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Sustainable Agri-Food Production and Supply Chain Management

ENERGY MANAGEMENT AND ITS STANDARD: CONCEPTS, APPLICATIONS AND ENVIRONMENTAL ASPECTS

Prof. Dr. Arif HEPBAŞLI

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Topic: *ERASMUS-JMO-2021-MODULE*

Energy Management and Its Standard: Concepts, Applications and Environmental Aspects: Part 1

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Some Remarks

- There are a total of 17 Study Questions here.
- Students are strongly recommended to

  a) go through the presentation first, and

  b) focus on study questions then.

Outline

- Introduction
- Some Terms Used
- Why an Energy Management System (EnMS) Structure
- Conducting an Energy Management Program (A Short Way)
- Establishing an Energy Management System (EnMS)
- EnMS Matrix
- Energy Saving Tips
- Concluding Remarks
- References

Changes in the World

In 1960s: Everything for production

In 1970s: Everything for production + cost

In 1980s: Everything for production + cost + quality

In 1990s: Everything for production + cost + quality+ term

In 2000s: Everything for production + cost + quality + term + management and environmental awareness

ISO 50001 Energy Management System Standard

Source: [1]

Some Terms Used

- Energy saving (conservation)/Energy efficiency
- Objective/Target
- Mission/Vision
- Energy/Exergy
- Advisor/Consultant
- Energy use/Energy consumption

- Energy
- Management/Manager
- System
- **Tonne of Oil Equivalent (TOE)**

Energy consumption ???

- Is the term "energy consumption"

  technically correct ?

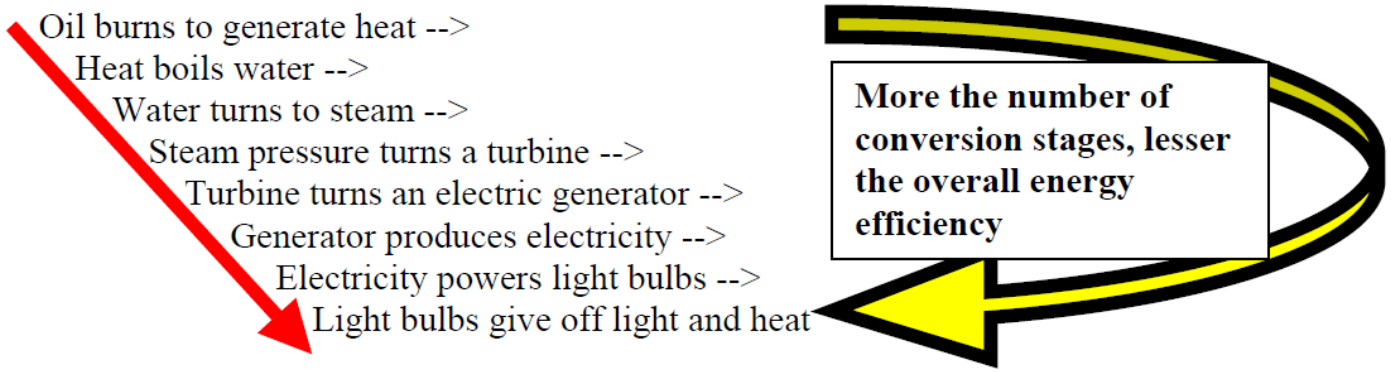
Source: [1]

Energy consumption ???

- It is a widely used term, although technically incorrect because energy is transformed or converted, but cannot be consumed.
- Energy consumption = Amount of energy used
- Energy use : Manner or kind of application of energy (i.e., ventilation, heating, processes, production lines)
- The quantity of the energy applied is expressed as energy consumption.

Source: [1]

The following is an example of the transformation of different types of energy into heat and power.



It is difficult to imagine spending an entire day without using energy. We use energy to light our cities and homes, to power machinery in factories, cook our food, play music, and operate our TV.

Source: Bureau of Energy Efficiency

Study Question 1

Which of the following is correct ?

a) Energy is consumed.

b) Energy is produced.

c) Energy is transformed or converted.

d) All

Reply

Energy is transformed or converted.

Study Question 2

Which of the following is false ?

a) The term "energy consumption" is technically incorrect .

b) The term "energy production" is technically incorrect.

c) The term "energy consumption" is technically correct.

d) The term "energy use" is technically correct.

Reply

Pls. see slide no. 7.

Energy Intensity

Energy intensity is energy consumption per unit of GDP.

Energy intensity indicates the development stage of the country.

Study Question 3

Energy consumption per unit of GDP is called as:

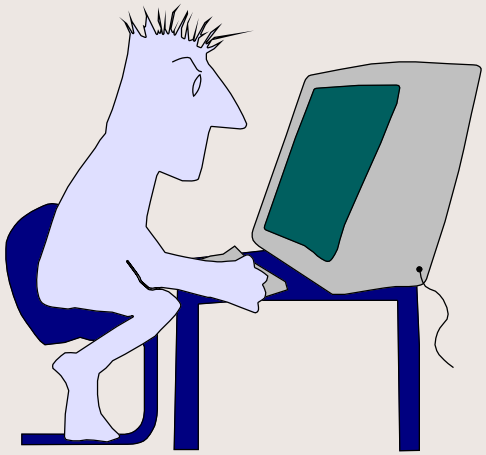
a) Energy ratio
b) Energy intensity
c) Per capita consumption
d) None

Reply

Energy intensity

ENERGY SAVING

- Less energy utilization by switching off devices
- *A human concern*



ENERGY EFFICIENCY

- Less energy utilization for the same quality and service
- *A technological concern*

Source: [1]

Energy efficiency means:

- Using advanced and state-of-the-art technologies to provide better quality energy services with less energy.
- Getting the most productivity from every unit of energy.
- Getting the desired energy services — comfortable homes, profitable businesses, convenient transportation — with less energy use, less air pollution, and lower total cost.
- Using energy wisely.
- Eliminating energy waste.
- Using technology to easily reduce energy use without having to daily "remember" to do it yourself.

Source: [2]

Study Question 4

Which of the following is incorrect ?

a) Energy efficiency means less energy utilization for the same quality and service.

b) Energy efficiency is a technological concern.

c) Energy conservation is a human concern.

d) Energy efficiency means less energy utilization by switching off devices.

Reply

Energy efficiency means less energy utilization by switching off devices.

Study Question 5

Which of the following is not correct ? Energy efficiency means

a) Getting the most productivity from every unit of energy.

b) Using energy wisely.

c) Increasing energy waste.

d) Using technology to easily reduce energy use without having to daily "remember" to do it yourself.

Reply

Pls. see slide no. 17.

What is the difference between goals, objectives and targets ?

I need to go to

the grocery store for milk

and have it on the table

by 8:00 a.m. for breakfast.

Source: [3]

I need to go to the grocery store for milk and have it on the table by 8:00 a.m. for breakfast.

- Now one could say that the goal is to obtain milk.
- The objective is to have milk with breakfast.
- The target is the 8:00 a.m. deadline, when breakfast is served.

Goal = where you want to be when you arrive.

Objective = what will be in place when you arrive at your goal

Target = When that goal is achieved

Source: [3]

Study Question 6

Considering this "I need to go to the grocery store for milk and have it on the table by 8:00 a.m. for breakfast.", which of the following is the target.

a) to obtain milk.

b) to have milk with breakfast.

c) the 8:00 a.m. deadline

d) to arrive at your goal

Reply

the 8:00 a.m. deadline

Pls. note that the target should be measurable and numeric.

What is energy ?

Energy is the capacity of a system to do work.

Energy makes change possible.

Energy is neither created nor destroyed.

Energy Management System

- Energy ~~Saving~~ = Money ~~Saving~~
- Energy = Money ……Even Cash
- Management or Manager ?
- System ?

Study Question 7

Which of the following is not correct ? Energy

a) does not make change possible.

b) is neither created nor destroyed.

c) is the capacity of a system to do work.

d) is money, even cash.

Reply

Pls. see slide nos. 27 and 28.

Give a short description about primary and secondary energy with example.

Reply:

Primary energy refers to all types of energy extracted or captured directly from natural resources.

Primary energy is further divided into two distinctive groups:

i) Renewable (solar energy, wind energy, geothermal, tidal, biomass)

ii) Non-renewable (coal, oil, natural gas and uranium)

Primary energy is transformed in energy conversion process to more convenient forms of energy such as electricity, steam etc. These forms of energy are called secondary energy.

Study Question 8

Which of the following is not a primary energy ?

a) Solar

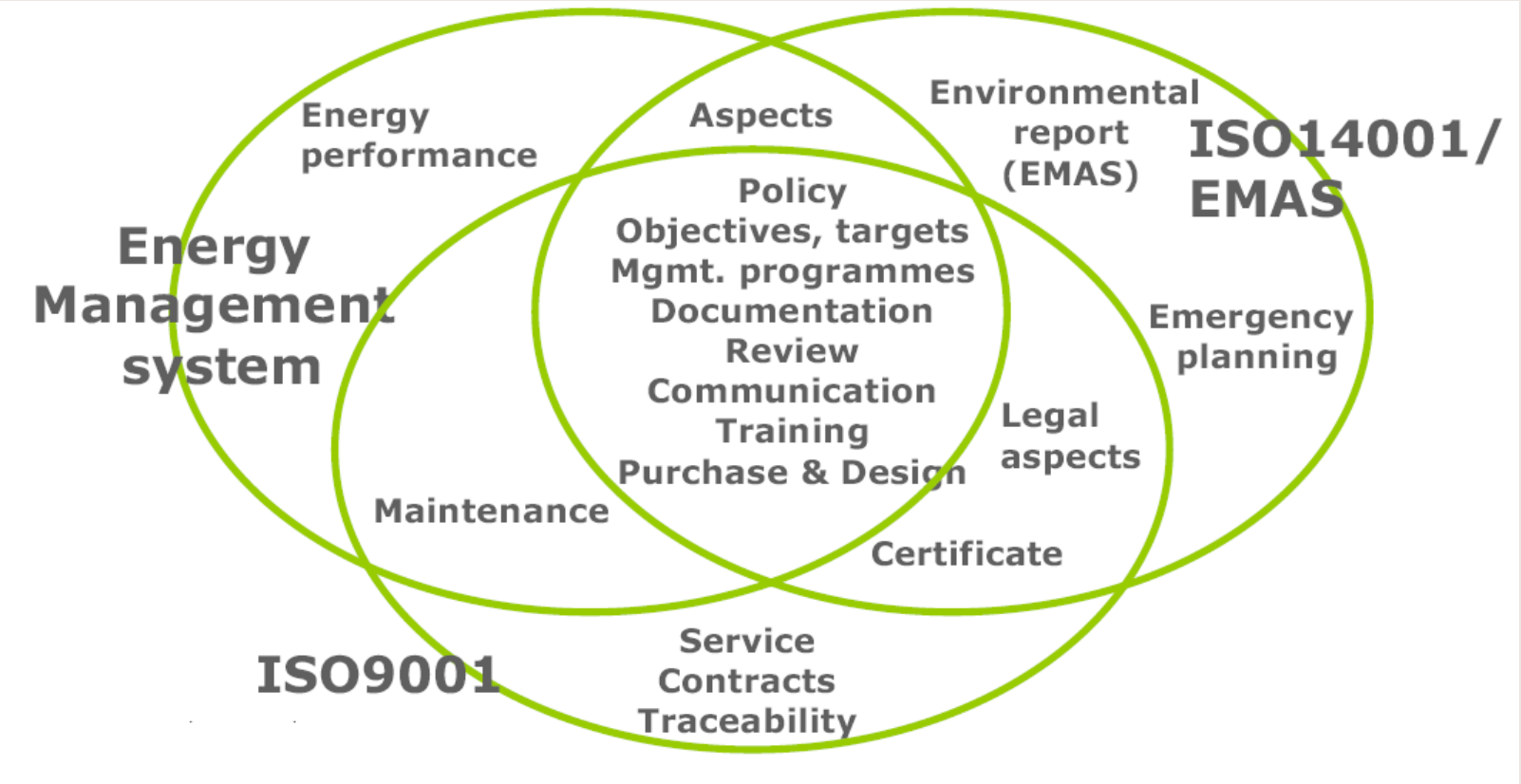
b) Coal

c) Electricity

d) Biomass

Reply

Pls. see slide no. 31.


Energy performance
Aspects
Environmental report (EMAS)
ISO14001/ EMAS
Energy Management system
Policy
Objectives, targets
Mgmt. programmes
Documentation
Review
Communication
Training
Purchase & Design
Emergency planning
Legal aspects
Maintenance
Certificate
ISO9001
Service
Contracts
Traceability

Source: [14]

Implementation of an energy management plan assists a company to:

- Develop a baseline of energy use
- Actively managing energy use and costs
- Reduce emissions without negative effect on operations
- Continue to improve energy use/product output over time
- Document savings for internal and external use (e.g., emission credits)

Source: [20]

Study Question 9

Which of the following is not a benefit from implementing an energy management plan ?

a) Actively managing energy use and costs

b) Reducing emissions

c) Improving energy use/product output over time

d) Controlling prices and politics

Reply

Controlling prices and politics

What are we to do ?

Industry alone cannot control

prices, politics, or the global economy,

but it can manage how it uses energy.

Source: [16]

Energy saving/efficiency is

a people problem first and then a technical problem.

Energy saving technology and measures are often simple and well-tested.

Source: [1]

Study Question 10

Energy saving/efficiency is ……. first and then a technical problem.

Which of the following is related to the above blank.

a) a human approach

b) a people problem

c) a wrong evaluation problem

d) None

Reply

Pls. see slide no. 39.

Why are we here (or why should we establish an energy management system structure ?)

- To reduce energy cost
- To save money
- To protect the environment by preventing greenhouse gas emissions
- Improve facility performance
- Qualify your facility for tax incentives, rebates, and prepare for mandatory energy reporting initiatives

Source: [18,19]

Study Question 11

Which of the following is a benefit from establishing an energy management system structure in enterprises ?

a) to reduce energy cost

b) to save money

c) to protect the environment

d) all

Reply

all

Energy management involves a combination of :

Managerial

&

Technical/Technological

Skills/Knowledge

Source: [18]

Study Question 12

Energy manager should be well versed with

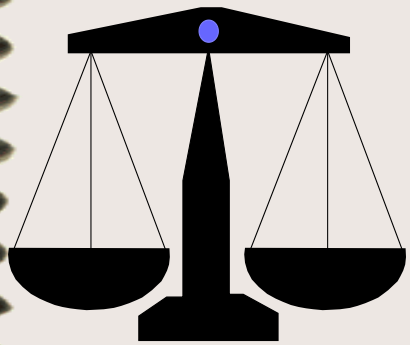
a) Manufacturing and processing skills
b) Managerial and technical skills
c) Technical and marketing skills
d) Managerial and commercial skills

Reply

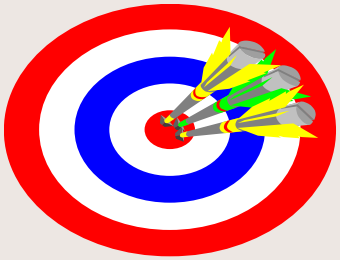
Pls. see slide no. 45.

Conducting an Energy Management Program (A Short Way)

MONITORING



ENERGY AUDIT



TARGET

Source: [1]

What is the driving force here ?

Nato Shinkawa
from Japan, born in
1936

"YAWATA WORKS INC." IN JAPAN

5800x1000 kcal/ton of steel production

Study Question 13

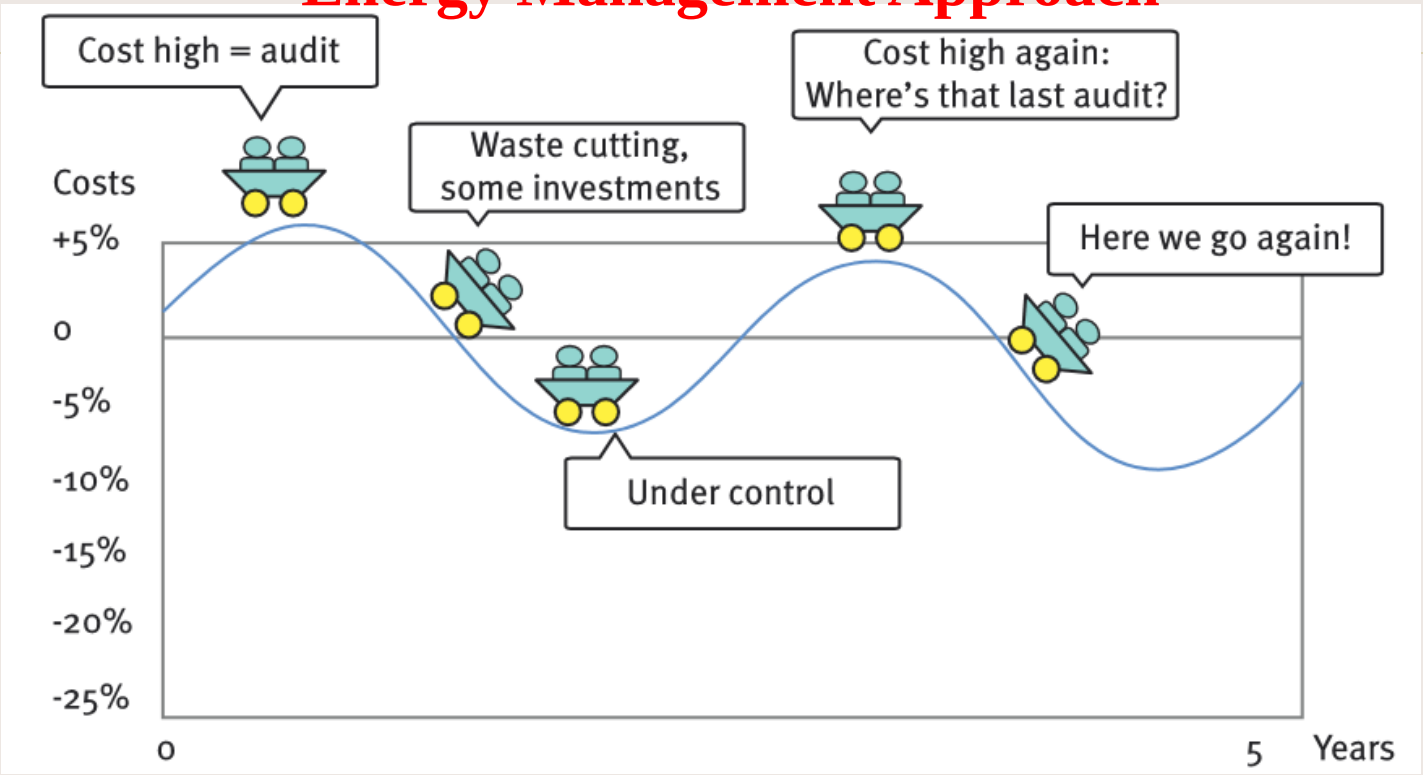
Which of the following is not one of the milestones of conducting an Energy Management Program ?

a) Monitoring
b) Energy audit
c) Target
d) Objective

Reply

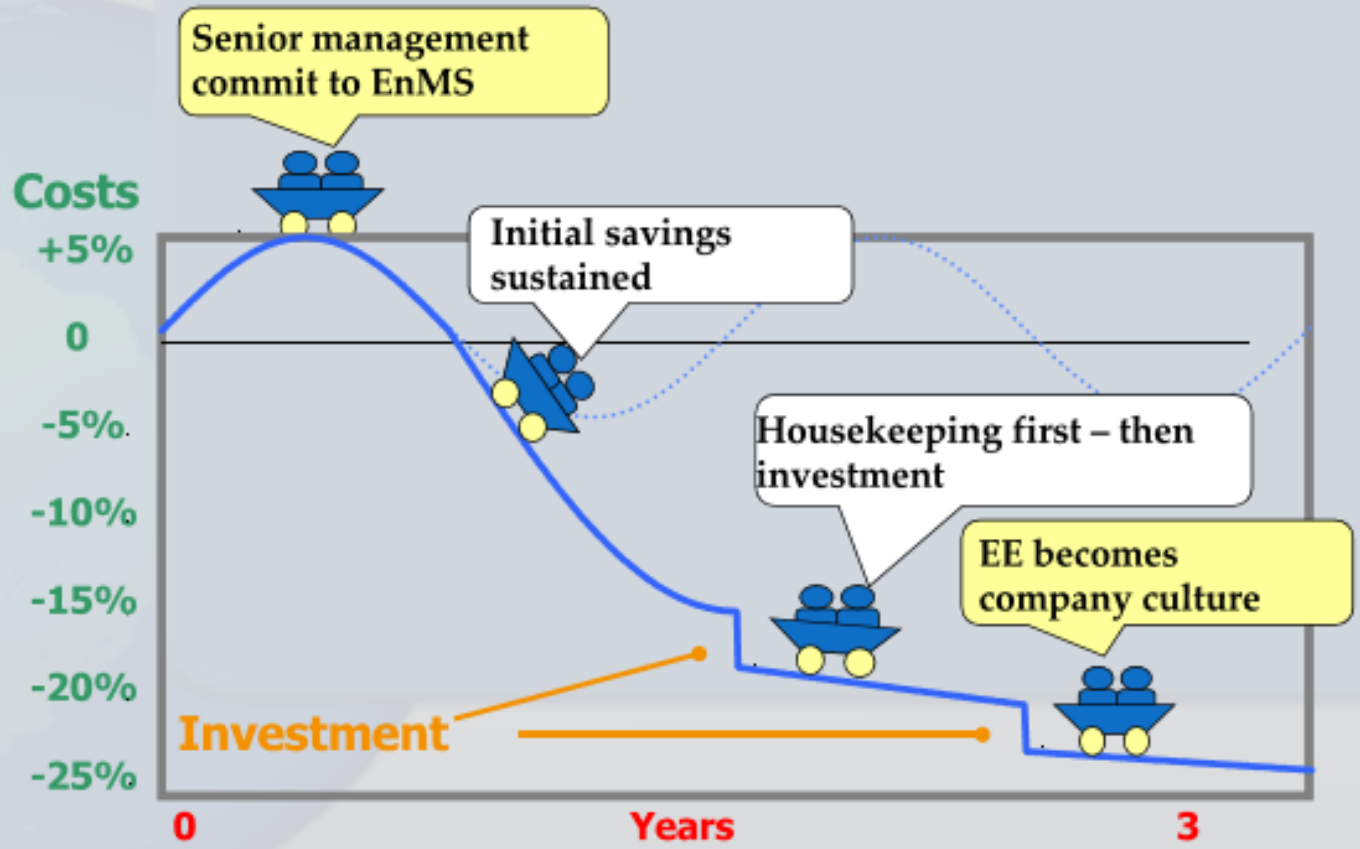
Pls. see slide no. 48.

Ad Hoc (Non-Systematic) Energy Management Approach



The above figure shows how energy costs behave over time when organizations occasionally implement energy savings actions in response to rising costs. Energy costs will continue to cycle and go out of control if an organization does not manage its energy use on a daily basis and make it part of normal business operations.

Systematic Approach



Development & Implementation of an EnMS - ISO50001

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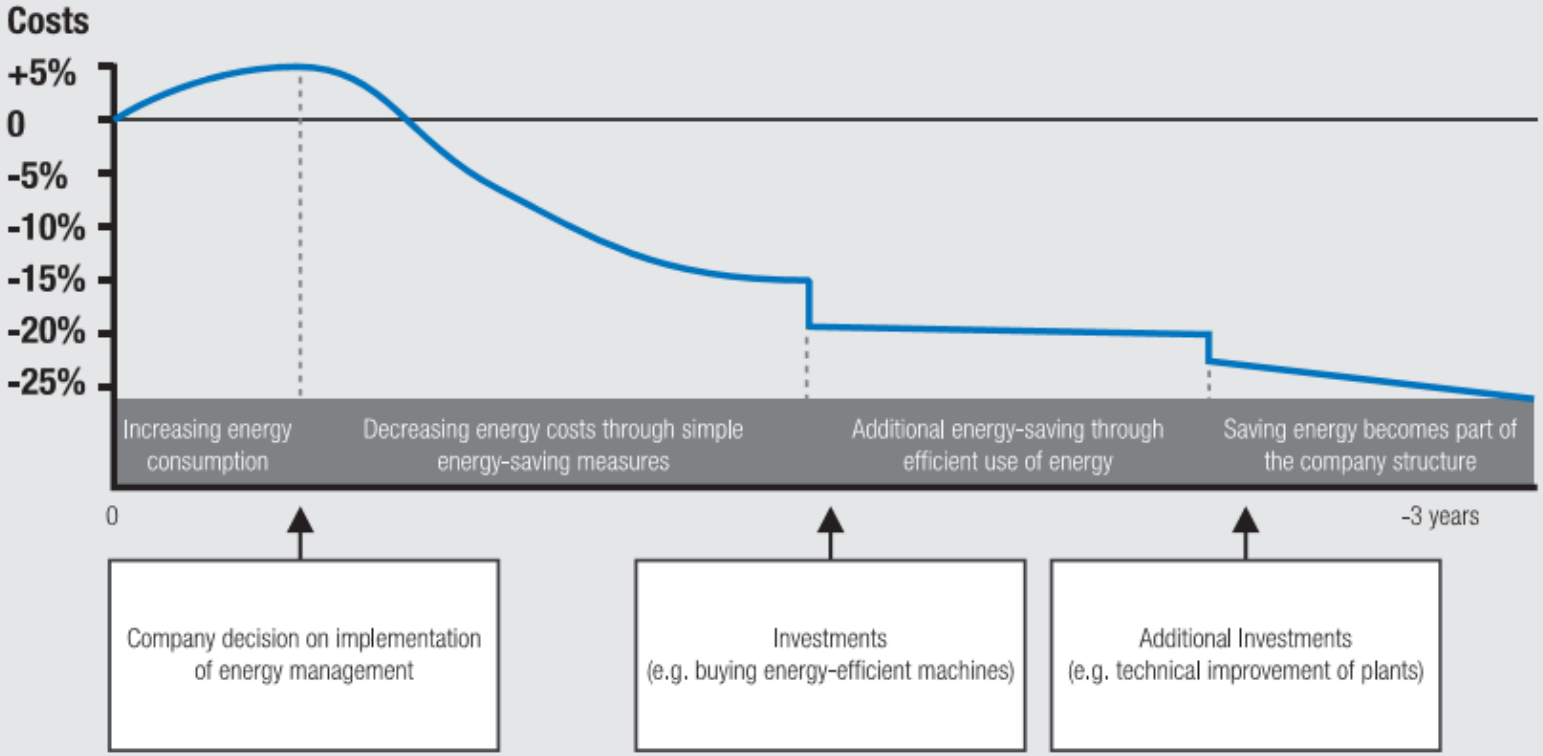
► CONTINUOUS COST REDUCTION WITH EnMS



Implementing ISO 50001 Energy Management System

ecci Driving Excellence. Delivering Results

An ecci Venture apex GLOBAL Learning for Excellence

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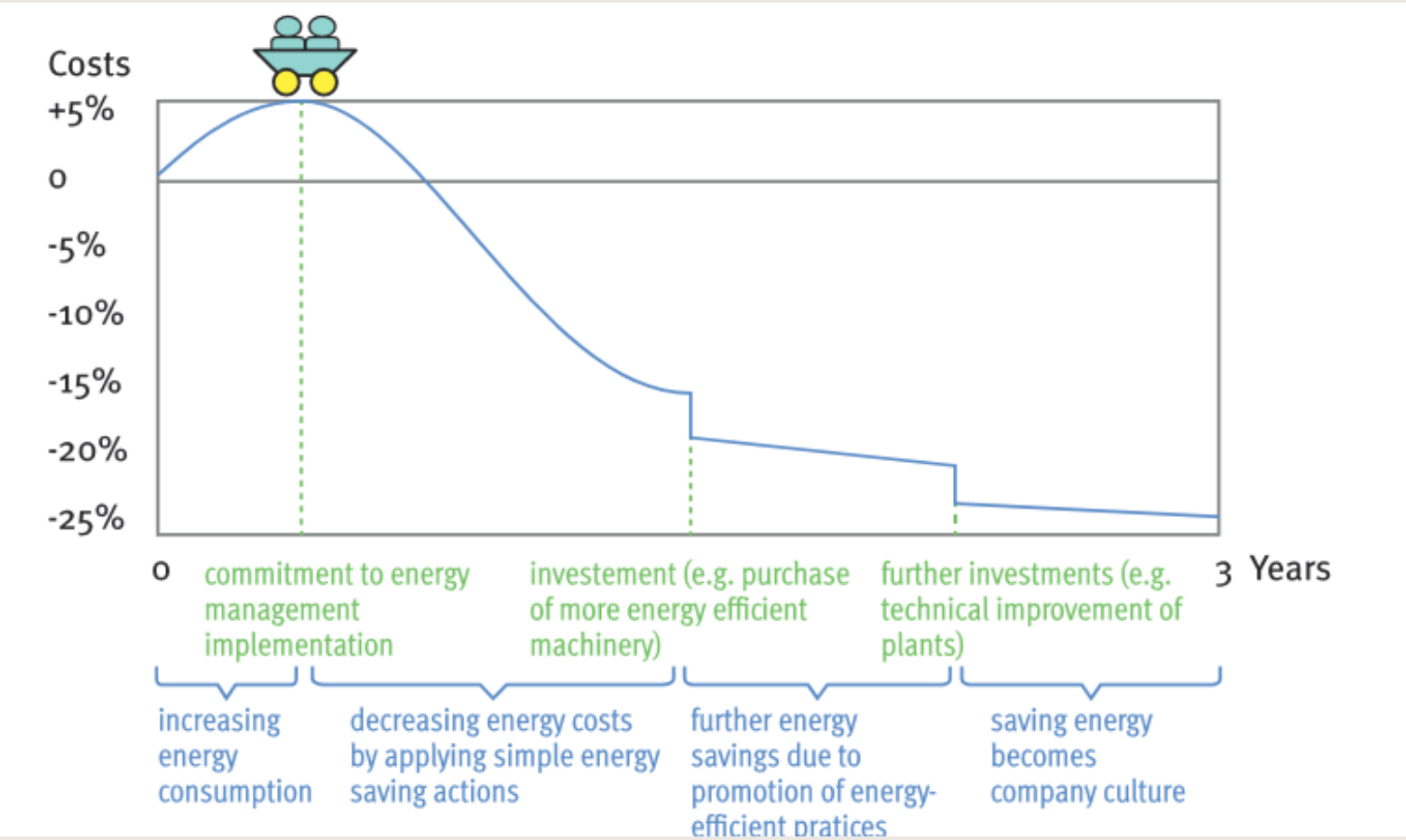

In the above figure, you can see that with a focus on continuous improvement through an energy management system, energy performance improvements can be maintained and costs continue to decline over time.

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Practical Guide for
Implementing an Energy Management System

Study Question 14

In which energy management approach will occur the following: Energy performance improvements can be maintained, and costs continue to decline over time.

a) Ad Hoc Energy Management Approach
b) Systematic Energy Management Approach
c) Non-Systematic Energy Management Approach
d) None

Reply

Systematic Energy Management Approach

Benefits of a systematic energy management approach

Direct benefts:

- Energy cost savings
- Prioritization of no cost and low cost energy saving opportunities in day to day operations
- Reduced greenhouse-gas emissions
- Reduced exposure to changing energy prices
- Reduced carbon footprint
- Increased security of supply by reducing dependence on imported fuels
- Increased energy awareness among staff and greater participation
- Greater knowledge of energy use and consumption, and opportunities for improvement
- Informed decision-making processes Reduced uncertainty as future energy use is better understood

Benefits of a systematic energy management approach

Indirect benefts:

- Positive publicity
- Improved corporate image
- Improved operational efficiencies
- Improved maintenance practices
- Improved safety and health

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Practical Guide for
Implementing an
Energy Management
System

Study Question 15

Which of the following is not an indirect benefit of a systematic energy management approach ?

a) Positive publicity
b) Improved corporate image
c) Improved operational efficiencies
d) Reduced greenhouse-gas emissions

Reply

Pls. see slide nos. 58 and 59.

WHY Energy Management Systems?

The evidence: Most energy efficiency in industry is achieved through changes in ***how energy is managed*** rather than through installation of new technologies

The problem: *Energy efficiency is not integrated into daily management practices!*

The solution: *A systematic approach is required and top management must be engaged in the management of energy*

Energy Management System (EnMS)

An EnMS provides a structured and systematic approach to **integrate Energy Efficiency into industry corporate culture** and **daily management practices.**

A framework for understanding significant energy uses

Action plans for continually improve energy performance

Structure and organizational framework to sustain energy performance improvements over time and change of personnel

Development & Implementation of an EnMS - ISO50001

Trevor Floyd – MSc CEnv CEng MEI CMarEng MIMarEST ACIBSE MCMI

An Effective Energy Management System =

1. Reduce operational costs
2. Reduced energy consumption
3. Reduced emissions to atmosphere

Development & Implementation of an EnMS - ISO50001

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Study Question 16

An effective energy management system will reduce ……, ……. and …… in any institution.

Which of the following is not related to the above blanks.

a) operational costs

b) energy consumption

c) emissions to the atmosphere

d) number of staff

Reply

Pls. see slide no. 64.

What are the famous Management Systems Standards?

- **ISO 9001** Quality Management (QMS)
- **ISO 14001** Environmental Management (EMS)
- **ISO 22000** Food Safety
- **ISO 27001** Information Security
- **ISO 13485** Medical Devices

CSA STANDARDS

ISO 50001, ISO 14001 and ISO 9001

- ISO 50001 is compatible with both ISO 14001 and ISO 9001 with the following differences:
  - ISO 50001 calls for **energy performance improvement and not only system improvement**
  - ISO 50001 **does not follow ISO 9000/9001** process/ and structure format
  - ISO 50001 includes requirements related **to procurement of Energy** & Energy Services

Note: ISO 50001 has 83 "shalls". ISO 14001 has 63 "shalls" and ISO 9001 has 138 "shalls"

CSA STANDARDS

Analysis of the basic concepts

General

- QMS : C**ustomer requirements** based on the "product quality"
- EMS : Significant external **environmental aspects** of the production process
- EnMS : **Energy performance** of the **whole organization/ production process**

CSA STANDARDS

The Energy Management System (EnMS) Matrix

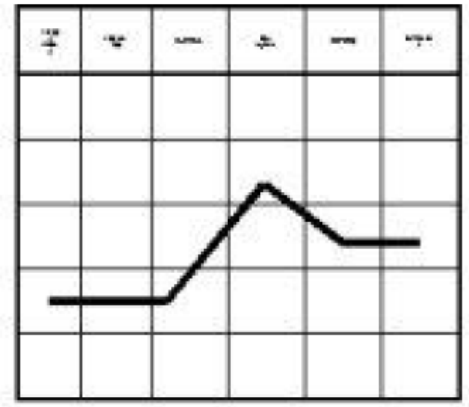
One tool ERM has long used in working with clients is the energy management matrix developed for BRECSU, an office of the UK's Building Research Establishment. It is time I shared this tool with you as well.

This tool is by no means new. It was first developed in 1984 as an outcome of a report published the year before by the UK's Department of Energy. Just as we still do today, that report emphasised the importance of an organisation's management approach to energy matters.

The beauties of this tool are manifold. Firstly, because it has nothing to do with technology, it allows organisations to compare themselves against others without any of the common excuses that are used to devalue many numercially based tools. Secondly, it provides a means of comparing progress, period by period, again without being diverted by discussions of the validity of the chosen measurement method. Thirdly, more than any other tool we use, this matrix has been successful in engaging management in the discussion of energy management. More successful, surprisingly, than some of the sophisticated financial modelling tools,

- Source: https://energy-rm.com.hk/wp-content/uploads/2014/07/ENERGY-MANAGEMENT-MATRIX-2014.pdf

The fourth beauty of this matrix is that it is simple to use. So although at ERM we run a series of six one-hour sessions to work through this matrix in depth, by spending just five or ten minutes you can easily come up with an energy management profile for your own organisation. Why not do it now?. Take one column at a time, reading each box and deciding where your business or institution currently stands. Put a dot in each column, then connect up the dots. If you want to have a finer scale than 0 to 4, you could put your dot higher or lower in a particular box.



Don't be surprised if your line reveals an organisation whose energy management practice is not well balanced: some aspects done well, others done poorly. But do let the line indicate to you which areas need more work (or, more positively, provide you with the greatest scope for improvement).

One enlightening approach is to then have relevant individuals at other levels on your organisation's hierarchy complete the matrix, and to compare your results. This step alone has proven time and time again to be a real eye-opener. It is not at all necessary that you agree (a superior might easily get their subordinate to agree that the former's line represents the true state of affairs) but it is immensly valuable when various levels of management understand the perspective of others.

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EnMS Matrix

Level	Commitment	Planning	Organization	Projects	Financing	Tracking	Communication	Training
5	An energy policy exists that has clear targets, has the commitment of senior management and is communicated broadly.	A comprehensive energy management plan covers all major practice categories, defines how targets will be achieved and is implemented by all departments with full support from senior management.	Energy management is fully integrated into the management structure with clear delegation of responsibility for energy consumption.	Identification of capital, behavioural, operational and maintenance projects, development of business cases and implementation are ongoing.	Investment criteria, financing mechanisms and commitment to implement energy efficiency projects are clearly defined.	An energy accounting system sets targets, forecasts use, monitors use against a baseline and the forecast, and identifies faults. Savings are tracked at a project and system level by using submeters. Performance is benchmarked.	The value of energy efficiency and the performance of energy management are reported and marketed, both within the organization and outside, continuously.	Senior management, building operators and staff or tenants are trained to fully support energy performance.
	☐	☐	☐	☐	☐	☐	☐	☐
4	A formal energy policy exists but lacks active commitment from senior management.	All departments are represented on the planning team with some senior management support.	An energy committee is used as the main channel of communications along with direct contact with major energy users.	There is formalized but infrequent identification of energy opportunities, basic business cases and implementation.	Life-cycle costing and/or internal rate of return investment criteria are used.	Facility-level performance is monitored against a baseline and benchmarked by using key performance indicators. Results from major projects are measured.	An ongoing program of staff and tenant awareness exists, and progress is reported through regular publicity campaigns.	Senior management or staff and tenants have received ad hoc training. Building operators are fully trained to support energy performance.
	☐	☐	☐	☐	☐	☐	☐	☐
3	The energy policy set by the energy manager, energy committee or equivalent has not been adopted.	Only technical people or technical managers are involved in developing an energy management plan.	An energy manager is in place but has no clear responsibility or authority.	Development of energy savings opportunities is ad hoc and infrequent. There is only selected implementation.	Investments are based on short-term or simple payback criteria only, with no consideration for life-cycle costing.	Facility-level performance is monitored against a baseline by using utility data with ad hoc use of findings. No benchmarking is done.	Staff and tenant awareness is occasional only and ad hoc.	Building operators are trained to maintain major energy-intensive systems.
	☐	☐	☐	☐	☐	☐	☐	☐
2	An undocumented set of guidelines or procedures exists.	One person has been delegated to develop an energy management plan.	An energy manager is a part-time responsibility that has limited authority.	Only informal assessments are made with ad hoc resources to identify energy-saving opportunities.	Only low-cost measures are implemented.	Cost reporting is based on utility invoice data. No benchmarking is done.	Only informal contacts are used to promote energy efficiency.	Building operators receive ad hoc training in energy-efficient technologies and practices.
	☐	☐	☐	☐	☐	☐	☐	☐
1	No guidelines or procedures exist.	No energy management plan exists.	There is no energy-related responsibility or contact between management, staff and the occupants.	There is no mechanism or resources to identify or develop energy-saving opportunities.	Energy efficiency investments are not pursued.	No energy data are being tracked or benchmarked.	Energy efficiency is not promoted.	There is no energy management or operational training.
	☐	☐	☐	☐	☐	☐	☐	☐

Energy Management
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Canada

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EnMS Matrix filled in

Level	Commitment	Planning	Organization	Projects	Financing	Tracking	Communication	Training
5	An energy policy exists that has clear targets, has the commitment of senior management and is communicated broadly.	A comprehensive energy management plan covers all major practice categories, defines how targets will be achieved and is implemented by all departments with full support from senior management.	Energy management is fully integrated into the management structure with clear delegation of responsibility for energy consumption.	Identification of capital, behavioural, operational and maintenance projects, development of business cases and implementation are ongoing.	Investment criteria, financing mechanisms and commitment to implement energy efficiency projects are clearly defined.	An energy accounting system sets targets, forecasts use, monitors use against a baseline and the forecast, and identifies faults. Savings are tracked at a project and system level by using submeters. Performance is benchmarked.	The value of energy efficiency and the performance of energy management are reported and marketed, both within the organization and outside, continuously.	Senior management, building operators and staff or tenants are trained to fully support energy performance.
	☐	☐	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☐	☐	☐	☐	☐
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	☐	☐	☐	☑	☑	☑	☐	☐
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	☑	☑	☑	☐	☐	☐	☑	☑

Energy Management
Best Practices Guide
For Commercial and Institutional Buildings

Canada

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Study Question 17

Which of following is not related to the EnMS matrix ?

a) It allows organizations to compare themselves against others.

b) It provides a means of comparing progress, period by period.

c) It is successful in engaging management in the disccusion of EnM.

d) It is not simple to use.

Reply

Pls. see slide nos. 70 and 71.

Energy Saving Tips

You are responsible for the following:

https://www.fix.com/blog/energy-saving-tips/, Access date: 29 September 2020.

Please read this and try to understand how to save energy through various energy-efficient applications. If you can not reach this website, please communicate with me by e-mail message.

Study Question 18

Which of the following is not an energy saving tip to help you save money ?

a) Unplugging your electronics

b) Cleaning or changing your air filters

c) Upgrading your appliances

d) Increasing the temperature in your home at night

Study Question 19

Which of the following is an energy saving tip to help you save money ?

a) Getting a cheap programmable thermostat

b) Not swapping your bulbs

c) Weatherproofing your home

d) Getting a high-flow shower head

Concluding Remarks

- This presentation is intended to provide more details about some general rules of an energy management structure that apply to almost all the companies.
- In conducting any energy management program, the measurement is very essential.

Generally speaking: To measure is to know and to know is to manage (You can not manage what you do not measure). In addition, to manage is **to improve** [28].

Western proverb: Seeing is believing [29].

Japanese proverb: Seeing once is better than hearing a hundred times [29].

Sources: [28,29]

- Success in your life is not a single achievement. It's all that you do with others and for others [27].

- Energy is a manageable cost.

- The European Union has committed to reach the following targets by 2020:-cutting greenhouse gas emissions by at least 20%-improving energy efficiency by 20%-raising the share of renewable energy to 20% -increasing the level of biofuels in transport fuel to 10% [30].

Sources: [27,30]

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QUESTIONS ???

THANK YOU
VERY MUCH
FOR YOUR
STAYING
HERE
TILL THE END

QUESTIONS ???

Be Expectional

&

Make a Difference

A. Hepbasli

Energy Management and Its Standard: Concepts, Applications and Environmental Aspects: Part 2

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(Certified Energy Manager)
Professor
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Some Remarks

- There are some "Study Questions" here.
- Students are strongly recommended to
  a) go through the presentation first, and
  b) focus on study questions then.

Outline

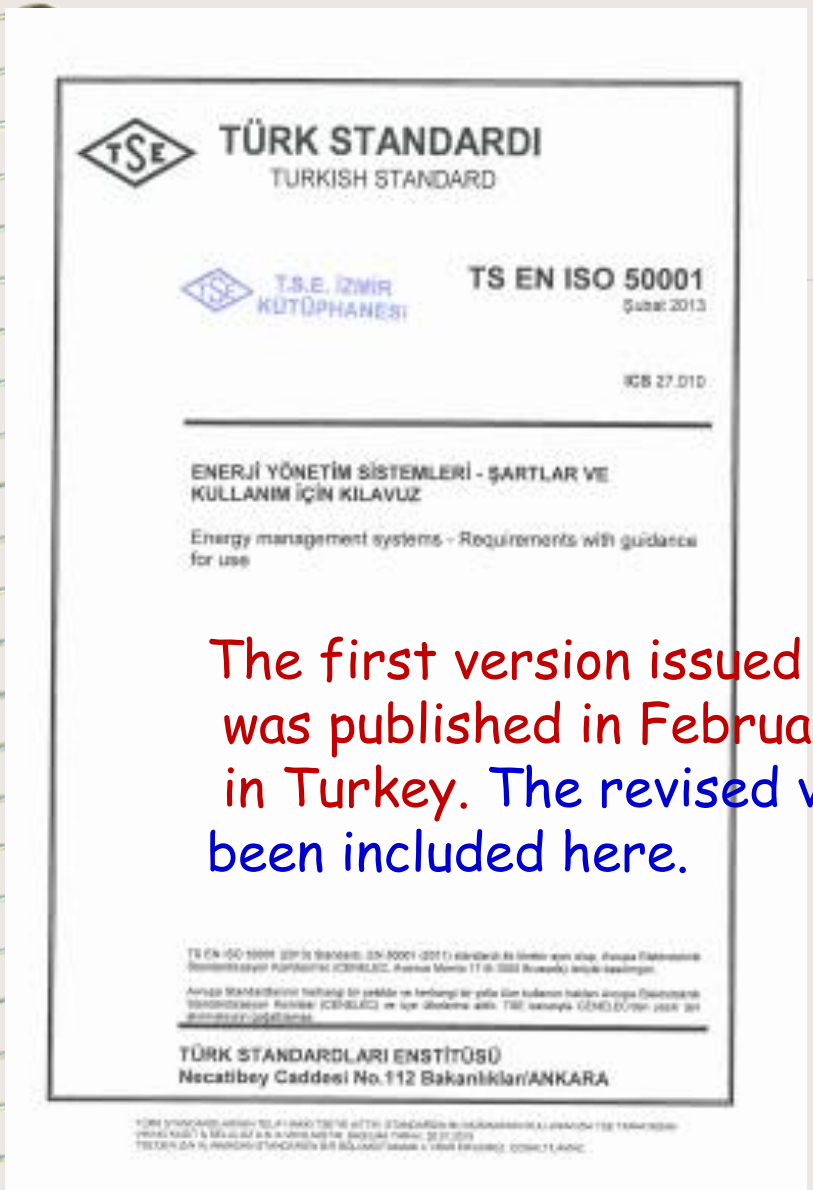
- Introduction
- EnMS Standard
- Videos
- Concluding Remarks
- References

ISO 50001 Energy Management System Standard

ISO 50001 is the international energy management system standard (EnMSS) issued in June 2011. The main objective of this standard is to focus on the continual improvement of energy performance, which covers the essential key items such as energy use, energy consumption, energy efficiency, and energy intensity.

The ISO 50001:2011 International Standard is a voluntary global management system standard and does specify mandatory requirements for an EnMS such as an energy policy, energy objectives, energy targets and action plans on significant energy uses [3], [4]. The ISO 50001 is a standalone standard and can be adopted regardless of any management systems (e.g. ISO 9001, 14001) that already exist.

Source: SEKERCI, H.; YILDIRIM OZCAN, N.; **HEPBASLI, A.**: 2017. "Energy Management System Standard Implementation at Yasar University In Izmir, Turkey: From ISO 50001 to Practice", *Proceedings of SEEP2017, 27-30 June, pp. 31-42,* Bled, Slovenia.



TÜRK STANDARDI
TURKISH STANDARD

T.S.E. İZMİR KÜTÜPHANESİ

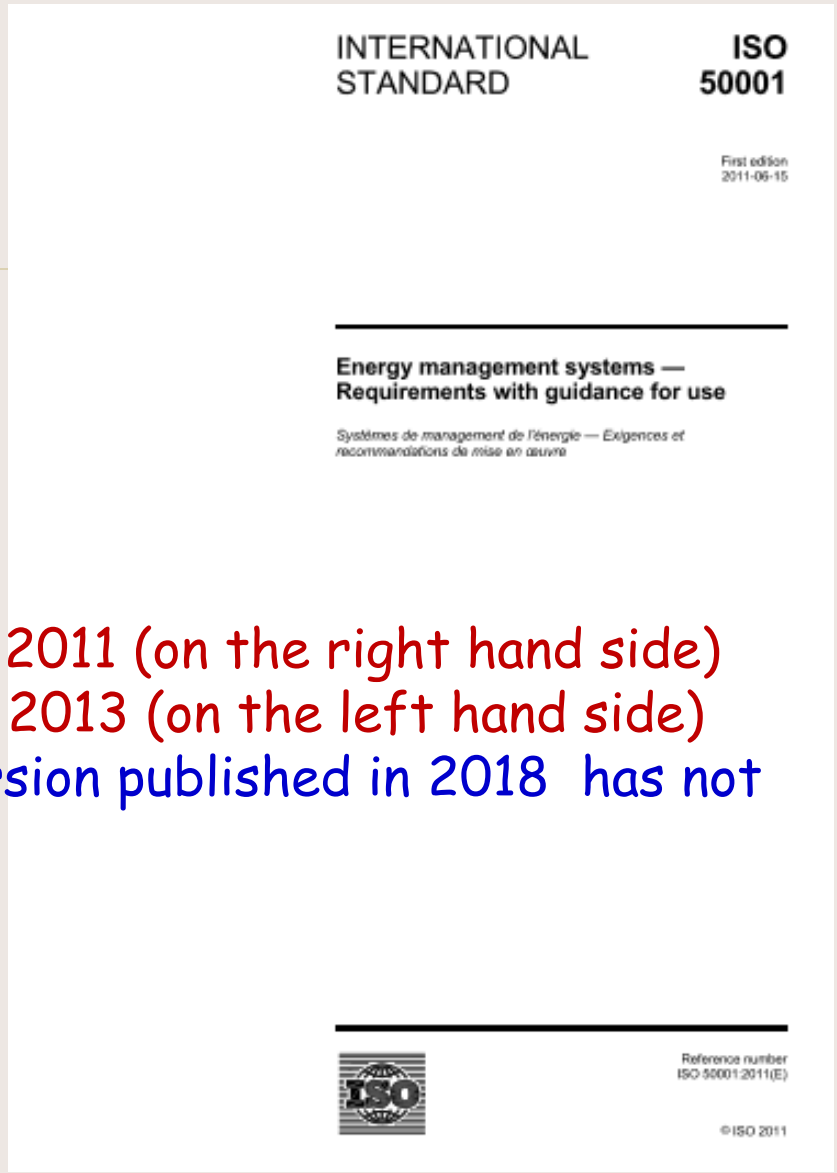
TS EN ISO 50001
Şubat 2013

ICS 27.010

ENERJİ YÖNETİM SİSTEMLERİ - ŞARTLAR VE KULLANIM İÇİN KILAVUZ

Energy management systems - Requirements with guidance for use

TÜRK STANDARDLARI ENSTİTÜSÜ
Necatibey Caddesi No.112 Bakanlıklar/ANKARA



INTERNATIONAL STANDARD

ISO 50001

First edition
2011-06-15

Energy management systems — Requirements with guidance for use

Systèmes de management de l'énergie — Exigences et recommandations de mise en œuvre

Reference number
ISO 50001:2011(E)

© ISO 2011

The first version issued in 2011 (on the right hand side) was published in February 2013 (on the left hand side) in Turkey. The revised version published in 2018 has not been included here.

Generic Plan-Do-Check-Act (ISO 50001:2011)

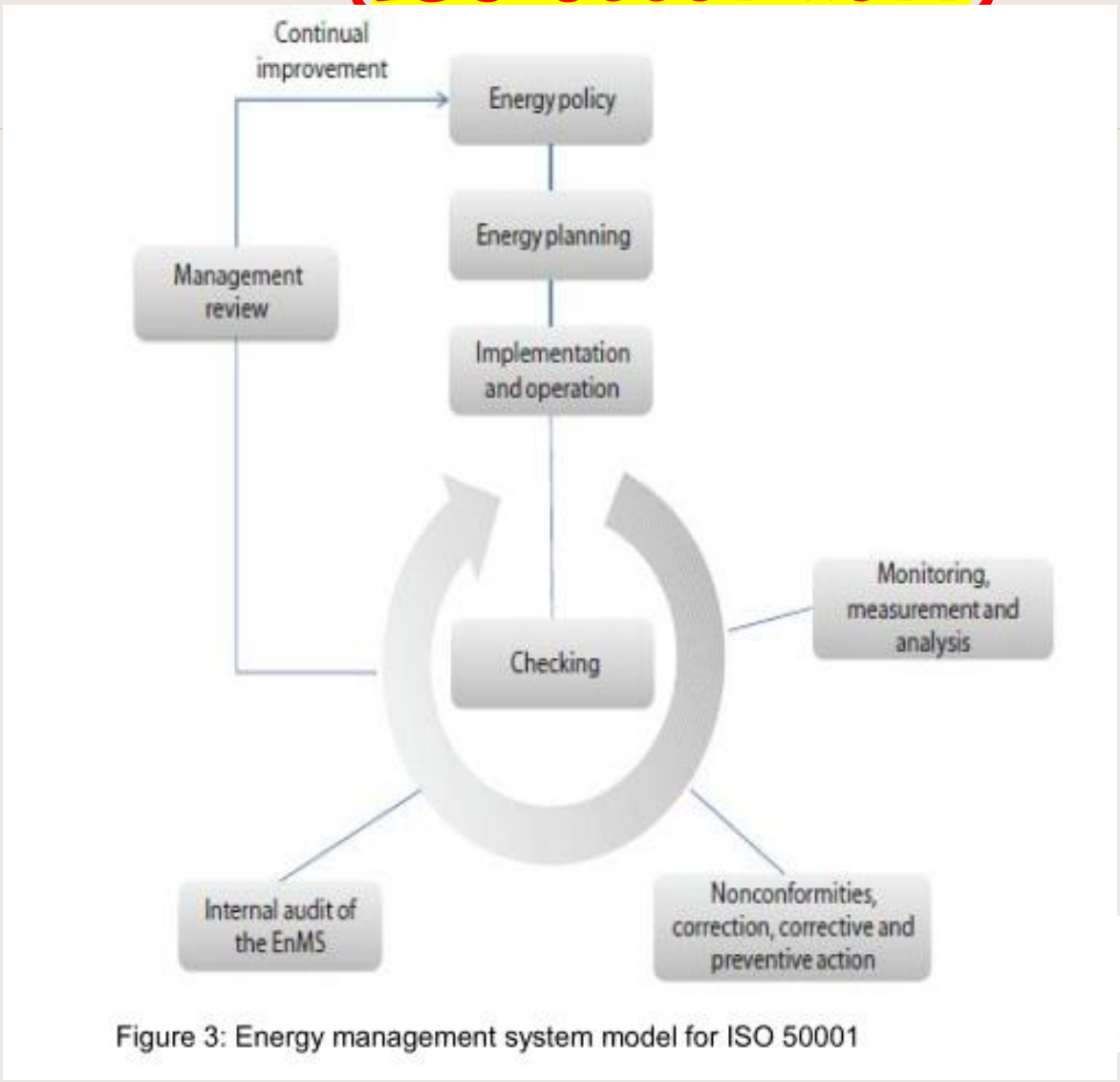
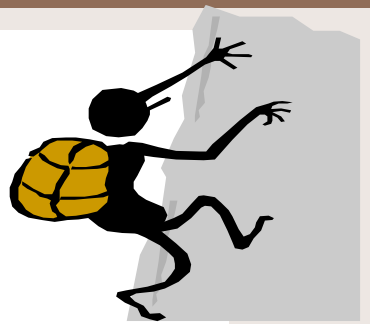
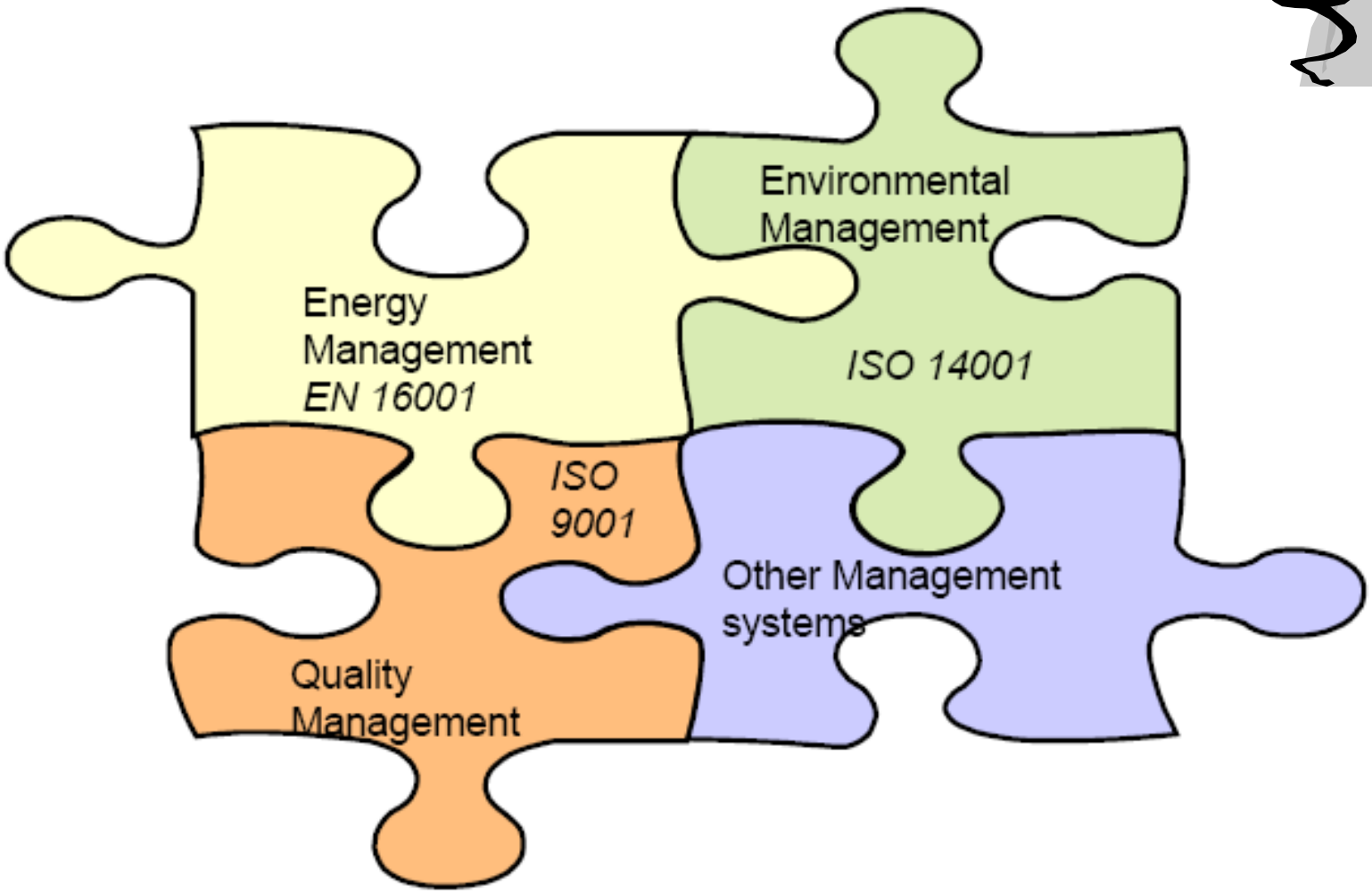


Figure 3: Energy management system model for ISO 50001

Compatibility





The revised version: Issued in 2018

TS EN ISO 50001 : 2018-11

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 50001

August 2018

ICS 03.100.70; 27.015

Supersedes EN ISO 50001:2011

English version

Energy management systems - Requirements with guidance for use (ISO 50001:2018)

Systèmes de management de l'énergie - Exigences et recommandations pour la mise en oeuvre (ISO 50001:2018)

Energiemanagementsysteme - Anforderungen mit Anleitung zur Anwendung (ISO 50001:2018)

This European Standard was approved by CEN on 6 August 2018.

CEN and CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN and CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN and CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN and CENELEC members are the national standards bodies and national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

The revised version: Issued in 2018

TS EN ISO 50001 : 2018-11

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 50001

August 2018

ICS 03.100.70; 27.015

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Figure I. Overview of an Energy Management System

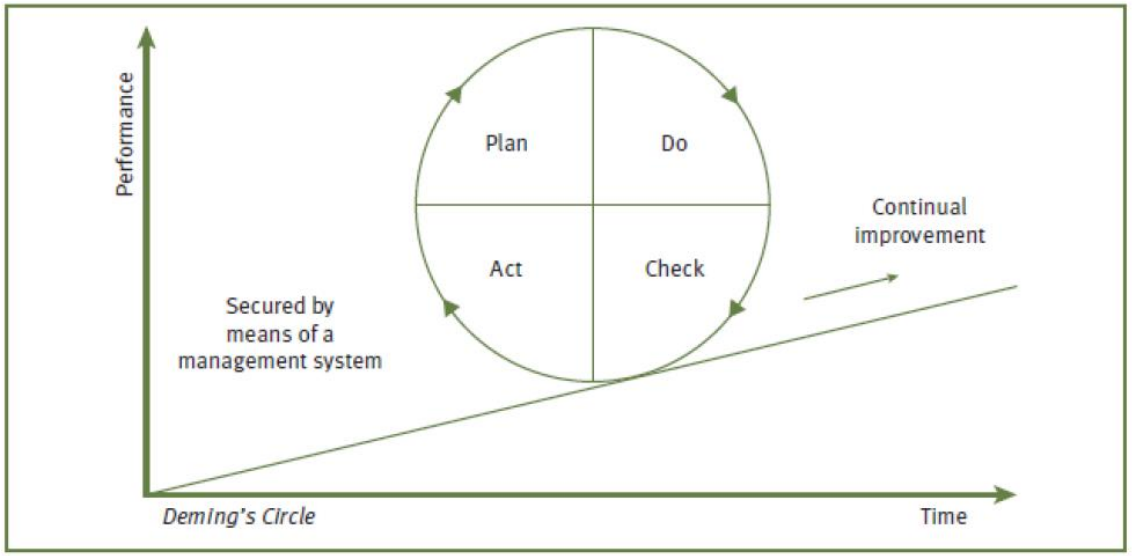


Figure I shows the principle of continuous performance improvement through the Plan, Do, Check, Act cycle.

The *Guide* is based on the approach and structures of a number of energy management system standards, including ISO 50001:2011 Energy Management Systems. The energy management system approach has a long and proven success record across all industry sizes and sectors. The information presented here has been structured to align with other popular industry management system standards such as those for quality (ISO 9001), occupational health and safety (OHSAS 18001) food safety (ISO 22000) and environmental management (ISO 14001). Organizations can thus, if appropriate, integrate an energy management system with their existing management system(s). Note that while this *Guide* is structured so that can be used with an energy management system standard, it is not necessary for all organizations to aspire to certification to a standard in order to use the principles set out in this *Guide* and to successfully improve their energy performances.

Source:

UNIDO
UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

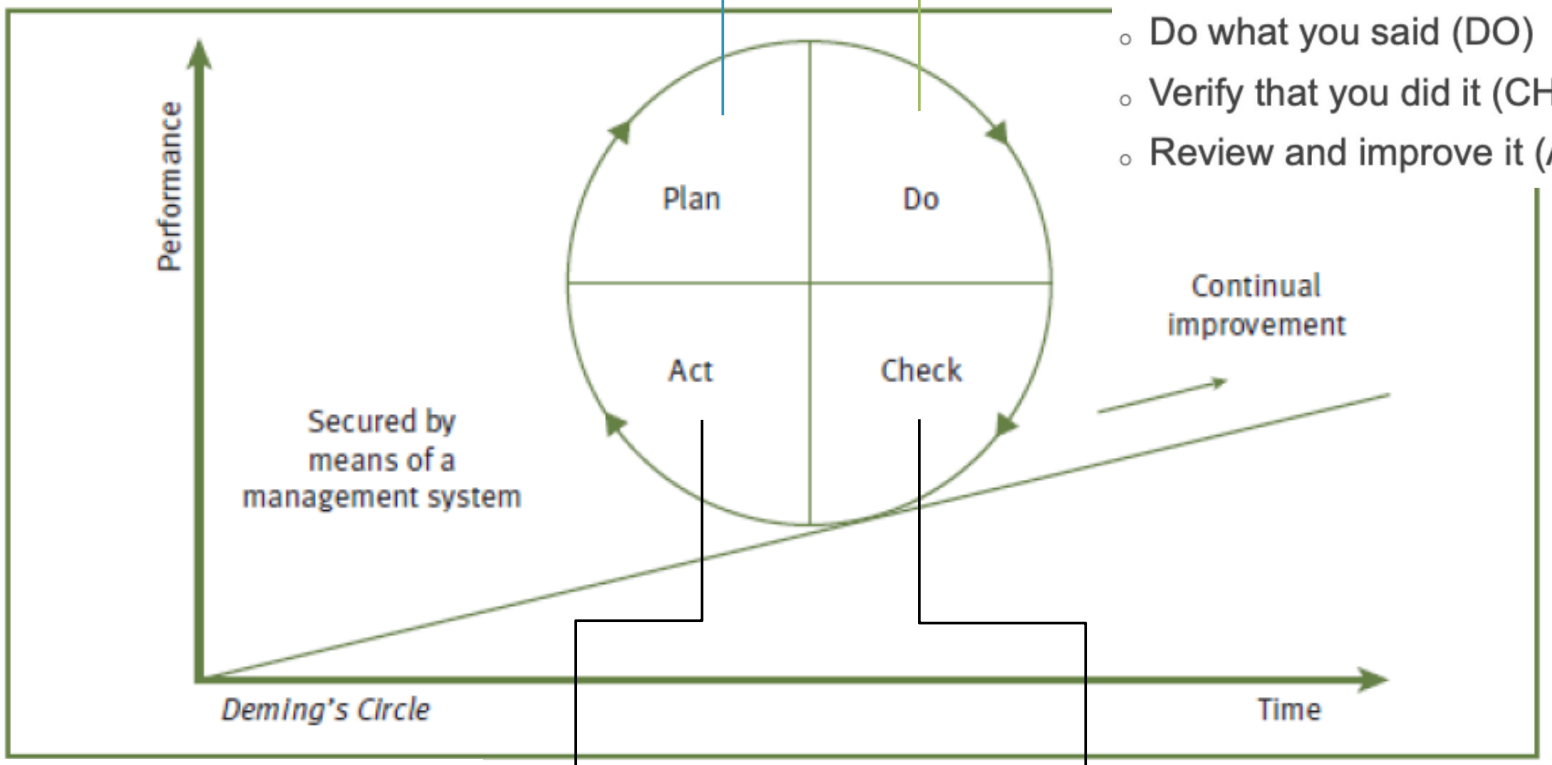
Practical Guide for
Implementing an
Energy Management
System

A. Hepbasli

Yapacağını söyle

Söylediğini yap

Figure I. Overview of an Energy Management System



- Say what you will do (PLAN)
- Do what you said (DO)
- Verify that you did it (CHECK)
- Review and improve it (ACT)

Source:

UNIDO UNITED NATIONS INDUSTRIAL DEVELOPMENT

Practical Guide for Implementing an Energy Management System

Onu gözden geçirip iyileştir

Onu yaptığını doğrula

A. Hepbasli

What is the acronym for the ISO 50001 continual improvement process?

a) SPCA b) NRA

c) AFLAC d) PDCA e) EIEIO

Energy Management System Standard

ISO 50001

- EN ISO 50001:2011 (June 2011)
- EN ISO 50001: 2018 (August 2018)

- ISO 50001:2018 is based on Annex SL, the high level structure (HLS) that brings a common framework to all ISO management systems. With the new standard structure in place, organisations should find it easier to incorporate their energy management system into core business processes and get more involvement from senior management.

Source: https://legislationupdateservice.co.uk/bs-en-500012018-energy-management-system-requirements-with-guidance-for-use/, Access date: June 8, 2019.

Requirement means in Turkish:

TS EN ISO 50001:2011 Şart

TS EN ISO 50001:2018 Gereklilik

- "shall" indicates a requirement.
- "should" indicates a recommendation.
- "can" indicates a possibility or a capability.
- "may" indicates a permission

Source: The revised version of ISO 50001 issued in 2018

ISO 50001:2011 ve 2018

- Requirement…….Şart (Gereklilik)

ISO 50001:2011

- 83 pieces of «shall»
- Namely 83 pieces of
- «meli, malı» in Turkish
- Only 22 pages

ISO 50001:2018

- 92 pieces of «shall»
- Namely 92 pieces of «meli, malı» in Turkish
- Only 30 pages

(Price based on 30 pages).

- ISO 9001…..138 pieces
- ISO 14001….63 pieces
- Source: https://www.auditingcanada.com/docs/Energy%20Management%20Systems%20Michael%20DeWit.pdf, Access date: 17 December 2020.

- **Source:** TS EN ISO 50001:2018, November 2018.

High level structure

Annex SL high level structure comprises the following:

1. Scope
2. Normative references
3. Terms and definitions
4. Context of the organization
5. Leadership
6. Planning
7. Support
8. Operation
9. Performance evaluation
10. Improvement

Source: https://www.nqa.com/medialibraries/NQA/NQA-Media-Library/PDFs/NQA-ISO-50001-Implementation-Guide.pdf, accessed on Feb. 10, 2022.

A. Hepbasli

In the context of an EMS, PDCA is translated into the following:

Plan:

Understand the context of the organization, establish an energy policy, understand risks and opportunities and undertake an energy review by gathering, analysing and interpreting energy data. This energy intelligence is then used to help set trends, Significant Energy Uses (SEU's), energy baseline(s) performance indicators, objectives, targets and actions. It is also critical to secure Top Management buy-in and identify where help from competent consultants is required as well as securing NQA as a preferred ISO 50001 certification provider.

Do:

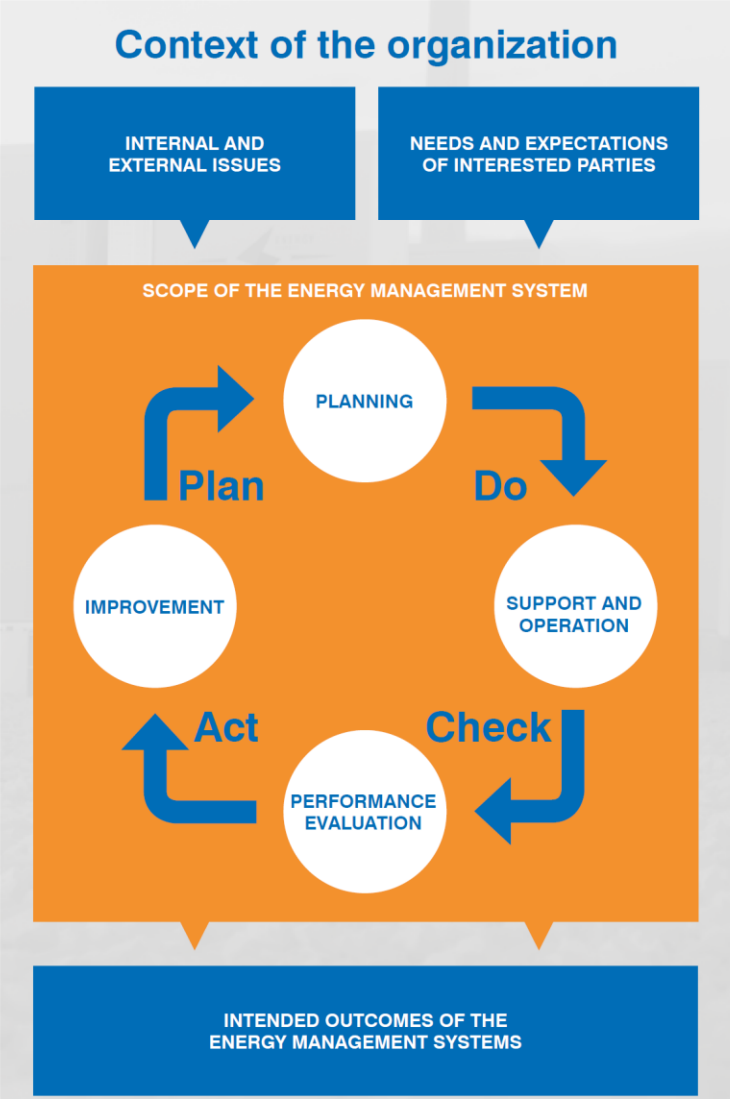
Implement the energy management action plans and act on the analysis of energy data to drive new standards of energy performance.

Check:

Monitor, measure, analyse, evaluate and audit and conduct energy reviews of energy performance against objectives and targets, then report the results.

Act:

This is where you take action, led from top management level, to ensure continual improvement in the EnMS and to address non conformity.



Source: https://www.nqa.com/medialibraries/NQA/NQA-Media-Library/PDFs/NQA-ISO-50001-Implementation-Guide.pdf, accessed on Feb. 10, 2022.

A. Hepbasli

Please note that the terms used in ISO 50001 are very essential. Here, only the terms "energy", "energy performance", "energy objectives" and "energy targets" will be explained.

energy

electricity, fuels, steam, heat, compressed air and other similar media

Note 1 to entry: For the purposes of this document, energy refers to the various types of energy, including renewable, which can be purchased, stored, treated, used in an equipment or in a process, or recovered.

energy performance

measurable result(s) related to *energy efficiency* (3.5.3), *energy use* (3.5.4) and *energy consumption* (3.5.2)

Note 1 to entry: Energy performance can be measured against the *organization's* (3.1.1) *objectives* (3.4.13), *energy targets* (3.4.15) and other energy performance requirements.

Note 2 to entry: Energy performance is one component of the *performance* (3.4.2) of the *energy management system* (3.2.2).

Source: BS EN ISO 50001:2018

energy efficiency

ratio or other quantitative relationship between an output of *performance* (3.4.2), service, goods, commodities, or *energy* (3.5.1), and an input of energy

EXAMPLE Conversion efficiency; energy required/energy consumed.

Note 1 to entry: Both input and output should be clearly specified in terms of quantity and quality and be measurable.

energy use

application of *energy* (3.5.1)

EXAMPLE Ventilation; lighting; heating; cooling; transportation; data storage; production process.

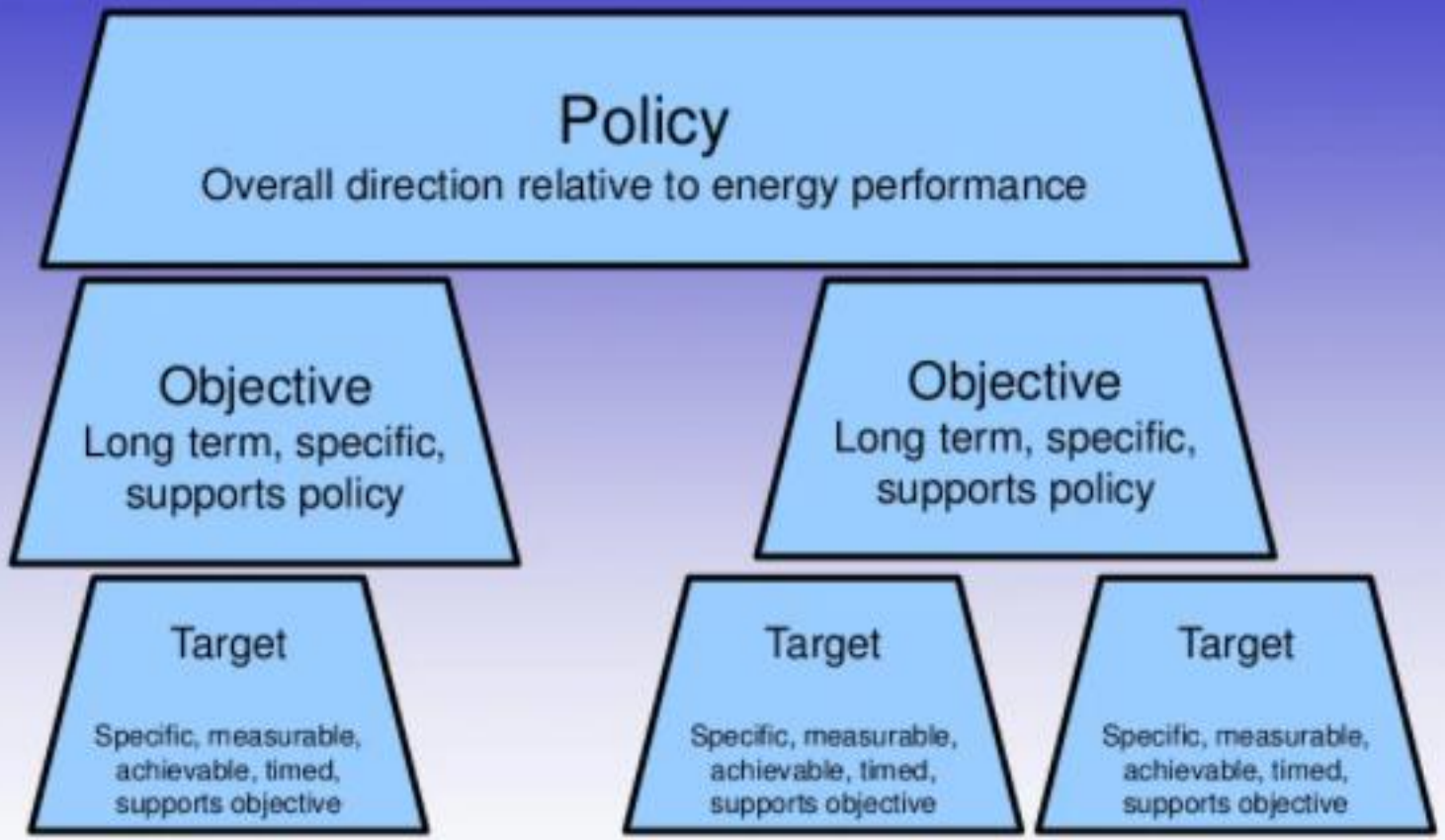
Note 1 to entry: Energy use is sometimes referred to as "energy end-use".

energy consumption

quantity of *energy* (3.5.1) applied

Source: BS EN ISO 50001:2018

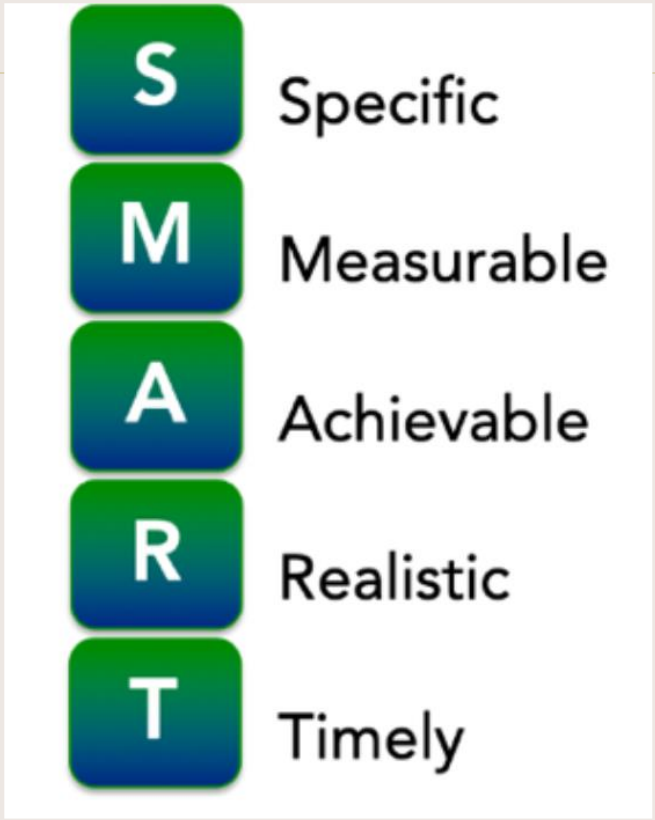
Objectives and Targets



https://pt.slideshare.net/TNenergy/iso-50001-workshop, accessed on Feb 6, 2022.

A. Hepbasli

S	Specific
M	Measurable
A	Appropriate
R	Realistic
T	Timeline



Examples of Objectives and Targets

Objective: Reduce facility-wide energy consumption by 15% by 2025.

- **Objective:** Reduce facility electricity consumption by 10% over the next two years (by the end of 2021).
- **Target:** By end of 2020, reduce electrical energy consumption in administrative operations by 2% from the 2018 baseline.
- **Target:** Reduce compressed air consumption to allow one compressor to be taken off-line by the end of January 2019.
- **Target:** By end of 2020, reduce natural gas consumption in boiler operations by 4% from the 2018 baseline.

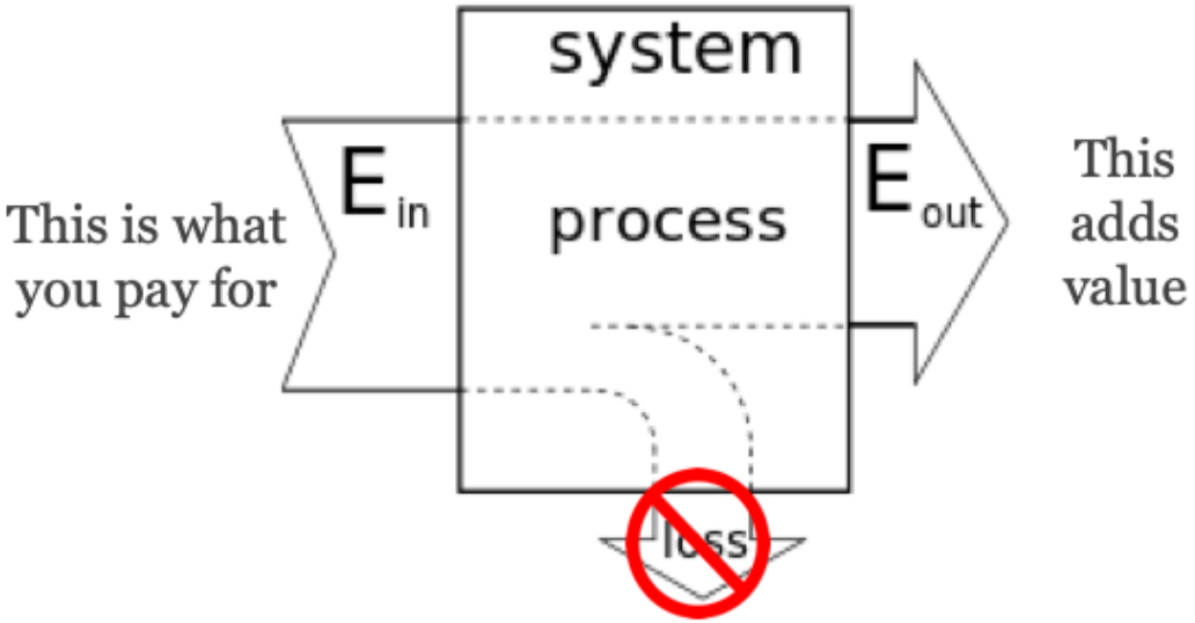
An **example** of an **objective** related to energy performance improvement is:
"Reduce energy consumption 10 percent in five years from the 2019 baseline."
An **example** of an **objective** related to improvement of the EnMS is: "Improve energy-related communications to on-site suppliers and contractors by the end of FY2020."
Energy targets are quantitative and may or may not be associated with objectives.
Examples of energy **targets** that may or may not be associated with the previous example of an objective related to energy performance improvement are:

- "Reduce electricity consumption 5 percent compared to a 2019 baseline by the third Quarter of 2021."
- "Reduce lighting system consumption 10 percent compared to a 2019
baseline by the end of FY 2020

OBJECTIVES	TARGETS
Reduce energy use	Σ Reduce electricity use by 5% in 1999 Σ Reduce natural gas use by 15% in 1999 Σ Reduce use of diesel oil by 10% in 1999
Reduce usage of hazardous chemicals	Σ Eliminate use of CFC's by 2005 Σ Reduce use of high-VOC paints by 50%
Reduce hazardous waste generation	Σ Reduce chrome wastes in plating area by 50% in 1997
Improve employee awareness of environmental	Σ Hold monthly awareness training courses Σ Train 100% of employees by end of 1999
Reduce waste water discharge	Σ Recycle water by 20% in boiler by 1999

https://www.pjr.com/downloads/webinar_slides/ISO%2050001%20ppt_4-22-2015.pdf, accessed on Feb. 6, 2022.

Make MORE with LESS:



Top tips for the successful implementation of a EnMS

1. To have an effective EnMS ensure that "Top Management" is committed to its establishment, implementation and continual improvement.
2. Use "Context" to understand the macro energy issues.
3. Integrate the EnMS into your work processes so that it is not another thing to do – it's just what you do!
4. Allocate people and time wisely.
5. Start "small and simple" with data capture and then expand over time.
6. The energy plan must be part of an organization's culture and supported from top management to all employees. Educate your organization, promote it, get buy in.
7. Use ISO 50001 for compliance directly with ESOS.
8. Aside of the potential to save energy, there is commerciality in having ISO 50001. Organizations are often asked at tender stage how they manage energy. If they say they have ISO 50001, procurement personnel are satisfied.
9. Understand that energy management requires an organization to shift from a project-by-project approach to one of continual improvement in energy performance
10. Use the ISO 50001 Standard as a means to design an EnMS.
11. Make energy data visible and easy to access.
12. Use Management Review to provide strategic direction.

Source: https://www.nqa.com/medialibraries/NQA/NQA-Media-Library/PDFs/NQA-ISO-50001-Implementation-Guide.pdf, accessed on Feb. 10, 2022.

Study Question 1

The proposed ISO standard for Energy Management System is:

a) ISO 9001
b) ISO 50001
c) ISO 14000
d) ISO 14001

Study Question 2

The name of the ISO standard for Energy Management System (EnMS) used in Turkey is:

a) TS 50001
b) ISO 50001
c) TS EN 50001
d) TS EN ISO 50001

Study Question 3

The name of the latest valid ISO standard for Energy Management System (EnMS) used in Turkey is:

a) TS 50001
b) ISO 50001
c) TS EN 50001:2011
d) TS EN ISO 50001:2018

Study Question 4

Why should enterprises adopt EnMS ?

a) To improve their energy efficiency
b) To reduce costs
c) To increase productivity
d) Systematically manage their energy use

Reply

Systematically manage their energy use

Study Question 5

What should be improved by adopting an EnMS ?

a) Fuel usage

b) Electricity usage

c) Energy performance

d) Energy intensity

Reply

Energy performance

Study Question 6

The ISO 50001 is a

a) Structured approach to the management of energy use

b) Voluntary global management system standard

c) Guide to improve energy performance

d) Technical regulation

Reply

Voluntary global management system standard

Study Question 7

The best way to ensure that enterprises have adopted ENMS is

a) Certification of ISO 50001 by accredited Certification Bodies/third party verification of improved energy performance

b) Robust adoption of ISO 50001

c)Ad-hoc management system

d) None

Reply

Certification of ISO 50001 by accredited Certification Bodies/third party verification of improved energy performance

Study Question 8

Certification of ISO 50001 is to

a) Assess conformity against all of the requisites of the standard

b) Providing a certificate against a management system implementation

c) Get international recognition on management practices

d) Verification process for achieving energy savings

Reply

Assess conformity against all of the requisites of the standard

Study Question 9

What does it mean to be a certified energy manager ?

a) Having completed an EnMS course

b) Completing an accredited certification process

c) Having a lot of EnMS experience

d) Graduating as an energy engineer

Reply

Completing an accredited certification process

Pls. note that in our university there are a total of 7 certified energy managers, as indicated in slide no. 101 (6 certified managers have been included here).

Study Question 10

Which of the following cycles (approaches) uses the energy management system standard ?

a) PDCA

b) PCAD

c) PACD

d) ACPD

Reply

Pls. see slide no. ???

YASAR UNIVERSITY

TSE

ENERJİ YÖNETİM SİSTEMİ BELGESİ
ENERGY MANAGEMENT SYSTEM CERTIFICATE

Partner of IQNet

TÜRK STANDARDLARI ENSTİTÜSÜ
bu belge ile

YAŞAR ÜNİVERSİTESİ
ÜNİVERSİTE CAD. NO:35-37 BORNOVA - İZMİR
YAŞAR ÜNİVERSİTESİ ÖĞRENCİ YURDU: KAZIM DİRİK MAH. 367/2 SOK. NO:9/2 35100 BORNOVA - İZMİR / TÜRKİYE

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Scope of the certificate is given in annex

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TURKISH STANDARDS INSTITUTION
SİSTEM BELGELENDİRME GRUP BAŞKANI
HEAD of SYSTEM CERTIFICATION GROUP

GÖKÇİN BİRCAN DEĞERLİYURT

Belge No / Certificate No: EYB-85/16
Belge Tarihi / Date of Certificate: 05.01.2016
Geçerlilik Tarihi / Valid Until: 05.01.2019
Revizyon Tarihi / Date of Revision: 05.01.2016
İlk Belge Tarihi / Initial Certification Date: 05.01.2016

Bu belge, Türk Standardları Enstitüsü'nün kuruluşu hakkındaki 132 sayılı kanun uyarınca verilmiştir.
This certificate is issued in accordance with the Law No. 132 establishing Turkish Standards Institution.

060801201611050001

The first campus in Turkey to achieve TS EN ISO 50001:2011 Certification on 5 January 2016

evy.yasar.edu.tr
http://evy.yasar.edu.tr/evykk/

Energy Management Team of Yasar University along with 6 Certified Energy Managers

ISO 9001 (Quality Management System Standard) …….2016

ISO 27001 (Information Security Management System)……2019

A. Hepbasli

TSE

ENERJİ YÖNETİM SİSTEMİ BELGESİ
ENERGY MANAGEMENT SYSTEN CERTIFICATE

Partner of IQNet

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Study Question 11

Which university achieved the ISO 50001 certification for the first time in Turkey ?

a) Ege University

b) Yasar University

c) METU

d) Nine September University

Reply

Yasar University

Study Question 12

What kinds of standards are achieved at Yasar University ?

a) Energy management system standard

b) Energy and quality management system standards

c) Energy, quality, environment and information security management system standards

d) Energy, quality and information security management system standards

Videos

Pls. watch the following videos (Access date: 29 September 2020):

1. **Getting Started - ISO 50001 Energy Management**
https://www.youtube.com/watch?v=MCPL3qk2qKI&feature=youtu.be

2. **Important Terms - ISO 50001 Energy Management**
https://www.youtube.com/watch?v=g_kQve_-D3g&feature=emb_rel_end

3. **Is ISO 50001:2018 worth its weight or just "hot air"?**
https://www.youtube.com/watch?v=PtoLWzGYMzM

Some Questions from Videos

Study Question 13

What should be committed by top management ?

a) Improving energy performance

b) Enhancing the energy sale

c) Improving the incomes of the institution

d) Increasing the energy saving

Study Question 14

Why should institutions undertake ISO 50001 ?

a) To raise awareness amongst staff.

b) To reduce carbon footprint.

c) To eliminate wastes.

d) All of them

Study Question 15

Which of the following relates to energy performance ?

a) Energy use

b) Energy efficiency

c) Energy consumption

d) All of them

Study Question 16

Which of the following is not meant by a constant repetition of the phrase improving energy performance and energy management system ?

a) Reducing energy use
b) Reducing energy consumption
c) Increasing energy efficiency
d) Raising awareness amongst staff.

Study Question 17

Which of the following is not the items of the so-called «SMART» approach?

a) Measureable

b) Realistic

c) Totally

d) Specific

Study Question 18

Which of the following is «energy» according to the ISO 50001 ? Please choose the most appropriate one.

a) Electricty

b) Steam

c) Compresed air

c) All of them

Study Question 19

Which of the following is related to energy use ?

a) "Factory X" uses 100 000 kWh of energy per month.

b) "Factory X" uses 100 000 kWh of energy per month in the food production line.

c) "Factory X" has a boiler thermal efficiency of 85%.

c) None of them.

Study Question 20

Which of the following is a (energy) target ?

a) Reduce electrical energy consumption in administrative operations by 2% in the next 3 years.

b) Improve energy-related communications to on-site suppliers and contractors by the end of FY2020.

c) Improve employee awareness of environmental issues.

d) Reduce the heating system consumption 12% compared to a 2020 baseline by the end of FY 2021

Study Question 21

Which of the following is an energy objective ?

a) Reduce electricity consumption 4% compared to a 2019 baseline by the third Quarter of 2021."

b) By end of 2020, reduce electrical energy consumption in administrative operations by 1% from the 2018 baseline.

c) Reduce lighting system consumption 8% compared to a 2019 baseline by the end of FY 2020.

d) Reduce facility-wide energy consumption by 8% by 2025.

Study Question 22

Which of the following is not a requirement ?

a) The organization shall establish, implement, maintain and continually improve an EnMS.

b) This document can be used independently; however, an organization can choose to combine its EnMS with other management systems.

c) Both input and output should be clearly specified in terms of quantity and quality.

d) The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.

Study Question 23

How many requirements are there in ISO 50001:2018 ? Please choose the most appropriate one.

a) 20-30

b) less than 60

c) 90-100

d) more than 100

Concluding Remarks

- This presentation is intended to provide more details about some general rules of an energy management structure that apply to almost all the companies.
- In conducting any energy management program, the measurement is very essential.

Generally speaking: To measure is to know and to know is to manage (You can not manage what you do not measure). In addition, to manage is **to improve** [28].

Western proverb: Seeing is believing [29].

Japanese proverb: Seeing once is better than hearing a hundred times [29].

Sources: [28,29]

- Success in your life is not a single achievement. It's all that you do with others and for others [27].

- Energy is a manageable cost.

- ISO 50001:2018 should be widely applied to all sectors in Turkey.

Sources: [27,30]

QUESTIONS ???

THANK YOU
VERY MUCH
FOR YOUR
STAYING
HERE
TILL THE END

QUESTIONS ???

Be Expectional

&

Make a Difference

A. Hepbasli