

*Introduction:*

*The National Energy Efficiency and Renewable Energy Action (NEEREA) is a national financing mechanism dedicated to the financing of loans in energy efficiency, renewable energy, and green buildings. NEEREA is a joint initiative between the Central Bank of Lebanon (BDL) and the Ministry of Energy and Water (MEW). NEEREA receives the technical support of the United Nations Development Programme (UNDP) through funding by the Global Environment Facility (GEF).*

*The Technical Support Unit to the Central Bank of Lebanon (BDL) at LCEC is dedicated to offer BDL technical assistance to evaluate the eligibility of submitted loans to benefit from the EU-funded subsidy. This task is financed by the European Union (EU).*

*Important Notes:*

***1. All sentences written in italic format in these Guidelines are for instructions purposes only. These sentences should be replaced in the technical feasibility study.***

*2. This guide is for instructional purposes. It is designed to help potential beneficiaries and contractors in preparing comprehensive technical reports and proposals about LED lighting systems installation/replacement.*

*3. This guide is a mandatory requirement towards facilitating the green loan applications and ensures sufficient and proper technical and financial analysis.*

*4. This guide is prepared by the Lebanese Center for Energy Conservation- Technical Support Unit to the Central Bank of Lebanon, and is available for public use.*

*5. This guide is divided into 9 sections that would ideally be available in the submitted technical report of a loan application. The last section offers general notes on the format of the report.*

*6. For questions, clarifications, or suggestions, please contact the LCEC: 01-569101 or by email: [energy@lcec.org.lb](mailto:energy@lcecp.org.lb)*

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| --- |
| ***Evaluation of projects requesting financing of LED Lighting Systems under NEEREA will be based on these issued LED Guidelines. Contractors are entailed to abide by the requirements set in these guidelines and must submit the technical reports following the steps and regulations clearly identified.*** |

# Light Emitting Diode (LED) Study Content

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## Introduction

*[This section should include the objective of the proposed LED system installation/replacement, the financial criteria and technical/operational limitations, the conclusions on the technical and economic evaluation of the project, a summary of the proposed system, annual energy savings and cost savings using a table format]*

A detailed summary of the proposed system is provided in this section in the table here below:

*[Supplier’s Signature] [Client’s Signature]*

|  |  |
| --- | --- |
| **Current Annual Lighting Energy Usage (kWh)** |  |
| **Current Annual Lighting Energy Cost (USD)** |  |
| **Annual Energy Usage with LED lighting (kWh)** |  |
| **Annual Energy Cost with LED lighting (USD)** |  |
| **Annual Energy Savings (KWh)** |  |
| **Annual Cost Savings (USD)** |  |
| **Initial Implementation Cost ($)** | South Façade  Total |
| **LED Lifetime (hrs)** |  |
| **Payback Period** |  |
| **Net Present Value (NPV)** |  |
| **Total amount of CO2  avoided per year (kg)** |  |

1. Light Emitting Diode (LED) lighting

*[This section should include dates of preliminary study or audit and data collected from facility or building owner. A general description of the relation between the existing lighting system at the facility and the LED Lighting system to be installed is required]*

*[The following sub-sections must be followed, described and completed to achieve a full technical LED project proposal. All the tables in these sub-sections are not shown as examples, they must be filled and completed in such technical feasibility studies and should include these minimum required information and details needed to assess the LED Lighting systems]*

3.1 Detailed Description of Modification/Installation

*[In this section a detailed description of all existing lighting types in each area of the facility with the specific proposed LED replacement type must be presented in details]*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Existing Lamps*** | | | | ***LED replacement*** | | | |
| **Type** | **Quantity** | **Power** | **Effective Lumens** | **Type** | **Quantity** | **Power** | **Effective Lumens** |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |

*[Add rows as much as needed]*

*[The effective lumens must be compared at the same beam angle]*

*[The table below must be filled according to the proposed replacement or installation of the lighting system]*

|  |  |  |
| --- | --- | --- |
| **Lighting System** | **Existing Lighting** | **LED Lighting** |
| **Total System Power (W)** |  |  |
| **Peak Load Reduction (W)** |  | |

The following tables summarize all existing lighting data required to choose the correspondent LED lighting for installation:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Indoor Areas* | Area (m2) | Number of rooms/assets | Lighting Output required | Existing Lighting Output | Number of existing luminaries per room |
| Theater |  |  |  |  |  |
| Living Room |  |  |  |  |  |
| Reception area |  |  |  |  |  |
| Offices |  |  |  |  |  |
| Conference Room |  |  |  |  |  |
| Warehouses |  |  |  |  |  |
| Underground garages |  |  |  |  |  |
| Corridors |  |  |  |  |  |
| *Outdoor Areas* | **Area (m2)** | **Number of rooms/assets** | **Lighting Output required** | **Existing Lighting Output** | **Number of existing luminaries per room** |
| Road |  |  |  |  |  |
| Garden |  |  |  |  |  |
| Terrace |  |  |  |  |  |
| Parking Lots |  |  |  |  |  |
| Outdoor entrances |  |  |  |  |  |
| Balcony |  |  |  |  |  |

3.2 Yearly Energy and Cost Savings

*[In this section a detailed analysis of the energy consumption and savings should be provided. All Assumptions should be clearly specified (Energy average tariff, Days of operation per year, hours of operation per day…)]*

|  |  |
| --- | --- |
| **Assumptions** | |
| **Hours of operation per day** |  |
| **Days of operation per year** |  |

*[Energy and Cost Savings must be detailed]*

*[The table below summarizes all the detailed benefits of the proposed LED lighting system from the technical and financial point of view]*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Type** |  |  |  |  |
| **Power (W)** |  |  |  |  |
| **Annual Operation (hrs)** |  |  |  |  |
| **Consumed Energy (kWh/year)** |  |  |  |  |
| **Energy Cost ($/kWh)** |  |  |  |  |
| **Yearly Energy Cost ($/year)** |  |  |  |  |
| **Lamp Lifetime (hrs)** |  |  |  |  |
| **Lamp Cost ($)** |  |  |  |  |
| **Lamp Maintenance Cost ($)** |  |  |  |  |
| **Lamp Yearly Maintenance ($/year)** |  |  |  |  |
| **Quantity of Lamps** |  |  |  |  |
| **Total Energy Consumed (kWh/year)** |  |  |  |  |
| **Total Energy Cost ($/year)** |  |  |  |  |
| **Total Maintenance Cost ($/year)** |  |  |  |  |
| **Total Cost ($)** |  |  |  |  |

*[Details must be provided on the calculations of the annual operation hours, consumed yearly energy and yearly energy cost]*

*[Ballast cost and maintenance should be added in the lamp yearly maintenance cost and detailed outside the table]*

*Summary of Yearly Energy and Cost Savings*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Total Power (W)** | **Total Energy Consumption Reduction (kWh)** | **EDL Savings (USD)** | **Generator Savings (USD)** | **Total Savings (USD)** |
|  |  |  |  |  |

|  |
| --- |
| **Existing Lighting** |
| **LED Lighting Solution** |

1. Financial Analysis

*[The detailed financial proposal of all the products of the LED system must be provided in the below table format]*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Ref. No.** | **Item** | **Item Description** | **Quantity** | **Amount Needed (USD)** |
| **1** |  |  |  |  |
| **2** |  |  |  |  |
| **3** |  |  |  |  |
|  | **Total Amount of the LED system (USD)** | |  |  |

*[Add additional rows if needed]*

*[Details on system life and maintenance are to be mentioned in this section such as expectancy, yearly degradation factor, yearly maintenance cost, etc…]*

*[In order to compare the different LED lighting options and to determine the most cost-effective system designs and to give the client a global view of the advantages and benefits of his investment in such projects, the life cycle cost analysis of the LED lighting system should be provided in this section showing the total cost of ownership for this energy efficient solution including energy cost, replacement cost and maintenance cost over the lifetime of the system]*

*[Three different parts must be studied to achieve a complete and clear financial analysis: the first one about all the parameters to take into consideration in the life cycle cost analysis, the second about the cash out-flows and the third discussing the cash in-flows]*

*[The following is an example to facilitate the financial analysis of the proposed system:*

* *Parameters of the LED LCC: total investment, interest rate, loan period, grace period, monthly payments through the loan’s period.*
* *Cash out-flows: file fees, insurance, grace payments, lease payments, etc…*
* *Cash in-flows: Cost savings from EDL, generator or any auxiliary energy source]*

*[All the information to be provided for the financial analysis must be clear, comprehensible and detailed]*

*[The net cumulative savings will be the essential data for concluding on the profitability and the return on investment. The following tables should be used in such analysis and more detailed tables can be provided according to the contractor or consultant detailed analysis:*

*Net Cumulative Savings*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Year** | **Cash Out-Flows** | **Cash In-Flows** | **Total Cash Flow** | **Total Cumulative Cash Flow** |
| Year 1 |  |  |  |  |
| Year 2 |  |  |  |  |
| **Net Present Value (NPV)** | |  |

*[Add additional rows for additional years as needed]*

1. Green House Gas Emissions Reduction

*[This section is dedicated to the environmental part of the project to be implemented. The calculation of the avoided greenhouse gas emissions must be provided and detailed]*

1. Post-Installation Monitoring

*[In case of data logging and monitoring, include in this section the most important parameters that will be measured]*

1. Conclusions

*[The conclusion of the LED system proposal must include the following:*

* *Summary of recommendations, estimated annual energy savings (kWh), estimated cost savings, projected investment cost and payback period in the table format below:*

*Summary Table of the proposed PV system*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***Total Units Power (W)*** | ***Energy Savings (kWh/year)*** | ***Cost Savings ($/year)*** | ***Implementation Cost*** | ***Payback Period*** | ***tCO2 reduced*** |
|  |  |  |  |  |  |

* *ESCO’s or Solar Energy Company’s recommended action plan and implementation schedule*
* *Statement by the client on which recommendations will be implemented and timeframe for implementation]*

1. Appendices

*[Information of significant importance, which cannot be presented as a part of the text report (because of number of pages, quality of presentation, etc.) shall be presented as appendices]*

*[The appendices should include:*

* *Details of all products specifications*
* *Details on simulation tools employed and calculations method*
* *Construction and physical characteristics and warranties conditions for concerned products]*

1. General Notes

*[Documentation – All numbers related to the results should be supported by information showing how they were derived. This includes all energy produced; cost savings, investment and payback information]*

*[Mathematical accuracy – All calculations in the report should be checked for mathematical accuracy]*

*[SI units must be used in all parts of the report]*

*[Grammar and style – The report should be written in proper prose. The language should be clear, concise and understandable]*

*[All graphs and plots should be properly labelled and show the dates and conditions when the data was taken]*