

Environmental and Social Report FeF Chemicals 2003



# FeF Chemicals – a specialist company

**FeF Chemicals is a small chemical company that is 100% owned by Novo Nordisk A/S, the company's largest customer. FeF Chemicals has 75 employees, mostly working in production or on analysis and quality assurance, both of which are closely linked with production.**

**F**eF is located in Ølsemagle Lyng about 5 km north of Køge in Roskilde County. The site occupies about 90,000 m<sup>2</sup>. To the east, the site borders a lagoon facing Køge Bay, which has been designated a valuable nature area. South of the site, there is an industrial and residential area. North of the site, there is a furniture business with living quarters, and north of this more industry. Københavnsvej passes to the west, and west of this is an old residential neighbourhood.

FeF is situated in an area with special drinking water interests, which means that there is a particular focus on protecting the groundwater against pollution.

FeF's main activities are the production of quaternary ammonium compounds, which are used for disinfecting or as auxiliaries in the pharmaceutical industry. The products are renowned for their high quality and sold throughout the world.

FeF's most important secondary activities are the manufacture of products for the medical and veterinary industries. For the medical industry, we supply substituted silica gel for recovering organic substances, and purified enzyme for use in the production of pharmaceutical products. We mainly supply to Novo Nordisk.

In addition to water and energy, we use a range of chemical substances in the form of amines, chlorinated and bromated organic substances, organic solvents, and other chemical auxiliaries. We also use cardboard and plastic packaging for our products.

The main environmental impacts are atmospheric emissions

of organic solvents from drying processes, and carbon dioxide, sulphur dioxide and nitrogen oxides from energy production. We discharge wastewater in the form of process wastewater, which is piped to Køge Local Wastewater Treatment Plant, and in the form of cooling water, which is discharged after use directly into Køge Bay. Finally, we have solid waste, which is disposed of in accordance with Køge Municipality's waste regulations.

FeF's management system is a combined system for both quality and the environment. Environmental management applies to both health & safety and the external environment, and covers all production processes and departments at FeF. The Quality and Environmental Management System meets the requirements of the Good Manufacturing Practice Guide for Bulk Pharmaceutical Excipients, ISO 9001, ISO 14001, and the Danish Chemical Industry Federation's Responsible Care programme, which is an environmental and health & safety code for the chemical industry. Through Novo Nordisk A/S, FeF also supports the ICC International Business Charter for Sustainable Development.

All FeF's production plants etc are covered by environmental approvals that set limits for our impact on the surrounding environment.

#### Contact:

Søren Damtoft  
CEO  
sdam@novonordisk.com  
+45 5667 1003



Our employees regard FeF Chemicals as a nice, safe place to work. In 2003 the new canteen (above right) was opened to the benefit of the canteen staff's working environment, and to the delight of employees.



# Systematised environmental and social responsibility

**In 2003 we acquired a new CEO, focused on optimisations, and made real progress in systematising our work on environmental and social responsibility. This report has been prepared on the basis of employee interviews and explains how we at FeF worked on environmental and social responsibility in 2003. Once again we are proud of our efforts, and we plan to continue in the same vein in the coming years.**

**O**n September 1, 2003 Søren Damtoft became CEO of FeF when Preben Engelund Poulsen retired after 17 years in the position. Prior to this appointment, Damtoft was vice president for development and has worked at FeF for 16 years. FeF has an Environmental Policy that obliges us to promote environmental awareness, prevent pollution, and continuously improve our environmental performance. We carry out environmental assessments of all new activities, and set targets relating to our main environmental issues. Since 2002 we have also had a system for evaluating the environmental and social performance of our suppliers. This evaluation is based on questionnaires.

Employees are involved in environmental work in various ways, and we are continuously working to make our management system part of our everyday working life. We have implemented action plans for the focus areas that we identified when assessing our environmental impacts. As well as the Environment Department, employees in other departments are involved in local environmental projects. Meetings are held in connection with environmental assessment so that employees are aware of the environmental impacts of their specific work.

Employees continuously come up with ideas for environment-improving initiatives, which are recorded in our system and subsequently evaluated.

### Annual environmental targets

In 2002 we set 14 environmental targets for 2003, ten of which we achieved, two of which we partly achieved, and two of which we failed to achieve. We have begun initiatives extending into 2004 to fully achieve the four last-mentioned targets.

FeF's total water consumption fell by 19% compared to 2002. This was due primarily to better possibilities for regulating water consumption for cooling. The lower water consumption can also be seen in the total wastewater discharge from FeF, which was reduced by 20%.

Overall energy consumption (electricity and natural gas) showed an increase of 10% compared to 2002. This was due to increased activities resulting from the commissioning of a new plant at the end of 2002.

The total quantity of waste increased by 14%. This was due primarily to waste from various building works. We have be-

come better at collecting cardboard for recycling, and have installed an extra container for this waste.

Total acetone emissions into the air fell by 59%. This was due partly to lower acetone losses per kilogram of produced product, and partly to the fact that we produced a smaller quantity of crystalline quaternary ammonium compounds. The method of calculating air emissions also entails a degree of uncertainty.

Emissions of ozone-depleting substances fell by 72%. In 2003 we introduced biannual servicing of our cooling machines, even though the legal requirement is only once annually.

We had no problems with noise, dust or odour (apart from the single noise complaint mentioned below) because wherever possible the processes are carried out in closed systems.

### Breaches and complaints

We had no regulatory breaches of limit values, but unfortunately two accidental releases of coolant as a result of leaks. The cooling machines were subsequently inspected and repaired.

In 2003 we received a complaint from our neighbours for the first time in seven years. The complaint concerned noise from an alarm that was accidentally triggered due to a frost-eroded valve. This 'false alarm' caused a nuisance to our neighbours.

### Focus on optimisation produces results

In 2003 we focused in particular on optimising one of our production processes and simplifying our working procedures. And this produced results. We have cancelled the plans to build another processing plant for purifying enzymes, which would have been ready for operation in 2005. Instead, the process in the existing plant has been improved so that we can produce much more than previously with the same quantity of water and energy. At the same time, we have saved the costs of the planned expansion.

### Systematised health & safety

Health & safety is high on our agenda, and we have been working intensively in this area for a number of years. In 2002, health & safety was integrated into our Quality and Environmental Management System, although the health & safety component is not certified. Last year we drew up a Health & Safety Policy, and set out objectives, targets and action plans to ensure that



FeF's CEO as of 1 September 2003: Søren Damtoft.

we meet our responsibilities in being a safe workplace for our employees.

With the introduction of our Quality and Environmental Management System, we developed a combined 'inforeport system'. This electronic database records non-conformities and suggestions for changes. The system is accessible for all employees and gives a current overview of the status of tasks in the three areas.

In order that all employees are aware of the health & safety risks associated with their work, we carry out routine workplace assessments (WAs) and draw up workplace instructions. The greatest risk at FeF is in handling chemicals, and we have drawn up a separate chemical WA that covers procedures for spills and injuries. At the end of the year, the Working Environment Service carried out a tailored inspection of FeF and categorised us as a Level 1 company. This recognition shows that our work on quality, external environment and health & safety as an integrated system is functioning well.

#### **Follow-up on health & safety targets**

Unfortunately, we failed to achieve last year's target that the frequency of absence resulting from occupational injuries should not exceed 0.02%. A twisted knee resulted in nine days off work for one employee. We are pleased that the few other injuries sustained during the year did not result in absence from work. This shows that our continuous focus on health & safety is producing results.

#### **Cooperation promotes innovation**

As one of the world's leading companies in products for recovering pharmaceutical substances, it is vital that we are able to keep pace with development and be innovative. We can do this best

by working with different stakeholders. Within Novo Nordisk we enjoy priceless cooperation with the departments that use our products. Among external stakeholders we have worked with Risø and the Biotechnological Institute, and we routinely swap experiences with national and international researchers.

#### **Transport**

Internal transport at the site is very limited, comprising just one forklift. We have no influence on the choice of transport when shipping products from the site since this is determined by our customers' wishes. We are working on a project to get larger tanks for raw materials and to install another tank for organic waste so that we are able to receive and ship out larger quantities and thus save on transport. The project is expected to be implemented in 2004.

#### **Future targets**

For the first time since 1995, 2003 was a year with no new building work. In 2004 we will begin building again – a laboratory and a warehouse. We have become better at consulting environmental and safety representatives from the early planning phase when carrying out new building work.

Our Quality and Environmental Management System, together with the new Health & Safety Policy, has really systematised our work on environmental and social responsibility. Employees are experiencing these areas as an integrated part of their everyday working lives, and it is natural for us to continue in the same vein in the coming years.

In 2004 we will be focusing among other things on monitoring methyl bromide and investigating emergency stops, gas alarms etc, in all plants. We will also be investigating the possibility of certifying our health & safety work.

# A positive and safe workplace

**In order to attract and retain the best employees, it is paramount that we can offer them more than just the expected. We are a chemical company, and we therefore have a constant focus on health & safety. We are also working to maintain and foster a positive culture so that employees perceive the workplace as a pleasant place to be.**



As already mentioned, we have a Health & Safety Policy and through our Quality and Environmental Management System, health & safety is an integral part of our daily working life. The introduction of the Health & Safety Policy emphasises that we will be continuing to place high requirements on ourselves in future. In 2003 we also set out five objectives on which our future health & safety targets are based:

- To prevent occupational injuries.
- To prevent major accidents.
- To ensure that everyone at FeF acts appropriately in the event of an accident.
- To optimise the Safety Organisation.
- To carry out statutory workplace assessments.

We examine our health & safety duties and action plans at the meetings of the Safety Committee. In this way we regularly monitor whether we are meeting the targets that we set.

### **Optimisation of the Safety Organisation**

Our Safety Organisation consists of a Safety Committee with a safety manager, a daily safety leader and four safety groups.

Previously we had two safety groups covering laboratories/offices/canteen and production/workshops/warehouses respectively. In order to optimise health & safety work, we have now expanded to four safety groups covering laboratories, offices/canteen, production/workshops, and production/warehouses respectively. This means that the individual safety representatives have become more visible to employees, and that there is more time for discussion. In 2004 we are planning to submit a questionnaire to employees to hear their opinions on the effect of the expanded Safety Organisation.

As well as the annual safety rounds, the safety representatives regularly carry out informal rounds where, among other things, they discuss near-misses with employees. Any near-

misses are reported in the inforeport system, and employees can use this system to monitor developments in cases. The regular contact with the safety representatives and the transparency of the inforeport system ensure that employees feel that their health & safety is being taken seriously.

### **Near-misses**

A permanent focus area in our health & safety work is near-misses. We stress that all employees must report any near-misses. The latest near-misses are discussed at department meetings. If we have a near-miss in one plant/department, we ensure that changes are also made in other plants/departments where the same near-miss might occur. In 2003 we had nine near-misses, including an inappropriate placing of a steam valve, a burst hose on a filling machine, and a case of hand eczema apparently due to product oversensitivity.

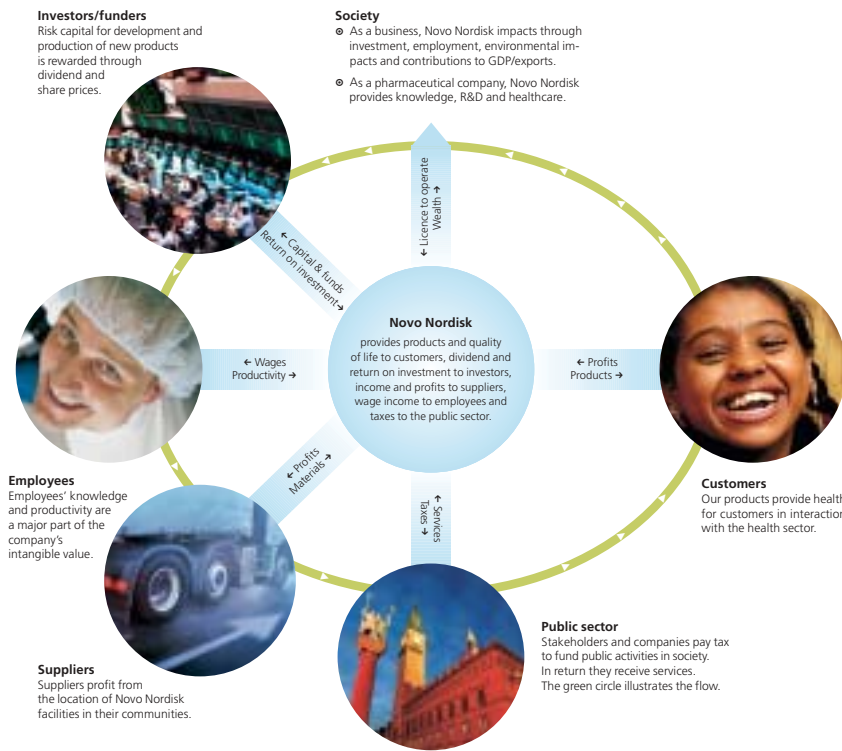
### **Quick action**

For a number of years we have been working determinedly to make health & safety a fully integrated part of the everyday working life of employees. And this work has borne fruit. As mentioned earlier, in 2003 we had only one case of absence from work as a result of an occupational injury. The other two injuries did not result in absence – primarily because our employees have become good at acting quickly and correctly in the event of an accident.

One of the injuries occurred when a process operator got amine in the eyes as a result of a leaky seal. The operator was wearing safety goggles, but the product still managed to get behind the goggles. Both the operator and other employees responded quickly to the injury. The eyes were rinsed, and an ambulance was called immediately. While the foreman accompanied the operator to hospital, the workshop manager shut off the pressure in the reactor so that no further releases could occur. Subsequently, this type of seal was replaced on all reac- →

## Socio-economic contribution

FeF Chemicals' operations in Køge create jobs for our employees, at suppliers, shopkeepers and in the public sector. In 2002, our overall socio-economic contribution in Greater Copenhagen can be set at 136 jobs<sup>1)</sup>. The chart below provides an overview of the interaction between key stakeholders, with detailed focus on employees, suppliers and the public sector.



### Employees

FeF employees (70 in 2002) account for less than 1% of Køge Municipality's jobs. 87 of Novo Nordisk's employees live in Køge Municipality, 23 of whom work for FeF. Employees pay around DKK 2.6m in tax to the municipalities in which they live, of which DKK 3.2m is income tax to Køge Municipality<sup>1)</sup>. Their private consumption contributes to some 16 further jobs in the region, 2 of these in Køge Municipality. They also contribute property taxes etc, and the remainder of their income tax that goes to the state.

### Suppliers

FeF is estimated to create the basis for 6 jobs locally, and 50 jobs overall in Greater Copenhagen. These jobs are estimated to contribute municipal income tax of around DKK 1.1m in the region<sup>1)</sup>, of which DKK 0.1m is to Køge Municipality. Additionally, income tax is paid to the state.

### The public sector

The company, our own employees and local suppliers' employees pay taxes to the municipality<sup>1)</sup> totalling around DKK 4.6m. However, the contribution to the municipality is only DKK 1.7m because equalisation systems would compensate for the lower tax revenue if these citizens and companies did not live or carry on business in the municipality. Novo Nordisk pays around 13% of the company tax to the municipalities, and DKK 0.6m in energy and environmental taxes to the state (62%) and municipality (38%).

1) The socio-economic contributions of jobs and taxes are based on assumptions for local purchase habits and multipliers for Greater Copenhagen. Income and tax payments are reduced by the income and taxes that these persons would otherwise have; calculated here as unemployment benefit. All data are from 2002.

### DOORS OPEN TO THE LOCAL COMMUNITY

Jørn Rasmussen, master builder and member of Køge Business Council

"My image of FeF is positive because of the openness and friendliness that the employees have shown me. But most Køge citizens only know FeF as the white buildings with the blue edges, and this is a shame," says Jørn Rasmussen.

"When I had to arrange a meeting a few years ago for the local Rotary Club, I approached the former CEO to enquire about the possibility of a tour of the plant. Initially he was very sceptical, but finally invited us in. FeF thought that it was exciting to show the outside world what they did. I have since been praised for helping to open the doors a little.

"FeF has become much more visible in



Jørn Rasmussen is delighted with the excellent cooperation between FeF and local business.

the local community in recent years and among other things has taken part in the Køge Business Committee's project 'the inclusive labour market'. Together with nine other local companies, FeF tried to get people who for one reason or another had been out of the labour market for a

while into work again in the local community. During the running of the project FeF took on one employee who was subsequently taken on full-time. The project has been so successful that a centre has been set up, JobØst, covering four municipalities. The project finished at the end of 2003, with JobØst taking over its role. In 2004 we are launching an integration project at national level that I would really like FeF to take part in. We will have to see what happens.

"FeF uses almost exclusively local labour, and we are a group of skilled manual workers that over the years has worked together at FeF. This model benefits both FeF and local skilled manual workers since it ensures a high service level from both sides. In the final analysis, good cooperation is based on loyalty and mutual trust," concludes Jørn Rasmussen.

→ tors in the plants so that the accident cannot be repeated. The situation is a good example of employees acting quickly and effectively when an accident happens. This also meant that the operator was able to return to work the very next day.

### Replacement of a carcinogenic substance

In our development laboratory we have for a number of years been using methylene chloride, which is used in the analysis of insulin recovery at Novo Nordisk. We only use a small amount of the substance, but it passes through many hands on a daily basis. There is a suspicion that the substance may be carcinogenic, and so we decided to work to have it replaced. It is a long road from the decision being taken to a replacement being made. Preliminary trials indicated the possibility of finding a substance with properties that matched the existing substance. The new substance, tetrahydropyran, was tested to ensure that it is just as effective as the former substance. We have had positive feedback from nine out of ten customers and are working to ensure that everyone is satisfied.

### A positive company culture

When new employees start at FeF, they are often surprised at the positive company culture that they find. We are a relatively small workplace where everyone knows each other, and this is probably one of the reasons why employees experience the workplace as a pleasant place to be.

We have a low employee turnover and an average length of service of ten years. In general, employees leave the company because they are retiring. Furthermore, nearly every day we receive unsolicited applications from people who want to work for us.

### Employee development

In order to attract and retain employees, it is important that they feel that they can develop in their work. As in the rest of

the Novo Nordisk Group, we conduct annual development interviews with employees. We have a training database in which we record all information on training possibilities. We also record employee requests for further training. At the development interviews we then follow up on whether the employees have been on the courses that they requested. Although we are still not able to compile statistical reports on course participation, we can see that the requested courses are being attended in most cases.

Again in 2003 our PC scheme for hourly-paid workers, who make up about one quarter of the staff, was a success. FeF makes a computer available to employees who wish to take part in a PC course. Last year we had a PC training room fitted out where up to six employees can take part in IT courses. Here our employees are instructed in general software packages such as Outlook, and the room is also used to provide training in the special document management systems that we use in our quality management.

### Health & safety targets 2004

- Absence from work as a result of occupational injuries to not exceed 0.02%.
- Improve monitoring of methyl bromide and handling of leaky cylinders.
- Ensure that all emergency stops in our plants are functioning optimally.
- Ensure that plants/departments are optimally separated through the sewage system.
- All employees to be trained in emergency plans and fire-fighting.

Social data							
Our employees	1999	2000	2001	2002	2003	Development in % 2002-2003	
Total number of employees	51	56	62	70	75	7	
Number of full-time employees	50	54	61	68	69	1	
Number of part-time employees	1	2	1	2	6	200	
Average age distribution (years)	43	43.4	43.7	43.7	43.3	-1	
Average years of service	10.8	11.0	11.0	10.4	9.7	-7	
Rate of employee turnover (%)	6.0	1.8	1.7	1.5	4.1		
Job functions and gender representation	Number of employees				2003		
Administration	8				50%	50%	Female Male
Research and Development	9				67%	33%	
Production	37				16%	84%	
Quality control	16				88%	13%	
Sales, Marketing and Distribution	4				25%	75%	
Other job functions	1				100%	0%	
<i>Of the total number of employees:</i>							
Vice presidents/senior principal scientists	1				0%	100%	
Managers/principal scientists	4				0%	100%	
Occupational injuries	1999	2000	2001	2002	2003	Development in % 2002-2003	
Frequency of occupational injuries	0	0	10.1	17.9	8.3	-54	
Number of occupational injuries with absence	0	0	1	2	1	-50	



**EMPLOYEES' ASSOCIATION**

Numerous activities within 'The Fan'

Relations between employees play an important role in creating and maintaining a pleasant workplace. Once again there has been great support for the social activities of FeF's employees' association, The Fan, including a ski trip to Isaberg for the whole family, a visit to Køge Skitsesamling art museum for the exhibition of Bjørn Nørgaard's work, and a lecture by theology student Dan Petersen on his experiences during the two years that he lived among the Afghan rebels. The Fan offers subsidies for participation in sporting events, including the DHL relay race, the Tøserunden cycling tour, and company volleyball and badminton meets. The annual summer party was held at Ledreborg Palace and offered activities such as archery and clay pigeon shooting in the park, wine tasting in the cellar, and a banquet in the banquet hall.

**NEW HORIZONS**

Alternative department meetings provide inspiration

In order to inspire one another some employees took the initiative of two alternative department meetings. The Development Department took part in a presentation on 'top-class motivation' arranged by the Danish Technological Institute. Similarly, the analysis laboratory arranged an event starting with a department lunch and followed by teambuilding on a Viking ship in Roskilde Fjord. Everyone had to help to row the ship – keeping stroke of course.

**HEALTH**

Health check at the workplace

Every two years all employees are offered a health examination, which is carried out by the Occupational Health Service (OHS). In 2003 75% of employees took up the offer and had their hearing, lung capacity and blood pressure checked. Employees were also checked for blood sugar in their urine due to the general increase in the number of people with diabetes. In recent years Novo Nordisk has increased its focus on employee health, and FeF has arranged for all employees to have a piece of fruit each day.

**WELL KNOWN IN KØGE**

Involvement in the local community

We are involved in the local community, and in 2003 we once again took part in Køge County's 'the inclusive labour market' project. This went so well that at the end of the year we took on a full-time

employee from the project. We have a representative in the Køge Training and Development Forum (KUUF), which among other things helps to consolidate Køge's position as a training town. Finally, we contributed to Køge's Entrepreneur Prize.



There is mutual benefit when we take part in Køge Municipality's business projects.



**WORLD DIABETES DAY**

Exercise for Indian diabetes clinic

It is a tradition at Novo Nordisk that employees take part in a jog-a-thon on 14 November, World Diabetes Day. The employees pay a small sum to take part, and Novo Nordisk gives an amount for each kilometre that the employees complete. At FeF you could

choose to run, walk or power walk. An aerobics instructor took charge of the general warm-up and gave instructions in power walking. In all, 56 employees took part and helped to raise funds for a diabetes clinic in Chennai in India. As well as the run, employees had the opportunity to have their blood sugar measured, and the canteen served a healthy, tasty Indian menu in honour of the day.

# New initiatives and continued focus on the environment

**The work leading up to ISO 14001 certification meant that all employees were involved in environmental work – and this is still the case. The commitment of the employees has been one of the driving forces behind the environmental initiatives that we have taken.**

**O**ur work on environmental management goes back to the middle of the 1990s, when we took part in Roskilde County's pilot project on environmental management. We have come a long way since then. Through the years the environment has become an integral part of our work and an essential part of our considerations when launching large projects. In follow-up to our certification, every year we are audited by Dansk Standard. In 2003 we received a single comment, but no non-conformities. The comment was that we had drums containing water on which the original content's hazard marking had not been deleted – and this was a fault. Despite this, we are proud of the result and take it as an affirmation that the environmental management system has been extremely well integrated into the company.

### Greater reduction in acetone than expected

Our greatest environmental impact is in the form of emissions of acetone from the production of crystalline quaternary ammonium compounds. One of our environmental targets for 2003 was to reduce consumption of acetone per kg product. A number of initiatives in this area proved to have an even greater effect than anticipated. Consumption in 2003 was reduced from 53 g to 46 g acetone per kg product, which was an improvement of 13% compared to 2002.

One of the new initiatives that has contributed to the high reduction in acetone emissions is a refitting of our system for recovering used acetone. We have modified the pipework, reduced the number of freestanding acetone tanks, and installed a buried, double-walled tank with automatic vacuum monitoring. The refitting has helped to improve both the external environment

and health & safety, on the one hand because reduced pumping results in fewer emissions, and on the other as a result of more space around the plant.

As part of the project we have also renovated the tanks and improved the seals and compression glands. The bottom of the tank pit has been given a new surface treatment, which has improved the protection of the external environment. Finally, we have replaced an old drying step in the production plant, which has significantly reduced acetone emissions in the production room.

As well as emissions of acetone, the main air emissions are methylene chloride from the production of genabilic acid, and carbon dioxide and nitrogen oxides from the burning of natural gas to produce steam for production purposes.

### Examples of cleaner technology

FeF uses a number of traditional production technologies and processes in chemical synthesis. We are trying to limit the impact on the environment as much as possible, for example by using the 'best available technology' both in connection with the design and setting up of new equipment and plants, and in connection with ongoing improvements in the existing production processes. There are numerous examples of this:

- ◉ We recover organic solvents by distillation.
- ◉ We have designed and installed a new drying plant for use in the production of crystalline quaternary ammonium compounds, which has reduced acetone emissions and brought a number of health & safety benefits.
- ◉ We recover heat from the ventilation systems in our newer plants.



Our environmental work concerns preventing pollution of our surroundings. This is achieved in cooperation between our management, the Environment Department and other employees, the authorities, suppliers and our neighbours. Cooperation and dialogue are important when it comes to requirements for measurements (below left), the setting up of voluntary groundwater monitoring (above left), approaches from neighbours – for example the incident of the ‘false’ alarm (above right) – or the development of our products at the instigation of employees and suppliers (below right).



- ● We recycle empty raw material packaging as sales packaging for technical products.
- We have optimised the enzyme purification process so that more enzyme can be recovered with the same raw material and energy consumption.

### Optimisation of electricity consumption

One of our environmental targets for 2003 was to optimise our electricity consumption through electricity-saving initiatives in existing production processes and new plants using environmentally appropriate planning. In planning our new laboratory and warehouse building we have also strived to optimise electricity consumption as far as possible. In 2003, two process technology students from laboratory science college drew up an energy balance for our central cooling system as part of their thesis work. Their report makes a number of suggestions for improvement that we will be working to implement in 2004.

We also decided to focus on electricity components that consume more than 15,000 kWh annually, which is equivalent to 1% of our total electricity consumption. We therefore took stock of a reactor that produces liquid quaternary ammonium compounds. We discussed how we could reduce the agitation speed without affecting the quality of the product. The change proposal was noted in our inforeport system, and subsequently we reduced the agitation speed by ten revolutions per minute. After ten trials – and close cooperation between the Environment Department, process operators and the Analysis Department – the change became a reality, without any compromise on quality. Our original target was to reduce electricity consumption from 400 kW per batch to 350 kW per batch. We actually achieved a saving of 225 kWh per batch, since after the reduction we were down to 175 kW per batch. In a normal year this will save us 14,000 kWh.

### Mapping steam consumption

In 2003 we carried out detailed mapping of our steam consumption. The first phase of the project focused on finding savings by looking at where steam is used and assessing whether the consumption is reasonable. We managed to complete the extensive measurements in 2003, and we now have a large amount of data that has to be analysed. We can already see that this will lead to a number of suggestions for improvement that we will be implementing in 2004.

### New preventive programme

Environmental mapping in 1988 and 1989 established pollution of soil and groundwater beneath FeF. The pollution, caused by our own production processes and degreasing activities carried out by a previous neighbouring firm, involves organic substances, including pesticides, chlorinated and bromated solvents and their breakdown products. Pollution with copper, bromide and bromate was found.

Since 1992, Roskilde County has prescribed a combined preventive and monitoring programme for FeF to reduce the pollution and stop it spreading. This is being done by pumping large amounts of water from the polluted groundwater reservoir and control measurements. Up to 2003 the authorities laid down a requirement for an annual water recovery of 60,000–120,000

m<sup>3</sup>. Changes in the soil pollution legislation from 1999 and changes in water recovery drillings have meant that the programme has been discontinued. We have established that the programme partly achieved its goal since the pollution has not spread to neighbouring plots or the underlying soil layers. However, we have also found that there has been no fall in the concentration of the polluting substances.

In conjunction with Roskilde County and an external consultancy firm, we are in the process of setting up a voluntary preventive and monitoring programme, which is expected to be implemented in 2004.

### Reduction of wastewater

FeF's production gives rise to wastewater in the form of process wastewater and cooling water. We also discharge sanitary wastewater and rainwater from outdoor areas impervious to water.

The process wastewater is collected in three wastewater tanks, where it is pH-neutralised, analysed for content of quaternary ammonium compounds, and pollution-assessed before discharge to the municipal sewage system – Køge Local Wastewater Treatment Plant.

The water from preventive drillings, which is used to cool reaction tanks etc, is discharged directly to Køge Bay together with any rainwater from outdoor areas impervious to water. Rainwater from storage yards for raw materials and products is collected in a retention basin to ensure that it is not discharged if there has been a spill at the site. The water is analysed for pH and content of quaternary ammonium compounds. The water is approved when the above analyses show that it does not contain chemical spills, and then discharged into Køge Bay.

Measurements of the wastewater discharged to Køge Local Wastewater Treatment Plant and Køge Bay show that we are observing the requirements of our wastewater permits by a good margin.

In 2003 the quantity of wastewater discharged from FeF into Køge Bay again fell, with a reduction of around 20% compared to 2002. This reduction was primarily due to the fall in water recovery resulting from the achievement of our target for water savings in the environmental action plan.

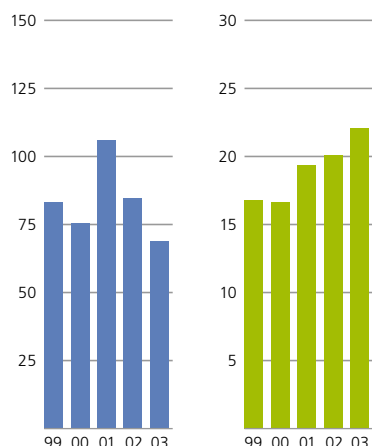
### New wastewater guideline tested at FeF

In 2002 the Danish Environmental Protection Agency drew up a new wastewater guideline, and Køge Municipality has carried out detailed testing of the guideline in conjunction with FeF. This work required extensive resources in 2003.

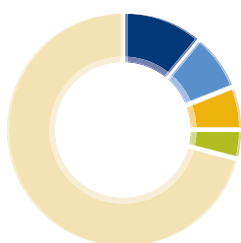
As part of the process, we had to describe the production processes for our various products. In so doing, we surveyed the wastewater-generating processes within production and identified the raw materials and auxiliaries that are involved. The wastewater guideline categorises all organic substances into A-, B- and C-substances according to their environmental hazardousness. A-substances are designated as unwanted in wastewater, the presence of B-substances should be minimised as far as possible, and the hazardousness of C-substances is so low that it does not necessitate limit values for their presence in wastewater, although they should still be minimised.

The purpose of the survey was to identify which hazardous →

Water and energy consumption  
1,000 m<sup>3</sup>      1,000 GJ



Breakdown of energy sources 2003



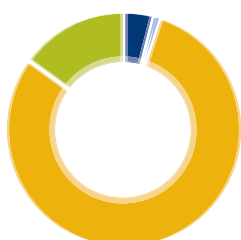
- Electricity: coal 11%
- Electricity: oil 8%
- Electricity: natural gas 6%
- Electricity: biomass and waste 4%
- Heat and steam: natural gas 71%

Breakdown of raw materials 2003



- Organic chemical compounds 41%
- Organic solvents 12%
- Other auxiliaries 47%

Waste disposal 2003



- Incineration 4%
- Landfill 1%
- Controlled destruction 80%
- Recycling 15%

#### DO-IT-YOURSELF

### Exemption streamlines waste transport

In 2003 we applied for and obtained exemption from using the municipal collection scheme for hazardous waste. The exemption means that we can now send all hazardous waste directly to Kommunekemi in Nyborg, which has meant a considerable streamlining of our waste transport. We have access to a database via Kommunekemi's website from which we can issue pre-completed declarations and labels with bar coding. Whereas previously we had to write the declaration numbers in oil paint on the drums, we now simply affix the labels. The new system, which has been free of running-in problems, has made the work easier for both our own and Kommunekemi's employees. Furthermore, we are saving around DKK 300,000 annually.



#### TIPS ON SAVING

### Regulation of cooling saves water

In connection with the mapping of environmental impacts, one of our operators noted that we use a lot of water to cool our reactors etc in production. As a consequence we have now installed regulating valves and water meters in four plants. A series of tests has subsequently shown

that the cooling effect is the same even if the water quantity is reduced. And the effect is huge; we can already see from the statistics that we are saving on our consumption of cooling water. In 2003 groundwater recovery totalled 68,000 m<sup>3</sup>, which was a fall from 84,000 m<sup>3</sup> in 2002. In the environmental action plan for 2003 we set the target of recovering a maximum of 75,000 m<sup>3</sup>, so the target was achieved in fine style.



→ substances we carry in our wastewater. However, this required a comprehensive study since not all substances are listed in the guideline. All in all, it has been a long process because the workshop's chemicals also had to be included and assessed. On the other hand, we have now mapped the hazardous substances that end up in our wastewater. And this is an important basis for further work on reducing the discharge of these substances. We will complete the survey of our production in 2004.

### Improvement in waste management

FeF's production gives rise to various forms of waste. The waste can be divided into two main groups: non-hazardous waste and hazardous waste. As much waste as possible within each of these main groups is sorted for recycling. All waste is managed, transported and disposed of in accordance with Køge Municipality's industrial waste regulations.

Waste that is non-recyclable and non-hazardous is sent to Kara Incineration Plant in Roskilde if it is combustible or Kara Landfill Site in Roskilde if it is non-combustible. Hazardous waste is sent for treatment at Kommunekemi in Nyborg – with the exception of certain empty drums that are sent for recycling with the permission of Køge Municipality.

In 2003 our total quantity of waste increased by 14% compared to 2002. This was due primarily to building waste in the form of asphalt from the moving of our gate, waste from various excavation works, and a large quantity of organic waste from plant 10, which was commissioned at the end of 2002.

### First complaint in seven years

As a result of water in a valve, one of our manual alarms burst in frosty weather, triggering the alarm in the process. This happened on a Friday afternoon when there were no employees on hand to switch it off. Thus, although it was a 'false alarm', it was no less annoying for our neighbours. One neighbour phoned the police, who contacted the duty employee at FeF, who eventually switched off the alarm.

Most of our neighbours are private households. When you live next door to a chemical company it is only natural that an alarm can create insecurity. We therefore made communication



with our neighbours top priority. The following Monday we delivered a letter to all our neighbours apologising for the alarm and stressing that it had been triggered by mistake.

We have ensured that no water can get into the valve again in order to prevent the fault being repeated. Finally, we set up a sign at the gate with the telephone number of Novo Nordisk's alarm centre so that we can be informed more quickly if anything similar should happen again.

### Environmental targets 2004

- Total annual electricity consumption for the common glucol plant to be reduced by at least 10% (32,000 kWh) for the electricity consumers that were included in the environmental review 2001.
- Total annual steam consumption for selected processes to be calculated so that we can explain at least 75% of the steam consumption in the next environmental review that includes steam.
- Ensure that safety datasheets and workplace instructions for all hazardous substances and products are up to date, including information on the external environment.
- Survey at least one raw material for the possibility of increased utilisation.

## Statement by the authorities on the green accounts for FeF Chemicals in Køge

On 9 February 2004 Roskilde County received the green accounts for the 2003 accounting period. Pursuant to §35a of the Danish Environmental Protection Act and §12, paras 2, 3 and 6 of Statutory Order no. 594 of 5 July 2002 on the duty of certain listed activities to draw up green accounts, the County wishes to issue the following statement on the above green accounts.

### Statement on the green accounts

The County has no information on the company that differs from that provided in the accounts, and has no information on other major issues that, in the opinion of the County, should have been included.

In the 2003 accounting period Roskilde County received no complaints about the company.

### Basis for the statement

The County has read the company's green accounts for the 2003 accounting period and has taken its position on the accounts on the basis of the County's existing information on the company's environmental activities and the conditions laid down in the approvals. The assessment thus covers all the points that the County is required to comment on in accordance with the above Statutory Order.

## Environmental data for FeF Chemicals in Køge 1999–2003

	Method	Unit	1999	2000	2001	2002	2003
<b>Water</b>							
Water (total)	M	1,000 m <sup>3</sup>	84	76	106	85	<b>69</b>
Drinking water	M	1,000 m <sup>3</sup>	1	1	1	1	<b>1</b>
Other quality	M	1,000 m <sup>3</sup>	83	75	105	84	<b>68</b>
<b>Energy</b>							
Energy (total)	M	1,000 GJ	16	16	19	20	<b>22</b>
External (electricity)	M	1,000 GJ	4	4	5	6	<b>6</b>
Internal (subtotal)	M	1,000 GJ	12	12	14	14	<b>16</b>
Gasoil	M	1,000 GJ	10	10	2	0	<b>0</b>
Natural gas	M	1,000 GJ	2	2	12	14	<b>16</b>
<b>Materials</b>							
Materials (total)	M	tons	2,736	2,930	2,034	2,067	<b>2,317</b>
Raw materials	M	tons	2,650	2,830	1,953	1,986	<b>2,228</b>
Packaging materials	M	tons	86	100	81	81	<b>89</b>
<b>Products</b>							
Products (total)	M	tons	2,152	2,433	1,570	1,481	<b>1,745</b>
Quaternary ammonium compounds	M	tons	2,120	2,381	1,521	1,445	<b>1,701</b>
Other products	M	tons	32	52	49	36	<b>44</b>
<b>Wastewater</b>							
Volume	B	1,000 m <sup>3</sup>	91	71	109	94	<b>75</b>
Suspended solids	B	tons	0.2	1.0	0.5	0.3	<b>0.9</b>
COD	B	tons	17	18	16	23	<b>21</b>
Nitrogen	B	tons	0.05	0.04	0.02	0.02	<b>0.03</b>
Phosphorus	B	tons	–	–	0.5	0.3	<b>0.6</b>
<b>Waste</b>							
Waste (total)	M	tons	232	482	1,102	401	<b>459</b>
Incineration	M	tons	2	12	27	15	<b>16</b>
Landfill	M	tons	12	7	9	3	<b>4</b>
Controlled destruction	M	tons	190	346	337	337	<b>371</b>
Recycling (subtotal)	M	tons	28	117	729	46	<b>68</b>
Construction waste	M	tons	9	93	693	24	<b>43</b>
Electronic equipment	M	tons	0	0	0.4	0.3	<b>0</b>
Glass	M	tons	0	0	0.03	0.03	<b>0.03</b>
Chemicals	M	tons	–	–	–	–	<b>5</b>
Metals (incl. iron drums)	M	tons	15	22	33	19	<b>13</b>
Paper and cardboard	M	tons	4	2	3	3	<b>7</b>
<b>Emissions to air</b>							
Organic solvents	B	tons	28.7	17.8	11.2	12.9	<b>5.8</b>
Acetone	B	tons	28.1	17.5	10.7	12.2	<b>5.0</b>
Methylene chloride	B	tons	0.6	0.3	0.5	0.8	<b>0.8</b>
Ozone-depleting substances (total)	A	kg	63	14	57	71	<b>20</b>
Carbon dioxide (CO <sub>2</sub> )	A	tons	1,527	1,371	1,536	1,560	<b>1,710</b>
Sulphur dioxide (SO <sub>2</sub> )	A	tons	2.0	1.0	0.6	0.6	<b>0.6</b>
Nitrogen oxides (NO <sub>x</sub> )	A	tons	3	2	2	2	<b>2</b>
Flue gases	A	1,000 m <sup>3</sup>	–	–	–	3,233	<b>3,593</b>
<b>Environmental Impact Potentials</b>							
Global warming	A	tons CO <sub>2</sub> -eqv.	1,700	1,434	1,658	1,712	<b>1,760</b>
Ozone layer depletion	A	kg CFC <sub>11</sub> -eqv.	3	1	2	3	<b>1</b>
Acidification	A	tons SO <sub>2</sub> -eqv.	3	3	2	2	<b>2</b>
Eutrophication	A	tons NO <sub>3</sub> -eqv.	4	3	18	12	<b>24</b>
<b>Compliance and complaints</b>							
Breaches of regulatory limits	M		2	0	1	0	<b>0</b>
Regulatory limits with repeated breaches	M		0	0	0	0	<b>0</b>
Accidental releases	M		3	2	0	3	<b>2</b>
Complaints	M		0	0	0	0	<b>1</b>
<b>Stockpile of Ozone Layer-degrading Substances</b>							
CFC	A	kg	0	0	0	0	<b>0</b>
HCFC	A	kg	325	293	207	259	<b>282</b>
Methyl bromide	A	tons	32	43	40	30	<b>34</b>

In the 'Method' column, the following categories are used in accordance with the Danish Environmental Protection Agency's guideline on green accounts: Measured (M), Calculated (B) and Estimated (A).

Data in this report were included in the assurance engagement performed by Deloitte. The full Assurance Statement from Deloitte can be found on page 58 of Novo Nordisk's *Sustainability Report 2003*.

FeF Chemicals is a well-established company with more than 50 years' experience in fine chemicals. We have 75 employees and sell our products internationally. FeF Chemicals produces quaternary ammonium compounds, substituted silica gel for recovering organic substances, and purified enzyme. The products are used for disinfecting, as additives in cosmetics and pharmaceutical products, and as auxiliaries in the pharmaceutical industry. FeF Chemicals is 100% owned by Novo Nordisk A/S, which in turn is owned by Novo A/S – both are headquartered in Bagsværd, Denmark. Through this ownership we are committed to the integration of sustainable development into the management of our company. This is being done on the basis of the 'Charter' for companies in the Novo Group. We aim to be sustainable not only financially but also in terms of social and environmental responsibility. This report (including the annex) also constitutes the company's green accounts for 2003.



FeF Chemicals A/S  
Københavnsvej 216  
4600 Køge  
Denmark

Tel. +45 5667 1000  
Fax +45 5667 1001

CVR no. 13 24 61 49  
P no. 1.000.528.134

[fef-chem.com](http://fef-chem.com)

