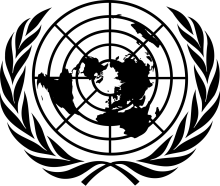
**Annex A**

**United Nations**

**MISSION NAME**

**Ref.XX**

|  |
| --- |
| ***Mission* Energy Infrastructure Management Plan *Template for***  ***UN Field Missions*** |
| Approved by: xxxx  Effective date:  Contact:  Review date: |

***Template instructions***

Relatively standard text relevant to all missions is in normal font. It should be used wherever possible to support all missions in consistent messaging and defence of annual budgets.

Guidance text to be deleted is presented in ***blue bold italics***.

Sample text to be changed to fit the mission situation is presented in ***red bold italics***.

***Delete these instructions prior to finalization and update the Table of Contents for repagination.***

Contents

[1 INTRODUCTION 4](#_Toc531175191)

[1.1 Document purpose 4](#_Toc531175192)

[1.2 EMP mandate 4](#_Toc531175193)

[1.3 EMP development methodology 4](#_Toc531175194)

[1.4 EMP documentation 5](#_Toc531175195)

[2 CONTEXT 6](#_Toc531175196)

[2.1 Mission history and context 6](#_Toc531175197)

[2.2 Mission geography and climate 6](#_Toc531175198)

[2.3 Mission infrastructure and logistics 6](#_Toc531175199)

[2.4 National and local energy sector context 6](#_Toc531175200)

[2.5 Peacekeeping energy economics and investment planning 7](#_Toc531175201)

[3 MISSION ENERGY PROFILE 8](#_Toc531175202)

[3.1 Electricity generation and sourcing 8](#_Toc531175203)

[3.2 Internal distribution 8](#_Toc531175204)

[3.3 Levelized cost of energy 9](#_Toc531175205)

[3.4 Air conditioning 9](#_Toc531175206)

[3.5 Lighting 9](#_Toc531175207)

[3.6 Water supply and wastewater treatment 9](#_Toc531175208)

[3.7 Other forms of demand 10](#_Toc531175209)

[3.8 Metering and monitoring 10](#_Toc531175210)

[3.9 Energy infrastructure management 10](#_Toc531175211)

[3.10 Forecast changes 10](#_Toc531175212)

[3.11 Summary – implications for energy management planning 10](#_Toc531175213)

[4 UPGRADE PLAN 11](#_Toc531175214)

[4.1 Option analysis 11](#_Toc531175215)

[4.2 Upgrade strategy 11](#_Toc531175216)

[4.3 Proposed projects and activities 11](#_Toc531175217)

[4.4 Project teams and technical support 14](#_Toc531175218)

[4.5 Oversight monitoring and evaluation 14](#_Toc531175219)

5 Contribution of the mission EIMP to the UNSCAP targets

# INTRODUCTION

## Document purpose

This mission infrastructure Energy Management Plan (EIMP) sets out the mission-wide plan of ***MISSION*** for managing and improving its facility energy performance, for the period ***XXX to XXX***. It covers all ***MISSION*** rented, owned and contingent supplied infrastructure. It does not cover transport – the vehicles and air fleet.

The EIMP sets out the ***MISSION*** energy context, its current energy profile, its strategy for performance improvements and a proposed list of interventions.

## EIMP mandate

The mandate for the EIMP comes from the following:

* **Environment Strategy for Peace Operations** This document came into effect in January 2017 and covers all peacekeeping missions. Improving energy efficiency and integrating renewable energy are two key topics, which in turn feed into an Environmental Management System (EMS). The global EMS came into force in 2017 and all missions need to regularly and systematically report on their performance on energy, solid waste management, water, wastewater and wider impacts.
* **Department of Operational Support Standard Operating Procedure for the Development of energy infrastructure management plans for UN field missions.** A global level SOP was released in December 2018, with which all missions are expected to comply.
* **Mission annual budgeting process** Member states have mandated that all missions deliver cost savings and reduce their annual operating budgets.Infrastructureenergy costs form a significant percentage of the ***MISSION*** annual budget (***estimated at 2-3%***). Baseline assessment work and the project experience of multiple peacekeeping missions the annual MISSION energy bill could eventually be cut by 30 - 50% with the right investments. Hence ***MISSION*** has a mandate and a responsibility to propose and implement investments in energy performance improvement.

**Include only if relevant**

* ***Security*** ***UN security assessments/prior experience indicate the one of the highest sources of vulnerability for MISSION contingents comes from fuel tanker convoys supplying forward bases. Hence there is a security imperative to increase the energy autonomy and efficiency of the forward bases and so reduce the number of fuel tanker convoys.***

## EIMP development methodology

The methodology for development of the EIMP was drawn from the above mentioned Standard Operating Procedure. In summary of the methodology:

* An EIMP task team was convened by the ***MISSION*** DMS and a kick-off meeting was held on ***XXX***
* External technical support was secured from ***list sources***
* A desk study generated an initial ***MISSION*** energy profile and identified key data gaps.
* Data collection was conducted to fill the identified key profile gaps over the period ***XXX to XXX***. This entailed manual meter reading and equipment performance monitoring and the installation and management of portable electronic meters and dataloggers.
* A working draft EIMP was generated, presenting the energy context and its current energy profile.
* The EIMP task team and external experts analysed the draft material over the period ***XXX to XXX*** and developed the ***MISSION*** strategy for performance improvements and an initial proposed list of interventions. The individual proposals were then screened and ranked to develop a list of priority themes, geographic regions and sites and key projects.
* The EIMP was completed in draft, circulated for review and then finalized on ***XXX***.
* Task teams commenced development on the agreed list of projects in the agreed order.

## EIMP documentation

This EIMP document is designed to provide a high level framework that can be revised every year or in the event of a major change in ***MISSION*** mandate or operational footprint.

Implementation details such as individual energy project plans and business cases will be developed as freestanding documents.

# CONTEXT

## Mission history and context

***Insert 1 page of key background information on the mission. The purpose of this section is to inform and justify the EIMP strategy and investment choices. Relevant topics include:***

***History, political setting, security status and trends, TCCs, …***

## Mission geography and climate

***Insert 0.5-1 page on the mission geography and climate. Cover the major land types and key features (coasts, mountain ranges, plains and valleys etc... and land use). Describe the climate including seasonality, humidity and night-day temperatures. Regional extreme events such as hurricanes, violent storms, dust storms and droughts should be described.***

***The purpose of this section is to inform the EMP strategy, as climate and geography can have a dominant impact on energy demand via cooling, heating and lighting.***

## Mission infrastructure and logistics

***Insert a 0.5-1 page summary of the MISSION footprint and the key logistics issues, including road conditions and other access. Include an overview of TCCs and the UNOE-COE division.***

***Insert a standard MISSION deployment plan.***

## National and local energy sector context

***Insert a 1-2 page summary of the national and local energy sector context. The purpose of this section is to inform the EMP strategy on interface issues, such as the potential for grid connection, local energy costs and diesel fuel availability, government regulatory and investment trends and the status and potential for renewable energy including solar, wind and hydropower.***

***The World Bank has online national profiles which include energy. Several other development banks have developed energy profiles for many countries in their respective regions.***

***A paragraph to be developed on relevant DOS/DPO policies, national and international environmental and energy legislation and international standards and conventions relevant to the Mission’s energy management; to outline how compliance with these policies and legislation will be achieved.***

## Peacekeeping energy economics and investment planning

***This is virtually standard text supplied by the Department of Operational Support. The purpose of this section is to inform and justify the mission EMP strategy, which is strongly affected by the Department scale processes and gaps.***

The average annual cost of generation and distribution of electricity across UN peacekeeping and political missions is currently in the order of 3% of the total annual budget.

Benchmarking the average performance of missions compared to industry best practice indicates the potential for long term annual financial savings and emission reductions in the order of 30 - 50 %. At the Department of Operational Support scale this translates into potential long term saving of US$100 million per annum.

The potential for savings is unevenly distributed, with the greatest potential located in the larger missions with the highest unit costs for electricity generation. **MISSION is a relatively large/medium sized/small mission, with a high/medium/low cost of energy, so the opportunities for savings are relatively large/modest.**

At present UN peacekeeping accounting procedures do not include a cost of capital for calculating the value of investments which may yield future savings. Hence the payback period is simply calculated from the net savings. The demonstrated and projected payback period for mission energy investments ranges widely. The most economic interventions have demonstrated payback in less than three months, whilst the payback period for other more marginal investments has exceeded ten years.

The funding for all peacekeeping missions is pooled and has the same general source: Member State assessed contributions. It is also generally insufficient to fully resource all mission mandated activities. In this context, all mission level investments, including those targeted in this plan, need to be ranked to focus first and foremost on those with the shortest payback period. Other project screening criteria (cf Appendix A), including project risks, also need to be incorporated into the project identification and ranking process. Shorter payback period limits may be appropriate for missions with a forecast short operational term.

Both peacekeeping level budget constraints and the internal mission human resources limit what is feasible to finance, develop and implement in any single budget year. The cycle of energy project scoping, budgeting, development and implementation is typically in the order of 2-4 years.

In this context, ***MISSION*** has identified project concepts for up to ***4*** years in advance, ranked generally from the shortest to longest payback period.

# MISSION ENERGY PROFILE

***Technical guidance on this topic is available upon request to GSC. Missions are encouraged to secure sufficient expertise to support the development of their energy profile.***

## Electricity generation and sourcing

***Insert a 1-2 page summary and key tables for energy sourcing. Divide the sourcing into 3 categories: self-generation, shared generation and purchase from external vendors, including the national and subnational grid.***

***For generator tables (UNOE and COE), ensure that the configurations are presented with sufficient detail to confirm the peak operational capacity, as well as the rated capacity of individual units. This will differ radically between individual, alternate shift and synchronized generators. Generators (UNOE and COE) should be presented as rated KVA as claimed on the unit manufacturers tag. Permanently/substantially damaged/worn and scrap units should not be listed.***

***For shared generation, describe the estimated or metered share of generation and/or demand and the operational and financial management arrangements.***

***For grid connections, describe the nature, number and scale of the connections, including details on the LV/MV configuration and associated transformers.***

***For COE, describe any variant to the standard process of free provision of diesel fuel to TCCs.***

***For solar photovoltaics, describe the location, scale, mounting, age and tie-in configuration (grid-tied, net metering, negative demand/low penetration, medium penetration. Describe if known the PV production in absolute and relative terms for the mini-grids/facilities of concern.***

***For wind and other renewable and/or unusual energy sources, describe the units in detail and include the history (including any performance issues).***

***Identify in a short paragraph any opportunities to pursue UNSCAP Track 2*** ***, including, where feasible, through contracting service providers for the supply of renewable energy under Power Purchase Agreement (PPA) type contracts.***

## Internal distribution

***Insert a 0.5-1 page summary of the internal distribution infrastructure in place at key sites. Where relevant list the defined mini-grid circuits (commonly more than one per site). Refer to single line diagrams where available.***

***Describe the layouts and key components in MV and LV including the configuration of cabling (overhead, ducted, buried, surface laid).***

## Levelized cost of energy

***Determine and present the Levelized Cost of Energy in a USD/kWh table for key mission locations.***

***The LCOE for a defined system in summary consists of all the forecast lifetime costs (initial investment, operations and maintenance, cost of fuel, cost of capital), divided by forecast energy generation.***

***For peacekeeping LCOE will be assessed for the end-user location, e.g the low voltage sources of demand in specific locations. LCOE will differ from the mission HQ due to the different logistics costs and the generator configurations and associated diesel fuel-kWH efficiencies. Distribution costs and losses need to be added to generation costs to determine end user LCOE.***

***Location specific LCOE values will be used to direct the MISSION EIMP strategy. In summary, the economic viability of virtually all investments is strongly controlled by LCOE: the higher the LCOE the better the economics and the shorter the payback period. End user LCOE values also correctly emphasize the value of demand reduction and efficient distribution. Finally, accurate LCOE values can inform decisions on outsourcing electricity supplies and grid connection.***

## Air conditioning

***Describe the dominant MISSION approach to air conditioning and any important variants. Cover cooling, heating and general ventilation. List the key technologies (through wall AC, split ACs, chillers) and comment on their age and condition. Provide extra detail on any large scale AC units and chillers.***

***Research indicates that air conditioning represents between 40 – 70% of peacekeeping energy infrastructure demand. It is by far the largest single source of demand and represents the largest opportunity for demand reduction.***

## Lighting

***Describe the dominant MISSION approach to external and internal lighting. Where efficient technologies such as LEDs and PV-battery street lighting are in place, describe the absolute and relative scale of the interventions (majority, minority, 20% etc...)***

***Research indicates that lighting represents 10 – 20% of peacekeeping energy infrastructure demand. The steep decline in the cost of LEDs results in a default very strong economic case for upgrading to LEDs for virtually all locations in all missions (noting LED production quality and lifetime is an ongoing issue).***

## Water supply and wastewater treatment

***Describe the dominant MISSION approach to potable water supply including treatment. Describe the peak power and energy demand (if known) of key units.***

***Research indicates water supply in missions is a major source of energy demand and has a disproportionate impact on generator sizing and performance (due to transient peak loads and VAR issues for electric pump motors). The extensive use of RO for non-saline deep well water sources is also an opportunity for demand reduction.***

***Describe the dominant MISSION approach to wastewater treatment and the number and type of modular standard wastewater treatment plants (WWTPs).***

## Other forms of demand

***Describe the other important sources of demand, including office equipment, IT rooms, kitchens and workshops.***

## Metering and monitoring

***Describe the existing deployment and operation of the four main types of metering: Portable meters and dataloggers, Generator-circuit level large current meters, Sub-circuit/ building level inline meters, Plug meters***

***Describe the process of metering reading and data management, including manual inspection and any online monitoring system in place or in process.***

Energy infrastructure management

***Describe the existing mission structure for managing the energy infrastructure. Include a breakdown as relevant for the various infrastructure components: generation, distribution, buildings, HVAC etc. Describe any existing oversight, monitoring and routine performance reporting systems.***

Forecast changes

***Describe any major anticipated short to medium term (1-3 years) changes in the mission context, mission profile or national energy context that should be addressed by the EMP.***

Summary – implications for energy management planning

***Insert 2 paragraphs on implications of the mission energy profile and the forecast on energy management planning. Note any key identified challenges that need to be considered (e.g. weak local capacity, difficult logistics, major security problems, uncertain or short mission lifespan***

# UPGRADE PLAN

## Option analysis

As of ***Month-Year***, ***MISSION*** has ***XXX*** operational sites. At each site, there are many potential energy interventions. Hence in theory, there is a very long list of options for ***MISSION*** energy investment. In practice only a subset of these warrant investment.

The subset of projects proposed for investment have been selected using a three-stage process:

1. The projects are sorted roughly based on forecast payback period – All concepts with a payback period exceeding 8 years should be discarded.
2. The projects are initially screened using the ranking table provided in Appendix A.
3. The top ***5-10*** projects are further developed using the site specific LCOE to generate a more robust payback period forecast, and then re-ordered from shortest to longest.

## Upgrade strategy

**Technical prioritization** The option analysis indicates that the top five most economic and viable interventions are:

* ***XXX***
* ***XXX***

**Geographic prioritization** The higher LCOE for remote areas and other considerations indicates that the geographic priorities for intervention are:

* ***XXX***
* ***XXX***

**Implementation model** **MISSION** has the in-house capacity to undertake ***all/part/ a small percentage*** of the above interventions, via routine work scheduling of the core team. The balance will be undertaken by contractors. ***Describe the contracting strategy planned for the key projects (international, local, separate procurement, turn-key etc.)***

**Scheduling** Subject to receipt of sufficient funding and central approvals, the majority of the proposed investments will be completed over a ***1-4*** year period.

**Awareness and training** In support to the mission strategy and the various prioritization of investments, awareness campaign (and trainings if necessary) are to be planned and conducted in the mission on a regular basis and to all type of personnel (civilian, police and force) aiming at supporting behavioural changes for a reduced demand.

## Proposed projects and activities

The internally approved interventions are presented in table form below. The list of interventions that are implemented or at least mobilized ***by last year of the EMP*** will be a subset and dependent upon securing a project budget via the annual budget cycle and/or smaller scale internal budget allocations and revisions.

***Insert the Excel EMP Projects and Activities table, in landscape format***

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **EMP APPROVED PROJECT TABLE** |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Project type**: Activities (A), Small projects (S) , Large & Complex projects (L) | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
| **Intervention** | **Location(s)** | **Project type** | **Estimated duration (months)** | **Initial estimated cost (USD K)** | **Forecast payback (Years)** | **Responsible unit** |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

## Project teams and technical support

***Describe the planned project implementation model and key teams/responsible units. Describe any planned external technical support (at the EMP level, not for each project).***

## Oversight monitoring and evaluation

***Describe the EMP oversight process and any planned formal progress monitoring and impact evaluation.***

Implementation of this EMP will be overseen by the C/DMS. An oversight committee will meet regulalry ***OR*** EMP progress will be added to the agenda of (***another pre-existing internal oversight-coordinating body***). The Chief Engineer will submit a brief progress report 1 week prior to these meetings.

The approved intervention table will be integrated into the Mission Environmental Action Plan. Progress will be reported to OUSG on a six monthly basis as part of the routine MEAP progress reports.

Projects with a capital value of over USD 1 million will be subject to an internally led post-implementation review for impact evaluation and lessons learned.

# Contribution of the mission EIMP to the UNSCAP targets

In September 2019, the United Nations Secretariat Climate Action Plan (UNSCAP) was promulgated setting ambitious eight targets, including the key ones as follow:

Carbon emissions: Absolute and per capita reductions of 25% by 2025 and 45% by 2030.

Electricity consumption: Per capita reductions of 20% by 2025 and 35% by 2030.

Renewable energy: 40% by 2025 and 80% by 2030 of consumed electricity.

The **MISSION** is planning to contribute to the targets in the following way:

***Describe and clearly identify the contribution of each planned activities to the UNSCAP targets, respectively for Track 1 activities (Intensification) and Track 2 (Innovation), including required timeframe for implementation.***

**APPENDIX A – PROJECT SCREENING CRITERIA**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **INTERVENTION RANKING TABLE** | | |  |  |  |  |  |  |
| **Suggested ranking scores** | | |  |  |  |  |  |  |
| V Positive | Positive | Neutral | Negative | Showstopper |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **Payback period** - Forecast operational period required for full recovery of investment | | | | | | | |  |
| Shorter is better and over 8 years is a showstopper | | | | |  |  |  |  |
| Less than 3 years | |  |  |  |  |  |  |  |
| 3 -5 years |  |  |  |  |  |  |  |  |
| 6-7 years |  |  |  |  |  |  |  |  |
| 7-8 years |  |  |  |  |  |  |  |  |
| Over 8 years | |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **GHG emissions** - Reduction in carbon intensity (CO2 Eq/total mission budget) | | | | | | |  |  |
| Reduced intensity is positive. Increased intensity is normally a showstopper | | | | | | |  |  |
| **Duration** - Project development, financing, mobilization and implementation | | | | | | |  |  |
| Shorter is better, to enable a shorter overall recovery on investment | | | | | |  |  |  |
| **Complexity** - Project technical complexity and number of key influences/variables | | | | | | |  |  |
| Simple is better, with complexity linked to risk and reduced forecast accuracy | | | | | | |  |  |
| **Economic scale** - Maximum size of the opprtunity | | | | |  |  |  |  |
| Larger is bettter for overall impact and minimized transaction costs | | | | | |  |  |  |
| **Minimum threshold** - Impact of any technical-logistical minimum size limits | | | | | | |  |  |
| Most technical solutions have a minimum practical scale to recover development costs | | | | | | | |  |
| **Logistics** - Impact of the mission and location specific logistics challenge | | | | | | |  |  |
| Heavy, extended or unusual logistics increase indirect cost and risks | | | | | |  |  |  |
| **Write-offs** Economic impact of the write-off of relatively new assets | | | | | |  |  |  |
| Integrate the true write-off monetray value or utility of existing useful assets | | | | | | |  |  |
| **Portability** - Potential for redeployment in the event of site or building demobilization or renovation | | | | | | | | |
| Portable and semi-permanent equipment fits well with mission mandates and need for flexibility | | | | | | | | |
| **Permanence** - Duration of the impact and/or lifetime of the new assets | | | | | | |  |  |
| Lasting and durable equipment and projects generate more savings beyond the payback period | | | | | | | | |
| **Disruption** - Impact on mission operational capacity during mobilization-implementation | | | | | | | |  |
| Less disruption in positive and major constraints on mission capacity must be avoided | | | | | | | |  |
| **Social impact** - Potential positive and negative external impacts | | | | | |  |  |  |
| Analyze impacts - maximise positives and minimize negatives | | | | | |  |  |  |
| **Local environmental impact**: Local environmental impacts - excluding GHG emission reductions | | | | | | | | |
| Analyze impacts - maximise positives and minimize negatives | | | | | |  |  |  |
| **Health & Safety** - Positive and negative impacts and risks for personnel health and safety | | | | | | | |  |
| Analyze impacts - maximise positives and minimize negatives | | | | | |  |  |  |
| **Security** - Positive and negative impacts on mission personnel security | | | | | |  |  |  |
| Analyze impacts - maximise positives and minimize negatives | | | | | |  |  |  |
| **Other risks** - Potential impact of specified risks, knowledge gaps and uncertainties | | | | | | |  |  |
| Identify, analyze and rank impacts | | |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROJECT SCREENING TABLE EXAMPLE**  **Replace all internal FLs with LEDs in UNOE and rented-loaned buildings throughout the mission** | | | | | | | | |  |  |  |  |
| **Project cost** | | **USD 75k** |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Criteria** |  | **Ranking** | **Comments** | |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Payback period** | | **2.5 Years** | Generally very short. Quick to model if LCOE is known | | | | | |  |  |  |  |
| **Project duration** - | |  | Overall relatively short. Limited lead time on procurement and delivery, but extended installation timetable | | | | | | | | | |
| **Complexity** | |  | Technically extremely simple | | |  |  |  |  |  |  |  |
| **Economic scale** | |  | A measurable but not overwhelming reduction in demand is forecast. Linear impact with No. of FLs replaced. | | | | | | | | | |
| **Minimum threshold** | |  | No real minimum threshold. Can be added onto routine O& M schedules and core team responsibilities | | | | | | | | | |
| **Logistics** |  |  | Very positive. Small size and weight and durability enables cost-effective air freight | | | | | | | |  |  |
| **Write-offs** | |  | Results in a complete write-off of installed FLs. Variable impact based on facility and bulb age. | | | | | | | | |  |
| **Portability** | |  | Not portable. Not economic to remove and redeploy in most cases. | | | | | | |  |  |  |
| **Permanence** | |  | Good quality LEDs should last for 10+ years | | | | |  |  |  |  |  |
| **Disruption** | |  | Negligible disruption due to simple installation | | | | |  |  |  |  |  |
| **Social impact** | |  | Labour intensive moderate skill task - employment generation for local electricians and technicians | | | | | | | | | |
| **Environmental impact** | |  | Generates FL tube waste which requires internal pre-treatment prior to landfill disposal | | | | | | | | |  |
| **Health and Safety** | |  | Routine LV electrical work | | |  |  |  |  |  |  |  |
| **Security** |  |  | Positive impact through a marginal reduction in fuel convoy requirements for forward bases | | | | | | | | |  |
| **Other risks** | |  | Universal issue of LED quality assurance | | | |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |