



BESS

Benchmarking and Energy management Schemes in SMEs

Intelligent Energy – Europe (EIE)

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0 Summary

0.1 Introduction to the BESS project

The BESS project (Benchmarking and Energy Management Schemes in SMEs) is implemented as a grant agreement within the EU's Intelligent Energy – Europe (EIE) Programme.

The primary objective of the project is to promote widespread use of best practice energy management and benchmarking tools and to improve energy efficiency in industrial small and medium-sized enterprises (SMEs), with particular focus on the food and drink industry.

The main tasks of the project are:

- Development of an interactive tool (jointly with the industrial associations) for the promotion of a systematic approach to energy management and benchmarking. The tool will contain the following elements: selection of appropriate measures, implementation and day-to-day management, an e-learning scheme, and a monitoring and benchmarking system for the food and drinks industry.
- Pilots in 55 industrial SMEs.
- Comparative analysis of energy monitoring and benchmarking in 11 pilot countries.
- Targeted dissemination of the interactive tool in co-operation with the food and drinks industry associations.
- Seminars, internet and other information dissemination.

The project started in January 2005 and the kick-off meeting was held in Utrecht, the Netherlands on 7-8 February 2005. The project is scheduled to be finalised by 30 April 2007.

The project's internet address is www.bess-project.info.

More information on the project can be obtained from the project partners (see website) and the project co-ordinator:

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0.2 Objectives and Outcome of Work Package 6.1

The objective of the BESS project is to further develop and promote the widespread application of benchmarking and energy management in order to improve energy efficiency in industrial SMEs.

To facilitate this widespread application an interrelated package of instruments and tools has to be developed. The first step within Work Package 1 (WP) was to describe the best practice policy framework and to choose the best practices in energy management and benchmarking in participating countries for further analysis and application in the pilot phase.

The BESS approach is fully in line with the plan-do-check-act (PDCA) principles, and suggests using the PDCA cycle to illustrate how all the best practices are interrelated and how they can play together.

The interrelated package contains an energy management specification, energy management implementation model, benchmarking scheme, energy management handbook, web based e-learning system and numerous different supportive tools like templates for energy audits, measure lists and checklists.

When energy is explicitly identified by a company as an important environmental aspect to be implemented in an environmental system, the application of ISO 14001 standard will automatically lead to implementation of an energy management system.

Therefore in the BESS project the requirements from the ISO 14001 standard, which is often applied in industrial SMEs, are translated to a BESS energy management specification. This offers companies the possibility to implement a high quality energy management system. However, companies which have not implemented ISO 14001 or which are not planning to implement a full energy management system will benefit from complying with (the main parts of) the requirements of the specification.

The BESS energy management implementation model (EMIM) is a tool which shows the logic of the implementation process within the PDCA cycle and suggests suitable tools for supporting the implementation actions. The logic interrelation of the suitable tools is explained in detail within this survey.

The BESS benchmarking scheme will offer the possibility to benchmark specific energy consumptions of chosen food & drink industry sectors on an international level. Benchmarking raises the interest of companies in energy matters. The BESS benchmarking scheme will also offer the calculation of possible energy saving potentials which will encourage companies to improve energy management and to conduct energy efficiency measures.

To present the package to the SMEs the project website (www.bess-project.info) and especially the BESS e-learning system have been developed and will be updated and extended during the pilot phase. The e-learning system is accessible via the project website and has a structure based on a PDCA dashboard model. It offers access to all checklists, templates, supporting tools and the benchmarking scheme to the pilot companies.

Basically, the BESS package contains all necessary tools for improving energy efficiency of industrial companies. But as the aim of BESS is to facilitate this process for SMEs which usually do not have enough personnel resources for energy matters, it is essential to offer a logical and easy to go way through the whole implementation process.

Therefore the inner ring of the dartboard model contains an easy-to-follow learning process on energy management. The user is able to start at the beginning of the scheme and follow a click-to-learn process in order to better understand the general principles of energy management. A part of the e-learning scheme (the bull's eye) is also accessible for the general public and offers basic information on energy management and its implementation.

Within WP5 the pilot companies will test the contents of the tools and the sequence of implementing actions. Their feedback will be used for improving the tools and implementing process for the final package. That ensures that the final package meets the real needs of the industrial SMEs.

Furthermore ready to hand guidelines and recommendations for policy makers for follow up activities and projects will be established. Each policy maker has to take into account different boundary conditions, historic developments and existing structures reflecting the specific needs of his/her country, region or municipality. The guidelines will take into account this fact, by pointing out different ways how to design the ideal package.

Finally recommendations for follow up activities and project will be developed to stimulate the outreach of the project results to other sectors and other European countries. Amongst others the results of this project have to be presented in such a way that a future consortium that want to use the contacts established in this project and want to replicate the outcome of this project and to accession countries and candidate countries, can easily built on them.

The BESS package will support SMEs with various necessary tools and instruments for a successful implementation of energy management and application of international benchmarking.

The e-learning system and benchmarking scheme are very complex instruments which will need the whole pilot phase to be developed. Some tools like e.g. detailed measure lists or guidelines for policy makers are more time consuming in development than others. Therefore a distinction has been made between the **first phase pilot package** and the **second phase pilot package**. At the beginning of the pilot phase the first phase package will be ready which contains the necessary tools and instruments for supporting the starting phase of the pilot actions. As soon as a tool is ready to use, the pilot companies will be informed and it will be available via the e-learning system. The feedback of the pilot companies to the tools and instruments will be used to adjust them according the market needs.

There are some more tools which are desirable for SMEs, e.g. the sector specific measure lists for other than the pilot sectors. Some of these tools will be developed during the pilot phase, for others a follow up project would be recommendable.

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1 Aim of the survey

The aim of this survey is to show the logic of instruments and tools which are going to be developed for the “BESS package“ and implemented and tested during the pilot phase into the pilot companies.

It will point out:

- the benefits of the chosen instruments and tools for the SMEs
- how they can support the SMEs
- how they are interrelated to each other

This survey will also serve the national pilot coordination group (NPCG) to evaluate the direct applicability of the pilot package contents for the SMEs.

2 The Recommended Best Practice Tools in WP1

To facilitate the widespread application of energy management and benchmarking in SMEs an interrelated package of instruments and tools has to be developed. The first step within Work Package 1 (WP) was to describe the best practice policy framework and to choose the best practices in energy management and benchmarking in participating countries for further analysis and application in the pilot phase.

The BESS approach is fully in line with the plan-do-check-act (PDCA) principles, and suggests using the PDCA cycle to illustrate how all the best practices are interrelated and how they can play together.

The recommended best practice tools of WP1 are:

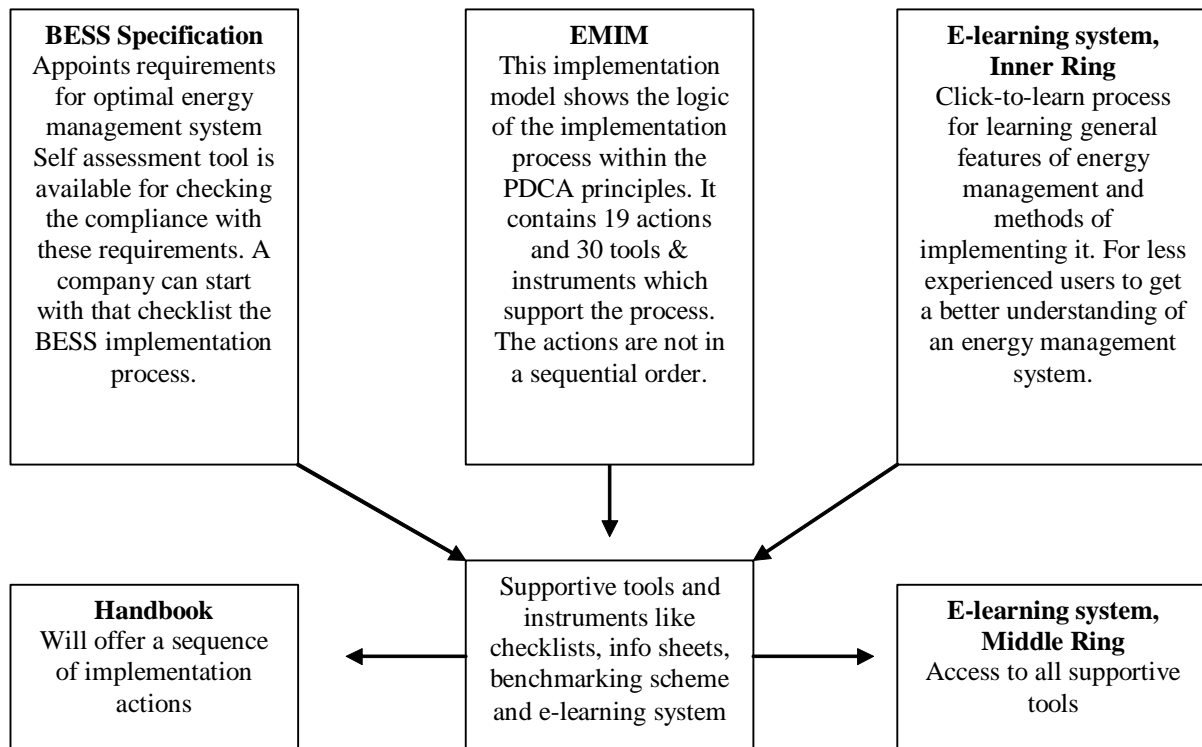
- Implementation of energy management
- Monitoring
- Checklists
- Good Housekeeping
- Energy Auditing and Auditing of Energy Management
- Benchmarking
- E-learning

3 The interrelated package of instruments and tools

The aim of the interrelated package is to support the SMEs in implementing energy management and benchmarking. Basically, the BESS package contains all necessary tools for improving energy efficiency of an industrial company. To facilitate the process for SMEs which usually do not have enough personnel resources for energy matters, an easy-to-follow learning process on energy management will be offered within the PDCA-part of the dashboard models inner ring. The user is able to start at the beginning of the scheme and follow a click-to-learn process in order to better understand the general principles of energy management. A second tool for facilitating the implementation process will be the energy management handbook which will be established during the pilot phase.

SMEs have different opportunities to use the BESS package. The less experienced companies with little knowledge of energy management systems may first enter the e-learning system to follow the click-to-learn process in order to better understand the general principles of energy management. Companies which have already gained knowledge on energy management and intend to implement energy management system will access directly the interactive tools and other informative text on the middle ring of the e-learning system.

The interrelated package contains following elements:



3.1 PDCA principle

A good approach for energy management implementation is to use the plan-do-check-act (PDCA) cycle. This is in line with the most commonly recommended management approaches that are relevant to SMEs, for example, the EMAS Toolkit for the SMEs and the EMAS Energy Efficiency Toolkit for the SMEs. The PDCA approach is well known across industry, and most SME managers know it by heart.

The PDCA cycle provides a framework for the continuous improvement of a process or system. The cycle is designed as a dynamic model where the completion of one turn of the cycle flows into the beginning of the next.

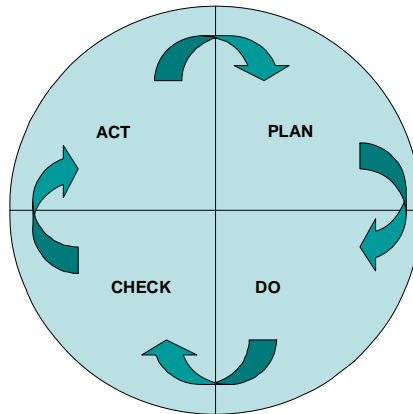


Figure 1: The Basic Plan-Do-Check-Act (PDCA) Cycle

The BESS approach is fully in line with the PDCA principles. The PDCA cycle will illustrate how the tools are interrelated and how they can be integrated into most SMEs daily management challenges.

3.2 Energy management specification

The BESS energy management specification offers the requirements for an optimal energy management system which is based on the ISO 14001 standard on environmental management systems and follows the PDCA-cycle. There are explanatory notes and definitions within the specification which are adopted from the energy management standard of the EMS-Textile project which is also supported by the Intelligent Energy Europe programme. Companies can decide which requirements to include primarily in their energy management system according to their needs and characteristics.

A company can use the BESS energy management self-assessment tool to evaluate the quality of its current energy management system by checking the compliance with these requirements. Linking lists are available to identify the relationships between the BESS specification and ISO quality and HACCP systems.

3.3 Energy management implementation model

For implementation of an energy management system according to the requirements of BESS specification a BESS energy management implementation model (EMIM) has been developed. EMIM is a tool which shows the logic of the implementation process within the PDCA principle (see Figure 2) and suggests suitable tools for supporting the implementation actions.

The proposed model consists of following steps which are not sequential, but rather present the contents, while the timing of performing individual actions depends on specific needs of the company and level of introduction of energy management into existing company structure:

		1	2	3	4
START	A	Business Case	Self assessment	Project Plan - EM Implementation	Definitions Specifications
UNDERSTAND (plan)	B	Energy Audit	Tools	Legislative & Regulative Framework	
PLAN (plan)	C	Action Plan	Roles and Responsibilities		
COMMIT (do)	D	Energy Policy	Energy Coordinator	Energy Team	
IMPLEMENT (do)	E	Implement Action Plan	Operation and Maintenance		
EVALUATE (check)	F	EM Checklist	Indicators	Benchmarking	Monitoring and Targeting
REVIEW (act)	G	Revision	Improve		

Figure 2: Actions within EMIM regarding PDCA principles

PDCA		PLAN	PLAN	DO	DO	CHECK	ACT
ACTION	A. START	B. UNDERSTAND	C. PLAN	D. COMMIT	E. IMPLEMENT	F. EVALUATE	G. REVIEW
ACTIVITIES	<p>1. BUSINESS CASE</p> <ul style="list-style-type: none"> - Initial data - Energy profile - Outer influence <p><i>Make a business case, recognize need for EM, check basic data and indicators and identify other influences defining the company decisions. Attach SAMPLE.</i></p> <p>2. FIRST SELFASSESSMENT</p> <ul style="list-style-type: none"> - Key questions - Decision on energy management - Commitment <p><i>Preparation of key questions, based on results the level of company commitment and implementation of EM is defined.</i></p> <p>3. ENERGY MANAGEMENT IMPLEMENTATION PROJECT PLAN</p> <ul style="list-style-type: none"> - Level - Organization, personel and budget - Implementation monitoring <p><i>Initialize energy management implementation by preparing a project plan with planned activities</i></p> <p>4. DEFINITIONS</p> <ul style="list-style-type: none"> - Dictionary <p><i>Definition of basic terms of EM for common understanding.</i></p> <p>5. SPECIFICATION</p> <ul style="list-style-type: none"> - Requirements - Linking lists <p><i>List of requirements of an EM system which is in accordance with the existing ISO standards with a prioritization for SMEs and compaibility lists between the EM requirements and relevant ISO and HACCP standards</i></p>	<p>1. ENERGY AUDIT</p> <ul style="list-style-type: none"> - Different types - Energy audit description - Data collection - Energy consumption and trends - Investigate large users - Tracking energy use, costs, emissions - Investigate benchmarks <p><i>Detailed description and procedures for 3 types of energy auditing, including data collection, trends and benchmark. Attach SAMPLE.</i></p> <p>2. TOOLS</p> <ul style="list-style-type: none"> - Energy bookkeeping software - Horizontal measure list - Sectoral measure list - Links to existing national measure list <p><i>Detailed description and attached tools on energy bookkeeping for data collection, measure list for horizontal and sectoral activities. Attach ALL TOOLS for assistance.</i></p> <p>3. LEGISLATIVE & REGULATIVE FRAMEWORK</p> <ul style="list-style-type: none"> - Regulations - Other influence a) Green procurement b) Voluntary programmes c) Outsourcing d) Etc. <p><i>Include legislative and regulative framework into company's knowledge about energy and environment. Check different</i></p>	<p>1. ACTION PLAN</p> <ul style="list-style-type: none"> - Energy saving activities: separate for no cost, low cost and high cost activities <p><i>Action plan describes reasons and plans activities for energy saving activities and procedures. It divides them into different cost categories. It includes detailed measure list. Attach SAMPLE.</i></p> <p>2. ROLES AND RESPONSIBILITIES</p> <ul style="list-style-type: none"> - People - Resources - Timescale <p><i>Describe roles of people in the company structure, define resources for planned activities and detail the timeframe for execution of the action plan.</i></p>	<p>1. ENERGY POLICY</p> <p><i>It includes objectives, goals, roles and responsibilities and plan for action. Attach SAMPLE.</i></p> <p>2. ENERGY COORDINATOR</p> <ul style="list-style-type: none"> - Job description - Qualifications <p><i>Describes appointment, role, job description and key qualifications for energy manager.</i></p> <p>3. ENERGY TEAM</p> <ul style="list-style-type: none"> - Job description - Qualifications <p><i>Describes selection, structure, role, job description and key qualifications for energy team.</i></p>	<p>1. IMPLEMENT ACTION PLAN</p> <ul style="list-style-type: none"> - Energy Savings Register - Awareness /Communication - Training /Education a) needs b) people c) learning tools <p><i>Implementation describes simple execution with supporting materials like energy saving register (similar to measure list from action plan), describes ways to raise awareness and how to communicate on the topic both internal as external. Training and education needs must be prepared taken into account people and learning tools (including E-learning). Attach ENERGY REGISTER SAMPLE.</i></p> <p>2. OPERATION AND MAINTENANCE</p> <ul style="list-style-type: none"> - Internal energy organization and procedures - Good housekeeping <p><i>Description of different levels in company dealing with energy use, describe procedures for operation and maintenance etc. Propose good housekeeping measures.</i></p>	<p>1. ENERGY MANAGEMENT CHECKLIST</p> <p><i>Questions to allow companies self asses their implementation level of energy management. Attach QUESTIONS.</i></p> <p>2. INDICATORS</p> <ul style="list-style-type: none"> - Company level - Energy users level - Compare over time <p><i>Define indicators for energy performance on company(e.g. energy vs. production) and end-user level (e.g. compressed air system). Allow comparison of indicators over time for evaluation.</i></p> <p>3. BENCHMARKING</p> <ul style="list-style-type: none"> - Compare against others <p><i>Describe method of benchmarking – comparison against performance of other companies.</i></p> <p>4. MONITORING AND TARGETING</p> <ul style="list-style-type: none"> - Analysis of the indicators <p><i>Describe M&T technique for indicators' analysis for internal evaluation of energy performance over time with monitoring and targeting function for better planning of energy saving activities.</i></p>	<p>1. REVISION</p> <p><i>After implementation the process should be reviewed and evaluated.</i></p> <p>2. IMPROVE</p> <p><i>Improve procedure, improve policy, improve execution, improve targets, improve goals, start again.</i></p>

Figure 3: Energy management implementation model BESS

3.4 Benchmarking scheme

The BESS benchmarking scheme is a web-based tool for international benchmarking of key indicators for selected sectors within the European food and drink industry. The tool builds upon the Norwegian benchmarking system, and will establish routines to seek compatibility between national systems. The benchmarking tool will have strong links to the e-learning module, and will have the benchmarking data-input as one e-learning activity during the pilot phase in WP5.

The BESS benchmarking scheme will offer the possibility to benchmark specific energy consumptions, the change in energy efficiency and the quality of the energy management system in a company of chosen food & drink industry sectors on an international level. The BESS benchmarking scheme will also offer the calculation of possible energy saving potentials which will encourage companies to improve energy management and to conduct energy efficiency measures.

Confidentiality and validation of company data are pillars of the BESS benchmarking system. To improve comparability between benchmarking figures correction different categories of production size will be introduced and options will be offered to correct for weighting of the product mix, capacity utilization and climate. Though benchmarking is to facilitate the insight of the company in its own energy situation a warranty will be shown with BESS benchmarking figures pointing out that not all influencing relevant factors are known or taken into account which are needed for a complete comparison.

Benchmarking of specific energy consumption is a powerful instrument to raise the interest of companies in energy matters.

3.5 E-learning system

To present the package to the SMEs the project website (www.bess-project.info) and especially the BESS e-learning system have been developed and will be updated and extended during the pilot phase. The e-learning system is accessible via the project website and has a structure based on a PDCA dartboard model. It offers access to all checklists, templates, supporting tools and the benchmarking scheme to the pilot companies.

Basically, the BESS package contains all necessary tools and instruments for improving energy efficiency of industrial companies. But as the aim of BESS is to facilitate this process for SMEs which usually do not have enough personnel resources for energy matters, it is essential to offer a logical and easy to go way through the whole implementation process.

Therefore the inner ring of the dartboard model contains an easy-to-follow learning process on energy management. The user is able to start at the beginning of the scheme and follow a click-to-learn process in order to better understand the general principles of energy management. A part of the e-learning scheme (the bull's eye) is also accessible for the general public and offers basic information on energy management and its implementation. The e-learning system contains following information:

- Bull's eye: general information on energy management and its implementation
- Inner ring: an easy-to-follow, step-by-step approach for learning about the general features of energy management and methods of implementing it (plan, do, check, act buttons of the inner ring). The features and information of the bull's eye will also be

available within this section. This section should be targeted towards the less experienced internet users and on users that have little knowledge of energy management systems. It will be structured along the lines of the EMIM.

- Middle ring: this section will contain interactive tools and other informative text for those users that have decided on implementing energy management systems and need additional tools and information, i.e. measure lists, information of energy audit procedures, case studies of successful schemes, checklists, best practices, energy management model tailored for SMEs, links to benchmarking schemes
- Outer ring: this section will contain links to other websites that may contain additional useful information, i.e. EU directives; international, EU and national laws; international, EU and national financial support programmes etc.

3.6 Energy management handbook

The energy management handbook shall facilitate the implementation of an energy management system according to the requirements of BESS specification into small and medium sized enterprises. The above described energy management implementation model consists of various steps which are not sequential, because the timing of performing individual actions depends on specific needs of the company and level of introduction of energy management into existing company structure.

The handbook will be elaborated during the pilot phase in which a logical sequences of energy management implementation actions is offered to the pilot companies. This procedure guarantees a practical approach of implementation for SMEs.

The chosen logical sequence through the implementation process is divided into two phases. In the phase I “getting started” following tools are offered to the pilot companies:

- BESS Energy Management Implementation Model
- Business Case (spreadsheet for data collection and first estimates of savings)
- Pre-self assessment checklist (Seven questions and some sub-questions to assess the current state of energy management)
- Commitment (example of declaration of management - later during the project, a more detailed statement will be drawn up, that will be the Energy Policy Statement)
- TRA-matrix (Tasks, Responsibilities, Authority)
- Template for organising an Energy Management Team
- Introduction to energy management implementation plan
- BESS energy management specification
- Linking list between BESS and existing energy management standards

Phase II, concerns the internal organisation, the audit and the initial benchmarking.

The handbook will serve companies as an example of a possible sequence of implementation actions. Additional knowledge gained from the e-learning scheme completes the picture of a successful implementation process. Companies which will take their time to use all information in the e-learning system and the handbook will be able to find the best sequence for their company.

It should be possible to adapt the handbook with little time and effort to other sectors and branches. Therefore it will contain only general applicable tools like horizontal measure lists or different templates for conducting an action plan or an initial audit. Sector specific tools

like sector specific measure lists or benchmarks will be attached as annexes to the handbook. The first annexes will be developed for the pilot sectors dairies, meat processing companies and bakeries.

The handbook will be a stand-alone tool but naturally on the website more detailed information can be given than within a handbook.

3.7 “Ready to hand” policy guidelines

During the pilot phase “ready to hand” guidelines and recommendations for policy makers for follow up activities and projects will be established. Each policy maker has to take into account different boundary conditions, historic developments and existing structures reflecting the specific needs of his/her country, region or municipality. The guidelines will take into account this fact, by pointing out different ways how to design the ideal package.

Furthermore recommendations for follow up activities and projects will be developed to stimulate the outreach of the project results to other sectors and other European countries. Amongst others the results of this project have to be presented in such a way that a future consortium that want to use the contacts established in this project and want to replicate the outcome of this project and to accession countries and candidate countries, can easily built on them.

3.8 Supportive tools

From the energy management implementation model the company gets an overview of the logical interrelation of 19 different actions that are proposed to be performed within the PDCA cycle. To support companies performing these actions various tools and instruments (benchmarking scheme and e-learning scheme) have been developed. All tools will be accessible via the e-learning scheme and most of them will be part of the handbook.

A distinction between the **phase 1 pilot package** and the **phase 2 pilot package** has been made. At the beginning of the pilot phase in April 2006 the first phase package will be ready which contains the necessary tools for supporting the starting of pilot actions. The phase 2 package will be available used by the pilot companies beginning with June 2006.

There are some more tools which are desirable for SMEs, e.g. the sector specific measure lists for other than the pilot sectors. Some of these tools will be developed during the pilot phase, for others a follow up project would be recommendable.

Tool	nr	EMIM nr	Phase 1			Phase 2	
			Getting Started	Energy Team	Additional Tools	Energy Audits	Additional Tools
Business Case (including sector fact sheets) – meat processing, bakeries, dairies	1	A1	X				
Pre-self assessment checklist	2	A2	X				
Commitment – example of declaration of management	3	A2	X				
Energy audit sample + description procedures	4	B1				X	
Energy audit data collection sheet	5	B2				X	
Horizontal measure list	6	B2				X	
Sector specific measure lists	7	B2				X	
Links to existing national measure lists	8	B2				X	
Information sheet legislative & regulative framework	9	B3			X		
Template for elaborating action plan (AP) including energy saving register	10	C1				X	
TRA matrix: roles, responsibilities, authority	11	C2	X	X			
Template for organising energy management team (incl. energy coordinator)	12	D3		X			
Examples of energy policies	13	D1			X		
Awareness raising (tool skipped)	14						
Description of good housekeeping measures	15	E2			X		
Energy management implementation project plan	16	E2	X				
Energy management checklist	17	F1					X
Set of indicators with Monitoring & Targeting (explanation)	18	F2					X
Benchmarking scheme – preliminary version: data collection template	19	F3			X		
Benchmarking scheme - final version	20	F3					X
Sector specific measures lists for new sectors	21	B2					X
E-learning system phase 1 (bulls eye + part middle ring)	22				X		
E-learning system phase 2 (inner ring)	23				X		
E-learning system phase 3 (middle ring + outer ring)	24						X
Energy management handbook draft	25						X
Energy management handbook final	26						X
National programmes & international projects	27	B2			X		
Ready to hand guidelines for policy makers	28						X
Set of definitions	29	A3			X		
Specification (requirements + part definitions)	30 a	A4			X		
Linking lists	30 b	A4			X		

Figure 4: Pilot Package phase 1 tools (April 2006) and phase 2 tools (starting in June 06)

4 Phase 1 Tools

To start an energy management implementation process companies recognise the need for energy management, check basic data and indicators and identify other influences defining the company decisions. The phase one tools are divided into “Getting started”, “Energy Team” and “Additional tools” are:

4.1 Getting Started

This package is available on the “inner ring” of the project website and leads the pilot company through the first important steps of the implementation process:

“Start with your preliminary activities in order to understand your company’s energy situation and to recognize the needs for implementation of energy management into your company structure and culture. Filling out the business case is one of your first tasks, which results are the overview of essential basic company data and indicators and identification of other influences defining the company decisions. These can be used to present the top management the importance of energy management.

It is important to find out the starting level of energy management. Even if you do not have implemented an energy management system you may have already been using different parts of such a system. The pre-self assessment checklist gives you the actual level of your energy management just by answering 7 questions.

After the business case and self assessment checklist you should elaborate a commitment to the energy management. The template of company commitment gives you an idea how this document could look like.

Furthermore the description of the roles and responsibilities shows you the first steps of how to organise the staff who will work on the energy management. Finally the introduction to an energy management implementation project plan and the energy management implementation model will show you the way for a successful planning and running of the energy management implementation process.”

4.1.1 Business case and fact sheets

The business case guarantees that the need for energy management is recognized by the company. It is also used to inventory essential basic company data and indicators and identify other influences defining the company decisions. The tool is a simple excel sheet that supports collecting all necessary data.

Furthermore the “fact sheets” for meat processing sector, bakeries and dairies will give an overview of the main energy facts of those sectors, like average percentage of electricity and heat consumption and main energy consuming processes.

4.1.2 Pre-self assessment checklist

One of the first activities to be undertaken when implementing an energy management system within a company is to check the existing level of the energy management system in the company. The BESS Energy Management Specification based on the ISO 14001 standard can be regarded as the basis of the definition of a mature energy management system.

The pre-self assessment checklist contains 7 key questions out of the BESS Energy Management Checklist which can be used by companies in the initial stage of implementing or improving their energy management system. The purpose is to identify the main priorities for company regarding the implementation process.

4.1.3 Example of commitment declaration of management

For long term successful energy management a company commitment is essential. Someone at the highest level of the organisation (for example, a board member or the managing director), whose signature on the company commitment will demonstrate the importance of the programme, has to be found. Support of highest level personnel will assist the managers who will be actively involved in implementing the strategy.

The commitment can be provided by assisting the senior management to clearly understand the level of energy management in the company. For this purpose the pre-self assessment checklist can be used. In second stage, the current situation should be presented to senior management with clear indication of trends of energy costs and energy issues. Specific emphasis must be given to the presentation of the benefits that might be achieved. The benefits can be estimated based on figures from the Business Case and in a later stage by cross checking several other sources, e.g. horizontal and sector specific measure list, benchmarking data or many other case studies which describe the energy management achievements in large and small organisations.

The ‘commitment’ is more than a statement of support – it should establish accountability among managers involved in the implementation of the strategy, and should require regular reporting on progress. In addition to top-level commitment, staff from all levels of the organisation need to be encouraged to join the process of implementing energy management in the organization.

4.1.4 TRA Matrix for describing roles and responsibilities

Furthermore the description of the roles and responsibilities shows you the first steps of how to organise the staff who will work on the energy management. The TRA matrix is a list of tasks, responsibilities and authority to clearly identify which individuals in the organisation are directly and indirectly involved with energy. This insight is extremely important for a properly-functioning energy management system. The list shows at a single glance who does what and who bears responsibility.

In compiling the TRA matrix, there is really only one question. Who is in a position to influence the energy consumption? Every individual in a position to influence energy consumption must be included in the TRA matrix.

Ultimate responsibility for the effectiveness of energy management must be assigned to management members with sufficient authority and skills. The executive committee is the most logical candidate. They can allocate time, money and manpower, therewith establishing the necessary conditions.

The employees on the work floor are very directly involved. In their daily tasks, they work with the machines and exercise the most direct influence on the energy consumption.

4.1.5 Energy Management Implementation Project Plan

The BESS energy management implementation model (EMIM) informs about the different aspects of implementing energy management.

When implementing energy management for the first time or for improving energy management system substantially it is strongly advised to compile an own energy management implementation project plan. The elaboration of the project plan can be made after filling in the business case and the pre-self-assessment check to give an indication of the quality of the current energy management system.

The ultimate goal of the implementation project is that energy management is integrated in the organization to such extent that the PDCA cycle for continuous improvement of the company's energy situation is secured.

4.2 Energy Team

Irrespective of a company's size, it is necessary to appoint an **energy coordinator** (energy manager), who will act as the responsible person, at least on a part time position, depending on the size of the company. If the company does not appoint a specific person for these tasks, nobody will feel responsible and there are chances that the required tasks will not be carried out. In addition, the role and competency of the energy coordinator must be communicated throughout the organisation. The energy coordinator must have the power to ask for support in areas in which he/she has no detailed know-how.

In small and medium-sized organisations, the energy coordinator should constitute an **energy team** which supports related activities and which acts as a link between the energy coordinator and other departments. The energy team consists of people who have a sound knowledge of individual processes and technologies. Their knowledge might be used to influence energy consumption in their departments and to contribute to the development and support of a company-wide strategy. To form the energy team the **TRA matrix and the template of organising an energy management team** will be useful. The TRA matrix is a list of tasks, responsibilities and authority to clearly identify which individuals in the organization are directly and indirectly involved with energy.

4.2.1 TRA Matrix for describing roles and responsibilities

See “Getting Started”

4.2.2 Template for organising the energy management team

This tool describes the key functions and selection process of an energy coordinator; responsibility for energy management; what makes a successful energy coordinator, outsourcing energy management and the energy management implementation team.

4.3 Additional Phase 1 Tools

4.3.1 Info Sheet on Legislative & Regulatory Framework

Companies which implement an energy management system should be regularly evaluate the conformance with legal and other requirements pertaining to energy. The organisation is expected to determine whether agreements and regulations have been satisfied in accordance with the policy statement. Every partner will set up an info sheet on the legislative and regulative framework in his country.

4.3.2 Examples of energy policies

What is the organization's position on energy management? One of the first key questions relevant for companies which want or have implemented an energy management system in their organisation. In particular: what is the relationship between energy management and daily operations? A clear vision defined in an energy policy statement signed by management supplies the proper framework for energy management.

With the energy policy statement, you have a document that gives direction and ensures you management support. The energy policy statement is an official document with which the management explains the position energy management holds in the organization.

The statement indicates the general direction and describes in general terms where responsibilities lie. The energy policy statement forms the basis for all future effort and measures within the framework of energy management. The energy policy statement is formal by nature and must satisfy clear requirements. It contains a number of promises formulated as energy objectives that are to be translated into practical measures. However, the statement is not a formality. It is a powerful tool that can be used to assess whether the organization is keeping its promises and whether the policy is truly directed towards achieving the agreed objectives.

An energy policy statement must satisfy at least the following requirements:

- The energy policy statement indicates that the organization's energy policy is subscribed to by the highest level of management.
- The policy states that the organization satisfies all relevant laws, regulations and other subscribed requirements.
- The policy states that the organization continually strives to improve and to prevent unnecessary energy consumption.

4.3.3 Description of good housekeeping measures

This description shows the different areas of improving energy efficiency in companies without or with very low costs. Those can be horizontal measures as well as sector specific measures. This tool will point out the different possibilities of good housekeeping.

4.3.4 Benchmarking scheme preliminary version (data collection sheet)

Energy Performance Benchmarking (EPB) is a tool which comprises the collection, analysis and reporting of data to provide an industrial company with a context for assessing its energy efficiency in comparison to others in the same sector. It provides data on how energy is currently used within a particular industrial sector, process or building type.

In addition to technical factors, benchmarking can be applied to energy management to evaluate how far a company has progressed in its efforts compared to other companies in their own sector and in different countries and an “ideal” energy management approach.

Energy Performance Benchmarking has some features of energy monitoring because periodical benchmarking enables a company to follow its performance over time and, depending on the design of the benchmarking scheme (if also system specifications have been benchmarked), take informed corrective action. Energy benchmarking and monitoring allows your company to identify deficiencies and adopt better practices.

Energy performance benchmarking focuses on a comparative analysis of energy use per unit of physical production, otherwise known as energy intensity or specific energy consumption (SEC). This energy intensity can then be compared to the “best practice”. Examples of performance indicators for monitoring and benchmarking on different levels are indicated in the table below. In the pilot-phase of the BESS-project we will start focusing on benchmarking at level 1.

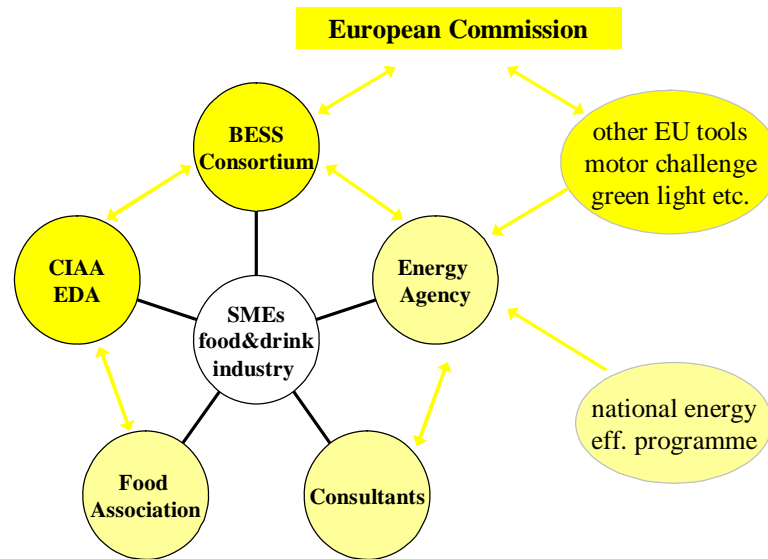
Level	Indicator	Unit
Level 1: Company	Total energy consumption/ton produced	kJ/ton
	Total electricity consumption/ton produced	kWh/ton
Level 2: Process/product	Process related energy/quantity produced	kJ/quantity
	Non-product depending energy use/square metre heated	kJ/m ²
Level 3: Equipment	Electricity for compressed air applications/ton produced	kJ/ton
	Energy for steam production/ton steam produced	kJ/kJ

4.3.5 E-learning system phase one and two

See Chapter 3.5.

4.3.6 National programmes and other international projects

To support the pilot companies in the best way, also national programmes for energy efficiency and existing tools of other international / EU projects will be offered to them. Especially tools for analysing different energy consumption parts like electrical motors, cooling and freezing, HVAC, lighting, computers etc. will be offered to the pilot companies.



That means the company will be able to

- calculate simple benchmarks,
- compare them with international benchmarks of the same sector and
- use additional tools to increase energy efficiency

As energy prices are of substantial interest for the companies, there should be also information available on possibilities to get better energy contracts (energy purchase on liberalised energy markets) or to reduce the electricity costs by load management or idle electricity compensation.

4.3.7 Set of definitions

For common understanding a set of definitions for basic terms of energy management within BESS has been elaborated and will be on the website part “Definitions and Specifications”.

4.3.8 Specifications (requirements and part of definitions)

Companies do already have to fulfil a lot of different quality standards. To connect the BESS energy management specification with already existing standards in the company a list of requirements of an energy management system which is in accordance with the existing ISO standards with a prioritisation for SMEs will be developed. And compatibility lists between the energy management requirements and relevant ISO and HACCP standards will be offered.

4.3.9 Linking Lists

When energy management is integrated into the daily practice of an organization, an instrument with which energy efficiency can be continually improved, has been created. The integration of this instrument into daily practice will run the smoothest if the process is based on the BESS Energy Management Specification and the BESS Energy Management Checklist.

Other management systems

A wide variety of management systems are used by organizations and businesses. Including energy management where possible in systems of this type can be useful. Maintaining multiple management systems simultaneously is less efficient than integrating them into a single system. It was for this reason that SenterNovem studied the link between its Reference Energy Management and three of the systems most commonly used: environmental management in accordance with ISO 14001, the quality management system ISO 9001 2000, and the food safety system HACCP (Hazard Analysis Critical Control Points). This resulted in three tables that indicate the links that exist between each of these management systems and the BESS Energy Management Specification and explain how energy management can be integrated into these systems. The tables are referred to as Linking Lists, and can be used as a tool to integrate energy management into your management system.

Using the Linking Lists

Select the linking list for the standard into which you want to integrate energy management. If you have already integrated a management system, select the linking list for the standard upon which your management system is based. This will often be the ISO 14001 or the ISO 9001 2000, but can also be HACCP. If you do not yet have a management system, it is best to work directly with the BESS Energy Management Specification. If you have a certified ISO 14001 system, you will be required to implement all elements of the BESS Specification for certification. If energy is identified as a relevant environmental aspect in your ISO 14001 system, in principle the system satisfies the Reference Energy Management.

5 Phase 2 Tools

5.1 Energy Audits

5.1.1 Energy audit sample and description of procedures

Within BESS three SME friendly energy audits are being suggested to the (pilot) companies. A start-up audit gives an overview of the current level of energy management. For this audit the tool is the “self assessment checklist” which is described in 5.2.1.

The walkthrough energy audit which focuses on good housekeeping measures (horizontal measure list) and on sector-specific measures which focuses on typical saving potentials and investments with short pay-back times.

5.1.2 Energy audit data collection sheet

You have agreed to a number of measures in the AP that will directly or indirectly result in more efficient energy consumption. Your organisation is prepared for energy management and the measures have been implemented in accordance with the energy plan.

The question now is whether the measures have the desired effect. This cannot be determined by simply recording the meter readings. The data must be correctly analyzed, and that requires more than just the meter readings.

What kinds of data are needed? Data that will enable you to compare the energy consumption with a reference value and with which you can explain the improvement or deviation. Thus you must not simply start to collect data. What you need is a proper reference. The major influential factors must also be recorded: data regarding the machines (technology), regarding the organisation, and regarding the production (volumes, times).

5.1.3 Horizontal measure list

The horizontal measure list shows possibilities to improve the energy efficiency in different areas of energy consumption which exist in all branches like e.g. lighting, HVAC, motors, compressed air, vacuum, refrigeration or building skin.

5.1.4 Sector specific measure list

Measure lists for specific processes of the different sector chosen for BESS pilot phase will be developed and offered to the pilot companies. Those lists give information on no and low cost measures to improve the efficiency of a certain process and also more expensive measures. The companies can go through this list step by step and check what possibilities would exist to improve the efficiency.

5.1.5 Links to existing national measure list

In most countries there are already some measure lists for improving energy efficiency of different sectors or processes on the market. Sometimes the chamber of commerce publishes such lists or energy consultants make them available on their websites. Each consortium partner will search for existing lists and set a link to these lists on his website and also on the project website.

5.1.6 Template for elaborating an action plan

An essential part of the energy management system in the company is the Energy Action Plan. It is part of the PLAN phase within the cycle for continuous improvement of energy efficiency.

The Action Plan documents:

- the commitment of your company to carry out current and future actions (for the duration of the plan e.g the coming 4 or more years) for further steps to implement energy management and actions to be taken to increase energy efficiency of the company.
- an overview of the current status of the Planning and the Implementation of the actions so far (the energy savings register part contain the achievements)

The energy action Plan contains the following items:

- the commitment and ambitions related to the energy policy of your company
- the energy (specific) consumption figures of your company in the reference year*
- relevant legal and regulatory obligations
- a description of the energy situation (historical development of the energy consumption, an energy consumption analysis, the energy savings register, the actual quality of the energy management system)
- energy savings options and selection criteria for savings actions/ measures
- planned actions (per year for the duration of the plan) for savings and improving energy management
- planned (feasibility) studies (per year for the duration of the plan) for identified attractive future savings options and other relevant activities
- description how the (yearly) monitoring, targeting and benchmarking is carried out

* The reference year is the when the first action plan was made or another appropriate fixed year of which the (specific) energy consumption figures are known. The reference year should preferably be representative for the current products and circumstances of the company.

5.2 Additional Tools for Phase 2

5.2.1 Energy management checklist

The BESS Energy Management Checklist is a tool for determining the extent to which an organisation has a properly functioning energy management system. If all of the questions in the checklist can be answered with YES, the system functions as it should regarding the BESS Specification. If the most important questions can be answered with YES, the system satisfies the minimum requirements.

During the Energy Management system audit, the BESS Energy Management Checklist is used as an instrument to determine whether a companies energy management system functions as it should if the company strives towards full compliance with the BESS Specification. Any non-conformance is identified, and possible improvements are noted and subsequently presented to management.

A proper Energy Management system audit results in clear reports and unambiguous targets about what will be done with the results. Thus the organisation can adequately respond to areas needing improvement.

5.2.2 Set of indicators including monitoring and targeting

Define indicators for energy performance on company(e.g. energy vs. production) and end-user level (e.g. compressed air system). Allow comparison of indicators over time for evaluation. Describe M&T technique for indicators' analysis for internal evaluation of energy performance over time with monitoring and targeting function for better planning of energy saving activities. Describe method of benchmarking – comparison against performance of other companies.

5.2.3 Benchmarking Scheme final version

Results of the monitoring will be compared with benchmarks from other companies of the same sector. A simple method of benchmarking your company's energy performance against the industry sector norm is by a comparison of Specific Energy Consumption (SEC). SEC is a measure of energy use per unit of production, e.g. kWh/t throughput.

Benchmarking ratios, such as SEC, can be derived using production and business data available within the company. These include:

- Production Data - quantity of product manufactured or treated
- Fuel Consumption - electricity, gas, fuel oil, etc. recorded from utility invoices or meters

Even limited data will allow preliminary comparisons of energy performance with other sites or similar processes and provide a baseline against which to start tracking on-going energy consumption.

Although establishing benchmarks for industry wide performance is useful, the energy consumption of a single process or factory will almost certainly be of much more interest to energy managers.

If the company is multi-site, or has similar operations within the same site, making comparisons between similar processes to see if there are significant differences in energy consumption should be considered. This internal benchmarking is a valuable technique for sharing best practice within a company.

It may also be possible to exchange experience of energy management techniques with companies from different sectors (neighbouring firms and suppliers). This can provide a new and creative insight into the company's energy management practices.

Displaying information graphically makes it clear and easy to understand and is a good format for communication with colleagues. It also enables the identification of trends in data.

5.2.4 Sector specific measure lists for new sectors

The energy management handbook will be usable for SMEs of all branches. For the three chosen branches for the pilot actions meat processing, bakeries and dairies sector specific measure lists will be established as an attachment to the handbook. It is one of the targets of the consortium to find possibilities for extending the project and benchmarking also when BESS has finished in May 2007. For this purpose the consortium members and also the members of the NPCG will search for existing measure lists for new sectors which could be prepared as additional attachments to the handbook.

5.2.5 E-learning system phase three

During the pilot phase all tools and the user friendliness of the website will be tested and feed-back will be given by the pilot companies and NPCG. The tools will be improved and changed regarding the feed-back which ensures that they really meet the market needs. The final e-learning phase three will contain all tested tools and tested navigation through the e-learning part of the project website. For more information see also chapter 3.5.

5.2.6 Energy management handbook draft version

See Chapter 3.6.

5.2.7 Energy management handbook final version

The final energy management handbook will be adapted regarding the comments and suggestions of the pilot companies and NPCG. It will be translated in all languages of the consortium countries and will be introduced at the EU-workshop in February / March 2007. The handbook will be available as download on the project website and on the websites of the consortium members. Furthermore of course the CIAA and national food and drink associations will offer the handbook to their members.

5.2.8 Ready to hand guidelines for policy makers

In the end of the project the consortium partners will have a very good overview of the situation for implementing energy management and benchmarking in SMEs of their countries. They will know the needs to facilitate the implementation process and in what way the policy could influence this process positively. Those facts will be gathered in the guidelines for policy makers to ensure that they know the best way to improve energy efficiency in SMEs.