

Programme for Improving Energy Efficiency

Experiences and results after five years with PFE

In this brochure you will learn more about the Programme for Improving Energy Efficiency in energy-intensive industries, PFE, and the results achieved so far. In particular, you will find out why companies participating in the programme have been so successful in their efforts. Hopefully you will receive valuable tips which you can use in your own business operations.



Increased competitiveness by improving energy efficiency

Enhanced competitiveness, improved environmental performance and reduced costs – something all companies want to achieve. Through PFE, the 100 companies participating in the programme have achieved just that. In this brochure, you will find out more about the companies that have used PFE as a recipe for success and how effective energy efficiency work can be designed.

Industry save 1.45 TWh of electricity annually by using PFE

During the first five years of the PFE programme the work has led to major efficiency improvements for the participating companies. The 1.45 TWh reduction in electricity consumption is more than twice the estimated 0.6 TWh reduction which Sweden had expected to achieve when the programme was launched in 2004. In addition, the major reduction in electricity consumption, which the companies have achieved, has also led to considerable work being done in reducing energy consumption in other areas of operations. For example, many companies have carried out fuel and heating efficiency improvements and increased their consumption of renewable energy. PFE is a voluntary programme which forms the basis of this successful work. The programme is aimed at energy-intensive industries and offers a tax credit in exchange for improvements in electricity efficiency. When a company applies to the programme, it commits itself to making improvements in

electricity efficiency, to carry out an energy review, to implement a certified energy management system, and to the establishment and implementation of procedures for the purchasing and planning activities that affect its energy use.

Systematic work and overall approach

The excellent results from PFE have not been achieved through any revolutionary new technology or working methods. Instead, a systematic work method, combined with a holistic approach to energy use, has led to a variety of measures that have been identified and taken advantage of. In particular, it is ‘the day-to-day hard work’ that lies behind the success. The largest number of measures have been implemented within the following areas: motors, fans, pumps and compressed air – measures the vast majority of industrial enterprises are able to commit to in order to become more energy efficient and competitive.



Helping businesses to make profitable investments, reduce costs, improve competitiveness, while reducing the environmental impact is the most rewarding thing we know!

*– Tomas Kåberger, Director General,
The Swedish Energy Agency ”*

What is PFE?

- The Programme for Improving Energy Efficiency, PFE, is aimed at companies in the manufacturing industry that are energy intensive, that use electricity in the manufacturing process and are expected to be able to meet the requirements of the programme. PFE is a five-year programme.
- PFE came about due to the tax on process-related electricity, which was raised from 0 to 0.5 Euro/MWh on 1 July 2004. Through the programme, companies receive a tax reduction of 0.5 Euro/MWh.
- The programme started in 2004 and is voluntary. When a company applies to and are accepted for the programme however, the Programme for Improving Energy Efficiency Act applies (2004:1196).
- The Swedish Energy Agency administers and supervises the programme. The Swedish Tax Agency (Skatteverket) handles the tax reduction.
- During the first period, there were approximately 110 companies participating in the programme, of which 98 companies have been participating since the programme's implementation in 2004.
- The programme's companies use approximately 30 TWh of electricity per year and receive a tax credit of 15 million Euro per year.

YEARS 0-2: Implement/Introduce

- Energy review
- EnMS
- Procedures for purchasing and planning activities

Energy review provides an overall picture of energy use

How is energy use monitored in my company and what measures are appropriate to implement? By conducting an energy review you will receive help in answering these kinds of questions. The review provides an overall view and a systems perspective of a company's energy use, making it easier to see where it is most appropriate to introduce improvements in energy efficiency in the short and long term.

Facts help to avoid guesswork

INTERVIEW WITH LARS NILSSON,
FAGERSTA STAINLESS AB

"Thanks to our energy review we can now make decisions based on accurate facts," says Lars Nilsson at Fagersta Stainless AB, who is pleased despite the fact that finding out how energy is used in all parts of the factory involved a lot of hard work. The survey, which started in 2005, has resulted in energy savings of more than 8,000

MWh per year. Total electricity consumption has fallen by 15 per cent.

"Nowadays, we do not have to guess how we use our energy, which means we have a good platform to stand on for the future. Well-informed decisions in the area are of strategic importance for us because energy accounts for a quarter of our total costs. ■"

READ THE FULL INTERVIEW AT:
www.swedishenergyagency.se

YEAR 2

Energy management system for continuous improvements in energy efficiency

By firmly establishing its energy efficiency work in an energy management system (EnMS), a company receives support so that it can work in a consistent and systematic manner with the energy issue in order to achieve continuous improvements. The EnMS functions as a management tool that helps to plan, implement, monitor and improve a company's energy performance. Participation in PFE requires a company to implement and certify a standardised EnMS within the first two years of the programme.

Holistic approach provides great savings

INTERVIEW WITH JERRY LARSON, SCA TIMBER

Around 2 million Euro per year. That is what SCA Timber has saved by implementing an EnMS at seven of its sawmills.

"From 2005 to 2009 we have reduced our energy consumption by 22 per cent," says Jerry Larson, energy coordinator at SCA Timber. The introduction of a group-wide EnMS has led to greater energy savings than would otherwise have been the case, he notes. One reason is that the system creates opportunities for benchmarking and an exchange of knowledge between different divisions in the company. Jerry Larson expects additional savings worth several million crowns over the next few years.

"My assessment is that we will be able to reduce consumption by two to three per cent in 2011 and by another five per cent at least by 2015," he says. ■"

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After year 2

- Reporting to the Swedish Energy Agency

YEAR 3



"From 2005 to 2009 we reduced our energy consumption by 22 per cent."

– Jerry Larson

Purchasing and planning activities – saving money by doing it right from the start

During purchasing of electrical equipment, planning activities or renovation work you have the greatest opportunity to influence energy consumption. The additional cost of buying slightly more expensive but more energy-efficient equipment will pay for itself several times over during the life cycle of the equipment. The Programme for Improving Energy Efficiency Act for energy-intensive enterprises includes specific requirements for the purchase of electrical equipment, and for planning activities, modification and renovation work. The basic idea behind these requirements described in the act is to highlight the cost of energy and its impact on the total cost of equipment, viewed over the equipment's life cycle. During the first programme period, companies have saved 174 GWh by following improved procedures when undertaking planning activities, modifications and renovations. Through improved procedures for the purchase of electrical equipment, they have saved 36 GWh.

Energy already at the conceptual stage

INTERVIEW WITH PIA LINDSTRÖM,
BOLIDEN AB

A new concentrating plant for Aitik mine was placed closer to the storage area but further away from the mine. "It was a decision that was influenced by energy use," says Pia Lindstrom, environmental manager for the business area mines at Boliden AB. More energy is required to pump waste than to move the ore. Boliden is participating in PFE and is already focusing on taking into consideration the energy issues at the conceptual stage of planning procedures. We compare various designs, techniques and proposals and place great emphasis on how energy efficient the solution becomes.

"Even before we purchase a single machine, we compare the life cycle costs (LCC), i.e. what a pump costs when it is first purchased and how much energy it consumes throughout its projected life cycle," says Pia Lindstrom. The annual electricity



savings due to new routines when project planning and purchasing is estimated at 10,900 MWh. ■

READ THE FULL INTERVIEW AT:
www.swedishenergyagency.se

Years 3–5

- Implement the EnMS
- Apply procedures
- Implement measures



PFE's recipe for success

The key to PFE's success lies in the fact that the programme adopts a holistic approach to energy matters. The factors that have led to PFE's success can be summarised as follows:

- The programme helps businesses to focus on energy issues*
- The energy issue rises to a higher status in the organisation*
- The systematic working method provides results in both the short and the long term*
- Suppliers are involved via procurement procedures*
- The methodology helps to create and disseminate knowledge*
- The programme establishes a network of companies which learn from each other*
- The tax reduction will result in increased profitability and reduced risks*
- The Swedish Energy Agency establishes the agenda for the work and the regulatory requirements motivate the company's personnel and management*
- The implemented energy efficiency measures are profitable and make businesses more competitive*

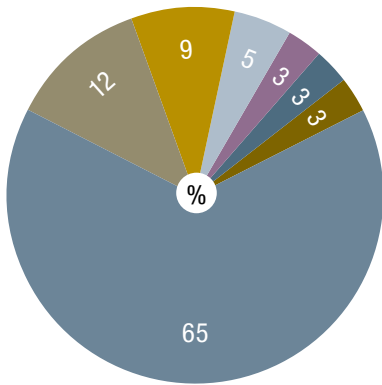
Companies are making fantastic progress – results from the first period

During the first period, PFE companies have achieved electricity efficiency improvements of 1.45 TWh annually. These measures alone are expected to generate savings of approximately 43 million Euro per year. In most cases, these measures are highly profitable and the average payback time is less than 1.5 years. The requirement of establishing an EnMS means that

companies need to look at the possibility of employing all types of energy efficiency measures and measures to mitigate CO₂ emissions, not just electricity efficiency improvement measures. The majority of companies have also carried out energy efficiency improvement measures, for example steam and fuel efficiency improvements. Broken down into the participating

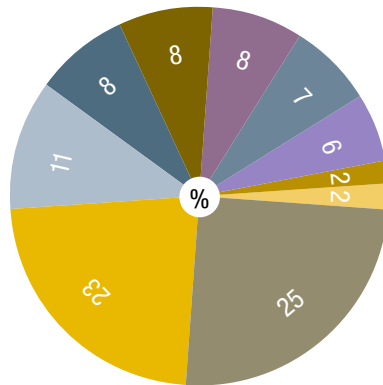
industries, the pulp and paper industry accounts for the vast majority of the efficiency improvements. But it is also the sector that uses the most electricity, approximately 23 TWh per year. The chart below shows how the total improvements in electricity efficiency in PFE are distributed among the various sectors of industry.

Total electrical efficiency improvements by sector



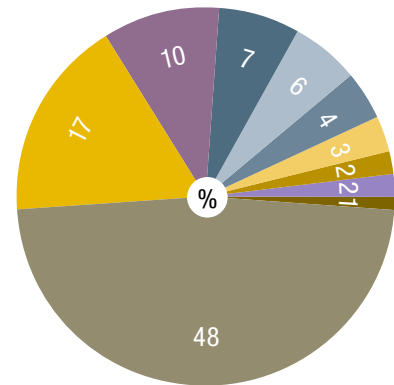
- 65% Pulp and paper
- 12% Mining and ore processing
- 9% Plastics and chemicals
- 5% Steel and metal production
- 3% Other
- 3% Food and beverage production
- 3% Sawmills and wood products

Number of electricity efficiency improvement measures divided into different categories



- 25% Production process
- 23% Pump systems
- 11% Electrical motors
- 8% Compressed air systems
- 8% Lighting
- 8% Other
- 7% Fan systems
- 6% Premises and ventilation
- 2% Cooling systems
- 2% Vacuum systems

Total electricity efficiency improvements organised by category



- 48% Production process
- 17% Pump systems
- 10% Other
- 7% Compressed air systems
- 6% Electrical motors
- 4% Fan systems
- 3% Vacuum systems
- 2% Cooling systems
- 2% Premises and ventilation
- 1% Lighting

Every little helps...

The greatest number of electricity efficiency improvement measures have been implemented in various auxiliary systems, such as pumping systems, electric motors, fan systems and lighting. The chart above shows the distribution of the number of measures per type of measure. If we instead look at the extent of the efficiency improvements that have been achieved through the more efficient

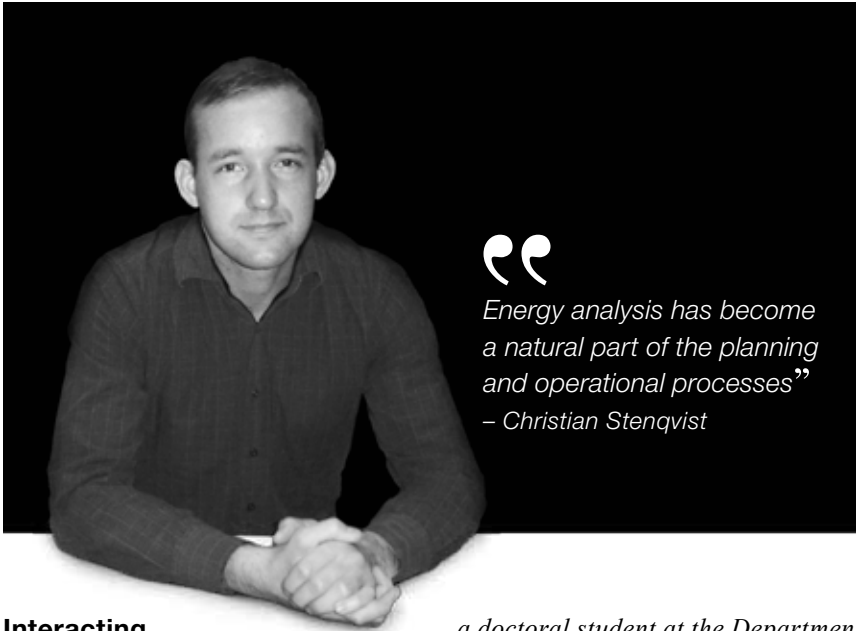
use of electricity we will see that the measures implemented within the production process often involve greater efficiencies than measures within auxiliary systems. Twenty-five per cent of the measures took place within the production processes, but they account for almost half (48 per cent) of the achieved electricity efficiency improvements. Divided into industrial sectors, the largest investments have been made

in the pulp and paper industry, followed by the iron and steel industry.

READ MORE ABOUT THE RESULTS AT:
www.swedishenergyagency.se

Year 5 Final report to the Swedish Energy Agency

- Measures implemented
- Effect of procedures
- Fulfilment of objectives



Energy analysis has become a natural part of the planning and operational processes”
– Christian Stenqvist

Interacting factors fortunate for PFE

INTERVIEW WITH CHRISTIAN STENQVIST

“The success of PFE is due to several factors,” says Christian Stenqvist,

a doctoral student at the Department Environmental and Energy Systems at Lund’s Technical University. “The tax reduction was an important incentive, as well as the legal requirements for

the EnMS and the measures that were taken; this placed a clear focus on improvements in energy efficiency. Together, this was a successful combination. My studies show that this kind of all-encompassing package of measures are needed to achieve society’s goals for energy efficiency. “PFE has exceeded its expectations”, he continued, “because when energy management forms a part of a company’s business practices, we discovered more ways of saving energy compared with what we originally foresaw or could expected. Energy analysis has become a natural part of our planning and operational processes.” ■

READ THE ENTIRE INTERVIEW AT:
www.swedishenergyagency.se



Did you know that:

...the programme’s companies together use 30 TWh of electricity per year. This represents one fifth of the total consumption in Sweden and half of what industry uses.

...the 100 companies have implemented and reported 1,247 efficiency measures.

...30 percent of PFE companies belong to the category of small to medium-sized businesses.

What happens now?

In 2009, PFE’s second programme period started. Companies that previously participated in the programme are in a position to participate in another programme period. New companies can apply to the programme, however, but there are specific conditions that must be fulfilled. Are you interested? Contact the Swedish Energy Agency, via info.pfe@energimyndigheten.se, for more information.



Valuable tips for energy efficiency improvements in industry

This brochure gives you a presentation of the first, successful, period of the PFE. You will receive more information about the constituent programme components, such as the energy review, the EnMS and the procedures for purchasing and planning activities. The publication also includes short interviews with some of the companies participating in the programme. The interviews describe how and why companies have been so successful in their streamlining efforts. See also PFE's success formula summarised in points. Finally, we present the excellent results achieved so far by the companies together.

The publication is aimed primarily at those who form a part of the energy-intensive manufacturing industries in Sweden, whether your company participates in PFE or not. It is addressed primarily to managers and those who are responsible for energy issues, but many other individuals will also be influenced by it and hopefully other industries will also be inspired.

More information about the PFE is available at:
www.swedishenergyagency.se



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