

Environmental management

Our vision is to achieve sustainable competitive business advantage and environmental sustainability through leadership and excellence. We aim to reduce our environmental impacts and address broader sustainability issues such as climate change, product stewardship and material and energy efficiency.

Q&A

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What is the top environmental priority for GSK?

The priority is to manage all the issues properly, looking at people, plant and processes, in the context of a long-term strategic plan.

We have been working on that since GSK was formed. In 2001 and 2002 I asked all operations worldwide to contribute to the creation of a self-regulating framework of programmes (i.e. policies, standards, guidance, audits, etc.) that defines how we believe we should operate, with legal compliance as the basic foundation. In 2003, we identified the key risks to GSK as employee chemical exposure, process safety, ergonomics, and driver safety, which we will continue to work on for some years to come.

In 2004, in discussions with our external stakeholders about EHS issues, they said that climate change and energy conservation, pharmaceuticals in the environment and the use of hazardous/toxic chemicals were our key external challenges. In 2005, we worked to complete core programmes and EHS management systems and achieve our improvement targets. Now it's time to move to the next stage.

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We discover, develop, manufacture and sell pharmaceutical and consumer products. This requires significant resources, so we need to understand, address and report on environmental impacts. They include issues common to all manufacturers, such as the use of energy and water, and waste handling. We also need to consider potential impacts of certain chemicals which can release volatile organic compounds (VOCs) and the chemicals in our inhalers which can damage the ozone layer and contribute to climate change. And our industry can have specific impacts through the release of pharmaceuticals into the environment after use by patients.

A systematic approach to [management of these issues](#) is crucial because control needs to be consistent over the long term. This is important as we move away from controlling emissions from our processes to developing and implementing new processes that are more efficient and therefore use less raw material and produce less waste. This is one of the first steps toward environmental sustainability which is our long term goal.

Overall [responsibility for environmental issues](#) rests with the Corporate Executive Team and the Board. The Board champion for Environment, Health and Safety (EHS) is JP Garnier, the Chief Executive Officer. Rupert Bondy, General Counsel, is the operational champion of EHS on the corporate executive team. We have a Corporate Responsibility Committee and [Corporate EHS department](#).

Environmental issues are managed together with health and safety through an [integrated EHS system](#) that aims to ensure issues and risks are identified, standards are established and adhered to, training is provided, targets set and audits conducted.

Our EHS [Policy](#), [Vision](#) and 64 Global EHS [Standards](#) set the overall framework. We provide sites with an EHS management toolkit which contains instructions and descriptions of appropriate procedures to help them comply with the standards.

Further background information on our approach to managing environmental issues is available in the [Environment, Health and Safety](#) section of our website.

THE PLAN FOR EXCELLENCE

We launched an [EHS Plan for Excellence](#) in 2001 which set out a strategy to improve EHS performance over a ten-year period. In 2006 we reviewed the first five years' performance, renewed the Plan for the second stage and extended it to 2015.

We began our review of the Plan for Excellence with an extensive consultation with key internal and external stakeholders, who encouraged us to adopt higher aspirations and align EHS objectives more closely with the business strategy.

The first five years of the plan established fundamental programmes that protect employees, our communities and the environment. The renewed plan includes a commitment to stakeholder engagement and strengthens the focus on sustainable environmental practices through operational efficiency. This requires a new approach to manufacturing processes and means we will move to incorporating environmental performance in process design, moving from compliance and risk management to adding value and creating new opportunities. For example, we want to move from having to treat a hazardous waste stream to choosing processes that do not produce hazardous waste.

The renewed plan is designed to complement the business strategies and contains three EHS Aspirations for GSK by 2015:

- **EHS fundamentals embedded in the business** – we believe that to produce and sustain high EHS performance we need to combine structured EHS systems with the attitudes and values that create a positive EHS culture. To achieve this we need to embed EHS awareness and systems in all GSK activities
- **Environmental sustainability** – we believe we need to embrace environmental sustainability as a driver for competitive advantage. To do this we have to define the principles of environmental sustainability and progressively integrate them into the business, translating them into practical action in line with advancing knowledge

- **Open and transparent EHS external relations** – we believe that external stakeholders who have a legitimate interest in the company's EHS affairs should have ready access to relevant information and the opportunity for dialogue about issues that concern them. We also believe that building open relationships and partnerships can lead to business opportunities, while failure to engage may damage our reputation

Each of these aspirations is supported by strategic objectives with performance targets in some areas.

Progress and targets

Our EHS Plan for Excellence initially set out targets in 10 areas, with interim targets for 2005.

[See 2005 report for progress against these targets.](#)

The plan for the next 10 years is aligned with the GSK business drivers and with our desire to move towards environmental sustainability. We have introduced these new targets:

- Material efficiency – by targeting efficiency we simultaneously target resource consumption, air emissions, water pollution, waste disposal and safety concerns
- EHS audit scores – these are a measure of the success of our management systems approach

These are the improvement targets across the company up to 2010, with 2006 as the new baseline:

Annual reductions per £ of sales	
Energy	1%
Solid waste	1%
Water	2%
Air emissions (volatile organic emissions)	2%
Wastewater (chemical oxygen demand)	3%
Material efficiency	
Achieve average 2% material efficiency of manufacturing processes for new products introduced between 2006 and 2010	
Cumulative targets for 2010	
Ozone depletion	100% elimination
EHS audit scores	
– Average	82%
– Minimum	70%

We no longer have targets in these areas:

- global warming potential – we have replaced this with a target on energy efficiency
- hazardous waste – we are now addressing hazardous waste through the new material efficiency target

Each business sector will develop its own objectives to support the corporate targets and will develop specific short and medium-term plans to achieve them. Individual sites may also set local targets to contribute to the business target.

We use annual action plans to focus our efforts on selected priority issues. The theme for 2006 was 'Embedding EHS in the Business' following the initial focus on fundamentals in the first 5 years of the Plan.

The [theme for 2007](#) is 'EHS Stewardship', which means caring for the present and thinking to the future when we make decisions, building excellence over time and maintaining the highest possible standards in everything we do. Each business sector will encourage a culture that accepts this responsibility by incorporating EHS into their planning and business processes.

Corporate EHS will work with businesses to:

- determine which elements of environmental sustainability we need to focus on and begin to promote environmental sustainability principles throughout the business
- continue the pilot programme of developing and distributing product stewardship guides for marketed products
- expand our programme of discussions with EHS external stakeholders beyond the UK to the rest of Europe and into the US.

See more in the [Product Stewardship](#) section and our background web pages.

STAKEHOLDER ENGAGEMENT

Stakeholder engagement plays an important role in how we manage EHS. This section reports engagement specifically on EHS issues. See engagement with stakeholders in the [Managing CR section](#) for details of engagement on other corporate responsibility issues.

In addition to inclusion in the Dow Jones Sustainability Index and the UK FTSE4Good, GlaxoSmithKline is rated by Business in the Environment (BiE), in the 'premier league' in a field of 145 participating companies. This rating indicates the extent to which we interpret environmental responsibility into the way we manage our business and in our environmental performance.

We have frequently engaged through ad hoc meetings with a range of external stakeholders to help us understand their views and identify emerging issues. In 2005 we stepped up our internal and external engagement on EHS issues and created a formal stakeholder panel in the UK to provide a perspective on our EHS performance. The panel is facilitated by The [Environment Council](#), an independent charity, and the 10 members represent our customers, suppliers, regulators, public interest groups and investors, plus four senior EHS representatives from GSK.

The next step is to expand our focus by improving our use of natural resources as a step towards sustainability. That's complex.

We are working on material efficiency in our production ([see page 57](#)). Energy is also a critical component and in 2006 GSK adopted a life cycle approach to investing in energy efficiency and renewable energy. ([see page 60](#)). In fact our CEO has requested a further review in 2007 of energy saving measures and use of renewable energy. Product stewardship is another aspect of sustainability and we will need to focus on the issue of pharmaceuticals in the environment ([see page 59](#)).

What is the highlight of 2006?

Approval of the second stage of our Plan for Excellence, up to 2015 ([see page 52](#)). In the first stage of the plan, since 2001, we focused on the fundamentals and improved our performance in many areas, but we need to do more. In the second stage of the plan, we will keep a keen focus on maintaining improvements, based on that foundation and on new annual improvement targets. In 2006, we established improvement targets for manufacturing new medicines which will move us toward our goal of sustainability.

From a tangible standpoint, our manufacturing function (GMS) has accepted the challenge from the Board of Directors to be ISO 14001/OHSAS 18001 certified, which will embed management systems into the business. We have also created new EHS Director positions in GMS and Biologicals who sit on the executive teams and will help EHS to be integral to all business decisions.

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Plans and systems aren't enough, are they?

No, they're not. First, we need to have great people, with the right qualifications and training, working on these issues. We also have to have the right culture, with senior management support to promote the right behaviour and investment. We are taking the position that we won't compromise on environmental protection or employee safety. We are seeing consciousness about environment, health and safety really becoming embedded in the business. This was our theme for 2006 and we have seen it reflected in enhanced attitudes in the business on EHS. We are moving from bolting on controls for existing processes to building them in so they are central to the operation. This culture change is central to the second stage of our 10-year plan. It means that we need to have addressed issues with our **people** (qualified, trained and aligned), our **plants** (our infrastructure is properly designed, installed and maintained) and our **processes and systems** (our management approach identifies the risks and develops programmes to manage these risks).

What is your priority for 2007?

Our theme for 2007 is EHS stewardship. That means we want to do more to embed the new culture in the business, so that people really understand that this is not a short-term exercise and they need to have a vision and an understanding of the long-term impact of everything that we do. And we need to think about environmental impacts such as climate change and embed inherent safety over the whole life cycle of our products, from raw material to waste. This change will reflect not only how GSK manages EHS but how EHS benefits GSK. For example, addressing climate change through improved energy efficiency benefits not only the environment but also has a financial benefit for GSK.

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It provides an opportunity for EHS experts from across GSK's businesses to meet stakeholders and discuss emerging EHS issues. Feedback has been used in developing the EHS Plan for Excellence.

The panel meets every six months. In 2006 discussions covered:

- our engagement strategy
- the need for public position papers on climate change/energy management, the management of hazardous chemicals, and pharmaceuticals in the environment (the final versions, approved by GSK management, are published on gsk.com)
- a serious process safety incident at our Irvine site (see the [Health and Safety](#) section)
- the strategic plan for EHS
- EHS performance in 2005
- how EHS aligns with GSK's business direction

Stakeholders have repeatedly highlighted their view that it is important for GSK to address broader issues such as climate change and sustainable development. We are beginning to address broader aspects of sustainability, for example in our work on material efficiency.

We plan to extend our stakeholder engagement activities to the US, Europe, and beyond over the next few years, beginning in the US in 2007. (See [Stakeholder engagement](#) background pages.)

Local engagement

Many of our sites also engage with stakeholders locally, through activities such as open days, newsletters and community projects. For example, our Dresden site conducted intensive communications with the local community ahead of doubling the manufacturing capacity for its flu vaccines. The construction activity was particularly sensitive because the site is in a residential area. This work won third place in our CEO's EHS Excellence Awards for community projects.

In 2006, we conducted a survey of EHS stakeholder engagement at 52 GSK sites around the world. This found that our sites engage most frequently with local government, the emergency services, neighbours/resident associations, local environmental and advocacy groups, and local business partners. Our sites reported that open dialogue with communities helps to build strong relationships and to dispel preconceptions. In particular they reported that it is beneficial to involve local communities in environmental risk assessments and the development of emergency response plans and site waste management plans.

Internal engagement

We engage with our GSK staff throughout the business in several ways. This includes discussions with business leaders to debate and agree the way forward for EHS at GSK, especially to agree the annual action plan and position papers on specific issues such as energy.

Engagement with EHS professionals helps us to work out details of programmes such as energy initiatives.

In 2006, we surveyed staff who are involved in EHS to assess the success of our communications and to identify areas for improvement. We also completed an internal review of Corporate Environment Health and Safety (CEHS) communications.

The [EHS Framework](#) documents received high marks for usefulness as a source of information, as did the [EHS Community](#) webpage. But the web page needs to be more user-friendly and we will relaunch the site in 2007.

We found that there was high awareness of the EHS Plan for Excellence, of EHS programmes on chemical agents and process safety, of EHS reward and recognition programmes, and of the theme of sustainability. But people said we needed to be clearer about our messages, especially priorities and their relationships to the overall mission of the corporate EHS department and GSK. We will address this in 2007.

In 2006, we also took feedback from company wide GSK employees to develop the 2006-2015 EHS Strategic Plan.

Engagement with regulators

GSK is keen to see proper measures in place to protect the environment and safeguard the development and launch of new medicines. At the same time, regulations need to be workable for industry to avoid unnecessary cost and bureaucracy. We collaborate with regulators to help them develop effective controls.

In 2006 we engaged with regulators in the UK on the government's work to improve regulation of business. We submitted comments on 14 EHS regulations which we consider should be reviewed for practicability, and hosted a visit from the Better Regulation Commission to one of our pilot plants to demonstrate some of the issues. We also participated in the House of Commons Select Committee Inquiry into the work of the Environment Agency.

We worked with trade associations, including the British, European and US pharmaceutical industry EHS groups.

We engaged in the consultation process for the European Union's Regulation on the Registration Evaluation and Authorisation of Chemicals (REACH) and the Globally Harmonised System (GHS) for the classification and labelling of chemicals. GSK supports the aims of both these initiatives to protect human health and the environment. We are pleased by the outcomes and by the efforts made by all parties to achieve workable regulation. We continue to play our part in the development of supporting guidance for REACH.

We welcome the introduction of formal guidelines for the conduct of environmental risk assessment established under the EU's New Medicines Legislation. GSK has lobbied for the environmental impacts of pharmaceuticals to be regulated solely through the European Agency for the Evaluation of Medical Products, and not also through the proposed REACH framework which would lead to duplication of effort and place an unnecessary burden on the pharmaceutical industry.

For more details on Public Policy see the [Managing CR section](#), see page 7.

TRAINING AND AWARENESS

Raising employees' awareness of environment, health and safety issues and improving their skills through training are key parts of our EHS programme. This is critical to embedding our framework and building an EHS culture throughout the business. Employees at all levels need to understand the EHS issues in their working environment. For example, employees need to understand the properties, hazards and necessary precautions associated with the chemicals they handle. Those who handle waste need to know its properties, the regulations that govern its disposal, and which materials can be recycled.

We help employees deal with these issues through meetings, bulletins and information on our intranet site, as well as specific training events. We have an EHS standard on training.

The intranet site, *myEHS Community*, contains links to a range of programmes, including the *EHS Manager* information system which contains policies, standards, guidelines, tools, training materials, examples of best practice and news. It also provides customised management reports on EHS performance by site.

Training

Training takes place at site level and programmes are routinely included in induction training for new employees. EHS training is also accessible through *myLearning*, GSK's online training service.

In 2006 we carried out additional EHS management training for our Consumer Healthcare and Regional Pharma Supply organisations. We made site visits for one-on-one training on the use of the *EHS Manager* software system.

EHS managers are encouraged to attend conferences and training programmes sponsored by local environmental organisations and academic institutions.

Awareness

We raise the profile of environmental issues through a variety of means, including the EHS framework, the Plan for Excellence and the Chief Executive Officer's [EHS Excellence Awards](#) scheme. (See side bars on the next two pages for the 2006 first place winners.)

We also run an Earthweek every June (to coincide with the World Environment Day) and send information kits to all sites to help them develop ideas and plan activities. In 2006, 74 sites from 34 countries celebrated Earthweek with activities involving over 80,000 employees.

Examples of activities in 2006 are:

- The GSK site in Mississauga, Canada celebrated Earthweek by planting 2,000 seedlings or small trees which are indigenous to the local area, involving 350 employees
- 160 GSK employees from the Civac Consumer Healthcare site in Mexico raised the environmental awareness of a group of local school children by showing them how to separate household waste for recycling.

We cover EHS issues regularly through EHS bulletins, and articles in GSK's internal magazines (GSK Spirit, e-Spirit). We encourage employees to consider environmental issues outside the workplace, such as minimising household waste, saving energy and water.

For more information see [EHS Communication](#) on the background pages.

How is GSK planning to move beyond basic environmental protection to address sustainability more broadly?

As I mentioned before, our first step toward sustainability concerns the efficiency with which we use materials and energy in manufacturing processes. We have a new target to double the efficiency for manufacturing new products introduced up to 2010. After that date we hope we will be starting to use raw materials from renewable resources rather than petrochemicals. And in the more distant future we will want to be using biological transformations rather than chemical synthesis. All of this needs to happen with inherent safety built in to all that we do.



Barnard Castle, UK

This site has made huge progress in reducing its environmental impacts over several years – cutting electricity use by 22 percent, gas by 23 percent and water consumption by 25 percent.

The site used energy audits to identify potential savings such as improvements to heating and cooling equipment, installing automatic light controllers and optimising boiler controls.

Posters and special events encourage employees to play their part. Employee ‘energy wardens’ have also been assigned to each department to help limit energy use in their area. These wardens are trained to identify potential energy savings, to make sure equipment is being used efficiently and to raise awareness among their colleagues.

The site has also installed two 250 kW wind turbines to reduce the amount of energy used from fossil fuel sources. This earned the site four regional awards and has acted as an example for other local industrial complexes – two of which have installed similar turbines.

Since 2001, Barnard Castle’s energy initiatives have reduced CO₂ emissions by a total of about 12,500 tonnes and have saved more than £3 million.

This project won first place in the EHS Initiative – Environment category.

Poznan, Poland

Our Poznan site founded the GSK Science and Public Centre in 2004. The Centre has become a meeting venue for community education events about public healthcare and disease prevention through community education. It is run by GSK employees who organise activities that have included:

- helping teachers to promote healthy behaviour among their students
- workshops teaching 1,000 pupils from 60 Poznan high schools how to deal with threats such as drugs, HIV/AIDS, aggressive behaviour and alcohol
- helping people with disabilities to put on theatre performances for the local community

This project won first place in the EHS Community Partnership category.

EHS EXCELLENCE AWARDS

The CEO’s EHS Excellence Awards recognise and reward GSK sites that show leadership in EHS. In 2006 the programme was expanded to include aspects of sustainability. The awards recognise people who have done exceptional work in promoting and implementing EHS projects. They highlight innovation and examples of good practice in EHS management to share with other sites. Each winner receives a trophy and selects a charity to receive a donation from GSK.

The winners of our 2006 Excellence Awards demonstrate once again that many projects which improve environmental performance also save money.

In 2006 – the fifth year of the awards – there were 95 entries from 25 countries. There were applications from all GSK’s business sectors: R&D, manufacturing and commercial, and from facilities management teams.

The winners were chosen by a panel that included experts from academia, government and public interest groups. In 2006, 12 projects representing Europe, North America, Central America, the Middle East and Asia received top honours.

Three of the 2006 first place award winners are featured on these pages. [See further details on the CEO’s EHS Excellence Award background pages.](#)

AUDITS AND COMPLIANCE

At the request of the Audit Committee of the Board of Directors, GSK has embarked on a programme to achieve ISO 14001 and OHSAS 18001 certification.

In 2006, the leadership of GSK’s manufacturing division (GMS) approved a four-year programme to certify all remaining GMS sites to ISO 14001/OHSAS 18001. This programme began early in 2007 and will be completed in 2010. Some sites had already achieved certification and in 2006, one additional site was certified to ISO14001 and OHSAS 18001, bringing the total of dual certified sites to 21. This means that 27 of our 80 pharmaceutical and consumer manufacturing sites are now certified (6 sites are certified to ISO 14001 only).

We carry out [regular EHS audits](#) of GSK operations, contract manufacturers and key suppliers. The aim is to assess how well they control risks and comply with key legislation, and the extent to which management systems and standards are being implemented to improve performance and maintain compliance. See [supply chain](#) page 50 for more information, including human rights audits.

Our audit programme requires all manufacturing and R&D sites to undergo EHS audits by our internal audit team. Audits occur every one to four years, depending on our assessment of risks. Sites are required to develop plans to address any

weaknesses identified in the audit and auditors monitor sites’ progress in implementing the plans. Internal auditors are certified as lead auditors against the international environment, health and safety management standards: ISO 14001 and OHSAS18001. Sites are also expected to conduct routine self audits of their EHS programmes.

In 2006 the majority of audits were conducted using a new risk-based process that focused on significant operational EHS risks and environmental impacts, rather than the full range of applicable EHS Standards. The audit frequency was determined by considering key site risks and the demonstrated performance in managing them effectively.

We conducted corporate audits of 32 sites, including 2 office locations. The average score was 74 percent (compared to 77 percent in 2005). No site achieved a score below 50 percent, which we regard as unacceptable. We aim to correct unacceptable performance and continue to pursue further improvements to achieve best practice.

A good level of performance was found at most sites, especially in areas covered by GSK environmental standards. But several aspects were identified for improvement, especially safety issues, see [Health and Safety](#) page 46.

In 2006, two sites achieved ‘leadership’ scores above 90 percent (two in 2005), while a further 10 achieved scores over 80 percent (seven in 2005).

The best performance on environmental issues was in

- management of solid wastes
- air emissions
- emergency planning

Sites were generally weakest on

- self auditing and inspection
- risk assessment processes
- biodiversity

Compliance

As a minimum, our policy is to comply with all legal requirements. There were no fines or penalties reported in 2006. We regret that in 2006 we were in breach of regulations in three cases, prompting the US Federal Aviation Administration to issue warning letters without penalties regarding non-compliance with shipping regulations. Deficiencies were:

- Non-compliance with marking, labelling and documentation of a shipment of inhalation aerosols
- Inoperative emergency number for hazard information
- Undeclared dangerous goods (flammable liquid) shipped via inter-office mail

MATERIAL EFFICIENCY

We aim to improve the efficiency with which we convert raw materials to finished product, as part of our drive for environmental sustainability. It will help us to reduce our consumption of resources, the waste we generate and the cost of production.

We have set a target to double the average material efficiency of manufacturing processes for new products introduced between 2006 and 2010. This will achieve material efficiencies of 2 percent for these new processes i.e. two tonnes of active pharmaceutical ingredient (API) for every 100 tonnes of input chemicals.

Pharmaceutical processes are typically very complex, often requiring large amounts of solvent. Typically, the industry uses about 100 tonnes of material for every tonne of API produced. That 1 percent material efficiency compares to about 20 percent for fine chemicals and 50 percent for bulk chemicals. It represents a waste of valuable resources, with financial as well as environmental consequences.

Our approach to addressing EHS issues already includes minimising the amount of material used – for example, through the eco-design toolkit (see page 58). We are now placing a higher priority on improving our use of materials and are bringing together R&D and manufacturing teams to increase material efficiency in the product development stage, as well as for selected existing products.

Our key measure of material efficiency is 'mass productivity'. This is the mass of all materials (except water but including solvents) used in the process compared to the mass of product produced. Our new 2 percent target applies to this measure.

We are already making improvements to material efficiency. For example, a research and development team at our Stevenage, UK R&D site, worked with our Cork, Ireland site to achieve substantial environmental benefits by developing a simplified process for manufacturing dutasteride, a treatment for benign prostate hyperplasia. The project will continue to deliver benefits to at least 2015.

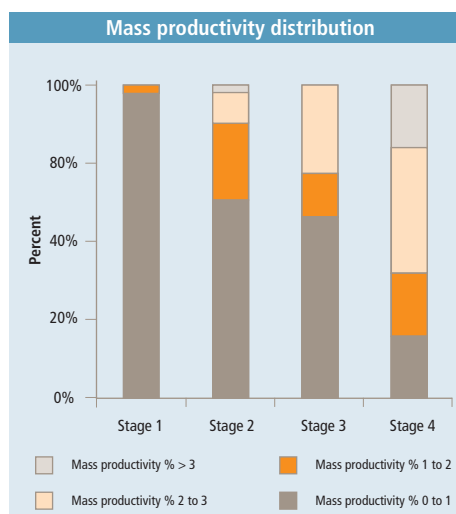
This work won third place in the Green Chemistry category of the Chief Executive Officer's EHS Excellence Awards in 2006.

The new process:

- produces 40 percent more drug substance from the same amount of starting material, saving up to £5.7 million/year
- saves energy – the chemical reaction now requires only four hours at 86°C compared to 22 hours at 100°C previously

- vastly reduces the use of solvent and therefore waste – a 70 percent reduction in the mass of waste, which avoids up to 80 tonnes of waste per annum
- is more robust than the previous process, resulting in less waste through failed batches
- reduces exposure of employees to hazardous materials.

The chart shows the extent to which we are improving material efficiency as compounds move through development stages. These data relate to compounds in development in 2006.



In early development almost all compounds have a mass productivity less than 1 percent. But the proportion with this low level efficiency falls in each stage. By the last stage of development, before transfer to manufacturing, the majority achieved productivity of more than 2 percent and some are above 3 percent, with one process achieving productivity of 4.9 percent.

Stevenage, UK

Our R&D site in Stevenage reduced the environmental impacts of manufacturing a compound which was in the development stage.

The original process for manufacturing the drug involved the use of seven different solvents and a number of hazardous chemicals. It produced low yields and high waste volumes.

The team at Stevenage developed a new technique that tripled material efficiency from 0.7 percent to 2.0 percent, which will reduce waste by 68 percent, using less organic solvent and hazardous chemicals. It also required less energy and the majority of waste could be handled on site.

This project won first place in the Green Chemistry/Technology category.

PRODUCT STEWARDSHIP

We address environmental issues associated with our products throughout their life cycle. This begins with product design and continues through manufacturing to eventual disposal. We refer to this as product stewardship.

This section covers product design (including packaging) and the impacts of pharmaceuticals in the environment. The research and development section of this report covers our approach to animal testing. Read more about [environmental issues associated with our products on our background pages](#).

Product design

Environment and health and safety staff work with product development teams to incorporate EHS considerations into the design of products and sourcing materials, and to identify residual EHS risks as products move from R&D to manufacturing.

Eco-design toolkit

We have developed an eco-design toolkit which scientists and engineers use to identify process improvements and address EHS issues early in the development process. The toolkit is available on the GSK intranet and consists of five modules:

- a **Green Chemistry/Technology Guide**, which helps GSK scientists and engineers apply Green Chemistry concepts to achieve more efficient use of resources, reduce EHS impacts and minimise costs
- **Materials Guides**, containing information on a range of materials used within GSK operations, including solvents that should be avoided. One guide covers solvent selection while a second deals with chemical base selection
- a **Green Packaging Guide** – an assessment tool which includes guidance and a business process for evaluating and selecting packaging options (see Packaging next)
- **FLASC** (Fast Lifecycle Assessment for Synthetic Chemistry) – a web-based tool and process that allows bench chemists to perform a streamlined life cycle evaluation of the environmental impacts of new or existing processes based on the materials used. *FLASC* helps scientists and managers to rapidly identify the ‘greenest’ materials option by comparing and benchmarking processes. It identifies the materials that have the most significant life cycle environmental impacts and provides guidance on how to reduce those impacts
- The **Chemicals Legislation Guide (CLG)** identifies legislation in various parts of the world aimed at phasing out hazardous substances from routine use. The CLG provides risk-based guidance, about a variety of chemicals of concern, in an easily accessible form.

Each module was designed to ensure that all EHS impacts of materials, processes and services are considered, from the manufacture of the raw materials through to the ultimate fate of products and wastes in the environment.

See more on the toolkit and our approach to [product design](#) in the background pages.

PACKAGING

We are working to improve the environmental performance of our packaging across several areas.

Our Green Packaging Guide provides guidance and a business process for evaluating and selecting packaging options. It includes an interactive “wizard” known as *WRAP* – Wizard for the Rapid Assessment of Packaging – which helps packaging designers and managers to benchmark new and existing packaging designs, considering five metrics over the product life cycle:

- manufacture of the material
- mass of the material
- biodegradability
- PVC content
- resource depletion

The example of bottles for consumer products such as Lucozade illustrates the range of work on packaging:

- reducing the amount of packaging – we moved from glass to a plastic bottle, making a huge saving in weight, energy and transport costs. Then we progressively reduced the weight of the plastic bottle by 14 percent
- increasing the use of recycled material – bottles currently contain between 20-30 percent of recycled material and we intend to increase this to 100 percent as soon as we can develop a reliable supply
- improving design to facilitate recycling of our bottles – recycling is easiest from clear bottles with no contaminating residues. We have changed from coloured to clear bottles and have developed shrink sleeves which do not need adhesive and can easily be separated
- promoting recycling in the community – we are active members of Recoup, which is a charitable organisation promoting plastics recycling in the UK (www.recoup.org). Through Recoup, GSK was a key contributor to a study on ‘Design for recycling of plastic containers’ and we are funding another project to promote recycling of plastic containers by providing ‘reverse vending machines’ in public places

- investigating biodegradable plastics – we are following developments of materials such as polylactic acid (PLA) made from corn starch but currently believe return and recycling of conventional (PET) bottles is the best environmental option
- using other packaging types – we aim to use the best type of container for each product. For example, we use cartons from Tetra Pak™ for *Ribena*, which minimises weight and improves distribution efficiency, although recycling systems are still under development
- other packaging impacts – we have invested in a distribution centre that is closer to the bottle supply company, which means we can maximise the efficiency of lorry movements

PHARMACEUTICALS IN THE ENVIRONMENT

Medicines work through active pharmaceutical ingredients (APIs) that are absorbed in the patient's body. These materials – including anything that is not absorbed – are eventually excreted through the body's normal mechanisms and enter the sewage system. Wastewater treatment plants remove most pharmaceutical residues, but small concentrations do end up in rivers or in the sea. In areas without wastewater treatment, higher concentrations enter the environment.

GSK has developed business processes to ensure that we carry out appropriate environmental tests. Environmental risk assessments are part of the approval process for new medicines in the EU and US, so we provide regulatory agencies with assessments to evaluate and allow for mitigation of any potential environmental impacts. In 2006 we were part of industry groups that met with regulatory agencies on this issue, including the Food and Drug Administration and Environmental Protection Agency in the US and the Environment Agency of England and Wales.

Risk assessments indicate that our products do not appear to pose an appreciable risk for humans or the environment based on current methods for ascertaining safe levels. But we continue to monitor the latest scientific studies and findings to improve our risk assessments in this area.

We work with other pharmaceutical companies, universities and research groups to develop the science and methodologies to assess the environmental risks of pharmaceuticals in the environment and increase understanding of such risks. In 2006 we started to investigate the issue of mixtures of pharmaceuticals, and have established a relationship with Brunel University in the UK to develop research plans in addition to our own in-house programme.

We also engage in joint projects in the pharmaceutical industry through the Pharmaceutical Research and Manufacturers of America (PhRMA). In 2006:

- a GSK model was used to upgrade the Pharmaceutical Assessment and Transport Evaluation (*PhATE*™) model so it can be used to estimate the potential environmental impact of sewage sludge applied to the land. *PhATE*™ is used to make risk assessments based on specific local stream flows and population patterns
- we contributed to developing a database of scientific literature on the impacts of pharmaceuticals on aquatic life
- we contributed to an analysis of the impact of unused medicines on the environment, a report which is being shared with regulatory agencies and will be developed into a paper for publication in the scientific literature

We also continue our own work in this area. In 2006 we:

- conducted chronic ecotoxicity testing on selected APIs based on new EU guidelines. We now use these guidelines as an integral part of our environmental risk assessment strategy
- continued comprehensive environmental risk assessments for about 40 APIs. We developed 'Allowable Daily Intake' levels for human consumption through drinking water and fish consumption, as well as 'No-Effects Levels' for aquatic organisms. We make quantitative risk assessments by comparing these levels with predicted environmental concentrations. We presented data on selected sets of these compounds at scientific meetings
- provided data and risk assessments on more than 20 GSK APIs to the Swedish Association of the Pharmaceutical Industry (LIF) as part of a voluntary programme to provide data to physicians. GSK is also part of the technical team that developed the LIF Guide document 'Guidance for Pharmaceutical Companies'.

See more on our approach to [pharmaceuticals in the environment](#) on our background pages.

Environmental performance

In 2006, we continued to improve our use of energy and reduce emissions to the atmosphere. We used slightly more water than in 2005 and generated more waste but succeeded in keeping the percentage increase below the percentage rise in sales.

Scope of the data

The environmental data covers the calendar year 2006. They are collected from all of our 80 pharmaceutical and consumer manufacturing sites, 11 of our 13 biologicals sites that are in operation, 18 of 22 pharmaceutical and consumer research and development sites and 6 of 8 major office locations. We include available data for sites that were in operation for all or part of the year. We do not require environmental data from small offices and distribution centres.

Notes attached to the data table on [page 72](#) explain the scope and data collection process for each parameter in more detail. Unless specified as being per unit of sales, figures are absolute numbers (i.e. total consumption of energy, water etc.)

We manufacture pharmaceutical and consumer products using processes that involve chemicals, so we need to understand, address and report on environmental impacts. They include issues common to all manufacturers, such as the use of energy and water, and waste handling. In common with some other sectors, we also need to consider potential impacts of certain chemicals which can release volatile organic compounds (VOCs). Our manufacture of asthma inhalers also means we use chemicals which can damage the ozone layer.

In 2006 we reviewed our reporting to consider the materiality of environmental impacts, in the light of pharmaceutical industry practice and the Global Reporting Initiative, as well as inputs from stakeholders.

Stakeholders have told us they want simplicity in reporting, but they also need an appropriate level of detail, and we have tried to balance these sometimes conflicting requirements. For example, we have reduced and simplified the graphs and charts in this report, concentrating on areas with targets. We include a full data table for completeness at the back of the environment section on [page 72](#).

We concentrate our reporting on:

- issues with potential financial benefit or impact for GSK such as material efficiency and energy efficiency
- issues directly related to the use of chemicals such as volatile organic compounds, chemical oxygen demand of wastewater and hazardous waste

This is the seventh year that we have reported on GSK's environmental performance (and the legacy companies reported for several years before the creation of GSK). Copies of these reports are available on the [Corporate Register](#).

Verification

The data in this Environment section and in the health and safety pages of the employment section of this report are externally verified by [SGS UK Ltd](#). Details can be found in the verification statement on [page 70](#).

ENERGY EFFICIENCY

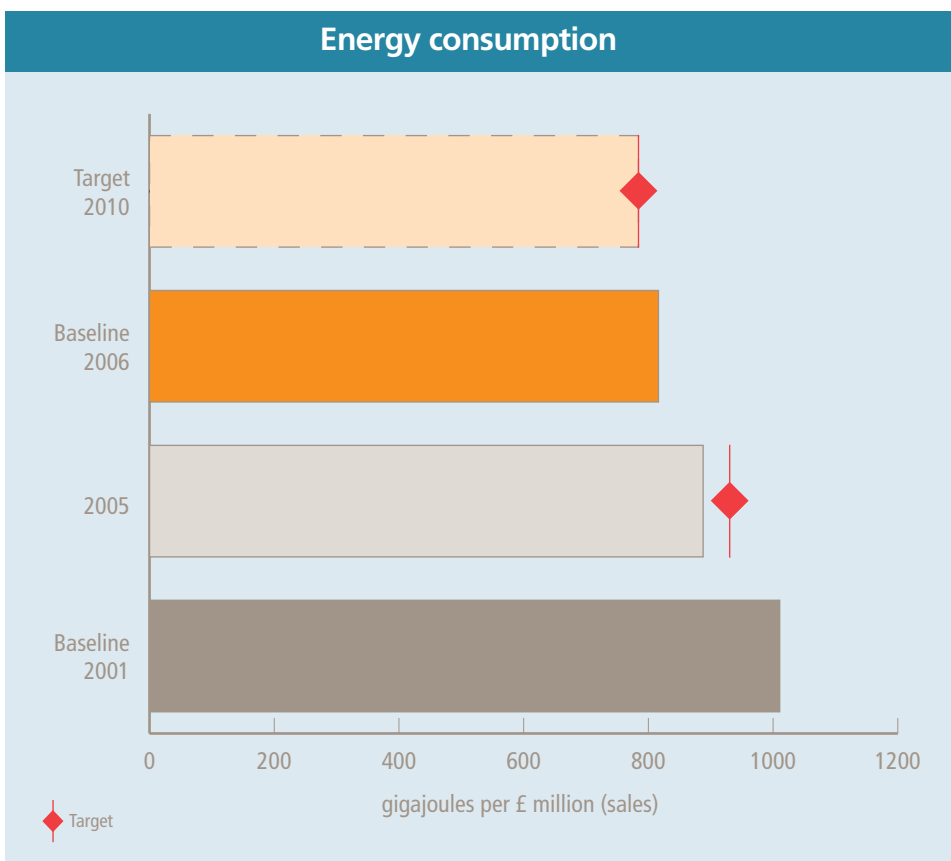
We need energy to discover, develop, manufacture and distribute medicines. Most of our energy use is in our facilities, especially manufacturing, but also R&D and office sites. Global Manufacturing and Supply (GMS) and Research and Development (R&D) accounted for 58 percent and 25 percent respectively, of our consumption in 2006 and this is where we are concentrating efforts to increase [energy efficiency](#). Transport is the main source of our remaining energy use.

Improving energy efficiency will help to reduce our global warming impact. It is now widely accepted that the activity of humans is changing our planet's climate. There is a scientific consensus that 'greenhouse gases' (GHGs) such as carbon dioxide and methane are causing the 'greenhouse effect' – trapping heat within the earth's atmosphere, causing a global increase in temperatures. Burning fossil fuels has greatly increased the presence of these gases in the atmosphere. Most experts now agree that this increase in GHGs is causing the earth to warm, a process which could bring about disastrous changes to our climate.

We will continue working to minimise energy use and emissions, despite expected growth in new products which will require additional energy. We expect to continue finding opportunities for greater efficiencies in new and existing facilities and operations. As a result, our new target is to reduce energy consumption by 1 percent per unit of sales each year until 2010.

In 2006 we finalised a [position paper](#) on our future use of energy, following extensive internal and external consultation. The position paper sets out a strategy for energy efficiency, renewable energy and emissions trading. It commits GSK to:

- reduce our reliance on fossil fuels whenever it is technically and economically possible
- support effective market-based mechanisms such as emissions trading, but seek to reduce our own emissions first
- evaluate the use of renewable energy
- evaluate energy investments over their lifetime rather than over the normal payback period used by GSK
- encourage suppliers, contractors and employees to improve their energy consumption
- report transparently our energy consumption using internationally recognised protocols



Energy consumption	
Year	gj per £ million (sales)
2001	1010.6
2005	887.8
2006	816.2

Energy performance

In 2006, we used 19 million gigajoules of energy, approximately 1.4 percent less than in 2005. We bought 43 percent of our energy as electricity and generated most of the rest from fossil fuels burned at our sites.

The reduction in energy use came despite an increase in sales. Energy consumption per £ sales was 8.1 percent lower than in 2005.

We continued to work on energy efficiency initiatives in 2006, with active energy teams in manufacturing and R&D and energy managers at many of the larger sites. Examples include:

- installing energy efficient lighting and motion sensors
- thermographic surveys to identify heat losses, resulting in insulation repairs
- ultrasonic surveys to identify air leaks
- site voltage reduction projects
- efficiency improvements to heating, ventilation and air conditioning
- retro-fitting economisers to steam boilers
- steam trap surveys and maintenance improvements
- electricity and steam metering improvements with centralised monitoring and targeting software systems
- refrigeration and chiller efficiency improvements

The data table on [page 72](#) includes additional details about energy and greenhouse gas emissions, such as amounts of electricity purchased and fuels consumed, and carbon dioxide equivalent emissions from energy sources and from inhaler production and use.

Renewable energy

We have started to invest in renewable energy projects. For example, Barnard Castle has installed two wind turbines and other sites are using solar energy to heat water. Some sites purchased some of their electricity from renewable resources. In the future we will report the amount of electricity from renewable sources.

Emissions trading

A number of UK sites participate in the government's emissions trading scheme (ETS), helping us to gain experience in carbon trading. The UK ETS is a voluntary scheme which rewards companies with lower energy taxes if they improve energy efficiency. Sites that keep emissions below an agreed target can 'bank' the spare credits to help comply with limits in subsequent years, or they can sell the credits to other participants in the scheme.

In 2006 all GSK sites complied with their Climate Change Agreements.

The European Union trading scheme came into force at the start of 2005 for an initial three-year period. Sites with more than 20 megawatts of

installed combustion capacity are required to participate and 16 GSK sites are covered. On balance GSK had surplus carbon credits. Any proceeds from the sale of carbon credits are invested in energy efficiency projects.

Energy investments

We have adopted an approach to energy investments which reflects the long-term nature of the projects and the importance of energy supply to the business. Instead of applying our normal investment criteria we will assess the return on the investment over the project's lifetime.

We expect that this will result in approving energy efficiency and renewable energy projects which would not qualify under our normal investment criteria.

The first project to be approved was for solar water heating at our site at Slough, UK.

Transport

We estimate that transport accounts for 340 million kilograms of CO₂, about 20 percent of our global warming impact from energy in 2006.

Business air travel accounts for almost half (44 percent) of our travel-related CO₂ emissions. In 2006, employees travelled a total of almost 900 million kilometres by plane resulting in 106 million kg of CO₂ emissions. Air travel does not include group travel originating outside the UK. Our global sales fleet drove a total of over 1 billion kilometres on business travel – resulting in 136 million kg of CO₂.

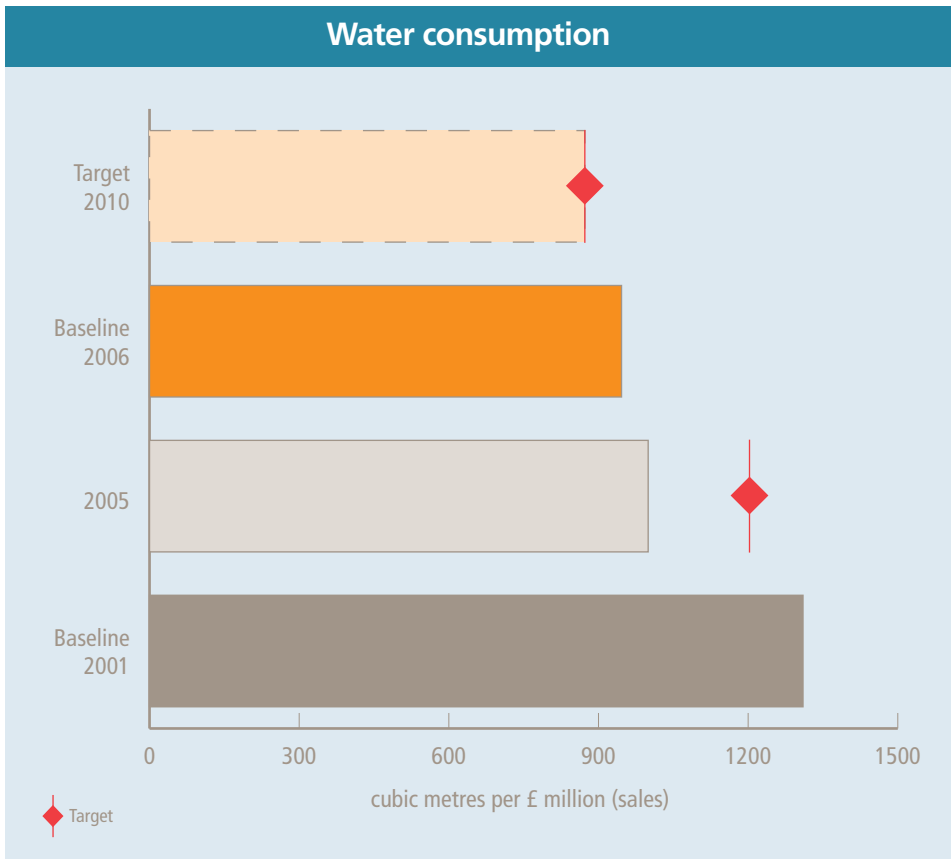
In addition to business travel, we also transport products from our manufacturing plants to distributors. In 2006, GSK products were transported a total of 227 million kilometres – the majority (81 percent) by air freight. We estimate that the air freight resulted in 87 million kg of CO₂ while ocean and road freight resulted in an additional 11 million kg of CO₂.

This year we used the Greenhouse Gas Protocol for all of our calculations of CO₂ emissions. We are also now able to obtain more details about freight shipments. With these details we can be more precise in our calculations of CO₂ emissions from freight transport. Because of these changes we are unable to compare CO₂ emissions from transport with previous years. We are still working on obtaining the same level of detail from our passenger air travel.

We have launched a number of initiatives to reduce the impact of transporting products. They include consolidating freight shipments so pharmaceutical and consumer products are transported together, consolidating shipping points, and making more use of round tripping (managing inbound freight trucks so they do not return empty). We also switch from air to sea transport where possible.

We have 'green travel plans' at a number of sites to encourage employees to reduce the environmental impact of their travel to work. For example, at GSK House in Brentford, UK, privileged parking spaces are given to car-sharers and drivers of fuel efficient cars, buses powered by biodiesel run to and from the local train station, while changing rooms and showers are provided for cyclists as well as discounts for bicycle equipment and repairs. We are beginning to use hybrid-engine cars for our chauffeur service.

We encourage employees to use video and teleconferencing where possible to reduce air travel. Virtual meeting software is available to employees for making presentations and collaborative working. In 2006, GSK employees conducted over 5,000 video meetings, over 464,000 teleconferences and over 5,000 web conferences.



Water consumption	
Year	m³ per £ million (sales)
2001	1310.0
2005	999.6
2006	946.2

Water performance

In 2006, we used 22 million cubic metres of water, 1.5 percent more than in 2005. In spite of the small increase in water consumption, with the rise in sales, water consumption per £ sales was 5.3 percent lower than in 2005. Our consumption is about average for the industry, based on benchmarking with other major pharmaceutical companies.

Water usage has gone up mainly due to increased activity at biologicals sites, especially higher vaccines production at Biologicals Belgium. Higher production at manufacturing plants in Ireland and the UK also required more water. These increases were partly offset by partial closing of one site and small improvements at several sites as a result of water conservation measures.

WATER USE

GSK uses water in manufacturing (for processes, products, cooling and cleaning) and for general site uses including drinking, food services and sanitation. Primary supply sites – those that manufacture active pharmaceutical ingredients – are typically heavy users of water, as are sites that manufacture vaccines or produce drinks. Those involved in research and development and commercial activities typically use less.

Water is a valuable natural resource that needs to be conserved – especially in areas where there are shortages – and protected from pollution. The GSK water standard requires sites to minimise water use, re-use water whenever feasible and ensure that all wastewater is treated and discharged in a way that minimises adverse environmental impacts.

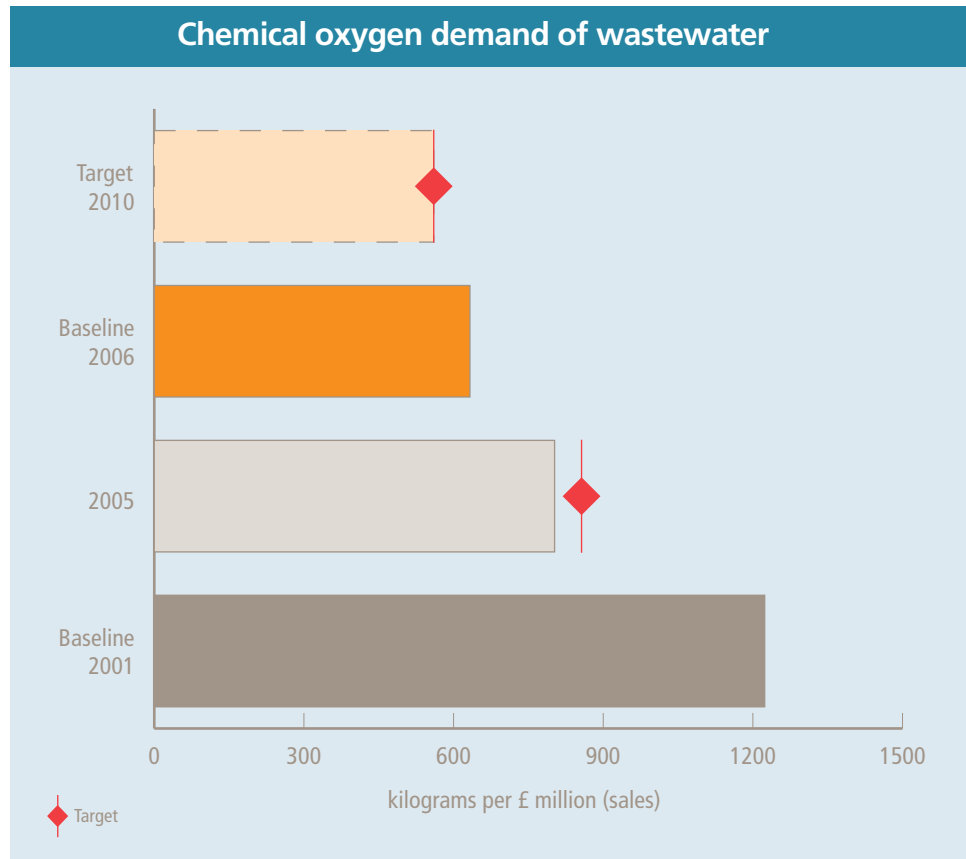
Our target is to reduce water consumption by 2 percent per annum per £ of sales.

Wastewater performance

We generated 10 million cubic metres of wastewater in 2006. The total volume was 6.4 percent less than 2005.

This reduction was partly due to changes at several sites including a new specialised wastewater treatment facility at a primary manufacturing plant which removes solvent from the wastewater, closure of some manufacturing operations in another plant and other changes to wastewater treatment and product mix.

Total chemical oxygen demand (COD) discharged after on-site treatment was 15 million kilograms which was 15 percent less than in 2005. The reduction in COD per £ sales was 21 percent.



Chemical oxygen demand of wastewater	
Year	kg per £ million (sales)
2001	1223.7
2005	802.5
2006	632.8

WASTEWATER

Most sites discharge wastewater to municipal treatment facilities. Some large sites, especially primary manufacturing, have their own on-site wastewater treatment systems. Some sites are permitted to discharge wastewater direct to the sea.

We assess the quality of wastewater by measuring the chemical oxygen demand (COD) – the oxygen required to chemically oxidise compounds in the water. The lower the COD, the cleaner the water.

Our target from 2006 is to improve COD discharge by 3 percent a year per £ of sales.

We have changed COD measurement to concentrate on wastewater from manufacturing processes and exclude sites whose waste is mainly

from ‘domestic’ activity (such as washrooms and canteens). The vast majority of COD comes from manufacturing and the contribution from these other activities is not sufficiently significant to warrant the time and effort required to collect the data. This change may result in a decrease in reported COD of up to 5.7 percent. We have recalculated prior years’ data so that it is comparable.

WASTE

Our research, production and commercial activities all produce waste, which we aim to manage safely and responsibly from when it is generated to its final disposal. We want to eliminate waste where we can, reduce it where we cannot, re-use materials if possible, recycle other waste and dispose of any remaining material sensitively.

We generate different kinds of waste in different parts of the business:

- production – hazardous wastes such as solvents and other chemicals
- R&D and quality laboratories – small amounts of chemicals including products and intermediates, as well as broken glassware and plastics
- offices – paper and other standard commercial waste
- renovations take place in production, office and lab space which produce non-routine waste such as obsolete equipment, office furniture and structural materials

Most of the active ingredients in our pharmaceutical products are manufactured using chemical processes. This means that a significant proportion of our waste is classified as hazardous because it contains solvents and chemicals used in these processes. We classify waste as hazardous, non-hazardous, and non-routine (for waste such as construction and demolition rubble).

Most production facilities segregate their wastes, re-use what they can, send what they can for recycling, and incinerate or landfill anything else. Incineration is usually the preferred choice for dealing with solvents that can't be reused or recycled. Where practicable, sites use waste management companies which use incinerators that recover energy from burning the materials.

We require disposal contractors to comply with our EHS requirements and local regulations. Sites audit their waste contractors or hire consultants to carry out the audits.

We continue to work on reducing waste, especially hazardous waste. Improving material efficiency will reduce waste, especially the number and volume of solvents. We have set a target to increase material efficiency of new products going from R&D to manufacturing to 2 percent.

In the past, some waste and chemicals handling practices [contaminated land](#) and groundwater. These practices are no longer followed, however we are continuing to clean up these sites to deal with health and environmental hazards.

GSK and its heritage companies have spent more than £100m cleaning up more than 50 sites in the US over the last 20 years. We are continuing to clean up 25 of these sites. Most of them are waste disposal sites where GSK is one of several responsible parties. These figures are not included in the data verification.

Non-hazardous waste

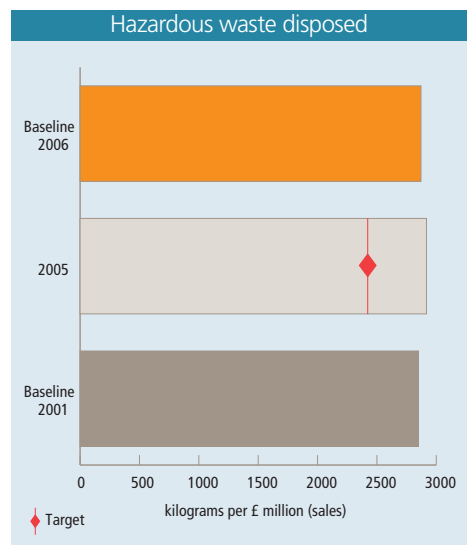
Most non-hazardous waste is general material such as office waste paper, kitchen waste and non-hazardous substances used in manufacturing. A very small part is biological waste that has been treated so it is not hazardous. We do not include construction and demolition rubble and similar material not related to day-to-day operations, which we describe separately as non-routine waste.

We continue to look for ways to reduce waste and have undertaken waste management reviews at many sites. Our new target is to reduce non-hazardous waste per £ of sales by 1 percent per annum.

Hazardous waste

More than 93 percent of our hazardous waste consists of solvents that are used in production processes. We also dispose of some lubricants and fluorescent lights, while research waste includes animal carcasses.

Regulations vary widely around the world, but our first choice for solvents is to re-use or recycle material. When this is not possible the main disposal option for solvents is incineration. We aim to recover energy from incineration wherever possible.



Hazardous waste disposed	
Year	kg per £ million (sales)
2001	2850.1
2005	2917.3
2006	2871.1

Most hazardous waste comes from primary production activity, and this is where we concentrate our efforts. We have stopped collecting hazardous waste data from consumer manufacturing plants, laboratories, offices and most secondary manufacturing sites. These sites produced about 3 percent of our hazardous waste in the past.

We have not set a target for reduction of hazardous waste. Our target to improve material efficiency is geared to accomplish reductions in hazardous waste.

Waste performance

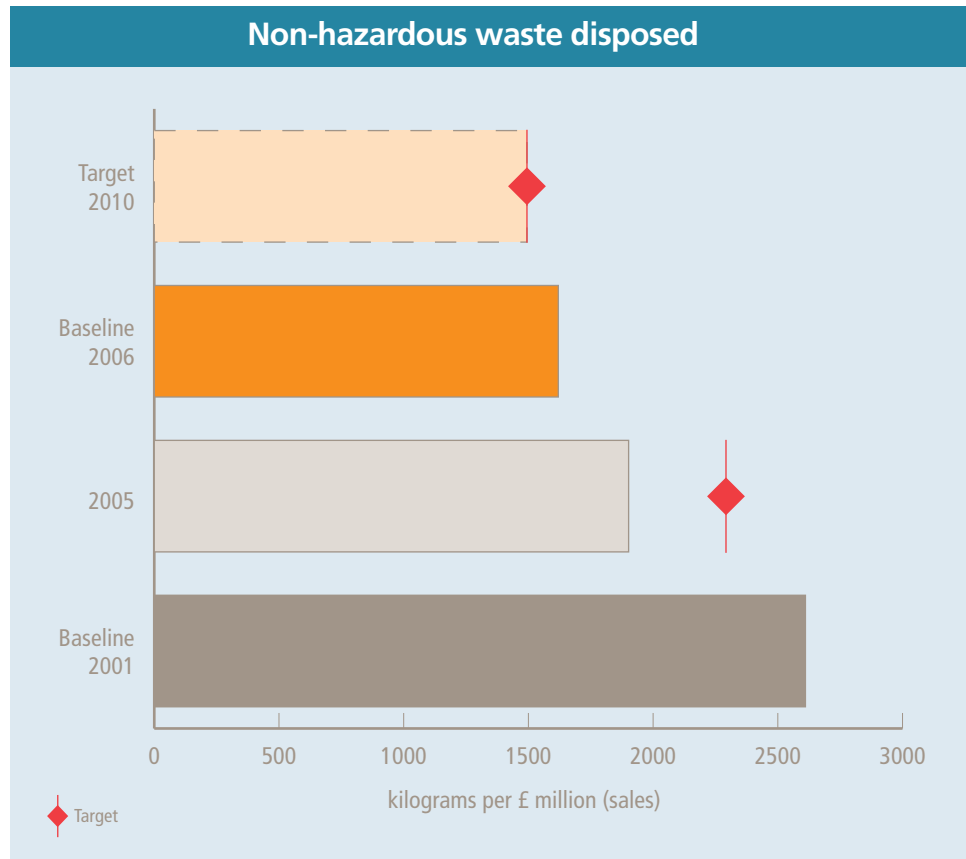
In 2006, we generated 234 million kilograms of hazardous waste and 114 million kilograms of non-hazardous waste.

We recycled 244 million kilograms of waste (168 million kilograms of hazardous and 76 million kilograms of non-hazardous). That represents 70 percent of the total generated (excluding non-routine waste.) The proportion of waste recycled was 2 percent lower than in 2005.

We disposed (via landfill or incineration) of 67 million kilograms of hazardous waste and 38 million kilograms of non-hazardous waste.

The total hazardous waste disposed was 5.5 percent higher than 2005. Adjusted for the rise in sales it was 1.6 percent lower. Hazardous waste was mostly solvents (94 percent), the rest being general site waste. We incinerated over 99 percent of hazardous waste disposed, with energy recovered from 42 percent of this.

Total non-hazardous waste was 8.7 percent lower than in 2005. The amount disposed per £ of sales decreased by 15 percent over the year. Of the non-hazardous waste generated, we sent 19 percent to landfill.



Non-hazardous waste disposed	
Year	kg per £ million (sales)
2001	2610.7
2005	1901.8
2006	1620.0

Recycling

We recycle hazardous and non-hazardous waste, aiming to minimise environmental impacts as well as the cost of materials and waste.

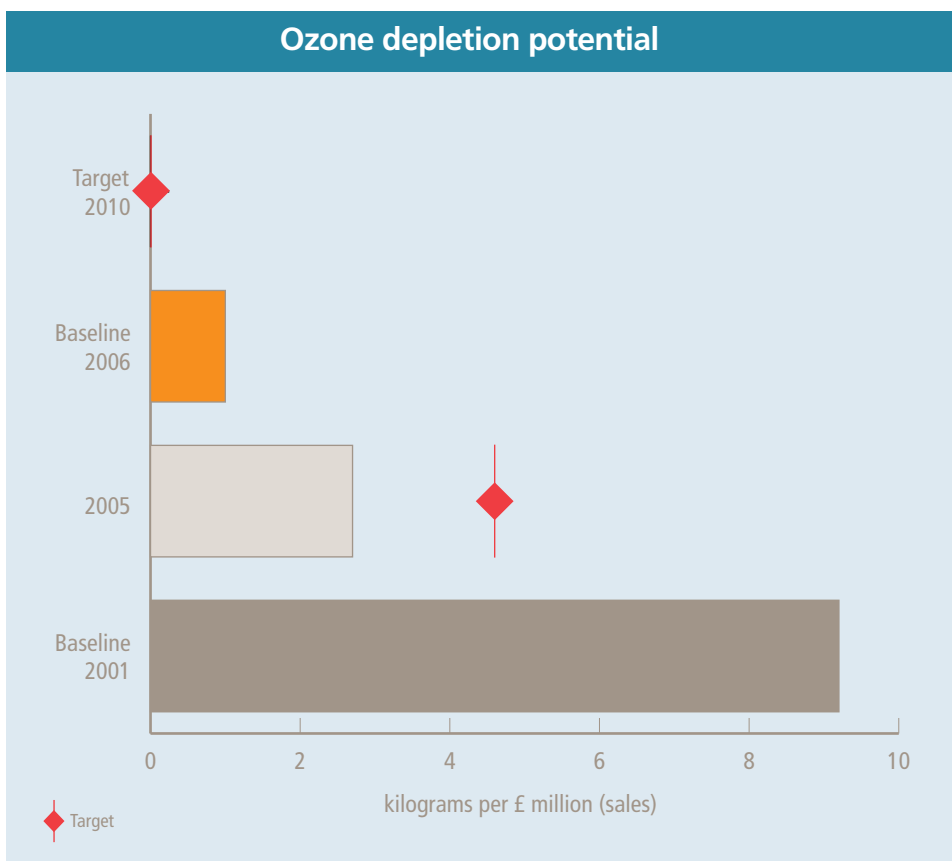
The largest waste component is solvent which has been used in the manufacturing process. Some solvent is purified on our sites and reused in the original manufacturing process. Sometimes we sell the solvent to commercial reprocessing companies, which we also include in the recycling statistics. Solvent which is not recycled in this way is usually incinerated.

Recycling non-hazardous waste such as paper, cardboard, glass, plastic or aluminium, usually means sending it for reprocessing so it can be reused to make new products.

Two sites in India have stopped land filling their coal ash generated on site; instead they sell it as raw material for the production of construction material.

In addition, three nutritional-drink manufacturing sites send some of their process wastes (barley husk) for animal food while others recycle canteen waste or effluent treatment plant sludge by converting it into bio-compost.

The data table on [page 72](#) includes additional details about waste such as amounts of hazardous and non-hazardous waste that go to recycling, landfill and incineration and the amount of non-routine waste.



Ozone depletion potential	
Year	kg per £ million (sales)
2001	9.2
2005	2.7
2006	1.0

Ozone depletion performance
 Total ozone depletion potential (ODP) from production of inhalers and from equipment was 23.5 thousand kilograms, 56.5 percent lower than 2005 (based on estimates for emissions from equipment). Ozone depletion potential estimated from equipment and production losses per £ of sales was 61.8 percent lower than 2005.

CFC 11 and CFC 12 are contained in 163 pieces of equipment, amounting to 16,137 kilograms of CFC. Over 4 thousand items of equipment contain other ozone depleting substances with the ODP of 7,315 kilograms of CFC 11 equivalent. We estimate that 2.75 percent or 645 kilograms CFC 11 equivalent were released from the equipment (using an estimation factor from the British Refrigeration Association).

OZONE DEPLETION

The ozone layer is essential to human survival because it filters out harmful ultra-violet (UV) rays from the sun. It has been damaged by ozone depleting substances (ODS), mainly chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs) and halons.

Our main use of ODSs in the past was as the propellant gas in metered dose inhalers (MDI) for asthma sufferers. The gas is released when patients use the inhalers and a small amount escapes during production. In the past we used CFCs but have been switching to hydrofluoro-carbons (HFCs) and dry powder technology which does not require a propellant. HFCs do not deplete the ozone layer but do contribute to global warming.

We also use ODSs in some cooling systems and for other ancillary uses at GSK facilities. We have switched to using HFCs, ammonia and hydrocarbons. Ammonia does not contribute to either ozone depletion or global warming and hydrocarbons have a small global warming impact.

The chart refers to ODS lost from production activities and equipment leakage. See data table on [page 72](#) for information about patient use of inhalers.

We are installing new equipment which will help us meet our target of [eliminating CFCs from equipment and product](#) use by 2010, apart from halon fixed fire protection systems and equipment containing under one kilogram of CFC.

In 2006, 186 thousand kilograms of CFC propellant were released when patients used our products. A much smaller amount – 22.8 thousand kilograms – were released during production of inhalers and we estimate that 645 kilograms CFC 11 equivalent were emitted from equipment.

Equipment and production

ODS – mainly HCFCs – are sealed inside cooling systems and are only released in the event of a leak or during maintenance.

The only way to eliminate emissions is to eliminate CFC and HCFC from cooling systems and that is our new strategy.

In 2006 we carried out an inventory of all CFC and HCFC containing equipment and will repeat the exercise in the first quarter of 2007 and annually so we can monitor the decrease in the CFC content. In 2007 we will also collect data on HFCs.

We recognise that there is also a risk of catastrophic failure of equipment and larger releases, until we eliminate these chemicals. We are focusing attention on the larger pieces of equipment to remove them from service before the end of 2010. We do not intend to replace equipment containing 1 kilogram or less because these are typically hermetically sealed and less likely to leak.

We no longer collect data on losses from equipment as we are concentrating on eliminating the equipment rather than controlling the releases. For comparison to prior years we have estimated that 2.75 percent of the total amount of CFC and HCFC is lost from the remaining equipment. The ODP chart shows the emissions from producing inhalers and the estimated emissions from equipment. Last year we reported 2985 kg released based on losses during equipment failures and replacements.

Metered dose inhalers

Metered dose inhalers (MDIs) are commonly used to deliver the main forms of treatment for asthma sufferers. They are pressurised, hand-held devices that use propellants to deliver doses of medication to patients' lungs. They were first introduced in the 1950s and CFCs were traditionally used as the propellant because they are non-toxic, non-reactive, non-flammable, and do not have any odour or taste.

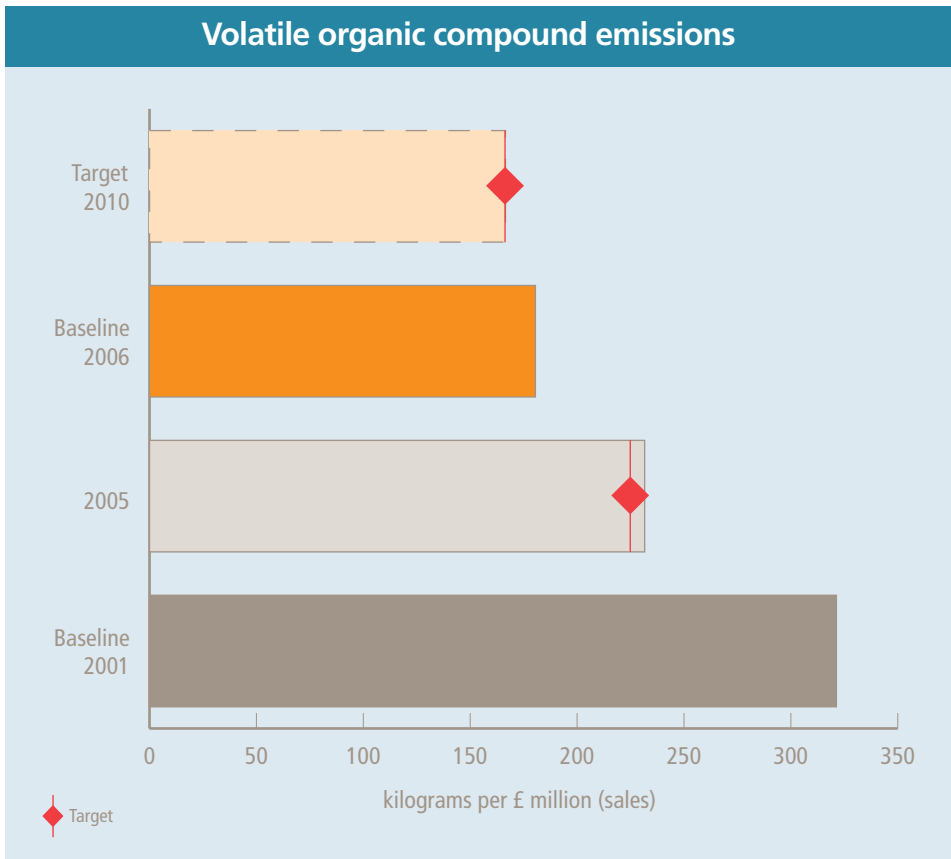
When a patient uses the MDI, the propellant is released into the atmosphere. The Montreal Protocol bans the production of CFCs but it exempts a number of 'essential uses' which include MDIs. Nevertheless we plan to eliminate the use of CFCs from our worldwide product portfolio by 2010.

We have stopped using CFCs in the US and the European Union. We now offer a selection of alternatives to ODS-containing inhalers in most countries. The main alternative propellant we use is HFC 134a, which does not affect ozone but does have high global warming potential, although it is less than CFCs. We have also invested heavily in dry powder delivery systems that do not use CFCs or HFCs.

We will continue to manufacture CFC MDIs in India, China and Pakistan and will use subcontractors to produce CFC devices for the Bangladesh and Latin America market until 2010. Our target is to eliminate all CFCs by then.

Ozone depletion potential from patient use of metered dose inhalers was 32 percent lower than in 2005. In previous years we only had this information from the US and EU. We now have data from India, Pakistan and China and have calculated the decrease from all CFC inhalers that we produce.

As production of CFC-containing MDIs decreases, the amount of CFC lost during production also declines. Total ozone depletion potential from production was 55 percent lower than 2005.



Volatile organic compound emissions	
Year	kg per £ million (sales)
2001	321.3
2005	231.6
2006	180.5

VOLATILE ORGANIC COMPOUNDS

We use volatile organic compounds (VOCs) mainly as solvents in our primary manufacturing operations and R&D pilot plants. Solvents are also used to coat some tablets and in cleaning for sterile operations. We also use small quantities in laboratories but do not measure emissions from this use.

VOCs react with nitrogen oxides in the presence of sunlight, creating ozone in the lower atmosphere. This results in smog, which is a factor in human respiratory illness. Workplace exposure to certain VOCs can also pose a health risk.

In 2006, we released 4.2 million kilograms of VOCs to the atmosphere. This was 16 percent lower than in 2005. Emissions per £ of sales were 22 percent lower than in 2005.

Our target from 2006 is to reduce VOCs by 2 percent per annum per £ of sales. Improvements in VOC emissions in 2006 were due to several projects at primary manufacturing sites to capture fugitive emissions, changes in production and changes in the way VOC emissions are calculated in alignment with local regulations.

Photochemical ozone creation potential was 19.8 percent lower than in 2005.

We have changed the way we measure VOCs to exclude the small quantities from laboratories, estimated to be 3 percent of total VOC emissions in prior years. We have recalculated VOC emissions in prior years to make them comparable.

Control of volatile organic compound emissions at the GSK Cork site

VOCs arise from many of the processes at Cork, where we use solvents such as dichloromethane, ethyl acetate and ethanol.

The introduction of the UK Air Pollution Act in 1987 led to a focus on control and elimination of solvent emissions and we carried out a complete review of all points of emission.

All solvent emissions from reactions, vacuum pump discharges, centrifuges, pressure filters and tanks are collected through a site-wide system and passed into two high temperature incinerators. They operate at 1100°C and destroy all organic vapours with an efficiency greater than 99.99 percent.

Emissions from the incinerator stacks are continuously monitored for VOC residues, carbon monoxide, sulphur oxides, nitrogen oxides and for hydrogen halides.

This incineration operation is regarded as the best available technology for efficient destruction of VOCs and prevention of emissions of these substances to atmosphere.

Control of VOC at Ulverston

The manufacture of two intermediate stages in the antibiotic, cefuroxime axetil uses solvents including dichloromethane (DCM) and tetrahydrofuran (THF).

In 2006, GSK approved a project to install a carbon adsorption unit to remove VOCs from these process stages. Carbon adsorption technology was selected as the methodology to reduce VOC emissions because the technology offers a robust, industry standard abatement solution and represents best available technology.

Existing vents to air will be redirected to the carbon adsorption Unit where they will be adsorbed on an activated carbon bed. The system operates continuously and uses steam regeneration to remove adsorbed solvents which will be recovered at the site by an existing solvent recovery unit for re-use in the process.

This project will remove 30 to 40 tonnes per annum of DCM releases to air and 130 to 150 tonnes per annum of THF. The site will also save an estimated £100k per annum from the recovery and re-use of these solvents.

Independent verification/assurance statement



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SGS United Kingdom Ltd's report on Environment, Health and Safety data in the GlaxoSmithKline Environment, Health and Safety (EHS) Report for 2006.

Nature and Scope of the Verification/Assurance

SGS United Kingdom Ltd was commissioned by GlaxoSmithKline to conduct an independent assurance of their 2006 EHS Report. The scope of the assurance, based on the SGS Sustainability Report Assurance methodology, included 2006 Environment and Health & Safety performance data and graphs, contained in pages 46 to 49 and 52 to 69 of this report and in the accompanying table on pages 72 to 74. Data relating to contaminated land pages 65 and health and safety data relating to non-GSK employees (page 47) were not included in this assurance process. Financial data drawn directly from independently audited financial accounts has not been checked back to source as part of this assurance process.

The information in the EHS Report of GlaxoSmithKline and its presentation are the responsibility of the directors and the management of GlaxoSmithKline. SGS United Kingdom Ltd has not been involved in the preparation of any of the material included in the EHS Report. Our responsibility is to express an opinion on the data, graphs and relevant statements within the scope of verification.

The SGS Group has developed a set of protocols for the Assurance of Sustainability Reports based on current best practice guidance provided in the Global Reporting Initiative Sustainability Reporting Guidelines (2002) and the AA1000 Assurance Standard (2003). The data in this report has been assured using our protocol for content veracity. The assurance comprised a combination of interviews with relevant employees; evaluation of data collection and submission methodologies, documentation and record review and validation with external bodies and/or stakeholders where relevant. Six sites were visited (in UK, USA, Belgium, Italy and Singapore) and a further eight sites were contacted by telephone (in UK, USA, Ireland, India and Australia). The sites selected included those submitting high proportions of key data and included all parts of the GSK business. Additionally visits were made to the Corporate Head Quarters and web-conferencing with key individuals was utilised in order to complete our verification activities.

Statement of Independence and Competence

The SGS Group of companies is the world leader in inspection, testing and verification, operating in more than 140 countries and providing services including management systems and service certification; quality, environmental, social and ethical auditing and training; environmental, social and sustainability report assurance. SGS United Kingdom Ltd affirm our independence from GlaxoSmithKline, being free from bias and conflicts of interest with the organisation, its subsidiaries and stakeholders.

The assurance team was assembled based on their knowledge, experience and qualifications for this assignment, and comprised auditors registered with IRCA, IEMA and EMAS Verifiers.

Verification/Assurance Opinion

On the basis of the methodology described and the verification work performed, we are satisfied that the data contained within the GlaxoSmithKline 2006 EHS Report is reliable and provides a fair and balanced representation of GlaxoSmithKline's EHS activities in 2006.

We believe that GlaxoSmithKline has chosen an appropriate level of assurance for this stage in their reporting.

Independent verification/assurance statement

Key areas for improvement to data collection, submission and manipulation were identified as follows:

- Definitions for data to be submitted were not always fully understood or adhered to consistently at site level;
- Estimations are used to calculate certain data and further guidance could be provided to sites to ensure that such calculations are approached consistently;
- Establish a more rigorous process to check entered data for anomalies, such as data entered in error, or missed data;
- Consider incorporation of an internal audit of data and data management systems alongside corporate EHS audits;
- Ensure training is undertaken when key individuals are replaced to ensure consistency and full understanding of systems and requirements;
- Ensure that, when sites submit data, comments are included to explain estimations, calculations and any significant changes;
- Ensure that the process used to extract data from electronic systems is used consistently and appropriately to enable the correct values to be obtained by all individuals utilising the system.

Key areas for improvement in data verification process were identified as follows:

- Ensure that all relevant data is available and internally checked in advance of external verification process.



For and on behalf of SGS United Kingdom Ltd

Pauline Earl
Business Manager
Systems and Services Certification

27 February 2007

Global warming potential

1. Global warming potential (GWP) from energy sources is calculated as CO₂ or CO₂ equivalent using the Greenhouse Gas (GHG) Protocol developed by the World Resources Institute and the World Business Council for Sustainable Development.
2. GWP from air, land and sea transport is calculated using the GHG protocol from distance travelled, not directly from fuel used.
In years before 2006, we did not collect all categories of freight transport or employee business travel. In 2006 we are missing group air travel that originated outside of UK. Motor vehicle travel conversion assumes medium vehicles for sales employees and heavy diesel vehicles for freight transport.
3. GWP from refrigerants released from equipment is calculated using factors from the Kyoto protocol. We have changed from collecting data on releases of refrigerants to collecting data on the amount of refrigerant contained in the equipment and calculating the releases using a factor from British Refrigeration Association for probable leakage. We calculate releases only from refrigeration equipment holding greater than one kilogram refrigerant.
4. GWP from ozone depleting substances in inhalers uses factors from the Kyoto protocol. We did not have enough information to calculate GWP from inhaler use in previous years.

Water

5. Water from other sources includes recycled sources.

Metric	2006	2005	2004	2003	2002	2001
Energy use						
Energy for operations (million gigajoules)						
Natural gas	9.00	8.66	8.68	9.44	9.71	9.86
Fuels	1.08	1.53	1.53	1.43	1.07	1.42
Coal	0.47	0.63	0.56	0.64	0.95	1.04
Steam imported	0.22	0.19	0.17	0.17	0.06	0.28
Electricity imported	8.19	8.21	7.98	8.31	8.27	8.10
Global Warming Potential (CO₂ equivalent)						
GWP from operations¹ energy (million kilograms)						
Natural gas	1,666.1	1,692.5	1,665.5	1,749.8	1,734.0	1,824.5
Fuels	453.0	435.9	437.1	475.4	488.6	496.5
Coal	81.1	114.0	113.0	104.0	76.9	102.0
Steam imported	22.0	29.3	25.9	29.8	44.1	48.3
Electricity imported	15.0	14.3	11.5	11.6	9.4	38.7
GWP from transport² (million kilograms)						
Sales force	1095.1	1099.5	1078.0	1128.9	1114.5	1138.5
Air travel	339.9	233.0	206.0	178.0	180.0	123.0
Product logistics	136.1	102.0	78.0	70.0	75.0	33.0
GWP from other production activities (million kilograms)						
Inhaler production losses	105.5	112.0	114.0	95.0	92.0	71.0
Equipment containing greater than 1kg refrigerant ³	98.3	19.0	14.0	13.0	13.0	19.0
CO ₂ , Methane and Nitrous Oxide	400.7	607.8	665.2	723.5	1,082.8	1,385.2
Waste treatment	283.4	420.3	491.9	539.1	857.4	1219.0
Other sources	6.99	46.82	46.66	50.20	64.38	58.43
GWP from use of inhalers by patients⁴ (million kilograms)						
CFC 11 inhalers	36.29	48.42	54.64	54.90	71.50	57.13
CFC 12 inhalers	46.40	76.40	56.86	52.56	44.86	47.06
HFC 134a inhalers	27.32	15.86	15.09	26.76	44.61	3.58
Water use and discharge						
Water (million cubic metres)						
Municipal	22.0	21.6	20.8	23.0	24.2	26.8
Wells or boreholes	12.73	12.77	12.72	13.03	14.23	15.12
Other Water ⁵	8.95	8.59	7.96	9.88	9.98	11.60
Wastewater volume⁶ (million cubic metres)						
WW to recycling	0.302	0.289	0.137	0.072	0.014	0.037
WW to municipal sewer	10.2	10.9	11.4	11.5	11.9	13.1
WW to water bodies	0.58	0.43	0.91	0.42	0.42	0.20
COD after on-site treatment^{6,7} (million kilograms)						
COD in recycled water	3.74	3.85	3.86	3.74	3.65	3.76
COD to sewer	5.88	6.63	6.62	7.35	7.88	9.17
COD to water bodies	14.7	17.4	18.9	21.6	22.3	25.1
COD in recycled water	<.01	<.01	<.01	0.90	1.98	<.01
COD to sewer	2.93	3.60	4.45	4.77	4.42	3.91
COD to water bodies	11.77	13.80	14.50	16.01	15.94	21.17

Metric	2006	2005	2004	2003	2002	2001
Volatile organic compound emissions						
Volatile organic compound emissions ⁸ (million kilograms)	4.2	5.0	5.3	6.2	6.4	6.6
POCP from total VOC emissions ⁹	1.29	1.60	1.74	2.11	2.14	2.10
Top five solvents released (million kilograms)						
Acetone	1.02	1.15	1.11	1.30	1.46	1.23
Dichloromethane	0.84	0.88	0.95	1.13	1.25	1.72
Methanol	0.44	0.71	0.66	0.92	0.76	0.73
Ethanol	0.42	0.44	0.51	0.32	0.28	0.26
Isopropanol	0.25	0.18	0.23	0.26	0.22	0.35
Ozone depleting substances¹⁰						
ODS Releases from production (thousand kilograms)	22.8	51.0	59.0	71.5	120.8	183.5
CFC11 releases from production	6.9	14.1	12.6	27.0	52.4	88.5
CFC12 releases from production	15.9	36.9	46.3	44.5	68.3	94.9
ODS Releases from equipment (thousand kilograms)	0.65	2.99	2.66	2.59	6.81	4.32
CFC11 releases from equipment	0.42	1.62	0.93	0.30	2.70	0.56
CFC12 releases from equipment	0.02	0.21	0.31	0.32	0.40	0.33
Other ODS from ancillary equipment	0.20	1.15	1.41	1.97	3.71	3.42
ODS Releases from patient use of inhalers ¹¹ (thousand kilograms)	185.6	272.5				
CFC11 from patient use	51.85	76.15				
CFC12 from patient use	133.72	196.38				
ODS contained in equipment ¹² (thousand kilograms)	23.4					
Waste generated and disposed						
Hazardous waste generated ^{13,14} (million kilograms)	234.3	253.4	251.6	291.0	312.8	345.9
Hazardous waste recycled	167.65	190.23	182.19	234.86	255.09	287.5
Hazardous waste disposed	66.68	63.19	69.40	56.13	57.74	58.40
Hazardous waste incinerated with energy recovery ¹⁵	28.06	28.78	35.47	25.83	27.56	27.76
Hazardous waste incinerated with no energy recovery	38.18	33.41	32.54	28.81	28.06	27.82
Hazardous waste to landfill	0.44	1.00	1.38	1.50	1.93	2.82
Non-hazardous waste generated (million kilograms)	113.7	125.0	149.3	134.6	135.3	132.8
Non-hazardous waste recycled	76.06	83.82	103.99	90.63	85.61	79.34
Non-hazardous waste disposed	37.63	41.19	45.29	43.97	49.66	53.49
Non-hazardous waste incinerated with energy recovery ¹⁵	8.90	9.18	7.76	8.34	8.43	5.92
Non-hazardous waste incinerated with no energy recovery	7.09	8.28	10.07	6.23	9.40	12.05
Non-hazardous waste to landfill	21.64	23.73	27.45	29.40	31.83	35.52

Wastewater

- In 2006 we changed the wastewater calculations to include wastewater and chemical oxygen demand only from the major contributors; primary operations, pilot plants, and coating and sterile operations. We recalculated data for previous years so they can be compared.
- Chemical oxygen demand (COD), a measure of water pollution, from manufacturing processes is measured when the wastewater leaves our sites, following any on-site treatment.

Volatile organic compounds

- In 2006 we changed calculation to include VOC only from the major contributors; primary operations, pilot plants, and coating and sterile operations. We recalculated data for previous years so they can be compared.
- In addition to kilograms of VOC emitted, we calculate photochemical ozone creation potential (POCP) in kilograms ethylene equivalents. Conversion to ethylene equivalents is based on the European Chemical Industry Council (CEPIC) "Responsible Care HSE Reporting Guidelines" for VOCs (1998).

Ozone depleting substances

- Ozone depletion potential (ODP) from ozone depleting substances is calculated using factors from the Kyoto protocol.
- In previous years we did not have information about inhalers produced in Asia for emissions from patients' use.
- In the previous years we did not have information on the ODS amount contained in equipment.

Waste

- We consider a waste to be hazardous if it is radioactive, bioengineered or biohazardous, or it has any of the properties defined by the 1989 Basel Convention. This includes flammability, explosivity, water or air reactivity, corrosivity, oxidising potential, acute or chronic toxicity, ecotoxicity or infection. Biological waste rendered non-hazardous after treatment is considered a non-hazardous waste.

14. In 2006 we changed calculation to include hazardous waste only from the major contributors; primary operations, pilot plants, and coating and sterile operations. We recalculated data for previous years so they can be compared.
15. Incineration with energy recovery means burning the material and using the resulting energy.
16. Non-routine waste includes construction and demolition rubble and is not included in hazardous or non-hazardous waste calculation.

Injury & illness

17. The health and safety data cover both our employees and contract workers who are directly supervised by GSK employees. We report a snapshot of the injury and illness performance for the year. Cases may be added later but we do not correct prior years.
18. Lost time injuries and illnesses are work-related injuries and illnesses that are serious enough to result in one or more days away from work.
19. Lost calendar days are the calendar days that employees could not work because of work-related injuries and illnesses, including weekends. This helps to provide a measure of the severity of injuries and illnesses.
20. Reportable injuries and illnesses without lost time are reported incidents that did not result in time away from work (lost time). They are more serious than first aid but generally less serious than lost time.

Metric	2006	2005	2004	2003	2002	2001
Non-routine waste generated¹⁶						
(million kilograms)	34.9	77.5	34.9	26.1	29.8	25.1
Non-routine waste recycled	16.86	39.97	6.80	2.59	14.17	16.86
Non-routine waste disposed	18.02	37.54	6.68	23.49	15.66	18.02
Non-routine waste incinerated with energy recovery	2.55	7.46	0.14	0.17	0.03	2.55
Non-routine waste incinerated with no energy recovery	0.66	0.37	0.08	1.88	0.15	0.66
Non-routine waste to landfill	14.81	29.71	6.46	21.45	15.49	14.81
Estimated costs and investments						
Operations and maintenance cost (million £)	33.6	39.1	43.0	39.0	47.3	41.4
Capital investment (million £)	9.7	12.1	9.4	11.0	18.5	24.4
Injury and illness – GSK employees¹⁷						
Hours worked (millions)	194.7	196.6	195.0	201.8	203.7	191.1
Fatalities	3	1	2	5	3	5
Number of injuries with lost time ¹⁸	552	547	519	567	638	751
Calendar days lost – injuries ¹⁹	11,281	11,080	12,748	12,344	14,077	16,268
Number of illnesses with lost time ¹⁸	94	77	91	95	116	133
Calendar days lost – illnesses ¹⁹	4386	2518	2959	1377	5342	5304
Number of injuries without lost time ²⁰	443	437	430	784	955	1079
Number of illnesses without lost time ²⁰	282	267	354	529	378	315
Injury and illness – non GSK employees (not verified by SGS)						
Hours worked (millions)	22.8	22.8	20.6	19.8	20.5	17.0
Fatalities	0	2	1	4	1	0
Number of injuries and illnesses with lost time	114	100	84	63	71	69
Calendar days lost	965	1575	1369	883	1069	754
Number of injuries and illnesses without lost time	373	275	293	199	238	1