

Trainer Instructions: Company Energy Efficiency Methodology

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Title	COMPANY ENERGY EFFICIENCY METHODOLOGY
Background	<p>In order to improve energy and resource efficiency on a continuous basis at a company, a systematic process is needed that looks at individual energy equipment or energy/resource use and puts it in a broader context. As part of the UNEP GERIAP project, a “Company Energy Efficiency Methodology” was developed that:</p> <ul style="list-style-type: none"> ▪ Is tailored to energy-intensive industrial companies in developing Asian countries. Though they are different from companies in industrialized and Western countries they also have similarities with companies in other developing countries. ▪ Focuses on energy, which is less visible than waste, water and raw materials. ▪ Explains <u>what</u> should be done in theory and <u>how</u> it is done in practice because all companies are different. A focus is given on how to overcome barriers such as time limitations and lack of data, and on practical company examples. <p>This methodology forms the basis of this training session.</p>
Objective	To understand how to improve energy efficiency in a systematic way and integrate continuous improvement into business processes.
Minimum duration and approach	<ul style="list-style-type: none"> ▪ Three sessions (4.5 hours), including 3 workshop exercises ▪ Recommended approach: <ul style="list-style-type: none"> - Session A (1.5 hours): spend up to 1 hour on the slides, then explain the workshop exercise and allow participants 30 minutes to complete it. If time is left, discuss the exercise before the break, if not, then discuss it at the start of Session B. - Session B (1.5 hours): spend up to 45 minutes on the PowerPoint slides. Explain the workshop exercise and give participants 30 minutes to complete it, followed by 15 minutes to go through the answers. - Session C (1.5 hours): spend up to 45 minutes on the PowerPoint slides. Explain the workshop exercise and give participants 30 minutes to complete it, followed by 15 minutes to go through the answers. ▪ Background report: “Company Energy Efficiency Methodology” ▪ Presentation: 72 slides (Session A: 43 slides; Session B: 10 slides; Session C: 19 slides).
Contents	<ul style="list-style-type: none"> ▪ Introduction to the methodology ▪ Methodology step-by-step, and for each of the 6 steps the following is explained:

	<ul style="list-style-type: none"> - Purpose, outputs and tasks - Company examples: 3 examples from companies in Asia on how they implemented the task. - Worksheets: these will assist to collect and record information and data. - Energy focus: some steps require specific energy knowledge or input, these slides are highlighted by an orange arrow.
<p>Assessment of participants</p>	<p>Workshop exercise A – Meeting with Top Management (Task 1a of the methodology)</p> <p>This workshop exercise is a role play. One person is the auditor and 1 person is the company’s managing director. The auditor has to interview the managing director about energy management at the plant, and based on the answers complete an Energy Management Matrix (“Matrix”). The Matrix provides insights into the level of energy management by giving a score 0 (lowest) to 4 (highest) in five categories: policies and systems; organization; motivation; information systems; training and awareness; and investment. Pages 1 and 2 of the workshop exercise document explain the Matrix in more detail.</p> <p>The “Auditor” gets a sheet with the following instructions:</p> <p><i>You are the auditor and have a meeting with the company’s managing director. You have to determine how well the company manages energy by filling out the Energy Management Matrix.</i></p> <p><i>During the meeting, introduce yourself, and explain that you want to get an understanding of the company’s systems and processes that are in place to manage energy before you start with the energy assessment.</i></p> <p><i>Then you have to ask questions for each Matrix category. Suggested questions are included below, but you can also make up your own questions. Based on the managing director’s answers you can put a bullet in the matrix under each category and connect the bullets to draw a line.</i></p> <p><i>Suggested questions are: (three questions for each category follow)</i></p> <p>The “Company’s Managing Director” gets a sheet with the following instructions:</p> <p><i>You are the company’s Managing Director and have a meeting with an auditor who wants to carry out an energy assessment of your plant. You don’t know what he will be asking, but your answers should be based on the information about your company provided below. (The following text provides clues about the company and its energy management practices.)</i></p> <p>There is an instruction sheet for a managing director of a large multinational</p>

and for a managing director of a small- and medium-sized family business.

The last page of the workshop exercise gives the Matrix with the scores of the multinational and family business based on the information provided for each business in the managing directors' instruction sheets. The main conclusions from the filled in Matrix for both companies are:

- The multinational company has many formal processes and systems in place (= high scores for policy/systems, organization, information systems and investment) but there appeared to be little ownership by the work floor staff (= low scores for training/awareness, which is mostly aimed only at senior staff, and motivation).
- The family-owned company has the opposite situation: informal processes and systems, but an incredibly high involvement and commitment from employees to help the company improve energy efficiency.

Thanks to the Matrix scores, the Team knew it had to focus on involving work floor staff at the multinational company and on setting up formal committees, policies and systems at the family-owned company to make the project successful. These would be typical recommendations to include in the report to management with energy efficiency options after the assessment, because without a proper system, energy efficiency efforts are less likely to continue in the future.

Suggestion on how to run the workshop:

- Explain the Energy Management Matrix: its purpose and how to use it (5 min)
- Nominate an auditor and a managing director. There are three possibilities:
 - Two people get nominated and do the role-play in front of the others. All observing participants fill in the scores in the Matrix based on the interview.
 - The group gets split into 2 groups. The same happens as with the first option, except one group gets the instruction sheet of the multinational company and the other group the instruction sheet of the family business.
 - The group gets split into pairs and each pair consists of an auditor and managing director.
- At group level, compare the Matrix scores developed by participants with the Matrix scores given on the last page of the workshop exercise document.
- A good way to close the workshop exercise is to ask participants what they would recommend to management to improve the overall energy management to ensure continuation of energy efficiency in the future (i.e., more than implementing concrete options).

Tip: if there are senior managers from companies in the audience, then they can also take the role of Managing Director without using an instruction sheet, can base

their answers on the real situation in their company.

Workshop exercise B - Identifying energy efficiency options (Tasks 3a and 3b of the methodology).

Participants are asked the following:

Crystal Cement is a medium-sized cement plant producing 400 tons of clinker per day (TPD) using the dry process. The Company Energy Efficiency Methodology was applied to this company:

- *Task 1d: the Kiln Area was selected as one of the focus areas.*
- *Task 2d: inputs, outputs and other parameters were measured as shown in the figure on the next page.*
- *Tasks 2d and 2e show:*
 - *Material losses of 2 TPD through the chimney.*
 - *The specific thermal energy consumption is 720.4 kCal per kg of clinker produced. The benchmark value is 675 kCal per kg of clinker.*
 - *During the last few months the fan power consumption has increased by 20%.*

Questions

1. *Task 2e: Identify the type of energy lost (thermal or electrical) from the clinker, kiln, preheater and ID fan.*
2. *Task 3a: Determine the possible causes of the energy losses.*
3. *Task 3b: List possible options.*

Areas of energy losses	Possible causes	Possible options
Clinker:		
Kiln:		
Preheater:		
ID Fan:		

If participants have difficulty getting started, try going through the “Clinker” area as an example:

- *Area of energy loss (first column): Thermal energy lost from clinker because temperature is 650 °C*

- *Possible causes of energy loss (second column): Clinker at 650 °C is left to cool in the open air*
- *Possible options (third column): Install a clinker cooler that allows you to recover waste heat (to be used for preheater or cogeneration)*

Workshop exercise C – Feasibility Analysis of an energy efficiency option (Task 4a of the methodology)

Participants are asked the following:

The first step in conducting a feasibility analysis is to identify what tasks must be completed for each option, i.e., what questions do you need to answer to decide if an option is feasible or not? Worksheet 16 of the methodology (attached separately) can be used to document the tasks and results of the feasibility analysis and the results after the option is implemented. Tasks are documented under the column “FEASIBILITY ANALYSIS TASKS (Task 4a)”. An example of feasibility tasks for the option “waste heat recovery from hot flue gases leaving the gas-fired furnace to pre-heat the combustion air” is provided in the workshop exercise sheet of tasks for the technical, economic and environmental feasibility analysis.

Questions

1. *Using Worksheet 16, list the tasks under the column “FEASIBILITY ANALYSIS (Task 4b)” for **one** the following options:*
 - *Installation of a condensate recovery system from a steam distribution network in a food processing industry*
 - *Replacement of incandescent lamps with fluorescent lamps*
 - *Insulation of steam pipelines*
 - *Installation of variable speed drives (VSDs) on motors coupled to fans to reduce electricity consumption*
2. *For the chosen option, what could be barriers to implementation?*

Suggestions on how to run the workshop:

- Hand out a copy of Worksheet 16 of the Methodology and explain it before going through the workshop exercise questions.
- Answers are provided only for the first option ‘*Installation of a condensate recovery system from a steam distribution network in a food processing industry*’. Therefore if the trainer has limited time to prepare for this session, it is recommended that all participants are asked to list feasibility tasks for this option.
- Suggest participants complete the exercise in pairs. In practice this is something people will do more likely as a group instead of on their own.

<p>Other comments</p>	<ul style="list-style-type: none"> ▪ It is possible to hold a 1-day training on the methodology alone. ▪ Session B has only a few slides but requires relatively more explanation under each slide compared to the other sessions. ▪ It is possible to go through the entire presentation in one session, but only if company examples and workshop exercises are excluded and if worksheets are not explained in detail. This approach is not recommended because even though presented, participants may not have completely understood the methodology and may need additional help to apply it. ▪ The presentation slides give 3 examples from companies for each task that participated in the GERIAP project. If possible, replace these with examples from the trainer's experience and/or examples that are more relevant to the participants' country or sector. If this is not possible, the examples from the GERIAP countries will provide a good understanding of how the methodology works in practice.
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