Terms of Reference (TOR) for the assessment of Information and Communication Technology (ICT) infrastructure, preparation of digitalization roadmap and technical specifications of Management Information System (MIS) at PNG Power Limited (PPL)

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1. Background

The Independent State of Papua New Guinea (the Borrower) has received a US$30 million financing loan from the International Bank for Reconstruction and Development (IBRD) toward the cost of the Energy Utility Performance and Reliability Improvement Project (EUPRIP). PNG Power Limited (PPL) is the implementing agency for EUPRIP, which aims to improve PPL's operational performance.

Papua New Guinea Power Limited (PPL) is planning to implement a Management Information System (MIS) program to improve its operational efficiency, data management, and decision-making processes. This system will allow for the incorporation of a suitable enterprise MIS that will enable more efficient, transparent, and accountable development of processes and activities in all areas of the business. This includes the operation and maintenance of assets for electricity supply, handling of customer claims, commercial functions, and management of corporate resources. To ensure that the MIS is effective, it will be supported by an updated and improved database that includes information on customers, assets, and other relevant data. This database will be supported by a geographic information system.

PPL aims to seamlessly integrate existing systems with the new MIS. Additionally, PPL recognizes the critical need to enhance communication networks between the headquarters and local offices. By implementing the MIS and supporting technologies, PPL will be able to achieve its goals of improving operational efficiency, data management, and decision-making processes.

Figures and facts of PPL are available in Ref 4 in Section 10, which the Consultant should update.

2. Objectives

The objective of this assignment is to assess Information Technology (IT) and Operational Technology (OT) infrastructure at PPL, prepare a digitalization roadmap and develop technical specifications for the effective implementation of IT/OT MIS tools for PPL. The implementation of the above-mentioned roadmap and technical specifications will seek to improve operational performance in terms of technical, operational, commercial, and financial aspects and achieve the objectives towards the supply of affordable, reliable and modern electricity services for all. To do this the consultant will establish short, medium and long-term performance objectives, undertake an as-is assessment of current practices and digital maturity, including ongoing and planned initiatives, and develop a strategy and time-bound digitalization and performance improvement roadmap.

3. Scope of Work

a. Task A: Assessment of current situation of PPL regarding use of digital applications

For each core Business Unit (BU) of PPL (electricity supply to customers, commercial operations, planning and management of corporate resources), the Consultant will assess: (i) Current organizational structure of the PPL; Supplement the assessment with a mapping of decision-making processes and identify areas where digital tools could improve inter-departmental collaboration. (ii) IT applications and other digital tools (including communication infrastructure) currently used to support operations of the unit; Include an analysis of middleware solutions to bridge legacy systems (e.g., Gentrack and Suprima) with the MIS. Address potential migration risks by creating a detailed transition plan from current digital tools to the MIS. Include backup and restoration procedures to minimize downtime during the migration. Develop a comprehensive data reconciliation and standardization strategy for GIS, operational, and customer data. Clarify roles and responsibilities for data cleanup and provide a timeline for these activities. Evaluate the cybersecurity posture of existing systems and design a framework for mitigating threats in the MIS. Include provisions for regular vulnerability assessments and disaster recovery exercises. The Consultant will also collect information on technical standards and topology currently adopted for design and construction of electricity distribution networks. The awarded bidder will receive related precedent documents.

b. Task B: Gap analysis

The Consultant will conduct a gap analysis comparing current situation of PPL in each BU with best practices in international experience relevant to the utility. Consultant will agree with counterpart team on two (2) benchmark utilities whose situation will be assessed in detail as part of the gap analysis Examine international benchmarks for integration strategies between legacy systems (e.g., Gentrack, Suprima) and new platforms. Include use cases from the benchmark utilities that have successfully transitioned from legacy systems to modern MIS while ensuring operational continuity. Focus on best practices in interoperability across diverse systems, particularly in utilities with complex IT/OT environments.

c. Task C: Preparation of Action Plan for incorporation of digital technologies and applications in core business units of PPL and implementation roadmap.

The Consultant will prepare a phased Action Plan for PPL to incorporate digital technologies and applications, including estimated costs and timeline of each phase, as well as a proposed implementation roadmap. Consultant will carry out detailed design of Phase 1 of the Action Plan, which will include, among other activities, those described in Annex of these ToR. Provide specific milestones for API development and detail how these interfaces will interact with the MIS to ensure seamless data exchange and process automation. Propose a mechanism for prioritizing Phase 1 activities, with particular emphasis on quick wins that demonstrate immediate value and build momentum for subsequent phases. Incorporate cybersecurity measures into the IT/OT roadmap to secure the integration of SCADA/EMS, AMI, and MIS systems. Include disaster recovery protocols specific to infrastructure vulnerabilities in Papua New Guinea and address cybersecurity threats to API endpoints. Design a training component for each phase of the roadmap, focusing on building digital competencies and understanding IT/OT convergence. Include capacity-building sessions tailored to each core business unit, ensuring alignment with the planned digital systems. Provide realistic timelines and budgets for each phase of the roadmap, with contingency allowances for delays or unforeseen complexities. Link payment milestones to the successful completion of key roadmap activities, such as API development or initial MIS integration. To be aware of:

- PPL is currently working on the deployment of Advanced Meter Infrastructure (AMI) project, supported by Meter Data Management (MDM) system and Automatic Meter Reading Software (AMR) which is also known as Head End System (HES).
- PPL works with the support of Supervisory Control and Data Acquisition system (SCADA) / Energy Management System (EMS).

The Consultant shall only consider the development of Application Programming Interface (API) of above listed systems as part of the preparation of the IT/OT roadmap and following technical specifications.

d. Task D: Preparation of technical specifications for implementing IT/OT roadmap.

The Consultant will prepare detailed technical specifications, related bid data sheet, and contractual obligations in compliance with WB's Procurement Regulations for IPF Borrowers, Procurement in investment project financing – Goods, Works, Non-Consulting and Consulting Services. Related procurement procedures will be shared with the awarded consultant.

e. Task E: Preparation of specifications for required ICT infrastructure.

The Consultant will prepare detailed technical specifications, and its cost estimates and implementation timeline for the deployment of required ICT infrastructure (Hardware (HW), Software (SW), cyber security, communication network, quality assurance requirement, Man-Machine Interface (MMI), etc.), and for the upgrade / establishment of Data Center, including access security, UPS/Backup generator, Heating, Ventilation, and Air Conditioning (HVAC), the fire extinguish system, a backup Data Center, and so on. Please note that Papua New Guinea sometimes experiences poor submarine optical cable communications outside the country. Develop a comprehensive cybersecurity framework tailored to PPL's infrastructure. Include specifications for intrusion detection systems (IDS), endpoint security, and encryption protocols to safeguard data flows and APIs. Include specifications for environmentally friendly infrastructure solutions, such as energy-efficient UPS systems and HVAC technologies. Propose compliance with international quality standards for ICT hardware, software, and infrastructure components. Include phased deployment timelines for ICT infrastructure, considering local challenges like communication limitations. Provide cost breakdowns for each component of the infrastructure to facilitate budget

planning and financing approvals. Develop a strategy for involving stakeholders during infrastructure design to ensure alignment with operational needs. Include consultations with PPL business units to validate specifications and refine requirements.

f. Task F: Develop specifications for implementing a National Digital Contact Center.

The Consultant will prepare detailed technical specifications, and its cost estimates and implementation timeline for the establishment of a National Digital Contact Center (Hardware (HW), Software (SW), cyber security, communication network, quality assurance requirement, Man-Machine Interface (MMI), etc.) in Port Moresby. Define specific hardware (HW) and software (SW) requirements for the Contact Center. Include specifications for interactive voice response (IVR) systems, automatic call distribution (ACD), customer relationship management (CRM) software, and workforce management tools. Develop a robust cybersecurity framework tailored for the Contact Center to protect customer data. Specify encryption protocols for data storage and transmission, intrusion detection systems (IDS), and multi-factor authentication for access control. Ensure the Contact Center has reliable communication infrastructure. Address Papua New Guinea's connectivity challenges by specifying dual redundant communication links, such as fiber optics combined with satellite or microwave backup. Prioritize user-friendly MMI designs for operators and supervisors. Include tools like real-time analytics dashboards, intuitive call handling systems, and AI-based chatbots for efficiency. Include specifications for quality assurance systems to monitor and improve service levels. Incorporate features like call recording, real-time monitoring, and customer feedback mechanisms to enhance service quality. Develop a phased implementation timeline with detailed cost estimates for hardware, software, and training. Align timelines with PPL's capacity to manage transitions and allocate funding in stages for hardware procurement, software licensing, and personnel training. Ensure seamless integration of the Contact Center with the MIS and CRM systems. Specify APIs and middleware solutions to enable data sharing between the Contact Center, customer billing systems, and operational dashboards.

g. Task G: Organizational restructure and training program.

The Consultant will also address the following activities, as part of the project:

- Propose an Organizational Restructure, fully compatible with implemented MIS. Map Roles to MIS Features:
    - Analyze current organizational roles and identify gaps or overlaps relative to MIS functionalities.
    - Ensure alignment between MIS outputs (e.g., automated reporting, asset tracking) and the roles that depend on them.
    - Introduce new roles or modify existing ones for specialized MIS management, such as:
    - Specify responsibilities for operational staff in integrating MIS outputs into daily processes.
    - Establish MIS support teams across PPL's key systems (Port Moresby and Ramu, Gazelle, stand-alone systems) for localized expertise and faster troubleshooting.

Provide a detailed organizational chart tailored to the MIS, including departments, roles, and reporting structures. This chart should emphasize cross-functional teams for effective collaboration between IT/OT and business units. Build up a training program, which should be prepare "Needs Assessment". Include a phased training roadmap covering all distribution networks and customer-facing operations. Incorporate timelines, budgets, and specific trainer qualifications.

Above listed tasks shall be addresses for all of distribution networks and customers of PPL (Port Moresby system, Ramu system, Gazelle system, and stand – alone systems, etc.).

4. Deliverables

Each report will include draft submission for comments by PPL and the WB. The content of the report will be in line with the scope described in Section 3.

Table 4.1. Deliverables.

Id	Deliverables	Topic	Notes
1	Inception Report	a) Outlining the consultants understanding of the scope of the study. b) Methodology to be followed including implementation schedule. c) Data requirements – main counterparts. d) Key deliverables/milestones. e) Key stakeholders for required consultations. f) Global examples of digitalization roadmap development and implementation.	- 3- day in country inception workshop.
2	Report on Tasks A (Assessment) and B (Gap Analysis)	a) With documented as-is processes and digitalization status. b) Gap analysis. c) Recommendations for process reengineering and IT/OT strategies. d) Recommendations for regulatory and legal entablements. e) Updated figures on PPL market share (see Ref 4 / Section 12 - 1.2. PPL retail business - Tariff categories and sales). f) Recommendations for the access security, architectural structure upgrade and UPS/Backup generator, HVAC etc. for data center.	- 3- day in country inception workshop. - The consultant will take reference documents in Table 11.1 such as , Ref 2 and Ref 3 (Section 12 of the referenced document).
3	Report on Task C (IT/OT Roadmap)	a) Action plan, prioritizing IT/OT tools. b) Cost estimates. c) APIs implementation activities. d) Implementation timeline. e) IT/OT Tools to be considered (see Section 11. Annex): - CMS - Digital Contact Center - AMI (MDM and HES(AMR)) – only APIs. - SCADA / EMS - only APIs. - OMS (including IRMS): CIM network model for HV/MV stepdown S/S and MV feeders. - ERP - GIS - BI and DW - Data Center - National Digital Contact Center (NDCC)	- 3- day in country inception workshop. - The Consultant will take reference documents in Table 11.1 such as Ref 2 and Ref 3 (Section 12 of the referenced document). - PPL made the decision of drafting an open roadmap, which should not be limited to existing service providers (Oracle). - At least, all IT/OT Tools and activities needs to be considered by the consultant as part of the report. - AMI main component is out of this assignment. - SCADA/EMS main component is out of this assignment.
4	Draft BD on Task D (Specifications for implementing IT/OT tools except ICT	It should provide detail explanations and support documents to PPL, and then it should cover full set of technical specifications to be consider as part of future Bid Document (BD) for the first stage. Thus, the Consultant needs	- 3- day in country inception workshop. - At least, all IT/OT Tools and activities needs to be considered

Id	Deliverables	Topic	Notes
	infrastructure and NDCC)	to prepare a draft BD by using the applicable World Bank's Standard Procurement Documents (SPD) template for future bidding. Each component should be a module for PPL to easily add/drop each necessary component.	by the consultant as part of the report. - As an example of what's expected for each IT/OT Tools, see Ref 5 (Section 12 of the referenced document) the Table 11.1.
5	Draft BD on Task E (Specifications for implementing ICT infrastructure)	As Above	- Remote workshop that should consider that PNG time zone is GMT+10. - It should cover IT/OT tools and activities addressed by this ToR, the consultant will take reference document in Table 11.1 such as reference Ref 5 (Section 12, only specifications sections).
6	Draft BD on Task F: (specifications for implementing a National Digital Contact Center)	As Above	- Remote workshop that should consider that PNG time zone is GMT+10. - It should cover IT/OT tools and activities addressed by this ToR, the consultant will take as reference document in Table 11.1 such as Ref 5 (Section 12,only specifications sections).
7	Report on Task G: Organizational restructure and training program.	NA	- Remote workshop that should consider that PNG time zone is GMT+10.

5. Consultant's team

The team in a firm should include the following expertise.

Table 5.1. Consultant firm's Key Expert requirements.

Position	Key Qualifications	Estimated Person Months
Project Manager (1 no.)	**Experience:** 10 to 15 years of experience in design and/or implementation of electric utility modernization/automation programs and plans including loss reduction & overall performance improvement in a senior level position in distribution utility/utilities of repute, as well as project management during implementation of IT systems. **Education:** At least a master's degree in IT or any other related, with specialization in the System Architecture field from a recognized university. Specializations in MIS, and/or Project Management, will be an advantage.	0.75
Team Leader/Enterprise Architect (1 no.)	**Experience:** Minimum 15 years' experience out of which at least 8 years' in working on IT/OT Architecture Design for electricity distribution utilities. Familiarity and experience with key issues related to power distribution utilities and/or experience in designing/implementing technology transformation/upgrade projects. **Education:** At least a bachelor's degree in IT or any related field, with a specialization in IT System Architecture from a recognized university. Specializations in MIS and/or Project Management will be an advantage.	1.5
Utility Enterprise Resource Planning (ERP) expert (1 no.)	**Experience:** Minimum 10 years' experience out of which at least 8 years working on implementation of ERP system in power utilities. **Education:** At least a bachelor's degree in business administration, economics, information technology, finance, or a related field (Coursework in financial modeling, computer programming, data science, and business ethics can be beneficial.)	2.0
Utility CIS / CMS / CRM - Contact Center Expert (1 no.)	**Experience:** Minimum 10 years' experience out of which at least 8 years working on CIS / CMS / CRM – Contact Center design and/or implementation for power utilities. **Education:** At least a bachelor's degree in IT or any related field, with a specialization in IT System Architecture from a recognized university. Specializations in MIS and/or Project Management will be an advantage.	2.0
AMI / AMR Expert (1 no.)	**Experience:** Minimum 7 years' experience working on AMI design and/or implementation in power utilities. **Education:** At least a bachelor's degree in IT or any related field, with a specialization in IT System Architecture from a recognized university. Specializations in AMI, MIS and/or Project Management will be an advantage.	0.75
ADMS Expert (1 no.)	**Experience:** Minimum 7 years' experience working on ADMS and CIM design and/or implementation for power utilities. **Education:** At least a bachelor's degree in IT or any related field, with a specialization in IT System Architecture from a recognized university. Specializations in AMI, MIS and/or Project Management will be an advantage.	0.75

Position	Key Qualifications	Estimated Person Months
GIS Expert (1 no.)	**Experience:** Minimum 7 years' experience working on GIS design and/or implementation for power utilities. **Education:** At least a bachelor's degree in IT or any related field, with a specialization in IT System Architecture from a recognized university. Specializations in GIS and/or mapping system will be an advantage.	1.0
ICT Infrastructure Expert (1 no.)	**Experience:** Minimum 10 years' experience out of which at least 8 years working on ICT infrastructure issues (including deep understanding of cloud technologies and poor communication condition) for power, gas, and/or water utilities. **Education:** At least a bachelor's degree in communication, Data Network Systems, or any related field, with a specialization in communication system architecture from a recognized university.	1.0
Architecture Expert (1 no.)	**Experience:** Minimum 7 years' experience working on a Data Center/ a server room/computer or an ICT room, and other similar facility's design, supervision, and/or implementation. **Education:** At least a bachelor's degree in civil, architecture, or related field related to data center and/or digital center.	0.75

Table 5.2. Consultant Firm requirements.

Item	Key Qualifications
Core business	Software and/or system development services; System integration services
Proven Experience	At least 5 completed MIS projects for utility companies (e.g., power, gas, water) within the past 12 years, focusing strongly on OMS, CMS, IMS, and/or ERP systems. Among projects, at least 2 projects are distribution and retail expertise-related projects.
Technical Expertise	Demonstrated experience in communication hardware and software, network design, server room expansion, and bid evaluation.
Domain Knowledge	A deep understanding of public utility business operations.
Financial Stability	A minimum average annual turnover of US$2 million in the past 5 years.
International Experience	At least 5 years of cumulative experience in World Bank or other International Financial Institution (IFI) projects, with a focus on MIS and/or ICT design and/or implementation.
Item	**Preferred Qualifications**
Country Experience	Experience in developing countries, particularly fragile, conflict, and violent countries and/or Pacific Island countries, including Papua New Guinea.

In order to demonstrate the required knowledge, experience and competence relevant to the assignment, the consultants need to provide evidence of the following:

- Previous work that involved development of IT/OT Roadmaps and business processes that were system agnostic.
- Understanding of the relevant IEC standards applicable to ADMS.
- Previous work that involved development plans for implementing CMS, ADMS systems and integrating these systems with GIS and ERP systems.
- Previous work that involved development of system specifications for IT/OT tools related applications.

Reports, meetings and workshops to be developed / conducted in English language.

6. Timelines, and Payment Schedule for Deliverables.

S#	Reports linked to Section 4: Deliverables.	Schedule (From date of contract signing)	Payment
-	Kick Off Meeting with PPL/WB Counterparts	2nd week	-
1	Inception Report	1 month	10%
	Report on Task A (Assessment) and Task B (Gap Analysis)	3 months	-
2	Report on Task C (IT/OT Roadmap)	5 months	20%
	Draft BD on Task D (Technical Specifications except ICT infrastructure and NDCC)	6 months	
3	Draft BD on Task E (Specifications for ICT infrastructure)	7 months	40%
	Draft BD on Task F (Specifications for National Digital Contact Center)	8 months	-
4	Report on Task G (Organizational restructure and training program)	8 months	30%

At the end of this assignment, the Consultant should prepare and submit a full set of comprehensive reports including full set of reports and documents with proper revision, relevant draft BDs, used electronic data and any relevant meta data in an appropriate electronical format, and 5 copies of printed comprehensive report; the Consultant should delete and/or dispose all original data, information, and documents provided by PPL.

7. Duration of Contract & Reporting:

The Consultancy Firm will be paid upon acceptance of key deliverables by the World Bank. Total duration of the assignment is eight (8) months. During this time, Consultant will report directly to the lead for this activity, Manager ICT, PPL, and copy to the Task Team Leader (TTL), EUPRIP Project, World Bank.

8. Provision by PPL:

- PPL will provide soft and/or hard copies of existing reports and documents where available.
- PPL will provide a room at its premises or provide or assign a room to the firm upon the firm's request.
- PPL Personnel of relevant business units and managers will provide necessary inputs upon the firm's request.

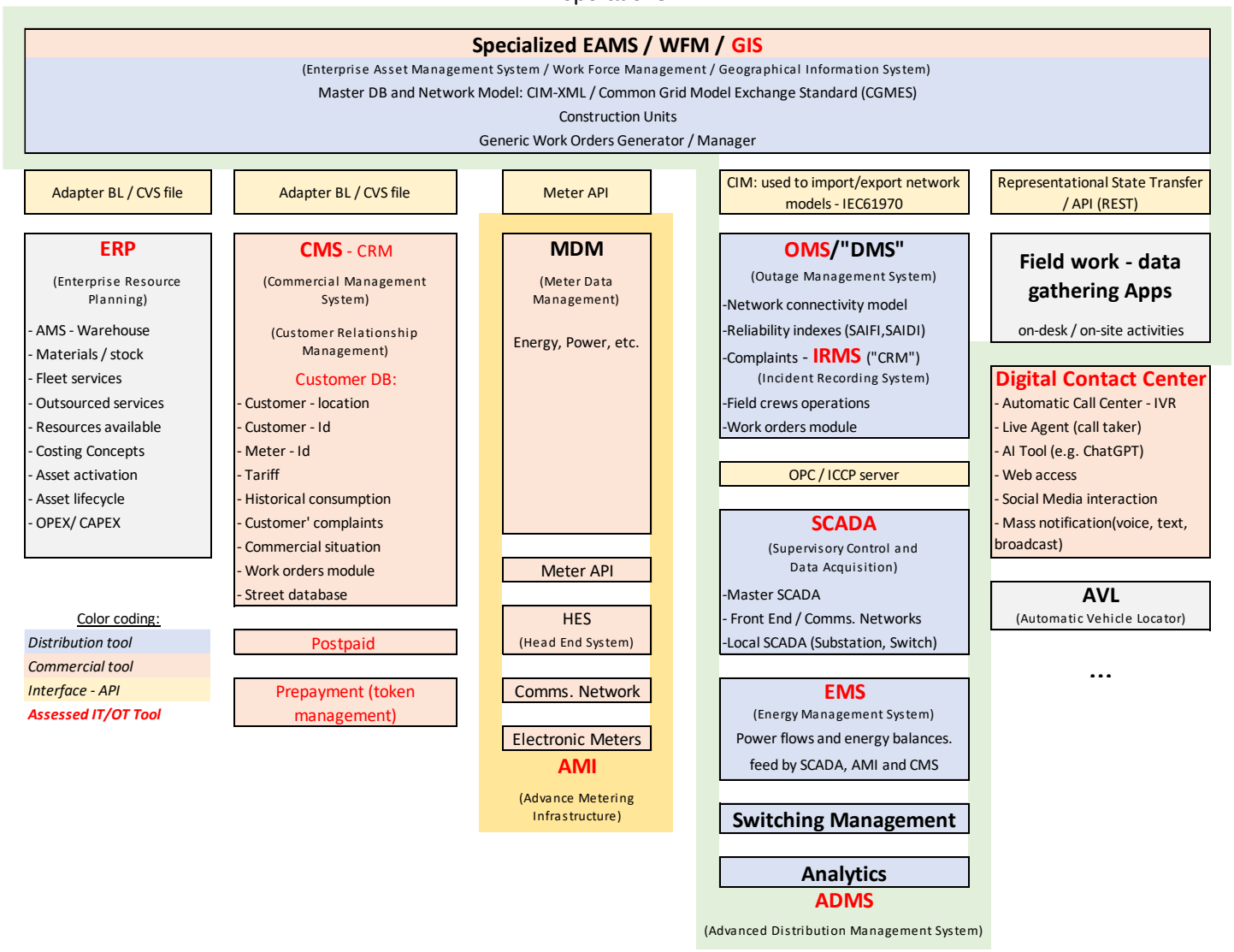
9. Provision by the consultant

The Consultant shall be responsible for providing all office, accommodation, meals, travel, visa, and other facilities for his staff and sub-consultants (if any), and the financial proposal shall reflect this.

10. Annex - Activities to be included in Phase 1 of Action Plan for incorporation by PPL of digital technologies and applications

OT is hardware and software that detects or causes a change, through the direct monitoring and/or control of industrial equipment, assets, processes and events. The term has become established to demonstrate the technological and functional differences between traditional IT systems and industrial control systems environment, the so-called "IT in the non-carpeted areas"[1]. From an operational / business perspective[2] in Distribution Company (DisCo), a figure below shows the set of IT/OT tools and related interfaces implemented by the sector for running Commercial and Distribution operations:

Figure 10.1. Typical set of tools implemented by Distribution Company (DisCo) for running Commercial and Distribution operations.



Above shown picture maps most important IT/OT tools to deal efficiently with electricity distribution:
IT/OT tools for supporting Commercial operations - "the business" is to sell to customers capacity of distribution networks and electric energy:

[1] Source: Wikipedia - https://en.wikipedia.org/wiki/Operational_technology

[2] Described set of IT/OT tools doesn't match whit ICT and/or applicable electrical standards (IEEE, IEC, etc.) and it was defined by adopting a practical approach.

- **CMS - Commercial Management Information System**: information system that supports execution of all commercial operations - revenue cycle of post-paid customers, management of prepayment customers, customer relationship ("face to face" and remotely). In order to achieve sustainable good commercial performance, the Disco must incorporate a state-of-the-art CMS allowing proper execution and monitoring in particular of activities related to commercial or revenue cycle, customer interactions, disconnection/reconnection of electricity supply linked to unpaid bills, connection of new customers.

- **Digital Contact Center services**: a hub system to receive from and send to messages (calls, chats, SMS) to customers. It combines staff teams and automated solutions.

- **AMI - Advanced Metering Infrastructure**: an integrated system of smart meters, data management systems and communication networks that enable two-way communication between the utilities and customers. It plays an important role in the implementation of Revenue Protection Program.

- *Head End System - HES:* The Advanced Metering Infrastructure (AMI) Head-End System (HES) serves as a hub for incoming data from all installed smart meters. The head-end system verifies the data, performs preliminary processing and then forwards it to the meter data management system (MDM).

- *Meter Data Management - MDM:* Meter data management (MDM) refers to software that performs long-term data storage and management for the vast quantities of data delivered by smart metering systems. This data consists primarily of usage data and events that are imported from the head-end servers managing the data collection in advanced metering infrastructure (AMI) or automatic meter reading (AMR) systems. MDM is a component in the smart grid infrastructure used by utility companies. This may also incorporate meter data analytics, the analysis of data emitted by electric smart meters that record consumption of electric energy[3].

IT/OT tools for supporting Distribution operation[4] - "the business" *is to develop, operate and maintain electricity distribution networks:*

- **SCADA - Supervisory Control and Data Acquisition system**: system (hardware and software) that allows remote operation and control of high and medium voltage network infrastructure. A state-of the-Art SCADA system is one the most cost-efficient solutions that not only helps utilities increase reliability through automation but also helps to lower costs and enable problem areas to be detected and addressed automatically and remotely.

- **IRMS - Incident Recording Management System:** information system to receive, manage and solve complaints from customers related to quality of electricity service (outages, voltage outside normal interval, etc.).

- **OMS - Outage Management Information System, Distribution Management System[5]**: OMS is a tool to quickly and accurately identify location and analyze extent of an interruption in electricity supply and enable fast resolution and service restoration. It is supported by a detailed representation of the distribution network and links between points of electricity supply and network assets using a Geographic Information system.

- **EMS - Energy Management System**: an integrated tool with advanced analytics and optimization techniques to improve energy infrastructure efficiency and reliability[6].

IT/OT tools for supporting corporate resources and general services:

- **GIS - Geographical Information System**: it maps customers (point of electricity supply), network infrastructure and customers' connections and links with network assets over a geographical single platform.

[3] Wikipedia - https://en.wikipedia.org/wiki/Meter_data_management

[4] DMS is a collection of applications that assists the control room and field operating personnel with the monitoring and control of the electric power distribution system.

[5] "An advanced distribution management system (ADMS) is the software platform that supports the full suite of distribution management and optimization". Source: Gartner IT Glossary. OMS is part of ADMS.

[6] EMS allows DisCo to run energy balances per facility level (substation, feeder, distribution transformer, etc.) and per distribution areas.

- **ERP - Enterprise Resource Planning System**: it is an information system that support corporate planning and management of shared services (accounting, finance, human resources, procurement, logistics and information technology).

- **Data Warehouse (DW) and Business Intelligence (BI) and Analytics:** DW is a Centralized Data Repository for storing data from various operational database like (facility databases), financial systems, customer information systems, SCADA and EMS for reporting and analytic purposes. BI tools for generating reports, analyzing data trends, and making informed decisions based on key performance indicators (KPIs) such as power consumption patterns, revenue, and operational efficiency.

Among above listed tools and systems, ERP, CMS (supported by Digital Contact Center services), IRMS and SCADA (focus on providing flexibility to MV operations) shall be considered as critical for running the business. While CMS takes control of the commercial cycles (reading, billing and collection cycles), IRMS allows DisCo to properly handle customer complaints and the process of creating incidents at network level, and SCADA facilitates remote network operations and streamline the fault restoration process.

Proposed IT/OT roadmap shall consider the following concepts / activities, among other activities to be conducted as per applicable assessment and gap analysis for the specific DisCo:

General requirements:

- Procurement and Implementation of tools mentioned in Section 2 of this report, including involved APIs.
- Deployment of required ICT infrastructure.
- Development of main business process blueprint.

Reorganizational restructure required for the effective implementation of IT/OT Tools. ***Specific requirements for implementing CMS:*** As part of the implementation of CMS DisCo shall consider the following activities:

- Conduct an on-desk campaign to be conducted by DisCo aims transferring and cleaning up data available within existing customer / billing systems to CMS.
- Conduct an on-site campaign to be conducted by DisCo aims capturing data from the field, required by CMS, OMS/DMS and GIS to support commercial and distribution operations. Among other activities, the on-site campaign shall include related massive labeling process of MV/LV Tx.
- Deployment AMI for specific segments of the market (e.g., high profile consumption customers). Applicable requirement on MDSMs, HESs, and communication networks shall be considered as part of the roadmap.
- Development of Pre – Payment metering an integration to the Master CMS.

Specific requirements for the establishment of a Metering Control Center - MCC: If applicable, as part of the scope of the Revenue Protection Project (RPP) conducted by DisCo, it shall establish a MCC supported by Advanced Metering Infrastructure (AMI) to systematically record and monitor consumption of large and medium customers and permanently eliminate commercial losses in that “high value” segment.

Specific requirements for implementing GIS: As part of the implementation of GIS DisCo shall maps customers (points of electricity supply), network infrastructure (High Voltage (HV), Medium Voltage (MV) network trace and location of MV/LV Transformers) and customers’ connections and links (CNL - Customer Network Link) with network assets over a Geographical single platform. While waiting for the onsite campaign for capturing data on CNL, DisCo should consider creating the well-known Virtual CNL (VCNL), developed based on customer’ nearest MV/LV distribution center.

Specific requirements for implementing SCADA: As part of SCADA implementation DisCo shall consider the following tasks:

- Establishment of a Distribution Control Room (building & facilities).
- Installation of a centralized Master SCADA fully integrated to OMS.

- Development of the communication network infrastructure (fiber optics, GPRS, satellite, etc.).
- Installation of required HW/SW at HV&MV substations to integrate them into the SCADA system: Required IEDs, local communication network, RTUs needs to be covered as part of the roadmap.
- Installation of required HW/SW at MV switching facilities to integrate them into the SCADA system.

11. Project related documental references and PPL systems in use

Project related documents as part of this TOR, as follows:

A few of the below listed documents are confidential and will be provided only to the selected consultant after awarding the contract, rest other publicly available documents will be shared with the shortlisted consultants only.

Table 11.1. Project Related Documental references.

Ref.	Name	File
1	Draft scope of the work for hiring a specialized firm to support PPL on the implementation of its IT/OT Roadmap (2024/WB).	PPL IT and OT Roadmap_WB_Nov2024v1.pdf
2	Design and implementation of management information systems (2019/WB).	PNG Assessment Report v4 ML.pdf
3	CESI - Utility digitalization strategy roadmap task 12 report: final report (2023/USTDA).	PPL USTDA USDR Task 12 Report- Final.pdf
4	Distribution and Commercial Operations Analysis (2018/WB).	PPL_Commercial Distribution Operations_V6.pdf
5	REPUBLIC OF MOZAMBIQUE / Request for Bids /ELECTRICIDADE DE MOÇAMBIQUE, E.P. / INTERNATIONAL COMPETITIVE BIDDING FOR Procurement of: Supply, Installation & Training of an IMS for Electricidade de Moçambique, E.P. / RFB No: MZ-EDM-284609-CW-RFB (2022/EDM-WB)	BID Document – IMS.pdf
6	EPRI - Common Information Model Primer - Eighth Edition - 3002024188 Technical Update, April 2022.	https://www.epri.com/research/products/000000003002012477
7	Papua New Guinea / Request for Bids Goods / PNG Power Limited / Procurement of DESIGN, SUPPLY, INSTALLATION AND MAINTENANCE SUPPORT SERVICES OF ADVANCED METERING INFRASTRUCTURE (AMI) SYSTEMS TO SUPPORT REVENUE RECOVERY AND PROTECTION PROGRAMS / RFB No: PG-PPL-157606-GO-RFB-XX-2019 / Issued on: Monday 9th November 2020	RPP_Bidding_Document 01.pdf

Table 11.2. PPL System in use

Ref.	Name	Note
1	Oracle	Financial Suite only
2	Gentrack	Post-paid customers, having an automatic interface with Oracle
3	Suprima	Pre-paid customers, having no automatic interface with Oracle
4	CHRIS21	Human Resource and Payroll
5	TAS – Travel System	Standalone system, locally developed
6	Time & Attendance BioMetric System	Time & Attendance System
7	TeamMate Audit	Audit Process Assistance
8	Fleet Management	Standalone system, locally developed
9	Travel Management	Standalone system, locally developed
10	Help Desk Ticketing System	SysAid for IT
11	Properties Management System	Standalone system, locally developed
12	Mapinforsystem	Standalone system
13	Office 365	Cloud Online System
14	Zendesk/TalkDesk – Call Centre	Cloud Online System
15	Meter Asset Management System - MEX	Cloud Online System
16	Tender Management System – Tender Link	Cloud Online System
17	Board Management System - Diligent	Cloud Online System
18	Geographic Information System (GIS) Upgrades	Cloud Online System
19	DocuSign Document Processing System	Cloud Online System
20	Document Management System	On Premise Standalone system
21	Lab Meter Testing Software	On premise Standalone System
22	GE SCADA/EMS	Originally developed by ABB

12. Abbreviations

ADMS	Advanced DMS
AMI	Advanced Metering Infrastructure
API	Application Programming Interface
AVL	Automatic Vehicle Locator
CIM	Common Information Model
CMS	Commercial Management Information System
CNL	Customer Network Link
DisCo	Distribution Company
DMS	Distribution Management System
D&R	Distribution and Retail
DW and BI	Data Warehouse and Business Intelligence and Analytics
EMS	Energy Management System
ERP	Enterprise Resource Planning
GIS	Geographical Information System
HES	Head End System
HV	High Voltage (nominal voltage > 35kV, IEC 60038)
ICCP	Inter Control Center Communication
IRMS	Incident Recording Management Information System
IT	Information Technology
IVR	Interactive Voice Response
MDM	Meter Data Management system
MV	Medium Voltage (nominal voltage above 1 kV and not exceeding 35 kV, IEC 60038)
OMS	Outage Management System
OPC	Open Platform Communications protocol
OT	Operational Technology
P/S	Power Station
S/S	Substation
SCADA	Supervisory Control and Data Acquisition System