

<b>Setting</b>	
Country	Sweden
Location	Alby, Alingsås, Arendal, Arninge/Täby, Aspabruk, Avesta, Avesta-Krylbo, Bengtsfors, Billesholm, Bjurholm, Bohus, Bolidenområdet,, Skellefteå, Norsjö och Malå, Borlänge, Bottnaryd, Boxholm, Brålanda (Dalsland), Bygdsiljum, Bålsta, Degerfors, Degerhamn, Enköping, Eskilstuna, Eslöv, Fagersta, Falkenberg, Filipstad, Finspång, Fjälkinge, Forshaga, Frövi, Gamleby, Garpenbergsgruvan, Hedemora kommun, Gränge, Grums, Gusum (Programstart 2006), Gällivare, Gästrike-Hammarby, Gävle, Göteborg, Götene, Hallsberg, Hallstavik, Halmstad, Heby, Helsingborg, Hultsfred (Programstart 2006), Husum, Hyltebruk, Hägersten, Härnösand, Höganäs, Iggesund, Jämsjö, Jönköping, Kalmar, Karlsborgsverken, Karlshamn, Karlstad, Katrineholm, Kiruna, Kisa, Klintehamn, Knivsta, Kopparfors Sågverk i Norrsundet, Kramfors, Kristianstad, Kristinehamn, Kumla, Kvibille, Kvillefors, Kvänum, Kåge, Köping, Landskrona, Lidköping, Lilla Edet, Lingsheds sågverk utanför Svärdsjö, Linköping, Ljusne, Luleå, Lycksele, Långasjö, Malmberget, Malmö, Mariestad, Mora, Munkfors, Mönsterås, Mörrum, Nordmaling, Norrköping, Norrsundet, Nossebro, Nyby, Nyby, Torshällan Nyköping, Nymölla, Nöbbelöv, Obbola, Orrefors, Ostvik, Oxelösund, Paul, Perstorp, Piteå, Ramkvilla, Ronneby, Rotebro, Rottneros, Rundvik, Sala, Sandarne, Sandviken, Skara, Skellefteå, Skoghäll, Skutskär, Skänninge, Skärblacka, Skövde, Slite, Smedjebacken, Stenungsund, Stockholm, Stockholm (Programstart 2006), Stockvik, Strängnäs, Ställdalen, Sundsvall, Surahammar, Svappavaara, Sveg, Säffle, Sälen, Sävar, Söderhamn, Södertälje, Sölvesborg, Timrå, Torsås, Traryd, Trelleborg, Tumba, Tärnsjö, Uddevalla, Umeå, Uppsala, Utansjö, Waggeryd, Vallvik, Vargön, Vemdalen, Vilhelmina, Vimmerby, Visby, Väja, Vännäs (Programstart 2005), Värö, Väröbacka, Västerås, Västra Frölunda, Växjö, Ystad, Åhus, Åmotfors, Åre, Åsens bruk (Programstart 2006), Älvdalen, Äppelbo, Örebro, Örnköldsvik, Östavall
Project start date	2004 (unless Programstart 2006)
Project end date	2009
Technology keywords	Electrical, Energy management
Host sector	Energy intensive industry

<b>Technical summary of the project</b>
<b>Objective of the project</b>
<p>The 1 July 2004 the tax on electricity for the processing industry was raised from 0 to 0.5 öre/kWh (0.50 Euro/Mwh). However, by participating in a program for energy efficiency, companies can get exempted from the tax.</p> <p>Swedish companies belonging to energy intensive industries can therefore apply to the PFE program which is five years long. Work must be performed in a structured manner and measures should be taken to increase energy efficiency.</p> <p>The objective of the program is to contribute to an economically and environmentally sustainable energy system in which the industry has a central role. Through the program companies lower their energy cost, the employees gain knowledge about energy efficiency and the environmental impacts are reduced.</p>

### Project description

There are 110 companies that together consume more than 30 TWh<sub>el</sub> per year participating in the program. This corresponds to more than a fifth of all electricity consumed in Sweden. The participating companies belong to the pulp and paper industry, the mining industry, iron and steel industry, the chemical industry etc.

The Swedish Energy Agency decides if a company that has applied to the program can participate or not. One out of two criteria must be met:

1. The cost of bought and produced energy in the company must amount to at least 3 percent of the production value.
2. The company's taxes on energy CO<sub>2</sub> and sulphur must amount to at least 0.5 percent of the company's value added.

A company can participate in the PFE program with the whole company or with just one part of the company that is energy intensive and is run independently with its own means. It is also possible to participate with several facilities with the same corporate identity number, separately and collaterally during the same program period.



*Figure 1: Holmens paper mill in Braviken is one of 110 companies that participates in PFE. Photo: Suzanne Durkfelt*

During the first two years the company should:

- Get certified according to a standardized energy management system. Since 2003 there is a Swedish standard for energy management. There is also a Danish standard and from 2009 a European standard (EM 16001).
- Perform an inventory and analysis, deeper than the one described in the standard for energy management. The inventory and analysis are conducted to help the company become aware of needs and find suggestions on measures and investments that can make the electricity consumption more effective. The company should make a list of the measures to be implemented in the following years. These will have a shorter payback time than three years. The list is submitted to the Energy Agency.
- Establish a routine for the purchase of power intensive equipment. When new equipment is purchased the company must to a higher degree choose energy-efficient products.
- Establish a routine for planning of development projects and restoration. As early as possible, the company must analyze and evaluate the impact of alternative choices for the company's energy use.

During the next three years the company should:

- Implement the actions in the list submitted to the Energy Agency;
- Continue to apply the introduced energy management system and procedures for purchasing and planning;
- Demonstrate the impacts of the purchasing routines in the company,
- Assess the impacts of the routine for planning.

The measures to be implemented during the program period shall correspond to the same level of electricity efficiency that the participating company would have achieved if it instead had paid the tax on electricity that it has the possibility to be released from as a result of the participation in PFE.

Measures with a payback period longer than three years do not have to be implemented unless it is required for the company to reach the energy efficiency that the company would have implemented if subjected to the tax.

### *Environmental and social benefits*

(Estimate of) Greenhouse Gases abated (in metric tons of CO<sub>2</sub>-equivalent)

#### The climate effects of electrical efficiency improvement

The efficiency improvement program helps to reduce environmental and climate effects as a result of the efficiency in the use of electricity achieved by the participating companies. However, attempting to quantify the climate benefit is not entirely straightforward. The effect of electricity use on the climate is disputed, and is dependent on various factors, including where the system boundaries are set and whether a short term or long term time perspective is being used. However, employing a marginal approach indicates that a reduction in electricity use should result in a marginal reduction of the amount of electricity used in total. If we assume that the marginal electricity would have been produced in a coal fired power station in Denmark or Finland, a reduction in electricity use results in a corresponding simultaneous reduction of CO<sub>2</sub> emissions in our neighboring states. 1 MWh of electricity from a coal fired power station is equivalent to a CO<sub>2</sub> emission of 0.5- 1 ton. The companies in the PFE have hitherto indicated electricity savings amounting to 1 TWh per year which, in accordance with the marginal calculation approach described above, would result in an annual reduction in CO<sub>2</sub> emissions of 0.5-1 million tons per year.

In addition to reductions in CO<sub>2</sub> emissions, there will also be reductions in NO<sub>x</sub> and SO<sub>2</sub> emissions from cold condensing power stations. In addition, many companies will carry out improvement measures in respect of energy carriers other than electricity, such as in connection with improving the efficiency of use of fuels or heating, which will also reduce the overall environmental impact.

<b>Number of reduction units</b> (EAU, CER, ERU, AAU)	
<b>Socio-economic aspects</b> What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?	Through the program companies lower their energy cost, the employees gain knowledge about energy efficiency and the environmental impacts are reduced.
<b>Methodology used</b> (if applicable: approved baseline methodology or study done - refer to this; and monitoring organisation)	NA

<i>Economic data</i>	
Investment	1 billion SEK ≈ 95 million Euros
Financing scheme	<p>The measures are estimated to bring nearly 1 TWh of electricity savings, which with an electricity price of around 50 öre / kWh (0.5 Euro/MWh) gives savings of close to 500 million kronor per year (50 million Euros). The average payback period for the actions is 2 years.</p> <p>The companies have had some costs to participate in the program, for example in carrying out energy surveys or the introduction of energy management system.</p> <p>In addition to savings from the reduced electricity costs, the companies also get a tax credit of around 150 million SEK (14 million Euros) per year by participating in the PFE.</p>
Financing organisation (if third party)	NA

<i>Project developer</i>	
Name of the project developer	The Swedish Energy Agency
E-mail and/or web address	<a href="mailto:karolina.petersson@energimyndigheten.se">karolina.petersson@energimyndigheten.se</a> <a href="http://www.energimyndigheten.se">http://www.energimyndigheten.se</a>
Contact person	Karolina Petersson

<i>Host organisation</i>	
Name of Host organisation	<p>Aahus Karlshamn AB</p> <p>AB Dahréntråd</p> <p>AB Sandvik Materials Technology</p> <p>AGA AB</p> <p>Ahlstrom Stålldalen AB</p> <p>Air Liquide Gas AB</p> <p>Akzo Nobel Functional chemicals AB</p> <p>Akzo Nobel Rexolin AB</p> <p>Arizona Chemical AB</p> <p>Arla Foods AB</p> <p>BBA Fiberweb Sweden AB</p> <p>Billerud AB Gruvöns Bruk</p> <p>Billerud Karlsborg AB</p> <p>Billerud Skärblacka AB</p> <p>Boliden Mineral AB</p> <p>Boliden Mineral AB Aitikgruvan</p> <p>Boliden Mineral AB Rönnskärsverken</p> <p>BooForssjö AB Forssjö</p> <p>BooForssjö AB Hjortkvarn</p> <p>Borealis AB</p>

Bäckhammars Bruk AB  
Cascades Djupafors AB  
Cementa AB  
Crane AB  
Domsjö Fabriker AB  
EKA Chemicals AB  
Fagersta Stainless AB  
Freudenberg Household Products AB  
Graphic Packaging International Sweden AB  
Grycksbo AB  
Gyproc AB  
Holmen Paper AB  
Hydro Polymers AB  
Härjedalens Miljöbränsle AB  
Höganäs AB  
Iggesund Paperboard AB  
Holmen Timber AB Iggesunds Sågverk  
Imerys Mineral AB  
Smurfit Kappa Kraftliner Piteå AB  
Kemira Kemi AB  
Korsnäs AB  
Korsnäs Frövi AB  
Lantmännen Agroetanol AB  
Lantmännen Färskebröd AB  
LKAB  
Lyckeby Culinar AB  
Martinsons Såg AB  
Masonite AB  
Metsä Tissue AB  
Mondi Packaging Dynäs AB  
M-real Sverige AB  
Munksjö Aspa Bruk AB  
Munksjö Paper AB  
N.K. Lundströms Trävaror AB  
Nordic Paper Seffle AB  
Norra Skogsägarna  
Norrskog Wood Products AB  
Nova Innovene Sweden AB  
Outokumpu Nordic Brass AB  
Outokumpu Stainless AB  
Ovako Bar AB

Perstorp Specialty Chemicals AB  
Pilkington Floatglas Aktiebolag  
Reppe AB  
Rexam Petainer Lidköping AB  
RexCell Tissue & Airlaid AB  
Rottneros Rockhammar AB  
Rågsvedens Såg AB  
Saint-Gobain Isover AB  
Sapa Heat Transfer AB  
SCA BioNorr AB  
SCA Graphic Sundsvall AB  
SCA Hygiene Products AB  
SCA Packaging Munksund AB  
SCA Packaging Obbola AB  
SCA Timber AB  
Siljan Timber AB  
SKF Mekan AB  
SkiStar Aktiebolag  
Stora Enso Hylte AB  
Stora Enso Kvarnsveden AB  
Stora Enso Nymölla AB  
Stora Enso Pulp AB  
Stora Enso Pulp AB  
Stora Enso Skoghall AB  
Stora Enso Skoghall AB  
Stora Enso Timber  
Stora Enso Fors AB Fors  
Stora Enso Fors AB  
Swedish Tissue AB  
Swedspan AB  
Svenska Lantmännen Ekonomisk Förening  
Sveriges Stärkelseproducenter  
Södra Cell AB  
Södra Timber AB Långasjö  
Södra Timber AB Värö  
Södra Timber AB Ramkvilla  
Södra Timber AB Unnefors  
Södra Timber AB Mönsterås,  
Södra Timber AB Orrefors  
Södra Timber AB Torsås, Torsås  
Södra Timber AB Traryd,

	Södra Timber AB Kinda Utansjö Bruk AB Waggeryd Cell AB Wallmarks Såg AB Vallviks Bruk AB Wasabröd AB Wedde Sveg Timber AB Viking Malt AB V&S Vin & Sprit AB Yara AB Åmotfors Bruk AB
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<b>Technology provider</b>	
Name of Technology provider	Over 900 energy efficiency measures were taken.
E-mail and/or web address	NA
Contact person	NA

### **Additional Information**

Project Web site:

<http://www.energimyndigheten.se/sv/Foretag/Energieffektivisering-i-foretag/PFE/>