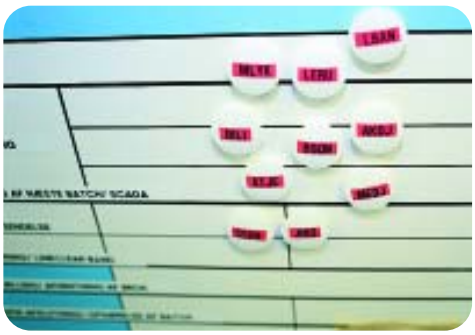
# Environmental and Social Report Kalundborg 2002

We are an important factor in the local community. We have a major influence on the lives of our employees. We must therefore take our work with environmental and social responsibility extremely seriously and present our results openly.


novo nordisk®

# 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 $m^2$, of which 120,000 $m^2$ 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.

Novo Nordisk accounts for almost 20% of the municipality's 12,000 jobs. We are part of the Industrial Symbiosis project (see www.symbiosis.dk) and so work closely with the region's other large companies, Kalundborg Municipality and the neighbouring municipalities.

**INSULIN AND HAEMOPHILIA MEDICINE** With 2,268 employees, the site in Kalundborg is Novo Nordisk's largest production site. Production is divided into three areas:

- Diabetes Bulk Production – DBP (basic insulin production) produces insulin crystals for treating diabetes. Production comprises fermentation using genetically modified yeast cells, followed by a number of recovery and purification processes. We also produce glucagon in the same way for treating insulin shock.
- Diabetes Pharmaceutical – DP (production of final insulin products) processes the insulin crystals into the final product, i.e. formulating, filling, assembling, packing and shipping insulin products.
- Factor VIIa Bulk produces factor VIIa, which is the active substance in the blood preparation NovoSeven®. Production is based on fermentation 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.

## RESOURCES AND ENVIRONMENTAL IMPACT

Novo Nordisk uses large amounts of water and energy in its production. We also use a range of raw materials and auxiliaries, of which the most important in terms of quantity are agricultural produce, mainly sugar and glucose. The genetically modified microorganisms used for 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.

## ENVIRONMENTAL MANAGEMENT SYSTEM

The three production areas are covered by the quality control system ISO 9002, and during 2002 DBP was certified according to the new standard ISO 9001:2000. Also in 2002, DBP and DP were certified according to the ISO14001 Environmental Management System. It is planned that Factor VII will be certified according to the same standard in 2003. In July 2002, DBP was also granted energy management approval as a supplement to the Environmental Management System.

Novo Nordisk in Kalundborg is covered by a general environmental approval and a range of secondary approvals. Some of the plants also have 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 Sealand County, while the Danish Forest and Nature Agency is the authority for genetic engineering approvals and Kalundborg Municipality for solid waste and wastewater.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# A busy year of certification and optimisation

For Diabetes Bulk Production and Diabetes Pharmaceutical, 2002 was marked by environmental issues with both units being certified according to ISO 14001. However, 2002 was also a year in which Novo Nordisk in general focused in particular on costs. Thus, in all areas in Kalundborg we worked extensively to optimise the production process – and this proved to have positive side effects for the environment.

From the left: Lise-Lotte Petersen, vice president of Diabetes Pharmaceutical, and Jesper Giede Bøving, vice president of Diabetes Bulk Production

In such a busy year, we were especially proud to achieve nearly all the environmental and social targets that we had set. We also continued to work on improving health & safety for our employees and began new activities in social responsibility.

Novo Nordisk has an environmental policy that obliges us to prevent pollution and continuously improve our environmental performance. We ensure this by carrying out environmental analyses of all new activities and by setting targets relating to the company's main environmental issues. In 2002 we set the target i.a. that DBP and DP should be certified according to ISO 14001.

**ISO 14001 CERTIFICATION** DBP and DP have been working for a few years on implementing an Environmental Management System according to ISO 14001 – and in 2002 both units acquired the certification. All employees were involved in the implementation process, although it was headed by environmental groups with representatives from all departments. The main tasks of the environmental groups were to map the units' environmental impacts and, through training, increase knowledge and awareness of the environment among all employees.

It is planned that Factor VII will be certified according to ISO 14001 in the second half of 2003. Here we have begun mapping our environmental impacts.

**ANNUAL TARGETS FOR WATER AND ENERGY** For both DP and DBP, a target for 2002 was that we should reduce consumption of water and energy in terms of the number of produced units by 5% and 4% respectively. This was more than achieved in DBP, but unfortunately DP failed to meet the targets, i.a. due to having to commission new plants. Factor VII also failed to achieve the targets due to bottlenecks in the quality system which meant that many produced units did not find their way into the figures for 2002.

**PROCESS OPTIMISATION** In 2002 we worked in all three areas on improving the production process. We mapped all work processes to find out where we could introduce initiatives for improvement. In DP, this process focused on how the individual waste fractions could be minimised. In DBP, we were able to increase fermentation yields by adding more glucose to obtain more product with the same raw material consumption.

**BREACHES OF LIMIT VALUES AND COMPLAINTS** In 2002 we recorded no breaches of regulatory limit values. However, in connection with our preparations for ISO 14001 certification we discovered some minor excursions relating to official requirements. We rectified these in all cases. During the year we received two complaints. We had a target for 2002 of avoiding complaints resulting from abnormal operating situations or building work. We achieved this since neither of the two complaints related to these. In handling complaints, we work closely with Novozymes. The environmental watch at Novozymes handles complaints and informs neighbours when we are implementing new projects that may involve noise or odour nuisance.

**TARGETS FOR SOCIAL RESPONSIBILITY** On the social front, we achieved almost all our targets for 2002. One target was that more than 80% of employees should make contact with a patient. We realised this through events that made a big impression on our employees. We also had a target that 90% of managers at all levels with direct reports should formulate an APIS target (annual target) for how they would develop their employees. 33 out of 41 managers (roughly 80%) achieved this target.

It is important for our employee motivation that we celebrate when we achieve targets that we set. So for 2002 we set a target that every vice president and director should identify a team target and decide how achievement of the target would be celebrated. We succeeded. DBP celebrated the ISO 14001 certification with champagne and snacks in the canteen, while our ISO 9001:2000 certification was celebrated by the whole of DBP with Danish pastries. In DP, all employees received an 'environment mug' and cakes when we obtained ISO 14001 certification.

Health & safety is an area that we are continuously working to improve. It is our skilled health & safety representatives that deserve the credit for the fact that in 2002 we recorded 313 near-misses. We had set the target that for each lost-time occupational injury there should be at least six near-misses, so we achieved this target. The number of injuries was 29, which was an increase from 2001 when we had 24 lost-time occupational injuries.

**BUILDING WORK IN HILLERØD AFFECTS KALUNDBORG** For Factor VII, building of the new Factor VII plant in Hillerød dominated 2002. Nearly all the employees in the unit were involved in the project. Some employees moved there permanently, while others were 'loaned out' for periods or used in an advisory capacity. This, combined with the company's general hiring freeze, made it a busy and tough year for the employees in Factor VII.

**EVALUATING OUR SUPPLIERS** 2002 was a year in which we really focused on evaluating the environmental and social performance of our suppliers. Our target for 2002 was to evaluate 90% of our main raw material suppliers. With a very few exceptions, the evaluation produced satisfactory results. In 2003 we will be working on the remaining suppliers to ensure that they are meeting our requirements.

**FUTURE FOCUS AREAS** For all areas, next year's focus on the environment will involve maintaining our Environment Management System at the present level. It is important that this system is active and engaging, and that it produces results. We will therefore also be working further on a number of the ideas for improvements that we received in 2002. Finally, we will continue to work on optimising our production methods so that our resource utilisation improves even further.

Here and in the remainder of this report on our performance in 2002 we discuss the environmental and social issues that are of major importance for our employees and relations with our suppliers and neighbours, the local community, and the environmental authorities. In respect of the environment, we have attached importance to documenting that we are meeting the environmental requirements laid down by the authorities and Novo Nordisk's own environmental policy, as well as the environmental targets that we set for 2002. In the social area, we have focused on issues that are of major importance for our employees' health, well-being and development and our suppliers' social responsibility, as well as on the targets that we set for 2002. We are proud of our efforts and plan to continue in the same vein in the coming years.

# Health & safety and equal opportunities

2002 was a tough year for Novo Nordisk. The hiring freeze and increased focus on costs intensified work pressure for certain employee groups – and this affected some of our employee development activities. In spite of this, we achieved almost all the social targets that we set for 2002 – and more.

As always, we worked extensively to improve health & safety and ensured that safety was a top priority. The year also featured a range of activities relating to equal opportunities.

In 2002 we set the targets that for every lost-time occupational injury we should record at least six near-misses. We achieved this, recording 313 near-misses and 29 lost-time occupational injuries. This slight increase in the number of injuries was due to the fact that we took on a lot of new employees.

We know that new employees have more accidents than more experienced employees. New employees are therefore introduced to health & safety as part of their induction course. In 2002, DP worked on introducing new employees to health & safety, e.g. preparing a pamphlet on the subject and making it a permanent theme of the obligatory training days.

**ATTITUDE AND THOUGHTFULNESS** One of our working procedures in health & safety is the regular safety rounds in the various departments, where the health & safety representatives check whether all the safety measures are in place, particularly in respect of any new focus areas. In 2002, Factor VII began a new initiative where all employees alternated in carrying out the weekly rounds. The benefits of this are that we have fresh eyes on our safety measures and that all employees get used to thinking about safety.

In DP we have been working for a long time to change employees' attitudes to occupational injuries. It is often human error that is the cause of injuries. Thus, we are emphasising the need for employees to give thought to new work processes before they begin them. It can be small things such as forgetting to use gloves when handling glass. Our philosophy is that every employee should be their own safety representative.

**CROSS-ORGANISATIONAL COOPERATION**
The daily work on health & safety is carried out in the individual departments, but we also attach great importance to cooperating across the organisation. We have a health & safety management committee in which health & safety representatives from the departments meet to swap experiences and good ideas on how our message can be put across, and to discuss relevant focus areas. There is also a health & safety network of representatives for the three areas that make up Novo Nordisk Kalundborg. This network meets twice a year.

**EQUAL OPPORTUNITIES THROUGH TRAINING**
It has been one of Novo Nordisk's main targets that all units should begin initiatives to ensure equal opportunities. In DP we see it as our duty to take part in the job of integrating ethnic minorities into our local community. We have therefore initiated a pilot project, in conjunction with the municipal Coordination Committee, in which we took on 10 New Danes for a combined training →

Social targets 2003

All units in Kalundborg will contribute to achieving the following corporate targets:

80% of all employees should discuss the findings from DAWN, HERS or other relevant studies with patients.

80% of all managers should score 3.0 or more in eVoice on questions related to 'winning culture'. All managers with a score below 3.0 should take action to improve in this area.

The 2003 targets for increasing equal opportunities should be set and 80% of these targets achieved.

Units with an unwanted employee turnover of more than 10% should reduce their turnover to a maximum of 10% by the end of 2003.

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and practice course. Over 26 weeks the participants are trained as medical operators, as well as attending courses at the Adult Education Centre in Danish, mathematics, English and IT, plus the obligatory courses for the pharmaceutical industry. The practical course at the plant comprises three times four weeks. While at the plant, each apprentice has an experienced operator as mentor to help the apprentice on two fronts: firstly, with finding a foothold in the department; and secondly, with introducing and understanding standards, cultural differences and language. In 2002, DBP ran a similar project, taking on eight people with non-Danish backgrounds for a practical course as industrial operators. The project was run in cooperation with the Process School in Kalundborg, which arranged the basic training before the apprentices begin their practice with us.

Novo Nordisk has concluded an agreement with the Technical University of Denmark to offer refugees or immigrants with a technical academic background a long-term practice. In Kalundborg, all three areas have taken on apprentices, although they have not yet begun their in-house practice.

### INCREASED UNDERSTANDING OF FOREIGN CULTURES

The work on ensuring equal opportunities also involves internally increasing understanding of foreign cultures through dialogue. In both DP and Factor VII we have therefore arranged lectures and dialogue meetings at which employees discuss equal opportunities. In Factor VII and DBP we have been visited by integration consultant Fahmy Almajid, who explained the challenges and potential of taking on employees with non-Danish backgrounds. In DP, all employees and managers have debated cultural differences: what is culture, and when and why do cultural misunderstandings occur? DBP's factory manager has also taken part in meetings in all departments to explain DBP's projects and prepare for a debate on the subject.

**SENIOR EMPLOYEES' SPECIAL NEEDS** Social responsibility and equal opportunities also concerns e.g. senior employees in the workplace. In 2002, DP carried out a quantitative and qualitative analysis to find out how employees of 50 and upwards experience life as an employee in DP, and where they see needs and opportunities. The next step will be to investigate how we can create more flexibility in the individual departments.

**EMPLOYEE DEVELOPMENT** For many years Novo Nordisk has given high priority to employee development. Although in 2002 we had to cut back on further training due to the increased focus on costs, we still worked to allow employees to develop in their jobs.

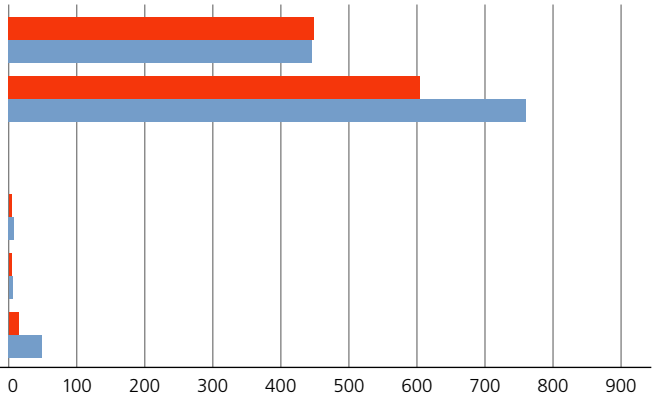
In DBP we held courses that will help to give wider business understanding. The courses were tailored to the specific employee groups. We had a course for our assistants, technicians and laboratory assistants called 'know your site', in which we examined the entire production process. This course was also held for the chemist group, where topics such as genetic engineering and protein chemistry were part of the training. For operators, we ran a three-hour training programme in chemistry, gave an overview of the production process and detailed training in recovery or purification. The courses proved very popular, and we are planning to follow up on these courses in 2003. Additionally, 120 laboratory assistants were trained in cGMP, where a total of seven modules were held over three days.

Hourly-paid workers have six fixed annual training days and three optional training days. In 2002, DP focused among other things on how to handle work changes and what environmental consideration means for individual employees. DP and DBP has a training group which, across the departments, develops, coordinates and implements training initiatives for i.a. the hourly-paid worker group, which at the end of 2002 comprised 561 employees in DP. In the case of DBP, training coordinators from all departments meet with the central Human Resources training function every two months to discuss training for hourly-paid workers, who make up 46% of DBP's employees.

| **Our employees** | 2000 | 2001 | **2002** |
|---|---|---|---|
| Total number of employees | 1,317 | 1,838 | **2,268** |
| Number of full-time employees | 1,245 | 1,732 | **2,165** |
| Number of part-time employees | 72 | 106 | **103** |
| Average age distribution (years) | 39.5 | 38.7 | **38.7** |
| Average years of service | 7.4 | 6.2 | **6.0** |
| Employee turnover (%) | 4.1 | 2.5 | **4.0** |

| **Occupational injuries** | 2000 | 2001 | **2002** |
|---|---|---|---|
| Frequency of occupational injuries | 15.7 | 8.2 | **8.0** |
| Number of lost-time injuries | 33 | 24 | **29** |

| **Gender representation** | | 2001 | **2002** |
|---|---|---|---|
| Administration | female | 363 | **449** |
| | male | 397 | **446** |
| Production | | 500 | **604** |
| | | 568 | **760** |
| Research & Development | | 0 | **0** |
| | | 1 | **0** |
| Other job functions | | 1 | **1** |
| | | 8 | **8** |
| Senior management (VP)* | | 3 | **2** |
| | | 4 | **6** |
| Management (Manager)* | | 14 | **14** |
| | | 46 | **49** |




* The figures for senior management and management are also included in the totals for the other employee categories.

WELL-BEING

## Job satisfaction and quality of life in DP

In October 2002, DP began the 'Well-being Project', which will increase job satisfaction and quality of life for our employees. Care must be taken of employees so that they can make a good work contribution. The method that we are using to create well-being is daily physical training. Eight groups have been set up that once or twice a day are visited by our full-time well-being instructor. She runs through four to seven minutes of resting exercises and back training, and advises employees who want to use the facilities in our Leisure Centre. The physical training has been adapted to the individual production areas. As well as increasing physical activity on a daily basis, our target in the project is to influence employees to change their habits so that in future they exercise themselves to counteract injury and fatigue. The project will be evaluated at the end of 2003.

INVOLVEMENT

## Project 'Throughput Time' produces results

In 2002, the whole of Novo Nordisk in Kalundborg worked to improve the production process. We mapped all work processes to determine opportunities for improvement. In DP, the employees played a central role. We set up a core group of representatives from all areas who went out and obtained information from their colleagues. This resulted in a number of 'quick wins', and with these we reduced throughput time considerably. All employees in Factor VII took part in workshops, which resulted in many creative and constructive ideas from the employees, ideas that we will be working to implement in 2003. In DBP, there is focus on employee retention, with the setting up of a pilot project relating to job design at one of the plants. All the chemists in the department were interviewed and thus contributed to the process. In addition, we carried out a 'motivation study' relating to our retention of chemists. All the chemists in DBP took part. The result will be processed during the first quarter of 2003.

THE REALITY

## Employee dialogue with patients

A target for 2002 was that 80% of all employees should enter into dialogue with patients. We therefore arranged four compulsory employee meetings at which various patients explained what it is like living with diabetes and haemophilia respectively. The employee feedback was generally positive, and many were highly affected by the patients' stories.

HOURLY-PAID WORKERS

## Offer of individual development interviews

In 2002, DP offered individual development interviews to its hourly-paid workers. This was an offer that was taken up by nearly all the hourly-paid workers, and the feedback was positive from both employees and managers. Employees were given the opportunity to express individual wishes and needs, while managers became more aware of the individual employees. This created greater trust between managers and employees.

VISION AND VALUES

## A common winning culture in Factor VII

In 2002, Factor VII focused in particular on creating a 'winning culture' in the workplace. All employees took part in the process to develop a vision and a set of values for the Factor VII area. The process started with employees being split into eight groups across professional groups. The groups were given the task of identifying success stories and specifying the values and qualities that they want to promote. Afterwards, the best stories were chosen and given to a workgroup that came up with five values: team spirit, motivation, initiative, optimism and responsibility. On the basis of these, management then began formulating Factor VII's new vision. The workgroup also gathered employees' ideas into a number of action points that were given back to the individual departments, which are now in the process of implementing many of the good ideas.

KNOWLEDGE SHARING

## University cooperation in DBP

Novo Nordisk has a long history of close cooperation with educational institutions. In DBP Kalundborg we are visited by the Engineering College of Odense and the Technical University of Denmark once a year. We arrange tours of the plants, and an employee from Novo Nordisk holds a 'lecture' for the students. For us the be-all and end-all is that capable people are trained with the potential to work for us. Through cooperation we can inspire students and show them what their training can be used for in practice. In 2002, we were also visited by Lund University, which has started a biotechnological line. Finally, we give annual 'guest lectures' at University of Southern Denmark – Esbjerg and Aalborg University.

# System and focus in environmental work

Novo Nordisk in Kalundborg is continuously working to reduce its impact on the environment. We are doing this by improving our technology, our processes and our methods of handling waste. In 2002, the majority of production worked more systematically on the environment, implementing and obtaining certification for an Environmental Management System in accordance with ISO 14001. This dominated our environmental work in 2002.

Certification of our Environmental Management System required a massive effort from all employees – but especially from members of the environment groups in DBP and DP. DBP obtained its certification in April 2002, and DP in November. Factor VII expects to be certified by the third quarter of 2003. DBP has also undergone the first six-monthly inspection by an external auditor, which went according to plan.

**EMPLOYEE INVOLVEMENT** The certification process has involved all employees through training programmes run by the environmental representatives from each department. The programmes explained the purpose of the system and how it affects work in the individual departments. We also made it clear that the aim of the system is to carry out continuous process improvements in order to reduce our environmental impacts. Both DBP and DP have set up procedures to collect ideas from employees, and we have already had many suggestions, illustrating the employees' great commitment to the project – i.a. because it connects clearly to our day-to-day activities.

In July, DBP had its system for energy management approved as a supplement to the Environmental Management System. This makes good sense since DBP accounts for about 50% of Novo Nordisk's energy consumption. Energy management obliges us to identify and monitor major energy-consuming plants to optimise our operations in terms of energy.

**OUR MAIN RESOURCE CONSUMPTION** We use large amounts of groundwater in production, water from Lake Tissø in cooling towers and steam from Asnæs Power Station for sterilising equipment and raw materials. In 2002 we used a total of 127,000 $m^3$ of steam, 923,000 $m^3$ of groundwater, and 123,000 litres of water from Lake Tissø. Compared to 2001, this was a 19% increase for steam, 18% for groundwater, and 2% for water from Lake Tissø.

We also use large amounts of energy in the form of electricity, steam and district heating. Steam and district heating are produced and supplied by Asnæs Power Station on the basis of coal, heavy fuel oil and orimulsion. Electricity is supplied by the Swedish company Elektra (69% in 2002) and is based on hydropower. The remaining 31% was supplied by Elkraft's Danish network based on sustainable and environmentally friendly energy forms. In 2002 we used 350,000 GJ of electricity, which was an increase of 32% compared to 2001 when the consumption was 266,000 GJ. We also used 351,000 GJ of steam and 98,400 GJ of district heat. This was also an increase of 20% and 55% respectively. In 2001 we used 293,000 GJ of steam and 63,300 GJ of district heat.

Our high consumption of both water and energy can be explained by increased production, the commissioning of new fermentation tanks and the running in of new plants.

In 2002 we used a total of 77.6 tons of raw materials and auxiliaries and 1.2 tons of packaging in connection with Novo Nordisk's production in Kalundborg. In 2001 we had used 73.9 tons of raw materials and auxiliaries and 1.05 tons of packaging, so our total consumption rose by 5%. This was due to increased production. More than three quarters of our raw →

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**Environmental targets 2003**

For DP, the target is to improve utilisation of water per produced unit by 5% compared to 2002. For DBP, this target is 6%. DP will aim to improve its utilisation of energy per produced unit by 4% compared to 2002, while the target for DBP will be an improvement of 6%.

DBP will also:
Carry out mapping of its water consumption.

Investigate alternative disposal of biomass.

Identify three resource-saving initiatives in each production department, and one initiative in each non-production department.

Ensure that at least 80% of the registered environment-improving ideas from 2002 undergo initial processing, with subsequent feedback given to those who suggested the ideas before the end of the year.

DP will also:
Prepare a preliminary project for a more energy-appropriate plant to reduce the energy consumption of cooling systems.

Reduce the waste fraction for incineration.

materials is sugar- and protein-containing agricultural produce, and less than 1% is substances that are harmful to the environment or health.

### A MIXED PICTURE OF WATER AND ENERGY

For 2002 the targets for each unit in Novo Nordisk Kalundborg were to improve resource utilisation of water by 5% and energy by 4% per produced unit compared to 2001.

In DP, our resource utilisation per produced unit fell by 21% for water and 13% for energy, due to several factors. We commissioned two new production plants (an InnoLet® packing machine and a filling line for 3 ml pens), requiring extensive testing using water, energy and raw materials without producing any products. Production difficulties in the first months of 2002 were also costly. Finally, due to the year's hiring freeze we were not always able to get production and analysis to follow on from one another. In some cases this meant that we had to reject several batches because production was ahead of the laboratories. In 2003 we are assured of better staffing compatibility between analysis and production, which should improve the situation.

In Factor VII, we experienced a fall in our productivity per consumed unit for both water and energy – 1% and 24% respectively. The result was an indication that the method for calculating the relationship between consumption and production does not allow for bottlenecks outside production. In 2002 we had just such a bottleneck because our Quality department was also working on a comprehensive revision of our analysis methods.

DBP succeeded in increasing productivity compared to 2001 both per consumed water unit and per consumed energy unit. This was due to optimisation of the processes for fermentation and recovery of insulin. The improvements were greatest for water, for which we had a 22% better resource utilisation than in 2001. For energy, the improvement was 12%.

**OPTIMISED PROCESSES** In 2002, DBP increased the glucose dosing for its fermentations. This gave a higher yield without a corresponding increase in the consumption of other raw materials. We are also continually striving to introduce new, small-scale initiatives where the effect may be a drop in the ocean in terms of overall consumption, but is still important because it means something for awareness of the environment that we are making efforts in all areas.

**DOUBLE TREATMENT OF WASTEWATER** Our process wastewater is piped to the site's common treatment plant, which is owned and run by Novozymes. Treatment greatly reduces the wastewater's content of organic substances and nutrient salts. The treated process wastewater may contain genetically modified microorganisms (GMMs) from our fermentation processes. However, the concentration of GMMs is below the limit set in the genetic engineering approvals. After treatment, the wastewater is discharged to Kalundborg Municipality's wastewater treatment plant for further treatment and then discharged into Jammerland Bay. Sanitary wastewater is discharged directly to the municipal treatment plant, and rainwater from non-polluted areas is discharged into Kærby Stream.

In 2002 we discharged a total of 934,000 $m^3$ of wastewater from Novo Nordisk's facilities in Kalundborg, an increase of 25% compared to 2001 due to greater production in existing plants and the running in of new plants.

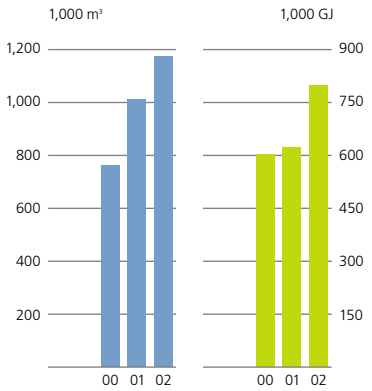
**BY-PRODUCTS RECYCLED** One of the by-products from our wastewater treatment and production is biomass. Novo Nordisk's primary contributor to biomass is the treatment of wastewater in Novozymes' plant. This is heated and has lime added to kill any microorganisms and inactivate product residues.

This produces a liquid fertiliser, which Novozymes disposes of under the names NovoGro® and NovoGro® 30. From 2001 to 2002 there was an overall increase in the quantity of these two products, partly due to a general increase in production and partly to fermentation with higher biomass, which gives more fermentation residue.

Yeast cream is another by-product of insulin production. This arises during the recovery of fermentation broth from insulin production, the biomass being separated from the fermentation broth. The biomass is heat-treated and has lactic acid bacteria added, thus producing the yeast cream by-product. The yeast cream is a protein-rich material that is used mostly as an additive in pigfeed, although in periods when the production of yeast cream exceeds the demand for pigfeed, the surplus is used as a source of carbon for producing biogas. In 2002 we produced a total of 106,700 $m^3$ of yeast cream, which was an increase of 16% compared to 2001. The reasons for this increase were the same as above.

**INCREASED FOCUS ON WASTE** We store, sort, transport and dispose of waste in accordance with Kalundborg Municipality's waste regulations, and waste handling is a central element in our Environmental Management System. The waste is 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. The proportion of recycled waste increased in 2002. This was largely due to the preparations for ISO 14001 certification, which increased awareness and tightened the mesh for waste sorting. In 2002 there was a total of 2,860 tons of waste from Novo Nordisk's production in Kalundborg, an increase of 21% compared to 2001 due to →

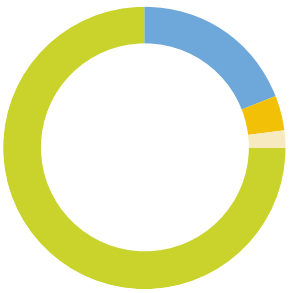
**Water and energy consumption**




**Breakdown of energy sources**

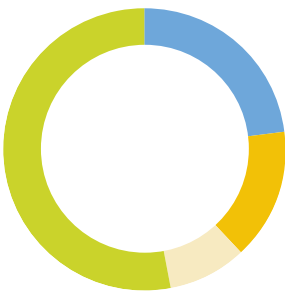
- Electricity: waste, biomass and natural gas 12%
- Electricity: hydropower 32%
- Steam: coal, orimulsion and oil 44%
- District heating: fossil fuels and biofuels 12%

**Breakdown of raw materials**



- Inorganic chemical compounds 19%
- Organic chemical compounds 4%
- Other auxiliaries 2%
- Agricultural produce 75%

**Waste disposal**



- Incineration 23%
- Landfill 15%
- Controlled destruction 9%
- Recycling 53%

INTO THE LIGHT

## Employee ideas for a better environment

There are many examples of ideas from employees that have been inspired by the implementation of the new Environmental Management System. Some of these we have already implemented, while others will be looked at in more detail. Often the ideas challenge our quality systems, which also means that we need to spend more time investigating whether it is possible to make changes. In DBP, for example, there was a suggestion to look at whether we can use less water to weight-calibrate our tanks. Other ideas concern the ventilation systems, the pumps on our cooling water system and the frequency converters on our processing equipment.

In DP we have worked on not throwing away boxes of user instructions that have been opened and only a small number used for an order or a test. Instead, we send them back to the stores. We have also had the light shut off in the fully-automatic crane warehouse that has no access for personnel. In the same way, we have installed light sensors in a cold store where employees only remain for short periods at a time. Finally, we have made changes in our sorting of waste for Kommunekemi so that it is more efficient than before.

COORDINATION

## Agreements and cooperation on waste

DP has entered a special agreement with NNS so that their waste handling now corresponds exactly to our sorting of waste, and thus we can track our waste. They will also provide summaries of our waste so that we can follow progress closely. The agreement also stipulates that NNS is obliged to inform us of new opportunities for waste sorting.

We have also appointed a waste project group with participation from DP and DBP. Here we are trying to draw up joint guidelines for how we handle waste, and to see whether we can coordinate better so that we do not pay to have half-empty containers collected where two buildings could share. The project also involves finding methods of following our waste fractions out into the community to ensure that they are not mixed 'outside our walls'.

GROUPWORK

## Joint plans to increase preparedness

We have appointed a group to work on preparedness plans across Novozymes, Factor VII, and DBP and DP. The group comprises environmental representatives from all units. The aim is to acquire a joint understanding of what preparedness involves if we were to have a serious accident or incident.

AT CLOSE QUARTERS

## Operators mapping in DP

In the packing plant we have set up a sub-group to the official environment group. This comprises eight voluntary operators covering the department's different areas. The group's members have been responsible i.a. for much of the mapping of our environmental impacts, on which our new Environmental Management System is based. This has resulted in a highly praised and highly detailed mapping because these employees are closest to the day-to-day processes and have been able to look at them with environmental glasses on.

MEASUREMENTS

## Examining environmentally critical consumption

DBP has a group that is working on 'environmentally critical measurements'. ISO 14001 has a requirement to monitor the extent of our consumption of resources that are of particular significance for the external environment. This may relate to water consumption, wastewater quantities, etc.

→ Continued from page 12

increased production in all units and DP having to run in new machines.

**MINOR AIR EMISSIONS** The main discharges from the site into the air are organic solvents (mainly ethanol). All air flows containing dust pass through effective filters, and the plants only give rise to a very small dust impact on the environment. All plants using large quantities of ethanol are equipped with recovery systems. These recover ethanol to as great an extent as possible (more than 95%) for subsequent recycling in the processes. In 2002 we discharged about 49 tons of ethanol into the air from Novo Nordisk's production plants in Kalundborg, which was an increase of 43% compared to 2001. This was due to the fact that the emissions from a new building are now included in the figures and that new measurements on another building showed higher emissions than previously assumed. The plant still meets the relevant requirements.

**NOISE PROGRESS** Noise comes from production and from transport. In production, the main noise sources are the old cooling towers and building work. The noise source catalogue was updated at the end of 2002 and showed that we are observing noise requirements.

DBP is the only department in the area to have received complaints about noise. There were actually two complaints, both resulting from a defective steam safety valve. A target for the year was that abnormal operating situations or building work should not give cause for complaints. A defective valve is not defined as such, and so the target was achieved.

In DP we corrected a more recent cooling system that, at the time of the first control measurement, proved to be producing more noise than permitted. Subsequent measurements have shown that we are now within the level set in our permit.

**OBSERVING THE REGULATIONS** We carry out continuous self-monitoring in accordance with our environmental approvals. The regulatory measuring programme includes regular measurement of odour from the fermentation chimney and the yeast cream store, and measurement of GMMs in wastewater from the recovery plant and in the filter cakes from recovery. Furthermore, every three years we carry out a measuring programme for GMMs in the factory's surroundings, a so-called field programme. The first field programme was carried out in 2002. A total of 14 samples of soil, water, compost and vegetation were taken around the site and in Jammerland Bay. None of the samples contained GMMs.

In connection with the environmental certification, DP discovered some excursions from our environmental approvals, which we duly notified to the authorities. None of these were of significance for the environment, but we have now rectified them all so that we are in full compliance with all requirements and permits. Finally, we have put right a matter involving explosive chemicals. We found a bottle of explosive chemical that had not been stored in accordance with instructions, and called in authorised military personnel to remove it.

**FEW SPILLS** In DBP we had two instances of spillages – although neither of these led to releases. One occurred because a test cock in fermentation had not been fully shut so that GMO-containing wastewater was discharged into the sewage system. The wastewater was collected, did not escape into the environment, and thus had no environmental impact. We also spilled about 100 litres of fermentation broth from recovery of insulin into the ground, which was subsequently disinfected using Rhodalon. To prevent this type of spillage in future the fermentation and recovery plant examined its sewage discharge lines to check the valves for leakages and fitted padlocks on some valves so that they cannot be opened. We have also introduced preventive inspection of pipelines four times a year. DP did not have any accidental releases in 2002.

## Statement on green accounts for Novo Nordisk Kalundborg

On 18 February 2003 West Sealand County received an e-mail of the Environmental and Social Report of Novo Nordisk in Kalundborg, which also represents the company's green accounts. The company's green accounts are subject to the following transitional rules. The procedure for drawing up green accounts is subject to the new Statutory Order no. 594 of 5 July 2002 on the duty of certain listed activities to draw up green accounts, while the requirements for content are subject to the previous Statutory Order (no. 975 of 13 December 1995). 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**

- Data on the major consumption by the company of energy, water and raw materials in the accounting period.
- 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 Sealand County's comments**

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 generally finds that the report is a very thorough work giving a good description of the company's environmental profile.

**Environmental data 2000–2002**

| | Unit | 2000 | 2001 | **2002** |
|---|---|---|---|---|
| **Water** | | | | |
| Water (total) | 1,000 $m^3$ | 762 | 1,010 | **1,173** |
| Drinking water | 1,000 $m^3$ | 625 | 782 | **923** |
| Process water (Lake Tissø) | 1,000 $m^3$ | 45.1 | 121 | **123** |
| Steam | 1,000 $m^3$ | 91.6 | 107 | **127** |
| **Energy** | | | | |
| External (electricity) | 1,000 GJ | 603 | 621 | **799** |
| Electricity | 1,000 GJ | 263 | 266 | **350** |
| Steam | 1,000 GJ | 277 | 293 | **351** |
| District heating | 1,000 GJ | 63.2 | 63.3 | **98.4** |
| **Materials** | | | | |
| Materials (total) | 1,000 tons | 63.7 | 74.9 | **78.8** |
| Raw materials | 1,000 tons | 62.7 | 73.9 | **77.6** |
| Packaging materials | 1,000 tons | 0.99 | 1.05 | **1.2** |
| **Wastewater** | | | | |
| Volume | 1,000 $m^3$ | 572 | 746 | **934** |
| Suspended solids | tons | 71 | 62 | **47** |
| BOD | tons | 21 | 23 | **28** |
| COD | tons | 258 | 305 | **331** |
| Nitrogen | tons | 20 | 29 | **31** |
| Phosphorus | tons | 1.0 | 1.5 | **2.1** |
| **NovoGro® + NovoGro® 30** | | | | |
| Volume | 1,000 $m^3$ | 67.8 | 55.2 | **48.8** |
| Dry matter | 1,000 tons | 9.4 | 9.5 | **11.8** |
| Nitrogen | tons | 200 | 207 | **251** |
| Phosphorus | tons | 102 | 105 | **133** |
| **Yeast cream** | | | | |
| Volume | 1,000 $m^3$ | 72.8 | 92 | **106.7** |
| Dry matter | 1,000 tons | 10.9 | 13.8 | **16.0** |
| Dry matter | tons | 967 | 1,208 | **1,398** |
| Phosphorus | tons | 251 | 318 | **372** |
| **Other waste** | | | | |
| Other waste (total) | tons | 1,327 | 2,359 | **2,860** |
| Incineration | tons | 149 | 797 | **650** |
| Landfill | tons | 327 | 350 | **441** |
| Controlled destruction | tons | 49 | 132 | **271** |
| Recycling (subtotal) | tons | 802 | 1,080 | **1,498** |
| Construction waste | tons | 133 | 175 | **148** |
| Glass | tons | 0 | 0 | **20** |
| Food | tons | 22 | 30 | **43** |
| Metal | tons | 79 | 95 | **130** |
| Mineral oil | tons | 0 | 3.0 | **10.9** |
| Organic solvents | tons | 413 | 516 | **877** |
| Paper & cardboard | tons | 132 | 185 | **237** |
| Plastic | tons | 23 | 76 | **33** |
| **Emissions to air** | | | | |
| Organic solvents (ethanol) | tons | 30 | 34 | **49** |
| Ozone-depleting substances (total) | kg | 13 | 163 | **330** |
| CFC | kg | 0 | 6 | **35** |
| HCFC | kg | 13 | 157 | **295** |
| Carbon dioxide ($CO_2$)* | 1,000 tons | 39.1 | 27.7 | **31.1** |
| Sulphur dioxide ($SO_2$)* | tons | 86 | 47 | **35** |
| Nitrogen oxides ($NO_x$)* | tons | 78 | 75 | **66** |
| **Environmental Impact Potentials** | | | | |
| Global warming | 1,000 tons $CO_2$-eqv. | 39.2 | 28.1 | **32.0** |
| Ozone layer depletion | kg $CFC_{11}$-eqv.. | 0.5 | 11 | **40** |
| Acidification | tons $SO_2$-eqv. | 141 | 100 | **81** |
| Eutrophication | tons $NO_3$-eqv. | 237 | 275 | **294** |
| **Compliance and complaints** | | | | |
| Breaches of regulatory limits | | 0 | 0 | **0** |
| Regulatory limits with repeated breaches | | 0 | 0 | **0** |
| Accidental releases | | 0 | 1 | **0** |
| Complaints | | 2 | 11 | **2** |
| **Stockpile of Ozone Layer-degrading Substances** | | | | |
| CFC** | kg | 180 | 228 | **19** |
| HCFC** | kg | 2,923 | 3,059 | **3,723** |

* The 2002 figures for emissions of $CO_2$, $SO_2$ and $NO_X$ are based for the electricity production proportion on Elkraft's indices for 2001.

** The stockpile of CFCs for 2001 has been adjusted from that reported in 2001, and the stockpile of HCFCs for 2000 and 2001 has been adjusted from that reported in 2001. This is due to the inclusion of new plants.

The present Novo Nordisk was formed in 2000, and data are therefore only available for three years for our activities in Kalundborg. Data in this report were included in the assurance engagement performed by Deloitte & Touche. The full Assurance Statement from Deloitte & Touche can be found on page 58 of Novo Nordisk's *Sustainability Report 2002*.

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 haemophilia. We are headquartered in Bagsværd and have production facilities in Denmark, France, the USA, Brazil, South Africa, Japan and China. We have around 18,000 employees worldwide 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 2002. For more information, visit www.novonordisk.com/sustainability, where you can also download this report in English and Danish.

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