

Focus on

energy efficiency

Stora Enso established new targets in 2004 for the efficient production and use of energy. This will contribute to Stora Enso's ongoing work to combat climate change.



The Energy 2005 project will reduce Skoghall Mill's CO₂ emissions by 170 000 tonnes a year.

In November 2004 the Sustainability Committee resolved that developments in energy efficiency should be monitored through two quantitative measures:

1. Efficiency in energy production is measured through the power to heat ratio, which shows how much electricity is produced in relation to the total amount of heat energy generated.
2. The proportion of pulp, paper and board mills assessed through energy efficiency reviews shows how well mills have been making continuous efforts to identify the potential for cutting energy consumption. The target is to ensure that all mills go through energy efficiency reviews at least once in a two-year cycle.

More electricity compared to heat

The figures for the year 2004 will be the baseline for these new targets. The overall power to heat ratio for energy produced in the Group's combined heat and power facilities was 18% in 2004.

Modern Combined Heat and Power production schemes (CHP) generally have a very high total efficiency rate compared to separate power and heat production processes.

Several measures undertaken in 2004 will affect this ratio in 2005, including most significantly the ongoing construction of a new boiler at **Skoghall Mill**. The mill's current power to heat ratio is 11%, but this will rise to 20% when the new power plant starts up. The new plant will also increase the share of bio-fuels, by replacing fossil fuels.

Overall energy efficiency is strengthened by the fact that altogether 11 Stora Enso mills deliver surplus heat to nearby communities in the form of district heating.

Details matter in energy audits

When it comes to energy efficiency audits, Stora Enso already has a long track record. During the period 2000–2002, all European mills went through audits at least once. Stora Enso North America has completed its third annual round of energy efficiency audits at each mill. The energy audits conducted in North America have identified more efficient ways to produce and utilise steam, opportunities to reduce the amounts of fresh water infiltrating processes, and state-of-the-art technologies for reducing the amounts of electricity consumed in large electric motors and for lighting large areas.

One important element of the new approach is that all audits have to lead to an action plan, whose implementation is to be monitored.

In particular the Fine Paper division has carried out systematic energy efficiency reviews. A pilot project started during December 2004 at **Veitsiluoto Mill** sets a good example concerning how energy efficiency can be enhanced in an integrated sawmill, pulp and paper production facility. Such integration means that internal energy flows can be efficiently used, although it also increases the complexity of the whole set-up. The pilot project at Veitsiluoto involves process and production workers, as well as energy specialists. This holistic approach also encompasses the role of product mix and interruptions in production.

Stora Enso's **Pulp Competence Centre** has meanwhile initiated a new round of energy audits in all 15 pulp mills (including Sunila Oy, an associated company), with the first pilot at **Kemijärvi Pulp Mill** commencing in autumn 2004.

Bright ideas cut energy bills in North America

For the second year running, Stora Enso has provided capital to fund innovative energy conservation and greenhouse gas emissions reduction projects in North America. These projects will share a total of USD 1 million in implementation funds, and will create annual energy savings amounting to nearly USD 1.8 million.

The combined thermal energy savings from these projects would provide enough heat annually for about 2 500 homes in Wisconsin's climate, and enough electricity to power more than 1 000 homes each year. At the same time, the combined reduction in coal, natural gas, and power consumption translates into a projected reduction of more than 22 000 tonnes of CO₂ emissions a year. These projects are also expected to reduce water consumption by at least 552 000 m³ per year.

Milestones in emissions trading

- 1997 EU CO₂ emission reduction targets set at country level
- 2004 Mill-specific allocations derived from National Allocation Plans in 25 EU member states
- 2005 Emissions trading starts in the EU on a trial basis
- 2008–2012 First Kyoto commitment period
- 2012– Post-Kyoto period

Preparing for emissions trading

Kyoto emissions trading officially starts in 2008, but the European Union has decided that it can already commence from the beginning of 2005. This has

meant a busy year during 2004 for Stora Enso in various countries where mills have been applying for emission permits and allowances.

Emissions trading is a corporate issue

Even though the targets to reduce greenhouse gases are country-specific, and allowance allocations are mill-specific, Stora Enso aims to optimise emission reductions at Group level in order to reach the most cost-efficient solutions. Emissions trading is to be handled in practice as follows:

Mills are responsible for:

- applying for CO₂ permits and allowances;
- monitoring CO₂ emissions and reporting third-party-verified figures to the authorities;
- surrendering CO₂ allowances.

Stora Enso Energy Services and Stora Enso Financial Services are responsible for:

- monitoring country-specific balances for Stora Enso mills;
- handling national and/or international emissions trading;
- hedging of future emission allowances.

In practical terms this means that each mill "owns" its CO₂ emissions and allowances. Where a mill achieves a positive or negative balance, the first step is to trade with other Stora Enso mills in the same country, at prices defined in the emissions trading markets. Sometimes it may also be feasible to trade nationally with external parties. Trade over national borders is also possible, but could increase bureaucracy and costs.

Trading in North America

The EU not the only region where Stora Enso is engaged in emissions trading. Stora Enso North America is an active charter member in the Chicago Climate Exchange (CCX) trading market, where

valuable experience has been gained in voluntary CO₂ emission reductions.

For 2003, Stora Enso North America's CO₂ reduction target was 1% below the baseline, which is defined as the average level of CO₂ emissions from 1998 to 2001. Results from 2003 show the division reduced its CO₂ emissions by about 8.75% or 154 208 tonnes compared to the baseline.

CCX aims to create an active market place to reduce the cost of carbon dioxide emission reductions. Stora Enso North America purchased 7 800 tonnes of CO₂ allowances in 2004, compared to purchases of 14 400 tonnes of CO₂ allowances in 2003. Stora Enso paid an average of USD 0.92/tonne of CO₂ in 2004.

Green trading based on bio-fuels

Due to the Group's very high level of bio-fuel utilisation, Stora Enso has been able to engage in green electricity and certificate markets for three years. In 2004 altogether 18 European mills have been involved in such trading.

Bio-fuel usage remains high

In 2004 the share of bio-fuels in the Group's own energy production was 62.5%, a slight increase from 61.5% in

2003. In absolute terms the total use of bio-fuels has increased by 6 000 TJ. The most important sources of bio-fuel are black liquor, bark and fibrous sludge.

Power plants under construction at **Skoghall Mill** and **Kvarnsveden Mill** will increase the share of bio-fuels. **Kabel Mill** and its local energy supplier have jointly built a new bio-fuel power plant, which started operations in December 2004 (see page 19).

Major investments are by no means the only way to increase the use of bio-fuels. Smaller steps also matter, particularly when they are continuous and systematic. At **Veitsiluoto Mill**, for instance, a new bark press was installed in 2004, improving the dry content and energy value of the bark bio-fuel. Bark and wood residual handling was also improved at **Celbi Mill**. At **Sachsen Mill** new equipment has been installed for storing and conveying substitute fuels that can be used instead of natural gas in the residue boiler.

In a large company like Stora Enso, it is also possible to channel bio-fuel to other units, if there is a surplus in one mill. A new example of such a scheme comes from **Oulu Mill**, which uses excess bark from **Kemijärvi Pulp Mill**.

Group target for sulphur dioxide

In 2004, Stora Enso set a Group-level environmental target to reduce SO₂ emissions by 15% per unit production of pulp, paper and board from 2004 levels by the end of 2009. To achieve this target, mills have to optimise their usage of fuels, adjust their process parameters, and increase their energy efficiency.

The other principle emissions to air from Stora Enso's operations are carbon dioxide, nitrogen oxides and particulates. These emissions are mostly generated during the burning of fossil fuels to produce power and steam for pulp or papermaking processes. Wherever possible, Stora Enso's mills use bio-fuels for energy production. Bio-fuels produce very low sulphur dioxide emissions, and also help to reduce greenhouse gas emissions from fossil fuels and conserve non-renewable fossil fuels.

Stora Enso mills widely utilise air pollution control technologies such as electrostatic precipitators to control particulate emissions, as well as state-of-the-art process controls designed to reduce emissions.

Electricity procurement and consumption in 2004

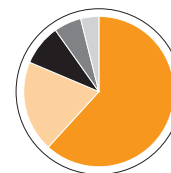
TWh	Finland	Sweden	Europe ¹⁾	North America	Asia	Total
Group resources ²⁾						
CHP	4.0	1.1	1.8	1.0	0.03	7.9
Hydropower	0.4	0	0	0.2	0	0.6
Nuclear power	1.3	0	0	0	0	1.3
Other sources	0.8	0	0	0	0	0.8
Subtotal	6.4	1.1	1.8	1.2	0	10.5
External purchasing ³⁾	2.3	5.1	3.9	3.8	0.1	15.1
Total procurement	8.7	6.2	5.7	5.0	0.1	25.7
Stora Enso mill consumption	8.3	6.2	5.0	4.8	0.12	24.4
External sales	0.4	0.04	0.6	0.14	0	1.2

¹⁾ Excluding Finland and Sweden

²⁾ Group resources = resources owned directly or indirectly by Stora Enso

³⁾ External purchasing = routine purchases of electricity from local grid

Total consumption of fuel in energy production in 2004, TJ



● Bio-fuels.....	63% (61%)
○ Gas.....	19% (20%)
● Coal.....	9% (9%)
● Oil.....	6% (6%)
○ Peat.....	3% (4%)
Total 221 400 TJ	

Bio-fuels already account for some 63% of Stora Enso's total annual fuel consumption of 221 400 TJ (215 300 TJ in 2003). Combined heat and power production covers 32% of the Group's total electricity consumption of 24.4 TWh.

