Environmental Report 2002/2003

GEORG FISCHER CORPORATION

GEORG FISCHER +GF+

Environmental Report 2002/2003

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Georg Fischer Ltd, CH-8201 Schaffhausen/Schwitzerland
Phone +41 (0)52/631 11 11, Fax +41(0)52/631 28 37, E-mail info@georgfischer.com, http://www.georgfischer.com

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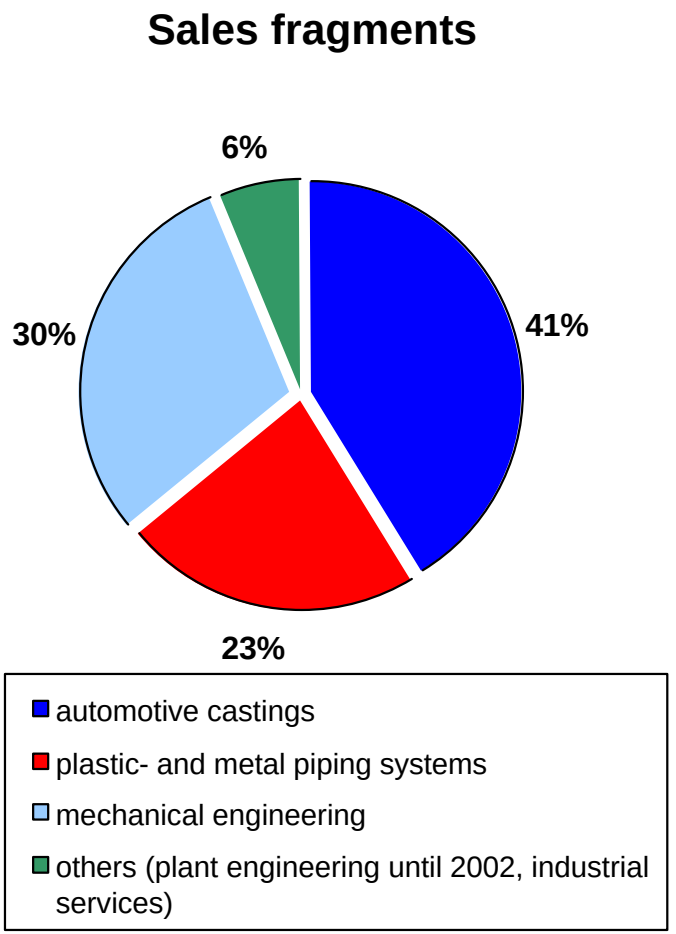
Georg Fischer Ltd, CH-8201 Schaffhausen/Schwitzerland
Phone +41 (0)52/631 11 11, Fax +41(0)52/631 28 37, E-mail info@georgfischer.com, http://www.georgfischer.com

The industrial corporation at a glance



- Georg Fischer produces primarily **castings,** both iron and light-alloy, for the automotive industry **plastic and metal piping systems** for industrial applications, gas and water distribution, and domestic installations, **machines** for tool and mold making
- Annual sales in 2002: CHF 3.2 billion
- 14,000 employees worldwide
- Represented in over 100 countries
- 34 production sites in 12 countries
- Sales and service companies in 20 countries

Our products' contribution to environmental protection

- **Lightweight automotive castings**

  Weight savings of as much as 20% through thin-wall structures and integrated add-on parts allow auto manufacturers to build lighter, more economical, and even safer vehicles.

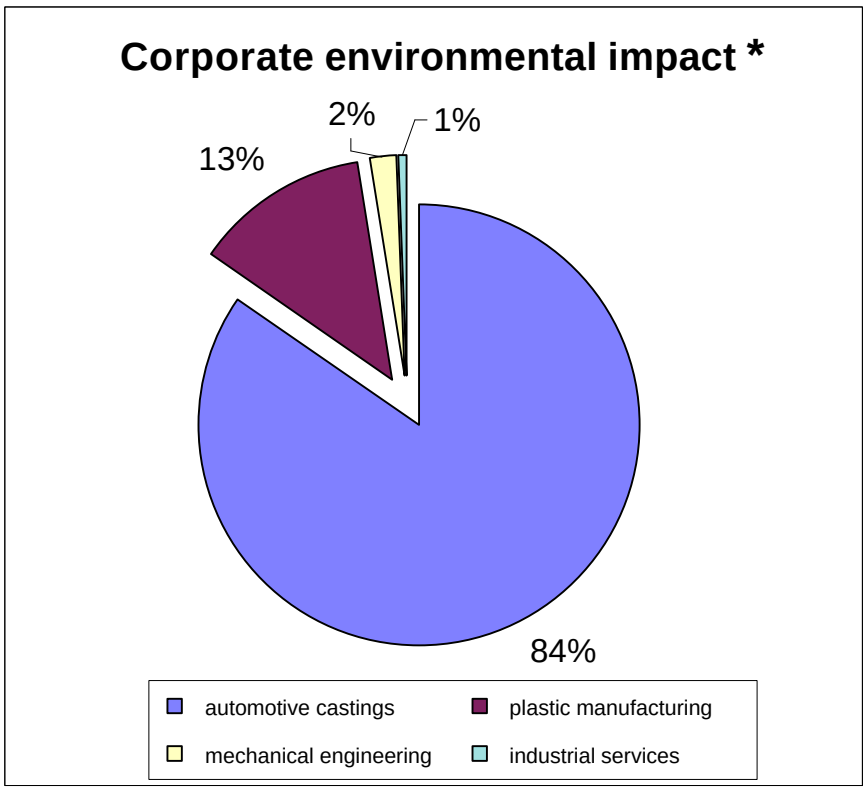
- **Reliable transport of clean drinking water**

  Georg Fischer piping systems are lightweight transport goods, corrosion-resistant and durable. They protect drinking water, a valuable resource, all the way from its source to individual homes.

- **Precision technology for mold-making**

  Our machines make it possible to produce high-precision molds so that thin-walled and very lightweight plastic bottles can be mass-produced economically while using resources efficiently.

Greatest environmental impact in the corporation: foundries



* The five indicators – energy consumption (electricity, natural gas, oil and coke), water, wastewater, atmospheric emissions and waste – are not weighted according to their actual environmental impact.No assessment was made. The graph shows the percentages of the total sum of indicators analysed that are accounted for by the four corporate groups.

- The casting process is the shortest path from the material to the end product. It conserves resources and avoids waste. However, the **iron and light-alloy casting process** has an impact on the environment. If the term "environmental impact" is understood to include consumption of water, energy, athmospheric emissions resulting from the combustion of energy, the accumulation of waste and wastewater, then the distribution of environmental impact within the corporation is as shown in the figure.

Environmental impact of the foundries

Percentages of the various environmental impact categories accounted for by **foundries**:

- Energy consumption: 89%
- Water consumption: 68%
- Wastewater: 80%
- Atmospheric emissions: 88%
- Waste volumes: 95%

Road map to environmental management

1992	**Signing of the ICC Charter - Georg Fischer declares its commitment to sustainability**
1994	**"Protecting the environment". Georg Fischer issues Environmental Statement**
1995	**Georg Fischer begins developing its environmental management system**
1996	**Definition of Georg Fischer's environmental policies**
1997	**Development of Environmental Management Information System (BUIS))**
1999	**All Georg Fischer foundries are certified under ISO 14001**
2000	**First corporate environmental report is printed and published**
2001	**Second corporate environmental report released**
2002	**Tracking of the most important environmental indicators published on the Internet**
2003	**Fourth environmental report published as PowerPoint presentation on the Internet**
2004	**Environmental report will become a component of sustainability reporting**

Honors and recognition

1998 CIATF Environmental Award goes to Georg Fischer foundries in Singen and Leipzig, Germany, for achievements in the area of environmental protection

1999 Swiss Cantonal Banks and WWF include Georg Fischer in their environmental funds after it received positive ratings

2000 Georg Fischer Fittings GmbH in Traisen, Austria, receives the BDO Auxilia environmental award for environmentally relevant process improvements, taking first place

2001 Georg Fischer is included in the Dow Jones Sustainability World Index Fund (DJSI)

2002 INRATE Leader in Sustainability Award goes to Agie Charmilles for environmentally compatible production in the mechanical engineering sector

2002 WFO environmental award for Georg Fischer foundry Mettmann, Germany, for developing methods for preventing odor emissions

2003 A- rating received from Corporate Sustainability Rating SIRI, Geneva, Switzerland

Environmental management

How environmental management is organized at Georg Fischer

- **Overall responsibility:**

  Dr. Ernst Willi, Head of Corporate Development, Member of Corporate Management Board, Environmental Officer of Corporate Management
  Ernst.Willi@georgfischer.com

- **Technical responsibility:**

  Urs Häberli, Dipl.-Ing. ETH, Head of Quality and Environmental Management
  Urs.Haeberli@piping.georgfischer.com

- **Project management**:
  Rouven Kraft, Dipl.-Ing. (FH), Environmental Engineer
  Rouven.Kraft@piping.georgfischer.com

- **Publications and information:**

  Dr. Bernd Niedermann, Head of Corporate Publications
  Bernd.Niedermann@georgfischer.com

- **Local responsibility at corporate subsidiaries:**

  Environmental management representative at all environmentally certified sites

Georg Fischer's environmental policies

Environmental Policy

Georg Fischer Corporation

Protecting the environment

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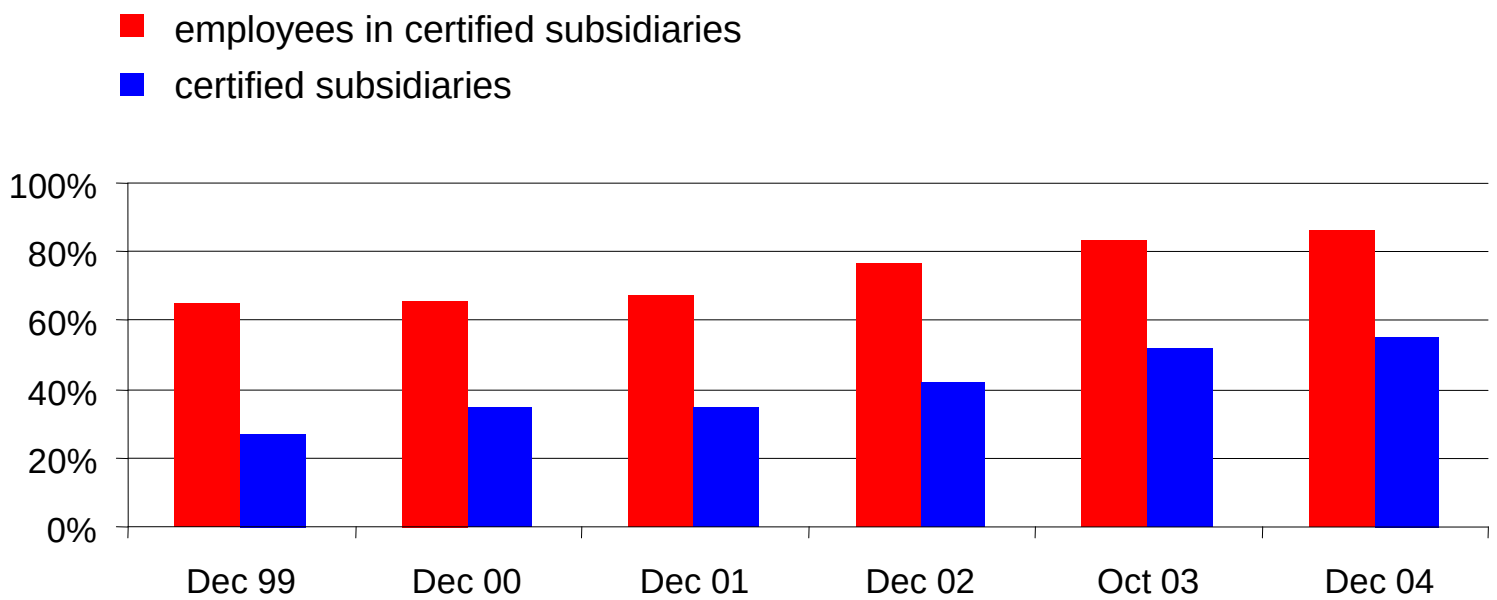
We at Georg Fischer are committed to taking an active part in protecting natural resources by striving to conduct our operations in harmony with the environment.

source: environmental policy

Development of environmental management system at Georg Fischer

- **Environmental management assures sustainable environmental protection**
  By the end of 2002, all corporate subsidiaries with production and logistics operations were environmentally certified. This includes 75% of all employees worldwide. All foundries (100%) are environmentally certified.



Corporate Environmental Information System-BUIS

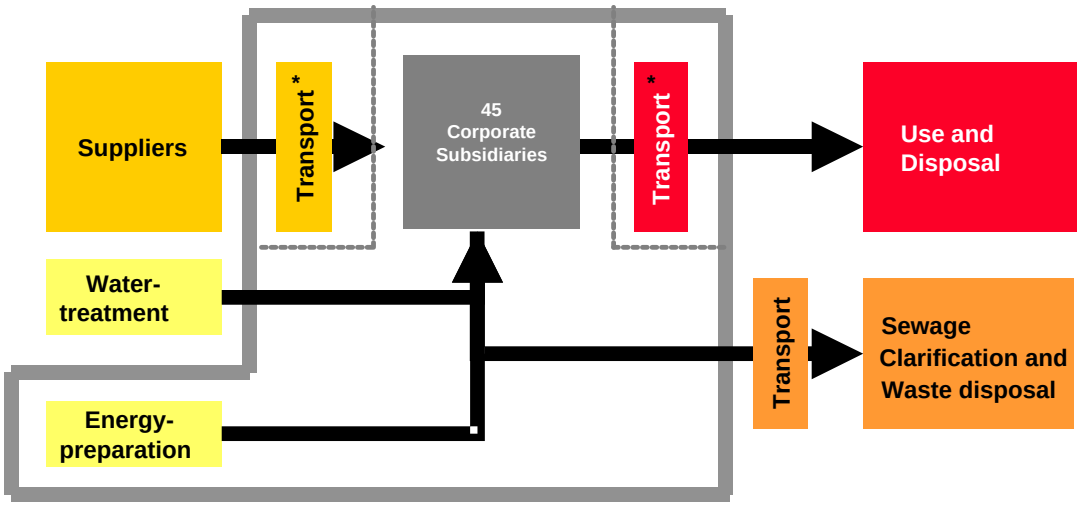
- All **corporate subsidiaries that have production and logistics operations** are covered by the Environmental Management Information System (BUIS). **Environmental reporting** therefore includes **77% of all employees**. Trained staff members at the individual corporate subsidiaries are responsible for collecting and reporting environmental data. Data on area, on consumption of electricity, natural gas, oil, water and on atmospheric emissions and wastes is collected on an annual basis.

- The **BUIS corporate reporting system covers 45 corporate subsidiaries**, including all sites with a production and logistics orientation. The data for these companies is not extrapolated for the corporation as a whole, which includes over 140 companies. Legal Compliance is ensured.

Corporate Environmental Information System-BUIS: system limit

- The BUIS system tracks the **flow of materials and energy** into the 45 BUIS companies (input) and the flow that leaves these companies (output).

System limit of the Corporate Environmental Information System (BUIS)



* Data on shipments delivered to these companies, shipments for product distribution, and business trips are also included in the system but are not published in the environmental report for reasons of data quality.

Georg Fischer's environmental goals

- Since the inception of environmental reporting in 1999, three **strategic environmental goals** were formulated and implemented on the **corporate** level for each of the years 2000 and 2001.

- Within the **corporate core businesses** automotive castings, plastic manufacturing, and mechanical engineering, additional **operational environmental goals** are defined each year.

Corporate environmental goals 2001/2002

Goals for 2001/2002 as formulated in the Environmental Report 2000:

1) **Certified environmental management systems in all companies with a production and logistics orientation**

   Result: **goal achieved**. By the end of 2002, all corporate subsidiaries with production and logistics operations had certified environmental management systems.

2) Gradual **introduction of environmental design**

   Result: **goal not achieved**. In spite of first successful steps in **plastic manufacturing**, environmental design has not yet been introduced in the Georg Fischer Corporation.

3) **Implementation of an environmental protection initiative** in all non-certified companies

   Result: **goal partially achieved**. The companies in question in Piping Systems have reached this goal, but the companies in Manufacturing Technology have not yet done so.

Environmental goals for 2001 in automotive castings

- **2% reduction** in **power consumption** compared with 2000

  Result: **goal not achieved**. Instead of a 2% reduction, there was a 2% increase (equivalent to 139 kWh / metric ton of acceptable cast product).

  Reason: Decline in capacity utilization in the second half of 2001 affects the key figure KWh per ton acceptable cast product negatively.

- **30% increase** in the number of environmentally-related or safety-related **suggestions for improvement**

  Result: **goal achieved**. Target exceeded by 130%.
  Reason: improvement in employee awareness.

Environmental goals for 2002 in automotive castings

- **2% reduction** in the relative **consumptions** of the two most important auxiliary materials compared with 2001.
  Result: **goal achieved**. Average savings increased by 37 kg of raw or auxiliary materials per metric ton of acceptable cast product.
  Reason: plant modernization.

- **2% reduction** in the relative **accumulation** from the two most important wastes compared with 2001.

  Result: **goal achieved**. On average, 58 kg less waste per metric ton acceptable cast product than planned.
  Reason: plant modernization.

Environmental goals for 2003 in automotive castings

Continuation of goals for 2002

- **2% reduction** in the relative **consumptions** of the two most important auxiliary materials compared with 2002
  Result: publication in first quarter of 2004

- **2% reduction** in the relative **accumulation** from the two most important wastes compared with 2002
  Result: publication in first quarter of 2004

Environmental goals for 2001 in plastics

- **Certification of 10 more corporate subsidiaries under ISO 14001**

  Result: **goal partially achieved**. A total of only 7 new certifications were achieved.
  Reason: Due to the financial situation a number of target deadlines were postponed.

- **Implementation of newly developed indicator system for environmental performance throughout the plastic manufacturing**
  Result: **goal achieved**. The existing BUIS indicator system was developed further, as planned.

- **Develop environmental arguments to show substantial customer benefit**

  Result: **goal achieved**. A list of questions & answers for PVC products was developed along with an academic thesis entitled "Environmental Sales Arguments for Georg Fischer Piping Systems“

Environmental goals for 2002 in plastics

Resubmission of the previous year's goal "Certification of 10 more corporate subsidiaries under ISO 14001"

- **After certification of 7 corporate subsidiaries in 2001, certification of 3 corporate subsidiaries in 2002.**

  Result: **goal achieved**. The goal has been achieved with even 4 new certifications.

Environmental goals for 2003 in plastics

- **Certification of 3 more corporate subsidiaries under ISO 14001**
  Result: publication in first quarter of 2004

- **CO_2 reduction** - Evaluation of **potential and actions to be taken** in connection with meeting the targets of the Kyoto Protocol on reduction of CO_2 emissions.
  Result: publication in first quarter of 2004

- **Environmental management as an additional customer benefit plastic manufacturing** evaluates possibilities for additional customer value in conjunction with environmental management in order to generate market benefits.
  Result: publication in first quarter of 2004

Environmental goals for 2001 in mechanical engineering

- **Further reduction in energy consumption in all main works**

  Result: **goal achieved**. Optimization of heating and air conditioning systems in the production halls of Charmilles, Switzerland.

- **Constructive improvements at production and office buildings**
  (goals 3-5 in environmental report 2000)

  Result: **goal not achieved**. Only several measures realized (roof insulation of production plant Schaffhausen, Switzerland, renewed).
  Reason: Due to the financial situation a number of target deadlines were postponed.

- **Optimization of temperature controls and -distribution at Geneva, Losone and Schaffhausen sites, Switzerland.**

  Result: **goal achieved**. Optimization of room temperature. Reduction by 2° C in the production and office buildings.

- **Motivational training for services personnel (environmental awareness of customers)**
  Result: **goal not achieved**.
  Reason: Motivational training project had to be postponed.

Environmental goals for 2002 in mechanical engineering

Resubmission of the previous year's goals:

- **Further reduction in energy consumption in all main works**

  Result: **goal achieved**. At the Saleggi/Losone site, Switzerland, of Agie new air conditioning monoblocks have been installed, in order to reduce energy consumption in the future.

- **Constructive improvements at production and office buildings**

  (goals 3-5 in environmental report 2000)

  Result: **goal not achieved**. Not all planned measures could have been realized (roof insulation of production plant Losone, Switzerland, and window reconstruction office building realized).
  Reason: Due to the economically tough situation some projects had to be postponed.

Environmental goals for 2003 in mechanical engineering

- **Further reduction in energy consumption in all main works**
  Result: publication in first quarter of 2004

Savings achieved with cast iron: less water on the fire

Mettmann Iron Foundry, Germany - cooling water cools longer thanks to optimized system

One of the functions of water in a foundry is to cool the melting furnaces, which contain hot iron at temperatures as high as 1400º Celsius.

- **Problem**
  Conserve expensive fresh water; use water volume more efficiently

- **Measure**
  Installation of a cooling water system in 2003 that increases the residence time of the water in the cooling system.

- **Result**
  Freshwater requirements reduced by 13% (55'000 m^3); 15% (44'000 m^3) less wastewater

Energy diet for Electric Discharge Machines' generators (EDM)

Charmilles mechanical engineering - customers save on electricity with optimized generators

The generators that generate sparks for wire-cut EDM are the heart of the wire erosion process but also represent its primary power consumer.

- **Problem**

  The machines are in continuous use in customer's plants. Energy consumption should therefore be minimal. Speed and accuracy must not be affected.

- **Measure**

  Development of a new architecture involving the "spark curve", which improves erosion and also saves on electric power.

- **Result**

  "Clean Cut" cutting system permits higher cutting rates and thus saves time and power (as much as 20%) without having to compromise on accuracy.

Made-to-measure for precision machinery

The mechanical engineering construction plant in Schaffhausen, Switzerland, doesn't need energy-intensive air conditioning thanks to an insulating tent.

- **Problem**

  For the manufacturing of high-precision parts on Electric discharge machines (EDM) a stable ambient climate in the production rooms is compulsory during the entire operation time of the systems including the final check. This can be achieved by air conditioning, but that's a very energy-intensive solution.

- **Measure**

  Every EDM machine is outfitted with its own insulating tent, which creates a standardized climate in a restricted space – this is important for the final check. As a result, production in this plant can do without energy-intensive air conditioning of the entire production hall.

- **Result**

  The result is a big saving in energy with a short pay-back time.

“Aluminium casting doesn’t smell (any more)”

Aluminium foundry in Friedrichshafen, Germany, eliminates smell pollution almost completely

The aluminium foundry is situated in the middle of a residential area and must therefore not only meet strict emission standards but also fulfil special requirements with respect to odour pollution.

- **Problem**
  The main source of odours is the casting process during which decomposition products arise from the binder substance as a result of the transfer of heat from the liquid aluminium to the sand mould, and are released into the environment.

- **Measure**
  Introduction of a low-smell binder systems, avoidance of diffuse solvent emissions. Additionally, the odour in the exhaust air flows is reduced by means of a chemical process, “regenerative thermal oxidation” as of 2004. A yield of over 90% leads to a significant odour reduction.

- **Result**

  Noxious smelling components in the emissions have been cut; the values for odour pollution in the vicinity are well below the limits.

Magnesium casting: Oil distilled out

Magnesium foundry in Altenmarkt, Austria, relies on sophisticated waste separation technology that isolates and reduces hazardous waste

The waste water in the magnesium casting production process is contaminated with oily substances such as hydraulic oil and lubricating greases and is therefore classified as hazardous waste.

- **Problem**

  Hazardous waste is dangerous for the environment and therefore intensive to dispose of.

- **Measure**

  The waste water emulsion is fed through a vacuum distillation plant which separates out the oily components from the water.

- **Result**

  Significant reduction in hazardous waste requiring special disposal. Lower transport costs. The excess heat from the distillation plant is used for heating the production halls.

Pressure die-casting in China: Better air with wax

Aluminium foundry in Zhiangjiagang, PR China, changes to different lubricants and so prevents oily waste

Pressure die-casting machines need large quantities of dependable lubricants. Substances containing mineral oil are normally used.

- **Problem**

  In the casting process parts of the oil are partially dissipated into the air due to pyrolysis and thereby affecting the air quality negatively.

- **Measure**

  Substitution of lubricants containing mineral oil by wax pellets.

- **Result**

  The creation of oily waste is avoided which consequently prevents impairment of the air quality and also mainly improves the air and job quality.

Production engineering: mechanical engineering “light”

Charmilles Technologies in Meyrin, Switzerland, uses an innovative ultrasonic process for “degreasing”, thereby reducing consumption of solvents containing VOCs

Metal machine parts are greased for storage and have to be degreased prior to installation.

- **Problem**

  Products containing volatile organic compounds (VOCs) are generally used to degrease machine parts. These volatile organic compounds impact on air quality and cause the formation of ground-level ozone (summer smog).

- **Measure**

  Establishment of a closed cycle for the ultrasonic degreasing of machine parts

- **Result**

  Consumption of solvents containing VOCs which are still used for degreasing - previously in an open system - has fallen by 76% since 2001. In volume terms this means a reduction of 1.5 metric tons of volatile organic solvents at this location.

Natural Gas replaces oil - protecting our climate

Schaffhausen site (Switzerland) - 588 metric tons less CO_2 per year

A major portion of the energy consumed in our part of the world is used to heat offices and production buildings during about half of the year.

- **Problem**
  Companies will be charged for releasing CO_2 in the near future.
  Emissions of CO_2 from fuel oil combustion are relatively high.

- **Measure**
  Find sources of energy that produce less CO_2;
  changeover of heating systems to natural gas.

- **Result**
  Running heating systems on natural gas means that approximately 25% less carbon dioxide is emitted per year. That is equivalent to 588 t annually.

Environmental indicators over time

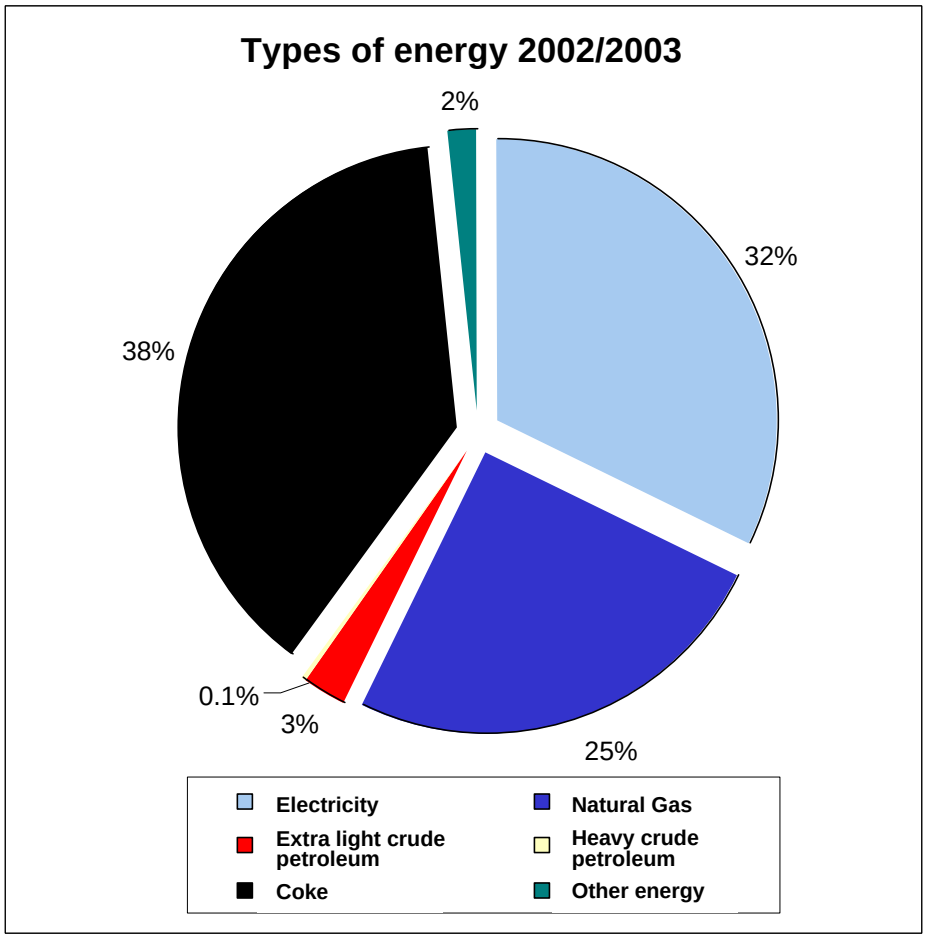
- Since 1997, Georg Fischer has collected environmental data **every calendar year** through its own Environmental Management Information System (BUIS). It was not until 2001 that an initial analysis of the trends in environmental data for 1999 and 2000 became possible.
- 2002: change in the reporting period (July of one year to June of the next year) in order to be able to publish current environmental figures in the Annual Report. For 2002/2003 reporting, the annual data for 2002 and the data for the first half of 2003 were collected, and the calculated average of a 12-month period was used. .
- For 2003, analysis of trends in the areas of energy, water, air and wastes over 4 years (1999, 2000, 2001, 2002/2003).

Energy

The most important power sources at Georg Fischer are:

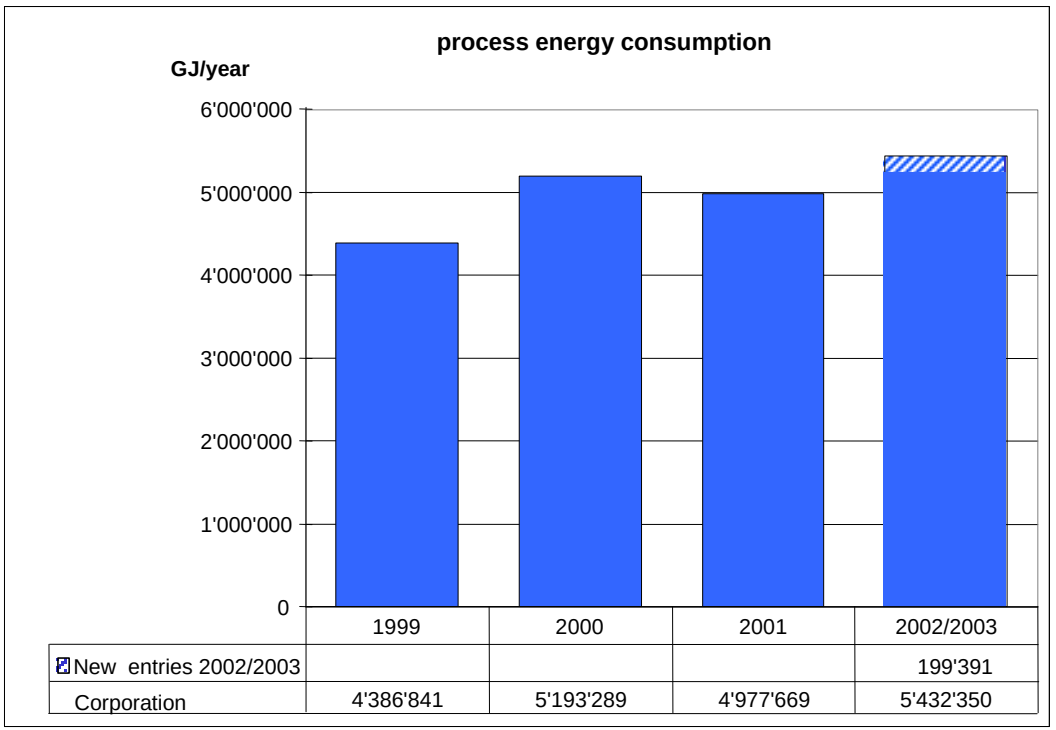
- **electricity**
- **natural gas**
- **oil**
- **coke**

Types of energy



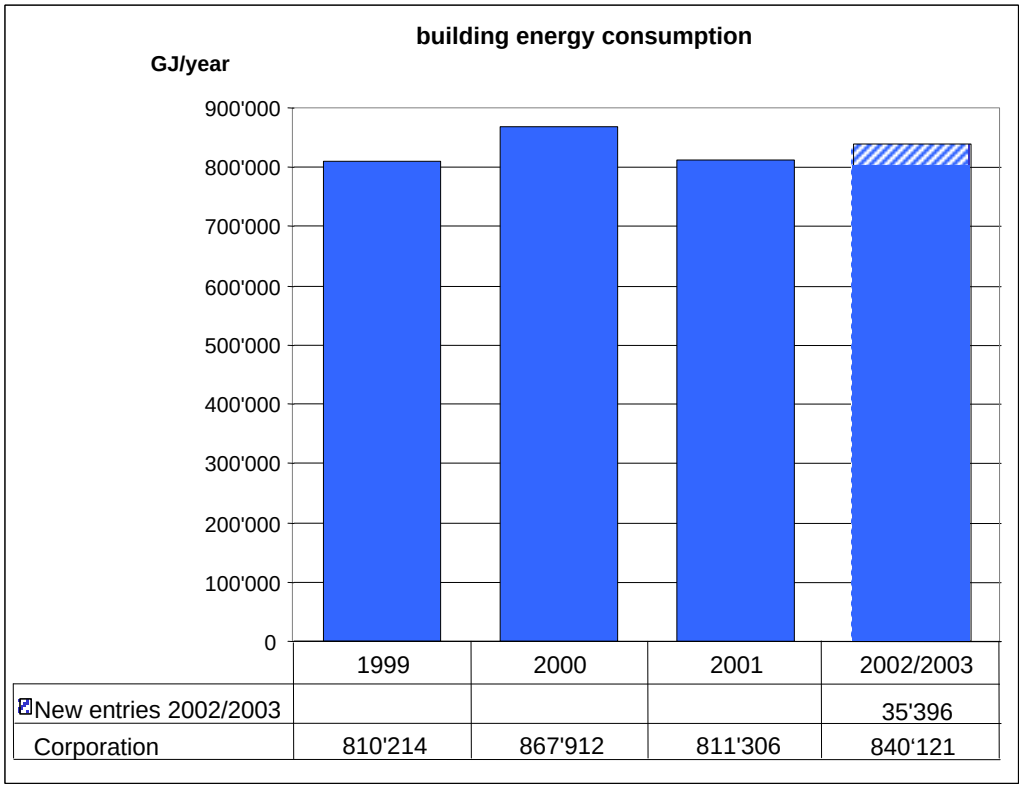
- **Coke** is used in the cupola furnaces of the iron foundries for melting iron and carburization.
- **Electricity and natural gas** are used primarily to provide process energy. **Oil** (extra light and heavy crude petroleum) is primarily used for building heating. **Other types of energy** involve energy from heat recovery and waste heat utilization.
- We break down overall energy consumption into **process energy consumption** and **building energy consumption**. Production and logistics account for the major share with 87%, and this is what we refer to as process energy.

Process energy consumption increases as group of consolidated corporate subsidiaries expands



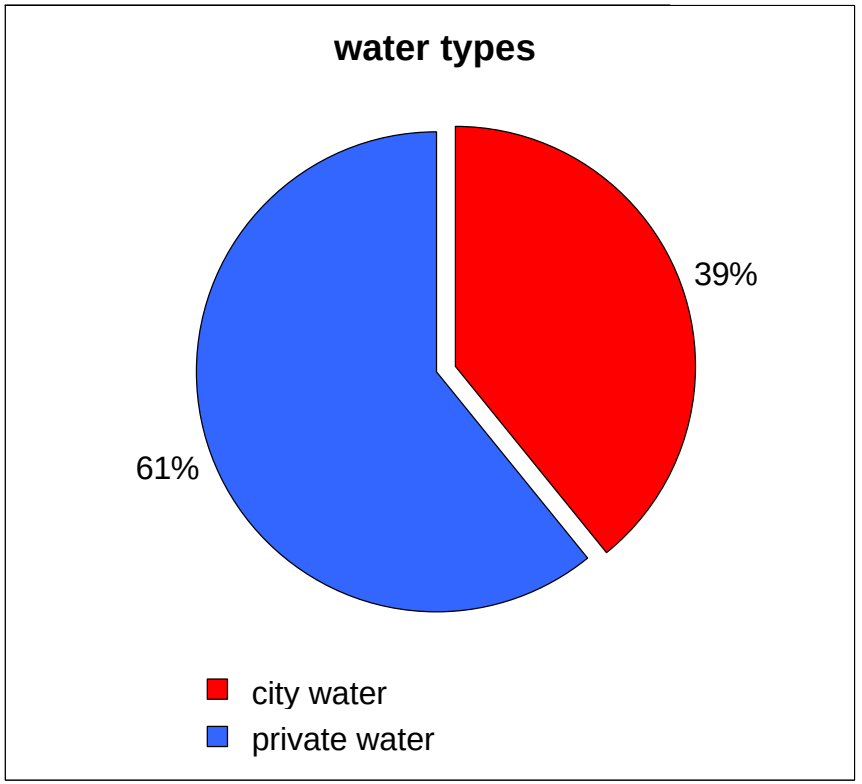
- Energy consumption in production and logistics increased in 2002/2003 because of the expansion of the corporate group (addition of 2 foundries, 3 plastics production plants and 1 affiliated company in the area of manu-facturing technology). These 6 corporate subsidiaries together account for 44% of the increase in process energy consumption, and the remainder can be attributed to increases in consumption (especially in electricity and natural gas consumption) by four large automotive foundries, a consequence of production increases and better capacity utilization.

Slight increase in building energy consumption as group of consolidated corporate subsidiaries expands



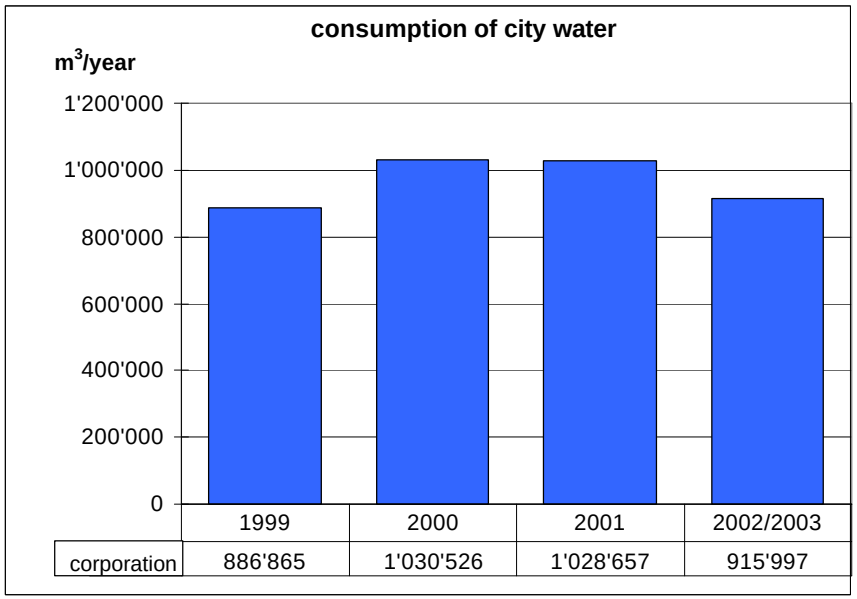
- Building energy consumption did not increase significantly, inspite of the larger number of corporate subsidiaries. The elimination of the plant engineering business and further improvements made to buildings and heating systems compensated for any major increases.

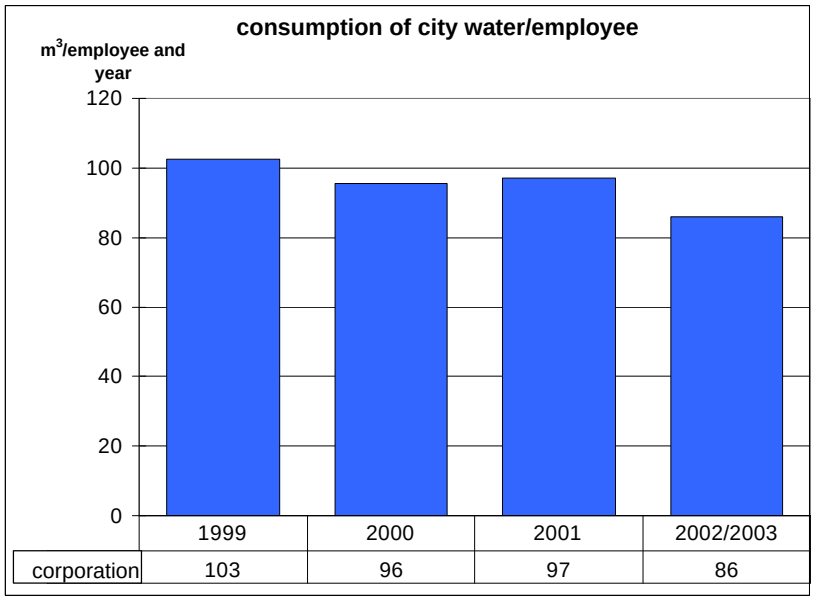
Water - fresh water



- At some sites, Georg Fisher uses not only drinking water from public water supply systems but also water from its own sources (wells and surface water). Expensively purified drinking water from public systems accounts for only 39% of total water consumption.

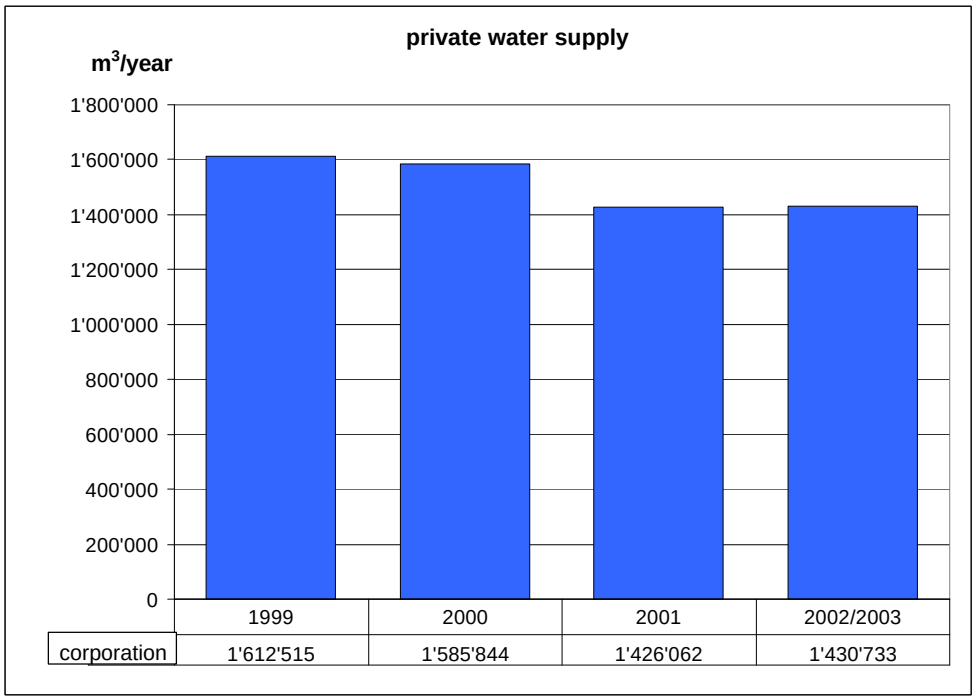
Drinking water from the public water supply system: efficiency increased and consumption reduced





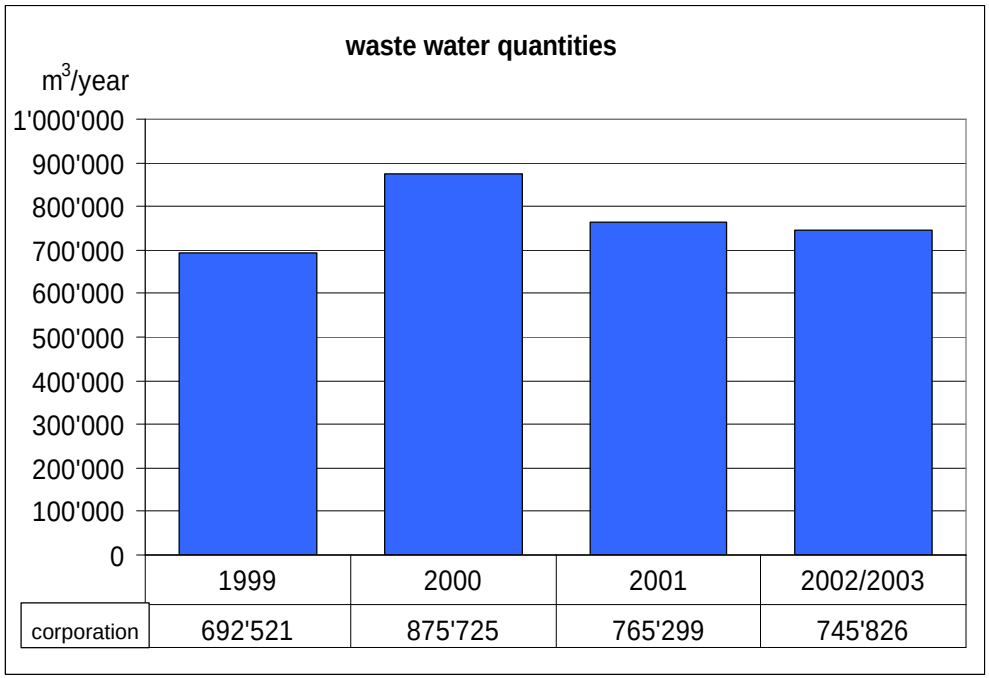
- The consumption of drinking water from public water supply systems was sharply reduced. The 11% drop can be attributed to concrete measures (increase in cooling water recycling, shutdown of once-through cooling systems, reduction in evaporation losses) at individual foundry sites. The growth in the number of corporate subsidiaries is more than balanced out by the improvement measures.

Water from private water supply systems - consumption stable



- The consumption of water from private water supply systems remains virtually constant, compared with 2001.

Wastewater - further reduction



- Wastewater generated by the affiliated companies ends up in public water treatment plants, although some of the water is fed through in-house purification stages before entering the public wastewater system.
- Less than 1/3 of the water volume from public and private supply systems that is used by corporate subsidiaries is accumulated as wastewater. The majority is used as cooling water, for instance, and is released to the natural environment as clean water.
- Measures taken to decrease the consumption of fresh water also have a positive effect on waste water levels. The reduced water consumption is also reflected in the decrease in wastewater flow.

Air

- **Energy consumption and atmospheric emissions**
  The consumption of fossil fuels such as coke, natural gas and oil results primarily in the following emissions:

  - carbon dioxide (CO_2)
  - nitrous oxides (NO_x)
  - sulfur dioxide (SO_2)
  - volatile organic compounds (VOC)

  Production processes result in the additional accumulation of solid particles and additional VOCs.

Air - emission: effects

- **Effects brought about by the major emitters:**

  CO_2: greenhouse effect ➔ global warming

  SO_2: soil acidification, winter smog ➔ forest dieback

  NO_x: ozone accumulation ➔ air pollution, allergies, respiratory diseases

  CH_4: ozone accumulation, global warming

  (some) VOCs: destruction of ozone layer ➔ increase in UV-B radiation (skin cancer, gray cataracts)

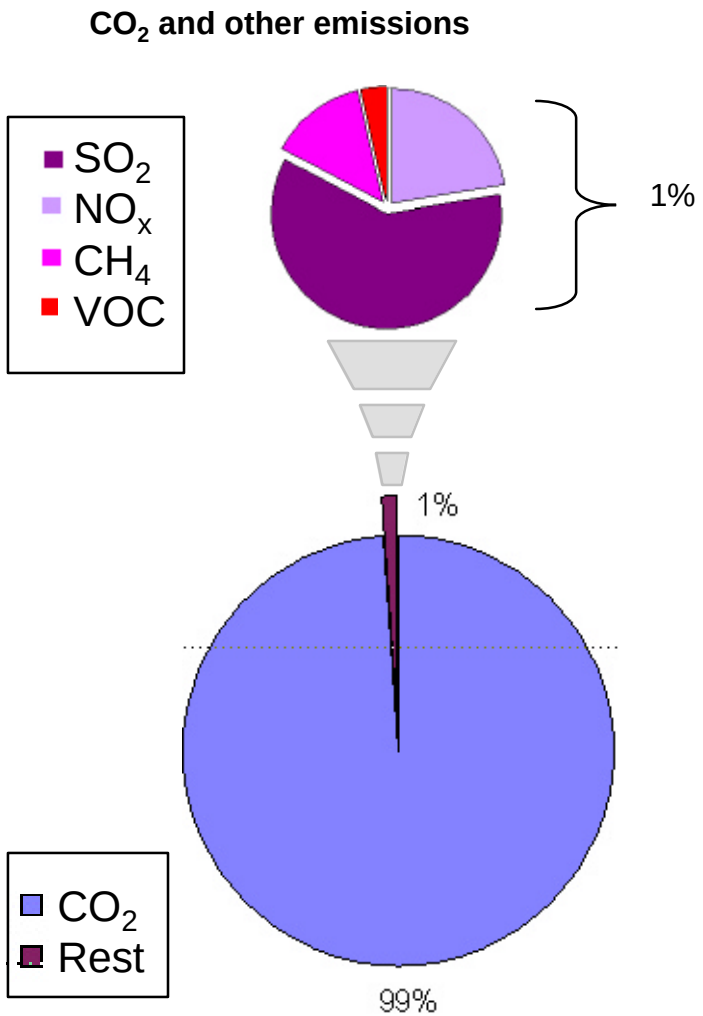
- **Global warming potential (GWP) of emitters:**

  The global warming potential describes the contribution of a substance to the greenhouse effect in relation to the contribution of an equal amount of carbon dioxide.

CO_2	factor 1
CH_4	factor 30

  The main focus is on CO_2 because it predominates in terms of volume.

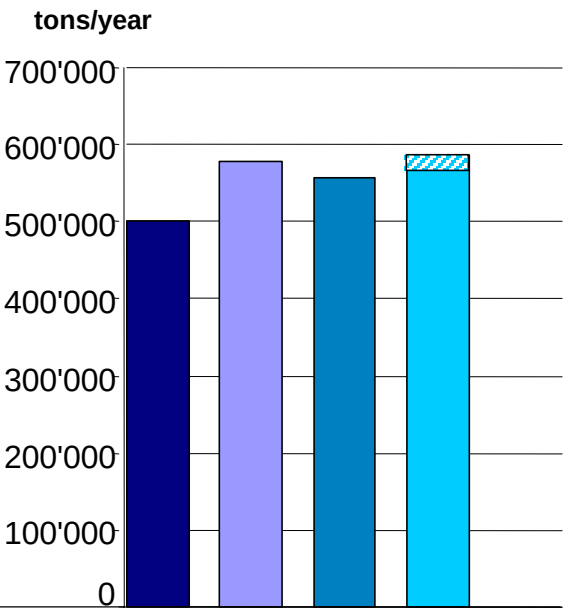
Emissions from energy consumption



- The generation and consumption of energy results primarily in emissions of carbon dioxide (CO_2) but also of nitrous oxides (NO_x), sulfur dioxide (SO_2), methane (CH_4) and volatile organic compounds (VOC).

Emissions from energy consumption - CO_2

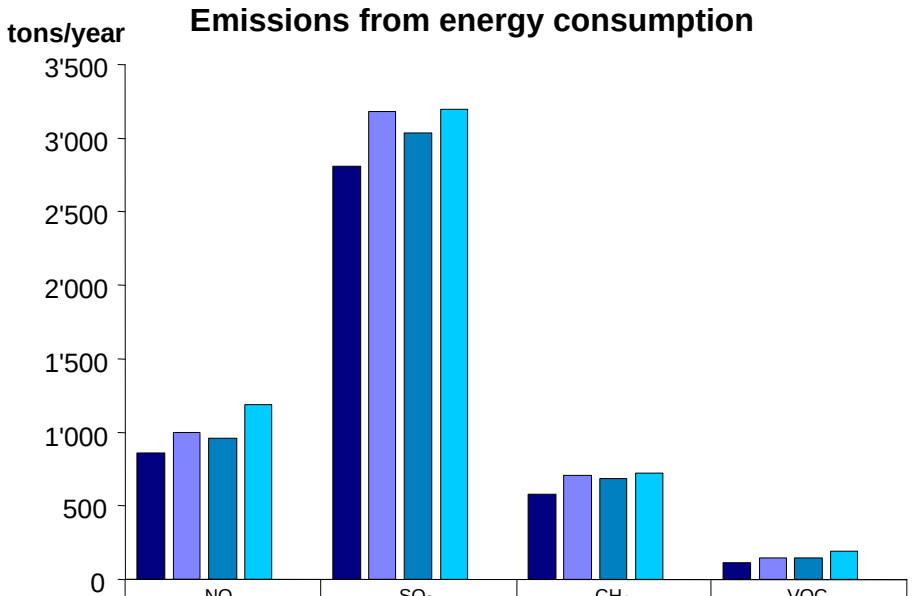
Emissions from energy consumption



	CO_2
1999	500'772
2000	579'529
2001	558'581
2002/2003	587'977
New entries 2002/2003	17'955

- Since emissions into the atmosphere also increase with rising consumption of fossil fuels, there has been an increase in CO_2 emissions as process energy consumption has risen.
- Process energy consumption rose during 2002-2003 due to the expanded group of corporate subsidiaries and due to production increases and improved capacity utilization.

Emissions from energy consumption - SO_2, NO_x, CH_4, VOC

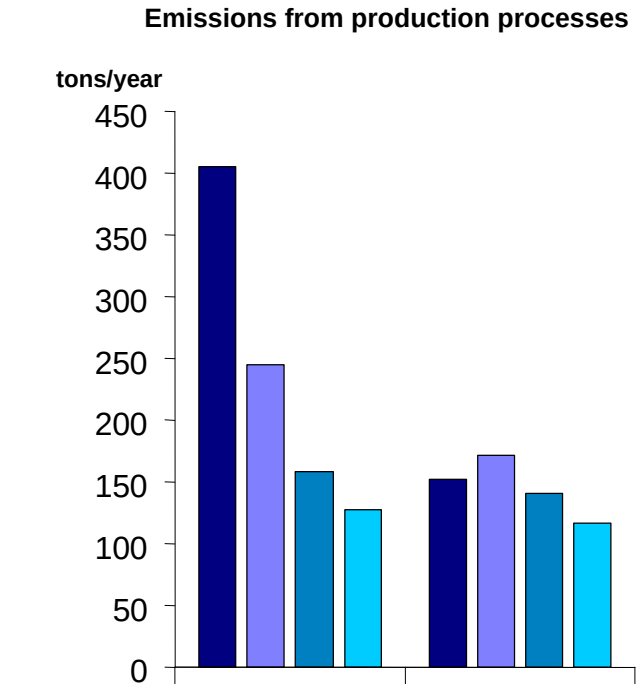


	NO_x	SO_2	CH_4	VOC
1999	863	2'806	580	116
2000	999	3'179	706	145
2001	956	3'036	688	141
2002/2003	1'187	3'195	724	190
New entries 2002/2003	26	48	22	6

(New entries are not pictured due to insignificance)

- Since emissions into the atmosphere also increase with rising consumption of fossil fuels, there has been an increase in the emissions of nitrous oxides (NOx), sulfur dioxide (SO_2), methane (CH_4), and volatile organic compounds (VOC) as process energy consumption has risen.

Emissions from production processes - particles, VOCs



	VOC from substances	Particles
1999	405	152
2000	245	172
2001	158	141
2002/2003	127	117

- Products containing VOCs (volatile organic compounds) are used in various production processes.

  These environmentally critical substances (causing sommer smog) have been further reduced – through more efficient handling, replacement by non-hazardous alternative products, or even elimination by process changes.

- Foundries also produce particulate emissions. New successes have been achieved in this area through continued efforts.

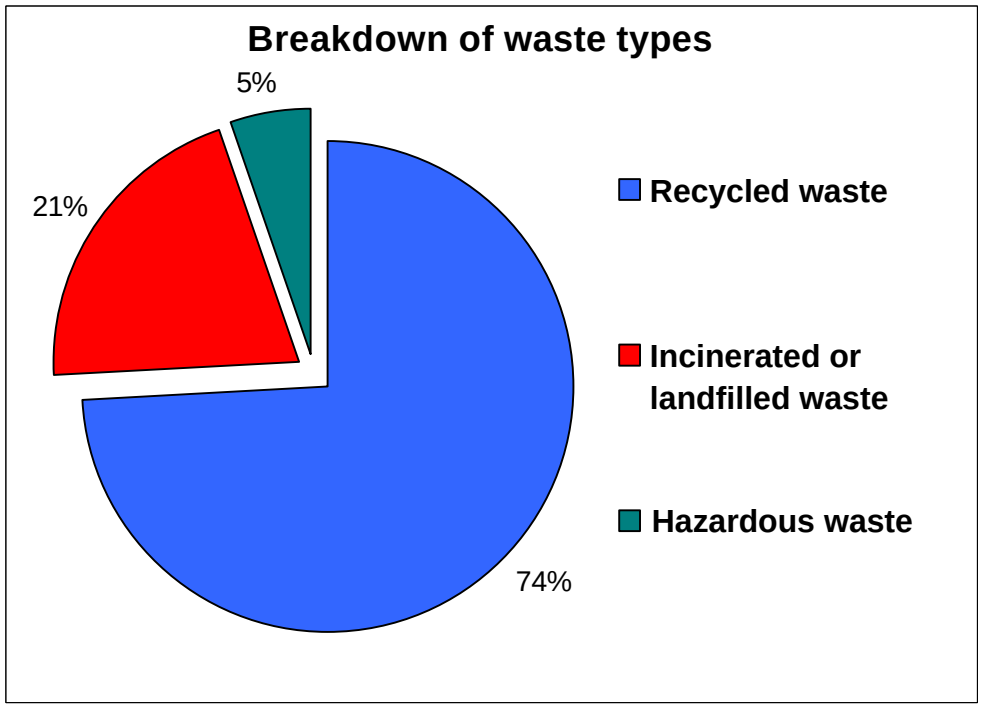
Waste

- **Recycled wastes**
  include all substances that are utilized outside the Georg Fischer Corporation materially or to produce energy, i.e., that are re-used as the raw material for a product or are burned as fuels (**externally recycled wastes**). This category also includes wastes that can be sold to a recycling company, and these wastes are referred to as valuable substances. Recyclables are **materials** that are **re-used within the company** and reduce raw material requirements. Foundries do not report recyclables, since materials are already recycled a number of times in the casting process for process-engineering reasons and not for environmental reasons. If these volumes were counted, the result would be so great that the individual achievements of other companies would no longer be apparent.

- **Incinerated or landfilled industrial and office wastes**
  Wastes from production operations or offices that cannot be recycled or used to produce thermal energy are either deposited in a landfill or incinerated.

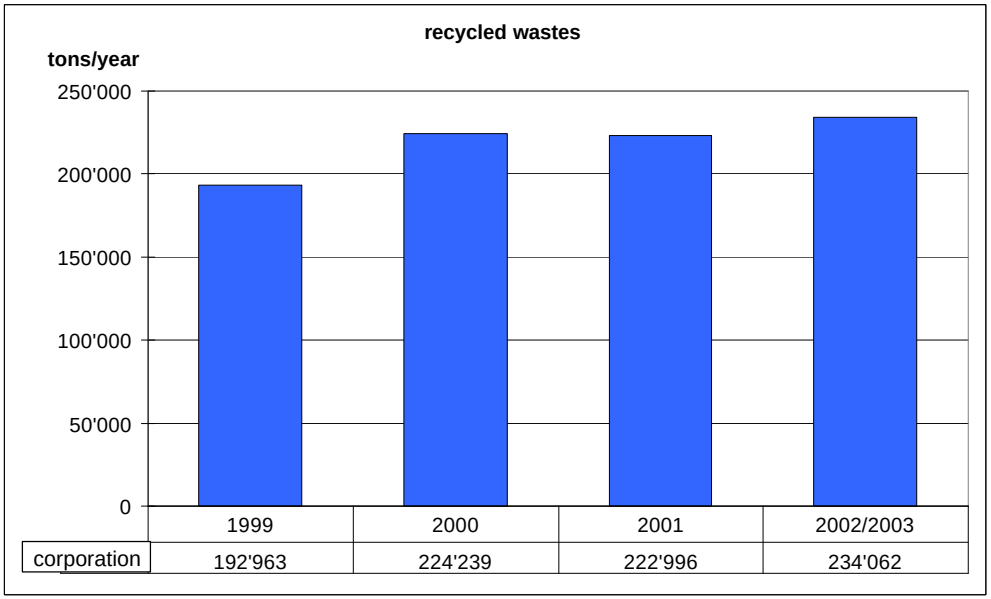
- **Hazardous wastes**
  are considered as a separate category and are transferred to licensed disposal companies. This category includes wastes that, because of their composition, must be stored separately and undergo special treatment and monitoring (hazardous waste dump or incineration).

Waste disposal



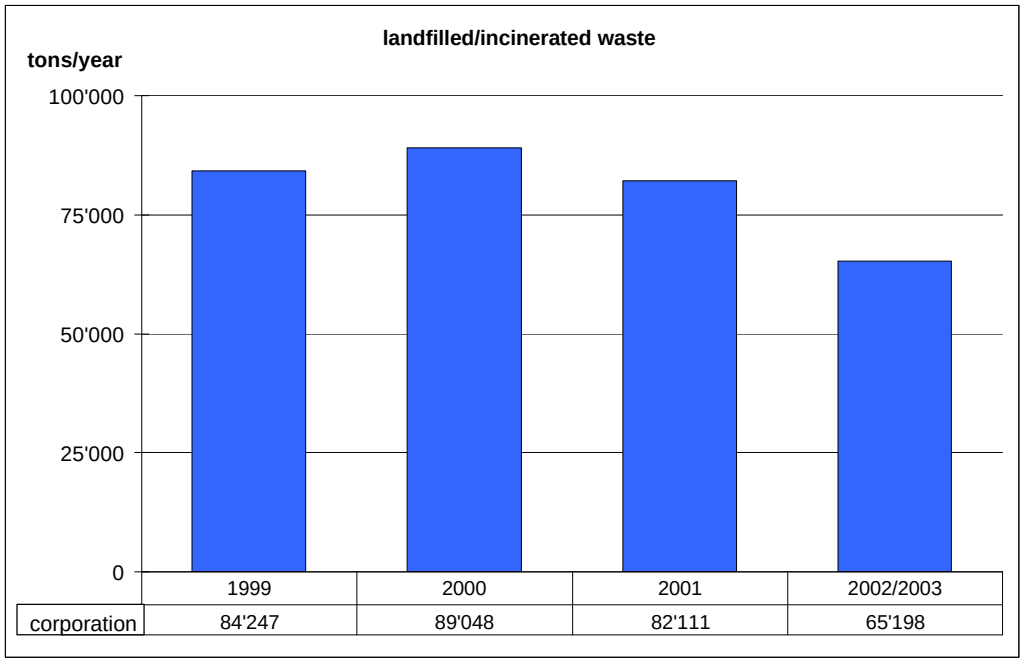
- **Waste disposal categories**
  A distinction is made between wastes that are recycled, residential or industrial wastes that are landfilled or incinerated, and hazardous wastes that are treated or disposed of separately.

Recycled wastes - increase in recyclable wastes



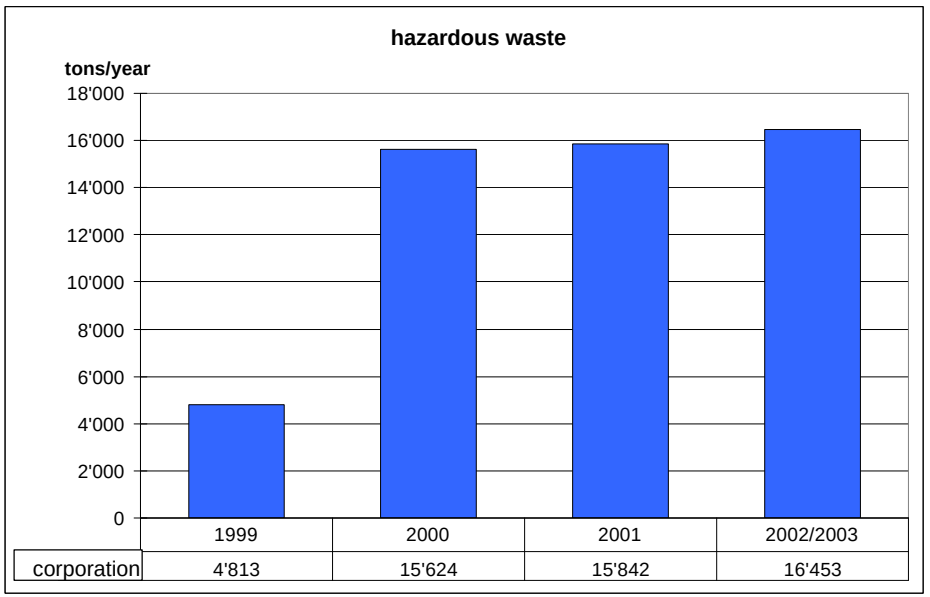
- The increase in waste recycling (e.g. external recycling of used sand and dried filter sludge for road construction) explains why there has been a decline in the disposal and incineration of less valuable wastes.

Industrial and office wastes deposited in landfills or incinerated - reduction



- The decline in the volume of wastes deposited in landfills or incinerated can be attributed to the increase in waste recycling.

Hazardous wastes - slight increase in 2002/2003



(The 6 foundries that were newly affiliated in fiscal year 2000 explain the sharp increase, from 1999 to 2000, in the volume of hazardous wastes produced by the corporation.)

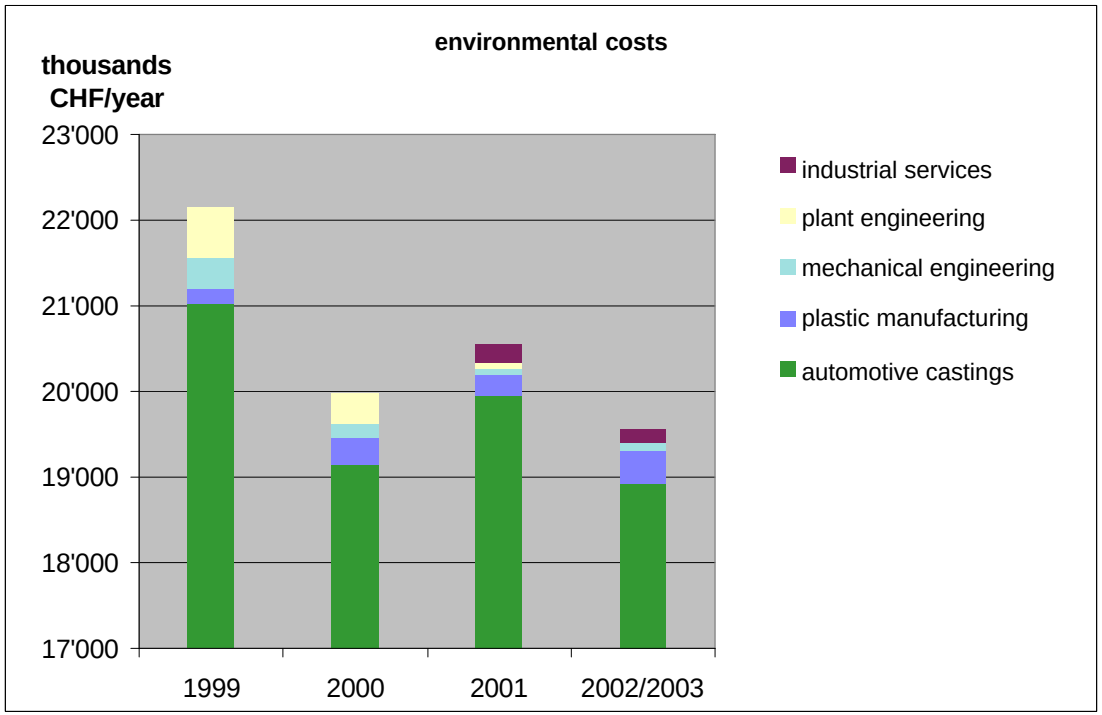
- The time frame in which wastes are disposed of does not correspond to the reporting time frame. Because of the relatively small individual volumes, disposal does not occur immediately after the wastes are produced – for economic reasons. Hazardous wastes are accumulated over a longer period of time and are often disposed of together with volumes from the previous year. Disposal in compliance with legal regulations is ensured.

Environmental expenses: costs and capital investment

- **Environmental costs**
  These are **operating costs** and depreciation of **environmental facilities**, training and further education of skilled personnel, consultation fees or other ecologically motivated costs. Costs for energy, disposal and water/wastewater are listed seperately and are included in the environmental cost.

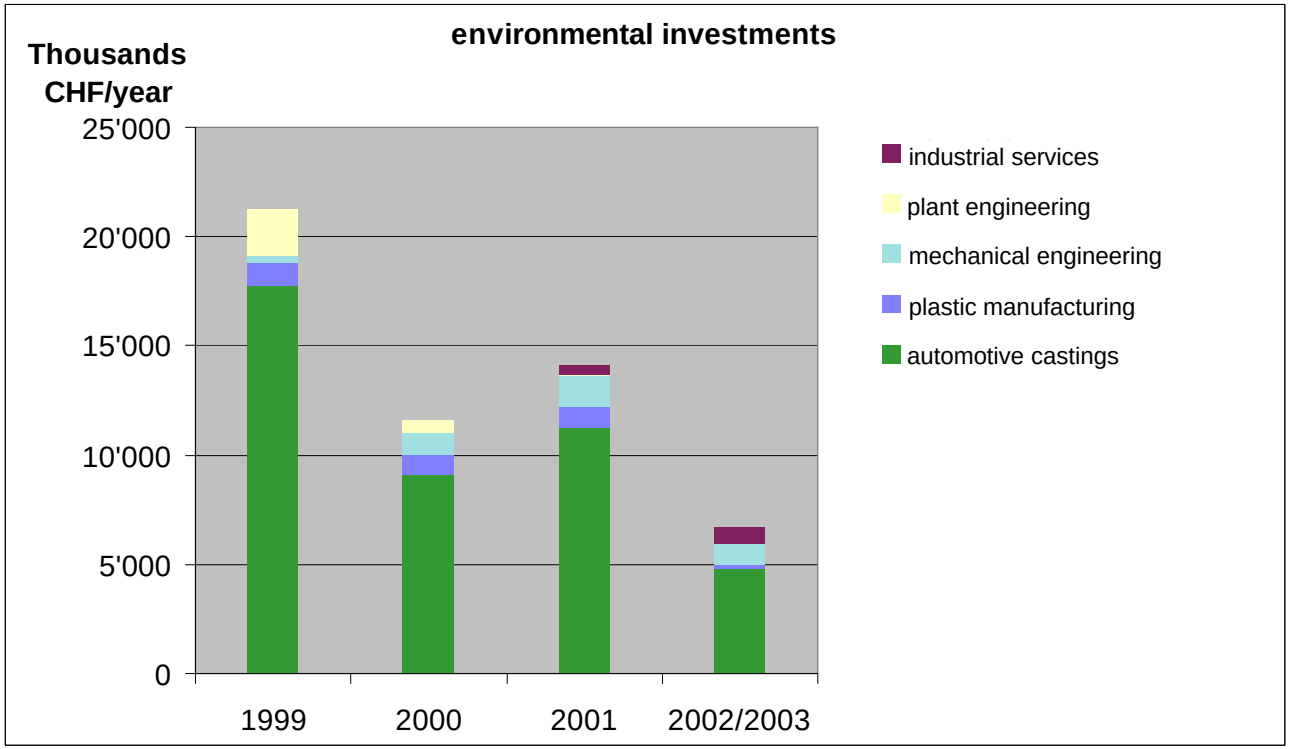
- **Environmental investments**
  These are investments made largely for **ecological reasons** or **environmental legislation**. They are capitalized in the balance sheet and deducted over their service life time. The investments which are transacted in the context of the “Highly Protected Risk“ standard are consolidated herein as well.

Environmental expenses: costs



- The trend of the environmental costs reflects the cost saving measures due to the economic situation. The increase within the plastic manufacturing and mechanical engineering sector is mainly caused by expansion of the consolidated group. In the automotive castings sector this effect has been equalized by cost savings.

Environmental expenses: Investments



- The environmental investments decreased in all corporate sectors. A single rise in the sector of Industrial services is effected by modernization measures in office and production buildings at the Schaffhausen site, Switzerland.

Units

Energy

A **gigajoule (GJ)** is equivalent to the energy content of 27 liters of heating oil (extra-light petroleum) or 278 kWh of electricity. It is sufficient to operate one PC station for an entire year.

Water

The annual consumption of water in the Georg Fischer Corporate is about 60 m^3 per employee. That is approximately equivalent to the contents of one 10-meter backyard swimming pool.

Air

The combustion of 27 liters of oil yields 1 GJ of energy. But the combustion process also produces atmospheric emissions, principally CO_2 (about 73 kg), but also SO_2 (0.1 kg) and different amounts of NO_x and VOC.

CO_2 strategy

Status

- Switzerland now has a CO_2 law, which provides for the introduction of a CO_2 tax beginning in 2004 at the earliest.
- In July 2003, the EU adopted its Emissions Trading Directive, which is designed to limit CO_2 emissions in conjunction with implementation of the targets specified by the Kyoto Protocol. In July 2003, Switzerland became a signatory to the Kyoto Protocol.

Actions

- At three of its sites, Georg Fischer has joined groups affiliated with the Business Energy Agency and has signed voluntary target agreements aimed at obtaining an exemption from the CO_2 tax.
- Georg Fischer has carried out a corporation-wide analysis in order to develop a corporate CO_2 strategy and to find out which sites might fall under the provisions of the directive. In a second step, the existing trading options under the EU directive will be analysed so that action can be initiated, if appropriate.

Future trends:
Developing recycling in production

An unrivalled form of value added in both the ecological and economic sense is recycling.

Recycling in the economy can be defined as

“Processes in which the **materials** or **energy** involved are still available largely in their original form and quantity after passing through various **transformation and production processes**”

Georg Fischer is endeavouring to establish recycling systems of this kind.

Recycling in foundries: Scrap as exclusive raw material

Material recycling at the Georg Fischer foundries and at their suppliers is becoming more and more comprehensive:

Scrap is used exclusively at Georg Fischer for the production of iron smelt. This consists of stamped waste from car manufacturers and arrives at the foundry in the form of a “sheet pack”. Amorphous **slag** that occurs during the smelting process is reused in road building. Iron casting is a 100% recyclable.

The **material recycling** applicable to a **foundry** is divided up into three groups of material:

- External process materials 54% (scrap, alloys)
- Internally recyclable material 39%
- External reuse 7% (slag)

Circulatory economy in plastics processing: Small- and large-scale recycling

Material recycling in the production of plastic piping systems has two dimensions:

Plastic waste that occurs during **production** is granulated and can be **reused** immediately in production without any further treatment. This “small-scale” recycling functions thanks to the properties of the plastic.

It will also be important to establish a “large-scale” recycling in the future when the first plastic piping systems of customers need replacing. Due to the outstanding durability of plastic piping systems this will result in a product-life-time up to 100 years. This “large-scale” recycling between producers and customers does not exist as yet.

Recycling in mechanical engineering: When machines exchange ideas

A special case of **recycling** can be illustrated by the case of precision machines for tool and mould making. The mechanical parts of the electric discharge and high speed milling machines are robust and of high quality. **Potential for improvement** exists mainly in the “brain” of the machines, in other words the software for control and regulation. The **innovation cycles** there are becoming ever **shorter**.

Thanks to new developments and improvements the process programs on the latest machines can be **exchanged** via computer through **remote maintenance**, thus crucially prolonging the service life of the machines.

There is no exchange of **materials** or **energy supplies**, only of **“ideas”.**

Validation of Environmental Report 2002/2003

Validation of the Environmental Report of the Georg Fischer Corporation by the Swiss Association for Quality and Management Systems (SQS)

SQS has examined the Environmental Report 2002/2003 of the Georg Fischer Corporation and has assessed the validity of the data and statements in the report by means of certifications and audits on the basis of local spot checks. SQS has checked to establish whether

- the main aspects have been determined as the basis for the report on environmental protection,
- the data surveys are adequate and reliable,
- the statements in the report are understandable and correct and agree with the data collected.

On the basis of the examined data and information we confirm that the Environmental Report 2002/2003 of the Georg Fischer Corporation has been drawn up with careful attention to the contents and that the published information and quantified statements convey an accurate picture of the actual situation.

Dr. Hanspeter Graf, lead auditor

Dr. Silvio Leonardi, second auditor

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Environmental management contacts - feed back

Your contact persons
We would appreciate your feedback on this environmental report.
We will be happy to answer any questions you may have.

Publications and information:
Dr. Bernd Niedermann, Head of Corporate Publications
E-mail: Bernd.Niedermann@georgfischer.com
Tel.: ++41 (0)52-631 2698

Project management:
Rouven Kraft, Dipl.-Ing. (FH), Environmental Engineer
E-mail: Rouven.Kraft@piping.georgfischer.com
Tel.: ++41 (0)52-631 3911

Technical responsibility:
Urs Häberli, Dipl.-Ing. ETH, Head of Quality and Environmental Management
E-mail: Urs.Haeberli@piping.georgfischer.com
Tel.: ++41 (0)52-631 3040