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Energy Management Terminology
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Abstract

This document contains definitions and terms used in the Energy Management Working Group. Each term contains a definition(s), example, and reference to a normative, informative or well know source. Terms originating in this draft should be either composed of or adapted from other terms in the draft with a source. The defined terms will then be used in other drafts as defined here.

Table of Contents

1. Introduction

Within Energy Management there are terms that may seem obvious to a casual reader but in fact require a rigorous and sourced definition. To avoid any confusion in terms among the working group drafts, one glossary / lexicon of terms should exist that all drafts can refer to. This will avoid a review of terms multiplied across drafts.

This draft will contain a glossary of definitions of terms that can be agreed upon by the working group outside of the context of drafts and then included in or sourced to this draft.

Each term will contain a definition(s), a normative or informative reference, an optional example, an optional comment(s) listed a note(s).

All terms should be rooted with a well-known reference. If a definition is taken verbatim from a reference then the source is listed in square brackets. If a definition is derived from a well-known reference then the source is listed as "Adapted from" with the reference listed in square brackets. If a defined term is newly defined here the reference will indicate as such by stating "herein" and if applicable list any composing terms from this document.

When applicable the [IEEE100] was used as the preferred source. If a term was not available from [IEEE100], then [IEC60050] was used. When these were multiple items from [IEEE100], [IEC60050] or [ISO50001], there were all included.

2. Terminology

Device

A piece of electrical or non-electrical equipment.

Reference: Adapted from [IEEE100]

Component

A part of an electrical or non-electrical equipment (Device).

Reference: Adapted from [ITU-T-M-3400]

Energy Management

Energy Management is a set of functions for measuring, modeling, planning, and optimizing networks to ensure that the network elements and attached devices use energy efficiently and is appropriate for the nature of the application and the cost constraints of the organization.

Reference: Adapted from [ITU-T-M-3400]

Example: A set of computer systems that will poll electrical meters and store the readings

NOTES:

1. Energy management refers to the activities, methods, procedures and tools that pertain to measuring, modeling, planning, controlling and optimizing the use of energy in networked systems [NMF].

2. Energy Management is a management domain which is congruent to any of FCAPS areas of management in the ISO/OSI Network Management Model [TMN]. Energy Management for communication networks and attached

devices is a subset or part of an organization's greater Energy Management Policies.

Energy Management System (EnMS)

An Energy Management System is a combination of hardware and software used to administer a network with the primary purpose being Energy Management.

Reference: Adapted from [1037C]

Example: A single computer system that polls data from devices using SNMP

NOTES:

1. An Energy Management System according to [ISO50001] (ISO-EnMS) is a set of systems or procedures upon which organizations can develop and implement an energy policy, set targets, action plans and take into account legal requirements related to energy use. An EnMS allows organizations to improve energy performance and demonstrate conformity to requirements, standards, and/or legal requirements.

2. Example ISO-EnMS: Company A defines a set of policies and procedures indicating there should exist multiple computerized systems that will poll energy from their meters and pricing / source data from their local utility. Company A specifies that their CFO should collect information and summarize it quarterly to be sent to an accounting firm to produce carbon accounting reporting as required by their local government.

3. For the purposes of EMAN, the definition from [1037C] is the preferred meaning of an Energy Management System (EnMS). The definition from [ISO50001] can be referred to as ISO Energy Management System (ISO-EnMS).

ISO Energy Management System

Energy Management System as defined by [ISO50001]

Reference: herein

Energy

That which does work or is capable of doing work. As used by electric utilities, it is generally a reference to electrical energy and is measured in kilo-watt hours (kWh).

Reference: [IEEE100]

NOTES
1. Energy is the capacity of a system to produce external activity or perform work [ISO50001]

Power

The time rate at which energy is emitted, transferred, or received; usually expressed in watts (or in joules per second).
Reference: [IEEE100]

Demand

The average value of power or a related quantity over a specified interval of time. Note: Demand is expressed in kilowatts, kilovolt-amperes, kilovars, or other suitable units.

Reference: [IEEE100]

NOTES:
1. typically kilowatts

2. Energy providers typically bill by Demand measurements as well as for maximum Demand per billing periods. Power values may spike during short-terms by devices, but Demand measurements recognize that maximum Demand does not equal maximum Power during an interval.

Power Characteristics

Measurements of the electrical current, voltage and frequencies at a given point in an electrical power system.

Reference: Adapted from [IEC60050]

NOTES:

1. Power Characteristics is not intended to be judgmental with respect to a reference or technical value and are independent of any usage context.

Power Quality

Characteristics of the electric current, voltage and frequencies at a given point in an electric power system, evaluated against a set of reference technical parameters. These parameters might, in some cases, relate to the compatibility between electricity supplied in an electric power system and the loads connected to that electric power system.

Reference: [IEC60050]

NOTES:
1. Electrical characteristics representing power quality information are typically required by customer facility energy management systems. It is not intended to satisfy the detailed requirements of power quality monitoring. Standards typically also give ranges of allowed values; the information attributes are the raw measurements, not the "yes/no" determination by the various standards.

Reference: [ASHRAE-201]

Electrical Equipment

A general term including materials, fittings, devices, appliances, fixtures, apparatus, machines, etc., used as a part of, or in connection with, an electric installation.

Reference: [IEEE100]

Non-Electrical Equipment (Mechanical Equipment)

A general term including materials, fittings, devices appliances, fixtures, apparatus, machines, etc., used as a part of, or in connection with, non-electrical power installations.

Reference: Adapted from [IEEE100]

Energy Object

An Energy Object (EO) is a piece of equipment that is part of or attached to a communications network that is monitored, controlled, or aids in the management of another device for Energy Management.

Reference: herein

Electrical Energy Object

An Electrical Energy Object (EEO) is an Energy Object that is a piece of Electrical Equipment

Reference: herein, Electrical Equipment

Non-Electrical Energy Object

A Non-Electrical Energy Object (NEEO) an Energy Object that is a piece of Non-Electrical Equipment.

Reference: herein, Non-Electrical Equipment.

Energy Monitoring

Energy Monitoring is a part of Energy Management that deals with collecting or reading information from Energy Objects to aid in Energy Management.

Reference: herein

NOTES:
1. This could include Energy, Power, Demand, Power Quality, Context and/or Battery information.

Energy Control

Energy Control is a part of Energy Management that deals with directing influence over Energy Objects.

Reference: herein

NOTES:
1. Typically in order to optimize or ensure its efficiency.

Provide Energy:

An Energy Object "provides" energy to another Energy Object if there is an energy flow from this Energy Object to the other one.
Reference: herein

Receive Energy:

An Energy Object "receives" energy from another Energy Object if there is an energy flow from the other Energy Object to this one.
Reference: herein

Power Interface

A Power Interface (or simply interface) is an interconnection among devices or components where energy can be provided, received or both.

Reference: herein

Power Inlet

A Power Inlet (or simply inlet) is an interface at which a device or component receives energy from another device or component.

Reference: herein

Power Outlet

A Power Outlet (or simply outlet) is an interface at which a device or component provides energy to another device or component.

Reference: herein

Energy Management Domain

An Energy Management Domain is a set of Energy Objects where all objects in the domain are considered one unit of management.
Reference: herein

Example: All EEO's drawing power from the same distribution panel with the same AC voltage within a building, or all EEO's in a building for which there is one main meter, would comprise an Energy Management Domain.

NOTES:
1. Typically, this set will have as members all EO's that are powered from the same source.

Energy Object Identification

Energy Object Identification is a set of attributes that enable an Energy Object to be: uniquely identified among all Energy Management Domains; linked to other systems; classified as to type, model, and or manufacturer.

Reference: herein

Energy Object Context

Energy Object Context is a set of attributes that allow an Energy Management System to classify the use of the Energy Object within an organization.

Reference: herein

NOTES:
1. The classification could contain the use and/or the ranking of the Energy Object as compared to other Energy Objects in the Energy Management Domain.

Energy Object Relationship

An Energy Object Relationship is a functional association among Energy Objects

NOTES
1. Relationships can be named and could include Aggregation, Metering, Power Source, and Proxy.

2. The Energy Object is the noun or entity in the relationship with the relationship described as the verb.

Example: If EO x is a piece of Electrical Equipment and EO y is an electrical meter clamped onto x's power cord, then x and y have a Metering Relationship. It follows that y meters x and that x is metered by y.

Reference: Adapted from [CHEN]

Aggregation Relationship

An Aggregation Relationship is an Energy Object Relationship where one Energy Object aggregates the Energy Management information of one or more other Energy Objects.
These Energy Objects are referred to as having an Aggregation Relationship.

Reference: herein

NOTES:
1. Aggregate values may be obtained by reading values from multiple Energy Objects and producing a single value of more significant meaning such as average, count, maximum, median, minimum, mode and most commonly sum [SQL].

Metering Relationship

A Metering Relationship is an Energy Object Relationship where one Energy Object measures the Power or Energy of one or more other Energy Objects.

These Energy Objects are referred to as having a Metering Relationship.

Reference: herein

Example: a PoE port on a switch measures the Power it provides to the connected Energy Object.

Power Source Relationship

A Power Source Relationship is an Energy Object Relationship where one Energy Object is the source of or distributor of Power to one or more other Energy Objects.

These Energy Objects are referred to as having a Power Source Relationship.

Reference: herein

Example: a PDU provides power for a connected device.

Proxy Relationship

A Proxy Relationship is an Energy Object Relationship where one Energy Object provides the Energy Management capabilities on behalf of one or more other Energy Objects.

These Energy Objects are referred to as having a Proxy Relationship.

Reference: herein

Example: a protocol gateways device for Building Management Systems (BMS) with subtended devices.

Energy Object Parent

An Energy Object Parent is an Energy Object that participates in an Energy Object Relationship and is considered as providing the capabilities in the relationship.

Example: in a Metering Relationship, the Energy Object that is metering is called the Energy Object Parent, while the Energy Object that is metered is called the Energy Object Child.

Reference: herein

Energy Object Child

An Energy Object Child is an Energy Object that participates in an Energy Object Relationship and is considered as receiving the capabilities in the relationship.

Example: in a Metering Relationship, the Energy Object that is metering is called the Energy Object Parent, while the Energy Object that is metered is called the Energy Object Child.

Reference: herein

Power State

A Power State is a condition or mode of a device that broadly characterizes its capabilities, power consumption, and responsiveness to input.

Reference: Adapted from [IEEE1621]

NOTES:

1. A Power State can be seen as a power setting of an Energy Object that influences the power consumption, the available functionality, and the responsiveness of the Energy Object.

2. A Power State can be viewed as one method for Energy Control

Power State Set

A collection of Power States that comprise one named or logical grouping of control is a Power State Set.

Reference: herein

Example: The states {on, off, and sleep} as defined in [IEEE1621], or the 16 power states as defined by the [DMTF] can be considered two different Power State Sets.

Nameplate Power

The Nameplate Power is the nominal Power of a Device as specified by the Device manufacturer.

Reference: herein

NOTES:

1. This is typically determined via load testing and is specified by the manufacturer as the maximum value required for operating the device. This is sometimes referred to as the worst-case Power. The actual or average Power may be lower. The Nameplate Power is typically used for provisioning and capacity planning.

3. Security Considerations

None

4. IANA Considerations

None

5. Acknowledgments

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6. References

Normative References

Informative References

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