Energy Efficiency – Accompanying Measures in Egyptian Universities

PROPOSAL SUB MISSION FORM (PSF)

This PSF sets the minimum required contents related to the submission of Energy Efficiency and Renewable Energy technologies proposal that are suggested by a University. All assumed technologies in this document have to comply with the technologies stated under the "Energy Efficiency - Accompanying Measures in Egyptian Universities".

This form has to be compiled and send as Word Document from the E-mail of the University Energy Manager

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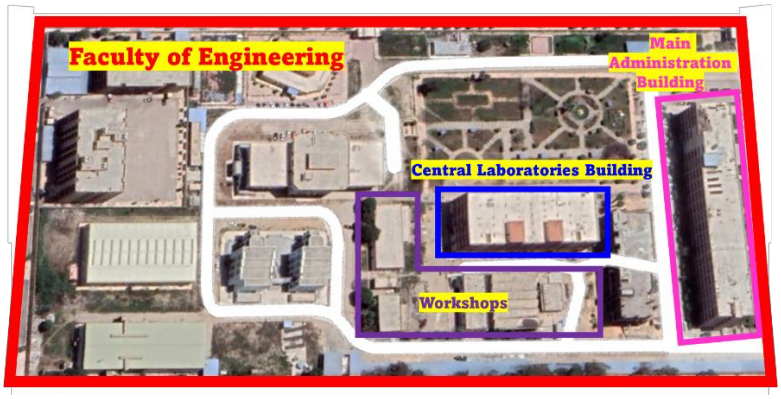
The content of this document shall contain the following:

Energy Efficiency – Accompanying Measures in Egyptian Universities

1. UNIVERSITY IDENTIFICATION AND WORK TEAM

{Please insert the following information and complete a form for each building}

University Name:	Port Said University
Location (City Name and GPS Coordinates)	Port Fouad, 31°14'47.9"N 32°18'48.8"E
Title of Building*[1] where the EE/RE opportunities will be implemented:	Central Laboratories building at the Faculty of Engineering
Building Address:	Faculty of Engineering, Port Fouad City, Port Said Governorate
Estimated Annual Building Energy Consumption (MWh): **Contribution of Building's Energy Consumption to Overall Energy Consumption of the Faculty and University: (ratio x:y)**	380 MWh per year **Building Energy Consumption / Faculty Energy Consumption = 380/1367** **Building Energy Consumption / Faculty Energy Consumption = 27.8%**
Building Location:	 You may attach a map showing the buildings around or describe the location relative to other buildings
Building Foot Print Area (m^2)	2000 m^2 for the Central Laboratories Building

[1] **A complete form is used for each building**

Building Number of Floors	5 floors
Building Functions, i.e. Admin, Faculty, Department, Lectures, Lab, Library, Workshop, Student Services,…… etc.	The building may serve more than one function The Central Laboratories Building includes the main laboratories of the Faculty of Engineering in addition to the main workshops. Furthermore, the building includes the central library and the teaching and administrative facilities for architecture and urban planning department.

Work Team in This Building

Name	Title	Contact's Mobile	Contact's Email
1. Mohamed Bassyouni	Professor	01159675357	m.bassyouni@eng.psu.edu.eg
2. Yasser Elhenawy	Assoc. Prof.	01022579996	dr_yasser@eng.psu.edu.eg
3. Mohamed Elsakka	Asst. Prof.	01033551211	elsakka@eng.psu.edu.eg
4. Ahmed Refaat	Asst. Prof.	01091747468	Ahmed_refaat_1984@eng.psu.edu.eg

2. LIST OF EE/RE OPPORTUNITIES SUGGESTED IN THE SELECTED BUILDING

EE/RE Opportunity List	Implementation Objectives
1. PV System	To provide a clean and sustainable energy supply that assist in reducing the energy bills.
2. Enhanced lighting technology	To reduce the energy consumption in the building and enhance the energy efficiency.
3. Replace few number of old air conditioning units	To reduce the energy consumption in the building and enhance the energy efficiency.

3. EE/RE OPPORTUNITIES DESCRIPTION

3.1. FIRST EE/RE OPPORTUNITY

Opportunity Description:	Installation of a 2000 m^2 PV system in order to provide a clean and sustainable energy supply that assist in reducing the energy bills
Applied Technology Description:	The utilization of Solar PV system to produce clean and sustainable energy
Expected Lifetime in Months:	240 Months
Technology **Extra O&M** requirements versus existing technology	54 Man-day per year (This will cover the periodic cleaning of the PV arrays.) 10800 LE per year (This will be covered as an in-kind contribution from the Port Said university)
Expected Opportunity Installations Time in Months	6 Months
Other Technical Requirements to replace the existing technology by the New Technology. If any	Provided new PV systems should include all parts such as cables, batteries and connections.

3.2. SECOND EE/RE OPPORTUNITY

Opportunity Description:	Enhanced lighting technology by replacing 1,250 light fixtures with new low wattage energy efficient light fixtures.
Applied Technology Description:	The utilization of low wattage LED lighting to reduce the building energy consumption while achieving excellent illumination.
Expected Lifetime in Months:	120 Months
Technology **Extra O&M** requirements versus existing technology	None Man-day Zero LE

Expected Opportunity Installations Time in Months	3 Months
Other Technical Requirements to replace the existing technology by the New Technology. If any	None

3.3. THIRD EE/RE OPPORTUNITY

Opportunity Description:	Increase the building energy efficiency through replacing few number of old Air Conditioning units with new energy efficient units based on inverter technology.
Applied Technology Description:	The inverter technology in the new Air Conditioning units increases the energy efficiency by optimizing the energy consumption at partial loads.
Expected Lifetime in Months:	240 Months
Technology **Extra O&M** requirements versus existing technology	2 Man-day per year 600 LE per year (This will be covered as an in-kind contribution from the Port Said university)
Expected Opportunity Installations Time in Months	1 Month
Other Technical Requirements to replace the existing technology by the New Technology. If any	None

4. EE/RE OPPORTUNITIES FEASIBILITY (TECHNICAL AND ECONOMICAL)

4.1. FIRST OPPORTUNITY

Describe your proposal with expected quantity/number of purchased items	Installation of a 2000 m^2 (286 kW) PV system
Anticipated Annual Reduction :/ Replaced: Electrical Energy Maximum Demand GHGs	 413,811.45 MWh Zero KW (PV system will not reduce the maximum demand) 189.53 Ton CO_2e
Expected Annual Cost Savings: Electrical Energy Maximum Demand	 298,411.05 (EGP) Non (EGP)
Expected Opportunity total Investment Cost:	(Opportunity investment cost plus installation costs and any other associated costs for opportunity completion to be in duty) 4,481,625 (EGP)
Total Anticipated Annual Cost Savings:	(Sum up of different items savings anticipated annually) 298,411.05 (EGP)
Simple Payback Period in Months:	180.22 Month
Any other Economic Indicators if possible:	Any other feasibility Study indicators such as Net Present Value (NPV), Internal Rate of Return (IRR),

4.2. SECOND OPPORTUNITY

Describe your proposal with expected quantity/number of purchased items	Replacement of 1,250 light fixtures
Anticipated Annual Reduction :/ Replaced: Electrical Energy Maximum Demand GHGs	 144.38 MWh 43.75 KW 66.12 Ton CO_2e
Expected Annual Cost Savings: Electrical Energy Maximum Demand	 Non (EGP) 114,056.25 (EGP)
Expected Opportunity total Investment Cost:	(Opportunity investment cost plus installation costs and any other associated costs for opportunity completion to be in duty) 437,500 (EGP)
Total Anticipated Annual Cost Savings:	(Sum up of different items savings anticipated annually) 114,056.25 (EGP)
Simple Payback Period in Months:	46.03 Months
Any other Economic Indicators if possible:	Any other feasibility Study indicators such as Net Present Value (NPV), Internal Rate of Return (IRR),

4.3. THIRD OPPORTUNITY

Describe your proposal with expected quantity/number of purchased items	Increase the building energy efficiency through replacing the 7 old Air Conditioning units (5 HP each) with new energy efficient units based on inverter technology.
Anticipated Annual Reduction :/ Replaced: Electrical Energy Maximum Demand GHGs	29.4 MWh Zero KW (PV system will not reduce the maximum demand) 13.47 Ton CO_2e
Expected Annual Cost Savings: Electrical Energy Maximum Demand	 23,226.56 (EGP) Non (EGP)
Expected Opportunity total Investment Cost:	(Opportunity investment cost plus installation costs and any other associated costs for opportunity completion to be in duty) 245,000 EGP
Total Anticipated Annual Cost Savings:	(Sum up of different items savings anticipated annually) 23,226.56 (EGP)
Simple Payback Period in Months:	126.58 Months
Any other Economic Indicators if possible:	Any other feasibility Study indicators such as Net Present Value (NPV), Internal Rate of Return (IRR),

5. PRESENTING THE RESULTS OF WALKTHROUGH DATA TO EE/RE OPPORTUNITIES

{to insert here the walkthrough data per each EE/RE for the current building presenting the methodology of collecting such data (i.e. measurements, estimation analysis). Please don't use link but insert in the Word document}.

• Electric meter characteristics (type of data collected, accuracy, data storage) and number (e.g. separate chillers + cooling tower, pumps,).

• Thermal energy meters: specifications for hot water and chilled water flow rate and temperature measurements.

• Environmental data measurements: indoor and outdoor air temperature and RH.

• Time coding: the data acquisition time interval should be specified typically in the range from 15 minutes up to 1 hr, depending on the type of data; the time sequence of collected data should never be interrupted, which means that, if for any reason the data are not collected at a given time, a conventional figure should be recorded. It should be clearly stated how summer daylight saving time is managed by the system.

• Data format: the correspondence between data and physical quantities should be clearly specified with alphanumeric codes that make the identification easy to the inspector.

Metering instruments

Instrument	Typical values logged	Acquisition time	Memory
Electrical power meter T/RH logger (stand-alone) Status logger (ON/OFF)	kW, kWh, VAh, PF °C, RH (%) On/Off status	15 minute 1 hour 1 second	1 year 6 months 8000 COV(*)

*COV: Change of value

In some buildings, the total electrical consumption will be only available (i.e. the typical "billing data" provided by the electric utilities), while in other cases the building management system allowed the separate measurement of the energy input to the main energy sub-systems (e.g., dedicated meters for: chillers and cooling towers; water circulation pumps; and Air Handling Units). For some energy systems, dedicated equipment will be installed for a detailed analysis of "critical" components.

6. EE/RE OPPORTUNITIES ASSESSMENT METHODOLOGY APPROACH

{to insert here the methodology approach for the assessment of each EE/RE opportunity. Also, to explain the analysis basis and the measurements conducted, if any, presenting the calculations to the anticipated savings. Please don't use link but insert in the Word document.}.

Lighting systems: - Developing the use of the management system automatically and taking advantage of led lamps inside classrooms and linking the system to schedules. It is expected to save the energy consumed daily for the lighting system.

Development of the use of the management system automatically to adjust the internal temperature inside the classrooms and linking the system to lectures/tutorials schedules to achieve thermal comfort while saving energy consumption.

Rationalizing and achieving technical coordination, awareness and community development regarding the importance of maintaining systems that help in energy conservation, raising awareness and maximizing the use of renewable energy.

The implementation of the photovoltaic system in the power distribution station enhances the voltage profile of the system and reduces energy losses due to the implementation of the photovoltaic system. Solar-powered buildings are a promising path toward sustainable aviation to reduce consumption of electricity to achieve Egypt's Vision 2030 towards sustainable development through a sustainable energy strategy at Port Said University