

Environment

Our responsibility to protect the environment is derived from our values and our Group strategy. We have instituted Group-wide principles, strategies and organizational structures for corporate environmental protection and have also implemented a certified environmental management system for our Group-wide activities. In this way, we aim to reduce our emissions and waste while also ensuring that resources such as energy, water and raw materials are utilized as efficiently as possible. Process safety is a key prerequisite here.



Environmental management

Our responsibility to protect the environment stems from our Values and our Group strategy. We aim to continually improve our performance and reduce our impact on the environment by applying the precautionary principle. This especially means efficiently conserving resources such as raw materials, auxiliaries, operating supplies, energy, and water. In addition to this, we strive to lower our emissions and waste so that we can reduce our costs as well as our impact on the environment.

Our Corporate Environment, Health and Safety (EHS) Policy, in effect throughout the Group, establishes the framework for principles, strategies and organizational structures for environmental protection at the company. The topics of health and safety are covered under Employees: [Occupational Health and Safety on p. 102](#).

Our EHS policy is implemented through internal guidelines and instruction manuals on compliant behavior, such as the "EHS, Security and Quality Manual". This manual describes, for instance, the fundamental global processes and organizational structure for environmental protection and occupational safety at the company. Our guidelines are based on the Responsible Care® Global Charter, which the chemical industry drafted in 2005. Merck KGaA, Darmstadt, Germany was among the first companies to sign the revised version of this charter in 2014. We have furthermore aligned our guidelines to the ISO 14001 (environmental management systems) and OHSAS 18001 (occupational health and safety management systems) standards. We have developed Group-wide standards as well as standard operating procedures for all environment, health and safety issues relevant to the company.

For our environmental protection activities, we have established a management system that is structured according to ISO 14001. We require all production sites with more than 50 employees to implement our environmental management system, which is optional for sites with 50 employees or fewer. This system is certified on an annual basis by an accredited, independent organization. New production sites must subsequently set

up and implement an environmental management system that conforms to Group standards and meets the requirements for ISO 14001 certification.

Since 2009, Merck KGaA, Darmstadt, Germany has had an ISO 14001:2004 group certificate for its environmental management system. As part of the certification process, multiple surveillance audits are conducted every year, which we passed with flying colors in both 2013 and 2014. Suitable action plans have been drawn up and are now being implemented. The group certificate currently covers 58 sites, including eight of nine production sites from AZ Electronic Materials, a company that was acquired in 2014. Due to site acquisitions made mid-year and the time needed to fully implement an environmental management system, there are generally always a few production sites still undergoing implementation that have not yet been certified to ISO 14001:2004 by year-end. At the time of the surveillance audit in 2014, four sites fell into this category.

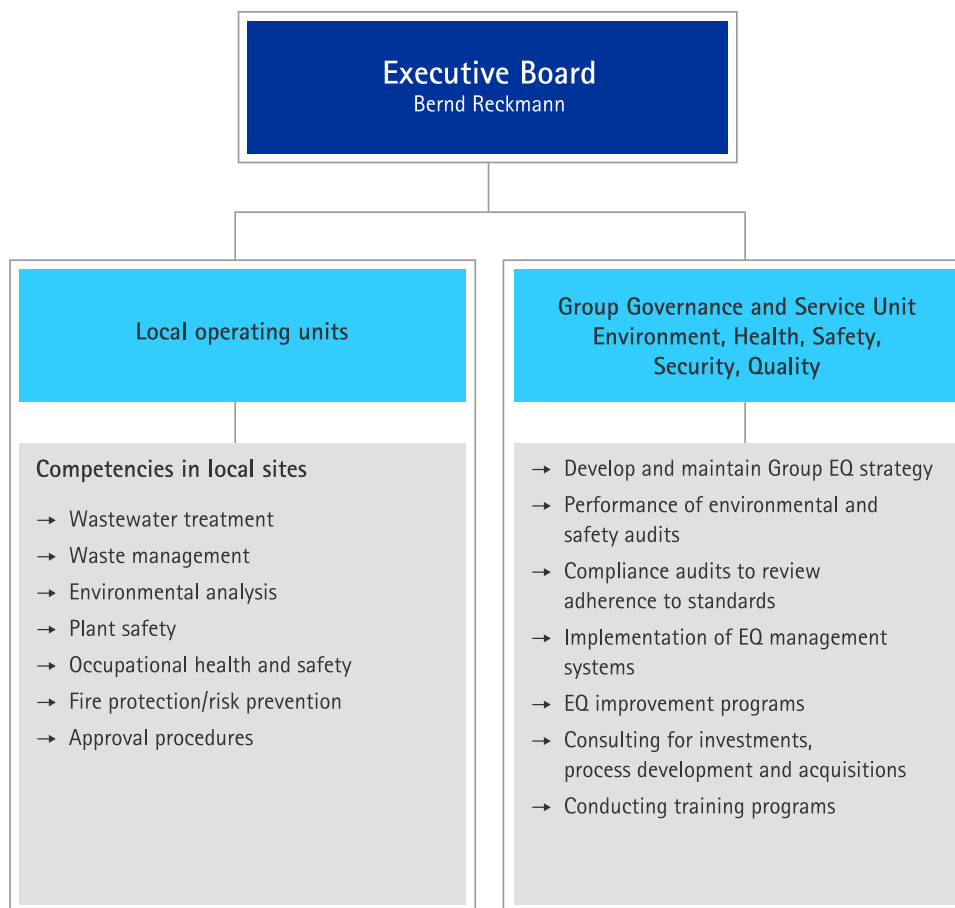
A new version of ISO 14001 is scheduled for publication in 2015. Merck KGaA, Darmstadt, Germany will be adapting its Group-wide environmental management system and corresponding documents such as the "Corporate EHS Policy" and the "EHS, Security and Quality Manual" to meet these new requirements.

Organization

Bernd Reckmann, Member of the Executive Board of Merck KGaA, Darmstadt, Germany, bears overall responsibility for environmental protection at the company. The Merck KGaA, Darmstadt, Germany function EQ is responsible for globally steering all environmental protection measures and is furthermore in charge of occupational health and safety, security, and quality.

Each site has specific employees in charge of EHS-related matters. The local site managers are responsible for operational environmental protection as well as occupational health and safety. When it comes to these matters, they receive support and guidance from EHS managers or, at smaller sites, from EHS coordinators.

The company AZ Electronic Materials, acquired in 2014, has been completely integrated into EQ's structural organization and processes since the beginning of 2015.



The processes for complying with local environmental protection laws, regulatory requirements, standards, and business requirements are stipulated by EQ, but are also partially defined by the sites themselves. EQ has created internal standards and standard operating procedures for all key environmental topics. Regular internal and external audits are conducted to verify compliance with these standards, the frequency of which is based on the site's risk potential. Employees can report violations to Compliance. In the 2013–2014 period, no significant violations of environmental laws or regulations were recorded within the Merck KGaA, Darmstadt, Germany.

Using the Group-wide LION electronic data management system, environmental data is recorded at the individual sites and reported to the Group function EQ at least once a year.

For all capital expenditure projects, either EQ or the local EHS unit will conduct environmental impact assessments to ensure sufficient environmental protection and occupational safety, as well as a proper degree of building

and plant security. When sites and property are acquired or divested, EQ performs its due diligence, drawing up detailed EHS statements in order to ensure that contaminated or otherwise problematic sites are neither bought nor sold.

All employees tasked with environmental protection responsibilities are trained on a continuous basis and obtain additional qualifications. In addition to local programs, this training also includes the annual international EHS Congress in Darmstadt, as well as the regional EHS Forum. These events inform attendees about new EHS issues as well as planned guidelines and laws, and furthermore encourage best practice sharing at an expert level. In 2014, these events focused on topics such as management systems, pharmaceutical residue in the environment, and environmental performance indicators.

In 2014, Merck KGaA, Darmstadt, Germany's spending on corporate environmental protection totaled € 146 million worldwide (€ 142 million in 2013). These figures also include capital investments made during 2013 and 2014.

Goals: Environmental management

Goal	Action	By?	Status in 2013 and 2014	Status
Audit and implement environmental management systems at acquired sites	Certify environmental management systems at further acquired sites	Ongoing		
	Perform gap analysis on the life science business acquisitions (e.g. Heipha and Biochrom), along with the Allergopharma production site in Reinbek	End of 2014	We conducted a gap analysis on Biochrom and Allergopharma production sites. Due to production issues, the implementation of ISO 14001 has been delayed for Heipha.	
	Integrate AZ Electronic Materials production sites	End of 2015	Eight out of nine production sites of AZ Electronic Materials, which was acquired in 2014, have been incorporated into the group certificate.	
Implement the OHSAS 18001 occupational health and safety management system for all Performance Materials production sites		End of 2016		

Legend:  Achieved  In progress  Not achieved  New goal

Plant and process safety

Plant and process safety is of great significance to Merck KGaA, Darmstadt, Germany. Failed safety systems can lead to chemical spillage, which can in turn adversely impact people and the environment. This can also result in financial damage from issues such as production stoppages. One of our top goals is therefore to prevent production disruptions that can cause workplace accidents and chemical leaks.

We apply the same uniform standard to plant and process safety across the globe. Our Group-wide standard "Plant and Process Safety" mandates safety-related requirements be applied to the entire life cycle of a plant – including construction, normal operation, modifications, maintenance, repair, and shutdown. This standard applies to all production plants and warehouses. A safety concept is always developed for each plant before the plant is commissioned. Continuously revised and updated, this concept contains an overview of potential risks (e.g. fires, explosions, substance leakage into the environment) as

well as the corresponding protective measures. The Group-wide standard "Spillage Control" defines organizational measures for preventing spillage during storage and transport, and also details how to handle hazardous materials. We furthermore have a Group-wide "Risk Management Process" operating procedure that specifies how to identify and assess risks, as well as how to develop and implement measures to minimize them.

The Group function EQ (see [Environmental management on p. 106](#)) is in charge of environmental protection and is the expert in plant and process safety guidelines as well as all related topics. At our individual sites worldwide, local EHS managers are appointed to handle environmental issues pertaining to plant and process safety.

In order to continuously identify potential for improvement, we regularly assess the plant and process safety of each site using EHS performance indicators, which gives us a comprehensive overview of safety at our sites. Accidents are evaluated retrospectively using lagging indicators, and potential future situations are

identified using leading indicators, which are based on factors such as near-accidents and identified areas of improvement.

These comprehensive EHS performance indicators consist of a variety of data. For instance, since 2013 we have been tracking the EHS Incident Rate, an indicator that synthesizes the following data: the number of workplace accidents involving our employees and contractors who work at Merck KGaA, Darmstadt, Germany sites; environmentally relevant incidents (e.g. product spills); activation of operational safety systems without an adverse impact on people and the environment (e.g. preventive system shutdown), and deviations identified in the course of external reviews and audits. For these indicators, product spills are defined according to a concept developed by the European Chemical Industry Council (CEFIC) and the German Chemical Industry Association (VCI).

Across all production, research and storage sites, we registered a total of 44 incident-related substance spills in 2013. Thanks to improved plant and process safety, we only recorded 26 incidents across all sites in 2014. We investigate each individual incident at the respective site and take appropriate countermeasures in order to prevent the same scenario – or a similar one – from recurring. We regularly organize best practice and information sharing sessions so that all our production sites can learn from incidents and implement preventive measures. Of the incident-related spills reported in 2013 and 2014, none resulted in significant environmental pollution.

Since plant and process safety always involves the interaction of man and machine, we consider it highly important for our employees to be well-trained and to receive ongoing training on a regular basis. To this end, in-house training on plant and process safety is regularly conducted at production sites. In 2013 and 2014, two training workshops were offered as part of an internal advanced training program for both site managers as well as for production, engineering and EHS managers from our Life Science and Performance Materials business sectors. The primary topics included systematic risk identification in processing plants, explosion protection, and static electricity.

Climate protection

As a company that operates responsibly, we are committed to helping protect the environment and mitigate climate change by conserving energy and reducing our greenhouse gas emissions. Our climate change mitigation activities are also of financial benefit to us since improved energy efficiency means that we save on operating costs. Pressure from a growing number of statutory regulations governing greenhouse gas emissions has also encouraged us to take action. Merck KGaA, Darmstadt, Germany is subject to a variety of national as well as international energy and emissions regulations, such as emissions trading systems. Currently, the EU Directive 2012/27/EU on energy efficiency is being incorporated into the national legislation of EU member states. It requires major industrial companies to conduct energy audits or implement energy management systems.

Within the scope of the Carbon Disclosure Project, we have been reporting on our greenhouse gas emissions activities, measures, and achievements for several years. In 2014, we were once more ranked in performance band B in the Climate Performance Scoring, which puts us clearly in the upper range of all participating companies in the Germany, Austria and Switzerland category. In the Climate Disclosure Scoring, which rates the thoroughness and transparency of a company's reporting, we scored 87 out of 100 points, putting it well above the average.

The company's function EQ is responsible for globally steering all climate protection activities (see [Environmental management on p. 106](#)). At the individual sites, operational units are responsible for implementing climate change mitigation measures.

In 2014, we implemented a new guideline on Group-wide energy management. Our "Energy Management" standard defines general principles for uniform energy management across all Merck KGaA, Darmstadt, Germany sites. Our "Emissions of Refrigerants" standard, implemented at the end of 2013, aims to reduce emissions from cooling processes that may cause global warming as well as ozone layer depletion. In 2013, we furthermore revised our company car policy and set a goal to reduce the average CO₂ emissions from our global company car fleet by 30% by 2020, relative to 2012 levels. In order to reach this goal, we are switching our pool of leased company cars over to more efficient, more economical models.

Our strategic EDISON program

We have set ourselves the goal of reducing greenhouse gas emissions by 20% by 2020, relative to the 2006 baseline. In order to achieve this target, we initiated in 2009 the EDISON energy efficiency and climate protection program, which consolidates the climate change mitigation activities of the Group. Worldwide, 20 company sites jointly account for 80% of our greenhouse gas emissions, so EDISON is focusing on these sites in particular. The reduction of our energy-related emissions is one of our primary measures. To this end, we are working to reduce greenhouse gas emissions from energy generation as well as to enhance the energy efficiency of research and production processes. Furthermore, we wish to lower process-related emissions through initiatives such as a process efficiency program at the life science business. Improving the energy efficiency of our facility operations and employing renewable energy are other measures that will contribute to this goal. For our the life science business sites, we have set ourselves the intermediate goal of reducing greenhouse gas emissions by 10% by the end of 2015, relative to the 2006 baseline.

To create and implement climate change mitigation projects, EQ collaborates with a working group that spans all of the company's businesses. This group develops measures and evaluates site-specific project proposals in terms of absolute CO₂ reduction, CO₂ reduction relative to capital spending volume, and potential cost savings.

Through the approximately 300 EDISON projects that have been initiated since 2012, we aim to annually save around 60,000 metric tons of CO₂ in the medium term. Around two-thirds of these projects have already been launched, or are currently being implemented. For 2015, we have initiated 57 new projects, which we expect to reduce CO₂ emissions by approximately 37,000 metric tons in the medium term.

At the end of 2014, the company commissioned a carbon-neutral biomass power plant in Goa, India that runs on the shells of locally farmed coconuts and cashews. This will enable us to cut CO₂ emissions by around 11,500 metric tons per year. On top of this, a biomass central heat plant went into operation in Jaffrey, New Hampshire (USA) in December 2014. This renewable energy biomass plant will run on locally produced wood chips and will enable us to cut CO₂ emissions by around 3,500 metric tons per year.

The company's production sites in Darmstadt and Gernsheim, Germany, account for around 40% of our global energy consumption. With the cogeneration plant in Darmstadt and the heating plant in Gernsheim, these two sites are subject to the EU Emissions Trading System. Merck KGaA, Darmstadt, Germany operates very efficient energy generation plants and, in this third period of EU emissions trading stretching from 2013 to 2020, we are also benefiting from a situation in which some certificates are being allocated free of charge. As things stand today, however, we will need to purchase additional CO₂ certificates in the future.

At the Darmstadt site, the company is spending around € 27 million on the construction of two state-of-the-art energy stations. In July 2014, Executive Board Chairman Karl-Ludwig Kley and the German Federal Minister for Economic Affairs and Energy Sigmar Gabriel inaugurated the first station, which is supplying the site's pharmaceutical production operations and research activities with power, heating and cooling. The second station is currently under construction and will cover the refrigeration needed by the site's chemical plants and laboratories, among other power needs. Once both plants are in operation, the site's CO₂ emissions will decrease by around 2,500 metric tons per year.

In mid-2013, a highly efficient cogeneration plant was commissioned in Gernsheim, which saves around 7,000 metric tons of CO₂ emissions per year.

Energy management is another component of EDISON. Eight of our sites have been certified to ISO 50001 "Energy Management Systems": Darmstadt, Gernsheim and Wiesbaden in Germany, Molsheim in France, Bari and Tiburtina in Italy, Taoyuan in Taiwan, and Poseung in South Korea.

You can find more information on our website:

- Biomass power plant in Goa, India
- Use of geothermal energy in Atsugi, Japan
- Solar power in Bedford & Billerica, Massachusetts (USA)
- Green buildings (LEED Gold-designed site in Bangalore, India)

Energy consumption and CO₂ emissions in 2013 and 2014

In 2014, Merck KGaA, Darmstadt, Germany consumed a total of 1,622 GWh of energy, which represents a slight increase over 2013 (1,566 GWh). Due to the complexity involved in collecting the data, we are currently not calculating the energy that is consumed upstream or downstream during the production and transport of our raw materials.

In 2014, the company emitted 524,000 metric tons of greenhouse gas emissions (CO₂ equivalents), with 567,000 metric tons emitted in 2013. This decrease can be attributed mainly to a 30% reduction in emissions from one production process. In this process, we have managed to reduce the emissions relative to production volume by almost two-thirds since 2008. CO₂ emissions fell by 9% relative to the 2006 baseline, which means that the company is on the right path to achieving its 20% reduction target by 2020.

In order to report and calculate its greenhouse gas emissions, the company utilizes the Greenhouse Gas (GHG) Protocol, an internationally recognized standard. We are currently reporting Scopes 1 and 2 of the GHG protocol, and parts of Scope 3. Scope 1 covers direct emissions that the company produces itself by burning fossil fuels, or through its own processes. Scope 2 pertains to emissions from imports of energy, such as electricity or district heating. Scope 3 includes emissions such as those from the manufacture and transportation of products, raw materials, and waste, or from employee business travel. Due to the complexity of Scope 3 emissions reporting, we are currently only reporting on Scope 3 emissions from business travel, from employee commuting, from fuel and energy-related activities, and from the disposal and recycling of waste generated in the course of our business operations. Merck KGaA, Darmstadt, Germany has done some product life cycle assessments and carbon footprint analyses (see [Sustainable products on p. 50](#)).

Educating employees

Our commitment to climate change mitigation is not only observed at work – we encourage our employees to exhibit this through more sustainable living habits as well.

To keep our employees informed, we publish a selection of climate protection facts and figures on our intranet. Furthermore, various tools such as energy checklists or examples of best practices are also available to help

employees share information and learn from one another. We continuously provide information on the company's climate change mitigation efforts in our employee magazine and in an employee newsletter.

Through an online training system, we have trained employees at our Darmstadt and Gernsheim sites in Germany on the topic of energy management. As an incentive to use public transportation, the Darmstadt site offers a "Jobticket", the cost of which is partially covered by the company. In 2014, nearly 4,000 employees took advantage of this option.

In the United States, the life science business supports employees' individual climate change mitigation efforts through engagement programs and monetary subsidies. Employees receive subsidies to install solar panels on their homes, have an energy audit conducted on their homes, or purchase hybrid and/or electric vehicles. New for 2015 will be the addition of select electric motorcycles to the personal climate change mitigation subsidies. The vehicle subsidy has already encouraged over 150 employees to switch to a hybrid or electric car. In addition to this, the life science business is bolstering its employees' awareness of and engagement in environmental protection through global campaigns such as Energy Month and its Corporate Responsibility Ambassador Network. Through the end of 2014, the life science business and the biopharmaceuticals business also installed electric vehicle charging stations at our Bedford and Billerica sites (Massachusetts, USA), where employees and visitors can charge their electric cars free of cost.

Logistics

We are working to reduce the greenhouse gas emissions that result from the transport of our products. To achieve this, we are reducing the use of air transport in favor of sea shipping. We have undertaken a project to identify products that can be shipped by sea instead of air in order to reduce costs and CO₂ emissions. These products need to safely withstand the longer travel time at sea without compromising the product quality and service level to customers. This project encompasses all shipments from our Global Distribution Centers to customers and local warehouses worldwide. For instance, thanks to changing how we transport goods worldwide from Darmstadt, Germany, we reduced CO₂ emissions by approximately 800 metric tons in 2014.

We are also focused on reducing emissions from shipping thousands of products to customers. In the United States, the life science business is an EPA SmartWay® Shipper. As a SmartWay® Shipper, we are committed to benchmarking operations and implementing supply chain efficiencies in order to improve our performance annually with respect to how we ship our products.

As we continue to evaluate our logistics for further climate-saving measures, we believe this will not only help reduce our own greenhouse gas emissions, but will also support our customers' needs as they seek more products and services with reduced carbon footprints.

Goals: Climate change mitigation

Goal	Action	By?	Status in 2013 and 2014	Status
Reduce direct and indirect greenhouse gas emissions (Scope 1 and 2) of the company by 20% relative to the 2006 baseline	Systematically examine the energy consumption at our individual sites	End of 2020	We continued to systematically examine ways to save energy at our production sites. For instance, energy audits were conducted on the Aubonne and Vevey sites in Switzerland.	
	Identify and implement ways to save energy	End of 2020	Through the approximately 300 EDISON projects that have been initiated since 2012, we aim to annually save around 60,000 metric tons of CO ₂ in the medium term. Around two-thirds of these projects have already been launched, or are currently being implemented.	
	Reduce process-related emissions	End of 2020	We have made significant progress in reducing the life science business' process-related emissions. The average process emissions relative to production volume at our Jaffrey, New Hampshire (USA) facility has decreased by around two-thirds. At this site, we have witnessed a 30% absolute reduction in process emissions in 2014 versus 2013, while production volumes have continued to increase.	
	Implement sustainable measures to increase energy efficiency and reduce greenhouse gas emissions	End of 2020	We are moving forward with our EDISON program, implementing new projects to increase energy efficiency and reduce greenhouse gas emissions. In 2013 and 2014, we introduced two new guidelines on Group-wide energy management and refrigerants emissions. Several sites were certified according to ISO 50001, accompanied by the respective training activities.	
	Reduce the life science business' greenhouse gas emissions by 10% by 2015 (2006 baseline)	End of 2015	The life science business has reduced greenhouse gas emissions by 13% relative to the 2006 baseline.	

Legend:  Achieved  In progress  Not achieved  New goal

Waste management

Waste management is a key aspect of our corporate environmental protection activities. This includes measures to prevent, reduce, and properly dispose of waste, as well as recycle materials and energy. Our waste management activities also cover proper waste storage at our sites, which is also crucial to occupational health and safety.

When it comes to waste management, Merck KGaA, Darmstadt, Germany utilizes a Group-wide environmental management system that is certified to ISO 14001. In the course of the ISO 14001 certification process as well as internal EHS audits, our waste management system is examined at both headquarters as well as at the relevant sites.

EQ, the Group function in charge of environmental protection, bears overall responsibility for waste management (see [Environmental management on p. 106](#)). At sites outside of Germany, EHS managers are responsible for implementing measures and receive regular training from EQ. As part of the annual ISO 14001 audit of our environmental management system, EHS managers and site management are educated on waste prevention and recycling.

With our Group-wide "Waste Management" standard, we have implemented a uniform waste management framework for all our sites. This standard defines organizational structures and processes and is regularly updated. The type and quantity of waste is logged and documented at all sites and communicated to the EQ Group function.

Waste output in 2013 and 2014

The company produced more waste in 2014 than in the previous year, which rose from 161,000 metric tons in 2013 to 229,000 metric tons in 2014. Waste from construction and renovation projects accounted for the majority of the waste (2013: 24%; 2014: 47%), stemming

in particular from the remodeling of our Global headquarters in Darmstadt. We disposed of 108,000 metric tons of the total waste produced in 2014, and 121,000 metric tons were recycled/recovered (material recycling plus waste to energy).

For the most part, waste is externally recycled or disposed of (2013: approx. 85%; 2014: 91%). Being the one who generates the waste, Merck KGaA, Darmstadt, Germany is ultimately responsible for its final disposal. As such, service providers are chosen with extreme care. The terms and conditions for disposal are contractually stipulated, and service providers are required to prove that the waste is properly disposed of. We regularly audit these providers, especially if they are involved with handling hazardous waste.

We continuously work to optimize chemical processes in order to prevent, reduce and recycle waste. Among other measures, solvents are treated and recycled.

For instance, in the 2013-2014 period, we started recycling heptane, a chemical that accumulates during the purification of liquid crystals. In this process, heptane is utilized as a solvent to separate mixtures. We collect the heptane, have an external recycling company treat it, and then reuse the purified solvent in our processes. Our recycling rate is over 85%, which is enabling us to lower our heptane consumption by 1,900 metric tons per year and thus reduce our total waste. This is simultaneously leading to significant improvement in the carbon footprint of the process.

The life science business uses methanol for the production of filtration membranes. While the majority of the methanol is treated on site and then reused, the remainder cannot be reused in the process. Luckily, methanol constitutes an important raw material for municipal wastewater treatment, and the life science business' remaining reclaimed methanol is now being utilized by a local wastewater treatment plant. You can find more information on our website.

Goals: Waste management

Goal	Action	By?	Status in 2013 and 2014	Status
Reduce the life science business' waste output by 10% relative to the baseline 2006)	Introduce measures to minimize waste and recycle materials, solvents, and other waste byproducts.	End of 2015	Between 2006 and 2014, the life science business lowered its waste output by 15%. The life science business has identified and implemented opportunities to distill and reuse solvents in the manufacturing process. At the Bedford, Massachusetts (USA) facility, methanol that cannot be reused in the process after multiple distillations is used as a feed chemical for a local municipal wastewater treatment facility. In 2014, 145 metric tons of methanol were reused externally. Increases in production yields reduced the amount of products scrapped during manufacturing.	
	Perform waste audits to identify ways to reduce waste or increase recycling efficiency	End of 2015	In 2014, waste audits were performed on the life science business' facilities in Molsheim, France, and Kankakee, Illinois (USA).	

Legend:  Achieved  In progress  Not achieved  New goal

Resources

For our business activities, we require energy, water, and raw materials, along with numerous other materials, which we mostly utilize for production purposes. Given that these resources are becoming ever scarcer and more costly, we consider it important to utilize them efficiently. We strive to not only cut costs, but also to preserve the environment and conserve resources.

We have therefore implemented programs and processes throughout the company in order to continually make resource management and consumption more efficient. This is a core component of our operations and a prerequisite for maintaining our competitive edge.

Energy use

In 2014, we utilized 1,622 GWh of energy in total, particularly in production, which represents a slight increase compared to 2013 (1,566 GWh). Our energy management processes are described in detail under [Climate protection on p. 109](#).

Water consumption

In its production processes, Merck KGaA, Darmstadt, Germany uses water primarily for cooling, as process water, and for exhaust air purification. For the most part, we draw groundwater from our own wells and drinking water from the local water supply. In 2013, we utilized a total of 9.6 million cubic meters of freshwater, with 11.1 million cubic meters consumed in 2014. The water utilized in 2014 consisted of 57% groundwater from our own wells, 41% water from the public water supply, and 2% surface water. No sensitive water sources were impacted by our water intake.

In the 2013–2014 period, we used public databases such as the WRI Aqueduct Water Risk Atlas and the Water Risk Filter to determine which of our sites are located in areas of high water stress and consume more than 30,000 cubic meters of water per year. Three of our sites – located in Mexico, Spain and Pakistan – meet these criteria. Furthermore, at our facility in Savannah, Georgia (USA) we identified an increased risk to local water availability. Within the scope of their ISO 14001

environmental management systems, these four sites will be focusing on sustainable water management, setting for instance water targets.

Where expedient, we also plan to help sites in areas of moderate water stress implement more efficient water management systems as well. At the end of 2013, we therefore created a best practice sharing platform for water management projects, which we will be continuously expanding.

At Merck KGaA, Darmstadt, Germany, cooling water for production processes is utilized in both closed/open circuit systems and in once-through cooling systems; in some processes, production wastewater is treated and reused. We recycled a total of 16.6 million cubic meters of water in 2013, and 16.0 million cubic meters in 2014.

Material consumption

From the very start of the process development phase, we focus on making the processes efficient and minimizing the resulting waste. We furthermore ensure that the materials utilized pose as little danger to people and the environment as possible.

In particular, we use production materials such as chemical and pharmaceutical raw materials. In addition to these, we also employ operating supplies and packaging materials such as folding boxes, glass bottles and ampules.

The purchased materials that go directly into our pharmaceuticals and chemicals are generally quantified by weight. We utilized a total of 209 metric kilotons of these materials in 2013 and 176 metric kilotons in 2014. These figures do not include packaging materials and operating supplies such as energy or lubricants.

The portfolio of our life science business features numerous devices and tools whose production requires semi-finished and finished materials, such as fully assembled electronic components or device casing. We log these by the piece.

Water

At Merck KGaA, Darmstadt, Germany, water is used in production primarily for cooling, as process water, or for exhaust air purification. After being utilized, the water may contain eutrophication substances, heavy metals, or active pharmaceutical ingredients. The treatment of this wastewater, and thus the prevention of environmental pollution, is a fundamental part of our corporate environmental protection activities worldwide.

EQ, the Group function in charge of environmental protection, bears overall responsibility for water protection (see [Environmental management on p. 106](#)). At sites outside of Germany, local EHS managers are tasked with implementing measures and receive regular training from EQ.

Our Group standard "Water Protection" defines the processes and responsibilities required for clean wastewater in the company and also covers the hiring of third parties to handle it. This standard is derived from our obligations under the Responsible Care® initiative. It requires all sites to estimate and assess the specific risks and effects of wastewater using tools such as ecotoxicological data. The standard also requires risk assessments to take a site's wastewater treatment plants into account. Furthermore, each individual site must develop and implement a water pollution response plan that features measures to prevent wastewater or reduce its volume. The plan must also define the documentation process for wastewater volume, points of origin, and local limits. The standard provides strict guidelines for wastewater treatment via external service providers. For instance, the service provider agreement must stipulate the wastewater quality to be attained – if not already specified by law – as well as the responsibilities involved.

Environment, Health and Safety (EHS) audits are conducted to verify whether our "Water Protection" standard is being properly implemented. In the 2013-2014 period, 57 internal audits were conducted by the Environment, Health and Safety (EQ-E) unit, and 18 audits were performed by external ISO 14001 certifiers. These audits examine water-related aspects in proportion

to how relevant they are to the individual site – for instance, water is a bigger issue at production sites than at administrative locations.

In 2014, the company produced 10.1 million cubic meters of wastewater. At our Darmstadt site in Germany, the discharge of purified wastewater into the Darmbach (a stream in the Darmstadt area) accounted for over 5% of the average annual volume of this body of water, which is permissible by law. The discharge did not have any significant impact on the Darmbach, or the associated habitats. In the 2013–2014 period, we did not discharge significant amounts of purified wastewater into other bodies of water either.

Active pharmaceutical ingredients in the environment

Our standard "Water Protection" stipulates that the amount of active pharmaceutical ingredients (APIs) in our wastewater should be kept to a minimum. Appropriate measures are defined and implemented on a site-by-site basis. For instance, production and purification processes are being optimized at our sites in order to maximally reduce API concentrations in the wastewater.

All our pharmaceutical production sites have wastewater treatment plants. At these sites, we regularly take readings to assess the amount of APIs being discharged. For these assessments, we apply the predicted no effect concentration (PNEC) values. If the concentrations are below the PNEC, then the substance is not expected to adversely impact the environment. In the 2013–2014 period, we did not exceed these limits.

Goals: Water

Goal	Action	By?	Status in 2013 and 2014	Status
Reduce the life science business' water use by 10% relative to the 2006 baseline	Implement water reuse and reduction initiatives	End of 2015	Despite significant increases in production volumes, between 2006 and 2014, the life science business reduced water consumption by 2%. In 2014, we performed five water audits at the life science business facilities. Our Molsheim, France facility identified viable projects that will be investigated further in 2015.	

Legend:  Achieved  In progress  Not achieved  New goal

Biodiversity

Since the Convention on Biological Diversity (CBD) entered into force in 1993, the concept of biodiversity has included diversity within species, between species and of ecosystems. Opened for signature at the United Nations Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992, this treaty has the following three main goals: conservation of biological diversity, sustainable use of its components, and fair and equitable sharing of benefits arising from genetic resources.

The loss of biodiversity is one of the greatest challenges of our time. Ecosystems provide us with services and resources such as sufficient quantities of good-quality water that are absolutely essential to our business operations worldwide. We therefore consider it extremely important to protect biodiversity and have put numerous environmental protection measures in place, all of which work indirectly to safeguard biodiversity. For instance, we have implemented measures to assess and reduce pharmaceutical residues in wastewater.

Our production sites are located in established industrial and commercial zones; they are located neither inside of nor within 10 kilometers of IUCN Category I or Category II protected areas, which are set aside to safeguard biodiversity. Category I includes strict nature reserves and wilderness areas in which human visitation, use and impacts are strictly controlled and limited, while Category II includes national parks. In order to prevent substances that could negatively impact biodiversity from leaking into the environment, we design and operate our facilities according to strict Group-wide safety and environmental requirements. For instance, in our Group-wide standards we have defined measures for processing waste and production wastewater (see [Resources](#) on p. 114). We have furthermore implemented a Group-wide program called EDISON in order to reduce greenhouse gas emissions.

We improve the habitats for plants and animals at our sites, for instance by increasing the amount of unsealed surface area. This is, however, not always possible since we seal certain surfaces to protect them from any leakage that may occur. In 1995, we developed a green open space concept for our Darmstadt site, and around 30% of the premises have now been greened. The green areas are designed to improve the functionality of the production areas without degrading the ecological value of existing open areas. In 2008, we signed an agreement with the city of Darmstadt that established the framework to increase the role of nature conservation in the industrial use of our site, as well as better integrate the site into its urban surroundings. The stipulated planning guidelines require, for example, an increase in the percentage of native plants on the site.

When planning new sites and facilities, we consider environmental aspects such as aeration, land-use structures that contribute to a favorable microclimate, and energy-efficient construction concepts. For instance, we conducted a biodiversity study when planning the expansion of our site in Corsier-sur-Vevey, Switzerland. To protect the bordering alpine meadows, we developed a landscape plan in which the meadows are tended to by a local farmer.

When we acquire new sites, we investigate their environmental situation, taking into consideration information from public sources such as neighbors and non-governmental organizations (NGOs). We assume responsibility for pollution we have caused and investigate our sites before selling them.