

Energy Management System

Syllabus for
ISO 50001 Class
EnMS Workshop

featuring

Chief Energy Officer Skill Development

In commemoration of

Energy Efficiency Initiatives in Singapore



Antris Management Solutions / EnMS-Doc Associates

Document Management Information	
Document ID	EnMS-Doc_Workshop-Syllabus_SG-M02E
Document Title	Syllabus for ISO 50001 Class EnMS Workshop
Version No.	1.0
Operation Name	Sustainability Business Development Exercise
Management System Name	Energy Management System

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1 Course Description

1.1. Background

Systematic approach in energy management with the baseline ISO 50001 International Standard “Energy Management System” (hereinafter referred to as “ISO 50001”) provides the opportunity for a company to run its business with an aim to gain the most energy efficient operation. This comes with continual improvement practice, leading into the best sustainable business development and performance.

Additionally in Singapore, various Energy Efficiency Initiative guideline and regulation has been set forth by the government such as the new Energy Conservation Act for industrial large energy users, incentive programmes for SME and commercial building owners. The main purpose of the initiatives are to improve the energy performance of companies making them more competitive in the global economy, and the initiatives and ISO 50001 complementing each other for Singapore to promote the superior system for energy management operation.

In order to execute effective Energy Management System (hereinafter refer to as “EnMS”) operation, an energy manager with strong leadership is essential who represents the top management. Having business accountability in the managing organisation’s energy performance improvement, the energy manager is expected to guide all the positive aspects generated by the energy management operation to be integrated into business opportunity, ensuring sustainable business development. The energy manager, management representative appointed by the top management with allocated resources and authorisation is termed “Chief Energy Officer” (hereinafter refer to as “CEO”).

Antris Management Solutions and EnMS-Doc Associates (hereinafter refer to as “organiser”) has identified that in order for a company to develop efficient EnMS operation for developing sustainable business, it requires a practical hands on workshop session, instead of a mere theoretical course, to develop CEO skill set in energy management who can integrate the superior elements into the business operation.

Skill set required for CEO is intense and complex. It therefore requires gaining in-depth practical knowledge developing from his/her experience in order to perform the duty. The organiser is taking the initiative to design, plan and implement a superior workshop session for CEO using a the most updated ICT tools together with the world top class instructors acting as implementers in the workshop sessions. As the first step as usual, the organiser develops an effective syllabus for the workshop session so that the participants as well as their top management and direct superior gain information about what is expected from the three-day session.

1.2. Workshop Description

Date and Time: 25-27 September 2013 8:30-17:00 (first day), 9:00-17:00 (second and third days)

Venue: Jupiter II, Level 3, Furama RiverFront (405 Havelock Road Singapore 169633)

Workshop enrolment No: 25 participants maximum

Workshop Implementer: Nobby Yamanouchi, Bayu Darmawan

Flow of the workshop goes like this. Day-1 is assigned to be lecture session to learn about the key elements in EnMS operation. Day-2 and -3 are assigned for hands on workshop session, splitting participants in 4 groups in forming a virtual energy user to act on its behalf. In order to maintain quality participant-instructor two-way communication and the effective workshop exercise, the size of session is limited to maximum of 24 participants.

Day-1 lecture session consists of 15 modules to learn about the business aspects of EnMS operation:

MS Keynote Presentation Session by National Environment Agency (NEA)

Module 1. Introduction

Module 2. Practical Guide to ISO 50001 Energy Management System

Module 3. ISO 50001 in relation with other management systems

Module 4. Top Management Involvement is the key

Module 5. Top Management Representative “CEO” and EnMS Operation Team

Module 6. EnMS Charter and documentation

AS Afternoon Session

Module 7. Energy Review objective and procedure

Module 8. Energy Performance Indicator, method to identify, and setting saving target and define verification methodology

Module 9. Energy Monitoring Principal and useful procedure

Module 10. “RENKEI” Control Concept

Module 11. EnMS Operation / Documentation System “wiki50001”

Module 12. Reflecting ECOs into Action Plan

Module 13. ISO 50001 Management Elements related to implementation & operation

Module 14. ISO 50001 Management Elements related to checking performance

Module 15. Day 1 wrap up and conclusion

Day-2 There will be five workshop sessions involving EnMS organisation/scope and boundary, Energy review exercise on (1) identify EnPI; (2) identify energy monitoring system; and (2) identify ECOs, Management review and Action plan :

Workshop 1. EnMS organisation/scope and boundary

Workshop 2. Energy Review *Exercise 1*: Identify EnPI and Cusum savings e

Workshop 3. Energy Review *Exercise 2*: Identify the first phase M&T system

Workshop 4. Energy Review *Exercise 3*: Identify ECOs

Workshop 5. Management Review

Workshop 6. EnMS Action Plan

Day-3 There will be two workshop sessions on EnMS audit which include gap analysis. The last two hour will be spent on wrapping up the session and to create workshop report addressing to the top management of the company represented:

Workshop 7. EnMS audit exercise #1 with gap analysis

Workshop 8. EnMS audit exercise #2 with gap analysis

Workshop 9. After appreciating audit exercise as an effective way to learn about EnMS operation, participants will be asked to identify the gap in order to run the ISO 50001 class EnMS operation for their organisation. With the gap identified, action items are to be defined.

Session ends with the presentation of workshop completion certificate.

1.3. Methodology and Procedure

Each participant is requested to bring his/her laptop PC. The session is under internet environment to exchange necessary documents and information.

Throughout the workshop, EnMS operation system (wiki50001) is used as an effective training tool for participants to experience real world EnMS operation. The system is developed by TEAM (Energy Auditing Agency Ltd.), a leading EnMS solution software suite from the U.K.

The methodology and procedure used are as follows:

Day-1 Lecture session:

- Each module is presented by an assigned instructor with pptx file slides.
- Keynote Presentation Session by National Environment Agency (NEA) will highlight Energy Efficiency Initiatives in Singapore and its relationship with ISO 50001 International Standard for Energy Management System (EnMS).
- 12 sets of ISO 50001 class ready-to-use key management documents (hereinafter refer to as “12 key documents”) are distributed to all participants in docx file.
- The first session of the afternoon will start with SPRING Singapore presentation addressing Business Excellence (BE) initiative and its business implication with ISO 50001 class EnMS.(Tentative)
- Starting with Module 12, wiki50001, an operation tool to perform control operation, documentation, training, communication and audit practices will be used. wiki50001 is embedded with the same 12 key documents that participants received for the workshop in pdf format. Throughout the session wiki50001 EnMS operation system plays an important role as training tool to cover ISO 50001 requirements efficiently.

Day-2 and -3 workshop session:

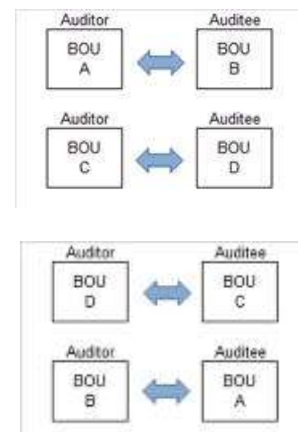
- There will be 4 groups formed for the workshop purpose. (6 persons maximum per group) They are tentatively named Group A, B, C and D.
- Each group acts as a virtual energy user company, and to represent the company throughout the workshop session.
- For the 3rd day EnMS audit, EnMS Audit Guideline in docx file and the EnMS audit scorecard system in xlsx file will be provided.
- The audit exercise will be carried out using wiki50001 system audit function together with the scorecard system.
- auditor/auditee assignments (Day-3) are as follows:

EnMS audit exercise #1

- Group A as an auditor team audits Group B auditee company
- Group C as an auditor team audits Group D auditee company

EnMS audit exercise #2

- Group D as an auditor team audits Group C auditee company
- Group B as an auditor team audits Group A auditee company



1.4. Workshop Learning Goal

Learning goal in general is for the CEO to become fully competent to lead the organisation's EnMS operation ensuring the energy performance improvement is within reach. In particular:

- Develop ideas for the best EnMS operation for the representing organisation
- Familiarise with the Energy Conservation Act-Singapore and manage to blend ISO 50001 elements to run optimal and superior EnMS operation
- Appreciate the top management role in EnMS operation and develop intimate trust relationship
- Capitalise the opportunities generated by the “energy manager = CEO” role and responsibility, and demonstrate how to take leadership in the EnMS operation as a CEO
- Become aware of organisation's energy use situation and how organisation is structured to improve energy performance
- Become expert to identify organisation's baseline and target energy performance indicators (EnPI)
- Identify procedure and result expected from the energy review activities
- Work under Plan - Do - Check - Act (PDCA) continual improvement framework incorporating energy management into everyday organizational practices
 - Establish EnMS action plan (P)
 - Implement and manage the EnMS operation (D)
 - Check overall performance of the operation including the effect of EnMS audit (C)
 - How to manage continual performance improvement procedure leading to measurable results (A)
- Take leadership to run effective management review sessions to accelerate the operation and motivate the workforce under the top management involvement
- Capture ideas of gaining 10% energy cost reduction from operational aspects requiring no or very little investment for the representing organisation
- At the end of the course to identify and report what is needed to properly perform as an effective energy manager, CEO

1.5. Prerequisites

The CEO joining the workshop must have full understanding together with willingness to enhance the organisation's EnMS operation. At the same time, the CEO must have endorsement of the top management, as well as the person of the direct reporting line regarding the content, result expected, and objective of the workshop.

1.6. Reference documents useful for the course

Following documents are useful to understand the course content:

- (1) International Standard ISO 50001, Energy management system-Requirements with guidance for use
- (2) International Standard ISO 19011:2011, Guidance on the Principles of Auditing
- (3) EnMS Charter
- (4) EnMS Document Management Guideline
- (5) EnMS Energy Review Report
- (6) EnMS Action Plan
- (7) EnMS Monitoring & Action Guideline
- (8) EnMS Audit Plan
- (9) EnMS Training Plan
- (10) EnMS Continual Improvement Guideline
- (11) EnMS Communication Guideline
- (12) EnMS Lean Energy Procurement Guideline
- (13) EnMS Legal & Requirements Compliance Status Report
- (14) EnMS Audit Guideline
- (15) EnMS Audit Scorecard System

1.7. Terms, Definitions and Acronyms

The terms and definitions, acronyms used in this document are shown in Appendix 2.

2. Objectives

Objectives set forth by three elements are considered in making sure the workshop provides benefits to all parties involved.

2.1. Workshop Objective

The workshop aims to ensure the concerned organisation in establishing sustainable EnMS operation in place, and build the capacity of the CEO to take leadership in implementing the system as well as the business output.

The objective of the workshop is to:

- enhance the management skill as the energy manager in taking leadership role for implementing EnMS operation which would place the representing organisation in globally competitive advantage position
- Generate awareness for the CEO to identify gaps between existing operation and the ISO 50001 class EnMS operation that can be turned into improvement action items
- Build up good working relationship with the top management as well as with the workforce

By completing the course, the CEO and the representing organisation will automatically becoming attached to the ISO 50001 class EnMS operation.

2.2. CEO (participant) Objective

- Understand energy impact on business output
- Expose to company-wide activities thus faster experience build up
- Integrate various management system with energy management
- Improve management skill
- Secure promising career path by developing sustainability business

2.3. Objective of Organisation represented by the CEO

- Sustainability business development with ISO 50001 Class EnMS operation
- Develop competent CEO
- Cost reduction/profit improvement through the effective EnMS operation
- Gain broader view of sustainability business promoters with whom to benefit from

2.4. Organiser Objective

- Workshop provides recognition of ISO 50001-class EnMS operation ensures enhancing organisation's sustainability business development blending with the opportunity generated by the Energy Efficiency Initiatives in Singapore
- Workshop guides organisation to achieve energy performance improvement through ISO 50001-class EnMS operation
- Workshop enhances skill of CEO to lead efficient and effective EnMS operation
- Workshop information brings at least 10% energy use reduction form the operational aspects requiring no or very little investment.

3. Workshop Topics

In this clause, it presents the flow of workshop session procedured together with overview of modules and workshop exercises. Additionally, the workshop timetable used as a guideline for scheduling the workshop is provided in Appendix 1.

3.1. Preparation phase

After completion of course registration and prior to workshop commencement, each participant is entitled to 30 minutes tele-conference session (or e-mail exchanges) for the organiser or the instructor to learn about the participants and the representing organisations to fine tune the workshop program ensuring it meets the expectation of the participant to the best of their ability.

Following information is useful for the organiser to collect during the preparation period:

- About participants
 - Current job description, role and responsibility
 - How they are appointed as the energy manager
 - Support intensity of top management in the organisation
 - Participants expectancy to the course
 - Etc.
- About representing organisation
 - Industry and overview of business
 - Rough energy use information
 - Rough organisation chart description
 - EnMS operation status
 - Organisation expectancy from the course
 - Etc.

Following topics of discussion should help accelerate the participant learning capacity:

- Participant and instructor relation build up
- Brief workshop description and participant's objectives
- About issues and concerns related to participating the workshop
- About the representing organisation's energy use and behavior
- Etc.

If the participant or representing organisation wishes for the organisation to carry out energy performance analysis to identify baseline and target EnPI prior to workshop session, organiser is pleased to assist this with the condition that necessary data are provided.

3.2. Day-1: Lecture Session

For the Day-1 lecture session, the course commences with a keynote Presentation Session by National Environment Agency (NEA) addressing the various measures taken in Singapore for Energy Efficiency Initiatives such as new Energy Conservation Act and various energy efficiency programmes for SME as well as NEA's promotional role in various directives for commercial buildings. Introduction session follows and step by step bringing the participants to the superior world of energy management system (EnMS), including the learning of the benefits of ISO 50001 class when it is adapted to the representing organisation.

Day-1 covers 15 modules with expected net duration of 6 hours. At the end of Day-1, individual question and answer session can be arranged for those who are staying longer.

3.2.1. Opening Presentation by The National Environment Agency (NEA)

Duration: 40 minutes

Presentation: "Energy Efficiency Initiatives" and NEA perspectives for Energy Management in Singapore

Outline: Energy efficiency related guidelines and regulations required in energy management practices for industrial and commercial building sector large energy users have been set forth in Singapore. Additionally various incentive programmes for energy efficiency drive directed to SME sectors are introduced.

The presentation will address NEA's position in promoting ISO 50001 class EnMS which would synergise to accelerate energy performance in conjunction with the various Singapore's Energy Efficiency Initiatives.

3.2.2. [Module 1] Introduction

Duration: 40 minutes

Objective: Understand the objectives of, and quickly attach to the workshop

Description: Organiser welcome remarks and self-introduction of all concerns including participants. As an orientation, the instructor will explain overall objectives, logistics, evaluation method, and learning tips. Additionally to go over definition of key terminology or abbreviation to establish common

3.2.3. [Module 2] Practical Guide to ISO 50001 Energy Management System

Duration: 20 minutes

Objective: (1) Learn about ISO; (2) Learn about Management System; and (3) Learn about ISO 50001 role and purpose

Description: Explain about ISO standards being useful tool to run business and about product standard and management standard differentiation. In ISO 50001 requirements, the focus is to explain about benefits of EnMS being ISO 50001 class, and additionally to point out the importance of documentation with 12 key documents coverage to requirements.

3.2.4. [Module 3] ISO 50001 in relation with other management systems

Duration: 20 minutes

Objective: Understand the positioning of energy management to other management systems, such as ISO 9001, ISO 14001, etc.

Description: This module explains about the relationship between ISO 50001 and other management system standards. It then expand into discussions about how to integrate the operation with various management system having in mind of the uniqueness of the energy management system.

3.2.5. [Module 4] Top Management Involvement is the key

Duration: 20 minutes

Objective: Convince that EnMS cannot be successful without the Management Involvement, and to set up strategy that top management is the one to convince the workforce to implement EnMS

Description: Explain why Top Management involvement is necessary, and to cover the elements that how top management should take leading role. This module is to explain the role of top management in EnMS operation in line with ISO 50001 requirements. Putting much stronger emphasis on top management is one of ISO 50001 specialities compared to other ISO management standard. Top management emphasis is very important to energy manager to carry out the task.

3.2.6. [Module 5] Top Management Representative “CEO” and EnMS Operation Team

Duration: 20 minutes

Objective: Understand the “CEO” role and responsibility as well as workforce role in the EnMS operation including EnMS Operation Team

Description: This module explains the key tasks of “CEO” who would lead the EnMS operation to ensure achieving energy performance improvement. It also expands the “CEO” ability to capitalise on the opportunity generated by EnMS for the company’s sustainable business development. The module will focus on the following elements before expanding it to the business aspects of “CEO”:

- role and responsibility for energy manager in line with ISO 50001.
- methodology for setting up EnMS and to provide guidance to apply the knowledge in real business practice in line with ISO 50001.
- how to set up EnMS operation committee and identify members including their role and responsibility to effectively run ISO 50001 class EnMS operation:

3.2.7. [Module 6] EnMS Charter and documentation

Duration: 30 minutes

Objective: Understand the importance of documentation in implementing ISO 50001 Class EnMS operation, and to further familiarise with the EnMS concept by learning the contents of EnMS Charter.

Description: This module explains about EnMS Charter that acts as the highest-level document of EnMS, setting the rule and the guideline for the operation. The charter is followed by 12 key management documents required by the ISO 50001 requirements, which will outline in the module. These documents are in nature to be created by “CEO”.

3.2.8. [Module 7] Energy Review, objective and procedure leading to EnMS Action Plan

Duration: 30 minutes

Objective: Understand the energy review purpose, overview and procedure.

Description: This module explains about practical energy review in line with ISO 50001 in four parts, (1) The purpose; (2) overview and procedure; (3) deliverables; and (4) recommendation.

3.2.9. [Module 8] Energy Performance Indicator (EnPI)

Duration: 30 minutes

Objective: Understand the specific energy consumption (SEC) concept (energy consumption per business output unit) and regression analysis method to derive baseline and target EnPI together with cusum saving verification

Description: This module explains about the characteristics of SEC and how to command the regression analysis method in order to identify baseline and target EnPIs. The hands on analysis will be practiced to fully understand the analysis methodology so that the energy manager can identify EnPIs and cusum savings for the representing organisation.

3.2.10. [Module 9] Energy Monitoring Principal and useful Procedure

Duration: 30 minutes

Objective: Learn a word “Miyeru-ka” and understand the benefit of Monitoring and Targeting (M&T). Additionally, to appreciate that Energy performance improvement quantitative verification cannot be done without M&T.

Description: This module explains how to identify the most economical and the best-suited M&T system for an organisation. After learning the system, the procedure related to M&T system is presented. The module also provides guidance how to evaluate the energy performance improvement with EnPI explained in Module 9.

3.2.11. [Module 10] “RENKEI” Control Concept

Duration: 20 minutes

Objective: Learn the most updated control technology, “RENKEI” Control (See Appendix 2, Terms and Definitions, Acronym), for energy performance improvement.

Description: This module provides information regarding the most updated energy efficiency technology, “RENKEI” Control using optimisation approach harmonising two or more control elements to output the optimal solution.

3.2.12. [Module 11] EnMS Operation/Documentation System “wiki50001”

Duration: 20 minutes

Objective: Learn about wiki50001 EnMS operation system, and to gain full appreciation of its functionality and benefits by practicing hands on operation.

Description: This module provides introduction and explain the feature-function-benefit of wiki50001, the powerful operation tool to perform control operation, documentation, training, communication and audit practices. The participants will operate the system through their own laptop PC.

3.2.13. [Module 12] Reflecting ECOs into Action Plan

Duration: 20 minutes

Objective: Summarise what kind of energy conservation opportunities (ECOs) were identified during the energy review and learn how to reflect them as action plan for implementation.

Description: This module provides case studies of operational and technical ECOs typically identified during the energy review. It will demonstrate, using the wiki50001 system, the process of prioritisation, recommendation, evaluation and authorisation at management review, and how to reflect it as energy saving project in the action plan.

3.2.14. [Module 13] ISO 50001 Management Elements in “Implementation & Operation”

Duration: 20 minutes

Objective: Understand ISO 50001 requirement regarding "implementation & operation" and what aspects are actually with the business management.

Description: This module covers following management items and explains how these are related to the daily business operation:

- Communication
- Lean Energy Procurement
- Design
- Operational Control
- Training Aspects

3.2.15. [Module 14] ISO 50001 Management Elements in “Checking Performance”

Duration: 20 minutes

Objective: Understand ISO 50001 requirement regarding “checking performance” and what aspects are actually with the business management.

Description: This module covers following management items and explains how these are related to the daily business operation:

- M&T review (covered in Module 10)
- Legal & Requirements Compliance Status
- Continual Improvement Guideline
- EnMS Audit

3.2.16. [Module 15] Day-1 wrap up and conclusion: Energy management is business

Duration: 30 minutes

Objective: Review the Day-1 presented modules, going over the points requiring clarification, and to become convinced that energy management is a business matter

Description: This module recaps the Day-1 session and holding question and answer session. The instructor will highlight the business aspects of the energy management operation for the Day-1 conclusion

3.3. Day-2: Workshop Session -Part 1-

The overall objective of the Day-2 workshop session is to gain in-depth EnMS knowledge by exercising the key EnMS operational activities, namely setting up the EnMS organisation and to conduct energy review to come up with recommendation for action plan. There will be five workshop sessions involving EnMS organisation/scope and boundary, Energy review exercise on (1) identify EnPI; (2) identify ECOs; (3) identify M&T system; and (5) having energy review recommendations to establish EnMS action plan.

3.3.1. [Workshop 1] EnMS organisation/scope and boundary

Duration: 90 minutes

Objective: To gain experience in setting up EnMS organisation and the management scope and boundary after each group identify group's business operation unit. Objectives are as follows:

- Get to know group members and build up team work
- Understand each role and responsibility
- Establish a representing virtual business operation unit
- Establish an organisation in order to set up EnMS and to perform energy review
- Define the business
- Define the process
- Define annual approx. energy use and cost
- Define scope and boundary

Description: This workshop is for each group to conduct the following elements and report the results:

- Assigning each member the strategic role to conduct EnMS operation
- Exchange information on organisation energy use information, Establish a representing virtual business operation unit for the group
- Create a business unit: business output, Process, EnMS scope and boundary, etc.

3.3.2. [Workshop 2] Energy Review *Exercise 1: Identify EnPI and Cusum savings*

Duration: 90 minutes

Objective: To gain experience in identifying baseline and target EnPI and cusum saving

- Identify baseline and target EnPI and cusum saving
- Perform Cusum analysis based baseline EnPI identified

Description: This session is for each group to gain experience to carry out energy data analysis to identify energy performance improvement target for the next year (EnPI: Baseline & Target) as well as perform cusum analysis to identify current saving cusum with a defined baseline. The outcome to be presented at the end of the session.

3.3.3. [Workshop 3] Energy Review *Exercise 2: Identify the first phase M&T system*

Duration: 60 minutes

Objective: To gain experience in identifying the first phase of M&T system suitable for organisation:

- Identify the budget for M&T system
- Identify M&T users
- Identify metering point
- Identify M&T system overview
- Conduct cost estimate
- Provide recommendation

Description: This workshop session is for each group to conduct the following elements and report the results:

- Analysis on M&T system organisational aspects
- Analysis on M&T system procedural aspects
- Monitoring system investigation (Ideal M & A system for the organisation)
- Analysis on economics of introducing the M&T system

3.3.4. [Workshop 4] Energy Review *Exercise 3: Identify ECOs*

Duration: 60 minutes

Objective: To gain experience in conducting energy audit to identify:

- ECOs of technical aspects
- ECOs of operational aspects
- ECOs of design aspect
- Training needs
- Communication needs
- Documentation needs
- Awareness programme
- Etc.

Description: This workshop session is for each group to conduct the following elements and report the results:

- Analyse the significant energy use items
- Technical review (Energy audit)
- Operational review
- Gap analysis to ISO 50001 compatibility
- Etc.

3.3.5. [Workshop 5] Management Review

Duration: 60 minutes

Objective: To gain the approval in energy efficiency action:

- Consolidate what was found in energy review and set up strategy what is needed by the top management
- Identify what action is necessary for following year and mid-long term
- Obtain management commitment for EnMS Action from the management review session

Description: This workshop is for each group to conduct the following elements and report the results:

- Group discussion how to present the result obtained from the energy review
- Hold a management review session
- Write a minutes from the management review session

3.3.6. [Workshop 6] EnMS Action Plan

Duration: 60 minutes

Objective: To gain experience in for the process of establishing EnMS Action Plan:

- Consolidating the approved action items from the management review session and convert it to action plan
- Establish EnMS Action Plan for implementation of EnMS operation

Description: This workshop is each group to conduct the following elements and report the results:

- Review what was agreed in the Management review session
- Establish action items for Jun 2013-May 2014 (real term basis)
- Schedule the action items (Objective, who what by when)

3.4. Day-3: Workshop Session -Part 2-

The overall objective of the Day-3 workshop session is to gain in-depth EnMS knowledge by exercising the EnMS Audit activities. There will be three workshop sessions involving two EnMS Audit activity sessions to cover all groups to be auditor and auditee. Final workshop session is for all participants to provide the wrap-up of the 3-day sessions followed by the ending session.

3.4.1. Audit Orientation

Duration: 60 minutes

Objective: Reach full appreciation of EnMS Audit and to learn the scoring method.

Description: This orientation session covers the following topics for the participant to have full appreciation of EnMS Audit and scoring system:

- Overview of EnMS Audit
- EnMS Scorecard
- EnMS Audit Exercise Instruction

3.4.2. [Workshop 7] EnMS Audit Exercise #1

Duration: 150 minutes

Objective: Reach audit expertise by hands on experience in EnMS audit activities from both auditor and auditee perspectives as well as gaining in-depth EnMS knowledge from the EnMS audit exercise.

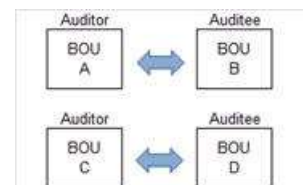
Description: This workshop is for two groups to conduct the following elements and report the results

Group A as an auditor team audits Group B auditee company

Group C as an auditor team audits Group D auditee company

Audit activities take place with following elements:

- Use wiki50001 operating system's audit function to conduct audit
- Use the audit scorecard to quantitatively assess the performance of auditee
- Two group acting auditor role conduct closing session to report on the audit findings



3.4.3. [Workshop 8] EnMS Audit Exercise #2

Duration: 150 minutes

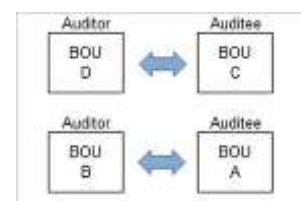
Objective: Reach audit expertise by hands on experience in EnMS audit activities from both auditor and auditee perspectives as well as gaining in-depth EnMS knowledge from the EnMS audit exercise.

Description: This workshop is for two groups to conduct the following elements and report the results

Group B as an auditor team audits Group C auditee company

Group D as an auditor team audits Group A auditee company

Audit activities take place with following elements:



- Use wiki50001 operating system's audit function to conduct audit
- Use the audit scorecard to quantitatively assess the performance of audittee
- Two group acting auditor role conduct closing session to report on the audit findings

3.4.4. [Workshop 9] Wrap-up and Ending Session

Duration: 90 minutes

Objective: Before going back to respective organisation, each participant is entitled to:

- Recover some points might have missed during the session
- Enhance understanding with supplemented information
- Sustain the partnership with other participants
- Gain confidence level that organisation is now ISO 50001 compatible
- Receive workshop completion certificate

Description: Wrap-up and ending session is for CEOs to enhance confident and comfort level from the knowledge gained during the 3-day workshop session. Topics covered are:

- Recap the ISO 50001 EnMS main objective is to continually improving energy performance and procedure
- identify what might be the gap in the participant's organisation for ISO 50001 class operation
- Talk about what is the next step: 2 min speech by participants
- Agree on next actions
- Present the certificate by the President of EeSolution Engineering

4. Deliverables

On top of gaining valuable knowledge from the three-day sessions in EnMS operation to make your company to position itself in the superior position globally for sustainability business development, the participating CEOs are entitled to tangible deliverables as described in this clause.

4.1. ISO 50001 Class Ready-to-use 12 key Management Documents

Participating CEOs will receive following documents necessary to run effective and efficient EnMS operation (all in word files market Price: SGD 240.⁰⁰)

- (1) EnMS Charter
- (2) EnMS Document Management Guideline
- (3) Energy Policy
- (4) EnMS Energy Review Report
- (5) EnMS Action Plan
- (6) EnMS Monitoring & Action Guideline
- (7) EnMS Audit Plan
- (8) EnMS Training Plan
- (9) EnMS Continual Improvement Guideline
- (10) EnMS Communication Guideline
- (11) EnMS Lean Energy Procurement Guideline
- (12) EnMS Legal & Requirements Compliance Status Report

4.2. ISO 50001 Class Ready-to-use EnMS Audit Scorecard System with Guideline

Participating CEOs will receive following tool and guideline useful to execute effective and efficient EnMS Audit (market Price: SGD 160.⁰⁰)

- (1) EnMS Audit Scorecard System (excel files software) with users guide
- (2) EnMS Audit Guideline (word file)

4.3. All presentation material shown during the 3-day workshop

Participating CEOs will receive all presentation materials shown during the 3-day workshop session in electronic format.

4.4. Regression Analysis Tool

Participating CEOs will receive specific energy consumption based regression analysis software tool (in excel file) that identifies baseline and target EnPI as well as cusum saving.

4.5. Workshop Completion Certificate

Participating CEOs will receive workshop certificate that is a proof that the CEO has gained competency in leading ISO 50001-class EnMS operation.

4.6. Workshop Report addressed to CEO's Top Management

At the completion of the workshop, the Workshop Report will be prepared by the organiser addressing to participating CEO's top management. With the report, the top management will become aware of what the appointed CEO can contribute to the company in pursuing energy performance improvement through the ISO 50001-class EnMS operation.

Appendix 1. Workshop Scheduling Guideline

Workshop schedule is provided as the overview of the 3-day session presented in the Table A- 1, below.

Table A- 1: Course Scheduling Guideline

3.2 Day-1: Lecture Session		Day-1										
Module No.	Module Title	8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	
00	Registration	←→										
MS	Opening Presentation by NEA Energy Efficiency Initiatives in Singapore and ISO 50001 class EnMS		←→ Guest Presenter									
01	Introduction (Ice Breaking Session)			←→	☐ Coffee break							
02	Practical Guide to ISO 50001 Energy Management System				←→							
03	ISO 50001 in relation with other management systems				←→							
04	Top Management Involvement is the key				←→							
05	Top Management Representative “CEO” and EnMS Operation Team				←→							
06	EnMS Charter and documentation					←→						
QA	Questions & Answers before lunch					←→	☐ Lunch					
07	Energy Review, objective and procedure						←→					
08	Energy Performance Indicator (EnPI)							←→				
09	Energy Monitoring Pricipal and useful Procedure							←→				
10	“RENKEI” Control Concept								←→	☐ Coffee break		
11	EnMS Operation/Documentation System “wiki50001”									←→		
12	Reflecting ECOs into Action Plan									←→		
13	ISO 50001 Management Elements in “Implementation & Operation”										←→	
14	ISO 50001 Management Elements in “Checking Performance”										←→	
15	Day-1 wrap up and conclusion										←→	

3.3		Day-2: Workshop Session #1													
Workshop No.	Module Title	Day-2													
		8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00				
01	EnMS organisation/scope and boundary		Work Session	Reporting											
02	Energy Review Exercise 1: Identify EnPI and Cusum savings		Coffee break	Work Session	Reporting										
03	Energy Review Exercise 2: Identify the first phase M&T system					Lunch	Work Session	Reporting							
04	Energy Review Exercise 3: Identify ECOs							Work Session	Reporting	Coffee break					
05	Management Review								Work Session	Reporting					
06	EnMS Action Plan											Work Session	Reporting		

3.4		Day-3: Workshop Session #2													
Workshop No.	Module Title	Day-3													
		8:00	9:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00				
OS	Audit Exercise Orientation														
07	EnMS Audit Exercise #1		Preparation	Coffee break	Site Assessment	Report Preparation	Lunch	Reporting							
08	EnMS Audit Exercise #2							Preparation	Site Assessment	Report Preparation	Coffee break	Reporting			
09	Wrap-up and Ending Session											Wrap-up	Ending Session		

Appendix 2. Terms and Definitions, Acronyms

The terms and definitions, acronyms used in this document are shown in the Table A- 2, below.

Majority of terms and definitions are taken from the following ISO standard:

- International Standard ISO 50001:2011(E), Energy management system-Requirements with guidance for use
- International Standard ISO 19011:2011, Guidance on the Principles of Auditing

Table A- 2: Terms and Definitions, Acronyms

Terms / Acronyms	Definitions
audit	<p>systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which the audit criteria are fulfilled</p> <p>NOTE 1: Internal audits, sometimes called first-party audits, are conducted by, or on behalf of, the organisation itself for management review and other internal purposes, and may form the basis for an organisation's self-declaration of conformity. In many cases, particularly in smaller organisations, independence can be demonstrated by the freedom from responsibility for the activity being audited.</p> <p>NOTE 2: External audits include those generally termed second- and third-party audits. Second-party audits are conducted by parties having an interest in the organisation, such as customers, or by other persons on their behalf. Third-party audits are conducted by external, independent auditing organisations, such as those providing registration or certification of conformity to the requirements of ISO 9001, ISO 14001 or ISO 50001.</p> <p>NOTE 3: When an energy management system and an environmental management system are audited together, this is termed a combined audit.</p> <p>NOTE 4: When two or more auditing organisations cooperate to audit a single auditee, this is termed a joint audit.</p>
audit criteria	<p>set of policies, procedures or requirements</p> <p>NOTE: Audit criteria are used as a reference against which audit evidence is compared.</p>
auditee	organisation being audited
audit evidence	<p>records, statements of fact or other information, which are relevant to the audit criteria and verifiable</p> <p>NOTE: Audit evidence may be qualitative or quantitative.</p>
auditor	person with the competence to conduct an audit
audit plan	description of the activities and arrangements for an audit

Terms / Acronyms	Definitions
boundaries	physical or site limits and/or organisational limits as defined by the organisation EXAMPLE: A process; a group of processes; a site; an entire organisation; multiple sites under the control of an organisation.
Chief Energy Officer	The person responsible to take management role to lead organisation's EnMS operation who is appointed by the top management. Having business accountability in the managing organisation's energy performance improvement, Chief Energy Officer is expected to guide all the positive aspects generated by the energy management operation to be integrated into business opportunity, ensuring sustainability business development.
continual improvement	recurring process which results in enhancement of energy performance and the energy management system NOTE 1: The process of establishing objectives and finding opportunities for improvement is a continual process. NOTE 2: Continual improvement can achieve improvements in overall energy performance, consistent with the organisation's energy policy.
corrective action	action to eliminate the cause of a detected nonconformity (3.21) NOTE 1: There can be more than one cause for nonconformity. NOTE 2: Corrective action is taken to prevent recurrence whereas preventive action is taken to prevent occurrence. NOTE 3: Adapted from ISO 9000:2005, definition 3.6.5.
cusum	cumulative sum
detailed energy audit	As a result of walk-through energy audit, any ECOs the organisation determines to pursue further, is to carry out the detailed energy audit. The purpose of the detailed energy audit is to evaluate if the ECO can be a realistic energy saving project as well as to gain enough financial and scale of economy information for the top management to make decision. In the detail energy audit, actual data are taken from the defined period in order to make analysis to come up with accurate energy saving estimate. As deliverables, it provides detail method to implement the energy efficient project including specifications that can draw quotation from vendors. The work is completed with a submission of detailed energy audit report.
energy	electricity, fuels, steam, heat, compressed air, and other like media. NOTE 1: For the purposes of this International Standard, energy refers to the various forms of, including renewable, which can be purchased, stored, treated, used in equipment or in a process, or recovered. NOTE 2: Energy can be defined as the capacity of a system to produce external activity or perform work.

Terms / Acronyms	Definitions
energy audit	activities of site-inspection, survey and analysis of energy flows for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the business output(s).
energy baseline	quantitative reference providing a basis for comparison of energy performance NOTE 1: An energy baseline can reflect a point in time or a period of time. NOTE 2: An energy baseline can be normalized by adjustment factors [relevant variable affecting energy use and/or consumption] such as production level, degree days (outdoor temperature), etc.
Energy Conservation Act, Singapore	The new baseline energy management legislative standards enforced by the government of Singapore, commencing the fiscal year 2013 for large energy users (As the first step, factories that consume more than 15 GWh of energy each year or 1.29 ktoe of energy are designated) in the industry sector. This includes (1) the appointment of energy managers; (2) reporting of energy use; and (3) submission of energy efficiency improvement plans. The main purpose of the act is to improve the energy performance of companies making them more competitive in the global economy,
energy consumption	quantity of energy applied
energy efficiency	ratio or other quantitative relationship between an output of performance, service, goods or energy, and an input of energy EXAMPLE: Conversion efficiency; energy required/energy used; output/input; theoretical energy used to operate/energy used to operate.
energy intensity	energy intensity is a measure of the energy efficiency within the business unit under energy management system scope. A typical measure can be the amount of energy it takes to produce a specific output unit, the specific energy consumption.
energy management system (EnMS)	set of interrelated or interacting elements to establish an energy policy and energy objectives, and processes and procedures to achieve those objectives
energy management team	person(s) responsible for effective implementation of the energy management system activities and for delivering energy performance improvements NOTE: The size and nature of the organisation, and available resources, will determine the size of the team. The team may be one person, such as the management representative. <i>In this document, a unique noun “EnMS operation committee (EnMS-OC)” is designated representing energy management team.</i>
energy manager	management representative appointed by the top management with allocated resources and authorisation, and having business accountability in managing organisation’s energy performance improvement, expected to guide all the positive aspects generated by the energy management operation integrated into business opportunity ensuring sustainability business development. Energy manager heads the energy management team. In the workshop it is defined “CEO”

Terms / Acronyms	Definitions
energy objective	specified outcome or achievement set to meet the organisation's energy policy related to improved energy performance
energy performance	measurable results related to energy efficiency , energy use and energy consumption NOTE 1: In the context of energy management systems, results can be measured against the organisation's energy policy, objectives, targets and other energy performance requirements NOTE 2 :Energy performance is one component of the performance of the energy management system
energy performance indicator (EnPI)	quantitative value or measure of energy performance as defined by the organisation NOTE: EnPIs could be expressed as a simple metric, ratio or a more complex model.
energy policy	statement by the organisation of its overall intentions and direction of an organisation related to its energy performance as formally expressed by top management NOTE: The energy policy provides a framework for action and for the setting of energy objectives and energy targets.
energy review	determination of the status of the organisation's energy performance based on data and other information leading to identification of opportunities for improvement NOTE: In other regional or national standards, concepts such as identification and review of energy aspects or energy profile are included in the concept of energy review
energy services	activities and their results related to the provision and/or use of energy
energy target	detailed energy performance requirement, quantifiable, applicable to the organisation or parts thereof, that arises from the energy objective and that needs to be set and met in order to achieve this objective
energy use	manner or kind of application of energy EXAMPLE: Ventilation; lighting; heating; cooling; transportation; processes; production lines.
EnMS procurement	When procuring energy services, products and equipments that have or may have an impact on significant energy use, the procurement is based on energy service, product or equipment carrying lifecycle operation specifications meeting the EnMS defined energy performance criteria
internal audit	systematic, independent and documented process for obtaining evidence and evaluating it objectively to determine the extent to which requirements are fulfilled

Terms / Acronyms	Definitions
Miyeru-ka	A Japanese established energy management terminology “visualization of energy” which is a rolling PDCA process of (1) seeing (monitoring or measurement) of energy; (2) appreciation of what you have seen; (3) act based on what you have appreciated; (4) while reviewing the progress; (5) take further action for improvement.
organisation	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. NOTE: An organisation can be a person or group of people.
organiser	Convention Links (S) Pte Ltd, the party organising the “ISO 50001 Class EnMS Workshop” as defined in the syllabus
procedure	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. NOTE 3: Adapted from ISO 9000:2005, definition 3.4.5.
product	result of a process
record	document stating results achieved or providing evidence of activities performed NOTE 1: Records can be used, for example, to document traceability and to provide evidence of verification, preventive action and corrective action. NOTE 2: Adapted from ISO 9000:2005, definition 3.7.6.
RENKEI control	"RENKEI" in Japanese suggests "cooperation, coordination or harmonisation" "RENKEI control" is to pursue energy efficiency optimisation with two or more elements interacting within one another to provide the most efficient and effective result from the control
scope	extent of activities, facilities and decisions which the organisation addresses through an EnMS, which can include several boundaries NOTE: The scope can include energy related to transport.
significant energy use	energy use accounting for substantial energy consumption and/or offering considerable potential for energy performance improvement NOTE: Significance criteria are determined by the organisation.

Terms / Acronyms	Definitions
team	person(s) responsible for effective implementation of the energy management system activities and for delivering energy performance improvements NOTE: The size and nature of the organisation, and available resources, will determine the size of the team. The team may be one person, such as the management representative.
top management	person or group of people who directs and controls an organisation at the highest level NOTE 1: Top management controls the organisation defined within the scope of the management system for energy. NOTE 2: Adapted from ISO 9000:2005, definition 3.2.7. <i>In this document, a unique noun "EnMS owner" is designated representing top management.</i>
walk-through energy audit	preliminary energy conservation analysis by one or two day site-inspection (walk-through) and survey to identify ECOs. The site-inspection is based on visual verifications, study of installed equipment and operating data and detailed analysis of recorded energy consumption for the defined period of time. Preliminary energy audit is another terminology.
BE	Business Excellence Initiative by SPRING Singapore
CEO	Chief Energy Officer
ECA	Energy Conservation Act, Singapore
ECO	Energy Conservation Opportunity
EMS	Environmental Management System
EnMS	Energy Management System, EnMS vs. EMS (Environmental Management System)
EnPI	Energy Performance Indicator
ISO	International Organization for Standardization An acronym "ISO" was chosen deriving from the Greek isos, meaning "equal" (Whatever the country, whatever the language, the short form of the organisation's name is always ISO)
NEA	National Environment Agency, Singapore
PDCA	Plan, Do, Check and Action
QUEST	QUality for Enterprises through STandards (QUEST) Programme by SPRING Singapore
SEP ^{cm}	Superior Energy Performance ^{cm} introduced by the U.S. Council for Energy-Efficient Manufacturing
SEP	Superior Energy Performance
TBD	To Be Determined
U.S. CEEM	U.S. Council for Energy-Efficient Manufacturing