

The result from *EKO-energi* in Sweden, a voluntary agreement for energy efficiency in industries

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Abstract

Acceptance is an essential condition, although not sufficient on its own, for energy efficiency to be implemented. Making visible the potential for energy conservation is important for its acceptance. Resources – human, organisational, financial – must be made available if energy efficiency is to be realised. The resources, together with the appropriate equipment, must be available at the right time.

Summary

The *EKO-energi* project can be split into three phases which are characterised by:

Formulation of ideas, organisation and areas of work responsibility: During this phase the ideas are formed. The contents of the project decided and the organisation and area of responsibility defined.

The work phase: During this phase companies are recruited and the programme is finalized.

Final phase: This phase is characterised by the fact that no new companies are recruited and that the work consists mainly of following-up with existing companies, net-work meetings and the results of the annual *EKO-energi* competition are announced.

VOLUNTARY AGREEMENT FOR ENERGY EFFICIENCY

The Government, via NUTEK (the Swedish National Board for Industrial and Technical Development), signs a

voluntary agreement with the company concerned. In this agreement the management of the company commits itself to follow the programme, appoint a representative responsible for the programme and work out a plan for the follow up of the project. NUTEK commits themselves to carry out an energy audit, analysis of energy flow, a first environmental investigation and education in energy efficient procurement (ENEU 94, now known as LCCenergy).

The company commits itself to formulate a long-term energy- and environmental policy in accordance with EMAS or ISO 14001 and to analyze the energy consumption thereby enabling specific goals to be fixed. The company also commits itself to the introduction of procurement routines in accordance with ENEU 94 when investing in equipment with high energy usage.

The companies involved in the programme help to reduce the CO₂ emissions in accordance with the Rio conference Agenda 21.

EKO-ENERGI PRIZE

The companies participating in the *EKO-energi* programme were invited to enter the annual *EKO-energi* competition where the *EKO-energi* prize was first presented in Stockholm on 10th September 1997 and the winner was Thorn Lighting AB. The final prize was presented to Tetra Pak AB in Eskilstuna on 12th March 2002.

The competition focuses not only on the company that reaches the set goals in the shortest period of time or is most efficient in saving energy but also achieves the best results in the following five points:

1. An environmental policy in accordance with ISO 14001 or EMAS and energy efficiency system introduced into the company's management system.
2. Long term energy goals.
3. Short term energy goals introduced into the organisation during the current budget year.
4. Plan for introduction of suggested energy savings.
5. Procurement of energy intensive equipment in accordance with ENEU 94 with regards to life cycle costs.

Why did they succeed?

The companies:

say that they have had a good usage for the energy audit which shed new light on the company's operations. The introduction of the measures has been decided and implemented with regard being taken to the financial situation of each company. The measures requiring smaller investments have been introduced immediately where as measures involving larger investments have been carried out in conjunction with renovation or new investments. Some of the companies carried out new energy audits at their other plants without economic or other support from NUTEK. The companies have therefore found a suitable system for energy audits.

have appreciated the enthusiasm and general company knowledge shown by the NUTEK project management group during the initial contact stage. This has enabled the enthusiastic implementation of the programme.

have had great use of ENEU education. One company trained every member of their sales, purchasing and design departments and use ENEU daily. A total of 60 courses have been arranged with the participation of more than 700 people in the whole *EKO-energi*.

have noticed that the environmental awareness of their personnel has been increased. The programme has, mainly through the audit, given a complete picture of the energy usage which has led to accent being placed on environmental and energy questions.

have appreciated the network meetings with the companies and the Swedish Energy Agency. The sharing of knowledge between the participating companies has been seen as an important part of the learning process. One company has, for example, studied the energy usage when machines are left on stand-by instead of being shut down. This showed that 31 % of the electricity consumed was by machines on stand-by! This project was carried out solely by the production personnel and the saving was achieved without any investment whatsoever. The electricity consumption per produced unit was reduced from 0.5 kWh to 0.35 kWh. Another company has started a project to reduce unnecessary losses e.g. by turning off lights in empty localities, (this has not previously been the case in Sweden as the electricity costs have been relatively low), making sure all pipe lines, joints and packings are leakproof, etc. This again shows that small changes in behavior can give large savings without the need for investments.

have the opinion that they have become more effective in and have an increased awareness of their energy consumption. This in turn has led to a reduction in CO₂ emission. In *EKO-energi* it is

calculated that each kWh is equal to the emission of 1kg CO₂. The key figures are difficult to quantify as the companies are spread over such a wide range of industries (manufacturing of screws, machines, paper, steel, bread etc.).

Description of implemented measures in one plant

Heating:

- Better and more effective m stems.
- Optimisation and modernisation of process exhaust equipment.
- Installation of heat recovery systems.
- Optimisation and modernisation of process exhaust equipment.

This resulted in a 20% reduction in heating!

Compressed air:

- Leaks eliminated wherever possible.
- Complete shut-down of system when not required.
- This resulted in a reduction of compressed air usage of between 10 and 14%.

Water:

- Replace older cooling towers.
- Modernize moisture removal equipment.
- Eliminate leaks.

The water usage was reduced by 26% purely by reducing leakages!

Electricity:

- Control of lighting (Timing and sections).
- Installation of HF-lighting.
- Shutting down machines instead of leaving them on stand-by.
- Installation of low energy consuming motors.
- Better and more effective maintenance.

The electricity consumption was reduced by 25%.

In 1998 one plant decided to shut down machines instead of leaving them on stand-by. They started with six grinding machines. The first step was to shut them down over the weekend. Next step was to shut them down as soon as possible, for example during lunch- and coffee break. They went from 0.5 kWh/detail to 0.35 kWh/detail without investment.

REPORT OF EKO-ENERGI PRIZE

The *EKO-energi* prize has been awarded five times. The winners were Thorn Lightning AB (lightning industry), Scania AB (manufacturer of large vehicles), Värösågen (sawmill), Volvo Lastvagnar AB (manufacturer of large vehicles) and Tetra Pak Business Support AB (packaging industry).

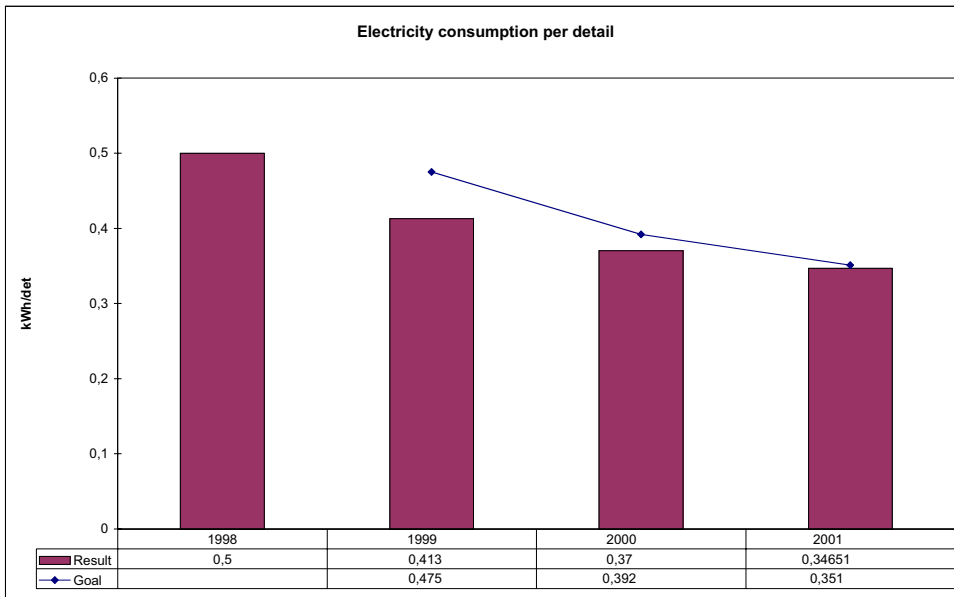
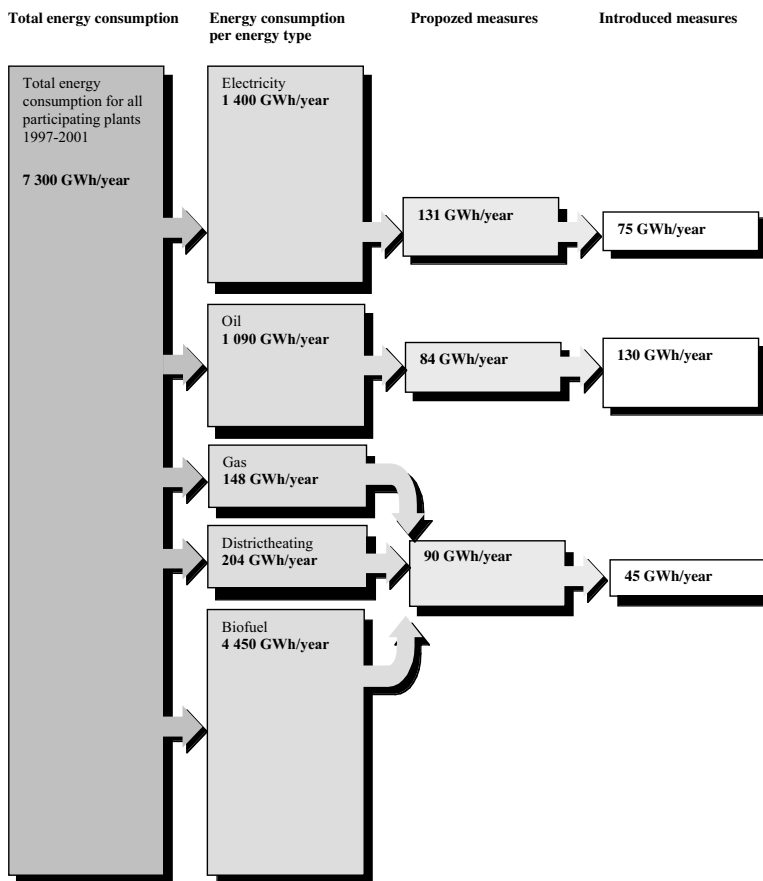


Figure 1. Example of how behaviour can reduce electricity consumption without investments.



The first column shows the total energy consumption for all participating plants in the *EKO-energi* prize 1997-2001.

The second column shows how the total consumption is divided into different energy types.

The third column shows the proposed measures in different energy types which gives a pay back in less than three years.

The fourth column shows introduced measures and outcome.

Figure 2.

Table 1.

Presentation of annual *EKO-energi* prize

Total energy consumption for all participating plants GWh/year	Energy consumption per energy type and year GWh/year	Proposed measures GWh/year	Introduced measures GWh/year
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1997

397	Electricity	188	17	9
	Oil		10	1
	Gas			
	District heating			

1998

3 765	Electricity	317	35	13
	Oil	317	23	4
	Gas	40	64	25
	District heating	96		
	Biofuel	2 980		

1999

642	Electricity	263	30	13
	Oil	102	12	3
	Gas	38	51	38
	District heating	78		
	Biofuel	146		

2000

3 759	Electricity	1 165	108	62
	Oil	845	60	117
	Gas	122	71	35
	District heating	161		
	Biofuel	1 450		

2001

780	Electricity	376	37	18
	Oil	161	31	18
	Gas	109	30	7
	District heating	53		
	Biofuel	63		

The *EKO-energi* programme covers total 12 TWh from 25 groups of companies with 71 plants, but the results below only cover the plants where results have been submitted for participation in the annual competitions.

After the presentation of the result of *EKO-energi* Patrik Nilsson from Tetra Pak Business Support AB will present Tetra Pak's work with energy efficiency.

(See Table 1. Presentation of annual *EKO-energi* prize overleaf)