

MAY 2007

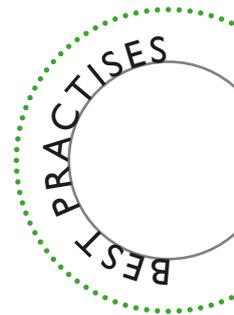
FACTS

on environmental protection

Cost-efficient control of NO_x emissions from energy production

NO_x emissions deriving from energy production constitute significant environmental and health problems. With a new combustion technique, NO_x emissions from large combustion plants can be reduced at considerably less cost than by methods based on flue gas cleaning.

PHOTO: FORTUM



Reducing NO_x emissions from energy production

Apart from traffic and industrial processes, energy production is the main source of nitrogen oxide, or NO_x emissions. An obstacle to reducing emissions is the continuous growth of energy consumption. For example, in Finland, specific air emissions from electricity generation have fallen since the 1970's, but total emissions have not, since electricity generation and consumption have quadrupled during the same time*.

Because the burning of fossil fuels by power plants will continue to play a key role in energy production in many industrial and developing countries for decades to come, technological solutions are needed to reduce their specific air emissions. Low-NO_x combustion techniques provide an innovative and cost-efficient solution.

The amount of NO_x emissions from energy production are influenced by combustion techniques and conditions, as well as by the properties of the fuel burned. NO_x emissions can, therefore, in principle, be reduced by methods based on both combustion technologies and flue gas cleaning**.

THE CHALLENGE

* Source: Adato Energia. 2005. Sähköntuotanto ja ulkomaankauppa (Electricity production and foreign trade). URL: <http://www.energia.fi/en>
Reference 18.01.2005. Data only to the beginning of 2000.

** Selective Catalytic Reduction = SCR





THE SOLUTION

Since the 1990's, the development of low-NOx combustion techniques has been encouraged both by national limits introduced for NOx emissions and by EU directives, such as the LCP Directive from the year 2001. The Directive sets progressively tightening limits on NOx emissions from large power plants, to be reached by the year 2016.

Economical low-NOx combustion technology for solid fuels

Fortum has launched a completely redesigned high-temperature combustion technology for reducing the NOx compounds produced by large combustion plants. An added advantage of the low-NOx burners is an optimal combustion process, which means that only a small amount

of fuel is left unburned and the risk of boiler corrosion is significantly reduced.

With the new combustion technology, it is possible to cut NOx emissions far more cost-effectively than before: compared with catalytic emissions control technologies, the overall costs may be as much as 70% less. The technology developed can be used in both coal- and peat-fired power plants, as well as in plants burning lignite and biofuels.

Fortum's low-NOx combustion technology is already in use in various parts of the world. In Europe, it has been sold to about 40 plants in countries including Finland, Sweden, Romania, the Czech Republic and Poland. The technology has proved a cost-efficient way of meeting the emissions limits required by law, while at the same time improvements have been found in efficiency and safety.

Power through cooperation

At the beginning of the 1990's, Fortum, at that time known as IVO, made a strategic and financial decision to begin developing the technology that was seen as essential for meeting future emissions limits.

The technology was developed in close cooperation with Babcock-Hitachi, an international pioneer that had learned the hard way, by experience with Japan's strict emissions limits, and a Finnish partner with the necessary top-level expertise in mathematical modelling, the Technical Research Centre of Finland, VTT. Investments from the public sector, e.g. in the form of national technology programmes, played an important role in promoting the consistency and continuity of the R&D work.

The more advanced modelling techniques, made possible by exponential growth in computer-aided calculation capacity during the past few years, have significantly contributed to the testing and rollout of the technology. Cooperation with a Japanese partner operating in the global market has not only brought synergy benefits for both companies' product development, but it has also opened the partners' marketing networks to each other. Another factor of vital importance for ultimate success on the market was the opportunity to develop the technology in cooperation with future customers.

THE LCP DIRECTIVE

Both existing and new combustion plants and gas turbines in the EU, with a rated thermal input of 50 MW or higher, are subject to the LCP Directive. The Directive, which limits emissions of certain pollutants from large combustion plants, was brought into force in Finland in 2002 by the Government's LCP Decree, which defines limit values for these plants. The objective is to reduce sulphur dioxide, nitrogen oxide and particulate emissions.

The LCP Directive sets emission limits that become progressively tighter. From 2008 on, the NOx limit value for >500 MWth plants burning solid fuels will be 500 mg/Nm³, and from the year 2016 it will be 200 mg/Nm³.

The costs for meeting the emission limits that come into force in 2016 will be very high for European power plants. The required level can be reached by flue gas cleaning, but the investment costs would in many cases be prohibitive.

THE SUCCESS FACTORS

THE COMPANY

Fortum is a leading energy sector group operating in the Nordic and Baltic countries. The group's operations include electricity and heat generation, sale and distribution, power plant operation and maintenance services, and other energy-related services.

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