

Environmental and Social Report Kalundborg 2003



Kalundborg – Novo Nordisk's largest production site

Novo Nordisk in Kalundborg is located in an industrial area on the outskirts of the town. The site for Novo Nordisk and Novozymes occupies 1,000,000 m², of which 120,000 m² is buildings. Novo Nordisk takes up about 60% of this area.

The site's nearest neighbours are a built-up area of low housing to the south, areas for industrial and agricultural purposes, and a green area that may not be built on. The areas around Hovvej/Holbækvej are intended for new industry. With 2,319 employees Novo Nordisk is a large workplace in Kalundborg, and it is important for the company to be involved in the local community. Thus, the head of Insulin Finished Goods Production, Lise-Lotte Petersen, is chairwoman of Kalundborg Regional Trade Council. We are also part of the Industrial Symbiosis project, and through this work closely with the region's other large companies, Kalundborg Municipality, and the neighbouring municipalities. Production is divided into three areas:

- Diabetes Bulk Production – DBP – produces insulin crystals for treating diabetes. Production comprises fermentation using genetically modified yeast cells, followed by a series of recovery and purification processes. We also produce glucagon in the same way for treating insulin shock.
- Insulin Finished Goods Production (Diabetes Pharmaceutical – DP) processes the insulin crystals into the final product, ie formulating, filling, inspecting, assembling, packing and shipping insulin products.
- Factor VII Bulk – Site FVII – produces Factor VII, which is the active substance in the blood preparation NovoSeven®. Production is based on culture using genetically modified mammal cells, followed by a series of recovery processes. The recovered product is sent for final processing and packing at Novo Nordisk's site in Gentofte.

The site also has laboratories, quality control, maintenance departments, a canteen, and administration, all of which are connected with the production areas.

Novo Nordisk uses large amounts of water and energy in its production. We also use a range of raw materials and auxil-

aries, of which the most important in terms of quantity is sugar- and protein-containing agricultural produce. The genetically modified microorganisms that we use in our fermentation are harmless to humans and the environment.

The main environmental impacts from Novo Nordisk's production are wastewater (which is treated in Novozymes' treatment plant on site), solid waste (which is disposed of in an environmentally appropriate manner), and air emissions of ethanol.

The three production areas operate in keeping with management systems that are quality- and environment-certified according to ISO 9001:2000 and ISO 14001.

Novo Nordisk in Kalundborg is covered by a general environmental approval and a range of secondary approvals. Some of the plants have also been granted a genetic engineering approval. All production plants are approved in accordance with the Danish Environmental Protection Act, and our genetically modified microorganisms are approved in accordance with the Danish Act on the Environment and Genetic Engineering. The environmental authority is West Zealand County, while the Danish Forest and Nature Agency is the authority for genetic engineering approvals and Kalundborg Municipality for solid waste and wastewater.

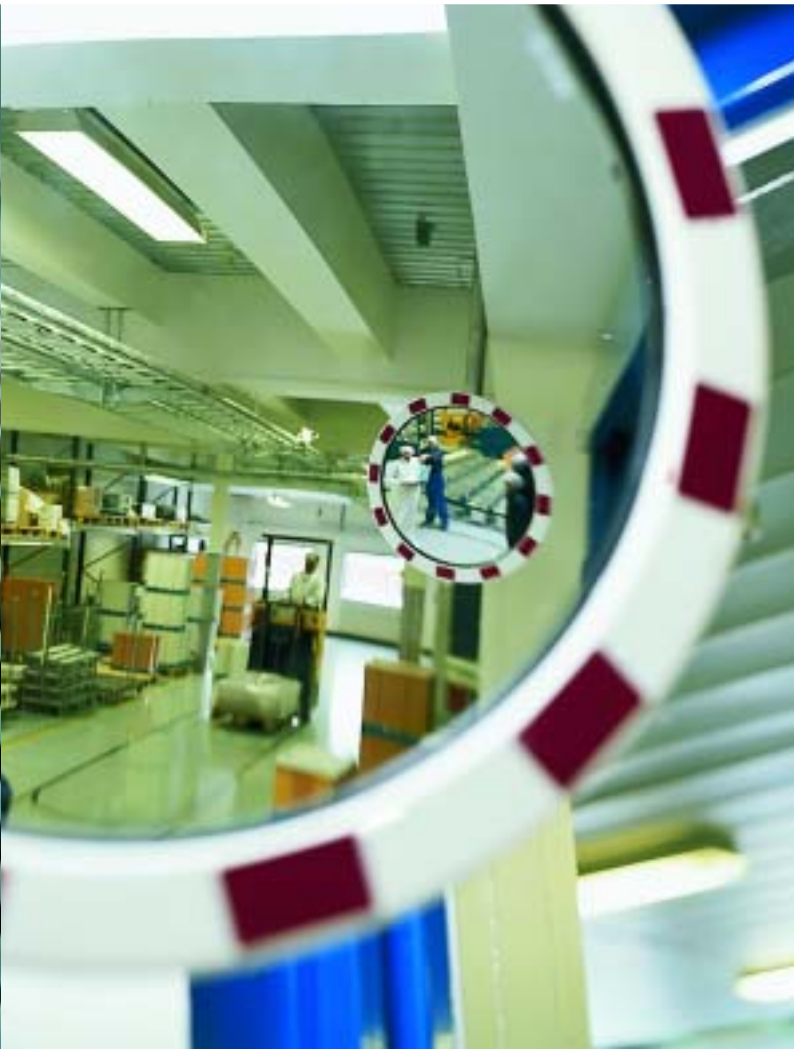
Contact:

Jesper Giede Bøving
Senior Vice President, Diabetes DBP
jgb@novonordisk.com
+45 4443 1483

Lise-Lotte Petersen
Vice President, DP
llp@novonordisk.com
+45 4443 9068



Novo Nordisk in Kalundborg is the company's largest production site, and it characterises us. The many complex processes necessitate continuous monitoring. This is done using advanced technology and our employees' persistence and hard work. This combination ensures effective, reliable production.



New plants and many targets achieved

The year 2003 was a busy year in which we focused keenly on costs and on increasing yield. It was also the year in which we celebrated the opening of the world's largest insulin plant, IBP (Insulin Bulk Production). On the same day we began work on the PIA II plant (Purification Insulin Analogue), which will purify the insulin product Levemir®.

In this report we discuss our social and environmental performance in 2003, which is of major importance for our employees and for relations with our suppliers, our neighbours, the local community, and the environmental authorities. In the social area we focused on issues that concern our employees' health, well-being and development, and on the targets that we had set for 2003. In the environmental area we focused on documenting that we are meeting the environmental requirements laid down by the authorities and in Novo Nordisk's own Environmental Policy, and on the targets that we had set for 2003.

Novo Nordisk's Environmental Policy 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 been systematically assessing the environmental and social performance of our suppliers. This assessment is based on questionnaires, and in 2004 the replies will form part of our auditing of selected suppliers.

Employees are involved in environmental work in various ways, and in 2003 we sought to make the Environmental Management System part of our everyday working life. We have implemented action plans for the focus areas that we identified when mapping our environmental impacts. As well as the environmental group, in which an environmental coordinator works with the environmental representatives from the departments, employees in the individual departments are involved in local environmental projects. There are ongoing training and promotional activities so that everyone is aware of the main environmental impacts of their work.

Annual targets for water and energy

All areas have set targets to reduce water and energy consumption measured in relation to the number of units produced. Site FVII and DBP both achieved their targets, and it should be highlighted that in 2003 DBP improved its resource efficiency by

16% for water and 45% for energy. Due to the running-in of new plants, DP unfortunately failed to achieve its stipulated targets for 2003. We hope and expect that 2004 will see a return to normal.

Major changes compared to 2002

In 2003 we commissioned new and expanded production plants, which meant greater resource consumption and increased discharges from our site in Kalundborg.

Compared to 2002 groundwater consumption rose by 27% and overall energy consumption by 10%. The consumption of steam from Asnæs Power Station for sterilising equipment and raw materials rose by 9% compared to 2002. The consumption of water from Lake Tissø rose by 84%, which was due to increased cooling requirements and the fact that some cooling systems switched from groundwater to lakewater. If we compare the water consumption with that in the Environmental Impact Assessment of 2001, it can be seen that the consumption in 2003 corresponds to that forecast for phase 1 of the expansion of the area.

In 2003 we used around 88,400 tons of raw materials and auxiliaries in production, an increase of 14% compared to 2002. More than three quarters of our raw materials is sugar- and protein-containing agricultural produce, and less than 1% of the total raw material consumption is substances that are harmful to the environment or health. We used around 1,200 tons of packaging, roughly the same as in 2002.

In 2003 we discharged a total of 1,308,000 m³ of wastewater from Novo Nordisk's site in Kalundborg, which was an increase of 40% compared to 2002.

In 2003 Novo Nordisk in Kalundborg generated a total of 9,544 tons of waste, an increase of 234% compared to 2002. This increase was primarily due to the fact that one of our new plants produces large amounts of organic solvents that cannot be recycled internally. Some of these waste streams were sent for destruction at Kommunekemi, while others were sent for external recycling as a carbon source in biogas plants and



The management team in Kalundborg: Jesper Giede Bøving and Lise-Lotte Petersen.

wastewater treatment plants. We are working towards a greater level of internal recycling and investigating alternatives to destruction.

Breaches and complaints

In 2003 we recorded two breaches of regulatory limit values. We also received two complaints. The first complaint was from the riding club located on the site and related to odour resulting from a short-term pressure compensation from an ammonia plant at the new insulin plant. The second complaint, from a recipient of our waste for incineration, related to insufficient waste sorting. We have increased our waste sorting to avoid any repeat. We had a target for 2003 of avoiding complaints resulting from abnormal operating situations or building work, and we achieved this.

Yield increase and ISO 14001 certification in Site FVII

The employees in the FVII plant have achieved something quite extraordinary. Over the last two years they have doubled the product quantity from production by streamlining working procedures. In spite of unusually high work pressure, we have not discontinued any operations. We have even loaned out employees to Hillerød and had employees from Hillerød here for training. In spite of how busy we are, it is of enormous value that we take time to swap experiences.

Additionally in 2003, the Factor VII plant was environmentally certified according to ISO 14001. The other areas in Kalundborg were environmentally certified in 2002.

Targets for social responsibility

In 2003 it was a common target at Novo Nordisk to carry out the electronic employee survey eVoice, which gauges the level of employee satisfaction. All departments in Kalundborg achieved this target, and the results were generally positive. However, the results were marked by the fact that the year's savings affected among other things the training budget, which meant that we had to cut back on external courses for employees. The survey also showed that employees are experiencing high levels of work stress. In DP we were granted extra

staffing resources. In DBP the start-up of IBP in particular has been demanding, which meant that late in the year a number of persons were released from the site's other plants to help ease the pressure in IBP. In Site FVII we were also extremely busy since our focus was optimum utilisation of production capacity, product release, and the work on ISO 14001 certification.

Another common target in 2003 was that 80% of all managers in Novo Nordisk, on a scale of 1 to 5, should achieve a score of 3 or above in the survey's questions on winning culture. And a third common target was that more than 80% of employees should be aware of the trends in customer complaints. We achieved both these targets.

Permanent focus on health & safety

Health & safety is an area that we are constantly seeking to improve. In DP and DBP we had set the target that for every occupational injury with absence we should record at least six near-misses, and we achieved this target. In Site FVII all employees have among other things studied a seven-point programme of the main health & safety areas in the department. Site FVII had no occupational injuries with absence in 2003.

As a result of this focused effort we succeeded in keeping the number of injuries with absence down to 30. This was an increase of just one compared to 2002, a modest increase in a year with so many new activities, plants and employees.

Future focus areas

Employees are experiencing health & safety and the environment as an integral part of their everyday working lives, and it is natural for us to continue in the same vein in the coming years.

As the largest resource consumer in Novo Nordisk, Kalundborg feels a natural responsibility to contribute to the development of the company's environmental work. In order to realise Novo Nordisk's environmental strategy for 2003–2008, environmental employees from DBP will be taking part in the development of a CO₂ strategy for Novo Nordisk, developing procedures for environmental management accounting, and taking an active part in improving the company's waste management.

Flexibility and prevention mean better working lives for many

The work on equal opportunities has begun and will continue in 2004. We are focusing on mapping and developing employee competences, and on developing internal training opportunities and new career paths. The health & safety work will increase its focus on stress prevention.

In all areas we are continuing our initiatives to create equal opportunities. In DBP we are now operating with the eighth team of apprentices in our project to train long-term unemployed people as medical operators through a combined training and practice course. The six-month training course is designed so that the apprentices do not require any further training to start at Novo Nordisk. There are many different profiles in these apprentices, who for one reason or another have become unemployed, and there are a lot of women in particular. The practical course gives us the opportunity to size up the apprentices, who themselves have the opportunity to try out the job – shift work can be tough on the body, and can be difficult to fit in with a family.

In 2003 both DBP and DP began initiatives aimed at New Danes, and these have been a great success. In DP we had ten trainee operators on a practical course, eight of whom were to be assessed as suitable for employment. We achieved this target. In DBP, six out of eight industrial operator trainees were offered employment. We are following up on this success with new teams. In DBP we have found that language skills can be the greatest barrier to integration, so we are now focusing on bringing in candidates for interview with a short, simple reading test first.

Unfortunately, Novo Nordisk Servicepartner (NNS) had to lay off a large number of employees in 2003. We undertook to offer jobs to some of these employees. This created a moral dilemma for us because we also wanted to offer employment to our apprentices and New Danes. The NNS employees, who will be starting in DBP, DP and FVII in 2004, will undergo medical operator training as part of their upgrading for new jobs. Retraining employees who have worked in cleaning for many years to work as eg filling operators is a major challenge for them, but we have no doubt that they will succeed given some collective help.

In DP and Site FVII we are continuing our cooperation with the Technical University of Denmark (DTU) in which we are offering two New Danes with a technical academic background a long-term internship. In future we would like to look more broadly at diversity in our employees, among other things in relation to their educational backgrounds. DBP also has a DTU student from Russia.

In the Factor VII plant we are working purposefully to employ people with non-Danish backgrounds. Provided there is a sufficient number of qualified applicants, 10% of those that come for interview should have non-Danish backgrounds.

Special consideration positions in DP

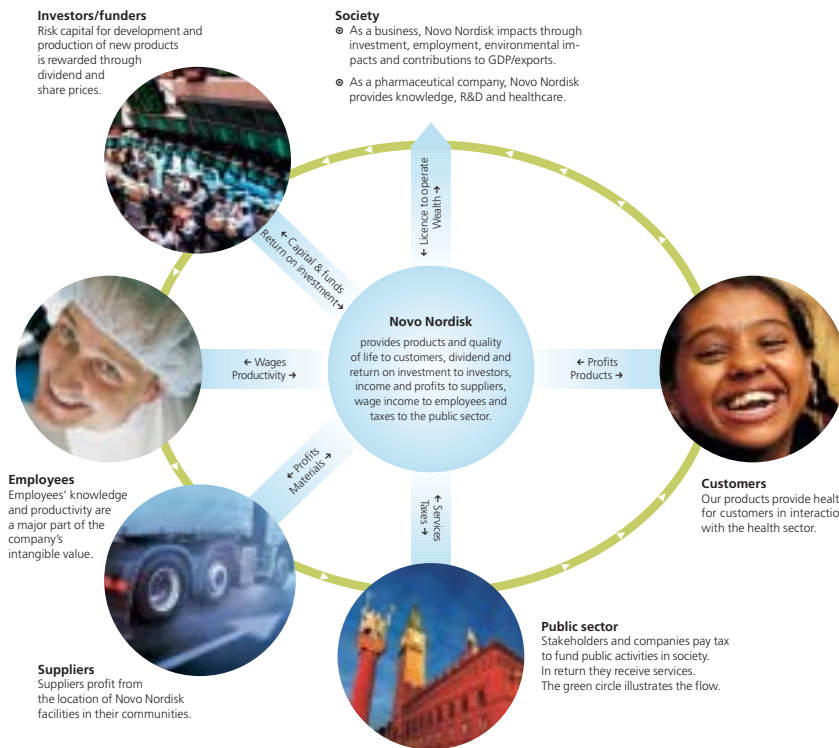
In DP we have decided to implement our social responsibility by defining 22 positions as 'special consideration positions'. As the name suggests, these are positions that are designed to give maximum possible consideration to the employees occupying them – both in terms of duties and time. The target group is hourly-paid workers who are above the age of 55 or who have a physical or mental impairment that makes shift work or physically demanding work difficult. The status of the positions as special consideration positions is permanent, and it is stipulated which duties should be undertaken in these positions. When a position becomes vacant, it can then be given to another suitable employee. There are currently three employees on the waiting list for a special consideration position.

Employees share their knowledge

Although we had to cut back on the training budget in 2003, our activities went ahead at full steam. Once again we focused on learning to use each other better and share our knowledge internally in DBP. Often the most relevant learning and development takes place on internal courses, on job swaps, or through →

Socio-economic contribution

Novo Nordisk's operations in Kalundborg create jobs for our employees, at suppliers, shopkeepers and in the public sector. In 2002, our overall regional socio-economic contribution can be set at 4,400 jobs¹⁾. The chart below provides an overview of the interaction between key stakeholders, with detailed focus on employees, suppliers and the public sector.



Employees

Novo Nordisk employees (2,268 in 2002) account for around 19% of Kalundborg Municipality's jobs. 1,211 of Novo Nordisk's employees live in Kalundborg Municipality, 1,180 of whom work for Novo Nordisk in Kalundborg. Employees pay around DKK 110m in tax to the municipalities in which they live, of which DKK 59m is income tax to Kalundborg Municipality¹⁾. Their private consumption contributes to some 626 further jobs in the region, 42 of these in Kalundborg Municipality. They also contribute property taxes etc, and the remainder of their income tax that goes to the state.

Suppliers

Novo Nordisk in Kalundborg is estimated to create the basis for 196 jobs locally, and 1,506 jobs overall in the region. These jobs are estimated to contribute municipal income tax of around DKK 34m in the region¹⁾, of which DKK 4m is to Kalundborg 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 municipality¹⁾ totalling around DKK 114m. However, the contribution to the municipality is only DKK 84m 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 46m in energy and environmental taxes to the state (7%) and municipality (93%).

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.



In 2003 we began to have sugar (sucrose) for the fermentation process delivered to the site by a local supplier, replacing glucose imported from, among other places, France.

→ more informal learning – development groups, project work, learning from colleagues, or by being given new tasks.

In DBP we are working on alternative career paths, and among other things we have carried out competence mapping through which we identified ten expert routes. This makes requirements and opportunities more transparent to employees. In Site FVII the competence mapping has helped to kick-start internal training, eg theme days within essential areas, to consolidate and expand our knowledge to everyone in the area.

In 2003 DP carried out a training initiative for all hourly-paid workers and salaried employees at the site to give us all a better appreciation of the links between departments and functions. The course 'My life as a vial' follows the product's route through the plant, illustrating the flow throughout finished goods production. This has opened many employees' eyes to what colleagues in other departments actually do.

Preventing occupational injuries

Throughout Novo Nordisk we counteract health & safety risks associated with pollutant substances, dust and noise by including health & safety considerations when fitting out our production plants and by focusing on near-misses. All our production sites have been classified as Level 1 by the Danish Working Environment Service, which means that the company is efficiently managing its working environment and meeting the requirements of the Danish Working Environment Act.

In DP our systematic efforts to improve health & safety are producing really good results. We stress the importance of analysing occupational injuries to learn from them and have now also begun to analyse near-misses. Our good results are also in large measure down to changing attitudes – teaching employees to think about how they can prevent injuries.

In 2003 we recorded six occupational injuries in DP, which has 750 employees. This was equivalent to an injury frequency

of around 5.7. We regard this as an excellent result. On the other hand, we have rather a lot of injuries without absence because we work extensively with glass. We have therefore set a target that there should be twice as many near-misses as the combined number of injuries with and without absence.

In conjunction with the Occupational Health Service (OHS) we held two courses in 2003 for team leaders and health & safety representatives to learn how to carry out effective analysis of injuries. OHS has developed systematic analysis tools for this kind of work.

We are also trying to highlight and motivate. For example, we have set up a board indicating how many days have passed since the last injury with absence. Recently the Filling Department reached 400 days between injuries with absence, so now the target is to beat this figure.

In DP we have several employees that have been affected by stress, and we want to make an extra effort in this area in 2004. In 2003 our network group of health & safety representatives in DBP and DP debated the psychosocial working environment, with OHS visiting and presenting The Stress Toolbox. DP held a two-day team leader seminar on stress and stress factors.

Social targets 2004

- Identify critical competences for the introduction of an improvement culture for all employee groups in relevant areas.
- At least 80% of employees to attend a presentation on marketing of our products.
- All employees to take part in a climate survey in which they are questioned on the winning culture, and at least 80% to score above 3.
- All areas to have a plan for their work on equal opportunities and to implement 90% of the actions in the plan.
- Reduce the number of occupational injuries per 1 million working hours compared to 2003.

Social data

Our employees	2000	2001	2002	2003	Development in % 2002-2003
Total number of employees	1,317	1,838	2,268	2,319	2
Number of full-time employees	1,245	1,732	2,165	2,251	4
Number of part-time employees	72	106	103	68	-34
Average age distribution (years)	39.5	38.7	38.7	39.3	2
Average years of service	7.4	6.2	6.0	6.6	10
Rate of employee turnover (%)	4.1	2.5	4.0	3.9	
Job functions and gender representation	Number of employees			2003	
Administration ¹⁾	139			29%	71% Female
Research and Development	1			100%	0% Male
Production ¹⁾	2,179			47%	53%
<i>Of the total number of employees:</i>					
Vice presidents/senior principal scientists	8			25%	75%
Managers/principal scientists	58			22%	78%
Occupational injuries	2000	2001	2002	2003	Development in % 2002-2003
Frequency of occupational injuries	15.7	8.2	8.0	8.1	1
Number of occupational injuries with absence	33	24	29	30	3

1) In 2003 administration in production is included in production and not in administration as in previous years.



WELL-BEING

Breaktime exercise increases motivation

One of the elements of the Well-being Project, which was introduced in DP in 2002, is breaktime exercise to prevent and counteract injury and fatigue. It is important for us that we can document the effect of our efforts, so in June 2003 our progress was evaluated. It turned out that employees who take part in breaktime exercise experience, among other things, better health, lower stress levels, increased concentration, higher energy – and they enjoy participating. A full 98% of employees find that breaktime exercise provides a mental break in their daily work. The picture shows employees in vial inspection bending and stretching their way through their breaktime exercises.

'HEALTH DAY'

Leisure Centre celebrates its anniversary

In August the Leisure Centre celebrated its first birthday, and to mark the occasion all the Novo Group's staff in Kalundborg were invited to a Health Day with lots of entertainment and activities. The many participants were able to test their health, enjoy a massage, try out new sports such as kung fu and power yoga, listen to lectures, or sample wines and cheeses.

IMPROVED HEALTH & SAFETY

Automatic inspection line minimises MRW

In DP we have an automatic inspection line for vials. This means that 32 employees (four teams of eight) no longer need to sit and carry out monotonous repetitive work (MRW). Some of these employees now work on the automatic line, while the rest have switched to more varied work on our new filling line.

FROM CHARTRES TO KALUNDBORG

Cycle ride raises awareness of diabetes

In 2003, five DP employees decided to mark World Diabetes Day in a different way. They travelled down to Novo Nordisk's plant in Chartres in France, and then made the return trip home to Kalundborg – by bicycle! Their colleagues were able to follow their progress via images on the intranet. The purpose of the trip was to raise awareness of World Diabetes Day and the importance of healthy eating and exercise in preventing diabetes.



MY LIFE AS A VIAL

Course increases awareness of the whole

Following the product's path through finished goods production increases employees' awareness of the links between the departments' functions.

PARTY TIME

Opening of the world's largest insulin plant

On Thursday June 26 there was a huge party in DBP. Lots of people were invited to the opening of the world's largest insulin plant, known to us as IBP (Insulin Bulk Production). On the very same day we began work on the PIA II plant (Purification Insulin Analogue), which will purify Levemir®. The festivities included speeches, guardsmen, magic, pastries, ice cream, bouncy castles, barbecues, helicopter rides, wine, beer and soft drinks.



Coordination on the agenda

Following environmental certification we have focused on motivation and knowledge sharing. We are coordinating the environmental work between the plants in Kalundborg and swapping audit observations to share knowledge and experience. The focus areas include resource consumption and waste management.

Our Environmental Management System is off to a good start. Non-conformity reports are being drawn up, and there are lots of environment-improving ideas. In DP we have decided that all employees should be responsible for considering environment-improving ideas in their working area. Many operators are already used to thinking along new lines. In DBP it was a target for 2003 that at least 80% of the environment-improving ideas from 2002 and 2003 should be completed or at least have undergone initial processing before the end of the year. We achieved this target with a success rate of 96%.

We also benefit from the environmental audits which help to maintain focus and leverage the system higher. One example of success comes from a department in DP where the number of observations for the last two external audits fell from ten to two. The environmental work thus went well in 2003, which we account for in the following pages.

Energy agreement and process optimisation

In February 2003 DBP entered into an energy agreement with the Danish Energy Authority that commits us to carrying out energy streamlining in return for the refunding of energy tax. Among the projects that we have undertaken are replacement of the raw material glucose with liquid sugar and a preliminary investigation into the possibilities of groundwater cooling.

In September 2003 we began to use liquid sugar instead of glucose, which means that we are saving money as well as reducing CO₂ emissions and wastewater discharge per unit of insulin produced. Furthermore, the sugar comes from Gørlev, just 20 kilometres away, whereas previously the glucose was driven through Europe. The project was started up by a buyer who contacted the manager of the fermentation plant because the plant had previously tried to use liquid sugar instead of glucose. In Gørlev a new plant has been built at the old sugar factory, where operations were otherwise shut down.

We have also investigated whether groundwater cooling could be feasible since this could potentially save on both energy and water. The groundwater must be cold enough for our cooling purposes. Unfortunately, test drillings indicated that we need to go down 400 metres to find sufficient quantities of water, and at this depth the water is too warm for our cooling purposes. Furthermore, the investment required for such deep drillings is too high to achieve profitable energy savings.

In DP our most visible optimisation project in 2003 was optimisation of the temperature regulation in our WFI plant (Water For Injection). Previously we flushed the water out if it was too

warm and took cold water in – and vice versa. Now we have minimised the amount of water that is wasted, equivalent to a saving of 2 m³ of water per 24 hours or DKK 10,000 per 24 hours at a cost of DKK 5 per litre of water.

Improvement of environmental indicators

In all areas we have focused on increasing production yields, and this also has an effect on the environment. By streamlining its processes, Site FVII has obtained greater production quantities and achieved its water and energy targets.

DP has looked at the possibilities of simplifying our batch journals within the fixed GMP framework. It transpires that there are great possibilities for saving on paper, working hours and resources. In Packing, a journal of around 30 pages could be reduced to four pages. In Assembly, we could make do with eight pages instead of 54 pages. In 2004 we will be following up on these results.

In DBP we have increased the glucose concentration in the fermentation broth, which has produced greater yields. This means that we are producing more per raw material unit. This gives gains in phosphorus, nitrogen and wastewater volume overall. We have also looked at optimising the broth with regard to vitamin and phosphate quantities, and here too we have obtained a yield increase. In 2004 we will be working to transfer our experiences to fermentation with liquid sugar.

Yield increase creates new cooling problems

A problem deriving from the yield increase in DBP's production has been in relation to cooling, namely how we handle the extra microbiological activity, and hence extra heat, in the tanks. In 2003 we acquired new cooling towers because it turned out that we could not increase the capacity in the old towers, which dated from the late 1960s. The new cooling towers have an overall cooling effect of 21.5 MW compared to the old towers' effect of 16 MW, which had been reduced to 8 MW as a result of wear and tear. The new towers have reduced energy consumption; among other things, they have lower energy consumption for blowing operation per produced cooling energy unit. They are also noise-dampened and thus have a significantly reduced noise impact on the company's surroundings.

Savings on groundwater increase the use of biocides

In DBP we use water from Lake Tissø for cooling. This means that we can save on groundwater, but also brings certain other problems, including growth of organisms in the cooling water. In order to minimise this growth, we add biocides. →



The environmental work has many dimensions, all aiming to minimise the impact of our activities. Environmental protection schemes come in all sizes. From the wastewater treatment plant (above left) that treats the considerable amounts of wastewater from production to waste sorting in our laboratories (above right). New cooling towers erected in 2003 have given us more effective, resource-saving cooling (below right).



→ One of the requirements of the common environmental approval for Kalundborg is that we should investigate the possibilities for reducing the amount of biocides that we use and report to the County in the middle of 2005. In 2003 we carried out trials in the new insulin plant with four sand filters, two for precleaning the water and two for side-streams so that the water is continuously recirculated. In 2004 we will be testing ozone treatment in the insulin recovery plant's cooling towers.

Difficult waste

We manage our waste in accordance with Kalundborg Municipality's waste regulations. Among other things, this means that the waste must be sorted with a view to maximum possible recycling. Non-recyclable waste is sent for incineration at Slagelse Incineration Plant or for landfill at Novoren's site in Audebo. Hazardous waste such as chemical waste is sent for destruction at Kommunekemi in Nyborg.

As already mentioned, in 2003 we had a significant increase in the overall quantity of waste from Kalundborg, especially the amount of organic solvents, which are either sent for controlled destruction or external recycling as a carbon source in biogas plants and wastewater treatment plants.

However, there were also positive trends. The amount of plastic for recycling increased significantly (230%), and the amount of waste for incineration fell (12%). This reflects the fact that in 2003 DP began to sift out plastic waste and send it for recycling, whereas previously it was sent for incineration.

Better waste sorting was one of our environmental targets in 2003, and this has proved to be a difficult area. We have installed containers for the various forms of solid waste – paper,

combustible material, metal, glass etc, but it can be difficult to get employees to use the right containers. Many external contractors visit the site, and together with Novozymes we have prepared a folder for guests describing among other things correct waste management in the area.

In 2004 Novo Nordisk's External Environment Department will be focusing on improvements in waste management throughout the company. We are looking forward to contributing and to learning.

NovoGro® and yeast cream

The treatment of wastewater in Novozymes' treatment plant gives rise to a quantity of biomass that is heated and has lime added to kill any microorganisms and inactivate product residues. This produces the fertiliser product NovoGro®. The increase in the amount of NovoGro® is due to the general increase in production.

Yeast cream is another by-product of insulin production. During recovery of the fermentation broth from insulin production, the biomass is separated out. The biomass is converted to yeast cream by heat-inactivation followed by acidification with lactic acid bacteria. The yeast cream is mostly used as an additive in pigfeed, although in periods when production of yeast cream exceeds the demand for pigfeed, the surplus is used in the production of biogas. In 2003 we produced a total of around 120,500 m³ of yeast cream, which was an increase of 13%. This increase is related to increased production.

Minor air emissions

→ The main discharges from the site into the air are organic sol-

External voice – 'the sniffer dog' Hermann Hansen

Chairman of the Residents' Association and town councillor

Good contact with our neighbours is important for us. Once a year we hold a large meeting with our neighbours that is attended by the three closest residents' associations. In 2003 we were pleased to hear from our neighbours that we have improved and generated less odour nuisance. As well as this meeting, we in the Novo Group meet with Hermann Hansen, among others, to discuss general neighbour issues and specific problems.

"When Novo received an environmental award in 2001, I promptly wrote to the local newspaper congratulating them on the award and saying that we were now waiting for them to do something for their neighbours as well. The company responded immediately. The

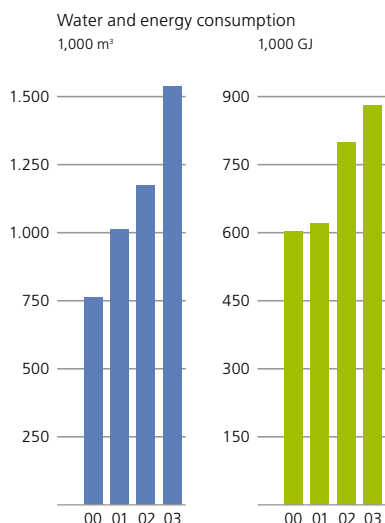
manager telephoned me and asked if we could talk. I summoned the board of the Residents' Association within one hour. We met with the company and agreed that the Residents' Association could act as 'sniffer dogs' for Novo. The company had already prepared a form in which we could record the extent of odours, their specific nature, and the given wind direction. Within a few days we were sent the forms, and from then on our cooperation has been running smoothly.

"And this cooperation is rubbing off on others. Another company in the area has had problems with odour. When they heard about our cooperation with Novo, they approached us because they also wanted to work with us to avoid complaints from neighbours.

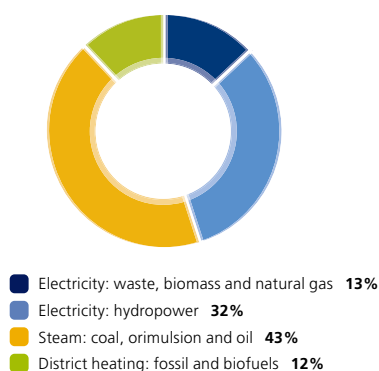
"Novo in Kalundborg now generates much less odour. We do not record nearly as many incidents of odour as before.



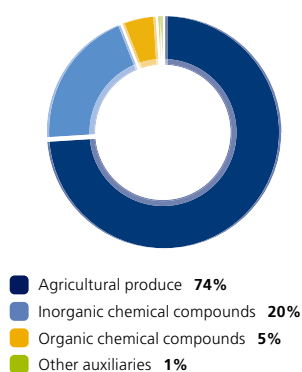
At the time it was a real nuisance; you could hardly sit out in your garden. We really feel that something has been done, and not just to the benefit of the residents in the area, but also the company's reputation. We would very much like to continue the cooperation. We know that the problem cannot be avoided from time to time and that there will be incidents of odour, but we also know that we can talk about it and that Novo will do something about it. This also means that we become more tolerant," concludes Hermann Hansen.



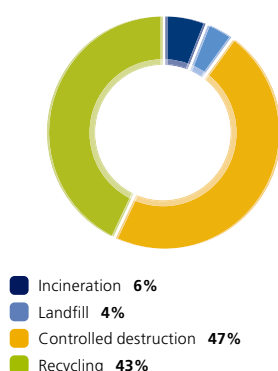
Breakdown of energy sources 2003



Breakdown of raw materials 2003



Waste disposal 2003



SAVINGS IN ALL AREAS

Environmental improvements in the laboratories

The laboratories have some special considerations when it comes to the environment because they often use such small quantities of substance that it is very difficult to measure and map environmental issues. However, a positive example of environmental improvements is the Chemical Laboratory in Kalundborg which, by changing a work process, has achieved savings of around 20 m³ of water and around 55 working hours per year.

CONSUMING LESS

DBP enrols in electricity saving campaign

In DBP we are in the process of enrolling in the Energy Savings Fund's electricity saving campaign, which is aimed at office buildings. This means that in 2004 we can go onto the Web to see what our

consumption is at various times of the day and compare ourselves directly with others that have enrolled. Among other things the purpose is to investigate how much we can save on night consumption, which in office buildings can be up to 40% of the total electricity consumption.

SAVINGS REQUIREMENTS

Difficult water mapping in DBP

We have mapped our water consumption in five plants. The mapping was difficult because we do not have meters for the individual processes inside the plants but only for how much comes in, and how much goes out in the form of wastewater. The exercise was occasioned by the fact that every three years we have to report to the County on potential water savings. It is also part of our Environmental Management System in the form of a continuous requirement to find savings in water consumption.



BRILLIANT ENVIRONMENTAL IDEA

'Pigs' clean cooling spirals effectively

A fun project for us as employees in DBP has been to follow the development of an instrument for cleaning the inside of the cooling spirals of fermentation tanks. We discovered that there were many layers inside the cooling spirals, and two of our bright maintenance operatives took a look at the project. They came up with a system using 'pigs' of cylinder-shaped

foam rubber with brushes on the side that they can send into the spirals to clean the insides. And they have done it so ingeniously that it can even be done during production. The effect is considerable. It makes a huge difference to our yield that we are cooling better. At the end of fermentation, which is a three-week process, the cooling effect in the spirals was previously reduced to 40–50% of normal capacity. Now the 'pigs' are sent in routinely once a week to maintain the high cooling capacity.

→ vents, mainly ethanol. All plants using large quantities of ethanol are equipped with recovery systems. These recover the impure solvents to as great an extent as possible for subsequent recycling in the processes. In 2003 we discharged about 45 tons of ethanol into the air from Novo Nordisk's production plants in Kalundborg, which was a fall of 8% compared to 2002. All air flows containing dust pass through effective filters, and the plants emit very little dust.

Noise

Noise comes from production and from transport. In production the main noise sources are the cooling towers. In 2003 the large, old cooling towers were replaced with more energy-efficient, quieter towers. This is reflected in the updated noise source catalogue, which at the end of 2003 showed that the company was observing the stipulated noise requirements, and that the company's noise contribution fell by up to 3 dB at the reference points that are most affected by the noise from these cooling towers.

Self-monitoring

In accordance with our environmental approvals we carry out regular measurement of odour from the fermentation chimney and the yeast cream store, as well as measurement of genetically modified microorganisms (GMOs) in wastewater from the recovery plant, in the filter cakes from recovery, in the yeast cream, and in the surroundings. We also carry out measure-

ment of ethanol emissions into the air at the request of the County or as first-time controls on new plants.

In 2003 we carried out odour measurements in four air discharges, measurement of organic solvents in 19 air discharges, and analysis for GMOs in six soil samples, eight filter cake samples, 37 yeast cream samples and 26 wastewater samples. We found two cases of non-compliance with limit values. These related to GMO content in yeast cream and ethanol content in an air outlet respectively. In both cases the cause was established and the fault rectified, and subsequent control measurements found the contents to be in accordance with our approval requirements.

Environmental targets 2004

- Account for overall consumption of water and possible water savings (DBP).
- Survey alternatives to and limitations in the use of biocides (DBP).
- Implement the special survey 'Process integration at Site DBP' in accordance with the agreement with the Danish Energy Authority on energy streamlining (DBP).
- Reduce overall consumption of R22 by establishing the ammonia-based cooling system for building EE (DP).
- Carry out an energy survey in finished goods in buildings DF and EF (DP).
- Improve consumption of energy and water per produced unit (Site FVII).

Statement by the authorities on the green accounts for 2004 for Novo Nordisk A/S in Kalundborg

On 2 March 2004 West Zealand County received the green accounts for Novo Nordisk A/S for 2003. The green accounts are subject to the rules of Statutory Order no. 594 of 5 July 2002 on the duty of certain listed activities to draw up green accounts. The County takes its position on the basis of the following information in the accounts:

Basic information

- Industrial sector, primary activities and category/categories in the Annex, cf. §3, no. 1.
- Information on the most significant environmental approvals granted to the company.
- The brief qualitative description of the most significant resource and environment parameters characterising the primary activities of the company and the secondary activities, where relevant.

Information on environmental issues

1. Data on the major consumption by the company of energy, water and raw materials in the accounting period.
2. Data on significant types and volumes of pollutants to the extent they
 - form part of the production processes,
 - are discharged by the company to air, water and soil,

- form part of the company's products,
- form part of wastes from the company.

West Zealand County's comments

The County considers it positive that the company has reduced the noise level from the site by installing new cooling towers and that experiments are being carried out using ozone as a disinfectant in the cooling towers, which would reduce the consumption of xenobiotic substances. It is also a major step forward that the Factor VII plant has also been environmentally certified. The company has described the development in water consumption in 2003 compared to the precalculated consumption in the Environmental Impact Assessment. Since water consumption is one of the main environmental parameters for Novo Nordisk in Kalundborg, the County would like to challenge the company to estimate in its future green accounts the expected water consumption for several years ahead and compare this with the precalculated water consumption in the Environmental Impact Assessment.

On the basis of the information available to the County on the environmental circumstances of the company, the accounts are deemed to be in accordance with the actual circumstances. The County is not aware of any further circumstances that should have been described in the green accounts.

Environmental data for Novo Nordisk in Kalundborg 2000–2003

	Method	Unit	2000	2001	2002	2003
Water						
Water (total)	M	1,000 m ³	762	1,010	1,173	1,536
Drinking water	M	1,000 m ³	625	782	923	1,171
Process water (Lake Tissø)	M	1,000 m ³	45	121	123	226
Steam	M	1,000 m ³	92	107	127	139
Energy						
External (total)	M	1,000 GJ	603	622	799	882
Electricity	M	1,000 GJ	263	266	350	395
Steam	M	1,000 GJ	277	293	351	384
District heating	M	1,000 GJ	63	63	98	103
Materials						
Materials (total)	M	1,000 tons	63.7	74.9	78.8	89.6
Raw materials	M	1,000 tons	62.7	73.9	77.6	88.4
Packaging materials	M	1,000 tons	1.0	1.0	1.2	1.2
Wastewater						
Volume	B	1,000 m ³	572	746	934	1,308
Suspended solids	B	tons	71	62	47	101
BOD	B	tons	21	23	28	0
COD	B	tons	258	305	331	581
Nitrogen	B	tons	20	29	31	39
Phosphorus	B	tons	1.0	1.5	2.1	5.1
NovoGro® + NovoGro® 30						
Volume	M	1,000 m ³	67.8	55.2	48.8	60.9
Dry matter	A	1,000 tons	9.4	9.5	11.8	13.2
Nitrogen	A	tons	200	207	251	295
Phosphorus	A	tons	102	105	133	146
Yeast cream						
Volume	M	1,000 m ³	72.8	92	106.7	120.5
Dry matter	A	1,000 tons	10.9	13.8	16.0	17.9
Nitrogen	A	tons	967	1,208	1,398	1,551
Phosphorus	A	tons	251	318	372	410
Waste						
Waste (total)	M	tons	1,327	2,359	2,861	9,544
Incineration	M	tons	149	797	650	569
Landfill	M	tons	327	350	441	406
Controlled destruction	M	tons	49	132	271	4,440
Recycling (subtotal)	M	tons	802	1,080	1,499	4,129
Construction waste	M	tons	133	175	148	175
Electronic equipment	M	tons	–	–	–	1
Glass	M	tons	0	0	20	14
Food	M	tons	22	30	43	36
Metal	M	tons	79	95	130	99
Mineral oil	M	tons	0	3	11	4
Organic solvents	M	tons	413	516	877	3,429
Paper and cardboard	M	tons	132	185	237	262
Plastic	M	tons	23	76	33	109
Emissions to air						
Organic solvents (ethanol)	B	tons	30	34	49	45
Ozone-depleting substances (total)	A	kg	13	163	330	319
CFC	A	kg	0	6	35	0
HCFC	A	kg	13	157	295	319
Carbon dioxide (CO ₂) ¹⁾	A	1,000 tons	39	28	31	33
Sulphur dioxide (SO ₂) ¹⁾	A	tons	86	47	35	38
Nitrogen oxides (NO _x) ¹⁾	A	tons	78	75	66	66
Environmental Impact Potentials						
Global warming	A	1,000 tons CO ₂ -eqv.	39	28	32	33
Ozone layer depletion	A	kg CFC ₁₁ -eqv.	0.5	11	40	13
Acidification	A	tons SO ₂ -eqv.	141	100	81	85
Eutrophication	A	tons NO ₃ -eqv.	237	275	294	425
Compliance and complaints						
Breaches of regulatory limits	M		0	0	0	2
Regulatory limits with repeated breaches	M		0	0	0	0
Accidental releases	M		0	1	0	0
Complaints	M		2	11	2	2
Stockpile of Ozone Layer-degrading Substances						
CFC	A	kg	180	228	19	6
HCFC ²⁾	A	kg	2,923	3,059	3,915	3,651

1) The 2003 figures for emissions of CO₂, SO₂ and NO_x are based for the electricity production proportion on Elkraft's indices for the previous year.

2) The 2002 stockpile of HCFC has been adjusted due to errors in previous reports.

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*.

Novo Nordisk is an international biotechnological and pharmaceutical company. We offer a wide range of insulin products, as well as products for growth disorders, hormone replacement therapy and haemostasis management. We are headquartered in Bagsværd, Denmark, and have production facilities in Denmark, France, the US, Brazil, South Africa, Japan and China. We have around 19,000 employees and are part of the holding company Novo A/S, which is also headquartered in Bagsværd. 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. The Charter sets out our Values, Commitments and Fundamentals, as well as the Novo Nordisk Way of Management, which includes the company's Vision and Policies. 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.



Novo Nordisk A/S
Hallas Allé
4400 Kalundborg
Denmark

Tlf. +45 4444 8888
Fax +45 4449 0555

CVR no. 24256790
P no. 1.007.675.697

novonordisk.com

