Environmental sustainability

We are committed to environmental stewardship across the product life cycle, from discovery and development, through manufacturing, marketing, use and ultimately disposal. We are also committed to minimising the environmental impact of our operations by reducing the carbon footprint and natural resource demands of our own and our suppliers’ business activities.

2014 highlights

- **18%**
  Operational greenhouse gas footprint reduced by 18 percent from our 2010 baseline.

- **36%**
  Hazardous waste reduced by 36 percent from our 2010 baseline.

- **17%**
  Water use reduced by 17 percent from our 2010 baseline.

Our approach

Environment is a core part of our safety, health and environmental (SHE) strategy, and is a key performance priority for our business. It is an area in which we believe we have both the capability and responsibility to implement activities that accelerate our business strategy while delivering wider benefits to society and the environment. Our commitment also extends to our suppliers’ business activities.

Our environmental strategy is twofold: 1) protecting natural resources, including reduction of our carbon footprint and 2) ensuring the environmental safety of our products, including understanding and minimising the long-term effects of pharmaceuticals in the environment.

Improvements can only be delivered through a collective effort across the company. To that end, each AstraZeneca function is responsible for identifying initiatives, monitoring progress and setting local targets that contribute to the global SHE objectives relevant to their own circumstances.
Incorporating external perspectives

In order to remain at the cutting edge of environmental performance, in 2014 we secured the support of an Environmental Sustainability Advisory Board. Made up of a group of four leading experts from around the world, their role is to challenge and advise us on all aspects of our environment strategy. The members of the advisory board are:

- Pankaj Bhatia, World Resources Institute, Washington
- Prof Jorgen Randers, Climate Strategy, BI Norwegian Business School
- Prof Koen Steemers, Head of Sustainable Design, Head of Department Architecture, University of Cambridge
- Polly Courtice, Director of the University of Cambridge Institute for Sustainability Leadership.

At the first meeting in October 2014 the Advisory Board provided feedback on proposed future environmental targets for beyond 2015 and challenged us to incorporate the concept of fair share as we develop these further and roll them out across the business. The Board will meet twice a year.

Following the science

At AstraZeneca, we follow the science which is why we recognise the role of the Intergovernmental Panel on Climate Change (IPCC) in leading global understanding of climate change science and impact assessment. The IPCC has concluded that natural systems around the world are being affected by regional climate changes, particularly temperature increases that are very likely to be the result of emissions of greenhouse gases from human activity and we accept those conclusions.

We recognise that climate change is not just an environmental challenge, but also one that affects the health and livelihood of millions of people because of the links to complex issues such as poverty, economic development and population growth. We believe that the most effective response to the challenges associated with climate change can only be achieved through a united global effort that takes account of the wider context of sustainable development. This includes aspects such as material efficiency; supply chain accountability; availability of safe, clean water; healthcare innovation; and infrastructure improvement.

By following the science, AstraZeneca is leading the field in the understanding of pharmaceuticals in the environment (PIE) and contributing valuable insight through our research on how to address potential risks.

Setting future targets

A key priority for us in 2015 will be setting new objectives and improvement targets for the future.

At AstraZeneca, we believe that all organisations have a role to play in controlling their own greenhouse gas emissions to help meet the United Nations Framework Convention on Climate Change (UNFCCC) Commitment in the Cancun agreement, limiting temperature rise to 2 degrees Celsius above pre-industrial levels. We want to take on a fair share of that responsibility which is why, in line with our commitment to follow the science, our thinking on future targets will be based around the World Resources Institute (WRI), World Wildlife Fund (WWF) and Carbon Disclosure Project (CDP) joint initiative on science-based target setting announced in their report ‘Mind the Science, Mind the Gap’. The initiative aims to develop a new, sector-specific methodology that helps companies set science-based emission-reduction targets, based not on existing carbon reduction projects in its own pipeline, but on the levels that will avoid the worst impacts of climate change.

We will also be trying to apply this concept of ‘fair share’ to our next generation of targets for material resource efficiency, including waste and water, and in our approach to sustainable product stewardship.

“There is very clear scientific evidence telling us what we need to do to ensure that we maintain this planet as a habitable place for us to live. To be true to its commitment to follow the science, AstraZeneca will have to find a way of applying this thinking in everything it does – while at the same time, balancing the needs of its business.”

Polly Courtice LVO,
Director of the University of Cambridge Institute for Sustainability Leadership and member of the AstraZeneca Advisory Board
Outsourced manufacture

With significant externalisation of manufacturing activity in line with our business strategy, we recognise the importance of working with suppliers to ensure they have ethical and SHE performance standards that are consistent with our own. We are also committed to being transparent about our total footprint and where practical, working to reduce this impact.

We work with key active pharmaceutical ingredient (API) and formulation and packing (F&P) suppliers to measure and report on the environmental impact of the manufacturing activity they carry out on our behalf. The environmental measures we have selected to report on at this time are waste generation, CO₂ emissions from energy use and water use.

We believe we have captured data for more than 90 percent of the globally managed outsourced manufacture of key intermediates and APIs, and of the formulation and packing for our established brands.

Reducing our carbon footprint

In common with most businesses, our greenhouse gas emissions arise from the energy we use and process emissions at our facilities; from transport and, indirectly, from the activities of our suppliers.

We believe we have a responsibility to reduce our carbon footprint. By the end of 2015, we aim to reduce our operational greenhouse gas emissions by 20 percent compared to the 2010 baseline data. We hope to do this by improving our energy efficiency; pursuing lower-carbon alternatives to fossil fuels and procuring green energy; improving the fuel efficiency of our sales and marketing vehicle fleet; and moving our global freight transport from air and into ships.

As some of our respiratory therapies also affect our total carbon footprint, we are also researching lower impact alternatives.

Our progress

In 2014, our operational greenhouse gas footprint totalled 738 thousand metric tonnes, a reduction of 18 percent from our 2010 baseline. By the end of 2015, we aim to reduce our operational greenhouse gas footprint (excluding emissions from patient use of our inhaler therapies) by 20 percent from our 2010 levels.

Energy used at our sites makes up less than 60 percent of our operational carbon footprint. During 2014, our air and road travel and freight transport emissions increased due to greater business activity in our pursuit of a return to growth. We are working, however, to ensure that our travel and transport activities are as efficient as possible.

Since the company formed in 1999, we have halved our carbon emissions. In 2014, the Carbon Disclosure Project (CDP) admitted us into their ‘A List’ of performance leaders. We are one of only three pharmaceutical companies to make the list.

We also achieved a position on the 2014 CDP Supplier Climate Performance Leadership Index (SCPLI). This index showcases 121 supplier companies around the world that are making the greatest progress towards mitigating climate change.
Carbon emissions from outsourced manufacture

Carbon emissions from energy used for outsourced manufacture of active pharmaceutical ingredients, formulation and packing amounted to 87 thousand tonnes in 2013; this is 20 percent of that from our own sites.

This may be lower than the equivalent waste figure due to the fact that the energy consumption data from our suppliers relates only to our products, whereas the energy use and emissions figures from our own facilities are aggregated for all activities on the sites, not just manufacture.

Towards lower impact respiratory therapies

The propellants in our pressurised metered-dose inhalers represent a significant portion of our total carbon footprint (an additional 60 percent of our operational carbon footprint in 2014 or 449 thousand tonnes). Typically used in the treatment of respiratory conditions such as asthma, they rely on hydrofluoroalkane (HFA) propellants to deliver the medicine to a patient’s airways.

While the inhalers only release 0.1 grammes of gas each time they’re used, multiplied by the millions who use them around the world and the impact on our carbon footprint is significant.

Finding suitable alternatives is challenging as any device must use a propellant that is safe, inert, non-toxic, non-flammable, tasteless and odourless. It must also possess the right aerosol characteristics to make it effective. There are no viable alternatives available to date and there is little research into possible alternatives. AstraZeneca’s SET approved a new inhaler strategy in 2014 and acquired two companies, Almirall and Pearl, both of which have technologies that could potentially lower the impact of our own inhaler technologies.

Using natural resources efficiently

Like all companies, we use natural resources in the development, production, marketing, transportation and disposal of our products.

While we can’t completely eliminate the use of natural resources, our aim is to use those resources as efficiently as possible while still maintaining the delivery of medicines that make a meaningful difference to patients.

We continue to refine and enhance our processes for managing the waste we produce and the water we use.

A responsible approach to waste

We characterise our waste as either hazardous waste, such as chemical waste, or other waste, such as trash or rubbish, according to national legislation, which varies in its definition from country to country. The majority of our hazardous waste consists of solvent and aqueous streams from manufacturing activities. Other waste includes general waste from our facilities around the world.

Our primary focus is waste prevention. Where this is not practical, we concentrate on waste minimisation during the production process and appropriate treatment or disposal to maximise the reuse and recycling of materials, and reduce disposal to landfill. We aim to reduce the amount of waste we produce during the production process, integrate environmental considerations into purchasing decisions and work with our employees to raise awareness of waste issues. For example, a solvent recovery unit was brought into operation at the end of 2013 at our Avlon site near Bristol in the UK that will significantly reduce hazardous waste volumes and reduce consumption of solvents in manufacturing.

Our targets on waste are ambitious, reflecting our determination to drive continuous improvement. In addition to 15 percent reduction targets for both hazardous and non-hazardous waste, we have also set ourselves targets to increase the proportion of waste recycled, recovered or reused, and to reduce the amount of non-hazardous waste sent to landfill. Updates on these targets are included in the progress section on page 6.
Case study

Implementing sustainable construction methods

In 2016, our UK-based global R&D centre and corporate headquarters will relocate to a purpose-built facility on the Cambridge Biomedical Campus. Almost 600 AstraZeneca employees now work at our Cambridge, UK site; of these employees, approximately half relocated from other sites, such as those in London and Alderley Park. Over the next three years, we expect to hire approximately 900 new employees to occupy our new site in Cambridge.

AstraZeneca took the decision early on in the project to work with our partners to deliver a sustainable design for the facility capable of achieving Building Research Establishment Environmental Assessment Methodology (BREEAM) ‘excellent’ ratings for sustainability performance. In order to achieve this the facility must gain 70 percent of the available credits.

The R&D Centre has 73 percent of these credits confirmed with a further 12.7 percent being targeted while the R&D Enabling Building has 74 percent of its credits confirmed with a further 16.7 percent being targeted.

Many of the steps taken to reduce energy consumption on the site have been based on learning from our existing Mölndal R&D site in Sweden which is a best-practice example from an energy use perspective. For example, the buildings use high-temperature water in the cooling process, meaning that energy is not wasted chilling water beyond the point needed for effective heat transfer for air conditioning and other uses.

Additional initiatives, such as the optimisation of natural light, a combined heat and power station and a rainwater recovery system, will further reduce energy consumption and the environmental footprint of the facility. Per scientist, the Cambridge site will be twice as energy efficient as Mölndal.
Our progress
By the end of 2015, we aim to reduce our hazardous and non-hazardous waste by 15 percent from our 2010 levels.

While waste prevention is our goal, we also seek to dispose of our waste in the best way through treatment, recycling and the avoidance of landfill disposal when prevention is impractical.

In 2014, our total waste was 35.8 thousand metric tonnes with a tonnes/$m index of 1.37. We reduced hazardous waste by 36 percent (a reduction of 18 percent indexed to $m revenues) since 2010 due principally to changing production patterns and a major investment at our manufacturing site in the UK to enable recycling and reuse of solvent wastes. Our non-hazardous waste indexed against staff numbers has not improved due to staff reductions since the baseline was set.

By the end of 2015 (baseline 2010) we aim to:
- Increase the proportion of waste sent for material recycling, recovery or reuse from 40 percent to 50 percent
- Decrease the proportion of non-hazardous waste sent for landfill from 26 percent to less than 10 percent.

Waste from outsourced manufacture
We have determined that waste generated from outsourced manufacture of active pharmaceutical ingredients, formulation and packing is similar to that from our own activities; some 28 thousand metric tonnes in 2013 compared with a total of 33 thousand metric tonnes from our own sites.
Reducing water use

Fresh water resources are under increasing stress due to climate change, emigration, population growth, and increasing living standards. It has been estimated that by 2025 two-thirds of the world’s population will live in water-stressed areas. We recognise the need to use water responsibly and where possible to minimise its use especially in countries classified as having ‘high’ or ‘medium’ water stress by the United Nations Environment Programme (UNEP).

All of our facilities use water and subsequently discharge wastewater that is either treated on site or discharged to the local municipality for treatment. We measure the total water volume used, volume discharged and the pollutant load that our effluents place on the aquatic environment. We have a company-wide water reduction target to reduce absolute water use by 25 percent by the end of 2015 compared to a 2010 baseline.

To help to achieve the 2015 target, all of our manufacturing and R&D sites that use significant quantities of water or are located in a water-stressed area, have water conservation plans in place. These plans identify opportunities to reduce and conserve water. Additionally we have formed a Global Energy, CO2 and Water Steering Committee and two regional teams (EU and North America) to facilitate energy, CO2 and water reduction.

Our progress

In 2014, our water use was 3.8 million m³, a reduction of 17 percent from our 2010 baseline. Water use indexed to revenues was 145 m³/$m (up 5 percent from 2010 baseline).

Water used in outsourced manufacture

We have determined that water use from outsourced manufacture is much less than that from our own activities; some 1.2 million cubic metres in 2013 compared with a total of 3.7 million cubic metres at our own sites.

2013 water use from outsourced manufacture

<table>
<thead>
<tr>
<th>Category</th>
<th>Water use (million m³)</th>
</tr>
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<tbody>
<tr>
<td>AstraZeneca sites</td>
<td>3.7</td>
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<tr>
<td>API (active pharmaceutical ingredients) category</td>
<td>0.59</td>
</tr>
<tr>
<td>F&amp;P (formulation and packing) category</td>
<td>0.55</td>
</tr>
</tbody>
</table>

Safe discharges of APIs

During 2014 we continued to share information on our Environmental Reference Concentrations (ERCs) and the approach we take with our 45 manufacturing, formulation and packing suppliers. We are working with our suppliers to conduct assessments and to understand how best to manage any emissions of the APIs they manufacture on our behalf.

Protecting biodiversity

We support the principles of the Convention on Biological Diversity. The Earth’s biological resources are vital to humanity’s economic and social development; a healthy planet depends on a diverse biosphere. Fair and equitable sharing of benefits arising from the use of genetic resources and use of the traditional knowledge associated with such resources are acknowledged by us as important for creating a sustainable future for communities.

We are developing Biodiversity Action Plans (BAPs) for selected facilities, aimed at conserving, and increasing biodiversity on and around the company’s properties worldwide. Individual sites can contribute to the preservation and enhancement of local biodiversity by protecting natural habitats and creating or maintaining refuges and ‘green corridors’ for flora and fauna.
Environmental product stewardship

Environmental product stewardship encourages all those involved in the lifespan of a medicine to take responsibility to minimise the environmental impact of the product.

We take seriously our responsibilities towards improving our products’ environmental profile and integrate environmental considerations into a medicine’s complete life cycle – from discovery and development, through manufacturing, marketing, use and ultimately disposal.

Our approach to environmental product stewardship includes the development of environmental risk management plans for new products; the application of green chemistry principles to our manufacturing processes; the continual improvement of the environmental sustainability of our packaging; and our ongoing commitment to ecopharmacovigilance or the safety of medicines in the environment.

Once our medicines are on the market, we provide healthcare professionals with information on their appropriate use and we work with national and local authorities to make appropriate guidance available to patients about how to dispose of unused medicines.

Environmental impacts at each stage in the product life cycle

**Discovery and early development**
Ensuring studies are completed in a timely way before regulatory submission, while at the same time avoiding unnecessary animal testing.

**Green chemistry**
Environmental impact at this stage relates directly to our consumption of natural resources. If we develop effective manufacturing processes, we will use fewer chemicals and fewer natural resources.

**Emissions during manufacturing**
At this stage, the environmental impact is potentially harmful to the local aquatic life if not properly controlled.

**Emissions from patient use**
We undertake environmental risk assessments as part of product approval to assess if environmental impacts occur due to continuous low-level exposure. We also conduct product-focused environmental research and we ensure that our risk assessments are updated in light of the latest scientific findings.

**Unused medicines**
Improper disposal adds unnecessarily to the environmental exposure to pharmaceuticals.
Moving towards greener drugs
We are looking at ways to improve the environmental sustainability of our future product pipeline. Green drug design is extremely challenging and the needs of the patient will always come first. The proactive development of greener drugs is still a long way from being realised but we currently remain committed to exploring this area further.

Green chemistry
Our SHE Triggers model is used to ensure the sustainability of new active pharmaceutical ingredient (API) manufacturing processes. It enables potential safety, health and environmental issues to be identified and designed out at the earliest possible stage in a medicine’s development.

The model incorporates an environmental risk assessment tool to enable our scientists to prioritise environmental issues for their projects. The SHE Triggers concept is also used in the development of secondary manufacturing processes and pharmaceutical products, including environmental assessment of packaging and devices.

Our Green Chemistry Network links environmental specialists, pharmaceutical development chemists and chemical engineers, and medicinal chemists to help promote the principles of green chemistry and engineering. All scientists in our Global Pharmaceutical Development function have the opportunity to attend training courses on how they can minimise the environmental impact of the manufacturing processes they are developing which include information and practical tools in the application of green chemistry.

Process mass intensity
Process Mass Intensity (PMI) is a resource efficiency target developed collaboratively by the pharmaceutical industry and is a measure of the total quantity of all input raw material divided by the quantity of product made. It is important to strive for the lowest possible PMI for each project in development because this will reduce the amount of material used and waste generated for the lifetime of the product which could be many years.

The 2014 end of year analysis of PMI, collated for pharmaceutical development projects revealed that our continued efforts to improve the API processes has led to an impressive 22 percent reduction in PMI against the agreed baseline.

Sustainable packaging
Packaging plays a critical role in protecting products as they transit through the supply chain. Making packaging more sustainable includes minimising the amount of material used, using materials from recycled or renewable sources and using materials that can be recycled. Unnecessary packaging wastes energy and materials.

Environmental considerations are taken into account at an early stage of packaging and device development, but we also continue to review our packaging requirements and identify improvements for existing products.

During 2014, eight global packaging standards and 10 packaging specifications have been rolled out across 17 countries. They have received support at the operations sites and are currently in various stages of implementation.

When launched in 2016, the new design of the FluMist pack, an intra-nasal influenza vaccine, will reduce the carton size by 57 percent and increase the number of doses per pallet by up to 220 percent, reducing the impact of transportation. The materials Polyethylene Terephthalate Glycol (PETG) and high-density polyethylene (Tyvek®) will also be eliminated from the pack increasing recyclability. This new design will reduce the cold storage and transport carbon footprint of the product.
Our commitment to safety of pharmaceuticals in the environment

Understanding pharmaceuticals in the environment (PIE) is a long-standing commitment for AstraZeneca. The majority of pharmaceuticals get into the environment through patient excretion but they can also enter the system during manufacture or through inappropriate disposal or discharge during manufacture.

To date, much of the research in this area has focused on detection methods. Although this work is important, we have chosen to focus our research on how to address potential risks. We want to identify any potential adverse effects that our medicines might have on the environment so that we can responsibly balance those effects against the benefits that these medicines bring for our patients.

Due to concerns surrounding the potential impact of PIE, a comprehensive Environmental Risk Assessment (ERA) is now a regulatory requirement prior to the launch of any new drug.

To ensure our manufacturing discharges are safe, we developed the concept of Environmental Reference Concentrations (ERCs) and Maximum Tolerable Concentrations (MTCs), which are standard levels and should not be exceeded in the aquatic environment receiving our effluents. To date we have established ERCs and MTCs for 42 of our active pharmaceutical ingredients (APIs).

All of our worldwide manufacturing sites meet our ERC criteria and we have a rolling programme to confirm ongoing compliance.

We have shared our ERC and MTC methodology with our key outsourced manufacturing partners, enabling them to risk assess and manage any emissions of the APIs they manufacture or formulate on our behalf. This also allows us to better understand and manage the global footprint associated with our manufacturing activities. In 2014, we completed 72 ERC assessments with our suppliers. We run an annual training event explaining our approach and methodology to our suppliers.

We also work with national and local authorities to raise public awareness and provide guidance on the safe disposal of medicines.