PT PLN (PERSERO)

ENERGY TRANSITION AND SUSTAINABILITY DIVISION

Energy Efficiency

MANAGEMENT GUIDELINE

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Key Abbreviation

E&S	:	Environmental and Social
EHS	:	Environmental, Health and Safety
ESF	:	Environmental and Social Framework
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
ESS	:	Environmental and Social Standard
GHG	:	Greenhouse Gas
GIIP	:	Good International Industry Practice
IFC	:	International Finance Corporation
PS	:	Performance Standard
WBG	:	World Bank Group

1 Introduction

PLN is committed to promote investments and innovations that maximize the opportunity to enhance E&S benefits, including contributing to energy and just transition, and climate change mitigation and adaptation. This will include promoting sustainable use of resources, including energy, water and raw materials. This management guideline is developed to improving efficient consumption of energy in PLN's projects and facilities, whether for a new project development, expansion of an ongoing project, or there are changes in the operation of PLN's facilities. The energy efficiency management is slightly different with other E&S impact assessment processes since it is focusing on opportunities for improvement in energy conservation and avoid or minimize the impacts associated with emissions from power sources related to production processes and supporting utilities. This guideline is developed to be consistent with the E&S principles described in the ESMS Manual and international good practice including the World Banks's ESS 3, WBG General Environmental Health and Safety (EHS) Guideline, IFC Performance Standard (PS) 3, and other documents as listed in **Section 10** of this management guideline.

This guideline will be required for PLN's projects and facilities that involves significant use of energy from fossil fuel or renewable energy for their construction or operation, for examples the process for power generation; process for heating and cooling; process and auxiliary systems, e.g., motors, pumps, and fans, etc. The national regulations[1] require preparation of an energy conservation program for activities that consume more than 6,000 tons of oil equivalent. This guideline may influence the project design, especially in selection of technology and equipment, as part of energy conservation measures. Efforts to conserve energy should be made to the extent technically and financially feasible.

2 Disclaimer

This management guideline should not be taken as a standard, regulation, or manual, and it is not described to a detailed level of a work instruction. If a more relevant or updated standard, regulation, or manual is available and requires revision of this guideline, then such revision is permitted under the terms and conditions in the ESMS' Management of Change. If any revision is made; references, rationales and amended sections should be clearly defined.

To be able to serve its purpose, this management guideline should be reviewed, implemented, and enforced by PLN staffs with relevant authorities and competencies specified in the ESMS Manual Section 3. Any changes to this guideline may potentially trigger the need to revise the associated procedures and other guidelines that connected with this guideline. Any update, deviation, or suggestion of this guideline will be followed up in alignment with the provision of Chapter 9 of the ESMS Manual (Management of Change).

[1] Government Regulation No. 70 Year 2009; Minister of Energy and Mineral Resources Regulation No. 14 Year 2012

3 Management Approach

What constitutes the efficient usage of energy is project- and context-specific but should be consistent with Good International Industry Practice (GIIP). The management effort and activities will be determined and implemented in a manner that is commensurate with the magnitude and cost of energy usage, and also target of energy efficiency that must be achieved, especially energy efficiency targets that set by the government (if any).

For example, an office for a substation with less than 10 people may not use significant amount of energy, thus the energy efficiency program may carry out as far as making policy and campaign of the use of light (energy saving). Power plant with cooling process may use significant amount of energy, thus a more comprehensive energy efficiency program is needed, which equipped with energy efficiency target, an energy mass balance and complete recording of energy use.

Energy management programs for projects and facilities that involves significant use of energy should include the following elements:

- Identification, and regular measurement and reporting of principal energy flows within a facility at unit process level during the construction and operation phase
- Preparation of mass and energy balance;
- Definition and regular review of energy performance targets, which are adjusted to account for changes in major influencing factors on energy use
- Regular comparison and monitoring of energy flows with performance targets to identify where action should be taken to reduce energy use
- Regular review of targets, which may include comparison with benchmark data, to confirm that targets are set at appropriate levels

4 Identification of Energy Use Sources and Mass and Energy Balance

4.1 Identification of Energy Use Sources

Identification of project activities that will consume energy is the first step in developing the energy efficiency management plan. A systematic analysis of energy efficiency improvement and cost reduction opportunities will be carried on for each identified source of energy use. Identification carried on for all project activities in each phase of the project that are predicted to consume energy in large amount and/or continuously. Data on energy consumption on each activity must be obtained and calculated (if necessary) based on direct calculation (usually for running activities) or based on reference (usually for planned activities).

Even though it varies in each project, usually the following process or activities will involve large amount or continuous consumption of energy:

- power generation;
- process and auxiliary systems, e.g., motors, pumps, and fans;
- process heating and cooling;
- compressed air systems, ventilation and air conditioning system; and

- lighting systems[2].

Energy management at the facility level should be viewed in the context of overall consumption patterns, including those associated with production processes and supporting utilities, as well as overall impacts associated with emissions from power sources.

4.2 Mass and Energy Balance

Once the energy use sources have been identified, mass and energy balance will be developed. Mass and energy balance should be calculated based on consumption of energy (i.e., electricity) and mass to energy (e.g., fuel, gas, etc.), and how the energy is used. This can be represented in a diagram, table or chart to show the breakdown of energy consumption and use on the site. Energy balance presentation may give a whole picture of energy stream, the potential energy efficiency measures during development of energy efficiency program and the performance of energy efficiency measures that has been implemented.

The mass and energy balance will be included in energy efficiency management plan (see Section 8) and will be continuously recorded and updated along with implementation of energy efficiency programs. This will provide clear understanding of the energy flow and to verify the energy use and calculation of total energy consumption. Based on the identification of energy use sources and the consumption calculation, potential energy efficiency improvements and cost reduction opportunities can be identified in order to achieve energy efficiency targets that will be determined (see **Section 5**)

5 Energy Efficiency Target

Energy efficiency targets spur the development and implementation of energy efficiency strategies and programs. In determining energy efficiency targets, there are several aspects that need to be considered, among others:

- National regulations or policies related with energy management, especially for energy.
- National regulation or policy related with Greenhouse Gas (GHG), especially for energy sector.
  It is to be noted that energy use is dominantly contributed to GHG inventory, therefore selecting target for energy efficiency should be aligned with GHG reduction target, if any.
- The potential energy efficiency improvements and cost reduction opportunities, which based on identification of energy use sources and to the extent technically and financially feasible.
- The targets shall be measurable, wherever possible to be quantitative in nature and can be measured with applicable tools. The targets may be based on the amount of energy use that can be reduced or energy saving.
- The targets can be compared with benchmark data. Widely accepted benchmarks that describe performance in quantitative terms are available. For example, energy use per ton product is often an accepted benchmark.

[2] WBG General EHS Guidelines, 2007

- The targets should be understandable, clearly communicated and can be transposed into actions that applicable in specific activity or sections of a project.

6 Energy Efficiency Measures

For any energy-using system, a systematic analysis of energy efficiency improvements and cost reduction opportunities should include a hierarchical examination of opportunities to:

- Demand/Load Side Management by reducing loads on the energy system
- Supply Side Management by:
  - Reduce losses in energy distribution
  - Improve energy conversion efficiency
  - Exploit energy purchasing opportunities
  - Use lower-carbon fuels

Some examples of measures for efficiency of energy use for general activities of PLN are among other:

- Cogeneration of heat and power;
- Trigeneration of heat, power, and cooling;
- Heat recovery;
- Process changes;
- Enhanced process control;
- Leak elimination;
- Insulation; and
- The use of more energy-efficient demand-side equipment (for example, electric motors, compressors, fans, pumps, heaters, and lighting fixtures)[3].

In a more generic type of business, changing the source of energy to renewable source is often recommended. In PLN's project context (particularly during operation), where the facility is powered by renewable in situ generated energy source, changes may be done by converting fossil fuelled vehicle/equipment with electrified or biomass-fuelled vehicle/equipment.

For project/activity that required to carry out Energy Management programs, energy saving implementation can be carried out through improvement of various items, among others:

- Air conditioning system;
- Lightning system;
- Supporting equipment;
- Production process; and
- Major energy utilization equipment.

The energy efficiency measures should also pay attention to the requirements of applicable national regulations, for examples the operation of air conditioning for state-owned buildings, lighting system arrangements, etc.

[3] Guidance Note for Borrower: ESS3 (2018)

Energy efficiency measures will be arranged in an Energy Efficiency Management Plan. The management plan can be part of the Project's ESMP, or to be a stand-alone document, whichever appropriate.

7 Monitoring and Review

The monitoring and review process serves as a tool to improve the energy efficiency performance. As part of the energy efficiency management, monitoring consists of periodical monitoring upon implementation of management activities (i.e., energy efficiency measures planned) and review of the overall management plan.

7.1 Management activities monitoring

Implementation of each energy efficiency measures should be monitored to ensure that management activities are carried out according to plan, ensure that project activities do not violate the provisions that have been regulated and determined, and serve as a tool for early notification for abnormal condition.

In developing a monitoring plan for activities that planned in the management plan, the following items should be taken into account, but are not limited to:

- Parameters to be monitored

  Parameters to be monitored are the benchmark or performance indicator that were determined when developing management plan.

- Equipment or facility to be monitored

  Equipment or facility to be monitored includes equipment/facility that directly used in the construction and operation of a project (e.g., such as diesel generator, air conditioner, lamps, refrigerators) and equipment that indirectly may impact energy efficiency in context of energy consumption (e.g., distribution cable, insulation apparatus, etc.)

- Frequency of monitoring.

  Energy use recording is commonly compiled in monthly basis to be reviewed quarterly, six monthly or annually. The review period will depend various factors, e.g., the target that has been determined, requirement from permits (if any), applicable rules and regulation for compliance, requirement from lenders, etc. Project/activity that obligated to carry out Energy Management is required to report the implementation of energy management to the government annually.

- Instruments that will be used for monitoring, including calibration requirements.

  The method and instrument to be used will comply with applicable regulation (if any), and will follow the best practice and manufacturer's specifications as technically feasible.

- The resources

  The monitoring will determine the minimum required qualifications of persons who will conduct the monitoring, recording and inspection.

7.2 Management plan review

An Energy Efficiency Management Plan is a living document where it has to refer to the relevant project phase. Its target and approaches should be reviewed, modified, or renewed as deemed necessary to find the best possible result.

The following are items that need to be determined related with management plan review:

- Schedule for regular review. The management plan should be reviewed regularly, minimum annually.
- The parties that are responsible for conducting the review, making an amendment, and the party approving the result of the review.

7.3 Energy Audit

Energy audit may be carried out to ensure that the energy use and efficiency programs are implemented on track and according to the applicable rules and regulations and for improvement of energy efficiency programs. Regular energy audit is required to be carried out for project/activities that required to carry out Energy Management, in minimum every three years.

8 Energy Efficiency Management Plan

The components of Energy Efficiency Management Plan are described as below.

8.1 Component 1: Objective(s)

The management plan should state the objective of implementing energy efficiency management plan activities. The main objective is to avoid or minimize the consumption of energy. Whenever possible, a quantitative objective is to be applied, e.g., percentage reduction in energy consumption.

8.2 Component 2: Documentation/inventory and Mass and Energy Balance

The management plan should include the documentation/inventory of equipment that consumes energy and the mass and energy balance of the whole project's activities. Associated facilities such as workers camps need to be included.

8.3 Component 3: Energy Efficiency Programs

This component includes proposed alternatives or initiatives that considered appropriate to reduce the use of energy or improve use efficiency to gain net saving or non-energy benefit. Each alternative or initiatives should have their clear rationales based on analyses done.

For project/activity that required to carry out Energy Management, the programs should include short-term programs, middle- and long-term programs, and continuously increasing awareness and knowledge of energy conservation techniques for employees/operators.

8.4 Component 4: Performance Indicator

Benchmarks in energy efficiency programs should be determined and included in the management plan. Widely accepted benchmarks that describe performance in quantitative

terms are available. For example, energy use per ton product is often an accepted benchmark. When these benchmarks are available and used in accordance with or to supplement GIIP, they can be used to evaluate project performance on the energy efficiency. If such benchmarks are not available, using a best-available-techniques approach may be appropriate to benchmark one engineering approach against another.

Other than determining the benchmark (if available), management performance indicators should be determined, which are be measurable, wherever possible to be quantitative in nature and can be measured with applicable tools.

8.5 Component 5: Institutional Responsibility

The management plan must identify and describe the responsibilities of all parties (PLN, contractor or other relevant third parties) and competent authorities. The management plan must also identify the roles and responsibilities of individual positions within these organization in implementing energy efficiency activities. For project/activity that required to carry out energy management programs, they are required to appoint an Energy Manager.

8.6 Component 6: Implementation Schedule

The management plan should detail an implementation schedule of the energy efficiency initiatives, taking into account the planned timing of the project stage.

8.7 Component 7: Cost Estimates

The management plan should include cost estimates for each of activity or set of activities implementation, including up-front investment costs and long-term recurrent costs.

8.8 Component 8: Monitoring, Recordkeeping and Reporting

The management plan must call for monitoring of energy efficiency initiatives that includes:

- Equipment/facility to be monitored;
- Energy consumption of monitored equipment/facility;
- The frequency of monitoring;
- Monitoring instrument/tool;
- The required qualifications of persons who will conduct the recording, monitoring and inspection; and
- Records that must be kept and the person responsible for keeping the records;
- Reports that will be prepared, to whom the reports are to be submitted for review, and the length of time records will be kept. This will include summary reports at intervals and to which institutional should be submitted

8.9 Component 9: Management Plan Review

The management plan should determine and state the schedule of management plan review (see **Section 7.2**). Regular review of the management plan and the party responsible for conducting a review, making an amendment, and the party approving the results of the review and the changes, must be stated in the management plan.

9 Procedures

In carrying out the Energy Efficiency Management Plan activities, some procedures that define work instruction level document may need to be prepared, such as energy calculation procedure, equipment procurement/replacement procedure, etc. In general, there are several key items that need to be included in the procedures to be developed are, but not limited to:

- Procedure Information, which includes procedure title, identification number, number of pages.
- Purpose. The procedure should provide information on the objective of the procedure.
- Scope. The procedure should inform the boundary of the procedure, aspects or parties that are covered under the procedure, and limitation to the procedure.
- Definition. The procedure should define the terms used in the procedure.
- Responsibilities. The procedure should identify and state the parties that will be responsible to follow the procedure, supervise the implementation of the procedure, provide training of the procedure, and parties that will regularly review and update the procedure.
- Work instructions. The procedure should list, in a simple and clear manners, the specific steps that will be taken to implement the procedure.
- Reference documents. The procedure should list the relevant documents that support, utilized as the basis or provide additional information for the procedure, including rules and regulation that need to be complied.
- Records. The procedure should provide information of the required documented outcomes of the procedures. Format for required records will be provided under the procedure, as necessary.
- Approving authority. The procedure should provide information on party that is responsible for approving the procedures.
- Issue date. The procedure should provide information on time of procedure issuance.
- Revision date. The procedure should provide information on time of procedure reviewed and revised (Procedures should be continually updated and improved).
- Other Environmental & Social components, if applicable. The procedure should include other environmental and social component, if applicable, related with the activities in the procedure. Example: PPE required for the activities must be clearly stated in the procedure.

10 References

- Government Regulation (GR) No. 70 Year 2009 on Energy Conservation
- Ministry of Energy and Mineral Resources Regulation N0. 14 Year 2012 on Energy Conservation
- World Bank Environmental and Social Framework (ESF), Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management
- World Bank Environmental and Social Framework (ESF) Guidance Note, Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management
- WBG Environmental, Health, and Safety (EHS) Guidelines, 2007
- IFC PS 3: Resource Efficiency and Pollution Prevention, 2012

- IFC Guidance Note 3: Resource Efficiency and Pollution Prevention, 2012
- SEEACTION: Energy Efficiency Program Impact Evaluation Guide