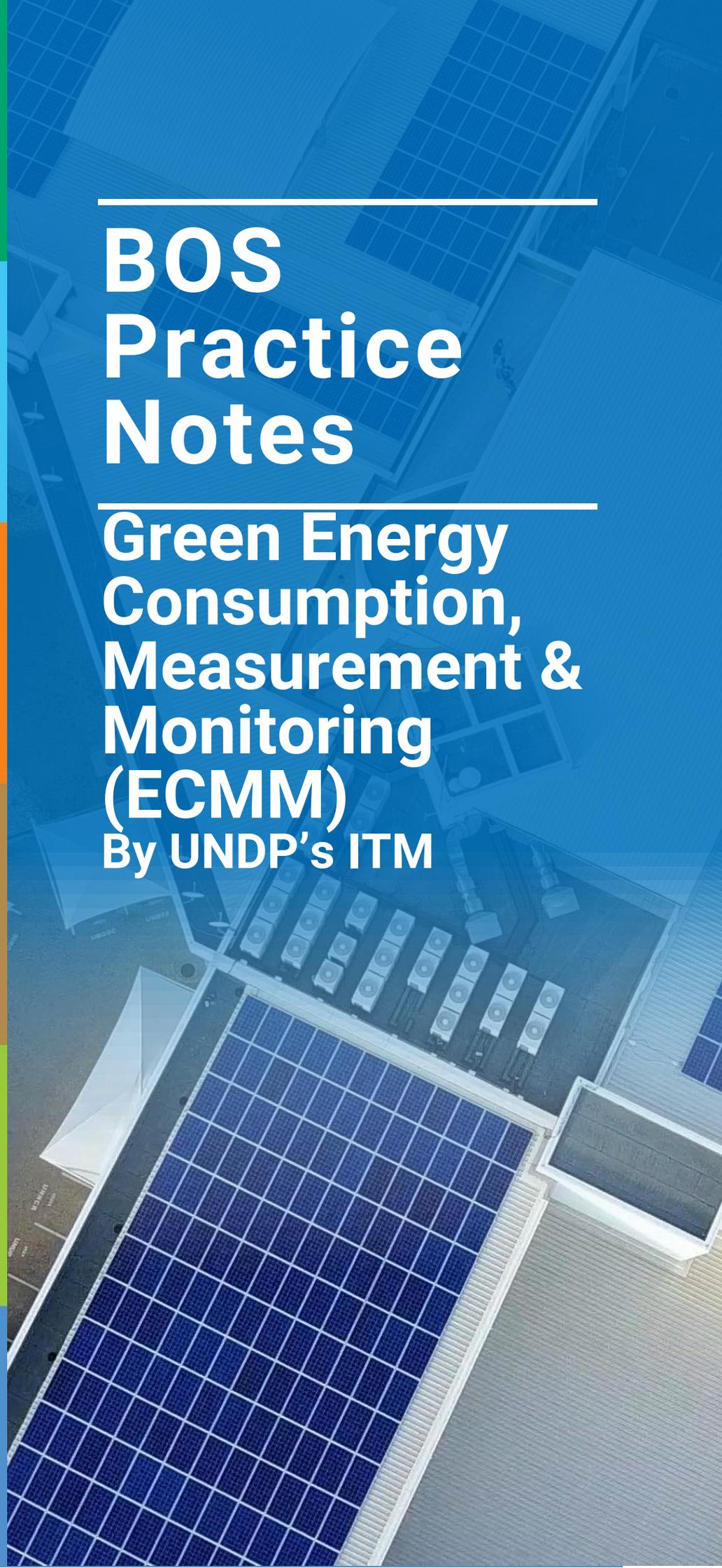

BOS Practice Notes

Green Energy Consumption, Measurement & Monitoring (ECMM)

By UNDP's ITM



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Introduction & Background

The Business Operations Strategy (BOS) is a results-based framework that focuses on joint business operations with the purpose of eliminating duplication, leveraging the common bargaining power of the UN, and maximising economies of scale. In support of more effective programme delivery on the 2030 Agenda, the Secretary-General mandates all United Nations Country Teams (UNCTs) to ensure compliance with an improved BOS by 2021.

A common management axiom states that “you cannot manage what you cannot measure”, which is especially true for Energy consumption. **UN Country Teams (UNCTs) and Operations Management Teams (OMTs) and operations managers that understand their energy use are in the best position to save energy and money, as they understand the amount of energy they are using for what purposes, at any given time.** With continuous monitoring, they can identify the areas where most energy is used—possibly in a wasteful way —, can make decisions to take advantage of off-peak tariffs and reduce peak demand charges. Additionally, they will be able to identify outdated equipment, which can be the base to implement energy efficiency measures.

In most UN premises, OMTs are not aware of the way the Country Office (CO) or UNCT consumes energy. Thus, improvement in the way of consumption and the implementation of energy efficiency measures is difficult, even though they would result in monetary and environmental savings. To be able to utilise these opportunities, **the very first step in energy efficiency and sustainability is the implementation of the Energy Consumption Measurement and Monitoring (ECMM) practice to enhance efficient use of energy** and to establish a base for future renewable energy installation on the premises.

Developing a BOS provides an opportunity for UNCTs to increase and improve sustainable development practices, bringing the UN a step closer to achieving the SDGs. OMTs are strongly encouraged to integrate environmental sustainability considerations for all common services at the earliest opportunity to enhance resource and cost efficiencies of UN operations and limit adverse impacts on the local environment. The implementation of the ECMM will help achieve better, more responsible and sustainable energy consumption at all UN premises. The measurements acquired while implementing the practice can be further used as direct input in the development of renewable energy solutions at premises, which further enhances the more sustainable operations.

Objective of the practice

As part of focusing on efficient business operations and supporting greening efforts implementation all over UN Agencies, the UNDP ITM Green Energy Team is recommending the implementation of the ECMM common service as the first step in an effort towards optimised and responsible use of electricity in all UN premises.

During ECMM, data is gathered with the Internet of Things (IoT) sensors installed on the main and sub-circuits of the electrical system and are uploaded onto a cloud-based portal for visualisation, analysis, and automated reporting. With the implementation of ECMM, multiple benefits can be reached, both for the premises on which it is installed and for corporate use. It helps identify energy leakages, inefficient appliances, verification of bills from power providers, accurate apportioning of costs in a multi-agency occupancy set-up, among other benefits. At the corporate level, the aggregated use of electricity can be monitored and visualised in dashboards and used

for different educational or representational purposes. Consumption profiles are also easily built for offices that intend to install renewable energy at the premises, particularly solar photovoltaic (PV) systems, which converts light into usable electricity.

Summary of the objectives and expected opportunities:

1. Display real-time electricity consumption data and visualise energy consumption trends with different time resolutions
2. Detect when consumption is unexpectedly higher or lower than would usually have been the case
3. Manage and optimise energy consumption, rather than accept it as a fixed cost
4. Identify and explain excessive energy use, the base for energy efficiency measures
5. Visualise and promote energy efficiency results
6. Determine future energy use and costs when additional users/applications are introduced
7. Develop performance targets for energy management programs
8. Provide energy assessment for Green Energy solutions, such as the implementation of solar PV solutions

Key stakeholders and partnerships

The suggested Practice is already implemented in most of the UNDP Country Offices and many other UN Premises—including UN Houses, FAO and UNICEF offices—by the UNDP ITM Green Energy Team. The Green Energy Team has the technical expertise, experience and capacity to manage and lead the implementation of the EMCC practice at all UN premises per request.

During the installation phase, the ITM Green Energy Team can support determining the composition of the package a UNCT needs, as this will depend largely on the number and size of circuits to be monitored. The physical installation of the IoT sensors and gateway(s) is a “Do it yourself” (DIY) process and takes no more than an hour for a standard package. ITM provides support remotely and a step-by-step installation guide. In addition, a YouTube video clip provided by the vendor will assist OMTs in the installation and configuration. During operations, the ITM Green Energy Team also provides 2nd tier support if the local focal point (normally the ICT Manager) cannot resolve a problem, while 3rd tier technical support is provided by the vendor.

A centrally managed Long-Term Agreement (LTA) is already in place with a solution provider for the Measurement and Monitoring, including the IoT sensors, cloud-based visualisation, analytics and operations support. This agreement can be used by all UN agencies/UNCTs, and there is no need for creating additional partnerships.

Implementation of the Project/ Activity

The implementation of the proposed practice takes only a couple of days—excluding time for shipment—but the measurement and monitoring will be done during extended periods of time, even during years—while delivering continuous advantages for the UNCTs. The steps of implementation are:

1. Engagement between UNCTs and UNDP ITM Green Energy Team
2. Defining the IoT package needed, based on the UNCT’s needs: **2-3 working days**
3. Shipment of the package for the Country Teams: **2-3 weeks**
4. Installation of sensors and setting up needed infrastructure: **1-2 working days**
5. Collecting information about the energy use of the UNCT

6. The data read with these devices is accessible through an online portal, to which both the Green Energy Team and the UNCT have access and can monitor the energy consumption of the UNCT
7. The load profile of the UNCT is created, which is the base for analysing and understanding the energy management in the compound, applying energy efficiency measures, developing performance targets – **after a minimum of 2 months of operations**
8. The collected data – i.e., energy demand and load profile of the compound - is also the input data for designing and implementing renewable energy solutions - like solar PV systems - at the premises

Results, Outputs, and Impact

The expected results are more educated, informed, and more responsible use of electricity, implementation of energy efficiency measures and renewable energy projects. The results can be measured by comparing the electricity use—and related costs—of the compound before and after the ECMM is introduced and the suggested changes are implemented.

Enabling factors and constraints

An important requirement for the implementation is to have at least a basic knowledge of the electrical network of the compound (electrical diagram). This is needed to determine where the IoT sensors should be installed to measure consumption.

Other technical factors are needed to enable the implementation of the practice:

- (i) A network point to connect the gateway module to the network
- (ii) Power outlets to connect each module, i.e. gateway and sensor modules
- (iii) Suitable space to place the modules, ensuring there are no barriers between the gateway and the sensor modules to block the wireless signal

A possible challenge in implementation could be that UNCTs might not want to install the sensors themselves—even though it does not require any special skills—and the presence of an electrician might be needed during the installation time.

The greater benefits of the implementation can only be reached if actions are taken to change the way the UNCT consumes electricity. **The measurement and monitoring are only used to point out the places where development can be done, but the implementation of the recommended changes must be done by the Country Teams.** The dedication of the OMT and the end-users will eventually define the success of the practice, which can be the biggest constrain of the implementation.

Sustainability and replicability

The implemented energy management changes (both supply and demand side) are long-lasting and provide cumulative benefits after the implementation is done. Consuming less electricity and supplying energy with renewable resources directly leads towards a more sustainable operation at UNCTs.

As previously mentioned, the practice is already implemented in most of UNDP country offices as well as in FAO and UNICEF Offices, where they have continuously proved to provide benefits. The installation of sensors and the set-up of the interface is very similar for all locations and, it is easily replicable. Naturally, the changes to be made are different for each location, but recommendations are made by the same expert team at UNDP ITM.

Required investment

The indicative price of the basic package is \$1,271 USD, which consists of the items in the table below. However, each location needs to be assessed individually for the identification of the optimal number and size of sensors.

STANDARD ECMM Package						
Model	Name	Item	Description	Quantity	Unit price (USD)	Price (USD)
EBWXS3-LV	3-sensor wireless X	(Includes: 1x Eyedro sensor module 3x 200A current sensors)	Package to measure electricity consumption of standard sized circuits	5	\$163.0	\$815.00
EBWEM1-SUB-LV	Wireless EM	(Includes: 1x Eyedro gateway module 1x Eyedro sensor module)	Gateway and sensor for connectivity	1	\$276.0	\$276.0
ESCLV-31-600A	600A	600A current sensor	Sensors to measure electricity consumption of bigger sized circuits	3	\$60.0	\$180.0
					TOTAL PRICE	\$1,271.0

Conclusion

The main objective of the Energy Consumption Monitoring and Measurement is to provide historical and real-time information about the energy consumption of the UNCTs, thus serving as a starting point and base case for future energy management activities, energy efficiency measures, and the implementation of renewable energy projects at the premise. The installation of the IoT sensors is easy, and the whole implementation process is overseen by UNDP ITM team, who is giving continuous support during the whole implementation, including O&M, troubleshooting and reporting.

If further information or any clarification is required, please note the following contact of the UNDP ITM Green Energy Team: Green Energy Helpdesk: helpdesk.green.energy@undp.org with a copy to itm.green.energy@undp.org.