

# Redefining energy efficiency programs for industry based on monitoring results

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## Keywords

energy efficiency in industry, voluntary approaches, benchmarking, long term agreement, covenants, energy management, production chain, (web based) monitoring and constant improvement

## Abstract

Several countries have implemented some kind of energy efficiency programs for industrial sectors since the beginning of the nineties. Some of these programs have grown into mature instruments through constant evaluation and improvement.

### ENERGY PERFORMANCE BENCHMARKING IN NORWEGIAN INDUSTRY

Since 1989, more than 900 Norwegian companies from 28 industrial sectors have provided energy and production data for annual energy performance benchmarking. The scheme has provided very interesting results both for the industrial companies as well as for the authorities. This web-based scheme is now mature, and the next step is to make it Europe-wide. The paper discusses success factors from the Norwegian scheme and potential impacts from the EIE-supported BESS project that is scheduled to start in January 2005.

### ENERGY MANAGEMENT IN THE NETHERLANDS.

SenterNovem has developed an Energy Management system based on ISO 14001. The system consists of the Energy Management Reference and the Energy Management Checklist. The implementation quality has been ranked in four levels. Each company participating in the Long Term

Agreement Second Generation (LTA2) is obliged to have reached at least level C. By using monitoring and auditing the level is determined, required actions are defined and the improvement extent is fixed.

### THE EXPANSION THEMES: LTA2 IN A BROADER PERSPECTIVE

Expansion Schemes were introduced in the LTA-2 to cover energy savings in all stages of a product chain. SenterNovem has developed a policy monitoring system to measure the effects of the Expansion Themes. The following product stages are taken into account: raw materials, production, distribution, use and the disposal phase. Seven indicators followed the implementation development. The results were used to optimise the Program.

## Introduction

This paper illustrates three examples of energy efficiency. Each of them is still a key factor in the national energy efficiency programs because they were constantly redefined on the basis of the results of monitoring activities. The programs are:

- Energy performance benchmarking in Norway
- Energy Management in the Netherlands
- Expansion Themes in the Netherlands

## Energy performance benchmarking in Norwegian industry

### BACKGROUND

Benchmarking within an organisation for given periods of time is an acknowledged way to improve performance. Even better is to benchmark with other companies using similar technologies or producing similar products. In general, benchmarking is the best way to identify improvement potential and implement a package of measures by learning of success stories or comparing with Best Practice.

Using energy efficiency indicators and benchmarking is also essential for identifying ways in which energy savings at company, sector and aggregated national level can be improved and monitored. This point is an important issue with regard to the proposal for a directive of the European Parliament and of the Council on energy end-use efficiency and energy services because this is a bottom-up approach to measuring results in terms of energy savings.

For many Small and Medium Sized Enterprises (SMEs), international benchmarking is becoming increasingly useful. One benefit of going international is that this will extend the assortment of comparable companies and the possibility to benchmark similar processes and technologies. This is a topic within the new BESS-project (Benchmarking and Energy management Schemes in SMEs) founded by the EU's Energy Intelligent Europe program. The primary project objective is to further develop and promote the widespread application of benchmarking and energy management in order to improve energy efficiency in industrial SMEs, with particular focus on the food and drink industry. Relevant sectors to involve in pilot activities are e.g. breweries, dairies and meat-processing. Participants from 11 countries including member countries, 2 accession countries, Bulgaria and Norway insure a broad base for the project and insure access to specific knowledge of energy management issues.

The BESS-consortium will develop a European web-based benchmarking scheme based on existing and new national schemes. This approach will build on the embedded experience from the participating countries and giving added value for the SMEs participating in national benchmarking activities.

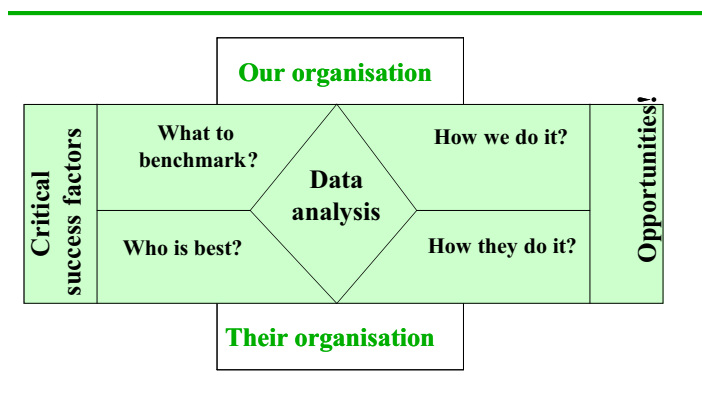


Figure 1. The benchmarking process – learning of best practice.

Benchmarking is an essential part of the Norwegian Industrial Energy Efficiency Network. (IEEN) Last year Norwegian authorities supported the establishment of a flexible web-based benchmarking scheme. The system was built on the technological platform *Microsoft.NET*

### WHY BENCHMARKING

Energy benchmarking & energy management are key to successful energy efficiency activities (See Figure 2).

In all the energy management activities that are carried out by public or private organisations, be it the level of associations, municipalities, regions or countries, the requirements for target setting, monitoring of performance and results are becoming increasingly important. The saying "If you can't measure it – don't do it" makes a lot of sense. Energy monitoring and benchmarking are in fact critical success factors to all other activities related to energy efficiency measures. In SMEs this is particularly true. The resources that are made available for improving energy performance are limited, and unless one can show an acceptable return, there will always be a large number of alternative uses for these resources.

In Norway, the Industrial Energy Efficiency Network has been in use since 1989. This web-based benchmarking scheme will benefit from an extension to European level through:

- Continuous improvement of the ongoing national benchmarking scheme ;
- Providing the SMEs with relevant energy benchmarks and best practice examples within the area of Energy Management so that they can gain a better understanding of their own performance compared to other European SMEs within their sector

Norway has established a quantitative savings target of 12 TWh/year (43,2 GJ) or 5% of stationary energy use by 2010

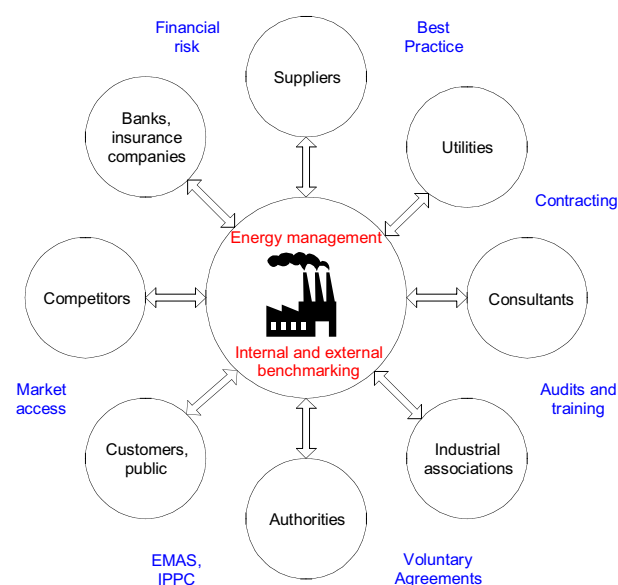


Figure 2: Energy Benchmarking and Energy Management are key to successful energy efficiency.

from energy efficiency and renewable energy sources. The national agency, ENOVA, has a national energy fund of 650 million Euro over a ten-year period at its disposal to achieve this objective. Energy management, benchmarking and networking are essential parts of stimulating energy efficiency within Norwegian SMEs. The Norwegian Industrial Energy Efficiency Network (IEEN) is an important tool for promoting these activities.

#### WEB-BASED BENCHMARKING – EXPERIENCES AND FEEDBACK

Much has been written on energy management and monitoring systems. Each country has developed more or less its own system and applications, and consequently information is not easily accessible for the industry. This goes for SMEs in particular.

Most benchmarking tools only operate within company groups. Benchmarking systems looking beyond the borders of individual companies will be a valuable source of information that can even provide interesting incentives to improve energy performance. These kinds of benchmarking information systems are not yet easily available across sectoral and national borders. However the currently running project in Norway may prove to be a way forward for the establishment of a web-based energy benchmarking scheme opened up to international benchmarking.

The Norwegian web-based benchmarking scheme was initiated by ENOVA in the spring of 2003. This was by and large based on the information collected in questionnaires and calculation methodologies used within the Norwegian Industrial Energy Efficiency Network since 1989. Ife and BEKK Consulting AS was given the task to develop the web-application and a pilot version was completed and made available for on-line testing in September 2003. The application test of the application was carried out during the energy reporting period and used production data from the 2003 IEEN member companies. This reporting exercise was completed before the summer of 2004, and the experiences gathered have been valuable for further fine-tuning of the application.

The application has three main components:

1. Security component – in which the members are provided with personalised access routines and control.
2. Registration component – in which the SMEs themselves can enter their relevant energy and production data. The registration component contains a conversion calculator, making entry of all relevant energy sources and carriers possible in a standardised way. Furthermore, routines for validation and quality checks against deviations levels from reported data from previous years are carried out.
3. Reporting component – in which the application performs and presents the benchmarking analyses for the individual SMEs in an up to 5 years historical perspective. The reporting component presents the following benchmarks for every individual SME:
  - Graphical presentation of specific energy consumption/produced unit of goods compared to arithmetic average and comparable companies within the sector

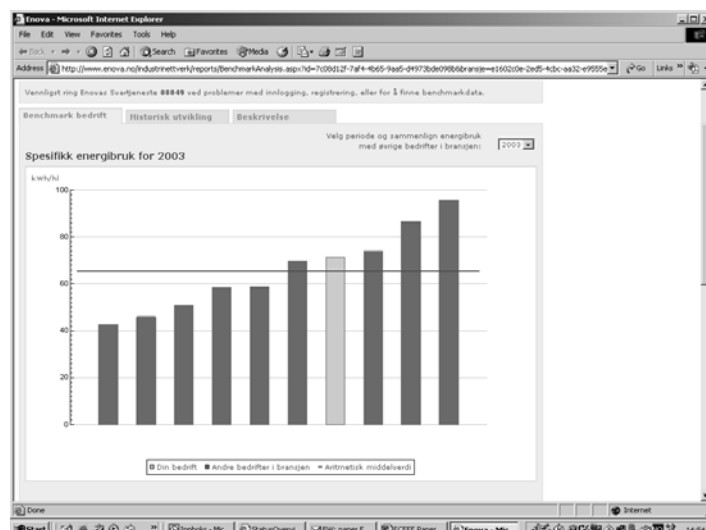


Figure 3. Benchmark results from the Brewery sector.

- Graphical presentation of energy consumption split on various energy sources/carriers
- Graphical presentation of energy efficiency potential based on specific energy consumption compared to best practice
- Graphical presentation of development of individual and sectoral specific energy consumption in a historic 5-year perspective
- Table with historic input data for individual SMEs
- Aggregated, historic input data for sectors

#### EUROPEAN BENCHMARKING SCHEME (BESS)

Energy management implementation and energy efficiency investments by individual companies have to be done nationally whilst taking local barriers and opportunities into account. Governments have their own national programmes to stimulate this process. However information on best practices to assist SMEs however is scattered all over Europe at this moment. Exchanging information and experiences we ensure that SMEs all over Europe can use the most effective selection of best practices and take advantage of the mistakes and benefits colleagues have experienced in the past. Especially SMEs can benefit from a European facilitated approach because normally they have a lack of resources and time to look for these best practices which are relevant for their own sector.

The recently initiated BESS project facilitates the introduction and exchange of sector specific (European) benchmarking information. Comparison of relevant energy efficiency figures can only be achieved when a minimum level of compatibility between figures exists. This is one of the major advantages of introducing a common European package of interrelated instruments.

When SMEs from different countries are involved in the development and the testing of this package a maximum commitment can be achieved. This especially is the case

when an SME association at the EU level with its national members supports the project.

Optimal replication can be achieved when the results of the projects are disseminated at the EU level. Participation of organisations and companies of nearly half of all EU, EEA, accession and candidate countries ensures a broad acceptance of the instruments to be developed in the whole area. The trans national approach in this project, backed by cooperation at the level of energy agencies/organisations and SMEs as well, guarantees efficient use of resources and an optimal connection with relevant EU policies and directives as well as with previous and current initiatives and projects in this field.

A few European countries, like Norway, The Netherlands, Austria and Finland have experience with national benchmarking. The project aim is to offer a uniform Benchmarking approach to SMEs and energy consultants within Europe. The approach will be to establish a benchmarking module on top of the individual, existing or planned national schemes, enabling international comparison of specific energy performance by sector and/or technology.

#### **BESS – Benchmarking tasks:**

1. Assessment of compatibility between existing national benchmarking schemes

Based on the existing or currently planned schemes, this first task will be carried out in order to identify and analyse all relevant schemes in the participating countries. Furthermore, for those participating countries where no scheme is currently in place, a first potential assessment for such establishment will be done. Each partner will provide the relevant information about national schemes for monitoring and benchmarking.

2. Develop routines for data compatibility between national schemes

In view of the presumed differences in data structures, level of aggregation etc, the compatibility between the different schemes must be ensured. This task will therefore develop routines in order to obtain the necessary compatibility between the national benchmarking scheme level and the overall EU benchmarking scheme level.

3. Design and development of Web-application

The web-based benchmarking solution will be based on the following four main components, which will be the basis for the detailed application design:

Security component.

Registration component. The solution will provide for flexible data collecting. To reduce the burden for SMEs by double reporting we will aim at coordination with other national statistics.

Analysis and quality assurance component. Automatic validation function will be built into the solution to limit the need for manual quality assurance.

Reporting component. Benchmarking results will give information on performance and how to improve energy efficiency.

As a preparation tool for the pilot projects a monitoring & benchmarking documentation package including web access to (one of) the web applications will be provided for the pilot SMEs.

#### **4. Testing Web application**

Prior to the launching of the web application, several tests will be carried out and any identified problems corrected.

#### **5. Informing and reporting**

Involves composing and submitting the deliverables as well as reporting to the project coordinator.

#### **BESS – Benchmarking outcome**

The outcome of the BESS project will be an EU-wide web-based monitoring & benchmarking module on top of the individual, existing or planned national schemes, enabling international comparison of specific energy performance by sector and/or technology.

First information on the BESS project will be given during the conference because the BESS project started in January 2005.

## **Energy Management in the Netherlands**

### **INTRODUCTION**

Energy management is a structural and economical way of applying organisational, technical and behavioural measures to minimise energy consumption, including the energy required to produce and apply raw materials and inputs.

### **ENERGY EFFICIENCY AS AN INTEGRAL PART OF THE SECOND-GENERATION LONG-TERM AGREEMENTS**

Energy management is a crucial instrument for bringing about a sustained improvement in energy efficiency. This is the firm belief not only of the Dutch government but also of many companies and institutions that have experienced energy conservation. This experience has been a major incentive in making energy management a permanent aspect of all the second generation Long-Term Agreements on Energy Efficiency (LTAs). The Netherlands Agency for Energy and the Environment (SenterNovem) has developed a method and instruments for the introduction of an energy management system.

Companies and organisations wanting to improve and systematically manage their energy consumption and hoping to introduce an energy management system often do not quite know how to get started. Therefore a few years ago, SenterNovem developed an overall method that can be broadly applied both by industry and the services sector.

This method consists of the following four phases:

- Preparation
- Analysis

- Planning
- Execution

The method has since been fully developed and has been shown to be a good way of introducing an energy management system into an organisation. It has been implemented in accordance with the “Energy Management Reference”, in a streamlined way and with due regard for all key aspects. The Energy Management Reference is based on ISO 14001 environmental standard. The accompanying guidelines say how it should be interpreted. The Reference also includes a checklist. This allows us to assess the quality of an energy management system (if already in place) and to decide what measures are needed to satisfy the minimum requirements. This will give us a good overview of which improvements are required.

SenterNovem has also developed a range of instruments that will be useful when phasing in an energy management system. Two of these instruments are:

- *The Energy Potential Scan.* Companies and organisations can use this instrument to take stock of their energy consumption and their energy conservation measures, and to identify ways of improving or to implement their energy management system.
- *The Energy Management Implementation Method.* This is an approach for “anchoring” energy management into an organisation’s commercial operations in accordance with the Energy Management Reference.

#### ENERGY MANAGEMENT IMPLEMENTATION DURING LONG-TERM AGREEMENT 2

The agreement is that all LTA2 participants will implement an energy management system that must meet the *minimum* requirement (quality level C on the Energy Management Checklist) within two years after joining the LTA programme. Approximately 70% of the LTA2 participants are requested to meet this criterion during the course of 2004.

The energy management system enables the implementation quality to be assessed. To do this, the energy management checklist should be filled in. This checklist consists of 100 questions. Each question could be answered with 0 (not implemented), 1 (partly implemented) and 2 (fully implemented). Among the 100 questions, the checklist contained 51 questions that should be answered with a minimum level of 1. These mandatory items should be implemented. If they are not the organisation will get level D

There are four levels of implementation of energy management:

|           |   |   |
|-----------|---|---|
| 181 - 200 | A | high level of Energy Management   |
| 102 - 180 | B | acceptable level of Energy Management with room for improvement   |
| 51 - 101  | C | the system for Energy Management does not yet satisfy the requirements for documentation and implementation as indicated in the Energy System Specification with Guidance for Use |
| 0 - 50    | D | systematic Energy management has not yet been implemented or the system has an important shortcoming  |

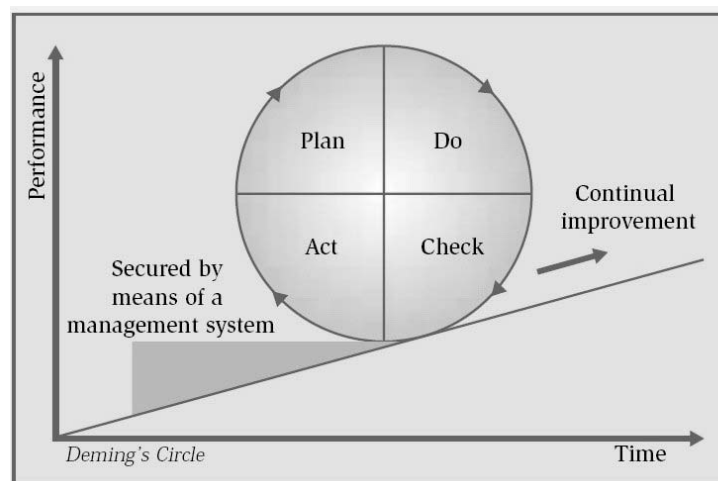


Figure 4.

#### MONITORING IN THE LONG-TERM AGREEMENT 2

Companies that take part in LTA2 are required to annually report to SenterNovem. They have to report to the Competent Authority and the sector organisation on progress of the implementation of their Energy Conservation Plan (ECP) and their systematic implementation of energy management.

##### Reasons for monitoring

Companies that take part in the LTA2 are required to report their progress with respect to the covenant each year. A monitoring report provides a company with an insight into how well it is succeeding in realising its own energy targets. On this basis, management can confirm the policy or make an interim policy revision. On the monitoring report basis, the Competent Authority can assess whether a company is making enough effort to realise its energy targets. In each sector, the corporate monitoring reports are aggregated. This gives the sector a picture of progress and insight into the need for any additional measures.

##### Contents

A company monitoring report in relation to LTA2 provides an insight into the progress in the preceding calendar year regarding:

- ECP implementation,
- Process efficiency
- Expansion themes
- Systematic energy management implementation.

The report must in any event contain data on the energy efficiency improvement in relation to the reference year (1998), and the CO<sub>2</sub> emissions avoided as a result.

##### Requirements

As part of the LTA2, each company reports to SenterNovem, the Competent Authority and its own sector organisation, no later than 1 April of each year. If the company also takes part in an environmental covenant, the aim will be to

integrate monitoring of that covenant together with the LTA2. The reason for this is to minimise bureaucracy for the company. The report must comply with the LTA2 Monitoring and Energy Management Protocol (Annex 5 of the covenant).

#### Procedure

SenterNovem contacts LTA2 companies for the annual monitoring report and facilitates monitoring implementation. SenterNovem verifies the corporate monitoring reports on the basis of the Monitoring and Energy Management Protocol and if necessary, will obtain further details from the company concerned.

#### Monitoring sector report

SenterNovem is responsible for informing the Energy Conservation Consultative Group (OGE) (This group consists of representatives from the companies from one sector, from the Ministries involved and SenterNovem), the Competent Authority and the LTA2 Platform on the LTA2 progress in the sectors taking part to that end. Corporate monitoring reports in each sector are processed and aggregated for that purpose. SenterNovem ensures that the information is published and that it cannot be traced to individual companies. The relevant Energy Conservation Consultative Group in each sector coordinates the reports. Sector monitoring reports provide an insight into the progress achieved in the preceding year with regard to:

- Systematic energy management implementation
- ECP's Implementation
- Long Term Plan Implementation for the sector
- Energy efficiency improvement achieved as a result of the above
- CO<sub>2</sub> emissions avoided as a result of the above.

#### Report to the Second Chamber

Each year, no later than 1 September, SenterNovem provides the LTA2 Platform with an aggregated report on LTA2 progress in the preceding year. The LTA2 Platform consists of representatives of the parties involved in the LTA2. The LTA2 Platform subsequently informs the Ministers of Economic Affairs and of Agriculture, Nature and Food Quality, who in turn informs the Second Chamber of LTA2 progress achieved in the preceding year.

#### MONITORING RESULTS LONG-TERM AGREEMENT 2

The quality of the participants' energy management systems was included in the annual LTA monitoring for 2003. This showed that 27% met the minimum energy management requirement. Around 4% achieved level A, 21% were at level B and 2% at level C. This is twice the amount for 2002. Although this is far below the 70% level target set out at the beginning of the LTA2 covenant. Therefore SenterNovem has been discussing this with the LTA2 Platform in November 2004.

#### EVALUATION AND FEEDBACK

The LTA2 Platform has decided that the Energy Management system is a good tool and should be compulsory but that it could be improved at certain points, namely:

- Made to measure Energy Management for smaller companies (SME: Small and Medium Sized Enterprises)
- Simplification of the systematic and the checklist

SenterNovem took the following measure within the Systematic of Energy Management:

The design of a new method for the Energy Management implementation in which next to support of a consultant the participant could also make use of the Internet. Previously this line of questioning caused interpretation problems. The aim is that participants will implement Energy Management on a simplified basis within their own companies. This method will be written on such a basis that a larger company could also use it.

Additionally the Energy Management Checklist will be modified. The language will be simplified and there will be fewer questions. Also the question will only be answered 'yes' or 'no' and not with 'partly implemented'. The sequence of the questions will be adapted to the way of implementation within the company. The Reference will remain unchanged. The Checklist layout will be more user friendly with more explanations as to whether it is a matter of 'yes' or 'no'.

#### NEW REQUIREMENTS

The results of this evaluation will lead to a new Energy Management implementation Reference and a new Checklist. These new requirements were not ready at the time of writing but they will be presented during the conference.

### The expansion themes: LTA 2 in a broader perspective

#### INTRODUCTION

Saving more than just the energy consumed to manufacture products: this is a major challenge for organisations taking part in the second generation Long-Term Agreements on Energy Efficiency (LTA2). The starting point for this goal lies in the so-called "expansion themes" of renewable energy and energy-efficiency product development (EEPD). EEPD is designed to improve energy efficiency at all product life cycle stages, from the raw material stage up to and including disposal. Expansion themes therefore cover savings on energy from fossil fuels, much of which is achieved outside the company itself. The possibilities for reaching these goals are often surprising in their nature and scope. Concrete measures for achieving EEPD include sustainable products, sustainable industrial estates and the optimisation of transport, logistics and product chains.

In the LTA2, companies, branch organisations and local authorities have to undertake steps to bring about improvements in energy efficiency within the so-called expansion themes. In specific terms, this means that LTA2 companies must have completed an extensive energy survey by 1 October 2004 identifying possibilities for expansion themes and

energy efficiency improvements that can be achieved through them. This information will be used to draw up a new Energy Conservation Plan (ECP 2005 – 2008). This requires from the companies that they must have a good insight into the energy consumption of the various processes.

### NEW ANGLES OF APPROACH

The LTA2 expansion themes have resulted in two new energy conservation achieving approaches for:

#### 1. Assessing the overall company environment:

- Customers (industrial buyers, the wholesale sector, consumers, etc.)
- Suppliers (of raw materials, inputs, office equipment, etc.)
- Distributors (transport companies, storage, refrigeration units, etc.)
- Industrial estates (industrial insurance boards, local authorities, etc.)

These new approaches can disclose other, and above all more extensive, energy conservation options other than those for simply improving the process efficiency in the company concerned. The main challenge facing expansion themes is to achieve coordination (and, where possible, co-operation) within other companies in the product chain.

#### 2. Evaluating the entire product life cycle may lead to the following improvements in each life cycle phase:

- Optimising function performance
- Saving on materials
- Process efficiency (among customers and suppliers)
- Optimising distribution
- Reducing energy consumption during product use
- Optimising life span
- Optimising disposal
- Optimising reprocessing

### ENERGY EFFICIENT PRODUCT DEVELOPMENT

Energy Efficiency Product Development is product development in such a way as to reduce its energy consumption throughout its entire life cycle. The product life cycle involves three areas in which further energy savings can be made:

#### SUSTAINABLE PRODUCTS

The key question here is: where in the product life cycle can (energy) gains be made? Working on sustainable products can result in a relatively simple, new and energy efficient product, but also in a new innovative system.

#### OPTIMISING TRANSPORT, LOGISTICS AND PRODUCT CHAINS

Substantial energy savings can sometimes be made in the products' distribution and as well as in the materials needed to make them. This optimisation leads to a reduction in the

## ENERGY-EFFICIENCY IMPROVEMENT IN A BROADER PERSPECTIVE

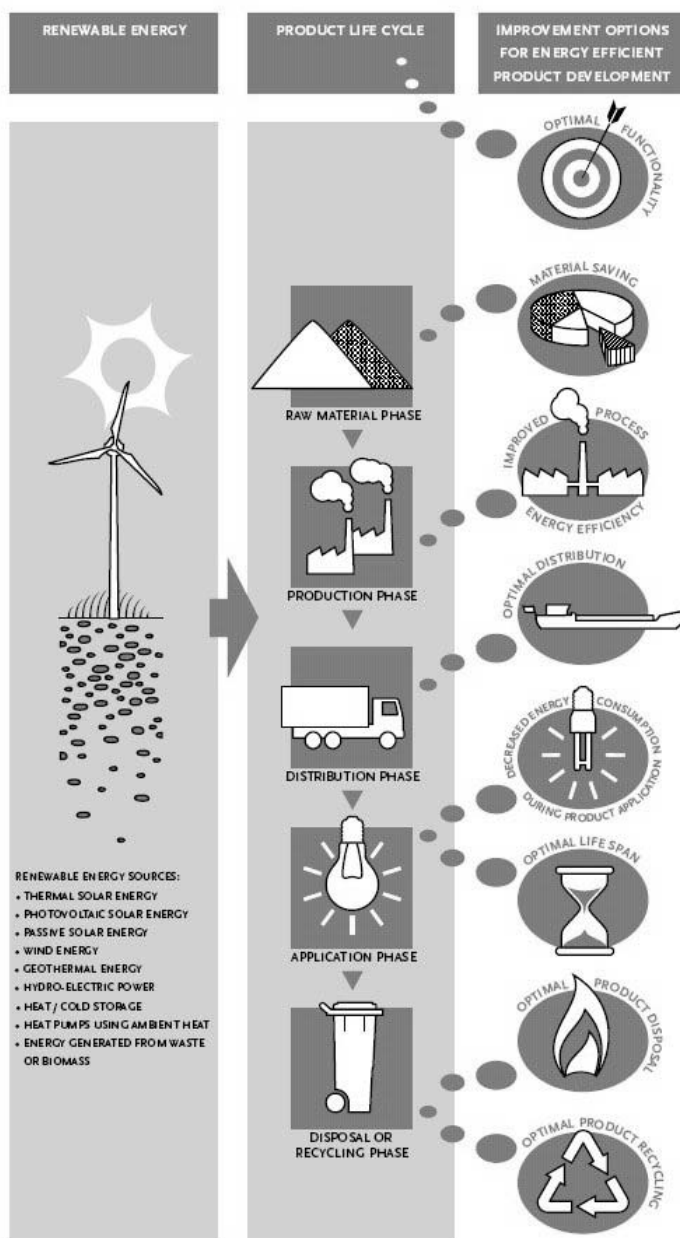


Figure 5.

energy used in the transport and storage per unit product, but also in its volume.

#### SUSTAINABLE INDUSTRIAL ESTATES

Companies can work together and with governments to reduce energy consumption in sustainable industrial estates by e.g.:

- Exchanging energy, raw materials and water (for example in the form of residue heat, cold and materials)
- Arranging the shared use of utilities and commercial functions (such as combined heat and power, waste water purification, compressed air)

- Joint collection, disposal or processing of waste.

#### **An Example: Beer crates production with less material**

Wavin Hardenberg is one of the LTA2 company. This company produces plastic packaging products. Wavin has already taken process efficiency improvement measures during the LTA1 period. The amount of economically feasible options remaining within the company has been reduced to a minimum. Therefore, Wavin decided to look into energy saving options in the production chain. Finally, Wavin came into discussion with the beer brewer Grolsch, a big customer of beer crates (400 000 per year). One of the options proposed by a brainstorm session was to make the crates lighter.

The idea looks simple but beer crates are being used for many other purposes than only beer bottle transport. For example: as a stool or a stepladder. Before being able to make the crates lighter Grolsch is going to make an inventory of the beer crates strength requirements.

After the research the beer crates design can be optimised to the new requirements. There is a big chance the product can be made lighter. In that case energy use reduction in the product chain will be substantial.

#### **EXPANSION THEME: RENEWABLE ENERGY**

The energy use from fossil fuels can be further reduced through renewable energy applications of :

- Constructing a renewable energy installation, either unilaterally or in collaboration with partners
- Purchasing of "green" energy (energy from renewable sources).

The following energy sources qualify as renewable:

- Hydroelectric power
- Wind energy
- Thermal solar energy
- Photo-voltaic solar energy
- Passive solar energy
- Heat and/or cold storage
- Geothermal energy
- Heat pumps that make use of ambient heat
- Energy from waste and biomass.

#### **WORKING ON EXPANSION THEMES**

Between 2001 and 2004, organisations participating in the LTA2 were obliged to take steps to develop the expansion themes. Companies achieving energy savings via an expansion theme will be allowed to include the effect as part of their energy efficiency index. A standard, transparent and verifiable method has been developed for the calculation. This method is known as the Life Cycle Energy System Scan (LESS) and it allows companies to calculate their own net savings on fossil fuels energy throughout the chain, plus the CO<sub>2</sub> emissions avoided as a result.

#### **MONITORING EXPANSION THEMES**

The LTA2 monitoring is done on the basis of an extensive procedure carried out annually. Each company supplies an extensive monitoring report on the progress development of the measures taken and the expansion themes' implementation. These reports are aggregated up to sector level and discussed at sector level annually. They give insight into the implementation and the progress of all LTA2 items, including expansion themes.

The LTA2 results were evaluated by CSTM in 2004. Their report was the basis for the discussion on redefining the Expansion Themes' approach.

#### **DISCUSSION OF EVALUATION RESULTS**

The external evaluation of the LTA2 program including the expansion themes was carried out by CSTM in August 2004. Although many of the LTA2 items were evaluated we zoom in on the expansion themes' results. First of all it was concluded that the Expansion Themes (ETs) took only a modest place in the LTA activities. The following conclusions were drawn:

- One quarter of the respondents believe that ETs will play a more important role
- Insight into the ETs is quite small
- The items *transport*, *logistics* and *chains* were identified as the most important
- The most difficult ET is industrial estate because of organisation, reliability and the match of volume and capacity
- The reason for the lower implementation stage is that these options were not elaborated on in the long-term sector plans. Another reason for the reluctance to implement is the difficulty to carry out the measures.

#### **PROGRAM MODIFICATION**

Ways to stimulate progress on the expansion themes are:

- A more specific stimulation to use the Expansion Themes potential
- Better guidance to ET start-up by using the existing LTA infrastructure
- Optimal experience and knowledge exchange between companies and sectors
- Exchanging of ETs' saved energy with measures mentioned in the Energy Saving Plans

#### **Conclusions**

These three examples showed that a good monitoring system is a very strong tool. Redefining programs can only be achieved as the basis of good monitoring results. The Norwegian benchmarking system has been simplified and is being made ready for spreading around Europe. The Energy Management implementation method and monitoring system is thoroughly changed and geared to the SME's. The approach and marketing of the Expansion Themes is changed to attract more companies within various sectors.



## Terminology

|       |  |
|-------|--|
| NEPAS | New Energy Performance   |
| EIE   | Intelligent Energy for Europe  |
| LTA2  | Long Term Agreement phase two (2001-2012)  |
| SME   | Small and Medium Sized Enterprises   |
| BESS  | Benchmarking and Energy management Schemes in SMEs   |
| ECP   | Energy Conservation Plan   |
| EEPD  | Energy Efficient Product Design  |
| CSTM  | Centre for Clean Technology and Environmental Policy (Centrum voor Schone Technologie en Milieubeleid) |
| ET    | Expansion Themes   |
| TWh   | Tera Watt hour ( $10^9$ kWh) is $3,6 * 10^{15}$ Joule  |
| GJ    | $10^9$ Joule (J)   |
| PJ    | $10^{15}$ J (ca 30 miljoen m <sup>3</sup> equivalent of natural gas)                                   |

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