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UNIVERSITET

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# ENVIRONMENTAL REPORT



**2004**



Confirmed by:  
Gunnar Svedberg  
Vice-Chancellor of Göteborg University  
February 22, 2005

**The following sections/operations at GU have been certified according to ISO 14001:**

University management (No. 3750 M)  
Joint administration (No. 3750 M)  
Tjärnö Marine Biological Laboratory (No. 3764 M)  
HDK Stenebyskolan (No. 3925 M)



**The following sections/operations at GU have been EMAS-registered: REG. NO. S-000256**

University Management (No. 3750 E)  
Joint Administration (No. 3750 E)  
Tjärnö Marine Biological Laboratory (No. 3764 E)  
HDK Stenebyskolan (No. 3925 E)



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**Image, cover: Göran Olofsson, Göteborg University**

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## 1. Introduction by the Vice-Chancellor

Göteborg University (GU) has continued with its systematic and focused environmental work during 2004 with the aim of reducing its negative environmental impact. During the year, the joint administration, the Tjärnö Marine Biological Laboratory and the University management carried out certification audits, resulting in ISO 14001 certification and EMAS registration. The University aims to certify all its operations during 2005 and it is heartening to note that all the faculties are working intensively to achieve this aim.

The environmental work has been integrated to a large extent into research, education and administration. The environmental management system offers further opportunities for an overall improvement in efficiency and resource management within the University's operations.

Examples from the past year include:

- Host for the international consultation "Learning to change our world"
- Implementation of GU's web-based chemical handling system has commenced
- The Climate and Mobility graduate school
- Environmental training for 83% of the personnel
- Replacement of environmentally hazardous chemicals
- Continued development of the Environmental portal
- The Science Festival on the theme "The Meaning of Life and Sustainable Development"
- The Environmental Innovation of the Year Award
- The setting up of an Environmental Unit

In this Environmental Report it can be seen that many units and employees have devoted a great deal of time and effort to realising our environmental policy and achieving the objectives included in the environmental activity plan as well as the local objectives and activity plans. Despite a heavy workload and the many demands made on their time, there has once again been considerable involvement on the part of the employees.

The importance of the University working actively for a better environment and sustainable

development has also been emphasised in our new aims document "Göteborg University 2010", which states:

*"Göteborg University in particular has a key role to play in the task of bringing about a sustainable society. Involvement in environmental issues is a characteristic feature of many of the faculties. Environmental awareness should also influence the way we conduct our work, both internally and externally".*

GU will thus in the future be characterised by a significant build-up of environmentally oriented know-how and research as well as environmentally adapted activities.

Göteborg, February 22, 2005

Göteborg University

Gunnar Svedberg  
Vice-Chancellor

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ronment and sustainable development are highlighted in the course register on the GU website.

4. The environment portal will become one of Sweden's most visited popular science websites with a focus on the environment and sustainable development.

5. Within the framework of public and popular science events the number of elements of the environment and sustainable development will increase.

6. The University will by 2005 at the latest be certified according to the ISO 14001 standard for environmental management systems.

7. The University will increase the number of products where environmental demands have been made in

1) The number of hits in relation to other websites.

1) The number of elements during the year.

1) The number of certified faculties.  
 2) The number of certified departments, schools and institutes.

1) The number of purchased products with an environmental demand.  
 2) The number of

opment in the course register and in the course catalogue.

1) LD 1) Marketing and running the environmental portal

1) ☺ 1) Increase the number of elements of sustainable development in popular science events.  
 2) GAME is developing co-operation.  
 3) Arrange a conference on the environment and sustainable development.  
 4) Arrange a series of seminars on the environment and sustainable development.

1) ☺ 1) Develop, implement and certify an environmental management system according to ISO 14001.  
 2) ☺ 2) GU's Environmental Handbook will be updated on an ongoing basis.

1) LD 1) Make environmental demands on both the supplier's environmental work as well as the products purchased.

2) ☺

Identification of courses has commenced, based on simple criteria, and the work will continue during 2005.

1) ☺ Results 2004: 3,100 unique visits per week. Comparable data from previous years is not available as the website has only recently been introduced.

1) ☺ Results 2004: During the year at least 263 public and popular science events took place that had an element of sustainable development (140 during 2003).  
 2) ☺ The doubling of the number of events is due, among  
 3) ☺ other things, to the Science Festival and the Learning  
 4) ☺ to Change our World conference.

1) ☺ Results 2004: Proceeding according to plan. The University management, the joint management and Tjärnö Marine Biological Laboratory were certified according to ISO 14001 on February 9, 2004. EMAS registration took place on February 13, 2004. HDK Stenebyskolan carried out a certification audit on January 13, 2005.

The focus is on certifying entire faculties. All faculties aim to be certified during 2005.

1) ☺ Results 2004: 70% of the general agreement procurements include environmental demands on the goods/services. All general agreement procurements ask some form of environmental question/make some form of environmental demand on the sup-

association with purchase and/or procurement.	general agreement procurements with environmental demands. 3) The number of purchase agreements with environmental demands.	3) ☺			plier's operations and products. The proportion of products purchased with an environmental demand cannot be stated as this follow-up requires better central systems and an increase in the demand for reporting from the suppliers and faculties.
8. The University will reduce its environmental impact in conjunction with business travel and transport.	1) The number of train kilometres of the total volume of domestic travel – km. 2) The number of video and computer conferences.	1) LD 2) ☺	1) Ensure that environmental aspects are included in the GU travel policy. 2) Work to increase the use of video conference equipment.	1) ☺ 2) ☺	<u>Results 2004:</u> The number of train-kilometres has been reduced and the cost of domestic flights has remained on the same level as 2003. In addition, air travel has become cheaper during the year. This is an indication that the key figure is moving in the wrong direction. This conclusion is drawn despite the fact that there is no basis for computing the key figure.
9. The University will increase the proportion of waste sent for recycling of materials to at least 50%.	1) The volume of waste sent for recycling as a proportion of the total volume of waste.	1) ☹	1) Increase the proportion of waste that is recycled. 2) Update and adopt a Refuse Plan. 3) Develop an environmentally adapted refuse handling system.	1) ☹ 2) ☺ 3) ☹	<u>Results 2004:</u> 29% of all waste is composted or recycled. The aim has therefore not been achieved although the conditions for achieving the aim have been improved considerably following the work done during the year. A revised waste plan was adopted during the year. A sorting at source project has been initiated/completed at several faculties.
10. The University's environmental impact resulting from the use of chemical products will be reduced.	1) The phasing out of hazardous chemical products. 2) Developing laboratory methods that require lower volumes of chemical products.	1) ☺ 2) ☺	1) Develop a handbook for the handling of chemicals in an environmentally adapted way. 2) Formulate guidelines for eliminating certain chemicals. 3) Implement the GU chemical register system.	1) ☺ 2) ☺ 3) ☺	<u>Results 2004:</u> Positive trend – GU has adopted a handbook for environmentally adapted handling of chemicals. GU has also acquired the chemical handling system "KLARA". Implementation of the system has commenced. There are many good examples on the operational level where environmentally hazardous chemical products/chemicals have been phased out. The development of laboratory methods that require fewer chemicals is continuing.
11. The University will reduce electricity con-	1) kWh/m <sup>2</sup> (electricity + district heat-	1) ☺	1) Take measures to reduce electricity consumption.	1) ☺	<u>Results 2004:</u> Annual electricity consumption and heating of premises remains largely unchanged com-

sumption in its operating premises by 5%	ing).	2) Work to bring about energy-efficient properties.	2) ☺ pared with 2003 and the target has thus not yet been achieved.
12. All the University's employees will have undergone some form of environmental training	1) The number of participants as a proportion of the total number of employees. 2) The total number of man-hours each year spent on training with an environmental orientation.	1) ☺ 1) Run appropriate environmental training for different personnel categories in accordance with identified environmental skills requirements for different positions. 2) LD	1) ☺ Environment and energy training for supervisors/heads of buildings has been carried out. <u>Results 2004:</u> A total of 323 people received environmental training within the environmental management system during 2004. A total of 3,904 employees have been trained, equivalent to 83%. The training was focused on specific personnel categories.

### 3. Environmental Management system

#### 3.1 Environmental Handbook

The Göteborg University Environmental Management System is a means of organising the environmental work. It is an aid in allocating responsibility, prioritising, communicating, following up and checking the work done to bring about a better environment.

The Environmental Management System has been compiled in the form of a handbook that describes how the environmental work is to be pursued.

The Environmental Handbook is built up in accordance with the requirements in the ISO 14001 standard and has been examined by both internal and external environmental auditors. The Environmental Handbook contains the headings listed below, all of which meet the requirements in the ISO 14001 standards. All routines need to be implemented if certification is to be achieved. To date, all the routines listed have been implemented at four units, the Tjärnö Marine Biological laboratory, Stenebyskolan, the Joint Administration and the University Management. These units have been ISO 14001 certified and EMAS registered. Many other units comply with some of the routines and therefore do not have that far to go to 2005 when the whole of the University will be certified. Within the University's diversified range of operations it is important to have a certain degree of flexibility in an Environmental Handbook to include all faculties and departments. It has therefore been made possible to change the routines in such a way that they suit each operating area as long as compliance with the basic routines is maintained. In this way it is possible for, for example, the School of Economics and Commercial Law to focus its environmental work in one direction whilst Sahlgrenska Academy focuses on other things.

The part of the Environmental Handbook that is most important for the individual employee is "Operational support", which contains a series of routines dealing with how University activities that represent a load on the environment should be handled. Operational support includes instructions on everything from the handling of chemicals to making purchases.

#### **The Environmental Handbook is structured as follows:**

- General requirements (4.1.1)
- Environmental policy (4.2.1)
- Environmental aspects (4.3.1)
- Legal and other requirements (4.3.2)
- Objectives, targets and programme(s) (4.3.3)
- Resources, roles, responsibility and authority (4.4.1)
- Competence, training and awareness (4.4.2)
- Communication (4.4.3)
- Documentation (4.4.4)
- Control of documents (4.4.5)
- Operational support (4.4.6)
- Emergency, preparedness and response (4.4.7)
- Monitoring and measurement (4.5.1)
- Nonconformities, corrective- and preventive actions (4.5.3)
- Control of records (4.5.4)
- Internal audit (4.5.4)
- Management review (4.6.1)

#### 3.2 Environmental policy

The Environmental Policy<sup>1</sup> describes the University's aims and principles within the environmental field and forms the basis for all the environmental work within the University. The policy is as follows:

- The overall aim of the environmental work at the University is to minimise all obvious harmful environmental impact and to counteract what are seen to be new negative environmental influences.
- The University will endeavour to make its students and personnel aware of environmental and development problems and, through existing know-how and the creation of further know-how, stimulate concrete activities that promote sustainable development.
- Environmental considerations will be incorporated into all decision-making processes, i.e. research, teaching, administration, management and technical functions, which will be characterised by environmental accountability.
- The University's personnel will endeavour to increase awareness of the importance of the environment and development issues and to work actively to gather, develop and disseminate knowledge within society.
- The University's environmental work will be improved gradually and the environmental policy will be revised continuously.
- The University will comply with all applicable environmental laws and regulations and other environmental requirements that involve the University.

<sup>1</sup> The University adopted an environmental policy on December 12, 1997, which was revised on February 25, 2000.

### 3.3 Environmental organisation and responsibility

The environmental organisation and responsibility are governed by instruction 4.4.1.1 in the Environmental Handbook. The following is a summary of the instruction.

*The University Board* makes overall decisions regarding environmental work.

*The Vice-Chancellor* makes decisions regarding environmental activities that affect the whole University. The Vice-Chancellor allocates duties, authority and resources in such a way that the University's environmental management system is implemented and followed up. Responsibility and authority are documented and communicated to facilitate efficient environmental management.

On the faculty and school level, the *Deans and the Heads of Department* are responsible for environmental work and for developing and implementing the environmental management system.

*The Environmental Director and the Environmental Co-ordinators* are appointed by the Vice-Chancellor and have overall responsibility for ensuring that environmental considerations are taken into account and that the environmental management system is maintained in accordance with the demands laid down in ISO 14001.

The environmental management work is led and co-ordinated by the GU Environmental Unit (established by the Vice-Chancellor on January 1, 2005). The Environmental Unit is led by the Environmental Director and administrative support is provided by two *Central Environmental Co-ordinators and an Environmental Audit Leader*. The Environmental Director assists the Vice-Chancellor and is the Vice-Chancellor's contact in environmental matters. It is the task of the Environmental unit to take the initiative/monitor and ensure that basic requirements in the environmental management system are laid down, introduced and maintained. The Unit is also responsible for reporting on the performance of the environmental management system, following up overall environmental objectives in accordance with the adopted operating plan and presenting proposals for ongoing improvement.

To co-ordinate and gain acceptance for this work within GU there is an *Environmental Co-ordinator Council Group*. The Group comprises environmental co-ordinators at the faculties/equivalent and is charged with the task of leading and co-ordinating the environmental work at each faculty. The group acts as a reference group, where different proposals within the environmental management system are discussed before being adopted by the Vice-Chancellor. The faculty representatives are also charged with the task of securing acceptance of the environmental management work of each dean

An *environmental representative* is appointed at each institute/department. The approximately 135 environmental representatives work with environmental tasks at each school/department directly under the head of department/departmental manager. The role of the environmental representative is to mediate information regarding environmental work, make environmental inventories/carry out surveys, provide proposals for the prioritisation and formulation of objectives and participate actively in the implementation, follow-up and audit of the environmental management system.

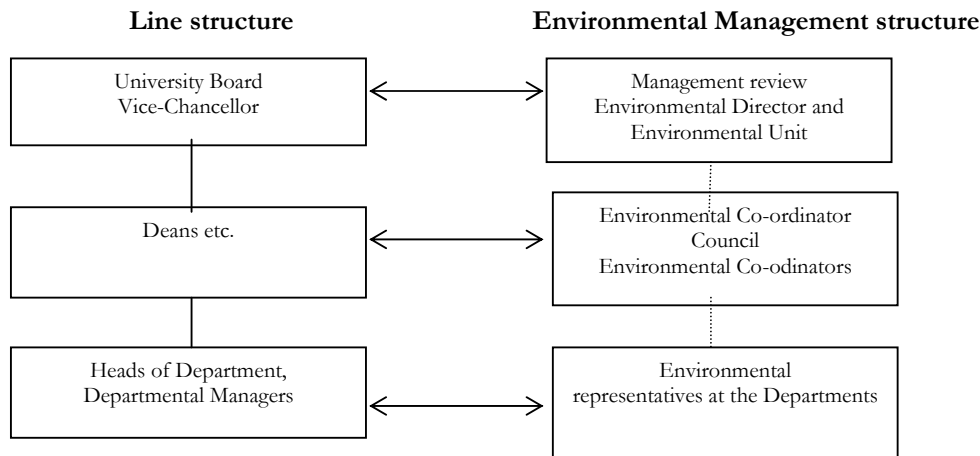


Figure 1: Organisation of the environmental field and its relationship to the University's organisation

Explanation: — = delegation, an assignment in the line organisation  
 ↔ = proposals, assignments, communication etc.  
 ..... = communication

### 3.4 Environmental objectives and activity plan

The University's Operational Plan 2004-2006 includes a number of strategically important objectives for the environmental work:

*Overall objectives:* Göteborg University will together with Chalmers be the leading university in Europe in education and research for sustainable development and the environment.

*Objectives for research and doctoral programmes:* Göteborg University will continue to profile itself within the environmental field.

*Objectives for other supportive, strategic areas:* Göteborg University will, no later than 2005, be certified according to the environmental management system ISO 14001.

During 2004, "Environmental objectives and activity plan for environmental work 2004-2006" were adopted. The environmental objectives were divided into four strategically important areas:

- Environmental objectives for Research and graduate programmes
- Environmental objectives for Undergraduate programmes
- Environmental objectives for Interaction and communication with society
- Environmental objectives for Internal environmental work

The results of the work and the University's environmental objectives are reported in Chapters 6-9.

The faculties have, in accordance with the Operational Assignment, broken down the University's environmental objectives and activity plan for environmental work 2004-2006 into its own faculty-specific environmental objectives and activity plans.

### 3.5 The University<sup>2</sup>

The arrangement of Göteborg University is that of a traditional European university with humanities, fine and applied arts, social sciences, education, medicine, odontology, nursing sciences<sup>3</sup> and natural sciences faculties as well as a School of Economics and Commercial Law, an IT University and an Education and Research Board for teacher training. There are currently some 70 departments and 15 central course programmes.

The University has 5,470 employees (57% women), which is equivalent to 4,725 full-time equivalents. Of these, around 465 are professors. The University had 2,400 postgraduate students, of whom 58% were women. During the year, 283 students graduated with a PhD (57% women) and 64 with a licentiate degree (48% women).

Göteborg University has one of the country's largest and most extensive range of course programmes. During the year students enrolled on around 125 programmes, with approximately 130 main subjects and around 1,900 independent courses. Around 51,000 students studied at the University during the year (equivalent to 26,700 full-year students), 67% of whom are women. A total of 4,800 students graduated.

During 2004, the University had SEK 4,112 million in income, of which SEK 2,720 million was in the form of grants and SEK 1,392 million was from external funding and other income. The University has a total of 392,000 m<sup>2</sup> of floor space and paid SEK 565 million in rent for these premises<sup>4</sup>, representing an average rent of SEK 1,441/m<sup>2</sup> per year.

#### **Göteborg University 2004**

**Number of employees: 5,470**

Employees as full-time equivalents: 4,725

**Students: 51,000**

Students as full-time equivalents: 26,700

**Professors: 465**

**Postgraduate students: 2,400**

**Course programmes: 125**

**Courses: 1,900**

**Floor space: 392,000 m<sup>2</sup>**

**Income: SEK 4,112 million**

<sup>2</sup> Annual Report 2004, Göteborg University.

<sup>3</sup> Education and research in medicine, odontology and nursing sciences are gathered within the Sahlgrenska Academy

<sup>4</sup> Including approximate costs for improvements to properties belonging to a third party.

## 4. The University's environmental impact and aspects

The most significant environmental aspects at the University take the form of:

- Research and education
- Travel and transport
- Use of energy
- Use of goods and services
- Waste and waste handling
- Use of chemicals and laboratory activities
- Paper consumption

For several of these aspects overall environmental objectives have been established for the University environmental activity plan. Each of the environmental objectives is reported later on in this report (see Chapters 6-9) together with the results achieved. Below is an account of the environmental impact of the more significant environmental aspects.

### **Research and education**

Produces positive effects through research projects, environmental science programmes, courses and graduate schools for virtually all the 15 national environmental objectives.

### **Travel – transport**

Travel and transport that involve the use of fossil fuels mainly have an impact on the climate, acidification and over-fertilisation of water and land, air pollution in urban areas leading to low-level ozone, and the use of non-renewable resources.

### **Energy use**

The use of fossil fuels has an impact on the climate, acidification, and over-fertilisation of land as well as the use of non-renewable resources. Use of nuclear power entails risks and generates waste problems. Hydroelectric power affects life both in and beside our rivers.

### **Use of goods and services – waste and waste handling**

Use of goods and services and the handling of waste have an impact on the environment in the form of climate-impacting gases, acidification and over-fertilisation of water and land (in conjunction with waste combustion), the use of land, water and non-renewable resources as well as breaches of the ecocycle in the form of waste and environmentally hazardous residual products.

### **Use of chemicals – Laboratory activities**

The University's use of chemicals and laboratory work produce effects in the form of thinning of the ozone layer, the effects of metals, the effects of organic environmental toxins and breaches of the ecocycle as well as waste and environmentally hazardous residual products.

### **Paper consumption**

Gives rise to transport, use of resources, emissions in conjunction with production and residual products/waste.

## 5. Environmental laws and environmentally hazardous operations

Environmental legislation is the absolute basic level for the University's environmental work. Compliance with the law is also a prerequisite for ISO 14001 certification and EMAS registration.

During the year, a new environmental legislation register was set up for Göteborg University. This extensive central register contains laws, ordinances, regulations, general advice and other requirements concerning the University's environmental work. Using the register as a base, the faculties then build up their own lists of laws and the parts that are applicable to their activities. The faculties' lists of laws then stipulate how compliance with legislation should be assured. The most common way to assure legal compliance is to formulate written working routines, although there are other ways of assuring legal compliance, such as environmental audits. The University's environmental unit has also formulated a series of routines and instructions to ensure that the University's operations meet the laws identified in the environmental legislation register. During the year, the faculties have worked on implementing these laws. Widespread introduction of working routines can be expected in line with the faculties achieving certification status.

An important change that has taken place during the year is the change in the rules surrounding cooling facilities, see freons. The total ban on all cooling facilities containing freon that was due to come into force on December 31, 2004 was changed at the end of the year, which means that these refrigerators etc. can be used until they have reached the end of their useful life. Without this change the cost of replacing cooling facilities would have been SEK 30-50 million. Now this phasing out can take place gradually in line with the scrapping/replacement of the cooling facilities.

### Activities that carry reporting obligations

The University has the following operations that carry reporting obligations:

- Laboratories for teaching and research
- Use of solvents (Medicinareberget etc.)
- Surface treatment using precious metals (School of Design and Crafts)
- Casting in metal (GoArt Organ Workshop)

The School of Photography and Film has been reclassified during the year as a non-environmentally hazardous operation as they are below the limit for photographic operations that carry reporting obligations as defined by the volume of developing paper. The reason is the fact that operations are moving over more and more to digital technology. This means two main things: activities at the University are subject to reporting obligations and they are environmentally hazardous. Firstly, the Environmental Administration Authority carries out continuous supervision of operations and secondly compliance with the ordinance governing internal controls by the body carrying out the activities is compulsory.

### Supervision

The local environmental administration makes supervisory visits on an ongoing basis within the University. There could be unannounced visits but generally they get in touch before they come. Supervision can take place anywhere in the University but the focus is on the operations listed above, which carry reporting requirements, i.e. GoArt, HDK, all laboratories as well as solvent use. During the year, a supervisory visit was made to the Botany Building. This resulted in a number of observations, which have been rectified.

### Internal control

“The ordinance governing internal control at a body carrying out an activity” means that GU must exercise control over its own activities. Responsibility for checking that the University does not do anything that is environmentally hazardous falls within the internal organisation and not within the local Environmental Administration or any other authority. Internal control and environmental management systems have many similarities. The fact that the University has an environmental management system helps us to satisfy the demands in this ordinance. Internal control involves the following:

- Established and documented allocation of organisational responsibility for environmental work.
- Routines for ongoing checks that equipment etc. are kept in good condition to avoid environmental disruption.
- Examining and assessing on an ongoing, systematic basis the operating risks based on the environment/health.
- A chemical register, a list of all chemicals that carry a labelling obligation.

## 6. Environmental sciences and sustainable development within research and graduate programmes

**Environmental aspects:** Produces positive effects through research projects and graduate schools in virtually all 15 of the national environmental objectives.

**Environmental objectives:** The University will work strategically to create competitive research environments with a focus on environmental sciences and sustainable development.

**Key figures:** Research funds, scientific publications and the number of PhDs.

**Results:** Within environmental science research, 31 scientific articles were identified during 2004. Sixteen of 314 PhD theses, equivalent to around 5%, were considered to be within environmental sciences and sustainable development.

### 6.1 Research within environmental sciences and sustainable development

In its operational plan for 2004-2006, the University writes that "Göteborg University will, together with Chalmers, be the leader in Europe in education and research within sustainable development and environmental sciences " and establishes an objective for research and graduate programmes that "Göteborg University will continue to profile itself within the environmental field".

According to the latest national inventory of environmental research in Sweden<sup>5</sup> there were 295 environmental researchers (equivalent to 166 full time positions) at Göteborg University. The researchers are to be found within departments with environmental and sustainable development as the primary activity as well as individual researchers/research groups with projects within environmental sciences and sustainable development at other departments.

During 2004, GMV<sup>6</sup> made an estimate of how many scientific publications within environmental sciences and sustainable development the University produces. The results are presented in Table 1 (see below). The summary is as follows:

"This key figure proved to be more difficult than we assumed. The difficulties are that it is very difficult to decide what is an environmental science publication and it is even more difficult to see what is a publication with sustainable development. Attempts have been made in two ways. One was a list of around 50 search words used when searching in SCI<sup>7</sup> and crossed with Göteborg University (with synonyms). This produces around 150-200 hits per year. Of these, only around 50-60 can be classified as related to environmental science. Many of the others use, for example, 'environment' in an abstract sense, e.g. within mathematics. The other method was to choose the obvious 'environmental periodicals' from the around 10,000 periodicals in SCI. This resulted in just 230 being selected. All articles in these periodicals that were written by employees at GU were identified. We then had a level of around 25-35 articles per year. It should be borne in mind that many articles with environmental science content are published in other periodicals that are not pure environmental periodicals, i.e. there is considerable underestimate. Nor are all periodicals included in SCI. If the same "mistake" is made systematically each year it is still possible to use these measurements to investigate trends. Our results indicate a considerable variation between the years, which in practice makes it impossible to draw any conclusions before very long series have been obtained."

Year	2000	2001	2002	2003	2004
Number of articles	31	33	20	23	31

Table 1: Assessment of the number of articles in SCI's "environmental periodicals"

#### Research funds

A database of research funds from different research funding bodies (Mistra, Formas, the EU and the National Environmental Protection Agency etc.) will, according to information received, be drawn up jointly for the University during 2005. At the present time there is no such list.

<sup>5</sup> Report 5112, *Svensk miljöforskning – en omfattningsundersökning*, National Swedish Environmental Protection Board, 2000.

<sup>6</sup> GMV, Centre for Environment and Sustainability, was assigned the task of preparing this list.

<sup>7</sup> SCI, Science Citation Index indexes more than 5,700 major journals across 164 scientific disciplines, including life sciences, physical, chemical and earth sciences, biology and environmental sciences. Besides the usual options it is possible to search by cited author or cited work.

## 6.2 Postgraduate programmes within environmental sciences and sustainable development

Göteborg University has around 2,500 active graduate students. The graduate programmes within environmental sciences and sustainable development are to be found within certain specific graduate programme subjects such as environmental science and human ecology but also within specially oriented projects within other graduate programme subjects. At the graduate schools there is the opportunity to co-ordinate such projects to obtain a holistic view of the problems.

### Graduate schools

As part of the investment in sustainable development, Göteborg University started a graduate school, "Climate and Mobility", in 2002 specialising in climate impact linked to transport. This graduate school is trans-disciplinary and currently has 20 graduate students at 15 departments within five faculties. In 2002, there were 11 graduate students. All participants are working on their own projects within their respective disciplines but within the graduate school they also take part in joint activities in the form of seminars, courses etc.

Apart from "Climate and Mobility" there are other graduate schools within environment sciences and sustainable development, such as "Environmentally adapted city", "Atmosphere and Environment", "Sustainable Energy and Material Turnover", "Natural Materials Specialising in Climate and Cultural Care". The last area has 11 graduate students registered whilst the others are kept together by a number of postgraduate courses.

### PhDs

In 2004, 314 PhD defences took place at Göteborg University. According to an assessment made by the Centre for Environment and Sustainability, GMV, sixteen defences, equivalent to around 5%, were within environmental sciences and sustainable development.

Year	Theses within environmental science	Theses within environmental sciences and sustainable development
2004	4	16
2003	6	17
2002	3	13
2001	7	20
2000	4	15
1999	2	14

Table 2: Assessment of all the University's PhD theses<sup>8</sup>

The number of active postgraduate students within the different subject areas can be seen in LADOK<sup>9</sup>. Around 66 of the 2,500 active postgraduate students (equivalent to 2.6%) are within subject areas that are deemed to be environment sciences and sustainable development. There is an inherent difficulty in deciding which postgraduate subjects belong to the area of environment sciences and sustainable development. Students addressing a problem area dealing with environmental sciences and sustainable development but who are in a subject area such as business administration, which does not normally deal with sustainable development, are missed.

## 6.3 Centre for Environment and Sustainability, GMV

To co-ordinate and reinforce research and education within environmental sciences and sustainable development the Centre for Environment and Sustainability runs a network, including researchers and departments at Göteborg University. Some 215 teachers, researchers and postgraduate students from the University are currently linked to the network, which has a total of 670 persons. The other people in the network come from Chalmers, other universities and colleges in the region, research institutes, municipal authorities, the region and industry.

Category/Year	2000	2001	2002	2003	2004
Teachers and researchers	104	108	111	121	136
Doctoral students	59	62	51	73	79

Table 3: Number of researchers/postgraduate students from GU linked to the GMV network

<sup>8</sup> The assessment was made by examining the title and the abstract. Within the group of theses dealing with the environment and sustainable development, environmental economics, environmental law and environmental medicine are included.

<sup>9</sup> LADOK is the University's central register of students and postgraduate students and their achievements.

## 6.4 European Panel for Sustainable Development, EPSD

EPSD is an independent research-based network established in 2004 by Göteborg University, Chalmers University of Technology and Lund University with its base at the Centre for Environment and Sustainability, GMV. EPSD also includes individual researchers from other European universities; Charles University in Prague and the London School of Economics, and the aim is to expand the network in line with operations. The aim is to act as a platform for a dialogue between researchers, opinion-makers and politicians. The operational idea is currently being developed and the aim is to acquire an overview and holistic approach to matters that are important within sustainable development in Europe and the world. Acting as a bridge between politics and science is the bearing factor of EPSD. In order for scientific research results to be reflected in policy with measures that really lead to something, it is required that the politicians have access to facts and that they are fully aware of the issues on which there is reasonable consensus among researchers.

During 2004, a report<sup>10</sup> was prepared by researchers from several European universities within the framework of EPSD with the aim of critically examining the EU's strategy and policy development for sustainable development. The report shows how the EU has handled this decision about using sustainable development as an overall guiding principle. The report was presented at a well-attended seminar at the Swedish Embassy in Brussels on September 20, 2004. The EPSD has also recently issued a second report, "Is the Kok report sustainable?"<sup>11</sup>, which examines the mid-point evaluation by the Wim Kok Group of the Lisbon strategy. The background to this EPSD report is that the Kok Group in several central issues came to different conclusions than the EPSD. The reports have aroused considerable interest and were front-page news in the newsletter Environment Daily, which reaches a broad body of the EU "environmental policy-makers" throughout Europe. In addition, EPSD was invited to write an article in another reputable journal, Challenge Europe, which is published by the European Policy Center in Brussels.

## 6.5 Environmental innovation of the year

A group of researchers at Göteborg University, led by Professor Magnus Willander, took on the task of developing a cost-effective light-emitting diode for the emission of white light. Light-emitting diodes are more effective and use much less energy than bulbs but up to now it has been complicated and expensive to generate white light. The solution is to be found among researchers within nanotechnology with zinc oxide as a semi-conductor. The photonic material qualities of zinc oxide in combination with advanced nanostructures make possible four times higher light intensity than what is currently available at a fraction of the price. The group was awarded first prize in Environmental Innovation 2004 for these research results.

## 6.6 Environmental medicine award

The Cancer and Allergy Fund Environmental Medicine Award is presented each year to two researchers who have made pioneering discoveries within the field of cancer and allergy. Agnes Wold, associate professor of clinical immunology at Sahlgrenska Academy, was awarded the 2004 Cancer and Allergy Fund Environmental Medicine Prize. Agnes Wold received the award for her research into what causes allergies. In 2000, her research group received just over SEK 6 million from the EU to conclude the so-called Flora Study. This study examined the explanation for allergies in bacteria flora in the intestines of small children. This new theory was at that time only supported by a small number of researchers. The capacity of the immune system to distinguish between what is harmful and what is harmless appears to depend on the intestinal flora one grows up with. Research on test animals has shown that those that were brought up without bacteria cannot develop oral tolerance. No one knows why this is the case but in the Flora Study children have been followed since the time before they became allergic. This was done to show that differences in early intestinal flora are of major significance to the development of allergies.

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<sup>10</sup> [From Here to Sustainability - Is the Lisbon/Göteborg agenda delivering?](http://www.gmv.chalmers.se/epsd/) EPSD, Final Report 2004-12-01, <http://www.gmv.chalmers.se/epsd/>

<sup>11</sup> "Make the Kok report sustainable!". Report No. 2 2004-12-01, EPSD, <http://www.gmv.chalmers.se/epsd/>

## 7. Environmental sciences and sustainable development in undergraduate programmes

**Environmental aspects:** Produces positive effects through programmes, courses and course sections on virtually all the 15 national environmental objectives.

**Environmental objectives:** Environmental sciences and sustainable development will be integrated to an increasing extent into undergraduate programmes.

**Key figures:** The number of course programmes and courses where environmental sciences and sustainable development are included.

**Results:** At the University there are five programmes with a significant element and 21 programmes with a certain element of environmental sciences and sustainable development as well as 136 courses where the issues were mainly within environmental sciences and sustainable development and 215 courses where the issues were partly within environmental sciences and sustainable development.

One of Göteborg University's profile areas within undergraduate education is environmental sciences, in particular through the social science environmental science programme, which integrates social sciences and environmental sciences. The range of courses also includes subject areas such as human ecology, environmental science and "environment and health". Sustainable development does not exist as an independent subject area but elements of sustainable development are to be found in a number of courses. The University states in its operational plan for 2004-2006 that "Göteborg University will together with Chalmers be a leading university in Europe in education and research within sustainable development and environmental sciences".

In the Swedish Higher Education Agency's most recent national evaluation<sup>12</sup> of course programmes within the environmental sciences field at Swedish universities and colleges it was noted that the environmental programme at Göteborg University maintains a very satisfactory level of quality. It was also stated that during the four-year period 91 MSc degrees were taken in environmental science at Göteborg University and 247 at other universities and colleges. This means that the University accounts for 27% of these degrees.

### 7.1 Course programmes that include environmental sciences and sustainable development

At Göteborg University there are five programmes (4%) with a large element of environment and sustainable development and 21 programmes (17%) with a certain element of environmental science and sustainable development of a total of 124 course programmes. Ninety-eight programmes (79%) still lack defined elements of environmental science and sustainable development. Within the five programmes with a greater element of environmental science and sustainable development, a total of 35 MSc degrees were taken during 2004. The assessments have been made using the same criteria as for individual courses (see section 7.2).

#### Programmes in which the environmental sciences and sustainable development feature strongly

1. Environmental science programme, specialising in natural science, 160 credits
2. Natural science problem-solving, specialising in physics, mathematics or environmental science, 160 credits
3. Social sciences environmental science programme, 160 credits
4. Environment and health protection, 80 credits (Master's programme),
5. Ecotoxicology, 80 credits (Master's programme).

#### Programmes with elements of the environmental sciences and sustainable development

1. Conservation of built environments programme, 160 credits
2. Biology programme, 120/160 credits
3. Building crafts, 120 credits
4. Design, 120 credits
5. Design, advanced course, 80 credits
6. Europe programme, 160 credits
7. Fishing conservation, 160 credits
8. Public health science programme, 120/160 credits
9. Earth sciences programme, 120/160 credits
10. Law (Programme for the Bachelor of Law degree), 180 credits
11. Chemistry programme, 120/160 credits

<sup>12</sup> Evaluation of course programmes in environmental science, environmental technology and environment and health protection at Swedish universities and colleges. Swedish National Agency for Higher Education Report Series 2003:10 R.

12.	Conservationist programme, 160 credits
13.	Diet and health programme, 120 credits
14.	Medical programme, 220 credits
15.	Teacher training programme, 120/140/160/180/200/220 credits. All teacher training students take course LAU150/LAU160, The Human Being in the World 1: Know-how is developed in a sustainable society, 10 credits.
16.	Marine studies programme, 120/160 credits
17.	Marine sciences, 80 credits (Master's programme)
18.	Nature conservation biology programme, 160 credits
19.	Psychology programme, 200 credits
20.	Ranger programme, 160 credits
21.	Hospital physicist programme, 180 credits

## 7.2 Courses with an element of environment and sustainable development

At Göteborg University there are 1,809<sup>13</sup> courses that can be applied for as individual courses, of which 136 (7.5%) have their primary focus on environmental sciences and sustainable development, 215 (11.9 %) have part of their focus on environmental sciences and sustainable development. 1,458 (80.6%) courses still lack defined issues within environmental sciences and sustainable development.

Courses/Criteria and assessment level	I	II	III	Total
Independent courses	115	180	1,106	1,401
Distance learning courses	2	7	33	42
Internet University	11	10	79	100
Evening courses	5	15	218	238
Summer courses	3	3	22	28
<b>Total</b>	<b>136</b>	<b>215</b>	<b>1,458</b>	<b>1,809</b>
<b>%</b>	<b>7.5</b>	<b>11.9</b>	<b>80.6</b>	

Table 4: Assessed courses within environmental sciences and sustainable development.

### Assessment criteria

The criteria are based on the general definition of sustainable development as stated in the Brundtland Commission "Development which satisfies current needs without compromising the ability of future generations to meet their needs" as well as the examples stated in Agenda 21<sup>14</sup>.

The assessment is made on three different levels:

- I. Courses where the issues are mainly within environmental sciences and sustainable development. The course is based on a central issue pertaining to ecological, economic or socially sustainable development. Elements of ecological, economic or socially sustainable development are included as more than half of the total course content.
- II. Courses where the issues are partly within environmental sciences and sustainable development. The course is built up around a central issue, which is not directly related to ecological, economic or socially sustainable development. Elements of ecological, economic or socially sustainable development are part of the course in order to understand the totality. These elements comprise less than half of the total course content.
- III. Courses that lack issues within environmental sciences and sustainable development. The course lacks elements of ecological, economic or socially sustainable development or only deals with these issues marginally and as examples without making an attempt at a definition of sustainable development.

<sup>13</sup> There are a further 500 or so courses in the system which are either not being run at present or which are only run as a course within a programme and are therefore not advertised as independent courses.

<sup>14</sup> Agenda 21, the final document from the UN conference on the environment and development held in Rio de Janeiro in 1992. The document was later ratified by the Swedish Parliament and translated into Swedish.  
<http://www.mls.miljo.gu.se/agenda21/>

### **Case study within sustainable development**

During 2004, the Centre for Environment and Sustainable Development was for the third year host for a case study within sustainable development. This time the theme was "Sustainable development based on the local community's needs and wishes" and dealt with the district of Majorna in Göteborg.

A total of 17 students from different subject areas at Göteborg University and Chalmers University of Technology studied together within the framework of a ten-credit case study course. In addition, six researchers/supervisors and a large number of players within the case took part. The results from the case study were reported orally at a presentation in Majorna and in written form in a case study report.

### **7.3 Reports from the faculties**

Within the faculties' feedback on environmental work during 2004 a number of positive examples have been taken up. The Education and Research Board for Teacher Training (UFL) writes "In the bill "Renewed teacher training" (Bill 1999/2000:135) it was confirmed on page 18: "Knowledge of ecological events for life on earth and basic knowledge in environmental work and preservation of biological diversity should be part of all teacher training". It also states that the teacher-training programme contains six optional specialisations that include environmental sciences or sustainable development.

The School of Economics and Commercial Law writes that the economics course includes the following elements: B-level: Environmental Economics 5 credits and on the C/D-level: Environmental Economics – international issues 5 credits, Economic Evaluation 5 credits.

## 8. Interaction with the community

### 8.1 Development of the Environmental Portal

**Environmental aspect:** Research and education: Generates positive effects through research projects, environmental science programmes, courses and graduate schools in virtually all fifteen national environmental objectives.

**Environmental objectives:** The Environmental Portal<sup>15</sup> will be one of Sweden's most visited popular science websites dealing with the environment and sustainable development.

**Key figures:** The number of hits in relation to other similar websites.

**Results:** 3,100 unique visits per week. Comparative data from previous years is not available as the website has just been launched.

The Environmental Portal is a popular science website, which presents research in environment and sustainable development in a general and easily understood way. The Portal is aimed primarily at young people of high school age and should reflect the considerable breadth and diversity that exists within research around environmental science and sustainable development at Göteborg University and Chalmers University of Technology. The environmental portal also functions as a tool for researchers and graduate students by acting as a platform that facilitates popular science publication.

During the year, the Environmental Portal was developed further and as the original publication system had a number of operating problems during the first half of 2004 it was replaced by a new system. In conjunction with commissioning of the new system in August 2004, the Environmental Portal was launched for a broader general public.

#### Marketing

The Environmental Portal has been marketed from the first pages of the GU and Chalmers' websites. The GU website had a link from the first page for a couple of weeks in spring 2004. At Chalmers the link has been on the first page since spring 2004. At GU the Environmental Portal is linked to, among other things, the GU central research pages and at Chalmers from the link collection of popular science pages. The Environmental Portal is also clearly linked from the GMV website. The Environmental Portal has been marketed by e-mail to the GMV network. The Portal has been marketed to individual high schools in Göteborg in conjunction with user tests for students and study days for teachers. Flyers have been produced and distributed at trade fairs, e.g. on the GU stand during the Book and Library Fair. An advertisement has been run in the newspaper "Ett23" which was sent to all high school students in GR (the Gothenburg Region Federation of Municipal Authorities) in December 2004.

#### Number of visitors

The key figure is based on visitor statistics for July-December 2004 as it was only after the mid-year point that the website was up and running without any problems. During these 26 weeks, 81,200 unique visits were noted, which is an average of 3,100 unique visits per week. Extrapolated on an annual basis this would mean 162,400 unique visits per year<sup>16</sup>. The key figures are rounded off to the nearest hundred.

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<sup>15</sup> See [www.miljoportalen.se](http://www.miljoportalen.se)

<sup>16</sup> The term 'unique visits' means the number of surfs done on the website. If a visitor leaves the website completely and returns later, this is registered as a new visit.

## 8.2 Environment and sustainable development in public/popular science events

**Environmental aspect:** Research and education: Generates positive effects through research projects, environmental science programmes, courses and graduate schools in virtually all fifteen national environmental objectives.

**Environmental objectives:** The number of features dealing with the environment and sustainable development will increase within the framework of public and popular science events.

**Key figures:** The number of features/lectures/seminars with a focus on the environment and sustainable development registered in the University calendar, as well as features on University TV.

**Results:** During the year there were at least 263 public and popular science events with features related to sustainable development (140 in 2003). The doubling of the number of events is due mainly to the Science Festival and the Learning to Change our World conference. Two conferences were run with open lectures, the content of which dealt to a large extent with the environment. GMV, Tjärnö MBL, the Department of Applied Environmental Science, the School of Economics and Commercial Law and the Department of Home Economics are those units that have contributed most to this success.

Co-operation with the community is the University's third primary task alongside research and education. The content of the assignment is very broad and could involve public lectures, involvement in television, conferences, debate articles, collaborative projects with industry and information to society about research results etc. Including all these events, projects and information is impossible but in the university calendar the most important and the "most public" events are included. These have also been supplemented with material from the faculties. The following is a selection of the material gathered.

### Learning to Change our World

During the year, Göteborg University was host for an international conference. This was arranged in collaboration with Chalmers University of Technology, the Ministry for Education and Science, the City of Göteborg and Universeum and lasted for four days in May. The theme was "Learning to Change our World" and 350 delegates from over 70 countries took part. The starting point was that teaching is a key to successful work, involving the complex questions that fall within sustainable development. Consultation was marked by a large degree of openness and the hospitality in Göteborg was considerable, both during the opening ceremony and when the delegates visited a number of different operations during a morning.

"Children must learn to think in an environmental way as early as pre-school," explained Ingrid Pramling, Professor of Education at Göteborg University. "Pre-school teachers have by tradition low status and yet it is at pre-school that you use the child's reality as a starting point and show the links that exist in nature."

Most applause was received by Nshemereirwe Peruth, a student from Makerere University, Uganda, who made the strongest impression. She pointed out that there are many aspects of sustainable development and what is self-evident in the rich is not as self-evident in other parts of the world.

"How can you talk about sustainable development when in certain countries there is no development whatsoever?"

The event was a major success and was concluded by Gunnar Svedberg, Vice-Chancellor of Göteborg University, and Jan-Eric Sundgren, President of Chalmers, promising to arrange a new conference for teaching on sustainable development in three years. The Vice-Chancellor and President also promised to work to ensure that 2005-2014 really is the decade for sustainable development that UNESCO has called for.

### The Science Festival

As one of Europe's main popular science events the Science Festival is a means of presenting research and science in an understandable way at the same time that it is a meeting point for researchers and the general public. The main theme for 2004 was *The Meaning of Life* and the sub-theme was about *Sustainable Development*. These themes generated 69 elements of environment and sustainable development. The following are just some examples:

- Lost resources
- Cyber food on the plate
- From the poorhouse to the environmental house
- Food and the ecocycle
- Edible plastic
- Purchasing sustainably
- Become a Planet Pilot
- Textile Hearts and the Tree Of Life
- Build your own ecocycle sculpture
- Hydrogen and fuel cells – keys to a sustainable society
- Workshop ecology and gastronomy in interaction – a sustainable design?

### Centre for Environment and Sustainability (GMV)

During 2004, the Centre for the Environment and Sustainability<sup>17</sup> arranged during 2004 individually or in collaboration with another party, 55 events with an element of environment and sustainable development. Thirty-two of these were arranged in conjunction with the international conference "Learning to Change our World" on May 4-7.

GMV arranged a series of seminars under the heading Environmental Perspectives during autumn 2004. The nature of the series was popular science and was directed at students and the general public. During the autumn, it was possible to, among other things, find out about the environmental situation in Göteborg, listen to Birgitta Dahl and Allan Larsson, find out more about wild boar and a hay bale building. The series was planned for eight Wednesday evenings in October and November. One lecture was cancelled as a result of illness. On average, there were 70 people at each lecture and the majority of the visitors were students on university level. Another large target group was people working in industry and the public sector within environment/sustainable development. One of the lectures was also delivered as a lunch seminar during the University Week and was attended by 180 people. In total, the series attracted around 670 people.

Another way of communicating with society and putting across know-how, research results etc. is through "Environmental Impulse West" which is a joint arrangement between GAME and Environmental Managers in Industry.

### University TV<sup>18</sup>

During the year, University TV had 22 elements of sustainable development. Six of these were in programmes broadcast on the Open Channel in direct collaboration with the international conference Learning to Change our World on May 4-7. The following are some examples of other elements from the University TV.

- "*Annamox*" – Pia Engström, Marine Chemistry, talked about the bacteria annamox, which transforms nitrogen pollutants into pure nitrogen without forming harmful greenhouse gases.
- "*Permafrost*" – Researcher Torben Christiansen from Lund University has arrived at the conclusion that plant life in Stordalen, south of Abisko, has changed tangibly.
- "*Thermal spraying*" – An interview with Per Nylén, PhD, on thermo spraying via computer simulation
- "*Sustainable development*" – An interview with Minister for Education and Science Tomas Östros on learning for sustainable development

### University week

For the seventh year in succession Göteborg University arranged University Week ([www.gu.se/universitetsvecka](http://www.gu.se/universitetsvecka)) with a whole series of popular science lectures over a period of 10 days. In 2004, five were linked to environment and sustainable development, including:

*"Göteborg 1950 to 2050" – visions of the future, past and present.*

Professor emeritus Emin Tengström, Human Ecology, Göteborg University, and Johan Swahn, Tech. Dr., project leader Göteborg 2050, Physical Resource Theory, Göteborg University/Chalmers spoke about the past and the future.

*"The acorn barnacle – a friend or foe."* How terrible is the acorn barnacle really and how far should we go to prevent it from becoming attached to our boats? Mia Dahlström, Marine Ecology

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<sup>17</sup> See [www.gmv.gu.se](http://www.gmv.gu.se)

<sup>18</sup> [www.gu.se/universitetsTV/](http://www.gu.se/universitetsTV/)

### School of Economics and Commercial Law

During the year, the School of Economics and Commercial Law ran a whole series of events. The Environmental Economics Unit, under the leadership of Professor Thomas Sterner, ran the majority of the events although the Department of Law was also well represented with a number of seminars and commissioned courses on environmental law. The Department of Business Administration and Cecilia Solér lectured on the theme "Why do more consumers not buy environmentally adapted food?"

When the City of Göteborg and others awarded the Göteborg International Environmental Prize the School of Economics and Commercial Law arranged lectures with the two prize-winners under the title "Money makes the world go around – a seminar on sustainable investment".

### Faculty of Education

Sustainable development and the subject domestic science are linked very closely. Perhaps due to a large extent to the fact that the development problems we are facing today are largely linked to the daily choices and decisions made by people and households. The Department of Domestic Science (IHU) also runs a series of lectures, including a successful workshop during the major international Learning to Change our World conference. *Ecology and gastronomy in interaction – a sustainable design?* The workshop was a joint arrangement between university lecturer Helene Wählander, university lecturer Susanne Dahlgren, university lecturer Ulf Wagner, university lecturer Hillevi Prell, Professor Helena Shanahan, students on the teaching programme, specialising in home economics and consumer studies, and Monika Mårtensson and domestic science and consumer studies students at Sannaskolan.

IHU also gave a number of lectures during the Science Festival, see separate chapter. The following are some examples of other events arranged by IHU:

- *"Residential perspective on waste management in Västra Hamnen, Malmö"*. Helena Åberg, PhD.
- *"Development of sustainable systems for waste and sewage. A household perspective"*. Helena Åberg, PhD.
- *"Local and global Ecosystems and Their Relationship to Globalisation – Example of Family Diets"*. Professor Helena Shanahan.
- *"Reflections on households as players in moving towards a sustainable society"*. On the prerequisites, needs and communication of households. Helena Åberg, PhD.
- *"Situation in the world and sustainable development"*. At the Attractive School conference, Professor Björn Andersson (IPD) delivered a statement on how teaching on this theme could renew the school's content in science and social science subjects.

### Faculty of Science

Here the majority of public and popular science events are run each year. Particularly visible is the Tjärnö Marine Biological Laboratory (TMBL) and the Department of Applied Environmental Science.

TMBL ran a series of popular science evening lectures on the ocean and the ocean environment for the general public. Applied Environmental Science and the Botany Building had lectures on, for example, alternative hull paints and had several debate articles in the newspaper GP. Furthermore, the Environmental Science programme at Göteborg University celebrated its tenth anniversary with a seminar on what we can learn from the environmental consequences of the tunnel construction through the Halland Ridge.

## 9. In-house environmental work

### 9.1 Certification ISO 14001

**Environmental aspect:** Affects all the University's principal environmental aspects and their impact on the environment.

**Environmental objectives:** GU will by 2005 at the latest be certified according to the ISO 14001 standard for environmental management systems.

**Key figures:** 1) Number of certified faculties = 0

2) Number of certified departments/equivalent within each faculty = 12

**Results:** During 2004 the University management, the Joint administration and Tjärnö Marine Biological Laboratory received ISO 14001 certification as well as EMAS registration. In February 2005, HDK Stenebyskolan also managed this. Almost all faculties have worked internally to implement the environmental management system. They have all worked actively to create the conditions for certifying operations during 2005.

GU aims to certify, according to ISO 14001, the whole of its operations during 2005. Happily, the university management, the joint administration and Tjärnö Marine Biological Laboratory have undergone certification audits subject to the requirements in ISO 14001 and EMAS. The units received ISO 14001 certification on February 9, 2004 and EMAS registration on February 13, 2004. During 2004, there has been intensive work to induce the faculties to promote, develop and co-ordinate their environmental management. Several faculties are now in line to be certified at the beginning of 2005 – which is very encouraging. During 2004, Stenebyskolan worked intensively with the environmental management system with the ultimate aim of certification. A certification audit took place on January 13, 2005 and in February 2005 they received ISO 14001 certification and EMAS registration.

GU has constantly had the ambition that environmental management should be firmly accepted on the operational level. It should not be controlled from the top by the management. This work has been run with a certain degree of success but has come to a situation where only locally involved employees are not enough to achieve the objectives. A management system requires strong support from the management and that the system is integrated into the normal operational structures and processes.

The plan to certify the whole of GU according to ISO 14001 has proceeded in such a way that in the first stage certain operations are permitted to be "test pilots/predecessors". These operations have been selected as they are strategically important: the university management, and the joint administration and also the fact that they have been positive to the idea of certification: the School of Economics and Commercial Law, the Tjärnö Marine Biological Laboratory and Stenebyskolan. This thus includes a cross-section of the whole of GU as the top management, all central/joint departments/staffs, one faculty and two units within different faculties have been included. When these operations have been certified, lessons and experience will be drawn to move on in the task of certifying the whole of GU. Apart from the School of Economics and Commercial Law, all operating areas have been certified. The School of Economics and Commercial Law chose to prioritise its quality work in 2004 and became EQUIS<sup>19</sup> accredited on November 25, 2004.

The environmental co-ordinators who have been the driving force among the certified units have all received new assignments to promote and co-ordinate the environmental management work at different faculties. The GU Environmental Handbook has been formulated so that it is directed at GU as a whole as well as on the faculty level. During 2004, intensive work has thus been carried out so that whole faculties/equivalents will co-ordinate the faculty's environmental work into their own operationally adapted environmental management system. Below is a presentation of the results of this work. An important part of this process has been the fact that the faculties have acquired a clear operational assignment with regard to the environmental management work.

<sup>19</sup> EQUIS = The European Quality Improvement System (EQUIS) is an international system for the quality assurance of higher education within economics and management.

### Operational assignment to the Faculty Board

"The work on the environment and sustainable development is governed by the Operational Plan 2004-2006 and the board's decision regarding an environmental policy.

The board will work to ensure that the objectives in the Operational Plan are achieved by:

- formulating environmental objectives for the board's area based on the joint university environmental objectives and formulating an internal activity plan for environmental work based on the joint university activity plan for environmental work,
- report activities, measures and results from the work of the board on the environment and sustainable development during the budget year 2004 as a basis for the University's feedback on the government assignment to introduce an environmental management system,
- apply routines and instructions according to the Environmental Handbook and, if necessary, formulate internal routines and instructions,
- plan and implement an internal environmental audit.

The faculty board will by the end of 2005 at the latest carry out an external environmental audit and certify the operations according to ISO 14001."

### Environmental work at faculties and departments

The Faculty of Science and the School of Economics and Commercial Law have adopted their own environmental objectives. Other faculties are also working on their environmental objectives and they will be adopted during 2005.

No faculty has its own adopted activity plan for environmental work. However, the Faculty of Science has adopted the measures/activities that have been proposed to achieve the adopted environmental objectives. The majority of faculties aim to adopt their activity plans during the first half of 2005.

As regards the use of GU's Environmental Handbook some state that they use the routines and instructions on the "medium level" and in particular they apply what is under "Operational Support". The majority of faculties state "low level" and report that as a faculty they have been late in getting under way with their environmental work but that the Environmental Handbook is used to a larger extent out at the institutions and departments.

As regards the formulation of in-house routines and instructions, some state that they have on a low or intermediate level formulated in-house instructions. Several state that this work is done more at the departments. Several faculties state that they have not formulated their own handbook yet but follow the joint manual for GU.

It is pleasing to note that all faculties have planned specific dates for internal environmental audits during 2005. Two faculties have already carried out an internal environmental audit:

- Faculty of Science on December 6-7, 2004,
- Faculty of Education on November 11, 2004.

The majority of faculties have the aim of certifying their operations during 2005. An environmental organisation has also been created and funds have been allocated for working on environmental objectives, activity plans and environmental management systems and certification. Some good examples are worth mentioning:

The Faculty of Social Sciences decided on June 9, 2004 to start a project to be environmentally certified by December 31, 2005 at the latest. The faculty board allocated funds for project co-ordination and payment to the departments for the involvement of the environmental representatives for a period of one and a half years. During the autumn, the environmental representatives underwent environmental training and worked in groups to produce proposals for environmental objectives and an activity plan.

At the Faculty of Science, work is in progress to introduce an environmental management system fully. The environmental work is run on a building-by-building basis within the faculty and each building has an environmental coordinator to lead the work. A great deal of effort has been devoted during the autumn and winter 2004 to acquiring a good structure for the handling of chemicals and waste in all buildings. The faculty management, the Botany Building, the Chemistry Building and the Swedish NMR Centre underwent internal environmental audits just before Christmas with satisfactory results and the same is expected for the faculty's other departments at the end of February 2005.

Element/stage completed (According to reports from the faculties)	Adopted/ completed	In progress	Planned	No action Not commenced
Environmental inventory	Faculty of Science, School of Economics and Commercial Law	IT University Sahlgrenska Academy		Miscellaneous
Reconciliation, environmental laws	Faculty of Science, School of Economics and Commercial Law	IT University Sahlgrenska Academy		Miscellaneous
Estimate of environmental impact	Faculty of Science, School of Economics and Commercial Law	IT University Sahlgrenska Academy		Miscellaneous
Environmental objectives for the faculty	Faculty of Science, School of Economics and Commercial Law	IT University Faculty of Arts Sahlgrenska Academy Faculty of Education University library	Faculty of Science	School of Design and Crafts
Activity plan for the faculty	Faculty of Science	IT University Faculty of Arts Sahlgrenska Academy School of Economics and Commercial Law	Faculty of Science	School of Design and Crafts
Follow-up of the faculty's environmental objectives				All
Follow-up of the University's environmental objectives	All			
Internal environmental audit	Faculty of Science, Faculty of Education		All	
External environmental audit			All	
Certificate ISO 14001			All	
EMAS registration			All	
Appointed an environmental coordinator	All			
Run-through with management	Faculty of Education		Miscellaneous	

Table 5: The faculties' steps towards an environmental management system

In order to provide a complete picture of the environmental work within GU we also wish to show what we have already done at each department within the different faculties. This work has been in progress for a number of years. An important source of support in this process is the Environmental Co-ordinators' Council and the approximately 130 local environmental representatives who are responsible for the work on the operational level. The task of introducing an environmental management system at the departments had achieved the following results on December 31, 2004.

Element/stage completed (According to the green dots on the website)	Number of departments/ equivalent 31-12-04	Number of departments/ equivalent 31-12-03	Number of departments/ equivalent 31-12-02	Number of departments /equivalent 31- 12-01
Environmental inventory	132 (of 135)	137 (of 140)	120 (of 140)	114 (of 142)
Reconciliation, environmental laws	102	107	94	65
Estimate of environmental impact	81	53	44	20
Environmental objectives for the unit	47	23	21	13
Activity plan for the unit	38	22	20	12
Follow-up of the unit's environmental objectives	13	23	21	13
Follow-up of the University's environmental objectives	135	104	140	142
Internal environmental audit	19	13	4	3
External environmental audit	26	12	0	0
Certificate, ISO 14001	12	0	0	0
EMAS registration	12	0	0	0
Appointed an environmental co-ordinator	119	122	122	130

Table 6: The steps taken by the Departments/equivalent towards an environmental management system.

#### In-house environmental audit

Within the environmental management system there are around 10 internal environmental auditors who continuously perform internal environmental audits. The auditors include a person appointed as audit leader. During 2004, five internal environmental audits were carried out, resulting in a total of 57 major non-conformities, 49 minor non-conformities and 123 observations, which are handled within the organisation.

Date	Organisation	Major non-conformity	Minor non-conformity	Observations
3-6-04	Joint management	3	11	17
3-6-04	Management	2	7	18
23-6-04	Tjärnö Marine Biological Laboratory	2	5	22
11-11-04	Faculty of Education, Faculty Management	16	4	4
	Faculty of Education, Department of Education and Didactics	12	5	11
	Faculty of Education, Department of Home Economics	14	2	8
6/7-12-04	Faculty of Science	8	15	43
<b>Total</b>		<b>57</b>	<b>49</b>	<b>123</b>

Table 7: Results from internal audits 2004.

#### External environmental audit

SP-Certification in Borås has carried out four follow-up audits and a planning discussion in 2004.

Date	Type of audit	Auditor	Organisation	Results
26-8-04	Follow-up audit	SP-Certification	University management/ Joint management	Two minor non-conformities and one note.
31-8-04	Follow-up audit	SP-Certification	Tjärnö Marine Biological Laboratory	Four minor non-conformities and one note.
26-10-04	Planning discussion	SP-Certification	Stenebyskolan	24 comments as well as proposals regarding a certification audit in January 2005.
30-11-04	Follow-up audit	SP-Certification	Tjärnö Marine Biological Laboratory	No non-conformities or notes.
14-12-04	Follow-up audit	SP-Certification	University Management/ Joint Management	Two minor non-conformities and one note.

Table 8: Results from external audits 2004.

## 9.2 Purchasing and procurement

**Environmental aspect:** Environmental stipulations in conjunction with general agreement procurement have an effect on the University's environmental aspects.

**Environmental objectives:** Increase the proportion of products where environmental stipulations are made in conjunction with purchasing and/or procurement.

**Key figures:** 1) Proportion of purchased products with environmental stipulations.  
 2) The proportion of general agreement procurements with environmental stipulations.  
 The proportion of purchase procurements with environmental stipulations.

**Results:** 70% of general agreement procurement includes environmental stipulations regarding the goods/service. In 100% of all general agreement procurement some form of environmental question is asked/environmental demand is made regarding the supplier's operations and products. The proportion of purchased products with environmental stipulations cannot be given, as this follow-up requires better systems for administration and increased demands regarding reports from suppliers and faculties.

Making environmental stipulations in conjunction with the University's procurement of goods and services has a considerable impact on the environment. Each year the University procures products and services to a value of several hundred million kronor. If these procurements are associated with environmental stipulations it will have a powerful influence on the suppliers. According to the state environmental management assignments the authorities shall work in particular to environmentally adapt their procurement within the framework of current regulations. To support this work, the government has created a means for making environmental demands in public procurement, the so-called EKU tool.

Göteborg University has within certain parts of the procurement process made considerable progress with regard to environmental demands. In all general agreement procurements the tender invitation documentation includes some form of environmental questions. Even in other forms of procurement environmental issues often arise. Environmental aspects are often dealt with as a point when GU meets the tendering parties. The Procurement Unit has thus in all general agreement procurement negotiations, to the greatest possible extent, made environmental demands on both suppliers' operations and procured products, such as removal services, computers and book transport.

According to the Procurement Unit, the product-specific environmental demands in the procurement of goods, an area in which the aim is to continue working and become clearer. It is, however, often difficult and time-consuming to make relevant demands for each individual item of goods that is to be procured, it requires reinforced collaboration between the Procurement Unit, the different procurement groups and the University's environmental co-

ordinators to succeed with this ambition. During 2004, product-specific environmental requirements have been made in approximately 70% of the general agreement procurements of goods. It is not possible, however, to state the proportion of purchased products with environmental demands as no inventory was made throughout the whole of GU during 2004. Improved follow-up requires systematic work based on better central systems and increased reporting demands from suppliers and faculties.

The environmental objective that there should be environmental demands in all Göteborg University's general agreement procurements has been satisfied. The financial value of public procurement in which environmental consideration has been given is reported for the period 2000-2004 (see Table 9)<sup>20</sup>. The general agreements are normally valid for 3-6 years, which means that the major agreements come up for renegotiation three to five years later. The Procurement Unit will continue during 2005 to work on making environmental demands in conjunction with procurement and purchasing.

Year	2000	2001	2002	2003	2004
Value, SEK m	984	609	1570 <sup>21</sup>	218	458
Number of procurements as a percentage with environmental stipulations <sup>22</sup>	100	100	100	100	100
General agreement procurements where environmental stipulations have been made on the procured products.				75%	70%

Table 9: Environmentally adapted procurement 2000-2004

Apart from GU's Procurement Unit making demands in conjunction with procurement and general agreements, the faculties and departments must in turn use/follow the central general agreements and take into account environmental aspects when making their own purchases. It is therefore heartening to see that many faculties are working actively with these issues. The following are a number of examples from the faculties.

### Good examples from the faculties

At the Faculty of Science joint purchasers of chemicals at the departments have been appointed to ensure better control over the handling of chemicals. The IT University's environmental co-ordinators are active in the Procurement Unit's procurement groups and are attempting to incorporate environmental issues when preparing and following up general agreements. At the Faculty of Social Sciences training is planned for purchasers of environmentally labelled goods during 2005.

At the Faculty of Humanities an environmental objective has been established that environmental aspects should be taken into account in conjunction with purchases as follows:

- Training for all purchasers of office products;
- The purchaser of paper is assigned the task to choose from GU general agreement suppliers a supplier that can supply paper that is both environmentally labelled (Svanen or Falken) and which is not bleached with chlorine;<sup>23</sup>
- When purchasing electronic equipment the electricity consumption should be compared;
- When purchasing printers and copying machines consideration should be given to purchasing multi-function machines, such as copy printers, which in the majority of cases are better for the environment and the economy;
- Persons ordering printing of theses should make environmental demands.

At the Faculty of Education certain departments have set up as an environmental objective to increase the purchase of environmentally labelled office material during 2005-2006. Environmentally friendly toner is purchased as well as eco-labelled coffee for the personnel. Generally, flat screens are chosen when making computer purchases at the

<sup>20</sup> The reason for the increase in this total in 2000 is that several major general agreements were signed during the year.

<sup>21</sup> Of which SEK 1,000 million refers to air travel ordered by other Swedish universities.

<sup>22</sup> Applies to the general agreement. For purchase agreements the aim is 100%.

<sup>23</sup> I.e. Total Chlorine Free, not just Elementary Chlorine Free or Process Chlorine Free

faculty, which is considered to have less negative impact on the environment, lower energy consumption and a longer life span.

### SAVE 5E

GU is involved in an EU-funded project, SAVE 5E, with a focus on creating a European model to make environmental demands in conjunction with the procurement and purchase of office equipment. The work is aimed primarily at improving the energy efficiency of office equipment (computers, copying machines, printers etc.). During 2004, a model was prepared for the criteria that ought to be used in conjunction with environmentally adapted procurement, particularly of computers and screens. Fourteen universities in Europe are involved in the project and a number of the universities involved will during 2005 procure based on these criteria. Göteborg University is contributing with its experience from its own procurement during 2003 in a report, which will be presented in early 2005. The work has been reported on an ongoing basis to the COPERNICUS secretariat, which co-ordinates the project.

## 9.3 Travel and transport

**Environmental effects:** Travel and transport where fossil fuels are used mainly contribute to the negative impact on the environment, acidification, over-fertilisation of land and water, air pollution in urban areas, low-level ozone and other air pollutants.

**Environmental objectives:** Reduce the negative environmental impact of business travel and transport

**Key figures:** The number of rail-kilometres as a proportion of the total kilometres travelled within Sweden

**Results:** The proportion of rail-kilometres is falling and the cost of domestic air travel is on the same level as in 2003. Air travel has in fact become cheaper during the year. Generally, this means that the Key figures are moving in the wrong direction. This conclusion is drawn despite the lack of a basis for computing the key figures.

Travel is one of the University's largest expense items and it is also one of the largest environmental aspects. Travel is a very important part of the University's work. Presenting results, communicating and co-operating in the international research arena are vital to all researchers. The aim is thus not to travel less but to travel in a way that minimises the environmental impact. By choosing the most environmentally friendly way of travelling the load on the surroundings can be reduced considerably. The University's travel policy has taken this on board and recommends that travel within Sweden takes place by train. Another important means of minimising the environmental load generated by travel is to use video and computer conferences, which could improve the efficiency of the employees' work substantially.

### Business travel by car

A slight downward trend can now be noted in the number of miles driven using private cars despite an increase in the level of compensation, which was a source of concern at the beginning of the year. The trend is reinforced slightly by the number of employees increasing during the year. In these figures a downturn of 21% can be noted, which is very heartening.

journey

### Business travel by air

Air travel presents the greatest environmental load among all the methods of travel. There are few realistic alternatives to flying when it comes to international journeys, although domestically the train is a perfectly good substitute. The University spent at least SEK 5 million on domestic air travel, which is on a par with previous years. During 2004, the number of journeys by air to Stockholm increased by almost 60% and during the year totalled almost 2,000 (excluding connecting flights). This is remarkable as the travel policy states that rail should be chosen for travel within Sweden. An important reason is the low price airlines, which attract travellers with low prices. The financial gains in this, however, are often lost com-

Year	Number of km <sup>24</sup> driven using one's own car	Number of km driven per employee
2000	1 660 000	352
2001	1 748 000	403
2002	1 703 000	376
2003	1 672 000	356
2004	1 530 000	280

Table 10: Business trips by car (excl. rental cars and company cars)

<sup>24</sup> Source: annual report for each year

pletely if the cost of the airport bus and working time are included. On the train there is the opportunity to work for three hours, undisrupted, whilst the equivalent figure for air travel is a maximum of 45 minutes. Today the train can also compete from a time point of view compared with air. Journeys to Stockholm by train currently take three hours city to city. This is difficult to beat if one includes the actual time a journey by air takes, including travel to and from Landvetter/Arlanda, checking in etc. A positive aspect in this context, however, is that the number of journeys by rail to Stockholm has increased, which means that generally it is not travel by rail but new journeys that are being switched to air. The number of people who choose to take the train to Stockholm is 72%. Breaking the trend of increasing the number of short journeys by air, however, should be seen as a prioritised task for the coming year.

### **Business travel by rail**

Rail travel fell during 2004 to 4,176,150 km (during 2003 the figure was 4,828,770 km), which is a fall of 14% compared with 2003. If the figures are divided among the number of employees then the reduction is even greater, 914 rail-kilometres per employee for 2003 compared with 763 for 2004.

The reduction in travel represents a reduction in environmental load but it is also the most environmentally friendly way of travelling that is falling which is not good. This entails a failure in the attempt to induce personnel to travel in an environmentally friendly manner, which was the aim.

### **Transport**

External transport to the University is a very difficult target for environmental demands. The EU and the Public Procurement Act are seeking to increase the exchange of goods and services between countries and are thus attempting to stem environmental demands on the length of transport. Co-ordinating external transport to the University is also difficult as the university is spread throughout Göteborg and co-ordination could instead have the opposite effect on the environment. Internal transport is, on the other hand, an area on which the University can exert an influence. Last year, all drivers working with in-house postal services underwent training in "eco-driving", which on average reduced fuel consumption by 13%.

### **Video conferences as a complement to travelling**

Göteborg University also has excellent video conference equipment at the Wallenberg Conference Centre, which in many cases can be used as a substitute for travel. Correctly utilised electronic meetings can make work more efficient and provide, for example, all researchers with a very powerful tool to co-ordinate with colleagues around the world. In a decision in principle made in 2004 the Vice-Chancellor decided to place the equipment at the Wallenberg Conference Centre at the disposal of the personnel at no cost, which hopefully will mean that even more researchers will be induced to use the equipment. The technology for simple electronic meetings via one's own computer has also become both better and cheaper. This type of meeting is also beginning to gather momentum thanks to its simplicity and easy availability.

During 2004, 200 booked meetings with 800 participant sessions took place on the premises intended for video conferences. In the four virtual rooms administered by the IT Department, E-meetings with 1,300 participant sessions took place. In the five virtual rooms at the IT University a further 805 participant sessions took place. The total figure is 2,905 participant sessions.

### **Other initiatives to environmentally adapt travel**

During the year, both the Environmental Representatives and the Environmental Co-ordinators' Board visited the City of Göteborg Traffic Office to find out more about how a modern car pool functions and the potential for running a so-called travel survey with the aid of web questionnaires to map travel to and from the workplace. The Traffic Office offers to provide web surveys free of charge at major workplaces in Göteborg.

Several faculties, e.g Social Sciences, Natural Sciences and Education have become interested in mapping travel patterns. The aim is to acquire knowledge of how both personnel and students travel to and from University and to use the results to establish environmental objectives for travel and stimulate more environmentally adapted travel. The surveys can also form the basis for discussions with, for example, the municipal authority, the Traffic Office and Västtrafik regarding better route planning, service frequency, cycle lanes etc. which could stimulate more environmentally adapted travel.

## 9.4 Waste/Sorting at source

**Environmental aspect:** Handling waste contributes to negative effects on the environment in the form of climate-impacting gases, acidification and over-fertilisation of land and water (in conjunction with the combustion of waste), use of land, water and finite resources, as well as breaches of the ecocycle in the form of waste and environmentally hazardous residual products.

**Environmental objectives:** Increase the proportion of waste that is sent for recycling of material to at least 50%.

**Key figures:** The proportion of waste sent for recycling and composting of the total volume of waste (excluding demolition waste and other temporary items).

**Results:** 29% of all waste is sent for composting or recycling. The objective has thus not been achieved yet although the conditions for achieving the objective have improved considerably as a result of the work done during the year.

### Operational waste

For 2004, the University had the environmental objective of increasing the proportion of waste that goes for recycling to at least 50%. To help them achieve this objective a waste plan was adopted at the beginning of the year, "Waste Plan 2004 Sorting at Source", by the University's property director. The aim was to facilitate sorting of waste at source where there is a specified minimum level for source sorting at GU. At the departments or equivalent the waste should be sorted into the following fractions:

- Combustible waste
- Non-combustible waste
- Packagings covered by producer liability
- Paper waste
- Hazardous waste

In addition, sorting of waste at source is recommended for

- Compostable waste
- Packagings with a deposit

In their annual reports the faculties report that the majority of departments have either created conditions for and/or taken measures to increase the proportion of sorted waste. New sorting facilities, better organisation of waste handling and more space have made it possible to expand the number of fractions sorted. Waste sorting guides have been prepared at many faculties and one faculty will begin composting all food waste.

The proportion of waste that is recycled is 29% of all waste generated during 2004. The aim has thus not yet been achieved. This year we had access to a more comprehensive statistical basis, which explains the volume of combustible operational waste compared with previous years.

Fraction	Volume (tonnes)	Fraction	Volume (tonnes)
Corrugated cardboard	14.2	Combustible operational waste**	2,941 m <sup>3</sup> + 217 tonnes = 1,687.5 tonnes***
Office paper	109	Non-combustible	4
Newspapers	150	Mixed recycling for sorting later	8.9
Glass packagings	17.5	Biological waste	58
Shrink and stretch film	0.23	Fat separator	21.6
Plastic packagings	0.21	Compostable food waste	6
Metal packagings	0.65		
Total operational waste *			2,378 tonnes

Table 11: Operational waste 2004 divided according to fraction. Information from Akademiska Hus.

\*The statistical basis is equivalent to 60 per cent of total operations.

\*\*This figure includes the fractions which the Ecocycle Office call "Mixed waste", "Residual waste similar to household waste", "Mixed household waste" and the fraction which Renova calls "Combustible operational waste".

\*\*\*It is estimated that 1 m<sup>3</sup> of mixed waste weighs 500 kg.

## Hazardous waste

The volume of hazardous waste has fallen, from 26 tonnes in 2003 to 13.4 tonnes in 2004. This is due, among other things, to a change in the statistical basis (compared with 2003 risk waste has been excluded) and that the volume of dishwashing waste has fallen. The volume of dishwashing waste has fallen due to the fact that other methods have been applied and that fine-tuning of the operating system has taken place at a number of laboratories.

There are good routines in place for handling hazardous waste within the University and good collaboration with the University's suppliers for handling hazardous waste.

Description	Volume (kg)	Description	Volume (kg)
Solvents	304	Acid waste	333
Dishwashing waste	4,520	Hardener	13
Laboratory waste	1,106	Mercury waste	16
Fluorescent tubes, low-energy lamps/bulbs	65	Alkaline waste	8
Electronic waste	6,891	Miscellaneous, combustible	11
Lead scrap	12	Other solid waste	16
Oil and oil scrap	111	Refrigerators and freezers	11
Uncleaned glass waste	20		
<b>Total volume of hazardous waste</b>			<b>Approx. 13.4 tonnes</b>

Table 12: Hazardous waste from Göteborg University 2004. Information from Reci and Renova

## 9.5 Environmental impact of chemicals

**Environmental aspect:** The University's use of chemicals and laboratory activities have an impact on the environment in the form of thinning of the ozone layer, organic environmental toxins and breaches of the ecocycle, waste and environmentally hazardous residual products.

**Environmental objectives:** Reduce the environmental impact of chemical products.

**Key figures:** 1) Phasing out of harmful chemical products to the benefit of more environmentally friendly alternatives.

2) Development and implementation of laboratory methods that require lower volumes of chemical products/microscale laboratory experiments.

**Results:** The trend is positive, as GU has adopted a handbook for environmentally adapted handling of chemicals. GU has procured the chemical handling system "KLARA". Implementation of the system has commenced. There are many good examples in the University's operations where environmentally hazardous chemical products/chemicals have been phased out. The positive trend, with laboratory methods require fewer chemicals, is continuing.

During 2004, the "Handbook for Environmentally Adapted Chemical Handling" was updated. GU has procured a web-based chemical register system from Nordic Port called KLARA. Procurement has taken place in collaboration with the "Västra Götaland regionen". This means that activities at the Sahlgrenska Academy and Sahlgrenska University Hospital will have the same system. Chalmers has also purchased the same system, which means that joint activities at the Faculty of Science and Chalmers will have the same system. A working group at GU has been set up to co-ordinate implementation of the system. The faculties concerned have appointed their own administrator for the system. During January/February 2005 three presentation seminars were run for the personnel concerned. The faculties concerned will formulate their own plan for implementing the system. The training of personnel will take place mainly at selected pilot units and will then be run at the faculties.

### Substitution of environmentally hazardous chemicals

The Faculty of Natural Sciences, Sahlgrenska Academy, the University Library and the Faculty of Applied and Fine Arts have all reported a certain exchange of chemicals for less environmentally negative alternatives, which has taken place during 2004. This includes the increased digitalisation of photographic activities, which has contributed to reducing the use on certain hazardous photo chemicals. New methods and analytical methods for laboratory work also contribute to environmentally hazardous chemicals being excluded in the handling, mainly chemicals that are listed on the so-called OBS/Prio list. Both Sahlgrenska Academy and the Faculty of Science have the objective of substituting environmentally hazardous chemicals and this work is ongoing. The following are some positive examples from operations.

<b>Faculty of Science</b>	
NMR Centre	The consumption of liquid nitrogen gas has almost been halved by compressed air being used instead. The production of liquid nitrogen gas is energy-intensive and the need to transport nitrogen gas is also reduced. The compressed air is produced locally.
Conservation	Wherever possible, solvents are replaced by water.
Tjärnö MBL	The following chemicals have been removed completely due to new methods: phenol, chloroform, isoamylalcohol. The use of methanol has been replaced by the use of acetone. The use of hexane and ethylacetate has fallen considerably in volume due to new methods
Botany Building	This is an ongoing process as a result of our research. The UK has apparently banned irgarol on the basis of our results. We have a toxicological test using fluorescence measurement instead of measuring using radioactive marked carbon. This also means that we avoid using formaldehyde, acetic acid and dimethylsulphoxide.
<b>Sahlgrenska Academy</b>	
Department of Anatomy and Cell Biology	Transferred from xylene-based scintillation liquids to biodegradable alternatives.
Clinical Genetics Unit	Methanol replaced by ethanol. P32-containing isotopes have been replaced by fluorochromes and formamide has been replaced by sodium hydroxide + an SSC buffer in fluorescence-based in situ hybridisation.
Laboratory science	Several departments in laboratory science have to an increasing extent abandoned the method of phenol extraction of nucleic acid from patients' samples and cell and bacteria samples. It has thus been possible to a large extent to replace phenol with smaller volumes of water solutions of guanidinisotiocyanate. These changes are taking place in collaboration with the Health Service.
Wallenberg Laboratory	To identify and locate tritium and S35 on electrophoresis gels we use a fluorescent imager, where it is not necessary to use any film or developing fluid to locate the radioactivity.

### Laboratory methods that require lower volumes of chemical products (microscale laboratory experiments)

Development and implementation of laboratory methods that require lower volumes of chemical products/microscale lab work have continued to develop positively. At the Sahlgrenska Academy and the Faculty of Science a series of trials are in progress involving microscale lab work. This means a smaller overall load of, e.g. chemicals and the result is that cost of purchasing chemicals and the handling of hazardous waste has been reduced. The following are a number of good examples from the work being done.

<b>Faculty of Science</b>	
Botany Building	The development of methods that have indirectly had this consequence. A test system (SWIFT) is a minivariant of the model ecosystem, which requires much larger volumes of test chemicals. <ul style="list-style-type: none"> <li>• Vacuase Comfort (IBS Integra Bioscience): Safe handling of biological risk waste in the liquid phase from the laboratory.</li> <li>• We use potassiumbichromate as a reference substance for toxicological tests on crustaceans, but nowadays we have reduced the number of tests and also halved the maximum concentration in our concentration series.</li> </ul>
Chemistry	Work within the GIMMIK project is continuing. Within this project laboratory experiments are run on a microscale. A review is continuing of all laboratory courses in basic chemistry with regard to transferring entirely to microscale operations. During the past operating year it has been possible to close down a large chemical store as the stock required for microscale laboratory experiments

	is considerably smaller. The majority of all laboratory experiments in basic chemistry are now possible to perform on a microscale. A decision has therefore been taken to increase the rate of investment in modern laboratory equipment adapted to microscale.
Swedish NMR Centre	We are implementing methods that reduce test volumes or the volume of material for an analysis.
Tjärnö MBL	New extraction methods for producing DNA for analysis.
<b>Sahlgrenska Academy</b>	
Department of Anatomy and Cell Biology	Virtually all laboratory methods today require lower volumes of chemicals compared with previously
Department of Laboratory Science	Demonstration exercises in molecular microbiology nowadays take place "in situ" via data projection for groups of around 80 students. This has replaced sessions for smaller groups of students where the demonstrations previously took place using authentic reagents.
Department of Environmental Medicine	All chemicals that were previously on the chemical list have been removed as wet laboratory operations have been discontinued entirely.
Wallenberg Laboratory	To measure radioactive samples only half as much scint-liquid is used now compared with previously.

## 9.6 Energy

**Environmental aspects:** The use of fossil fuels contributes to the negative impact on the climate, acidification and over-fertilisation of land and well as the use of finite resources.

**Environmental objectives:** Electricity consumption on the University's premises will in total be reduced by 5% per square metre.

**Key figures:** kWh electricity/m<sup>2</sup>

**Results:** Electricity consumption has generally remained unchanged since the preceding year and the objective has thus not yet been achieved.

For a number of years the University has worked with energy-saving measures, ranging from small efforts such as the use of low-energy bulbs to major resource-intensive efforts, such as work on the properties' heating systems. The level of awareness is high at all the faculties and more energy-efficient equipment has also been purchased on an ongoing basis, which has further reduced the University's energy consumption. Within a number of faculties co-operation with the property owner regarding energy issues has been intensified. The University buildings are heated mainly with the aid of district heating.

During the year, energy training took place for building supervisors within the University. This training took place in co-operation with Akademiska Hus and further discussions have taken place on how we in co-operation can reduce energy use in the various premises. Concrete measures discussed include: 1) continued "night patrols" to see how much energy a property uses when there ought to be no work going on, e.g. at night, 2) running energy-saving campaigns at selected units within the university.

Table 12 below shows the results for energy consumption for 2004. This shows that energy consumption maintains the same level as during the past two years.

Average energy consumption/year	2000	2001	2002	2003	2004
Electricity kWh/m <sup>2</sup>	131	113	117	115	116
Heating kWh/m <sup>2</sup>	107	139	112	112	120
Electricity and heating kWh/m <sup>2</sup>	238	252	229	227	236
Floor space included in the calculation (m <sup>2</sup> )	240 458	278 214	326 283	372 299	330659

Table 12: Energy consumption, 2000-2004.

## 9.7 Personnel training

**Environmental aspect:** Produces positive effects through increased knowledge, increased awareness, environmentally positive handling, which is expected to have an effect on virtually all 15 national environmental objectives. Positive environmental effects are reported in this environmental report.

**Environmental objectives:** All the University's employees will have undergone some form of environmental training.

**Key figures:** Number of participants/Number of employees

Number of personnel training hours per year

**Results:** To date, 83 per cent of the University's employees have received environmental training. A further positive note is the fact that more and better specially adapted training programmes are being run, directed at selected personnel groups.

*Personnel training is an important cog in the environmental machine. The environmental objective for Göteborg University is that all personnel should undergo environmental training in some form or other. The training must provide knowledge of the environmental management process and the actual environmental work. In recent years there has been a greater focus on specially oriented environmental training for individual personnel categories. The following are some of the programmes that were run during 2004.*

Environmental training	Occasions	Persons
Klara chemicals register, inventory training. Department of Chemistry?	1*3 hrs	15
Ecocentre: Faculty of Social Sciences environmental representatives	1*3 hrs	15
Environmental course 2 for Faculty of Social Sciences environmental representatives	1*3 hrs	15
Environmental day/kick-off at Sahlgrenska Academy.	1*3 hrs	25
Management Group at the Faculty of Education	1*1 hrs	10
Environmental management for environmental co-ordinators (School of Design and Crafts and the IT University)	1*2 hrs	2
Environmental management at UFL	1*1	2
Chemical and waste training for personnel at the Wallenberg laboratory	1*3	44
A series of seminars on research dealing with the environment/sustainable development as part of skills development among staff at the Department of Home Economics.		
Environmental foundation – basic environmental training on CD	1*1	1
Sorting at source and advanced course, sorting at source	1*2	2
Environmental legislation	1*1	2
Flammable goods	1*2	8
GF Printed matter	1*3 hrs	19
GF Purchasers	1*3 hrs	26
Energy training for building supervisors	1*3 hrs	35
Göteborg University, Introductory course	1*0.5 hrs	45
Environmental audits in the public sector	2*8 hrs	1
Audit technique for environmental and quality auditors	3*8 hrs	1
Chemical products, labelling and classification	3*8 hrs	1
<b>Education visits</b>		
Procurement group, Renova Incineration plant + Electronics recycling	1*3 hrs	10
GF Renova, electronics recycling	1*1 hrs	6
GF Renova Incineration plant	1*4 hrs	6
Environment Fair and Ecology		4
Environmental representatives at the Traffic Office: Car pool + travel habits	1*2.5 hrs	16
Environmental co-ordinators at the Traffic Office: Car pool + travel habits	1*2.5 hrs	12
<b>Total 2004</b>		<b>323</b>
<b>Total 1998-2004</b>		<b>3904</b>
<b>Key figures: Number of personnel training hours with a focus on the environment</b>		<b>845.5 hrs</b>
<b>Key figures: Number of training participants/Number of employees<sup>25</sup></b>		<b>83 %</b>

<sup>25</sup> Average number of full-time equivalents

Table 13: Environmental training of personnel

## 9.8 Paper consumption

**Environmental effects:** Gives rise to transport, use of resources, emissions during developing as well as residual products/waste.  
**Environmental objectives:** Lacking  
**Key figures:** Office paper in kg per employee + full-time student  
**Results 2004:** Use of office paper is on the same level as the preceding year, approximately 12.5 kg per employee + full-time student

The use of office paper has increased or is on the same level as the previous year. Paper in itself is not the most environmentally negative product but in the light of the University's high consumption its importance should not be ignored. A few years ago many people spoke about the paperless office due to the progress made in the computer field. Instead the exact opposite has happened and paper consumption has reached new heights. With a reduction in consumption for the third year in succession we can once again begin talking about the advantages of the computer in this respect.

The decrease in paper consumption will be even greater if it is related to the number of employees and students. As Göteborg University has grown into Sweden's second largest university the reduction is an even greater achievement.

The reasons behind the fall are probably many. Copying on both sides of the paper, reading on the screen and e-mail ought to be some of the main underlying reasons. Another contributing factor is the payment systems for print-outs, which have been introduced for students at the majority of departments.

Year	1999	2000	2001	2002	2003	2004
Office paper (tonnes)	420.5	442.9	461.5	444	396	393
Number of employees <sup>26</sup> /full-time students <sup>27</sup>	27,244	27,397	28,128	30,531	31,500	31,425
<b>Key figures:</b> Office paper, kg per employee + full-time students	15.4	16.2	16.4	14.5	12.6	12.5

Table 14 Consumption of office paper

## 9.9 Environmental communication

It is important to disseminate knowledge and information about current environmental work at GU. It is important internally to learn from each other, to spread good examples and to co-ordinate the environmental work. It is also important to disseminate information externally.

### Newsletter

During the year the internal newsletter "Grönheter" (Green News) was sent out within the GU environmental organisation. In the magazine "GU journalen" there was an article about certification and one about a video conference as well as a report on the environmental work.

### Environmental profiles

During the year, two environmental profiles were named:

#### 1) Monica Börjesson, Applied Environmental Science

During 2004, Monica Börjesson received the Environmental and Health Protection Prize from the Swedish Association of Environmental Health Professionals and was thus also highlighted as an environmental profile for Göteborg University. The reason given for the environmental and health protection prize was as follows:

Monica Börjesson, biologist with training in environmental and health protection, has worked since 1999 within the field of environmental law at the Department of Applied Environmental Science at Göteborg University,

<sup>26</sup> Average number of full-time equivalents

<sup>27</sup> Number of students as full-time equivalents

primarily with advanced courses offering scientists the opportunity to work with environment and health protection supervision.

Monica is rewarded for her capacity to inspire and enthuse people with regard to environmental and health protection issues, important qualities for both a municipal head of administration and a university teacher. Her endeavour has been to utilise the potential of legislation to protect the environment and health and to be forward-thinking and test new working methods and the limits of the law to achieve better results.

## 2) The Miljöbron organisation

Miljöbron is a scheme that has for many years successfully established contact between industry and students in Göteborg. The students have the opportunity to put their knowledge within the environmental field into practice. Small and medium-sized companies, which normally do not engage any external resources for environmental work, are given a little push. Miljöbron has succeeded in running 159 assignments for companies, 63 projects within the framework for different course programmes, mediated 38 degree projects and arranged 46 project positions.

With two new project leaders 2004 has been an incredible turnaround for Miljöbron, which has expanded in both the number of employees and also taken in a new university college, Trollhättan/Uddevalla University College.

## Environmental report and other communication

The Environmental Report has been published on the website so that anyone can read it and download it. During the year, approximately 1,000 copies have been printed. The Environmental Report has been translated into English and has been available on the website. In conjunction with the major international conference "Learning to Change our World" the Environmental Report was distributed to all participants.

The environmental co-ordinators have given lectures to the students on the natural sciences and social sciences environmental science programme. During the year, three articles were published regarding environmental management in *GU journalen*.

## Environmental management at universities (MLUH)

We have actively taken part in the network for environmental management at universities and university colleges (MLUH) in the network meetings that were run during 2004. We also arranged a mini conference alongside "Learning to Change our World" under the title "Learning to Change our Universities" and the focus was on how the environmental management systems can contribute/support the work with the environment and sustainable development within universities and colleges.

## 10. ISO 14001-certified and EMAS-registered units

Below is a presentation of the units which up to now have been ISO 14001 certified and EMAS registered: the University Management, the Joint Management, the Tjärnö Marine Biological Laboratory and Stenebyskolan.

### 10.1 University management and the Joint administration

#### Operations

The University management comprises the Vice-Chancellor, Pro-Vice-Chancellors, the Vice-Chancellor's Board and the secretary to the Vice-Chancellor. The Joint administration (GF) is the central administration at the University and employs 433 people, calculated on a full-time basis (including NCM, GMV etc.). GF comprises 10 departments; the Department of Financial Control, the Information and Analysis Department, the Property Department, the Information Technology Department, the Conference and Service Department, the Human Resources Department, the Planning Department and the Vice-Chancellor's Office. Operations are almost exclusively office work, although janitorial work for the whole of the University and certain conference activities are also included.

#### Environmental objectives

Sorting of waste at source will cover all waste through to 31-12-2005 and the proportion of recycled waste will increase to 60% by 31-12-2006

**Key figures:** The recycled waste<sup>28</sup> / total (excluding demolition waste, bulky waste etc.)

**Results:** A collective concept has been produced around sorting at source and a system has been introduced which means that the first part of the objective has already been achieved. Today office, dining room and copying machine waste is sorted into several fractions. The majority feel that sorting waste is positive and the initial resistance has disappeared.

Based on waste statistics compiled by waste contractors no computation of key figures can be made. As there will be new procurement process in 2005 these statistics will hopefully be better by the end of next year.

*Electricity consumption in the management premises will fall by 5 % before 31-12-2006.*

**Key figures:** kWh electricity/m<sup>2</sup> with 2003 as a base year

**Result:** Electricity consumption per m<sup>2</sup> has increased to 83 kWh, which means that the key figure is going in the wrong direction and it is doubtful whether the objective will be achieved before 31-12-2006. The only reason is that the property at Vasaparken has more than doubled its electricity consumption. All other properties have either reduced or are in line with previous years. Analyses of the increased electricity consumption reveal that a new computer room has been built, where all the university's servers and IT systems are being gathered. If one removes the computer room effect from the figures there is instead a reduction of 5.9%, which should mean that the objective has been achieved for operations in general.

*All courses with an element of environment and sustainable development will be clarified in the University's course register on the Internet and/or in the course prospectus by 31-12-2005.*

Electricity consumption	2002	2003	2004
Electricity consumption kWh/m <sup>2</sup>	77	75	83

**Key figures:** Clarified in the University's course register on the Internet/Clarified in the University's course prospectus

**Results:** The Student Department has investigated the potential for clarifying the courses in both the prospectus and on the Internet-based course portal. There are no obstacles to labelling. The department must receive help in assessing which courses have an element of the environment and sustainable development. The Centre for Environment and Sustainability will make such an assessment in accordance with the assignment during the year and the target is expected to be achieved in time.

*The prospectus will be distributed electronically/ on the Internet as far as possible*

**Key figures:** The circulation of the paper version of the prospectus

**Result:** The circulation has fallen by 10,000 copies. This is a reduction of 7.4%. In addition, work has been in progress to reduce the size of the prospectus to reduce the volume of raw materials and transport. This year's prospec-

<sup>28</sup> The recycled material is made up of the following fractions: Corrugated cardboard, office paper, newspapers and magazines, glass packagings, coloured and clear, metal packagings, confidential documents, shrink and stretch film, mixed recycling for sorting later and biological waste.

tus is 32 pages shorter than previous years. Attempts have also been made to reduce the number of programme prospectuses. The circulation is being reduced each term and the circulation for the autumn term 2005 is 35% lower than the preceding year's circulation, which was 6,700.

*The Environmental Portal<sup>29</sup> will be one of Sweden's most visited popular science websites dealing with the environment and sustainable development*

**Key figure:** The number of unique hits will increase by 30% between 2004 and 2005

**Result:** 3,100 unique visits per week on average during 2004, which is a considerable figure although no comparison can be made with previous years as the portal was only launched during the year. The Portal has been marketed by GMV. External relations have, however, not run any major information campaigns or similar but as soon as the opportunity arises information is presented about the Environmental Portal and its function.

*Within the framework of popular science events, the number of elements of "sustainable development" will increase each year.*

**Key figure:** The number of elements/lectures/seminars with a focus on the environment and sustainable development registered in the University calendar.

**Result:** During the year at least 263 public and popular science events with an element of sustainable development were run (140 during 2003). A doubling of the number of arrangements depends mainly on the Science Festival and on Learning to Change our World. Two conferences with open lectures were held, the content of which to a very large extent dealt with the environment. The Centre for Environment and Sustainability (GMV), Tjärnö Marine Biological Laboratory, the Department of Applied Environmental Science, the School of Economics and Commercial Law and the Department of Home economics are the units that have contributed most to this success.

*At least 30 % of all printed matter ordered by External Relations in 2005 should be Swan-labelled. The proportion will then increase by five percentage points each year.*

**Key figure:** The circulation of Swan-labelled printed matter/total circulation of all printed matter

**Result:** 43 % of External Relations' printed matter was Swan-marked during 2004 and the target has been achieved. In addition, several items of printed matter have comprised paper which met the demands of Swan-labelling but did not have the actual label. Attempts have also been made to minimise the number of surplus copies, although the number is 23,000, which is equivalent to 11 % of the total circulation (excluding the prospectus). The major reason for this is the 20,000 extra copies of the programme for the University Week.

An environmental training programme focused on orderers of printed matter was run at the beginning of the year. During the programme the initiative was taken to formulate a Handbook for Environmentally Adapted Ordering of Printed Matter to bring together all the hints and ideas that have arisen during the course. The handbook is available in the Environmental Handbook.

*The agreement database<sup>30</sup> will be complemented with environmental information to make it easier for the University's purchasers to make the relevant environmental demands in conjunction with purchasing/sub-orders.*

**Key figure:** Number of agreements with environmental information

**Result:** During 2004, a basis has been produced with the text that ought to be integrated into the Agreement Database. In addition, a pilot project was planned together with the Faculty of Social Sciences. The project will be run during 2005, the aim being to improve and adapt the texts that have been produced which will then be integrated into the database. It is expected that the target will have been achieved by the final date.

*The Janitorial Department will be a role model and a leader with regard to environmentally adapted janitorial work.*

**Key figure:** No key figure

**Result:** The Janitorial Department continues to work actively with environmental issues in a very admirable way. A series of environmentally friendly cleaning methods are now included as an obvious part of the work such as, for example, dry cleaning methods, environmentally labelled cleaning chemicals, energy efficient washing machines and a great deal more. New employees also receive the requisite training where they are informed about the environmental work and environmentally friendly cleaning methods. Prior to this turn of the year no benchmarking took place but, prior to the final date for this objective, this will have been done.

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<sup>29</sup> See [www-miljoportalen.se](http://www-miljoportalen.se)

<sup>30</sup> A database for all the University's supplier agreements (general agreements, direct purchase agreements etc.)

*Reduce the fuel consumption of the internal postal service per kilometre by 10 % before 31-12-2006.*

**Key figure:** Fuel consumption per kilometre using 2003 as the base year

**Result:** Figures for key figure computation cannot be produced in time. The internal postal service has also during the year continued to work on optimising the postal rounds based on fuel consumption and time. During the year, several other internal transport movements have also been integrated into the internal postal rounds, which make transport more efficient. All drivers have undergone training in eco-driving.

*The GU shop/Media technology will make strict environmental demands in conjunction with purchasing so that its customers can be reassured that they always buy the best environmental choice if they purchase from the GU shop.*

**Key figure:** Environmental proportion

**Result:** During the past year, the GU shop has developed a web portal, which has made purchases even more efficient. The GU shop has also developed an environmental range even further during the year and makes environmental demands in conjunction with all purchases that are possible in accordance with the assignment.

*The University will replace paper communication with electronic solutions in conjunction with the introduction of the new PA/HR system.*

**Key figure:** The number of matters that go via the employee portal and recruitment model. The number of salary specifications that are sent out in a manner other than by post.

**Result:** During 2004, solid development work took place to make the whole personnel administration system functional. During 2005, the major implementation will take place and it is estimated it will be completed at the end of 2005. The environmental objective behind the new PA/HR system is reduced paper consumption and transport.

During the year, the Human Resources Department also examined the potential for sending out salary slips by post. Employees who are customers at Nordea can today receive their salary slip electronically and within the near future the same service will probably be offered to customers at FöreningsSparbanken. However, an enquiry on the obligations in conjunction with the salary slip must be examined before a broad transfer takes place.

*The Human Resources Department will advertise clearly all environmental courses for personnel on the training portal.*

**Key figure:** The proportion of environmental programmes that have been advertised on the Internet training portal.

**Result:** The Environmental Unit has been offered its own entrance in the training portal and can, after certain preparations, begin adding environmental programmes to this portal. In this way the environmental programmes are available in the same way as other employee training programmes, which increases the clarity, and the environmental management system is integrated into normal operations.

*Continued integration of environmental assignments/follow-up of environmental systems with other operational assignments*

**Key figure:** No key figure

**Result:** The Planning Department has continued to work on this question. The operational assignment for 2005 also has its own chapter this year, known as Environment, which contributes to continued integration of the environmental management system in other operations as well as its governing documents.

*Continued and reinforced focus on investing funds within foundation and fund management with consideration given to the environment and ethics (according to the adopted investment regulations).*

**Key figure:** The proportion of invested funds within foundation and fund management with consideration given to the environment and ethics.

**Result:** The objective was achieved in 2004 that all the funds invested within the foundation and fund management are invested with due consideration given to the environment and ethics. The fund managers engaged scan their share and fund investments regularly based on an adopted investment directive (governing environmental objectives and ethical objectives). Discussions are in progress with the fund managers regarding concrete follow-up figures, i.e. has the proportion of environmental and ethical investments become more, less or remained the same during the past year.

*GU will have introduced electronic invoice handling by 31-12-2006 at the latest and purchasing/order support no later than 31-12-2008*

**Key figure:** Electronic invoice handling introduced

**Result:** A project group, within the framework of the NEKST project, was set up on 15-12-2004. This project group is working on the introduction of electronic invoice handling (EFH). Tenders for EFH support have been requested, with 2-2-2005 as the final date, and an evaluation of tenders is in progress. Introduction according to plan during 2006. The same project is also working with purchasing/order support with a plan for introduction during 2008. Everything is running according to plan.

*Data and video conferences will increase by 20% through to 31-12-2006.*

**Key figure:** The number of video and data conferences which are run under the auspices of the IT Department compared with 2003.

**Result:** The key figure has increased so much compared with 2003 that it was already met during 2004. During 2004, 200 booked meetings with 800 participant sessions took place on the premises intended for video conferences. In the four virtual rooms administered by the IT Department, E-meetings with 1,300 participant sessions were run. In the five virtual rooms at the IT University a further 805 participant sessions were run. The total figure is 2,905 participant sessions.

*Thin clients and flat screens will replace the majority of the administration's traditional computers.*

**Key figure:** The number of thin clients that replace traditional computers

**Result:** During 2004, more than 40 computers were replaced by thin clients. Thin clients offer many advantages, particularly financially, but there are also many advantages for the environment. Reduced electricity consumption is perhaps the most obvious although the absence of a system unit saves on raw materials and the use of flame-retardants is eliminated completely.

*The University will develop an Intranet-based set of rules and regulations.*

In these rules and regulations it is possible to search for the University's joint control documents adopted by the Vice-Chancellor or the board. These could take the form of instructions, general advice, rules, guidelines, policies, working instructions and rules of procedure. On completion, the central rules and regulations ought to bring together all the decisions pertaining to rules that are common to the University. The rules and regulations are also complemented by rules and regulations embodying "Laws and Ordinances". At a later stage, "Local Rules" could be added with the faculties' rules and policies.

**Key figure:** The aim is that the number of visits to this website in 2005 will be the same as the number of administrators employed at the University multiplied by two.

2006: the same number of administrators employed at the University multiplied by three.

**Result:** The Internet-based rules and regulations will be launched at the end of the year and the first part of the environmental objectives will thus have been fulfilled. The link to the environmental system and its control documents is included in the rules, although these will also be developed.

*With the aim of reducing paper consumption and postal transport, Central Records will introduce an electronic handling system. These electronic documents will be linked to Central Records and then distributed by e-mail.*

**Key figure:** A system introduced for E-dok

**Result:** E-dok was introduced at the end of the year and the aim has thus been achieved. The system has been received positively and offers all personnel and external interested parties rapid access to registered documents. From an environmental point of view, E-dok saves on both paper and transport as everyone has access to the documents.

## 10.2 Tjärnö Marine Biological Laboratory

The Tjärnö Marine Biological Laboratory is a field station for marine biology research and education. This is where around 70 people work all year round in research, education, administration, service and maintenance. The Department of Marine Ecology, the Department of Zoology and departments at Stockholm University have located parts of or all their courses at TMBL, mainly within marine systematics and ecology. In 2004, over 500 students attended courses lasting from a few days to 20 weeks.

Research at the laboratory can be divided into five main areas: Biohydrodynamics, Coastal Zone Planning, Genetics, Chemical Ecology and Fishing and Water Use.

The laboratory takes part in several inter-disciplinary projects within research and development, partly in collaboration with industry. There is considerable international collaboration, among other things through several EU-funded projects.

Certain commissioned work is also carried out for municipalities, companies or other organisations. The laboratory had 6,300 visitors within the framework of its public activities for 2004. Based on an environmental survey conducted in 2001, we identified our most important environmental aspects, both negative and positive:

- ⊗ Emission of air- and water-polluting substances through the use of petrol and diesel
- ⊗ Emission to the air through the use of solvents
- ⊗ The risk of excess nutrients in shallow bays due to emissions of saltwater from the laboratories.
- ⊗ The risk of emissions when handling chemicals.
- ⊗ The spread of metals in nature due to the emission of copper compounds when cleaning boat hulls.
- ⊗ Scraping the seabed has a negative impact, above all on hard seabeds.
- ⊗ The use of natural resources through the use of electrical energy.
- ⊗ The risk of spreading organic environmental toxins in conjunction with all handling of chemicals.
- ⊗ Waste production.

- ⊕ Some sixty research projects involving 27 researchers and as many doctoral students and project assistants. Many research projects are aimed at creating an understanding of how life and the environment in the sea and coastal zones are affected by human activity. This could in time contribute to reduced negative environmental impact.
- ⊕ The laboratory is located in what is perhaps one of the country's most beautiful coastal areas and operations encourage curiosity and involvement among students and the general public with regard to sea life and the ocean environment.
- ⊕ The restaurant's personnel, who prepared around 18,000 portions of food during the year, have very high demands with regard to ingredients and where the ingredients come from and they buy a great deal of food that has been ecologically grown. All waste food is composted.
- ⊕ The laboratory's contacts with the municipality and industry in the form of co-operation, advice and commissioned work led to a greater understanding of the potential and limitations of the ocean environment.

Our environmental policy and the overall environmental objectives that guide our environmental work through to 2006 have been formulated using these environmental aspects as a basis.

#### **Environmental policy for Tjärnö Marine Biological Laboratory**

*Our environmental work should continue as long as there are negative effects on the environment as a result of our operations.*

Apart from following laws and ordinances that cover our operations

- everyone working at TMBL should have daily, active involvement in the environmental work and the management assumes overall responsibility for resources being reserved for this work;
- all visiting teachers, students and visitors are informed about our work and the overall environmental objectives and about their role in the environmental work,
- in all aspects of our work (research, teaching, service) we should actively endeavour to achieve operating forms that prevent pollution and do not give rise to negative effects on the environment
- in conjunction with purchases, procurement of services and investments we should always consider using the alternative that from a holistic point of view is best for the environment
- we make regular follow-ups with the aim of improving our environmental work.

#### **Our detailed environmental objectives for 2004 were:**

1. Increase the number of printers pre-set for double-sided printouts.

Result: ⊕ All copying machines are pre-set for double-sided copying. We have not yet received any figures for the printers.

2. Allocate funds for and build a car park with engine heaters for car-pooling drivers.

Result: ⊕ A car park with several engine heaters has been built to avoid the number of cold starts. A number of specially allocated parking spaces with engine heaters have been built purely for the benefit of car-pooling drivers.

3. Allocate funds for and build a car park for cyclists.

Result: ☺ A covered cycle park has been built to encourage all people who cycle to work.

4. Formulate routines for all chemical handling at the Lars Afzelius Laboratory.

Result: ☺ We have formulated routines for all handling of chemicals. We have also appointed people responsible at the laboratories for all laboratory activities and these are responsible for ensuring that everyone who is actively involved operationally receives training or a run-through if required.

5. Develop a system for the documentation of sample rooms (fauna and flora).

Result: ☺ We have produced an electronic template for the registration of species found in the ocean. We will test the method during 2005.

### Other results achieved during the 2004 environmental year

Since January 2004, the environmental management system at Tjärnö Marine Biological Laboratory has been certified according to ISO 14001 and registered according to EMAS. We have an electronic environmental handbook for the whole of our operations, which comprises research, education, commissioned work and information services as well as service functions. Since June 2004, we have had a new research laboratory covering 1,000 square metres, which comprises six small laboratories, seven thermo-constant rooms, a rinsing room and a specially equipped room for working with solvents. There is also a generous waste sorting room for 15 fractions and in the opinion of many it is the University's most beautiful waste room.

All laboratories have their own head, who is responsible for ensuring that the necessary routines and instructions for, among other things, the handling of chemicals are followed and documented in order to minimise negative environmental impact. New methods have also meant that it has been possible to completely eliminate certain chemicals from handling (phenol, chloroform, isoamylalcohol) whilst the use of other chemicals has fallen considerably (hexane and ethylacetate).

Year	2000	2001	2002	2003	2004
Electricity consumption kWh/m <sup>2</sup>	221	254	248	278	268
Water consumption m <sup>3</sup>	3700	3800	3900	4700	3500

Table 5: Electricity and water consumption at TMBL

The use of both electricity and water has fallen during the year. The janitor has, among other things, adjusted the toilets to the minimum flush. The number of students has been fewer than the year before, which could also be a contributing factor to the reduced water consumption.

We are constantly working to improve operating routines with the aim of reducing our negative environmental impact. Sorting of waste at source functions well, we have achieved a good structure and we have ample space.

Fraction	Volume	Comment
Cardboard	2.07 tonnes	Bohusfrakt. Refers to office paper, cardboard and corrugated cardboard.
Packagings that fall into the producer liability category	2.7 m <sup>3</sup> metal 1.7 m <sup>3</sup> plastic	Refers to metal and hard plastic. Coloured and clear glass is not included. This is sent directly to the glass recycling containers.
Household waste	76 m <sup>3</sup>	Municipal refuse collection is handled and paid for by Akademiska Hus.
Mixed waste	2.28 tonnes	Isolated case. Refers to a major clean-up in June in preparation for the opening of the laboratory.
Combustible	2.88 tonnes	LBC Schakt och Transport.

		Refers to a skip for restaurant waste that is not composted or sorted.
Food waste	6 tonnes	Composted.
Toner	25 kg	Each box holds 100 litres. (weight approx. 12-13 kg full). Sent to Strålfors.
Batteries	11	To Österröd Strömstad
Waste oil	225 litres	To Österröd Strömstad
Oil filters	6	To Österröd Strömstad
Chemicals	120 litres	Refers to solvents, formalin, glacial acetic acid. Till Österröd Strömstad
Fluorescent tubes, low-energy bulbs, bulbs	132	To Österröd Strömstad
Electronic waste	89 kg	To Österröd Strömstad
Pressure-impregnated material	600 kg	To Österröd Strömstad
Refrigerators and freezers	4	To Österröd Strömstad

Table 15: Waste volumes, TMBL 2004.

### 10.3 HDK Stenebyskolan

Stenebyskolan has approximately 60 employees and around 180 students and of these 70 belong to "HDK Steneby", i.e. the part of Steneby that belongs to GU. Other parts are run by, for example, the Stenebyskolan Foundation (the Western Götaland Region) and Trollhättan – Uddevalla University College. There are also a number of EU-funded projects. The GU part covers the programmes "Furniture design – Cabinet-making", "Iron and steel, public representation" and "Textile – Clothes, Design" on the MSc and BSc level.

During the past year the work has mainly been directed at preparing for a certification audit. This has involved rectifying shortcomings in the documentation for the Environmental Management System.

#### Environmental enquiry

An extensive environmental enquiry of Stenebyskolan was conducted in 2001 with the aid of students from the Department for Environmental Science programme education. The environmental enquiry indicated a number (8) material environmental aspects. The enquiry was presented at the environmental days for personnel, students and the press. The environmental enquiry has partly formed the basis for the environmental objectives that we have later worked with.

#### Stenebyskolan – material environmental aspects:

- Education: One of our largest environmental aspects is environmental awareness among our students following completion of their education. We influence this by addressing relevant environmental aspects in the teaching.
- Raw materials: Raw materials comprise mainly materials for the course programmes. We can exert an influence through environmentally adapted purchases, more efficient use and recycling.
- Chemicals: Comprises mainly materials for the course programmes and for cleaning and washing up. We can exert an influence through the safe handling of chemicals and the replacement of products with less environmentally disruptive features.
- Other waste: Reduced mainly through sorting and recycling.
- Hazardous waste: The negative environmental impact is minimised through safe, lawful handling.
- Emissions into the air: Mainly from the burning of coal in the forge work programmes, oil-firing in the boiler facility. We can exert an influence through technical development and increased proportion of bio-fuels in the boiler facility.
- Emissions into water: From Textiles there are emissions of pigments/chemicals in conjunction with dyeing. Because of the students' individual specialisations the volumes can vary.
- Transport: Transport of goods is being co-ordinated more and more. Passenger transport has a significant impact on the environment at Stenebyskolan.

### General environmental work

The school has appointed a management group to work on a general basis with environmental issues. As part of this work we have established **environmental objectives** and an **environmental policy**. The policy has been adopted by the board. An environmental management system according to ISO 14001 has been introduced. An environmental co-ordinator has been appointed as well as a number of environmental representatives at the departments. The environmental co-ordinator reports on an ongoing basis to the management and the board. An annual report is also presented to the Western Götaland Region and Göteborg University.

#### Environmental policy

- Operations at all units as Stenebyskolan shall promote long-term sustainable development where the management of resources and ecocycle adaptations are the guiding features.
- We follow current legal stipulations and other demands and through ongoing improvements we reduce and prevent negative environmental impact resulting from our operations with regard to the use of resources, transport, emissions into the air and water and residual products.
- We continuously provide all employees and students with basic and operations-specific environmental know-how. The students shall develop a holistic view of aesthetic, ethical and environmental aspects of their work.
- We make the environmental work and this policy known to employees, students and the general public and we report and evaluate the environmental work in the Annual Report.

### Education

We have run a number of environmental days and course programmes with all personnel and students as well as directed programmes for key persons, e.g. general environmental days, directed education to everyone who handles chemicals/hazardous waste. Two internal environmental auditors have been trained. The environmental co-ordinator has been trained in the chemical handling system KLARA. Environmental education has been included in all new curricula.

### Chemicals/Hazardous waste/VIB – Chemical register

We have carried out an environmental enquiry and prepared an environmental list. An agreement with Ragnsells has been signed for the handling of hazardous waste. We have carried out the "chemical sweep" and sorted out all old 'sins' that have become permanent. We have also built a store for hazardous waste at one of the recycling stations. We have trained personnel to be responsible. Routines and forms for updating the Goods Information Sheet have been formulated. The students have been informed that they are not to introduce their own goods which carry a labelling obligation without informing the head of department and where a Goods Information Sheet has been drawn up. The task of introducing the chemical handling system KLARA has commenced.

### Recycling

We have built four recycling stations for sorting waste at source. These have been equipped in order to receive the fractions included in the *Returnera* system. One of the stations has also been equipped for hazardous waste, another for electronic scrap, fluorescent tubes, compost and other special fractions.

### Compost

Local composting of biological waste from the kitchen, pantries and coffee rooms takes place in an Aletrumman rotation compost. The composted material is used in the school's flowerbeds, is taken care of by the personnel or is given to the nearby garden centre.

### Energy

We have built a heating system in order to be able to guide the heating better so that it is used where we need it at any given time. We have also fitted energy-efficient bulbs at certain places and movement detectors to control lighting in premises where this is appropriate. Windows have been refurbished and sealed. Heating has for a number of years largely taken place using pellets. A preliminary study for the construction of a new boiler facility together with two companies and possibly a number of apartment blocks has commenced. A certain saving in energy has been noted recently.

### **Eco-labelling**

We have gradually introduced more eco-labelled food in the dining room. We have had problems finding catering packs of eco-labelled food. At present, approximately 10% of the food we serve is eco-labelled.

### **Vehicles**

During 2004, the company replaced two company cars and a bus with smaller, more fuel-efficient vehicles. One of the two pick-ups has been replaced by a more efficient minibus. A replacement with environmental vehicles, RME or ethanol, has been discussed. There are plans to locate an ethanol plant in Dalsland, which would change the conditions for ethanol vehicles.

### **Environmental audit**

An internal environmental audit took place on August 28, 2003. Since then the environmental management system has been updated in accordance with the views presented in the audit. A certification audit took place on January 13, 2005.

## 11. Glossary/Explanation of concepts and symbols

Fifteen national environmental objectives	The government has decided on fifteen environmental quality objectives that will apply to the whole of Sweden. See <a href="http://www.naturvardsverket.se">www.naturvardsverket.se</a>
Assessment of objective fulfilment	☺ = Objective met ☹ = Objective partly met (positive tendency) ⊗ = Objective not met
Certificate	ISO 14001 certificate (see below)
EMAS	Eco Management and Audit Scheme. The EU's environmental management and environmental audit system.  The EU standards for environmental management systems are almost identical to ISO 14001. However, they differ in certain respects, e.g. the demand for a public environmental report. <a href="http://www.miljostyrning.se">www.miljostyrning.se</a>
Energy	A measure of the work done during a certain period; the product of output and time. Energy is expressed in watt hours (kWh)
Hazardous waste	Waste covered by the Waste Ordinance (SFS 2001:1063) See also <a href="http://www.riksdagen.se/debatt">www.riksdagen.se/debatt</a> or <a href="http://www.kemi.se">www.kemi.se</a> The GU Waste Plan 2004 covers: Chemicals, Batteries, Fluorescent tubes, Low-energy bulbs, Bulbs, Electronic scrap, Refrigerators and freezers and chemical waste  Should not be confused with the term Risk waste (biological, infectious, cutting/pointed, radioactive and pharmaceutical residue).
GAME	Göteborg Action for Management of the Environment
GF	Joint administration, the University's central administration
GMV	Centre for Environment and Sustainability
GU	Göteborg University
Sustainable development	An expression that has its origin in the Brundtland Commission: " <i>A generation may not meet its needs by compromising the ability of future generations to meet their needs.</i> "  Sustainable development is based on three mutually dependent dimensions: ecological, social and economic sustainability.
ISO 14001	International Standard of Organisation = ISO The international standard for environmental management systems. The main purpose of the standard is to act as a source of support in environmental protection and to prevent environmental pollution, while at the same time requisite consideration is given to socio-economic requirements. ISO 14001 certification means that systematic environmental work is in progress, that the work is being conducted in areas where the organisation has the greatest environmental impact and that it is possible to show ongoing improvements in the environmental field.
Environmental Handbook	The Environmental Handbook contains all the documents within the environmental management system for GU.
Environmental management system	An overall management system that covers the systematic introduction of an in-house environmental policy.
Environmental audit	A management tool that involves an evaluation of how the environmental protection organisation, management routines and equipment are functioning with the aim of protecting the environment.
Swedish Environmental Management Council.	The Swedish Environmental Management Council has been commissioned by the government and its owners to manage and administer two systems: 1) EMAS – The EU's environmental management and environmental audit system 2) Certified Environmental Declarations – EPD <a href="http://www.miljostyrning.se">www.miljostyrning.se</a>
TMBL	Tjärnö Marine Biological Laboratory

## 12. Contact us

Those of us working at the **GU Environmental Unit** to reduce negative environmental impact and to develop the environmental work being done at GU, would be very happy to receive feedback with thoughts and ideas on our environmental work. If you have ideas, views and proposals for improvements – call or e-mail us:

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\*\* Information about GU's Environmental management work can be found at [www.mls.miljo.gu.se](http://www.mls.miljo.gu.se)

