Basics: Energy Management Systems according to ISO 50001

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AGENDA

Introduction Envidatec

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Corporate Development of the Envidatec GmbH

- Company Envidatec founded out of E.ON as an independent business to be a center of expertise on energy management systems.
- Central area of expertise is energy efficiency analysis, individual tailoring of solutions to reduce costs, and the implementation of said solutions.
- Service provision, hardware and software for efficient energy use.

- 2001 Foundation of the central office in Hamburg for expertise on the efficient use of energy
- 2004 Starting a branch office in Vienna (for R&D)
- 2007 Foundation of the omtec Energiemanagement GmbH, Vienna
- 2009 Establishment of: “Energy-efficient into the Future! – DIN EN 16001“
- 2010 Starting subsidiary company Envidatec Ost in Yekaterinburg, Russia
- 2011 Start of OpenJEVis (open source community)
- 2012 Establishment of: “Energy-efficient into the Future! – DIN EN ISO 50001“

Company Structure Envidatec

http://www.openstreetmap.org/

- Envidatec GmbH
- OOO Envidatec Ost, Yekaterinburg
- omtec Energiemanagement GmbH, Vienna
- Partner Companies

National References

International References

Energy Management System ISO 50001

Basics

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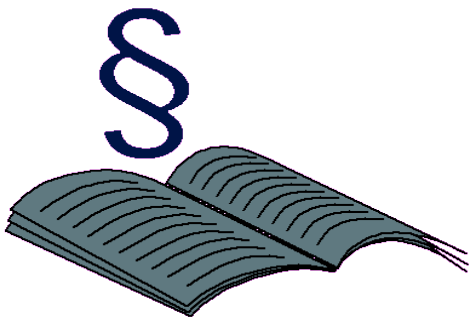
Energy Management System Legal Framework (Selection)

- Energieeinsparungsgesetz EnEG, Energy Savings Law
- Energieeinsparverordnung EnEV, Energy Savings Ordinance
- Erneuerbare-Energien-Gesetz EEG, Renewable Energy Law
- Erneuerbare-Energien-Wärmegesetz EEWärmeG, Law on Renewable Energy in Heating
- Bundes-Immissionsschutzgesetz BimSchG, Federal Emissions Control Law
- Energieeffizienzgesetz EnEfG (Entwurf), Energy Efficiency Law (Draft)

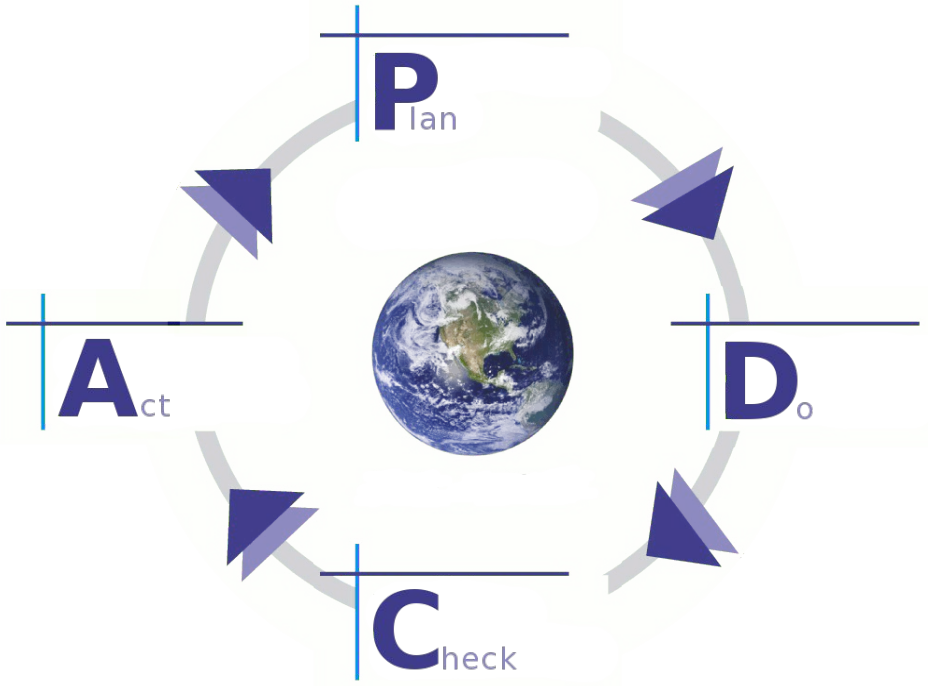


Energy Management System Introduction of Regulatory System in Germany

Stage 1 (2008)	**Advocacy for the Introduction of Energy Management Systems (EnMS)**
Stage 2 (2011)	**Energy Data Recording and Systematization; Development of Energy Management Structures (Conditions for an Energy Tax Rebate - Transitional Phase)**
Stage 3 (2012)	**Introduction of Management Processes; aimed at bringing about continuous improvement**
Stage 4 (2013)	**Updates to Energy Management Systems (Mandatory for Companies; will be a condition for Energy Tax Rebates)**

Energy Management System – the Origin of ISO 50001

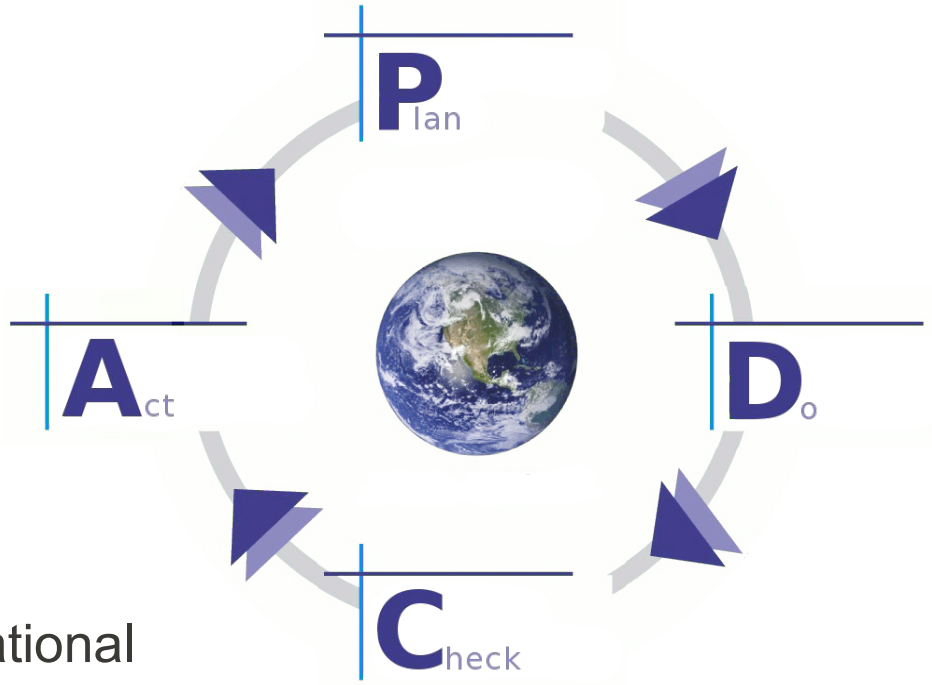
- DIN EN 16001 effective in Europe since August 2009
  - Nearly identical to ISO 50001 (definition slide follows)
  - Same structure as ISO 14001 (definition slide follows)
- Related to VDI 4602 (German engineering norm about energy management, definition follows)
- Based on PDCA-cycle (next slide)



Energy Management System – the Origin of ISO 50001

Plan:

Definition of objectives and processes necessary to deliver results in line with the energy policies of the organization.



Do:

Introduction of defined processes.

Check:

Monitor and measure processes against energy policy principles, strategic and operational objectives, statutory requirements and documentation of results.

Act:

Take actions to continually improve the EnMS.

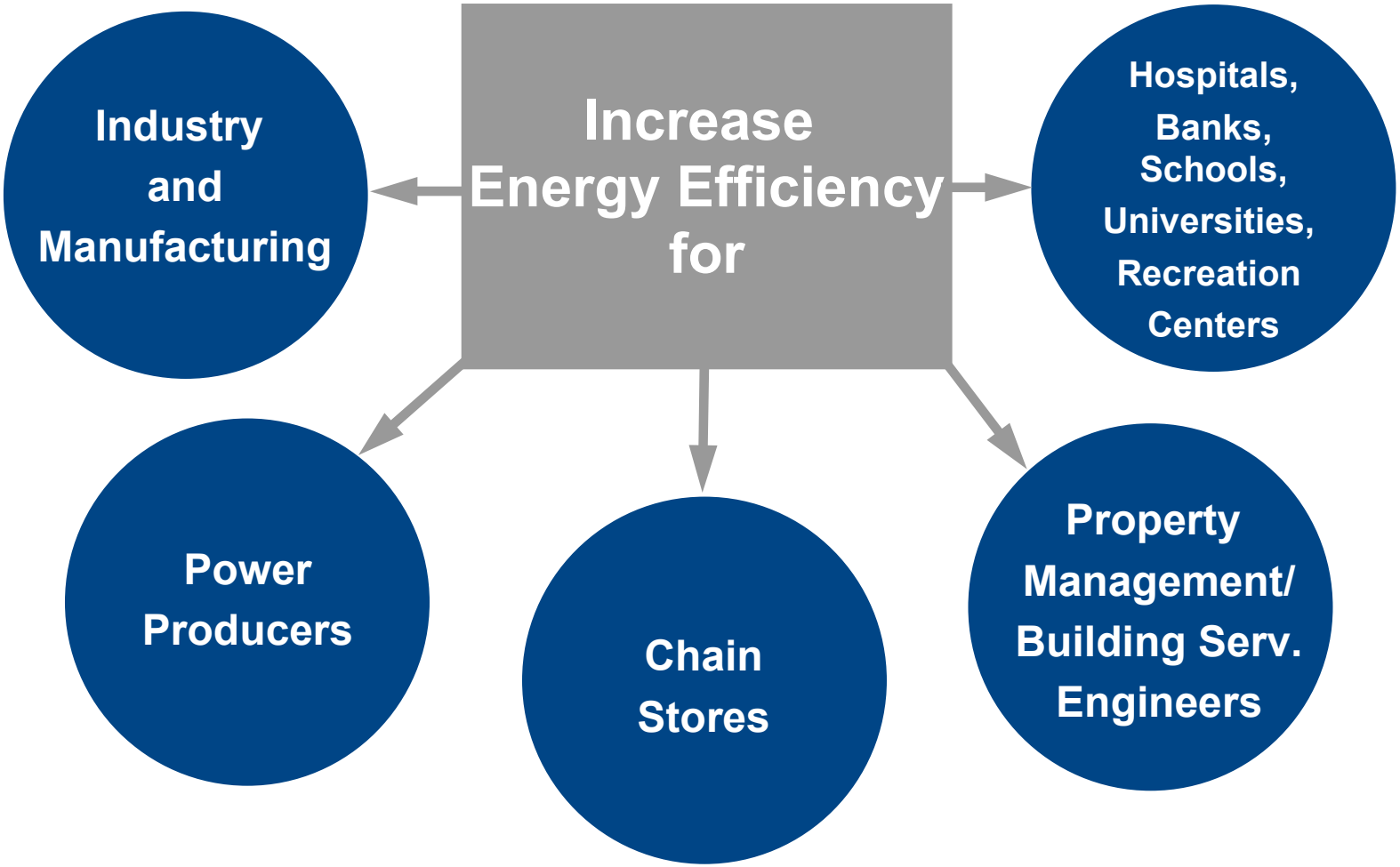
Energy Management System ISO 50001 – Central Ideas

Objectives

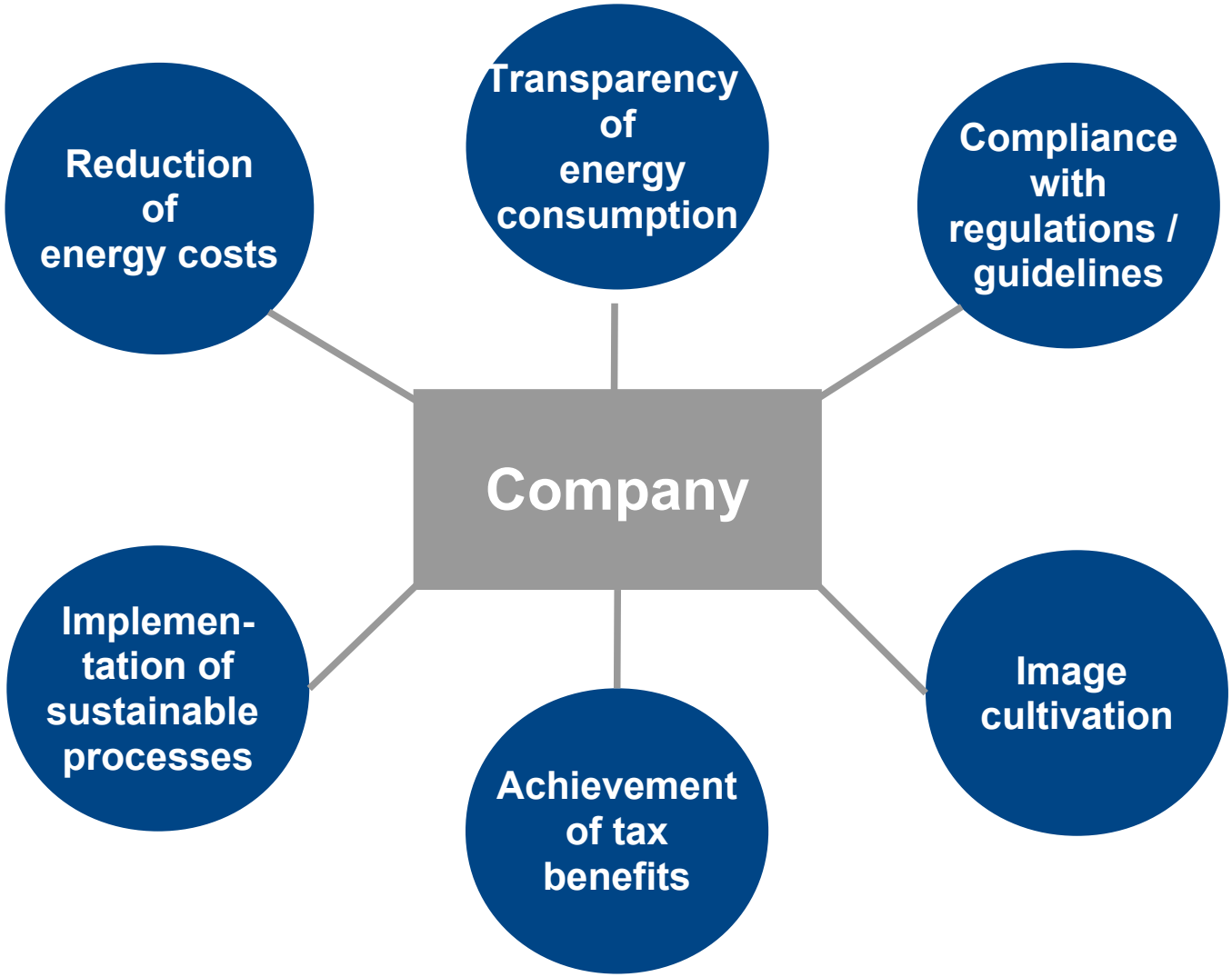
- To offer support in the development of systems and processes which improve energy efficiency
  - Systematic energy management leads to:
    - Reduction of costs
    - Reduction of greenhouse gas emissions
- Develop a corporate energy policy
- Define aims and processes
- Take into account necessary measures to improve output

→ Success is only attainable with the support of all departments, at all levels, including top-level management

Energy Management System ISO 50001 – Target Groups



Energy Management System ISO 50001 – Benefit



Energy Management System ISO 50001

Terms and Definitions

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Energy Management System ISO 50001 – Definition

From ISO 50001:

“Set of interrelated or interacting elements of an organization to establish energy policy and objectives and to achieve those objectives.”

From VDI 4602:

“Energy management is the forward-looking, organized and systematic coordination of the procurement, conversion, distribution and utilization of energy in order to cover requirements and which takes ecological and economic objectives into consideration.”

“The term “energy management system” covers not only the organizational and information structures required for implementing the energy management system but also the technical resources needed for this (software and hardware, for example).”

ISO 50001 – Terms and Definitions

Action Plan (3.1)

Activities with defined responsibilities and a beginning and end.

Boundaries (3.2)

Physical or site limits and/or organizational limits as defined by the organization.

Continual Improvement (3.11)

Recurrent activity to enhance energy performance and the energy management system.

NOTE 1: Establishing objectives and finding opportunities for improvement is a continual process. It can achieve improvements in overall energy performance, consistent with the organization's energy policy.

NOTE 2: Adapted from ISO 9001

ISO 50001 – Terms and Definitions

Energy Policy (3.4)

- Overall intentions and direction of an organization related to its energy performance
- formally expressed by top management (provides a framework for action)

Energy (3.5)

Electricity, fuel, steam, heat, compressed air, renewables and other like media.

ISO 50001 – Terms and Definitions

Energy use (3.6)

Manner or kind of application of energy.

NOTE 1: ventilation, heating, processes, production lines
NOTE 2: The quantity is expressed as energy consumption.

Energy baseline (3.7)

Quantitative reference providing a basis for comparison of energy performance

Energy efficiency (3.8)

Engineering accepted use of the term by the organization.

NOTE: conversion efficiency, energy required/energy used etc.

ISO 50001 – Terms and Definitions

Energy profile (3.10)

Status of the organization's energy performance.

Energy performance (3.9)

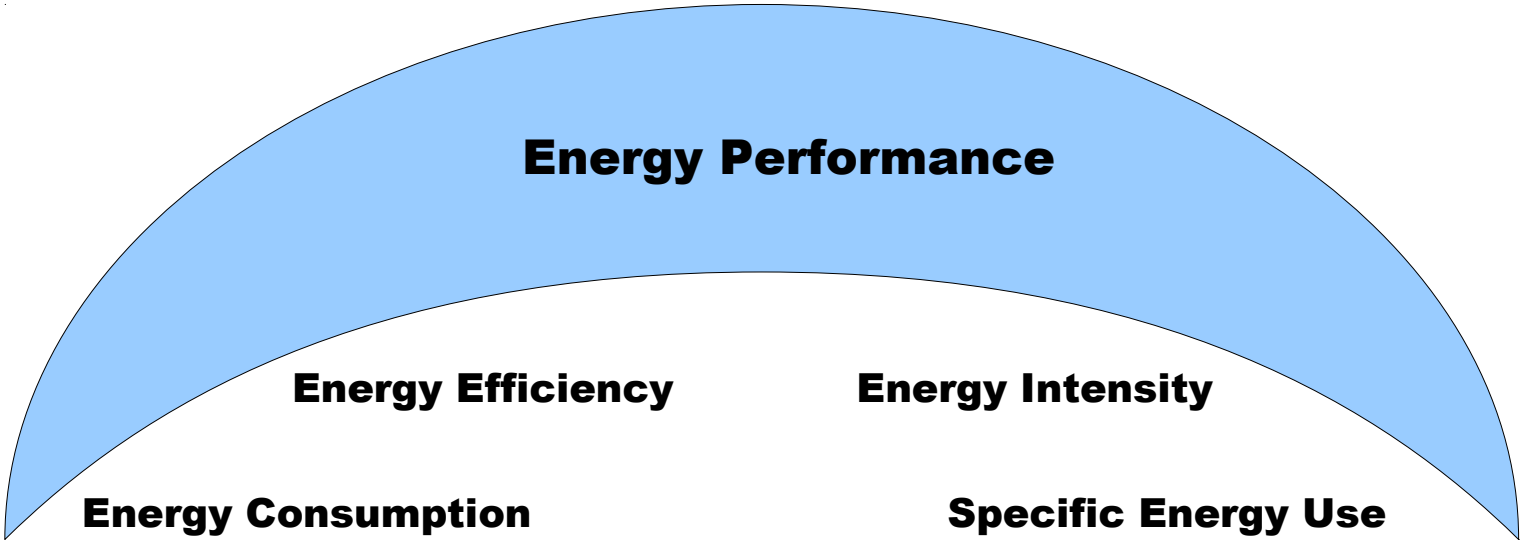
Measurable results related to energy (see next slide).

Examples: energy efficiency, energy intensity (the inverse of energy efficiency), specific energy use, etc.

Energy performance indicator (EnPI) (3.12)

Quantitative index of energy performance as defined by the organization.

ISO 50001 – Terms and Definitions



ISO 50001 – Terms and Definitions

Nonconformity (3.13)

Non-fulfillment of a requirement.

Objective (3.14)

Desired outcome or achievement set to meet the organization's policy related to energy.

Organization (3.15)

Company, corporation, firm, enterprise, authority or institution, or part or combination thereof, whether incorporated or not, public or private, that has its own functions and administration and that has the authority to control its energy use and consumption.

Team (3.24)

person or person(s) responsible for effective implementation of the energy management system activities and delivering energy performance improvements

ISO 50001 – Terms and Definitions

Procedure (3.16)

Specified way to carry out an activity or a process.

NOTE 1: Procedures can be documented or not.

NOTE 2: When a procedure is documented, the term “written procedure” or “documented procedure is frequently used. The document that contains a procedure can be called a "procedure document.”

Significant energy use (3.17)

Energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement.

Target (3.18)

Measurable performance requirement to be set and met to achieve part or all of an objective.

ISO 50001 – Terms and Definitions

Document (3.19)

Information and its support medium

NOTE 1: The medium can be paper, magnetic, electronic or optical computer disc, photograph or master sample or a combination thereof.

NOTE 2: A set of documents, for example specifications and records, is frequently called "documentation."

NOTE 3: Some requirements (e.g. the requirements to be readable) relate to all types of documents, however, there can be different requirements for specifications (e.g. the requirements to be revision controlled) and records (e.g. the requirement to be retrievable).

ISO 50001 – Terms and Definitions

Record (3.20)

Document stating results achieved or providing evidence of activities performed.

NOTE: Records can be used, for example, to document traceability and to provide evidence of verification, preventive action and corrective action.

Top management (3.21)

Person or group of people who directs or controls an organization at the highest level.

NOTE: Top management controls the organization defined within the scope of the management system for energy.

ISO 50001 – Terms and Definitions

Corrective action (3.22)

Action to eliminate the cause of a detected nonconformity or other undesirable situation.

NOTE: There can be more than one cause for a nonconformity.

Preventive action (3.23)

Action to eliminate the cause of a potential nonconformity or other undesirable potential situation.

NOTE 1: There can be more than one cause for a potential nonconformity.

NOTE 2: Preventive action is taken to prevent occurrence whereas corrective action is taken to prevent recurrence.

Energy Management System ISO 50001
Structure Overview

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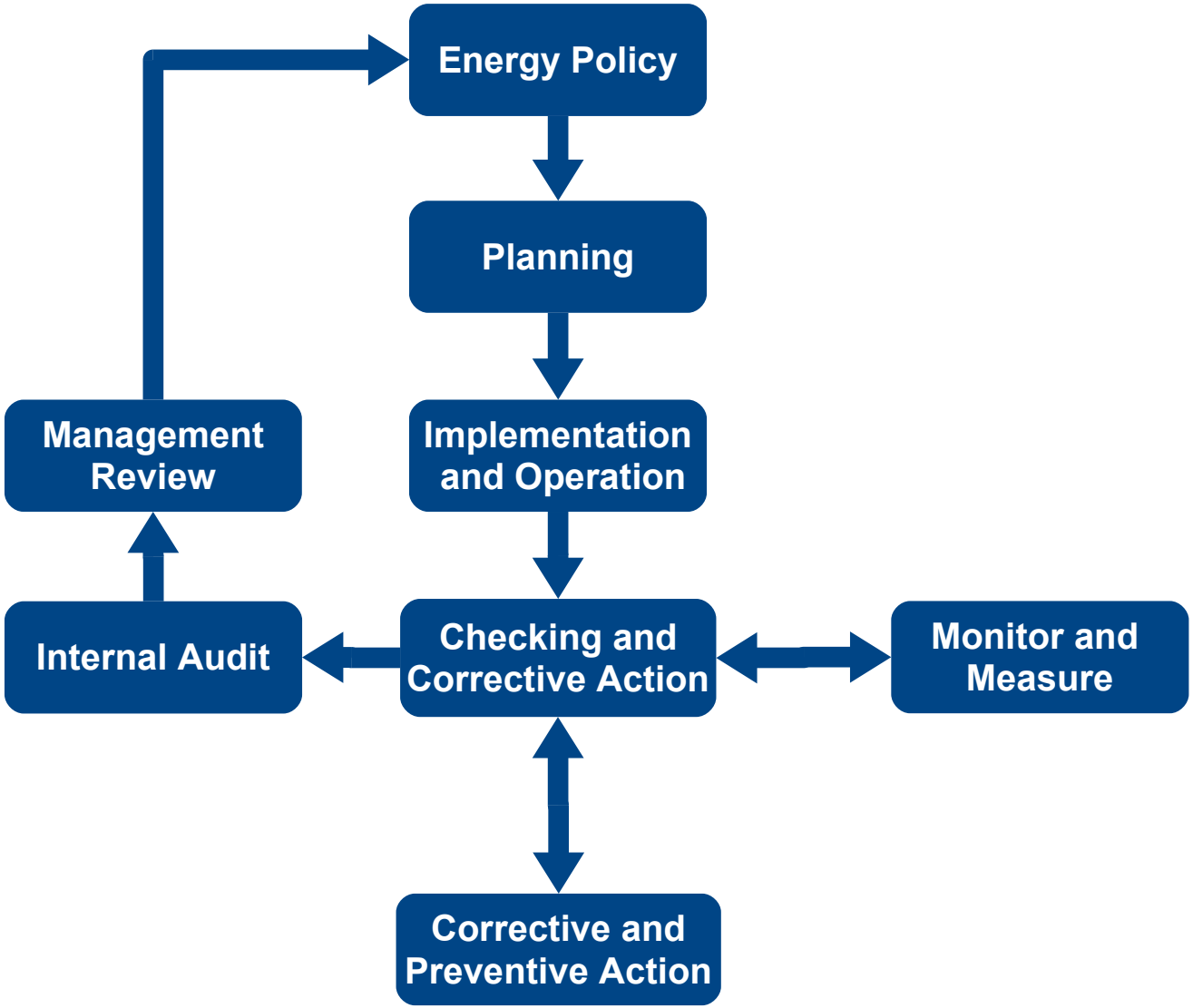
Energy Management System ISO 50001 – Overview



Energy Management System ISO 50001 – Topics

Energy Policy

- Determine energy policy objectives with those responsible (Top Management)
- Cover all aspects of energy implementation
- Define areas affected
- Determine which parties are responsible
- Commit to continuous improvement
- Specify resources needed to achieve objectives
- Supply adequate information

Energy Management System ISO 50001 – Topics

Planning

- Investigation and testing of existing energy implementation
- Analysis of energy usage
- Estimation of expected energy usage
- Identification of areas for potential improvement
- Identification of all persons and their activities, which affect total energy usage
- Accounting for compliance with legal requirements
- Determination of responsibilities
- Development of measurable, documented and (within a time frame) achievable goals

Energy Management System ISO 50001 – Topics

Implementation and Operation

- Top Management: availability of necessary resources (personnel, technical and financial capital, know-how)
- Personnel: provided with adequate knowledge (energy policies, requirements of the EnMS, influence of their work on total energy usage, etc.) → Provision of Training
- Internal and external communication
- Documentation describing the organization's EnMS
- Communicate work flows and plans of action that guarantee compliance with the firm's energy policy

Energy Management System ISO 50001 – Topics

Checking and Corrective Action

The organization shall ensure that:

- the key characteristics of its operations that determine energy performance are monitored, measured and analyzed
- the equipment used in monitoring and measuring of key characteristics provides data which is accurate and repeatable

Key characteristics shall include at a minimum:

- the energy profile,
- significant energy uses and
- effectiveness of the action plans in achieving objectives and targets.

Energy Management System ISO 50001 – Topics

Checking and Corrective Action

implementation

JEMS MY Internet Portal

JEMS Inhouse Solution

tools

JEGraph

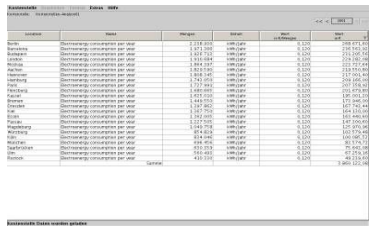
Graphical curve display

JEBench

Benchmarking Tool

JEAlarm

Limit Value Monitoring



JEReport

Reporting

Energy Management System ISO 50001 – Topics

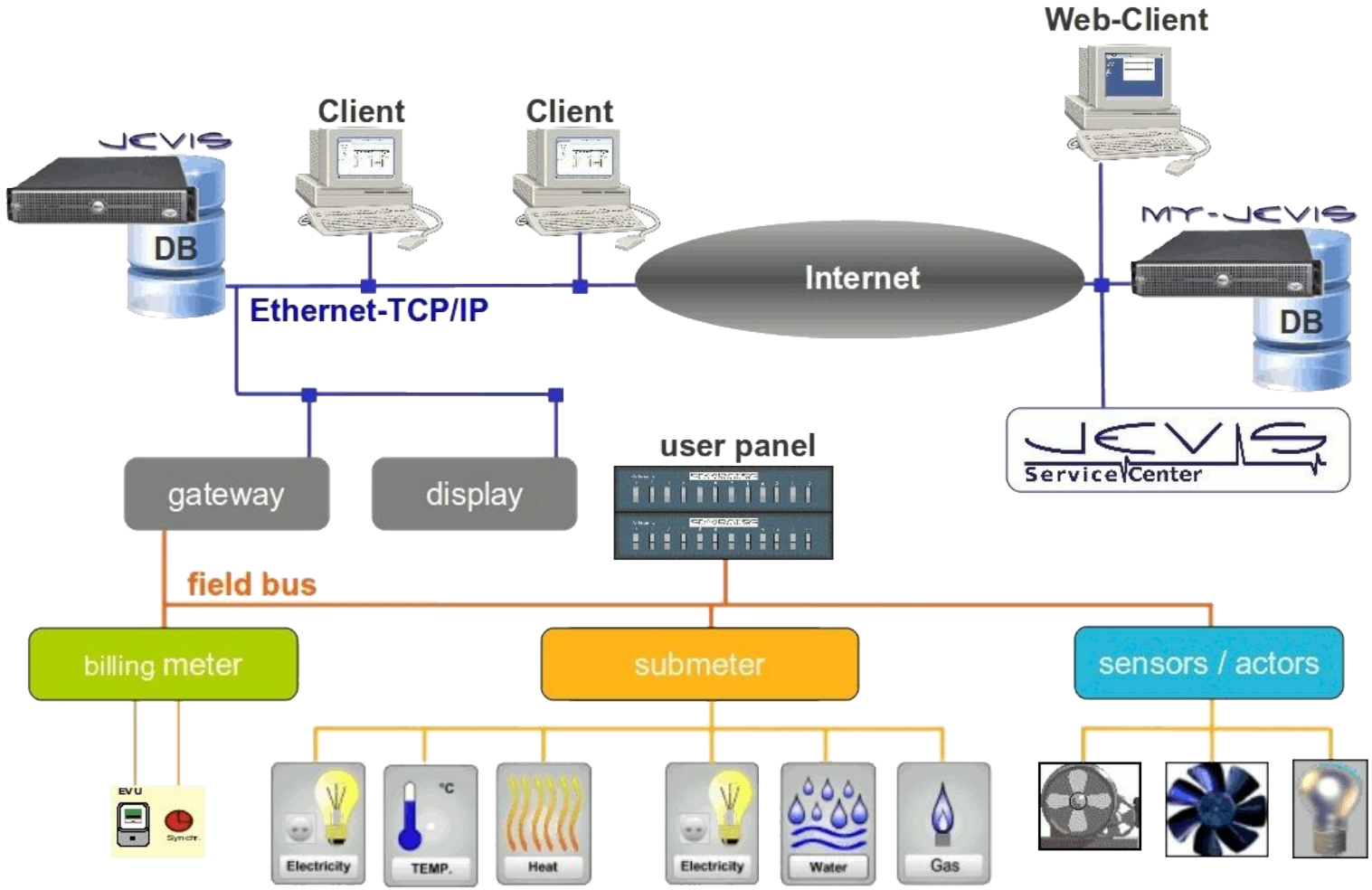
Monitor and Measure

- Evaluation and description of the requirements of the organization's energy program
- Periodic measurement, oversight and recording of central energy uses, as well as the factors affecting them

monitoring device VIDA350

Energy Management System ISO 50001 – Topics

Monitor and Measure



Energy Management System ISO 50001 – Topics

Corrective and Preventive Action

- Detect and investigate nonconformities
- Resolve them in a suitable manner within a defined time frame
- Initiate corrective and preventive actions appropriate to the magnitude of the actual or potential problems and the energy consequences encountered
- Reviewing the effectiveness of the action taken

Energy Management System ISO 50001 – Topics

Internal Audit

Examples of subjects for consideration by internal auditing include:

- proper implementation of energy management programs, processes and systems;
- opportunities for continual improvement;
- capability of processes and systems;
- use of information technology.
- performed by employees and/or by external parties appointed by the organization.
- The person or persons performing the audits are qualified, experienced, objective, impartial and independent of the area of the organization to be audited.

Energy Management System ISO 50001 – Topics

Management Review

- The top Management shall review the EnMS at predetermined intervals
- The management review is to be documented and presented
- Input parameters:
  - Follow-up actions from previous management reviews
  - Review of the energy policy
  - Review of energy performance (and EnPI)
  - The extent to which the energy objectives and targets have been met
  - Evaluation of its conformity with legal requirements and changes within
  - Status of corrective and preventive actions
  - Energy management system audit results
  - Forecast of energy related performance
  - Recommendations for improvements

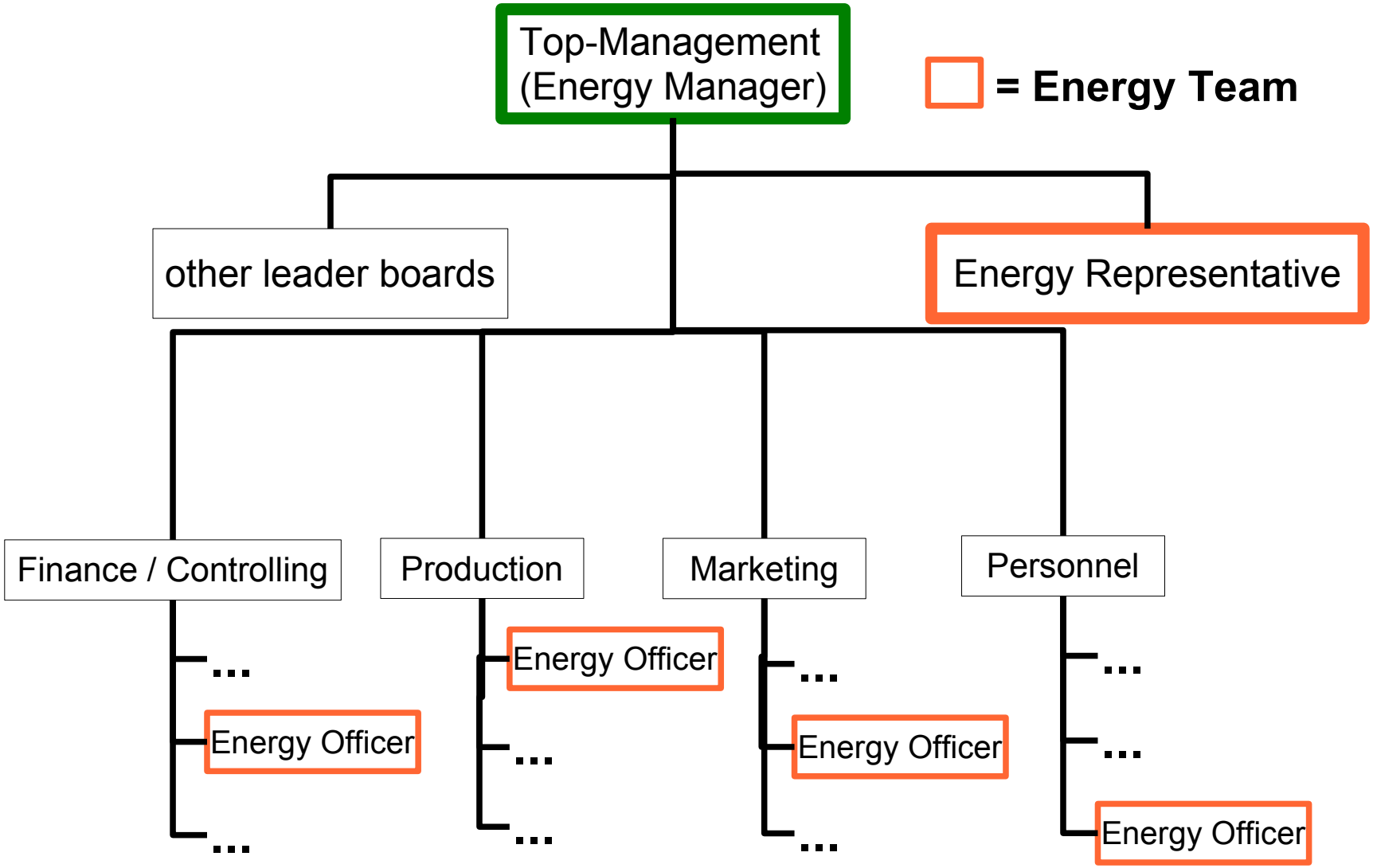
Energy Management System ISO 50001 – Topics

Management Review

Results of Management Review:

- Changes in energy-related performance of the organization
- Changes in energy policy
- Changes in EnPIs
- Changes in strategic and operational objectives and other elements of EnMS in accordance with the commitment of the organization to continual improvement
- Changes providing resources

The Special Role of the Energy Team



Energy Management System ISO 50001

Motivation and Typical Weaknesses

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Motivation and Communication / Internal Energy Teams

Energy management systems lead to:

- Reduced costs
- Reduced energy consumption
- Increase of productivity
- Reduced CO_2 emissions
- Environmental protection
- Increase of competitiveness
- Improvement of the external representation of the company

Motivation and Communication / Internal Energy Teams

Energy management systems lead to:

- Improved communication between different departments of the company
- More efficient workflow
- Awareness of all, which department needs specific amount of energy
- Implementation of measurements can be validated with all affected people before

Typical Weaknesses and Stumbling Blocks

- Insufficient communication between departments
  - Action: well mixed energy team with people from all relevant departments
- Inexistent transparency
  - Action: Analysis of energy flows, energy consumers and their responsible person
- Ignorance about legal requirements
  - Development and maintenance of a legal registry

Typical Weaknesses and Stumbling Blocks

- Lack of command authority
  - Action: Must be covered by the energy manager

- Lack of awareness
- Lack of knowledge
  - Action: Periodical training of employees, conversations with the employees, proposals of employees

Questions?

Suggestions?

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Thank you for your attention

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