

Recommendation

ITU-T L.1260 (08/2024)

SERIES L: Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant

Power feeding and energy storage

Reference model of a factory energy management system

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Environment and ICTs, climate change, e-waste, energy efficiency; construction, installation and protection of cables and other elements of outside plant

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Recommendation ITU-T L.1260

Reference model of a factory energy management system

Summary

Recommendation ITU-T L.1260 presents a reference model for a factory energy management system that is operated to efficiently manage energy consumed in the factory. A factory energy management system should provide functions such as data collection and control, data processing and analysis, energy services, system management and security. The factory energy management system may be provided as a cloud computing service or operated on-site, depending on the factory's operating situation and environment.

History *

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Introduction

Global energy use has been increasing with industrial development. The industrial sector accounts for one-third of the energy consumed worldwide and the energy costs in the sector are increasing due to the rise of oil prices. Energy costs account for a large proportion of manufacturing costs in factory operations. Accordingly, to reduce manufacturing costs as well as to meet carbon neutrality, lots of efforts to save energy are made under great pressure both internally and externally in factory operations. The need for an energy management system is becoming essential for efficient energy utilization.

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Reference model of a factory energy management system

1 Scope

This Recommendation intends to present a reference model of a factory energy management system, which can be applied in various manufacturing environments. It does not target a specific manufacturing process or environment. This Recommendation covers the minimum functional elements of a factory energy management system that should be configured to manage energy consumed in factories and the functions that should be provided in general.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

None.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 application programming interface [b-ITU-T T.170]: Boundary across which a software application uses facilities of programming languages to invoke software services. These facilities may include procedures or operations, shared data objects and resolution of identifiers.

3.1.2 cloud computing [b-ITU-T Y.3500]: Paradigm for enabling network access to a scalable and elastic pool of shareable physical or virtual resources with self-service provisioning and administration on-demand.

NOTE – Examples of resources include servers, operating systems, networks, software, applications, and storage equipment.

3.1.3 edge computing [b-ITU-T Y.3073]: This refers to a strategy to deploy processing capability at network edge where end terminals are connected, and to perform the processing of data which is derived from and fed to the end terminals.

3.1.4 energy management system [b-ITU-T Y.2071]: A computer system comprising a software platform providing basic support services and a set of applications providing the functionality needed for the effective operation of electrical generation and transmission facilities so as to ensure adequate security of energy supply at minimum cost.

3.1.5 gateway [b-ITU-T Y.4101]: A unit in the Internet of things which interconnects the devices with the communication networks. It performs the necessary translation between the protocols used in the communication networks and those used by devices.

3.1.6 micro grid [b-ITU-T L.1205]: A local area grid connecting some buildings together at relatively short distances. It can be in AC or DC. In general a nano grid is lower than 100 kW and a micro grid can be of higher power.

3.1.7 utility [b-ITU-T Y.4251]: An entity providing services such electricity, gas, water and heating to the general public and/or to industrial and commercial entities.

3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 factory energy management system: A system that monitors and analyses energy consumption by collecting energy-related data on the production process and minimizes energy consumption by controlling facilities and improving the operation of the factory.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

API	Application Programming Interface
BLA	Business Level Agreement
CBAM	Carbon Border Adjustment Mechanism
DVD	Digital Versatile Disk
ERP	Enterprise Resource Planning
FEMS	Factory Energy Management System
GHG	Greenhouse Gas
MES	Manufacturing Execution System
MG-EMS	Micro Grid Energy Management System
NAS	Network Attached Storage
SMS	Short Message Service
UPS	Uninterruptible Power Supply

5 Conventions

None.

6 Overview of a factory energy management system

A factory energy management system (FEMS) monitors and analyses energy consumption by collecting energy-related data on the production process to efficiently manage the energy use of factories. Improvements in energy efficiency derived from the statistics and analysis of energy use can be applied to control and operate facilities in the production process. FEMS is operated to perform energy management by supporting the optimization of production activities that use energy from factories.

Various energy sources are used according to the production process in the factory. Utility facilities are specifically used to provide energy sources to production facilities. Energy is consumed while operating utility facilities as well as production facilities. Energy loss may inevitably occur in the production process, such as conversion loss caused by the operation of the utility, distribution loss caused by the energy system, and operation loss caused by the facility. Therefore, there is a need for a plan to reduce energy waste and use energy more efficiently by identifying the current energy consumption by energy source, process, and facility used in factories, and monitoring the operation information of each facility. In addition, it will be possible to establish energy management standards using the FEMS and to prepare an energy management system from a company-wide perspective through process operation optimization and energy consumption analysis.