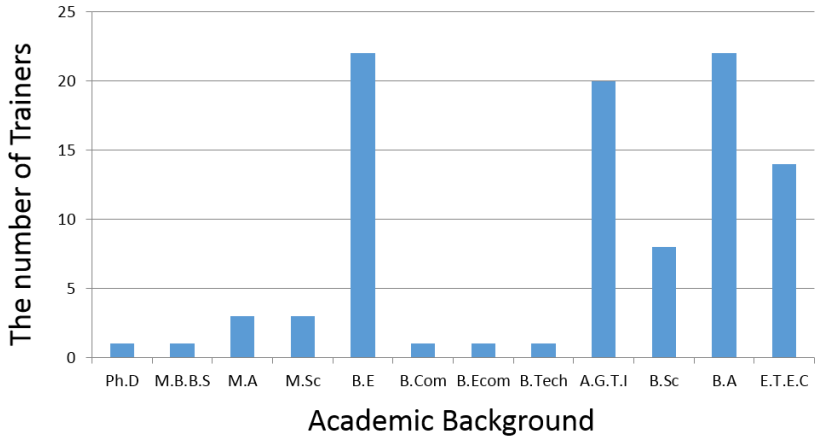
5.1 Trainer Selection Policy of Each Institution

5.1.1 MOC

There are dedicated trainers who work fulltime for engineering courses, accounting courses, office staff courses, housing courses, storekeeper courses and trade training courses at the Central TC of MOC. In addition, there are senior engineers such as Chief Engineers who sometimes works a part time at engineering course trainings by teaching the subjects which they are specialized as necessary at the Central TC of MOC. Moreover, retired officers are invited to engineering course trainings at the Central TC of MOC as outside trainers to teach their specialized subjects at the trainings.

5.1.2 MOTC (CITC)

One of the trainer selection criteria is based on their academic background. Figure 5-1 shows the number of trainers and their academic background.



Academic Background	No. of Trainers
Ph.D	1
Bachelor of Medicine, Bachelor of Surgery (M.B.B.S)	1
Master of Arts (M.A)	3
Master of Science (M.Sc)	3
Bachelor of Engineering (B.E)	22
Bachelor of Commerce (B.Com)	1
Bachelor of Economic (B.Ecom)	1
Bachelor of Technology (B. Tech)	1
Associateship Government Technical Institute (A.G.T.I)	20
Bachelor of Science (B.Sc)	8
Bachelor of Arts (B.A)	22
Electrical Training Evening Classes (E.T.E.C)	14
Total	97

Source: MOTC (CITC)

Figure 5-1 The number of Trainers in MOTC (CITC) and their Academic Background

5.1.3 MOTC (MPT)

There are 32 numbers of dedicated trainers who work full time for computer skill training, English language training, soft skill training and technical training at the MPT TC. Sometimes trainings are outsourced to vendors and experts are sometimes hired as outside trainers.

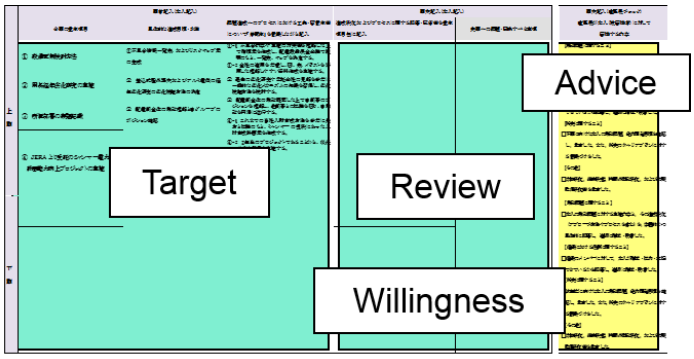
5.1.4 MOEE (MPE)

If there is someone who requests to transfer him/her to the TC, he/she may have a chance to be assigned as a permanent trainer. The head office decides a trainer based on the education level such as graduates from college or university. Teaching skills are not considered as one factor to become a trainer. Permanent trainers

have to stay there until they retire. There is little possibility of job rotation.

5.1.5 CEPCO

Trainers are selected based on experiences, willingness and suitability. Not only senior trainers but also junior trainers are also selected for effective training. To check willingness and suitability, periodic interviews are conducted for all employee based on interview sheet as shown in Figure 5-2. Employees fill the interview sheet every year. On the interview sheet, the employees make a target at beginning of Fiscal Year (April) and review one's work at end of Fiscal Year (March).



Source: CEPCO

Figure 5-2 Image of Interview Sheet

5.2 Example of Trainer Selection Criteria

Experience, willingness and suitability would be one of the examples of trainer selection criteria. Willingness and suitability to be trainer would be clarified through interview sheet to be filled by officers/staffs.

1. Experience
   - Junior trainer: 5-8 years experiences
   - Senior trainer: more than 15 years
   - Noteworthy experience (e.g. JICA training course for trainer)
2. Willingness

   One of the option is interview sheet to check willingness
3. Suitability

   One of the option is interview sheet to check suitability

Chapter 6 Budget

6.1 Cost allocation between TC and Mother Departments/ Institutions

6.1.1 MOEE

Each department in MOEE has been allocated with a certain amount of budget for conducting trainings in each fiscal year. The budget amount varies based on the number of staff in a department; for example ESE has bigger amount of budget than DEPP. The amount of budget for a training in DEPP is 1,000,000 MMK in 2018-19 fiscal year.

There is no specific budget for maintenance and operation of a main building, dormitories, a kitchen and a dining room of the Central TC in MOEE. It is difficult to maintain these TC facilities with the current budget condition.

Common trainings and specific trainings for each department for electricity sector have been conducted at MOEE Central TC. All departments bear expense of each training cost such as meal, printing and copying training materials, etc. in case of common trainings in MOEE. The amount of shared expense does not depend on the number of participants from a department. After each training, expenses for this training such as meal, printing cost, expenses for an opening and closing ceremony were requested to related departments. Concerning a specific training conducted by each department such as ESE, DPTSC, etc., each department bears its own expense. In some years, even a training for newly employed employees could not be conducted due to budget constraints in a department.

Cost allocation between MOEE Central TC and Departments/Institutions is shown in Table 6-1. Three main work sectors such as management, administration and training are divided for cost allocation. Management works include management of overall TC and management of training group such as distribution department. Administration works include training facility procurement plan, training facility provision, utility of training center, accommodation, transportation of trainees and salary of administration staff. Training works include life-cycle training program preparation, detailed training development, overall coordination of the detailed training course prepared by each training group, provision of trainers, training procurement plan, training equipment provision, training equipment maintenance, training materials, development of textbooks/handout, printing of textbooks/handout and evaluation of trainees.

Institution for MOEE Central TC has not been established as of November 2018 and manpower planning branch in DEPP manages TC. There has been no life-cycle training program preparation recently.

Table 6-1 Cost Allocation between DEPP and Departments/Institutions for MOEE Central TC as of Nov. 2018

Works		DEPP	Department/ Institutions
Management	Management of overall TC	✓	
	Management of training group (e.g. distribution department)	✓	
Administration	Training facility procurement plan	✓	
	Training facility provision (e.g. furniture, maintenance, cleaning)	✓	
	Utility of a training center (e.g. electricity, water)	✓	
	Accommodation (e.g. dormitory, meal)	✓	
	Transportation of trainees		✓
	Salary of administration staff (general affair, accounting)	✓	
Training	Life-cycle Training program preparation	-	-
	Detailed training course development		(✓)
	Salary of trainers		✓
	Training equipment procurement plan	(✓)	(✓)
	Training equipment maintenance	(✓)	(✓)
	Training materials provision (e.g. insulator, safety tools)	(✓)	(✓)
	Development of textbooks/handout		✓
	Printing of textbooks/handout	✓	

Source: JICA Expert Team based on interview to MOEE

6.1.2 MOEE (No. (1) Refinery Plant (Thanlyin) MPE)

No. (1) Refinery Plant (Thanlyin) MPE TC is located next to No. (1) Refinery Plant (Thanlyin) in Thanlyin Township. MPE training center used to belong to the Refinery Plant, however it has been transferred to Administration Department of MPE. The office of Administration Department is in Nay Pyi Taw and the training center requests the budget approval from Administration Department. Because of the limitation of the budget, training was not conducted at the No. (1) Refinery Plan (Thanlyin) MPE TC from July, 2017 to Oct, 2018. As of Oct, 2018, renovation of this TC was carried out and a new training about knowledge of LPG Handling and Safety Policy Safety was planned to be conducted in Nov, 2018.

Table 6-2 shows cost allocation between No. (1) Refinery Plant (Thanlyin) MPE TC and Departments/Institutions. Practical trainings and On the Job Training (OJT) had been conducted at the No. (1) Refinery Plant (Thanlyin) by using facilities of the Plant (currently the No. (1) refinery plant is not operating). There are dormitories for trainees. Concerning meal, TC does not prepare meal to trainees recently although TC prepared it before. Therefore, trainees have to use necessary expense for meal after receiving 1000 Ks/day/person for meal allowance from the government. Transportation for trainees is provided by Departments/Institutions and other administration works are done by TC.

Table 6-2 Cost Allocation between No. (1) Refinery Plant (Thanlyin) MPE TC and Departments/Institutions

Works		Training Center	Departments /Institutions	Remark
Management	Management of overall TC	✓		
	Management of training group	✓		
Administration	Training facility provision (including furniture, maintenance, cleaning)	✓		
	Utility of training center (e.g. electricity, water)	✓		
	Accommodation (e.g. dormitory)	✓		
	Transportation of trainees		✓	
	Salary of administration staff (general affair, accounting)	✓		
Training	Life-cycle Training program preparation	✓		
	Detailed training course development	✓		
	Salary of trainers	✓*	✓*	
	Training equipment procurement plan	-	-	
	Training equipment provision			No. (1) Refinery Plant (Thanlyin) nearby the TC
	Training equipment maintenance			No. (1) Refinery Plant (Thanlyin) nearby the TC
	Training materials (e.g. carpenter materials, pile, etc.)			No. (1) Refinery Plant (Thanlyin) nearby the TC
	Development of textbooks/handout	✓*	✓*	
	Printing of textbooks/handout	✓*	✓*	

* For trainings conducted by outside trainers, textbooks/handout are developed and printed by outside trainers from other refinery plants, fertilizer factories and LPG plants and for those by permanent trainers at TC, they are developed and printed by TC.

Source: JICA Expert Team based on interview to MPE

6.1.3 MOEE (Paung Laung TC)

Paung Laung training center belongs to DHPI in MOEE as of November 2018 and the budget planning is done by DHPI. The maintenance of Paung Laung training center is undertaken by Construction Division in DHPI. Institutions of Paung Laung TC has not been established and DHPI manages TC. Table 6-3 shows cost allocation between DHPI and Departments/Institutions.

Table 6-3 Cost Allocation between DHPI and Departments/Institutions for Paung Laung TC as of Nov. 2018

Works		DHPI	Department/ Institutions
Management	Management of overall TC	✓	
	Management of training group (e.g. distribution department)	✓	
Administration	Training facility provision (e.g. furniture, maintenance, cleaning)	✓	
	Utility of training center (e.g. electricity, water)	✓	
	Accommodation (e.g. dormitory, meal)	✓	
	Transportation of trainees		✓
	Salary of administration staff (general affair, accounting)	✓	
Training	Life-cycle Training program preparation	-	-
	Detailed training course development		(✓)
	Salary of trainers		✓
	Training equipment procurement plan	(✓)	(✓)
	Training equipment maintenance	(✓)	(✓)
	Training materials provision (e.g. insulator, safety tools)	(✓)	(✓)
	Development of textbooks/handout		✓
	Printing of textbooks/handout	✓	

Source: JICA Expert Team based on interview to DHPI

6.1.4 MOC

In the Central TC of MOC, an annual training program is prepared every year and budget planning is done based on the annual training program. Central Training Center and its two branches of TC belongs to Department of Highway (DOH) and budget approval is requested to DOH in Nay Pyi Taw by the Principal of TC.

6.1.5 MOTC (CITC)

CITC is one of the departments in MOTC and it has its independent budget to operate and maintain.

It has revenue from running shops and from renting hostels and classrooms to automotive mechanics trainees and training fees from a car driving and a big car driving training. The profit got from these trainings have been used for the welfare of trainees, Officers and Staff in CITC, for example: one hundred kyat for each trainee for breakfast, food support to Officers and Staff and activities to strengthen the unity among Officers and Staff in CITC.

Regarding trainings, 500 Ks per trainee for dry ration and 500 Ks per trainee for fresh ration are allowed by Union Budget. Annual training program is prepared based on the necessity of 18 departments in MOTC. Annual meeting is held at CITC to decide the annual training program and the annual training program is approved at the MOTC Executive Committee (EC) meeting.

It estimates revenue and expenditure for every fiscal year based on annual training program and the budget is adjusted with State/Region budget.

6.1.6 MOTC (MPT)

During February to April, Training Master Plan is updated by Training Team and all departments by analyzing the feedback, by discussing with each department to know the requirement, by preparing the proposed plan. By

confirming from each division and by estimating the budget. Updated Training Plan is reported to HR and Administration division. HR and Administration division adjust policy and strategy to align with business strategy, support management to communicate with other divisions, approve training target and submit the training plan to BOD to get approval on budget.

6.1.7 MOTC (IDCS)

The budget approval procedure is the same as other governmental departments.

Table 6-4 shows cost allocation between the TC and Departments/Institutions in MOC and MOTC (CITC, MPT, and IDCS)

Table 6-4 Cost Allocation between the Training Center and Departments/Institutions

Works		Training Center	Departments/ Institutions
Management	Management of overall TC	✓	
	Management of training group (e.g. distribution department)	✓	
Administration	Training facility provision (including furniture, maintenance, cleaning)	✓	
	Utility of training center	✓	
	Accommodation (e.g. dormitory, meal)	✓	
	Transportation of trainees		✓
	Salary of administration staff (general affair, accounting)	✓	
Training	Life-cycle Training program preparation	✓	
	Detailed training course development	✓	
	Overall coordination of the detail training course prepared by each training group	✓	
	Provision of trainers	✓	✓
	Training equipment procurement plan	✓	
	Training equipment provision	✓	
	Training equipment maintenance	✓	
	Training materials (e.g. carpenter materials, pile, etc.)	✓	
	Development of textbooks/handout	✓	✓
	Printing of textbooks/handout	✓	

Source: JICA Expert Team based on interview to MOC and MOTC (CITC, MPT and IDCS)

6.1.8 CEPCO

Annual training program is prepared by each Departments/Institutions such as distribution department, transmission and substation department, thermal power department and it is submitted to Human Resource Development (HRD) center for provision of facility, accommodation and budget approval.

Table 6-5 summarizes cost allocation between the TC of CEPCO and Departments/Institutions. In summary, all works except training materials and preparation of textbooks, purchase of textbooks are arranged by the TC. Departments/Institutions are responsible for training materials and preparation of textbooks and purchase of textbooks.

Table 6-5 Cost Allocation between the TC and Departments/Institutions for CEPCO TC

Works		Personnel Department/ HRD Center	Departments/ Institutions
Management	Management of overall TC	✓	
	Management of training group (e.g. Generation)		✓
Administration	Training facility provision (furniture, maintenance, cleaning)	✓	
	Utility of TC (e.g. electricity, water)		✓
	Accommodation (e.g. dormitory, meal)		✓
	Transportation of trainees		✓
	Salary of administration staff (general affair, accounting)		
Training	Life-cycle Training program preparation		✓
	Detail training course development		✓
	Salary of trainers	✓	
	Training equipment procurement plan		✓
	Training equipment provision	✓	
	Training equipment maintenance	✓	
	Development of textbooks/handout		✓
	Printing of textbooks/handout		✓

Source: JICA Expert Team

6.1.9 Proposed cost allocation between MOEE Central TC and Departments/Institutions

Proposed cost allocation between MOEE Central TC and Departments/Institutions is shown in Table 6-6.

Table 6-6 Proposed Cost Allocation between MOEE Central TC and Departments/Institutions

Works		Training Center	Departments/ Institutions
Management	Management of overall TC	✓	
	Management of training group (e.g. Distribution, Generation)	✓	
Administration	Training facility provision (including furniture, maintenance, cleaning)	✓	
	Utility of training center (e.g. electricity, water)	✓	
	Accommodation (e.g. dormitory, meal)	✓	
	Transportation of trainees	✓	
	Salary of administration staff (general affair, accounting)	✓	
Training	Life-cycle Training program preparation		✓
	Detailed training course development	✓	
	Salary of trainers	(✓)	✓
	Training equipment procurement plan	✓	
	Training equipment provision (e.g. transformer)	✓	
	Training equipment maintenance	✓	
	Development of textbooks/handout	✓	
	Printing of textbooks/handout	✓	

Source: JICA Expert Team

Chapter 7 Others

7.1 Introduction of Incentive System

Following section describe about the incentive system regarding participation of training.

7.1.1 MOEE

MOEE awards prize for top 3 trainees for some training programs.

7.1.2 MOC

MOC awards prize for top 3 trainees for training programs. Also, training system of MOC relates to Human Resource Development (HRD) department. Basically, the staffs who got high evaluation at the training course shall be prioritized for promotion in MOC.

7.1.3 MOTC (CITC)

Top 3 highly evaluated staffs in the training program would receive prize. Training system of MOTC (CITC) relates to Human Resource Development department. The staffs who got high evaluation at the training course shall be prioritized for promotion in MOTC. Also, those highly evaluated staffs shall be prioritized for training abroad when there is opportunity.

7.1.4 MOTC (MPT)

No specific incentive is provided; however, it would be difficult to work without training for new technology operation since IT systems are upgraded frequently.

7.1.5 MOTC (IDCS)

Top 3 highly evaluated staffs in the training program would receive prize with small amount of money. Also, those highly evaluated staffs shall be prioritized for training abroad when there is opportunity.

7.1.6 CEPCO

Since Human Resource Development Center is under the Personal Department, the result of training would be a part of personal evaluation consideration.

7.2 Alternative Funding Resources

7.2.1 Collaboration with Private Companies

Currently some private companies are providing training program as a part of their Corporate Social Responsibility (CSR) to the departments of MOEE. However, the contents of program and timing of training is most likely depending on private companies. Therefore, current training provision from private companies are not systematic and sustainable training. In order to make it more systematic and sustainable training provision, MOEE might collaborate with private companies more effectivity. One of the method would be the following.

1) Prepare annual training program based on life-cycle training program framework. And classify the courses which can be provided senior officers of MOEE and which needs to be provided from outside trainers.

2) The necessary training courses from outside are publicly offered as private donation course.
3) Private needs to satisfy the course requirement including detail training curriculums; however, they can also introduce their technology.

With above-mentioned method, MOEE is able to receive the training course based on their annual training program with sustainable manner.

7.2.2 Collaboration with International and Domestic Institution/Organization

Some international organizations including JICA currently provide capacity development program as technical assistance. Those are the good opportunities for MOEE to upgrade their capacity by introducing international know-how and experience into Myanmar. However, it should be more efficient to receive technical assistance if MOEE has life-cycle training program and annual training program which liked with the life-cycle training program. International and domestic institution/organization also can prepare their collaboration based on those training program.

7.2.3 Open Courses for Private Companies

MOEE might accept staffs from private companies with necessary expenses. For example, the private company which carries out construction works for MOEE would be necessary to join safety related training programs. Safety related program is important not only government staffs but also the staffs of private companies who actually carries out construction works for MOEE.

Appendix: Photos of Each Training Center Facilities

1. MOEE (Central TC)

	
Appearance of Training Center	Distribution Training Facilities
	
Training Materials and Tools in Store Room	Lecture room on the ground floor
	
Lecture room on the first floor	Female Dormitory

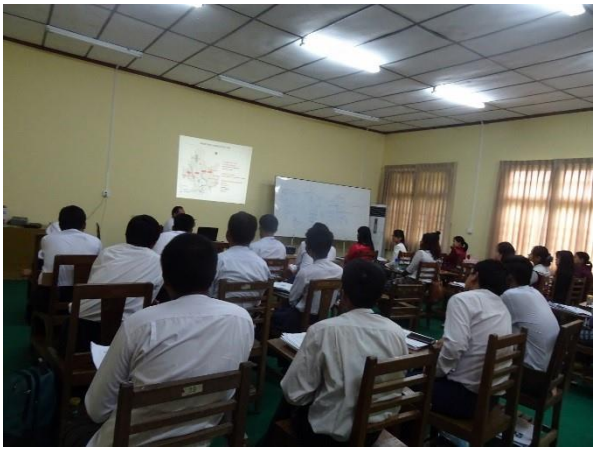
2. MOEE (Paung Laung Training Center)

	
Appearance of Training Center	Lecture room
	
Lecture room	Dam model for training
	
Dining room	Dormitory

3. MOEE (No. (1) Refinery Plant (Thanlyin) MPE)

	
Appearance of Training Center	Appearance of Training Center
	
Lecture room	Lecture room
	
Lecture room	Dormitory

4. MOC

	
Appearance of Training Center	Lecture Room
	
Library	Clinic
	
Dining room	Dormitory

5. MOTC (CITC)

	
Appearance of Training Center	Computer room
	
Lecture room	Train for practical training
	
Dining room	Dormitory

6. MOTC (MPT)

	
Appearance of Training Center	Lecture room
	
Lecture room	Lecture room
	
English Classroom	Lecture room

Project Design Matrix (PDM)

Version.1:　Before commencement of the Project (as annex of R/D in October 2015)

Project Design Matrix (PDM)

Project Title: Project for Capacity Development of Power Transmission and Distribution Systems
Project Duration: Dec.2015 to Nov.2020 (tentative)
Target Area: Nay Pyi Taw as the main site and the whole country of Myanmar　　Oct-2015
Target Group: Engineers and technichians engaged in transmission and distribution in the Ministry of Electric Power (MOEP)　　Version. 1
Conterpart Organization : DEPP(Department of Electric Power Planning), MEPE(Myanma Electric Power Enterprise), ESE(Electricity Supply Enterprise), YESC (Yangon Electricity Supply Corporation), MESC (Mandalay Electricity Supply Corporation)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions
Overall Goal			
Efficiency and reliability of power supply and energy access is improved through the reignforcement and improvement of power supply infrastructure in Myanmar.	Decrease of no. of faults and their duraion of transmission and distribution (hereinafter referred to as "T&D")faults	Sampling survey	-Generation capacity will be developed for the power demand appropriately.
	T&D loss will be decreased by more than XX%	Data from counterpart organizations	
	Electrification rate will be improved by more than XX%	Data from counterpart organizations	
Project Purpose			
Capacity for engineers and technicians engaged in T&D system is strengthened.	Length of T&D lines of newly designed /constructed by utlizing obtained slkills/ standard through the Project	Data from counterpart organizations / Reports from experts	- The engineers and technicians trained by the Project will continue their services in their respective positions.
	No. of substations of newly designed /constructed by utlizing obtained slkills/ standard through the Project	Data from counterpart organizations / Reports from experts	- Any change of assistance policy by other donor will not adversely affect the Project implementation.
	No of faults and their duration at township offices where trained engineers/technicians are assigned.	Data from counterpart organizations / Reports from experts	- The Myanmar Government's policy and MOEP's policy on human resource development in the power sector will not be drastically changed.
	Reduction rate of T&D loss at township offices where traind engineers/technicians are assigned.	Data from counterpart organizations / Reports from experts	- Counterpart organizations appropriately allocates the budget for operation and maintenance for the facilities and staff training.
	No. of assigned trainers with accreditation in counterpart organizations	Data from counterpart organizations / Reports from experts	
Outputs			
1.The framewrok of human resource development is prepared.	Reccomandation for improvements of financial and institutional challenges	Report form experts	
	Reccomandation for improvements of techincal chalenges of T&D system including standardization	Report form experts	
	Proposed human resource development plan/policy	Proposed human resource development plan/policy	
2.Training programs are planned and implemented.	Authorized training prgram	Authorized training prgram	- The trained instructors continue their services in their respective positions.
	Syllabi, curricula and textbooks for trainings	Syllabi, curriculam and textbooks for trainings	
	No. of implemented traing of trainers (hereinafter referred to as "TOT")	Record/Report of TOT	
	No. of trainers trained	Record/Report of TOT	
	Authrized trainer's accreditation system	Internal traning policy document	
	Introduced necessary equipment and materials for trainings	Report from counterpart and site recognition	
	No.of textbooks related to techinical standardaization activity	No. of textbooks related to techinical standardaization activity	
	No. of trainees	Training report	
	No. of trainings	Training report	
	Implement evaluation system for trainees.	Evaluation report	
3.PDCA(Plan, Do, Check, and Action) cycle for training system is established and practiced.	No. of monitoring and evaluation for trainings	Results of monitoring and evaluations	
	No. of feedbacks for next training plan	Results of monitoring and evaluations	
	Continuous practices of PDCA	Results of monitoring and evaluations	

Activities	Inputs		
	Japanese side	Myanmar side	
1-1. To indentify institutional and financial challenges of counterpart organizations and provide necessary advices on them. (In particular distribution system) 1-2. To identify technical challenges of T&D system including standardization and provide necessary advices. (In particular distribution system) 1-3.To carry out assessment of human resource development plan/policy and existing training system. 1-4.To examine and advise the framework/roadmap of human resource development. 2-1.To discuss and plan training programs. 2-2.To develop syllabi, curricula and textbooks for trainings. 2-3.To conduct TOT 2-4.To prepare and implement trainer's accreditation system 2-5.To develop a procurement plan of equipment and materials for trainings and introduce them. 2-6.To advise techinical standardaization related to T&D system and reflect to textbooks for trainings. 2-7.To implementt trainings 2-8.To propose, and implement evaluation system for trainees. 3-1.To monitor and evaluate trainings system (Checking) 3-2. To propose actions to feedback for the next training plan (Action) 3-3.To establish the instituional capacity for continuous PDCA cycle.	1. Experts Long-term (Resident) ・Training Program /Coordinator Short-term (Visiting) ・Chief Advisor/Transmission and Distribution Systems ・Distribution System Planning and Designinig ・Distribution System Construction ・Distribution System Operation and Maintnance ・Transmission ・Substation ・Financial and Institutional Analysis 2. Trainings in Japan 3. Equipment and materials for trainings	1. Counterpart Personnel 2.Construction of new training facility 3. Office space and facilities for experts 4. Local cost 5. Available data and information relavant to the Project	**Preconditions**

Version.2: Approval on the 1st JCC in November 2016

Project Design Matrix (PDM)

Project Title: The Project for Capacity Development of Power Transmission and Distribution Systems
Project Duration: July 2016 to July 2021
Target Area: Nay Pyi Taw as the main site and the whole country of Myanmar
Target Group: Engineers and technicians engaged in transmission and distribution in the Ministry of Electricity and Energy (MOEE)
Counterpart Organization : DEPP(Department of Electric Power Planning), DPTSC(Department of Power Transmission and System Control), ESE(Electricity Supply Enterprise), YESC (Yangon Electricity Supply Corporation), MESC (Mandalay Electricity Supply Corporation)

Nov. 2016
Version. 2

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions	Achievement	Remarks
Overall Goal					
Efficiency and reliability of power supply and energy access is improved through the reinforcement and improvement of power supply infrastructure in Myanmar.	Distribution loss of 17% in 2016 will be decreased to xx% by 2024. Total number (xx) and duration of faults (xx minutes per fault) in distribution system in Myanmar in 2016 will be decreased to less than (xx) by 2024.	Data from MOEE organizations Data from MOEE organizations	-Generation capacity will be developed for the power demand appropriately.		
Project Purpose					
Capacity for engineers and technicians engaged in T&D system is strengthened.	28 accidents at distribution line work in 2016 in ESE, YESC and MESC are decreased to less than 18 accidents by 2018, and 10 accidents in 2021. More than 2 pilot sites reduce the total number and duration of faults (minute per fault) more than the target value. More than 2 pilot sites reduce distribution loss more than the target value. More than 3 times of training for engineers and technicians are conducted by certified trainers in 2018, and more than 10 times by 2021.	Data from MOEE organizations / Reports from experts Data from MOEE organizations / Reports from experts Data from MOEE organizations / Reports from experts Data from MOEE organizations / Reports from experts	- The engineers and technicians trained by the Project will continue their services in their respective positions. - Any change of assistance policy by other donor will not adversely affect the Project implementation. - The Myanmar Government's policy and MOEE's policy on human resource development in the power sector will not be drastically changed. - Counterpart organizations appropriately allocates the budget for operation and maintenance for the facilities and staff training.		
Outputs					
1.The framework of human resource development is prepared.	More than one recommendation for improvements of financial and institutional challenges is applied in MOEE. More than one recommendation for improvements of technical challenges of T&D system including standardization is applied in MOEE. Proposed human resource development plan/policy	Report form experts Report form experts Proposed human resource development plan/policy			
2.Training programs are planned and implemented.	More than one training program is authorized. Syllabi, curricula and textbooks for trainings are prepared more than one each. Training of trainers (hereinafter referred to as "TOT") is implemented more than one time. 27 trainers certified Authorized trainer's accreditation system Introduced necessary equipment and materials for trainings At least one textbook related to technical standardization activity is prepared.	Authorized training program Syllabi, curriculum and textbooks for trainings Record/Report of TOT Record/Report of TOT Internal training policy document Report from MOEE and site recognition No. of textbooks related to technical standardization activity	- The trained instructors continue their services in their respective positions.		
3.PDCA(Plan, Do, Check, and Action) cycle for training system is established and practiced.	At least one time of evaluation for trainings At least one time of feedbacks for next training plan Continuous practices of PDCA	Results of monitoring and evaluations Results of monitoring and evaluations Results of monitoring and evaluations			

Activities	Inputs		
	Japanese side	Myanmar side	
1-1. To identify institutional and financial challenges of counterpart organizations and provide necessary advices on them. (In particular distribution system) 1-2. To identify technical challenges of T&D system including standardization and provide necessary advices. (In particular distribution system) 1-3.To carry out assessment of human resource development plan/policy and existing training system. 1-4.To examine and advise the framework/roadmap of human resource development. 2-1.To discuss and plan training programs. 2-2.To develop syllabi, curricula and textbooks for trainings. 2-3.To conduct TOT 2-4.To prepare and implement trainer's accreditation system 2-5.To develop a procurement plan of equipment and materials for trainings and introduce them. 2-6.To advise technical standardization related to T&D system and reflect to textbooks for trainings. 2-7.To implement trainings by trained trainers 2-8.To propose, and implement evaluation system for trainees. 3-1.To evaluate trainings system (Checking) 3-2. To propose actions to feedback for the next training plan (Action) 3-3.To establish the institutional capacity for continuous PDCA cycle.	1. Experts Long-term (Resident) ・Training Program /Coordinator Short-term Experts (Visiting) - Chief Advisor / Distribution System Technology - Deputy Chief Advisor /Distribution Technology (Operation and Maintenance) - Distribution Technology (Planning and Designing) - Distribution Technology (Construction) - Transmission Technology - Substation Technology - Human Resource DevelopmentPlanning 1 (Training system) - Financial and Institutional Analysis - Power Development/ Distribution Expansion Policy - Power Technology1 (Planning) - Power Technology2 (Regional cities) - Human Resource Development Planning 2 (Regional Cities) 2. Trainings in Japan 3. Equipment and materials for trainings	1. Counterpart Personnel 2.Construction of new training facility 3. Office space and facilities for experts 4. Local cost 5. Available data and information relevant to the Project	**Preconditions**

Version.3:　At the end of Phase I of the Project in November 2018

Project Design Matrix (PDM)

Project Title: The Project for Capacity Development of Power Transmission and Distribution Systems
Project Duration: July 2016 to July 2021
Target Area: Nay Pyi Taw as the main site and the whole country of Myanmar　　Nov. 2018
Target Group: Engineers and technicians engaged in transmission and distribution in the Ministry of Electricity and Energy (MOEE)　　Version. 3
Counterpart Organization : DEPP(Department of Electric Power Planning), DPTSC(Department of Power Transmission and System Control), ESE(Electricity Supply Enterprise), YESC (Yangon Electricity Supply Corporation), MESC (Mandalay Electricity Supply Corporation)

Narrative Summary	Objectively Verifiable Indicators	Means of Verification	Important Assumptions	Achievement	Remarks
Overall Goal					
Efficiency and reliability of power supply and energy access is improved through the reinforcement and improvement of power supply infrastructure in Myanmar.	Distribution loss of 17% in 2016 will be decreased to xx% by 2024.	Data from MOEE organizations	-Generation capacity will be developed for the power demand appropriately.	Actual value at the time of the end of Phase I (FY 2017 to 2018) is 14%.	
	Total number (xx) and duration of faults (xx minutes per fault) in distribution system in Myanmar in 2016 will be decreased to less than (xx) by 2024.	Data from MOEE organizations		The actual records of Myanmar country as a whole were not presented by MOEE. But it was decided that this item would remain as the indicator for overall goal because it can show the effect of the Project itself appropriately.	
Project Purpose					
Capacity for engineers and technicians engaged in T&D system is strengthened.	12 victims of work accidents at distribution line work in 2016 in ESE, YESC and MESC are decreased to less than 10 victims by 2018, and less than 7 victims in 2021.	Data from MOEE organizations / Reports from experts	- The engineers and technicians trained by the Project will continue their services in their respective positions.	Actual value is 11 victims. (Year 2017)	
	More than 2 pilot sites reduce the total number and duration of faults (minute per fault) more than the target value.	Data from MOEE organizations / Reports from experts	- Any change of assistance policy by other donor will not adversely affect the Project implementation.	In two townships (Takton and Kyaupadaung), distribution loss rate has been reduced.	
	More than 2 pilot sites reduce distribution loss more than the target value.	Data from MOEE organizations / Reports from experts	- The Myanmar Government's policy and MOEE's policy on human resource development in the power sector will not be drastically changed.	In three townships (Dala, Takton and Kyaupadaung), total number / total duration of power faults have been improved.	
	More than 3 times of training for engineers and technicians are conducted by certified trainers in 2018, and more than 10 times by 2021.	Data from MOEE organizations / Reports from experts	- Counterpart organizations appropriately allocates the budget for operation and maintenance for the facilities and staff training.	0 time training by certified trainers	
Outputs					
1.The framework of human resource development is prepared.	More than one recommendation for improvements of financial and institutional challenges is applied in MOEE.	Report form experts		Establishment of TCPC was recommended and has been approved by Deputy Minister.	
	More than one recommendation for improvements of technical challenges of T&D system including standardization is applied in MOEE.	Report form experts		Introduction of multi-transformer system and SOG-VCB into medium voltage distribution lines was recommended and have been actually applied in townships over Myanmar.	
	Proposed human resource development plan/policy	Proposed human resource development plan/policy		The direction of human resource development plan/policy was proposed.	
2.Training programs are planned and implemented.	More than one training program is authorized.	Authorized training program	- The trained instructors continue their services in their respective positions.	Regional Seminars for engineers in six major cities were authorized in MOEE and conducted in June and July 2018.	
	Syllabi, curricula and textbooks for trainings are prepared more than one each.	Syllabi, curriculum and textbooks for trainings		JICA experts prepared five themes of textbooks. But any syllabus, curriculum and textbook based on the systematized training program were not prepared.	
	Training of Trainers (hereinafter referred to as "TOT") is implemented more than one time.	Record/Report of TOT		The JICA expert team conducted the intentive training as the part of TOT.	
	27 trainers certified	Record/Report of TOT		Certificate Awarding Ceremony of Trainers was held in September 2018 and 26 trainers candidates were certified as a new trainer.	
	Authorized trainer's accreditation system	Internal training policy document		Trainer's accreditation system has not been considered and reviewed yet because the activities of MOEE related to the establishment of human resource development framework is stopped.	
	Introduced necessary equipment and materials for trainings	Report from MOEE and site recognition		Equipment and materials for training including had been procured and were installed on MOEE Training Center.	
	At least one textbook related to technical standardization activity is prepared.	No. of textbooks related to technical standardization activity		JICA expert team inputted information about technical standardization into prepared textbooks and lectured on the information through TOT.	
3.PDCA(Plan, Do, Check, and Action) cycle for training system is established and practiced.	At least one time of evaluation for trainings	Results of monitoring and evaluations		The training at regional seminars in June to July 2018 was reviewed and the implementation situation was evaluated.	
	At least one time of feedbacks for next training plan	Results of monitoring and evaluations		How to utilize the evaluation results on implementation of regional seminars for the next training was discussed.	
	Continuous practices of PDCA	Results of monitoring and evaluations		In the period of Phase I, training by C/Ps could be conducted only one time and the Project is not at the stage for conducting continuous practice of PDCA cycle yet.	

Activities	Inputs		
	Japanese side	Myanmar side	
1-1. To identify institutional and financial challenges of counterpart organizations and provide necessary advices on them. (In particular distribution system) 1-2. To identify technical challenges of T&D system including standardization and provide necessary advices. (In particular distribution system) 1-3.To carry out assessment of human resource development plan/policy and existing training system. 1-4.To examine and advise the framework/roadmap of human resource development. 2-1.To discuss and plan training programs. 2-2.To develop syllabi, curricula and textbooks for trainings. 2-3.To conduct TOT 2-4.To prepare and implement trainer's accreditation system 2-5.To develop a procurement plan of equipment and materials for trainings and introduce them. 2-6.To advise technical standardization related to T&D system and reflect to textbooks for trainings. 2-7.To implement trainings by trained trainers 2-8.To propose, and implement evaluation system for trainees. 3-1.To evaluate trainings system (Checking) 3-2. To propose actions to feedback for the next training plan (Action) 3-3.To establish the institutional capacity for continuous PDCA cycle.	1. Experts Long-term (Resident) ・Training Program /Coordinator Short-term Experts (Visiting) - Chief Advisor / Distribution System Technology - Deputy Chief Advisor /Distribution Technology (Operation and Maintenance) - Distribution Technology (Planning and Designing) - Distribution Technology (Construction) - Transmission Technology - Substation Technology - Human Resource DevelopmentPlanning 1 (Training system) - Financial and Institutional Analysis - Power Development/ Distribution Expansion Policy - Power Technology1 (Planning) - Power Technology2 (Regional cities) - Human Resource Development Planning 2 (Regional Cities) 2. Trainings in Japan 3. Equipment and materials for trainings	1. Counterpart Personnel 2.Construction of new training facility 3. Office space and facilities for experts 4. Local cost 5. Available data and information relevant to the Project	**Preconditions**

調達資機材リスト

Safety Equipment	安全資機材	数量	管理・設置場所
Safety Belt and Safety Rope	胴綱（安全帯）	10	研修センター
80-25000V Voltage Detector (Warning sound type)	80-25000V検電器（音響式）	10	研修センター
11-77kV Voltage Detector (Pinwheel type)	11-77kV検電器（風車式）	10	研修センター
Grounding tool for line work (Earth hook)	作業時接地器具	10	研修センター
Separation distance measuring instrument	離隔測定器	5	研修センター
Laser-type distance measurer	レーザ式距離測定器	5	研修センター
Helmet	ヘルメット	30	研修センター
Safety Shoes	安全靴	5	研修センター
Leather Glove	皮手袋	5	研修センター
Insulation-resistance Measuring Apparatus	絶縁抵抗測定器	5	研修センター
GPS: Global Positioning System	GPS位置測定器	10	研修センター
Infrared Thermograph	赤外線温度測定器	5	研修センター
Ladder	昇柱はしご	1	研修センター

Materials and Equipment for Power Facilities	電力資機材	数量	管理・設置場所
11kV line switchgear	11kV線路開閉器		
- Switchgear for 11kV distribution line (Manual)	- 真空手動開閉器	1	研修センター
Small-capacity pole-mounted transformer	小容量変圧器		
- 25kVA (single phase) mock-up	- 25kVA（単相）研修センター用	1	研修センター
- 100kVA (three phase) mock-up	- 100kVA（三相）研修センター用	1	研修センター
Insulators for 11kV distribution line	11kV絶縁用がいし（配電用）		
- Pin Insulators	- ピン碍子	9	研修センター（9個）
- Strain Insulators	- 耐張碍子	72	研修センター（36個*2）
Current Limiting Arcing Horn	耐雷ホーン	9	研修センター（9個）
Enclosed cutout switch	密閉式カットアウトスイッチ		単相変圧器用：2個
- Enclosed cutout switch	-本体	8	三相変圧器用：3個
- Spare fuse(20A)	-スペアフューズ(20A)	4	開閉器用：2個
- Operation Rod	-操作棒	2	研修用：1個
Reinforced concrete pole (incl. stepbolts)	コンクリート柱（ステップボルト含む）	1	研修センター（9本）
Middle -voltage insulated wire　(SAC)	中圧被覆電線（500m）	500	研修センター
Connection materials for MV system (tension gun)	アルミクランプ	40	研修センター
Connection materials for MV system (socket)	ソケット	40	研修センター
Low-voltage insulated wire	低圧被覆電線		
- OW wire (4mm)	4mm仕様のOW電線 (200m）	200	研修センター
- OW wire (5mm)	5mm仕様のOW電線 (200m)	200	研修センター
- OW wire (60mm2)	60mm^{2}仕様のOW電線 (300m)	300	研修センター
Insulators for 400V distribution line and accessories	400V絶縁用がいし及び接続部品	40	研修センター
Connection materials for 11kV and Materials for 400V	接続部品		研修センター
Connection materials for Tr. and SOG etc. incl. Earthing	SOG用・変圧器用接続部品(接地線含む）		研修センター
Hot-dip Galvanized Cross Arm and Single Pole Brace for 11kV	溶融亜鉛メッキ腕金、アームタイ		研修センター
- Angle iron (2.5" x 2.5" x 0.16" x 5'L)		37	
- U channel iron (2" x 4" x 2" x 0.16' x 6'L)		34	
- Angle iron (2.5" x 2.5" x 0.16" x 5'L)		38	
Concrete Footing for poles	コンクリート柱の根巻き（コンクリート）	9	研修センター
Gravel for Training Center Ground	砂利	80	研修センター
Gravel for Training Center Ground (Additional)	砂利（追加分）	75	研修センター
Sand for Training Center Ground	砂	15	研修センター
Concrete for guy wire	支線用のコンクリート		研修センター
Plastic Layer for Training Center Ground	敷地用プラスティックカバー	7	研修センター

Equipment for Power Facilities at Pilot Sites	現場設置用資機材	数量	管理・設置場所
11kV line switchgear with overcurrent breaking function	過電流遮断機能付11kV線路開閉器		
- Switchgear for 11kV distribution line with overcurrent breaking function	-過負荷遮断機能付真空開閉器（操作棒１本付）	2	実配電設備
Accessories for SOG (additional hotstick and head)	操作棒（追加１本）	1	
Accessories for SOG (handle rope)	操作ロープ	2	
Accessories for installation of SOG at sites	SOG設置用資機材（接続部品）	2	
11kV Lighting Arrester, Polymer for SOG	11kV開閉器用アレスタ	12	
Small-capacity pole-mounted transformer	小容量変圧器		
- 25kVA (single phase)	- 25kVA（単相）	5	実配電設備
- 50kVA (single phase)	- 50kVA（単相）	5	実配電設備
- 100kVA (three phase)	- 100kVA（三相）	3	実配電設備
- 200kVA (three phase) incl.Modification (Primary:11-6.6kV)	- 200kVA（三相）電圧変更（一次：11-6.6kV）	3	実配電設備
Insulators for 11kV distribution line	11kV絶縁用がいし（配電用）		
- Strain Insulators	- 耐張碍子	28	設置場所は検討中
Current Limiting Arcing Horn	耐雷ホーン	51	設置場所は検討中
Reinforced concrete pole (incl. stepbolts)	コンクリート柱（ステップボルト含む）	9	柱上変圧器用
Enclosed cutout switch	密閉式カットアウトスイッチ		現場（三相変圧器用：各3個×6台=18個）
- Enclosed cutout switch	-本体	42	現場（単相変圧器用：各2個×10台=20個）
- Spare fuse(20A)	-スペアフューズ(20A)	76	現場（開閉器用：各2個×2台=4個)
- Spare fuse(6A)	-スペアフューズ (6A)	8	スペアフューズ各2個
- Operation Rod	-操作棒	6	
Parallel Joint Connector　(PJ Connector)	ジョイントコネクタ		
- Parallel Joint (PJ) Connector (For connecting 5mm copper wire to each other)	- 5mm銅線同士の接続用	300	
- Parallel Joint (PJ) Connector (For 5mm • 60mm2 copper wire interconnection)	- 5mm・60mm2銅線相互接続用	50	設置場所は検討中
- Parallel Joint (PJ) Connector (For connecting 60mm2 copper wire to each other)	- 60mm2銅線同士の接続用	150	
- Cover for LV 5mm	- カバー（低圧5mm用）	300	
- Cover for LV 60mm2	- カバー（低圧60mm^{2}用）	200	

Training Office Equipment	執務・研修用屋内資機材	数量	管理・設置場所
Lap-top Computer	パソコン	10	プロジェクトオフィス
Projector & Screen	プロジェクター、スクリーン	1	プロジェクトオフィス
Printer/Copier/Scanner	複合機	1	プロジェクトオフィス
AC	エアコン	2	プロジェクトオフィス