



Marabu

MARABU ENVIRONMENTAL REPORT

WORKING TOWARDS GREATER
SUSTAINABILITY WORLDWIDE

Marabu Group, March 2017

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Removable insert

Timeline of green milestones

KPIs

Input-/Output Tamm and Bietigheim-Bissingen



Marabu has been manufacturing high-quality inks in Germany for over 150 years.

Our success is rooted in our long-term, sustainable approach to business, and in our global competitiveness.

Across all divisions, Marabu offers premium-quality, user-friendly products. We are the number-one manufacturer of printing inks for specialist printing processes, and of paints and inks for arts and crafts.



MARABU PRODUCTS



Screen printing inks



Pad printing inks



Digital printing inks



Liquid coatings



Paints for arts and crafts



TAKING RESPONSIBILITY FOR FUTURE GENERATIONS

Protecting the environment has been a priority for Marabu since its foundation in 1859. However, over time the issues have changed. In the 1990s, waste management and recycling, air pollution concentrations, and ground contamination were major topics. Today, our main focus is improving energy and resource efficiency.

As a manufacturer of inks and paints, Marabu is a chemicals company. The way we apply raw materials while safeguarding users and the natural environment – particularly soil, air and water – is an ever-present concern. We are committed to offering products of the highest quality – while minimising the use of substances that pose health risks.

The future will see a greener economy. This means transitioning to sustainable manufacturing and consumption to conserve the natural resources that we depend on.

“Cry over the world’s lack of sustainability, and you cry alone. Celebrate effective sustainability solutions, and the world celebrates with you.”

Prof Stefan Schaltegger

Marabu’s international subsidiaries uphold the enterprise’s commitment to environmental protection. No matter where they are located, they are bound by the same principles of our corporate philosophy – enshrined in our environmental policy, which mandates efforts to reduce emissions and waste across the entire Marabu group.



OUR ENVIRONMENTAL POLICY – GUIDING PRINCIPLES

Our overriding goal is to protect the natural world and conserve its essential resources – air, water and soil. Minimising the environmental impact of our production activities is an ongoing task that constantly presents us with new challenges.

1. Responsibility

Safeguarding human life and the environment is integral to all our business processes. We oblige all our employees to comply fully with all relevant duties and policies.

2. Products

We develop state-of-the-art products with low emissions across their entire lifecycle.

3. Use of hazardous materials

We choose all our raw materials with the greatest care. Where technically feasible, we avoid the use of hazardous substances that require special safety precautions. Wherever possible, we employ less harmful substitutes that pose much lower risks.

4. Resource efficiency

Responsible consumption of raw materials and energy-efficient production processes help conserve primary natural resources while improving the cost-efficiency of our business. We prioritise the use of renewable energy and wood from sustainably managed forests.

5. Assessment and improvement

We continuously assess our environmental management practices and the outcomes, both in terms of risks and quantifiable key performance indicators. This enables us to identify potential improvements and take corresponding action.

6. Investment

Ongoing investment in state-of-the-art plant and equipment supports efficiency in the development, manufacture and use of our products.

7. Communications and transparency

We engage in open dialogue, both internally and externally. The knowledge and experience of all employees play a key role in achieving continuous improvement. We take account of the requirements of stakeholder groups and respond transparently. Our commitment to health and safety, and to the environment, is also reflected by our participation in chemical industry associations.

CERTIFICATION

Marabu fulfils a diverse range of legal requirements and has implemented further, voluntary measures in almost all areas of its business. Against this background, our primary production plant in Tamm, Germany, has been certified to EN ISO 14001 since 2003. In light of our commitment to continuously improving our environmental performance, we regularly review our business operations. Statutory requirements and voluntary policies related to environmental issues are included in our process descriptions and integral to our everyday activities and practices.

Our quality and environmental protection policies have been mandated for our international subsidiaries' core processes since 2012.

Our binding QES Requirements Guide, applicable worldwide, plus eight regional management handbooks in our subsidiaries' national languages, are accessible to all employees online. This guarantees excellent quality and state-of-the-art environmental performance worldwide.



Marabu was founded in 1859 and has been an independent company ever since. It is overseen by a CEO and a managing partner, assisted by an advisory committee.

Efficient communications channels and decision-making ensure Marabu is responsive to market requirements – keeping pace with changing imperatives with innovative products and outstanding services.

THE MARABU MANAGEMENT SYSTEM



Applicable worldwide



Documented in the online handbook in multiple languages



Certified by independent test and inspection agency TÜV Süd



Marabu Executive Committee

Defines company policies and goals that are applicable worldwide
Central management review, compliance guide

Defines requirements



Documents compliance



Quality, environment and safety (QES) team

Monitoring of global management system

Authorised to issue instructions to subsidiaries

Manages Marabu Group's annual internal audits and ensures continuous improvement

Monitors

Manages



Reports

Documents compliance

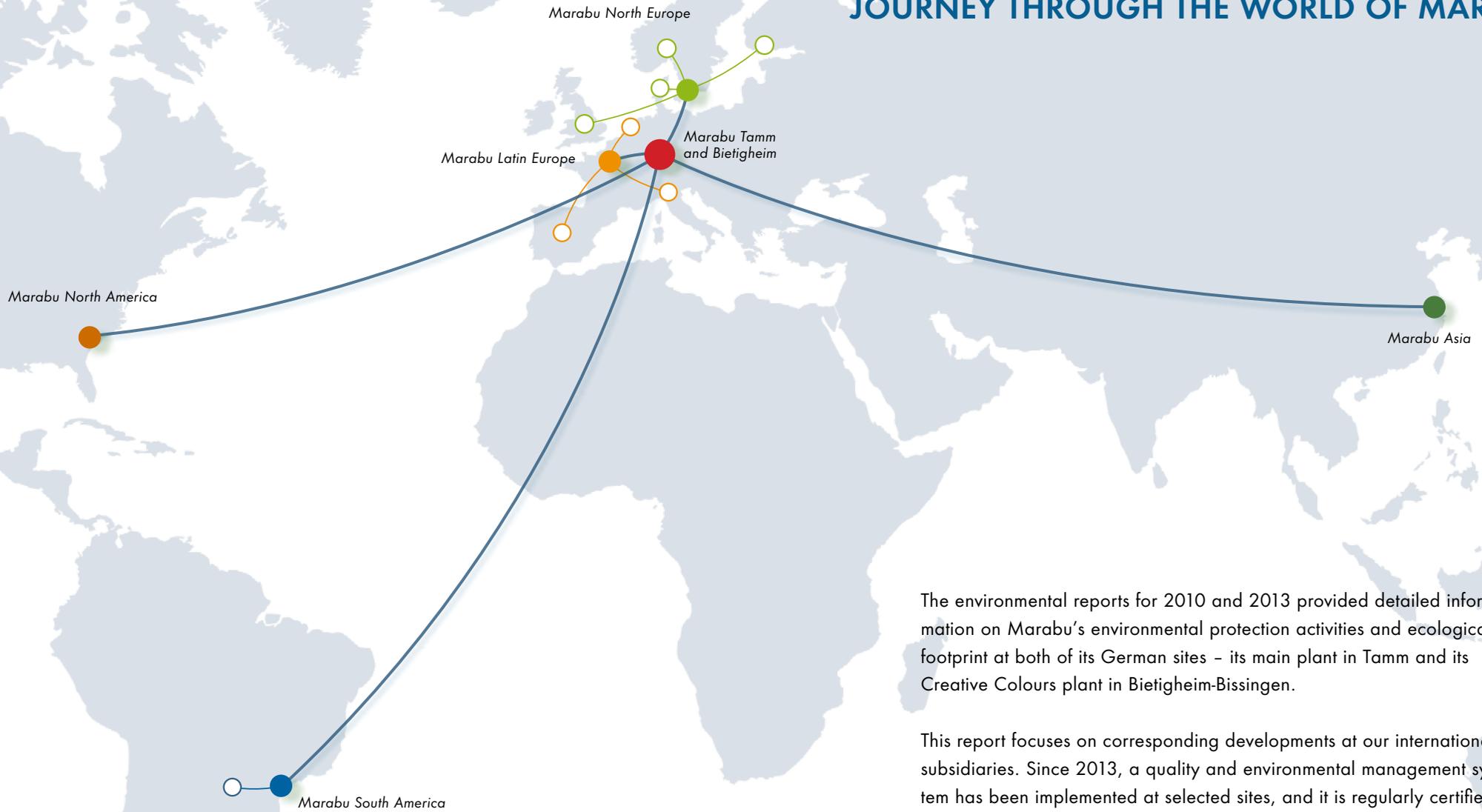


Marabu subsidiaries and plants

Localisation and documentation, performance of internal audits
Communication with the QES team

Join us on a ...

JOURNEY THROUGH THE WORLD OF MARABU



The environmental reports for 2010 and 2013 provided detailed information on Marabu's environmental protection activities and ecological footprint at both of its German sites - its main plant in Tamm and its Creative Colours plant in Bietigheim-Bissingen.

This report focuses on corresponding developments at our international subsidiaries. Since 2013, a quality and environmental management system has been implemented at selected sites, and it is regularly certified and monitored by TÜV. This guarantees maximum quality and first-class services across the group, and minimises our environmental impact.

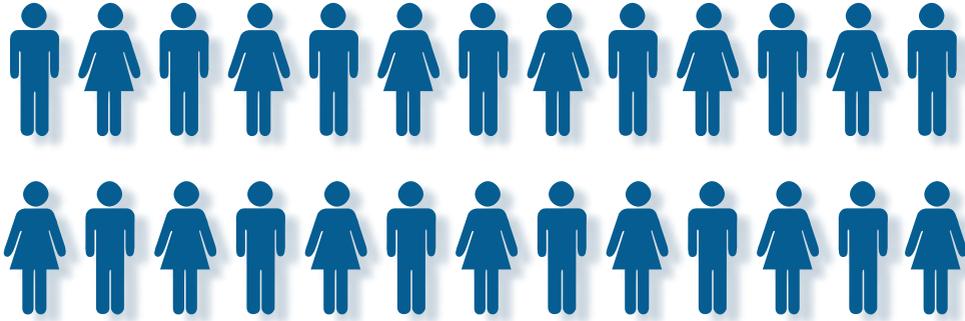
TAMM, GERMANY



MARABU TAMM

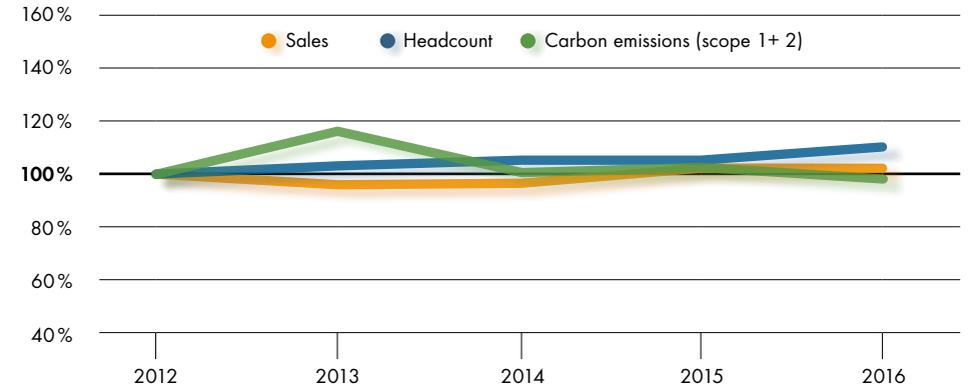
Marabu GmbH & Co. KG,
Ink production plant and group headquarters

Total headcount



262 employees

Development of key metrics in per cent



Activities at Tamm site



Research and development



Manufacturing: printing inks



Logistics



Administration



Product management



Marketing



Sales



Customer-specific formulations



Customer service and support

Certifications



ISO 9001

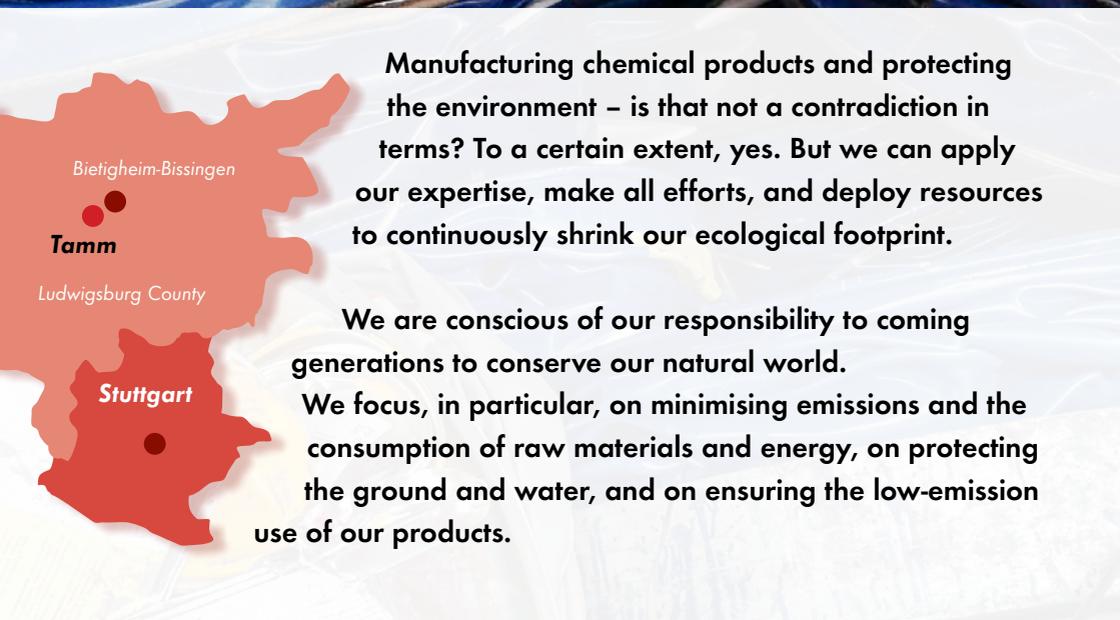


ISO 14001



OHSAS 18001

A FOCUS ON ECOLOGY



Bietigheim-Bissingen
Tamm
Ludwigsburg County
Stuttgart

Manufacturing chemical products and protecting the environment – is that not a contradiction in terms? To a certain extent, yes. But we can apply our expertise, make all efforts, and deploy resources to continuously shrink our ecological footprint.

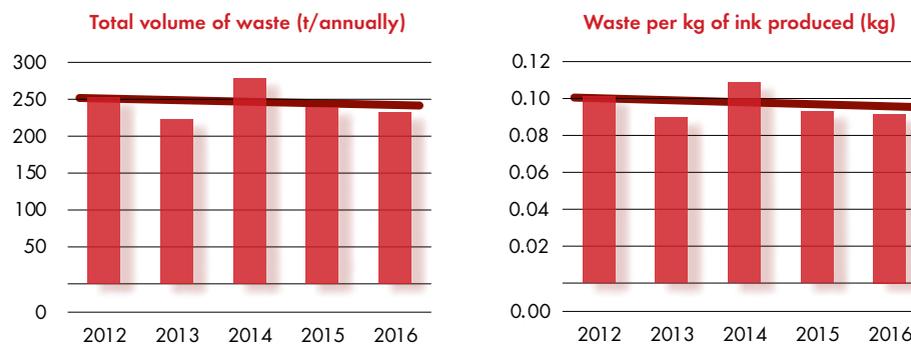
We are conscious of our responsibility to coming generations to conserve our natural world.

We focus, in particular, on minimising emissions and the consumption of raw materials and energy, on protecting the ground and water, and on ensuring the low-emission use of our products.

Bottom left: The main office building uses water heated by solar thermal collectors, and electricity generated by photovoltaic panels.

Waste management with ever better results

Marabu implemented effective waste management processes at a very early stage. For the outset, there has been a clear focus on avoidance, and on segregating waste for recycling – leaving just a small amount of general household waste. Solvents are distilled and re-used in-house. Further measures were implemented to monitor and reduce waste ink and raw materials. The graphic depicting the amount of waste (including wood, scrap metal, and plastic) generated per kilogramme of ink output underlines the long-term success of the strategy: there has been a decline in volume over the last ten years from 0.15 kg waste/kg ink to 0.09 kg waste/kg ink in 2016.



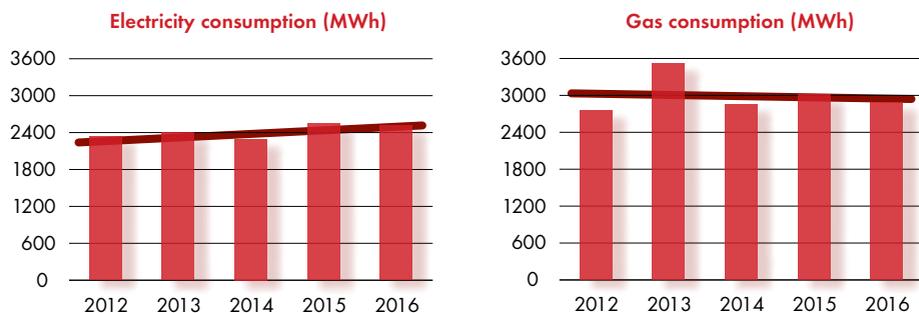
Less (paper) is more (forest)

Almost one in five trees that are industrially logged is used to manufacture paper – and demand continues to rise. An aggregate area of land equivalent to one and half times the size of Austria* is deforested annually. Lower paper consumption is therefore vital to the conservation of global woodland. At our sites in Tamm and Bietigheim-Bissingen, combined annual paper usage fell by 17 per cent, from 1.8 million sheets to 1.5 million. Unnecessary printouts are avoided, and documents instead stored in electronic form. Where printouts are unavoidable, preference is given to duplex (double-sided) printing. The paper consumed is FSC-certified, and 80 per cent is from recycled stock.

* Source: WWF

Energy and carbon emissions – scope 1 and 2

In addition to efforts to reduce material input and improve the efficient use of raw materials, a key priority is to curtail energy consumption. Over the last five years, specific electricity demand was between 0.89 kWh/kg and 0.99 kWh/kg ink output. This value has remained fairly constant despite the need to install additional electrically powered laboratory cooling systems – and an increase in power demand in production due to the manufacture of custom inks in multiple small batches. Gas consumption is a direct function of the number of days the heating is activated per calendar year, and was therefore correspondingly higher in Tamm in 2013, when it was needed on 264 days, compared with 2016 with just 248 chilly days.

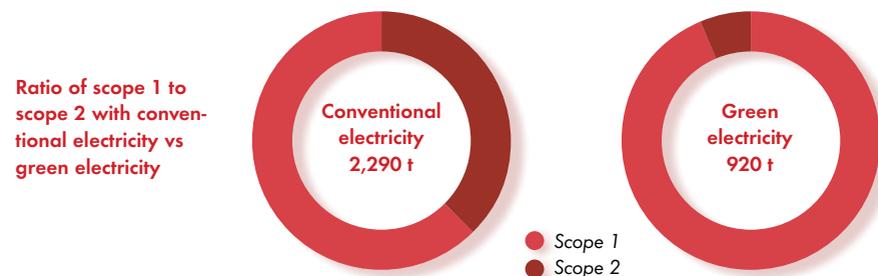


Marabu intends to construct an extension for the laboratories and the production department, beginning in 2018. This will open up a unique opportunity for a step-change in energy efficiency for both buildings and equipment. Plans exist to install new systems for heating, cooling and compressed air supply, and for ventilation of production areas.

An energy monitoring system is to be established in 2017. This will be connected to a software system that optimises energy consumption, for example by deactivating certain systems during peak load.

Since 2007, all electricity has been sourced from eco-friendly hydropower, greatly reducing our carbon footprint. All CO₂ emissions are reported in terms of scope 1 and scope 2 values.

Scope 1 measures all direct emissions, for example from the gas-fired heating system, and from company vehicles. Scope 2 comprises indirect emissions, such as those released by third-party generation of electricity consumed by Marabu. As a result of the switch to green electricity from hydropower, our scope 2 value has plummeted by 96 per cent.



Cutting all gaseous emissions

Each metric ton of carbon that is not released into the atmosphere is a minor but significant step towards combatting the greenhouse effect, and to abating climate change. In addition to the advances that will be made by the extension building project and the energy monitoring system, Marabu employees themselves are making a small but important contribution to cutting carbon emissions. Every year, a number of staff members sign up for a cycle-to-work campaign. Together, they pedalled almost 4,000 km during their daily commute in 2015, saving 750 kg of CO₂.

Waste process air with entrained solvents is "scrubbed" in a heat treatment system



State-of-the-art, encapsulated three-roll mill technology means lower noise and solvent emissions

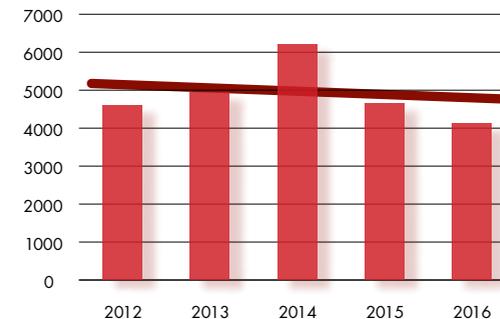


Carbon emissions contribute directly to the anthropogenic greenhouse effect. The impact of volatile organic compounds (VOCs) is, by contrast, indirect in nature. VOCs emitted from production areas and laboratories are extracted via a central waste air system and almost completely destroyed by being heated to approximately 600° C. The waste heat from this "scrubbing" process is recovered for use in the in-house distillation system.

Fall in water consumption

Water consumption makes no significant contribution to Marabu's ecological footprint in Tamm. It is not employed in production processes, except for cooling. As a result, the composition of waste water is comparable to that from private households, and can be disposed of via the public sewage system. Moreover, it is notable that consumption fell sharply from 6200 m³ in 2014 to 4121 m³ in 2016, a decline of 34 per cent. A pleasant side-effect has been a drop in water supply charges, which (in Germany) are the second highest in Europe after Denmark.

Water consumption (m³ /year)



Measuring environmental performance – the Marabu eco-grid

To provide an at-a-glance overview of Marabu's ecological performance, six core metrics are combined to calculate the Marabu Green Development Index (MGDI). The weighting of the individual parameters is based on a predefined points system. The index is designed to highlight the development of key ecological factors over recent years. The average for the previous five years is employed to highlight performance in the current year.

Explanation of the underlying parameters:

Official and public recognition: This is based on ISO and OHSAS certification, and other ecological awards and standards. This metric also takes account of any complaints or objections from government agencies or private citizens, where relevant.

Product carbon footprint (PCF): This comprises total CO₂ emissions generated by the manufacture of our products at all sites.

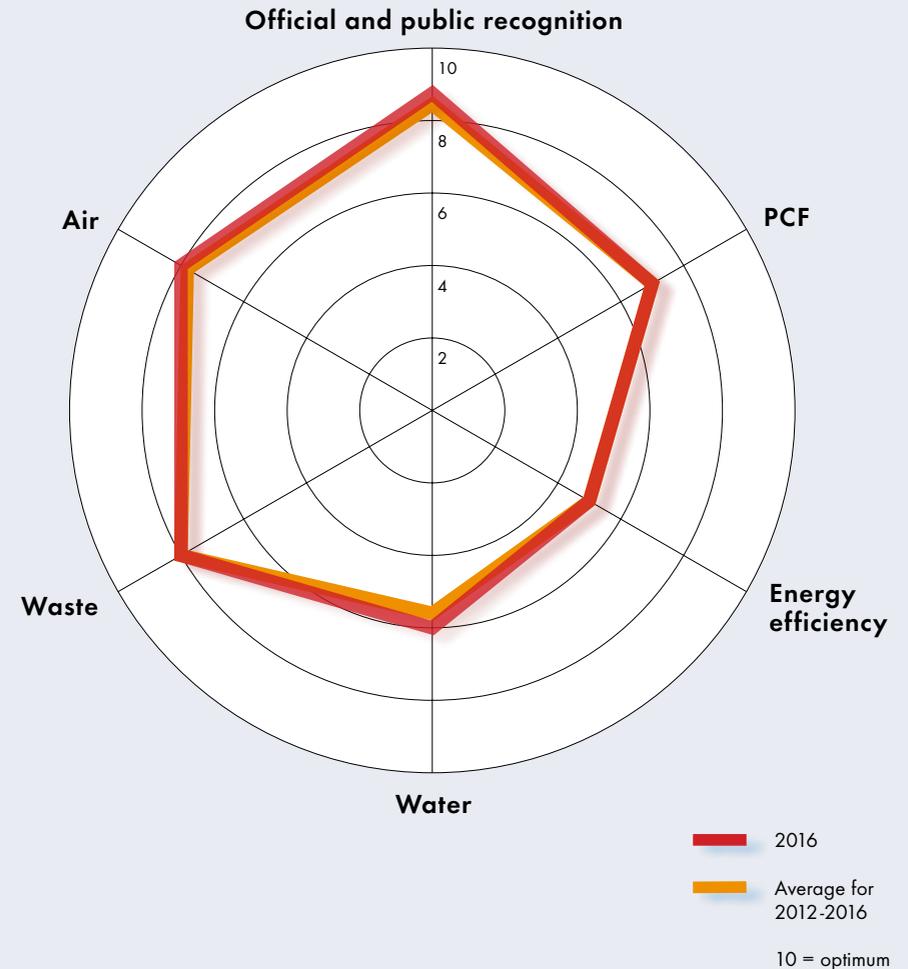
The carbon footprint begins with the base value for 2005, with the annual change given in per cent.

Energy efficiency: This reflects electricity and gas consumption for each kg of ink output.

Water: The volume of fresh water used for each kg of ink output.

Waste: The total volume of waste is compared with the total volume of ink output. A distinction is not made between waste destined for recycling and waste for disposal, or between hazardous and non-hazardous waste.

Air: This is based on the measurements of waste air mandated by the regulatory authorities. The emission values are multiplied by hours of operation and the air flow rate.



BIETIGHEIM-BISSINGEN GERMANY

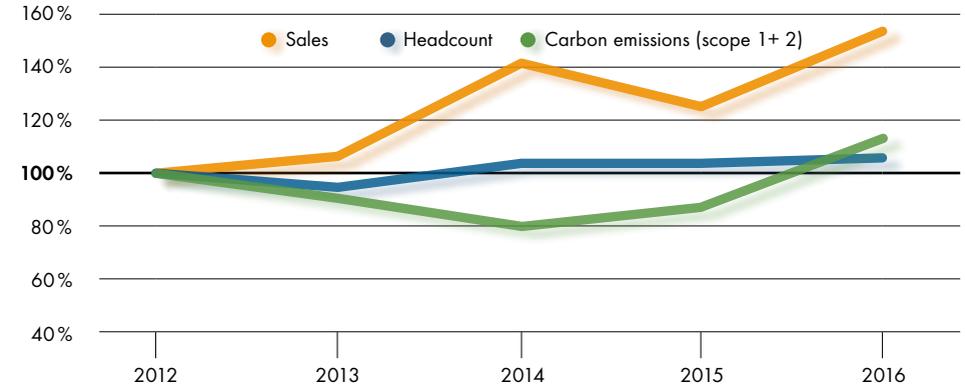


Total headcount



87 employees

Development of key metrics in per cent



Activities at Bietigheim-Bissingen site



Research and development



Manufacturing: printing inks



Logistics



Product management



Marketing



Sales



Customer service and support

Certifications



ISO 9001



ISO 14001



FSC 2013



OHSAS 18001

CREATIVE COLOURS, A CREATIVE BUSINESS



Our Creative Colours (arts and crafts paints) are almost entirely water-based, and are non-hazardous according to the EU CLP Regulation (classification, labelling and packaging of substances and mixtures).



Natural night-time cooling during the summer months and the recovery of waste heat from the air compressors for heating during the winter minimise the building's energy requirements. In addition, excellent thermal insulation and smart building control technology ensure low carbon emissions relative to total floor space.



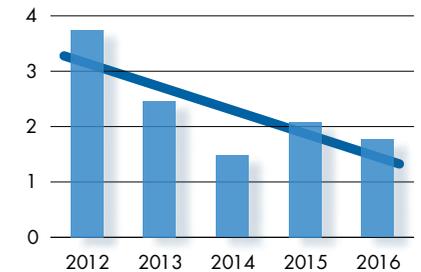
New, energy-efficient factory buildings

A state-of-the-art industrial building was constructed for Marabu Creative Colours in 2004, just two kilometres linear distance from the main company headquarters. The new facility has been designed to ensure the efficient organisation and coordination of all operational activities – from goods receipt, to production, to storage, to shipment.

To minimise the environmental impact of the structure, plants are cultivated on large areas of the roof. This "green roof" retains moisture, and during warmer weather helps cool ambient air through evaporation. As a result, only certain critical areas, such as the laboratories, require additional powered cooling.

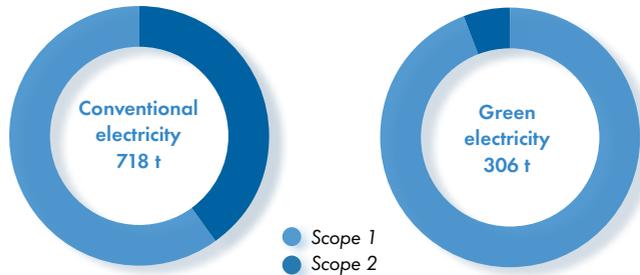
In 2014, when the building was only a decade old, Marabu installed highly advanced lighting systems. 60 power-hungry 400-W mercury vapour lights and a further 72 160-W lamps were replaced by energy-efficient 45-W tube lights. This investment, and other steps, such as the management of lighting via the central building control system, has lowered specific energy demand by 28 per cent from 2.45 kWh/kg paint in 2013 to 1.77 kWh/kg paint in 2016.

Energy consumption kWh/kg of paint output



The use of green electricity has helped minimise carbon emissions in Bietigheim. In, 2016 just 306 metric tons of CO₂ were released, compared with 718 metric tons that would have been generated by conventional power sources.

Ratio of scope 1 to scope 2 with conventional electricity vs green electricity



Marabu Creative Colours has extended its product portfolio, necessitating the construction of a new warehouse, commissioned in early 2017. The warehouse's thermal insulation far exceeds the requirements of the EU directive on the energy performance of buildings (and the corresponding German legislation: EnEV). In fact, primary energy demand is calculated to be 110 kWh/m², and therefore much lower than the mandated figure of 162 kWh/m².

In comparison to conventional structures of this type, this means an annual reduction in carbon emissions of 36.7 metric tons of CO₂. Energy-saving LED tube lighting has been installed, and warmth is provided by highly efficient gas-fired infrared radiant heaters. Moreover, the new warehouse has increased the total amount of space available in Bietigheim-Bissingen, enabling the company to close remote storage facilities that had previously entailed time- and energy-intensive transportation of goods between sites.

Top right: Primary energy demand for the new storage building is far below the requirements of the applicable European directive and German legislation

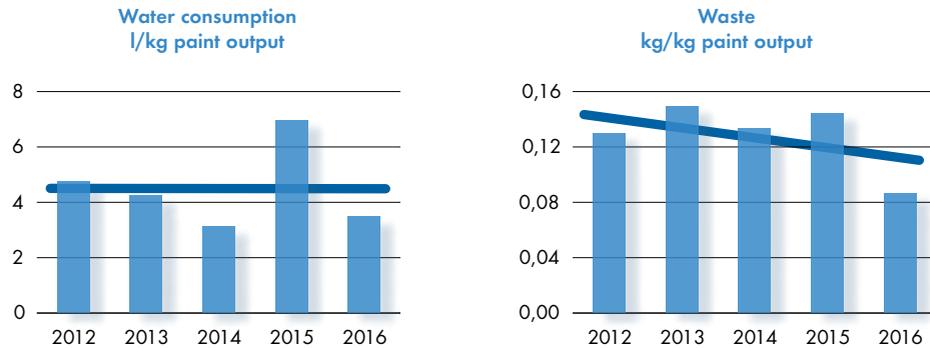
Bottom right: The atrium and glass facades in the building interior ensures plenty of natural light in the production areas and break rooms



The pond provides a habitat for koi and goldfish, and is popular place for staff and guests to relax.

Clean water and no hazardous waste

In contrast to the factory in Tamm, where binders are based on artificial resins containing solvents or UV-curable acrylate oligomers, the Bietigheim facility makes paints with aqueous emulsions. Water is also employed to clean metal containers used in production. Waste water from this process is purified in a dedicated in-house treatment plant, making it suitable for disposal via the public sewerage system. The quality of the treated water is far better than statutory thresholds. Specific water demand per kg of paint output has fallen continuously from 5.19 l/kg paint in 2009 to 3.47 l/kg in 2016.



Waste reduction is a key aspect of responsible business practices in terms of both cost and the environment – after all, waste is ultimately lost profit. A particular focus is in-house manufactured and externally sourced end-products – which we have been able to keep to an absolute minimum by carefully identifying the exact inventories required.

Nevertheless, the amount of annual waste remains linked to production output. However, we succeeded in lowering the specific volume of waste from 0.13 kg/kg paint output in 2013 to 0.08 kg/kg paint output in 2016.



Decorations and accessories from FSC-certified wood

Our eco-friendly portfolio also includes items externally sourced – where we apply the same high standards of sustainability as with our own products. Since 2013, all wooden accessories, such as brushes, picture frames, Christmas tree decorations, 3D jigsaw puzzles, and articulated mannequins have been made exclusively using wood from FSC-certified forests and dealers. The Forest Stewardship Council (FSC) was established to promote ecologically sound, socially responsible and economically viable forestry around the globe. Marabu has been included in the worldwide database of FSC-certified companies since 2013.

Since 2015, the product offering has included both mini and jumbo colouring pencils from FSC-certified wood. Marabu believes the creative enjoyment of painting and drawing can, and should, be combined with the conservation of natural woodland.



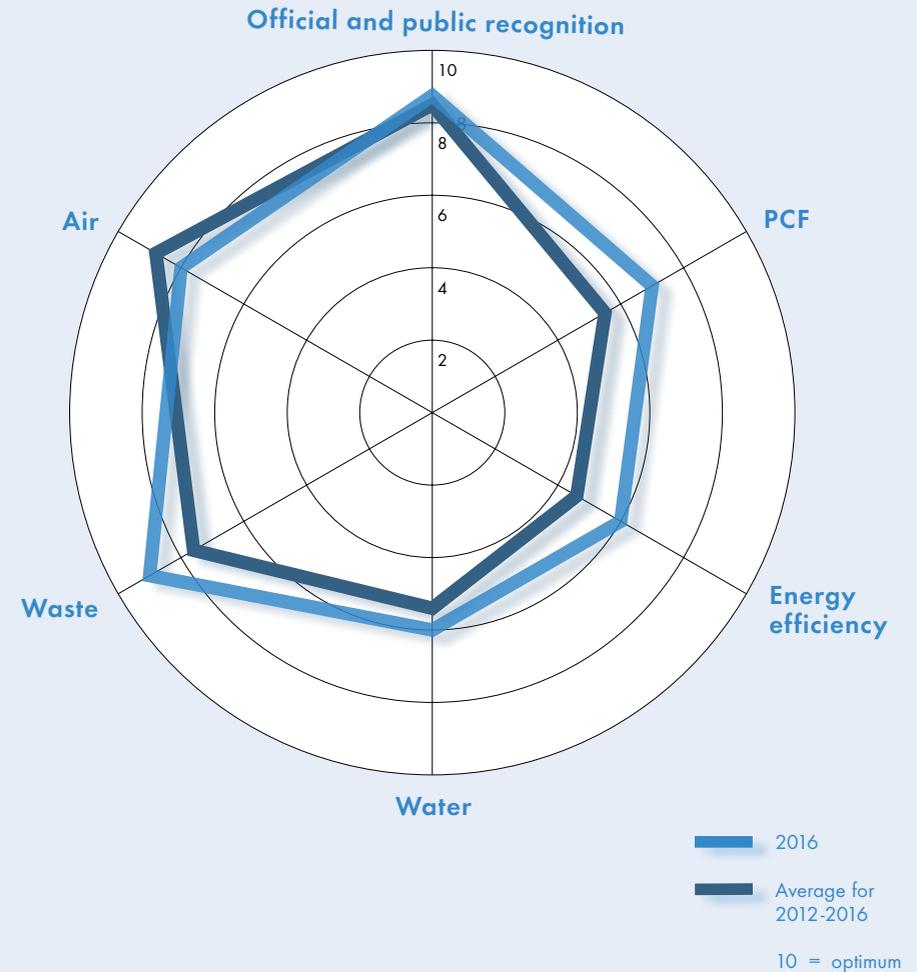
Marabu purchases materials from eco-friendly sources – all wood is from FSC-certified forests...



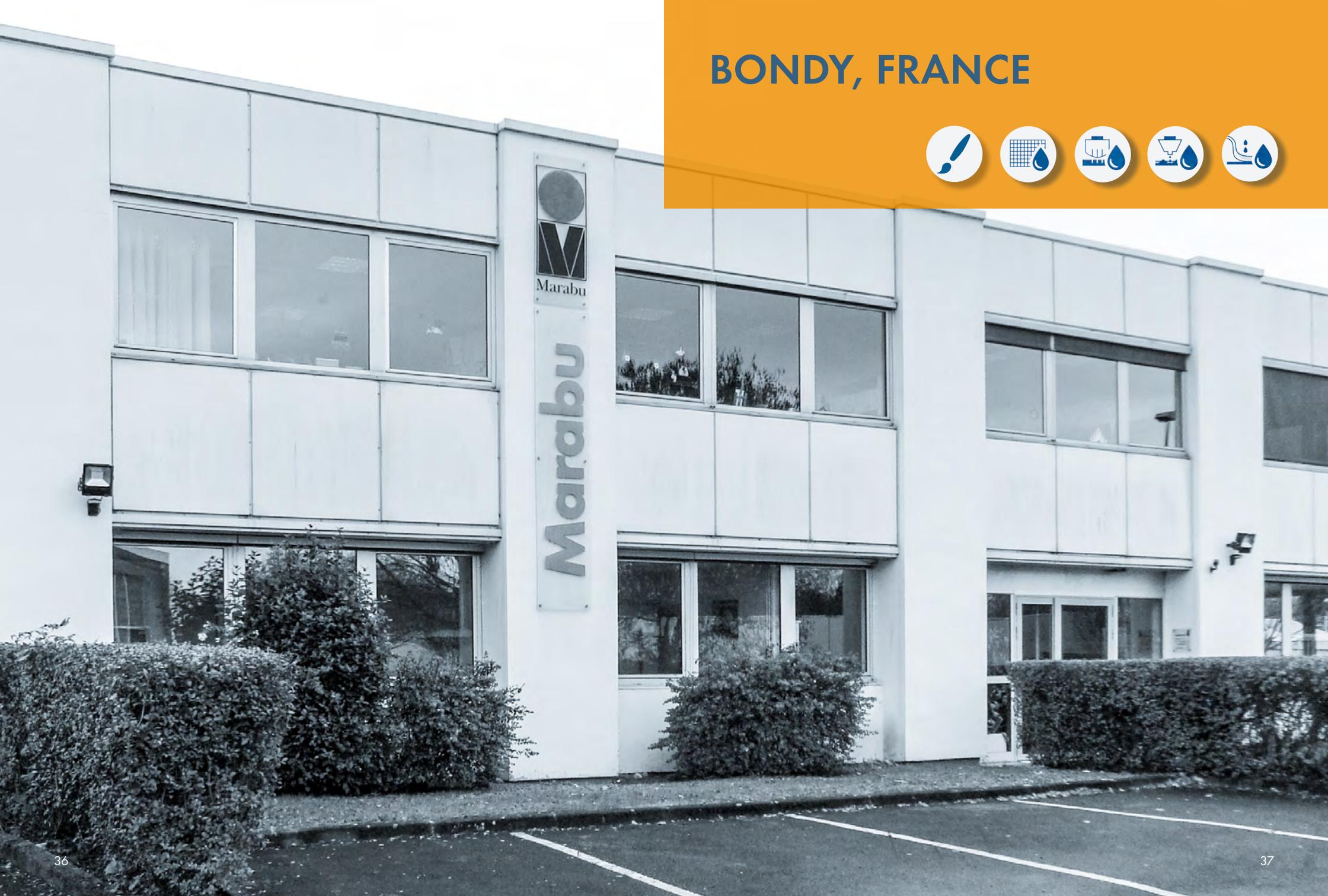
... allowing customers to enjoy arts and crafts with a clear conscience

The Marabu eco-grid

We have also compared ecological performance for our Bietigheim-Bissingen site in 2016 with the average for the previous five years. The parameters are explained in the corresponding eco-grid section for Tamm.



BONDY, FRANCE



Locations

Marabu France:
Bondy Cedex, (headquarters)
Lyon, Le Mans

Marabu España: Granollers
Marabu Italia: Mailand, Italy

Total headcount



62 employees

Activities at Bondy site



Logistics



Administration



Sales



Customer-specific
formulations

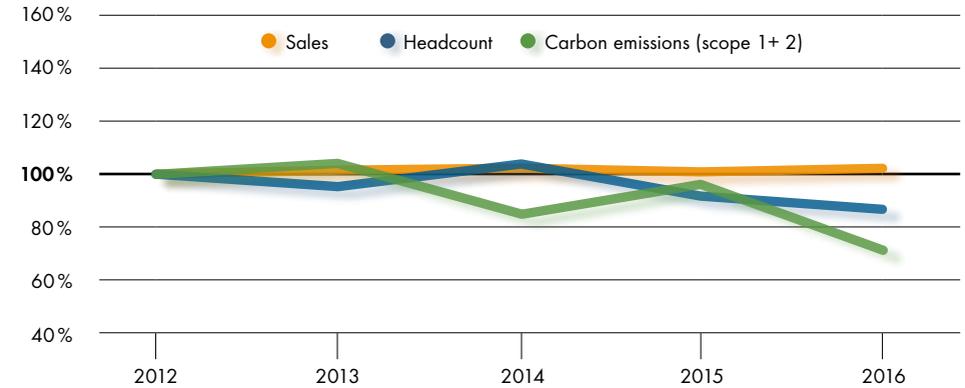


Screen stretching
stencil/film manufacture



Customer service
and support

Development of key metrics in per cent



Certification



ISO 9001

MARABU FRANCE – THE LARGEST AND OLDEST INTERNATIONAL SUBSIDIARY

Marabu France was established in 1970, and is the oldest and largest international subsidiary. Since 1988, it has been headquartered in Bondy, a suburb north-east of Paris. In 2008, Marabu France and Marabu Benelux merged to create Marabu West. The subsidiary sells printing inks and arts and crafts paints, and also offers a screen stretching service at its sites in Le Mans and Lyon, representing the broadest portfolio of any non-German subsidiary.



The acquisition of Sefar Leguay in 2010 has enabled the company to provide a first-class stretching service with a variety of screen mesh fabrics and the exceptionally high-quality manufacture of stencils. The portfolio also includes comprehensive customer support, and in-house customer training courses.

Waste reduction through recycling

Marabu France has undertaken a number of major projects in recent years in order to be equipped for future challenges. The introduction of a quality management system to ISO 9001 in 2013 for all French sites helped streamline key processes, such as the labelling of custom inks, the production of safety data sheets for locally developed formulations and the shipment of hazardous goods. There is currently no official environmental management system for Marabu France's operations, but plans exist to implement one in the mid-term. Nevertheless, the subsidiary has already taken steps to conserve resources and energy, and to minimise the impact of employee and on-site vehicle usage.

The laboratory for customer-specific formulations in Bondy – where workstations are equipped with an air extraction system



In Bondy, materials are stored according to the first-in-first-out principle

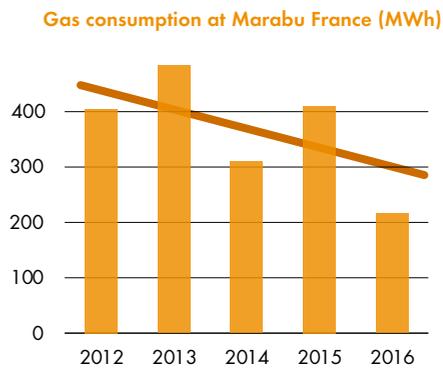
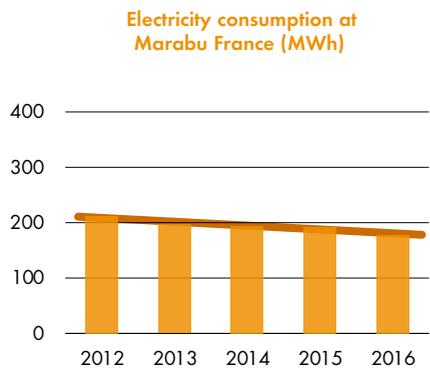


La Grande Nation began segregating its refuse by type for recycling considerably later than Germany. But today, the country has defined highly ambitious goals for waste reduction. The government now takes the issue very seriously, reflected, for example, by an act passed in 2016 to prevent food wastage. The legislation requires supermarkets with 400 m² or more of floor space to sell off edible foodstuffs at discounted prices, and to sign corresponding supply agreements with charitable organisations.

Marabu France has embraced this rejection of the throw-away mentality, and acts accordingly. In Bondy, empty tins are compacted, and sent to be recycled. Cardboard boxes are reused on multiple occasions, reducing the volume of waste. And Le Mans has set an example in terms of paring back the volume of used plastic: a company has been identified that collects and reclaims the plastic mesh removed from returned screens.

A new location in Lyon

To operate multiple sites is typically cost- and work-intensive. To streamline operations and to improve cost efficiency, Marabu France closed its screen stretching service in Colmar and its previous location in Lyon.



New hall for screen stretching in Lyon.

January 2015 marked the opening of a new and larger location in Lyon with 1400 m² of floor space. This enabled activities to be consolidated at single site. This did not have any meaningful impact on electricity consumption, but almost halved gas usage.

In Le Mans, by contrast, significant improvements were achieved with regard to electrical power usage. Electric heating was replaced by a much eco-friendlier and less expensive gas heating system. This led to a fall in electricity consumption of more than 50 per cent over the last four years, which has had a tangible positive impact on aggregate demand for all French sites.

Marabu France also has major plans for the future. In 2017, lighting is to be gradually transitioned to LED technology. And in the coming years company cars are to be replaced by hybrid vehicles. Moreover, an agreement is being sought with the owners of the property in Le Mans with the aim of insulating the building to lower heating costs.

MALMÖ, SWEDEN



Locations

Marabu Scandinavia: Malmö (Sweden, headquarters), Vejle (Denmark), Vantaa (Finland), Oslo (Norway)

Marabu (UK): Milton Keynes
Marabu Nederland: Almere

Total headcount



55 employees

Activities at Malmö site



Logistics



Administration



Marketing



Sales



Customer-specific formulations

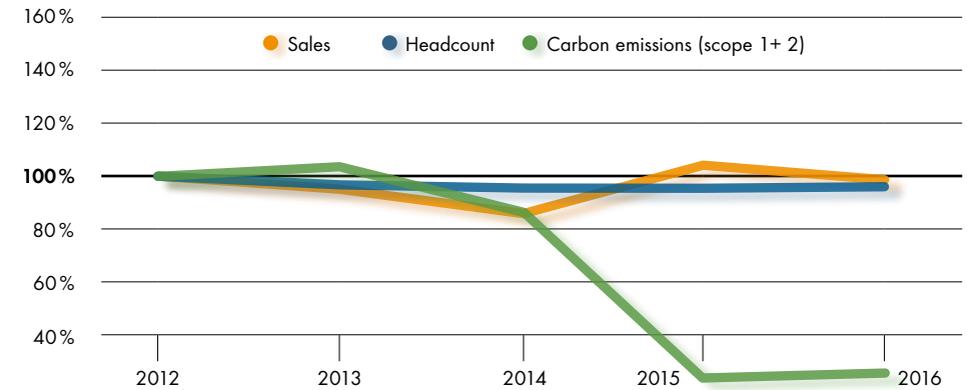


Screen stretching stencil/film manufacture



Customer service and support

Development of key metrics in per cent



Certifications



ISO 9001



ISO 14001



MALMÖ – STEADY GROWTH IN NORTHERN CLIMES

Since its foundation in 1979, Marabu's Swedish subsidiary, based in Malmö, has enjoyed continuous business growth. Since 1990, Marabu has also established sales offices in Göteborg (Sweden), Vejle (Denmark) and Helsinki (Finland), enabling it to better support the extensive Nordic market.

Its success is largely attributable to a commitment to customer centricity, with a comprehensive range of services, built on proven skills in digital, screen, pad and UV flexo printing. Customers look for quality products, expert advice, and reliability within the scope of a genuine long-term partnership. With this in mind, Marabu has established locations and storage facilities throughout Scandinavia – guaranteeing rapid delivery and highly responsive service and support.

Efficient and state-of-the-art architecture

In 2008, Marabu Scandinavia moved into a new building in Malmö. There is much to admire about Swedish architecture, and this is reflected in an excellent ground plan and the elegant simplicity of office layouts and interiors. Workstations are intelligently designed and equipped, ensuring a safe and healthy environment.



Attention has been paid to attractive office interiors, largely based on light-coloured wood. A further priority has been ergonomics: all desks are height-adjustable, and there is a quiet zone, complete with a massage chair. Both desks and massage chair have proven popular with guests.

The building was, from the outset, designed to be highly eco-friendly. It is equipped with sensors that detect when a room is unoccupied, automatically switching off the lighting. At the end of the business day, a smart control system deactivates all unnecessary sources of illumination.

Since 2015, all electricity at the Malmö site has come from renewables – wind, hydro or solar. The switch to 100 per cent green power has slashed total carbon emissions (scope 1 and 2) from 120 metric tons annually in 2014 to 33 metric tons in 2016 – a drop of 73 per cent.

There is a state-of-the-art recycling point within the building – where all reclaimable materials and products, such as batteries, paper, plastics, glass and aluminium, are collected and segregated by type. As a result, only 6.45 metric tons (2016) of waste remains to be disposed of. The volume of hazardous waste is also very low, weighing in at 1.25 metric tons.



End-to-end product safety protects users and the environment

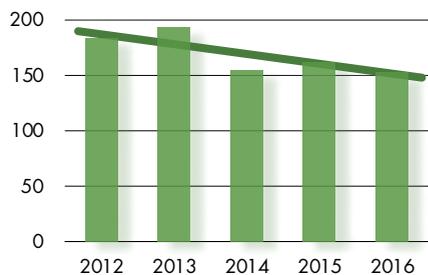
Marabu Scandinavia works with a variety of suppliers, making it essential that all provide safety data sheets and labelling in line with the European CLP standard (classification, labelling and packaging substances and mixtures). Marabu customers automatically receive all relevant safety data sheets, including any updates. Any product shipped from our storage facilities is labelled with the correct safety information in the appropriate language.

The best kind of waste is none at all

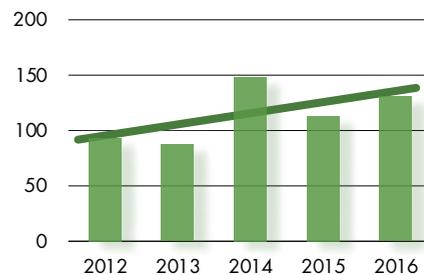
A major focus of Marabu’s annual environmental programme is to reduce the volume of waste. Duplex printing, for example, has enabled paper consumption to be halved. A further key priority is to lower the amount of hazardous waste generated. Picking stored items using the first-in-first-out (FIFO) principle helps ensure that ink stocks do not exceed their expiry date. Inventories are carefully monitored, and aligned with the quantities supplied to customers to keep volumes in storage to a minimum.

Marabu’s efforts to curb carbon emissions extend to the exhaust gases produced by company cars. Any new company car must be more fuel-efficient than the model it replaces. All employees are instructed on eco-friendly driving styles in order to lower consumption and exhaust emissions.

Electricity consumption at Marabu North Europe (MWh)



Gas consumption at Marabu North Europe (MWh)



SÃO BERNARDO DO CAMPO, BRAZIL



Locations

Marabu do Brazil: São Bernardo do Campo (headquarters)

Marabu Paraguay: Ciudad del Este

Total headcount



24 employees

Activities at São Bernardo do Campo site



Logistics



Administration



Sales

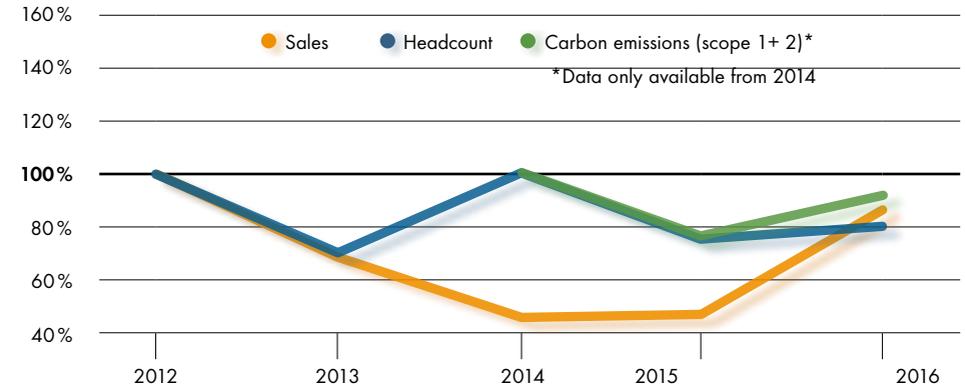


Customer-specific formulations



Customer service and support

Development of key metrics in per cent



Certifications



ISO 9001

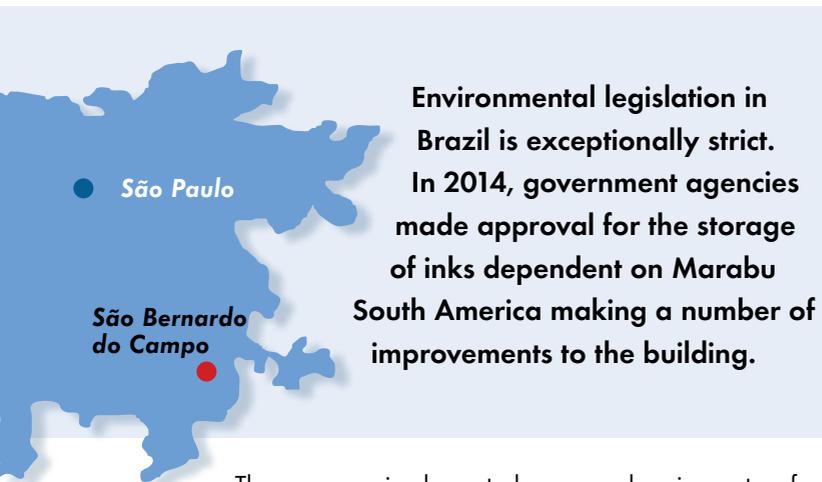


ISO 14001

BUSINESS IN GOOD SHAPE – DESPITE A HARSH BUSINESS CLIMATE

Marabu established a subsidiary in São Paulo, Brazil, in 2004, three years before the foundation of Marabu North America. A staff of 16 moved into the current headquarters in 2013, in an industrial park in São Bernardo do Campo, in the federal state of São Paulo. The area is primarily home to auto industry players. The three-storey building and grounds are shared by three companies, with Marabu occupying approximately a quarter of the available space, equivalent to around 650 m².

Strict regulations to be met for operating license



The company implemented a comprehensive system for protection in the event of a fire, with alarms, fire doors and explosion-proof lighting. Additional hydrants were installed to ensure the availability of sufficient water to extinguish fires. Raised barriers on the ground floor hold back materials that could endanger groundwater or seep into the soil or sewers. Initially, the main Marabu do Brazil site did not have government approval for the operation of a laboratory, meaning it had to be located at some distance for a number of years. Suitable premises were found approximately half an hour's drive away. However, this was not a satisfactory long-term solution.



The installation of a suitable ventilation system allowed the laboratory to be moved to the main Marabu site in September 2016.

Refuse collection by local government – recycling by private individuals

Hazardous waste is collected twice monthly by a specialist disposal company. Liquid waste is stored in leak-proof containers prior to disposal. Other unsorted items, such as plastic, paper and general household waste, are picked up regularly by a local government utility. These are subsequently sorted by private citizens, and any valuable materials are sold for recycling. Marabu South America is located in the sub-tropics, and there is no need for heating. As a result, electricity is the only form of energy required. Power is primarily needed for air conditioning during the summer months. As Marabu was located elsewhere prior to 2013, reliable consumption data is only available for 2014 and subsequent years. We will observe developments in the longer term.



There is similarly low demand for water, which is only required in small quantities for typical household tasks. As three businesses share the building and water costs, there is no precise data on consumption. The current political and economic climate is challenging, but Marabu do Brazil has defended its position, returning to profitability in 2016. In common with Brazil as a whole, Marabu is now hoping for a broad-based economic recovery.

CHARLESTON, USA



Locations

Charleston, USA

Total headcount



35 employees

Activities at Charleston site



Research and development



Manufacturing: liquid coatings



Logistics



Administration



Product management



Sales

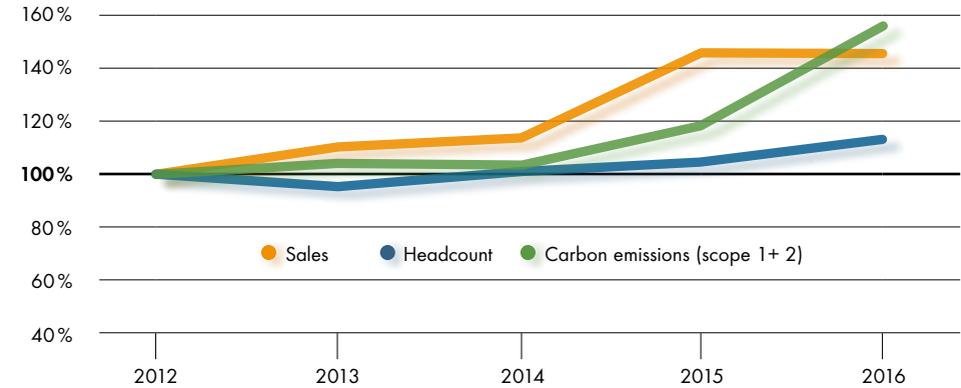


Customer-specific formulations



Customer service and support

Development of key metrics in per cent



Certifications



ISO 9001



ISO 14001

SUCCESS IN THE LAND OF OPPORTUNITY

The acquisition of Clearstar in 2008, followed by the purchase of Autoroll in 2011, led to the establishment of Marabu North America in Charleston, South Carolina. As a manufacturer of liquid coatings for a variety of applications, Clearstar was an ideal match for Marabu with its portfolio of inks.

Since its foundation, the subsidiary, which also operates a sales office in Boston, has gone from strength to strength – on the back of a comprehensive product offering and a focus on excellent customer support. In 2013, it was awarded first prize for the largest annual increase in sales of any company in South Carolina by leading business magazine SC Biz News. It also was ranked highly in 2014 and 2015.

South Carolina

Charleston

Laboratory for the development of custom inks



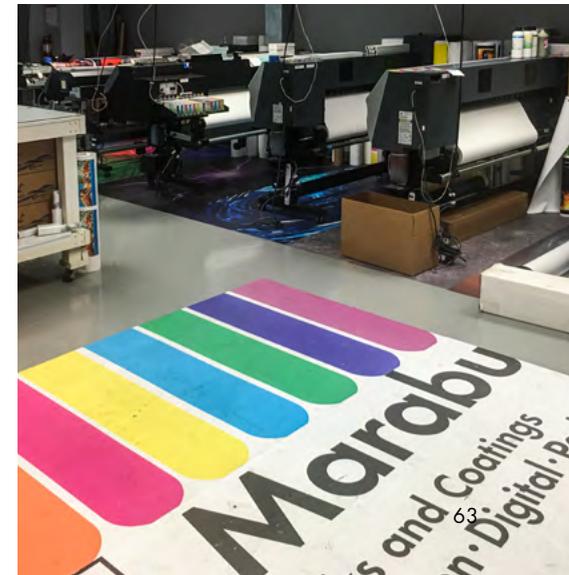
Addition of three state-of-the-art laboratories

Two years ago, a decision was made to purchase the building that had originally been leased. In the same year, three highly advanced laboratories were created, with a fully automatic air purification system that also provides air conditioning and controls ambient humidity.

Ten air changes per hour ensure low contamination of the interior atmosphere, and safeguard staff health and safety. Moreover, printing tests can be performed under ideal climatic conditions.

The downside is an increase in power consumption of around 60 per cent, from 244,000 kWh in 2014 to 388,320 kWh in 2016 – despite the installation of a state-of-the-art system with energy recovery technology. This has also had a knock-on effect on the total scope of carbon emissions for the location. Gas (on which the scope 1 value is based) is only consumed in small amounts during the colder months from November to February, and therefore accounts for just 4 per cent of total energy demand. As a result, the equipment upgrade and the corresponding increase in electricity usage for air conditioning and workplace safety has exerted a correspondingly large impact on total CO₂ emissions.

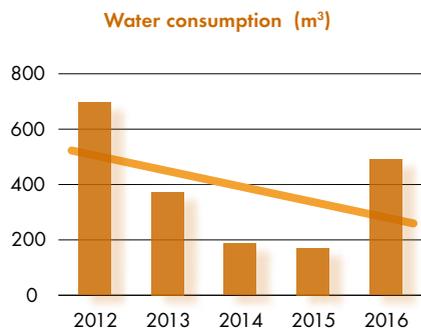
State-of-the-art printers in the new digital printing room



Initial recycling efforts and prudent water usage

Little federal legislation has been passed on the management of waste in the USA (EPA⁽¹⁾). There are provisions governing hazardous waste, rules on the disposal of waste in landfills (as is usual practice in America), and certain statutory recycling requirements. However, the regulation of waste management is otherwise left to the individual states – meaning there are hugely divergent laws in place. Many states now impose a deposit on aluminium cans to ensure these containers – which require considerable energy to manufacture – are not simply discarded. The country also celebrates Recycling Day on 15 November of every year, to raise public awareness of the valuable materials that can be recovered from waste. On average, every North American generates 2.09 kg of household waste every day⁽²⁾, the largest per capita volume worldwide. In contrast, a European produces an average of 0.474 kg⁽³⁾.

Against this background, Marabu in Charleston is a pioneer and role model. In spring 2016, the company purchased a baling press to compress waste cardboard packaging before it is transferred to a recycling specialist. Moreover, 200 l metal containers are returned to suppliers for recycling. These steps are reflected in the statistics, with the volume of waste falling by one third between 2015 and 2016.



Baling press for compacting cardboard



By law, aerosol spray cans must be stored behind safety fences in South Carolina. In the event of fire, this prevents potential injuries from bursting cans.



Water is primarily required to clean containers used in production. To conserve precious fresh water and to minimise the very high charges levied for soiled waste water, the cleaning process has been improved, reducing the volume of H₂O to a minimum. The spike in consumption in 2016 is attributable to a leakage.

In 2015, Marabu North America was received the SGIA Sustainability Award for its commitment to environmental protection.

Successful introduction of arts and crafts paints

Following on from its success with inks, Marabu North America launched selected arts and crafts paints in autumn 2015. Expectations were more than met, and the Marabu brand is now well established in this market. This led to a need for additional storage space, prompting the rental of premises in the immediate neighbourhood in September 2016.

⁽¹⁾ United States Environmental Protection Agency

⁽²⁾ Wikipedia: Recycling in the United States, 7 March 2017

⁽³⁾ German Federal Office of Statistics (destasis), 7 April 2017

FENGXIAN, CHINA



上海润志实业有限公司

楚江路899号

Locations

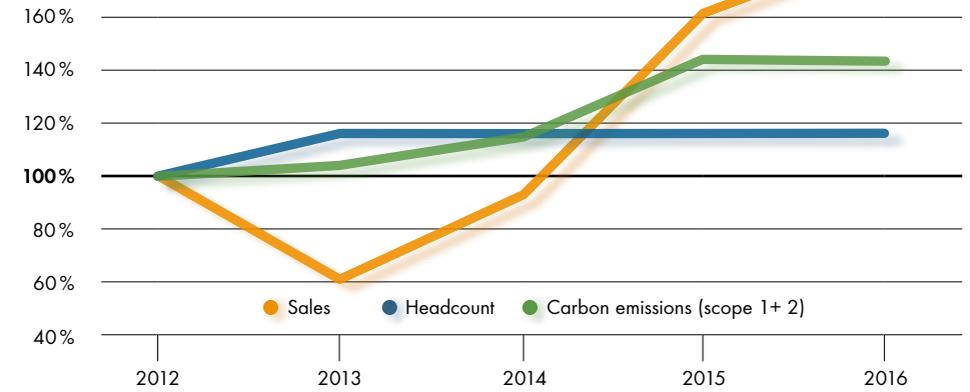
Fengxian, China

Total headcount



7 employees

Development of key metrics in per cent



Activities in Fengxian



Logistics



Administration



Sales



Customer-specific formulations



Customer service and support

Certifications



ISO 9001



ISO 14001

MARABU IN THE MIDDLE KINGDOM

A local presence for over 25 years



China is the prime mover of growth for German enterprises. Marabu was quick to recognise this opportunity, and established a local presence with a broad portfolio of printing inks over 25 years ago. Customers are chiefly equipment manufacturers and subsidiaries of German companies. As a result of its long-established business relationships, the Marabu brand enjoys a high degree of recognition and a correspondingly prestigious reputation in China.

In order to be responsive to customer needs, and to mix custom inks locally, a dedicated subsidiary, Marabu Asia, was established in 2010 in Kunshan, 60 km west of Shanghai. However, it quickly became clear that this location was far from ideal – especially as the storage of hazardous materials was prohibited, hampering the large-scale development and production of inks.

We succeeded in finding more suitable facilities in an industrial park in Fengxian, to the south of Shanghai – and we were able to secure all licenses required to store and mix inks. The subsidiary relocated to the new site in January 2017, enabling the provision of a complete range of services to customers throughout Asia.



A pioneer in waste segregation

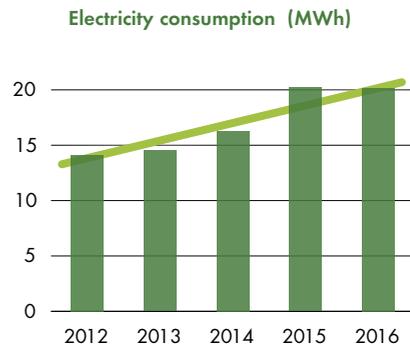
Over the past four years, Marabu Asia's sales have almost doubled, bringing with it a more moderate increase in the volume of hazardous waste from approximately 40 kg in 2012 to approximately 70 kg in 2016. Precise figures are available for hazardous waste, which is weighed. However, they are not available for the small quantity of general household waste, or for recyclable materials such as glass, plastic bottles, paper and cardboard – which are segregated, and collected by a specialist recycling company. Metal rings from tins and the empty metal cans themselves are also collected, and sold to private recycling specialists. Batteries are disposed of separately. In China, food and drink is frequently sold and consumed in disposable "to go" containers – but not at Marabu Asia. Instead, beverages are served in reusable tea cups and glasses. Moreover, printed paper is used again, reducing the volume of waste.

Plastic boxes contain spillage from used tins



Wood recycling: collection by private citizens in Kunshan





The vast majority of waste in China is not segregated or sorted. In major cities, approximately 480 kg of waste is generated annually per head of population (compared to approximately 520 kg per capita in Germany). However, as there is scarcely any recycling in China, a large volume of waste is simply incinerated. As most incinerators are not fitted with air filtration systems (the systems are not switched on), this leads to extreme air pollution. Against this background, Marabu Asia is a role model in terms of waste management and recycling.

China is a pioneer in combatting climate change – Marabu is following suit

China has recognised the threat of climate change, and leading by example. The country generates 28 per cent (approximately 9.8 billion metric tons in 2016) of total worldwide carbon emissions. As a result, it has a major part to play in efforts to restrict global warming to the agreed 2° centigrade (1). It has succeeded in reducing emissions every year since 2013. Despite economic growth of 6.7 per cent in 2016, CO₂ output fell by 4.3 per cent (2). In this context, China is focusing on the expansion of all types of renewables, especially hydro and solar, but also (unfortunately) on atomic power (3). And while the choice of energy source is key to carbon emission abatement, the efficient use of that energy is equally important.

Custom inks are mixed in the new laboratory – with its efficient layout and good natural lighting



Fengxian employs LED lighting, as was the case in Kunshan. As the new facility has greater floor space, electricity consumption is expected to rise, not least because the hot and humid climate necessitates year-round air conditioning.

Marabu's commitment to environmental protection extends beyond its own four walls – and China is no exception. A successful trial was conducted at customer sites, replacing traditional UV dryers with LED lighting. These are capable of curing Marabu TPC inks with just 0.4 kW rather than 11 kW. Moreover, LEDs do not generate ozone, which means the new technology not only lowers energy consumption and costs, but also improves the working environment.

(1) The international community has agreed to take measures to limit global warming to two degrees centigrade above the level that existed before industrialisation.

(2) statista.com, 16 March 2017

(3) [bizzenergy](http://bizzenergy.com), published 2 March 2017

CONCLUDING STATEMENT FROM THE EXECUTIVE COMMITTEE

Marabu inks are used around the globe – for a huge variety of purposes: to create works of art, to decorate T-shirts, to precisely mark industrial products by means of screen printing, to create controls on touchscreens with an inkjet. The possibilities are limitless. And as a result, both we, as a manufacturer, and our product portfolio must fulfil extremely diverse requirements.

As a company operating within the chemical industry, we have long been committed to ensuring our production operations are as eco-friendly as possible, and that we comply with all statutory and regulatory imperatives. When developing our ink formulations, we are careful to select the most suitable raw materials, avoiding highly hazardous substances.

With the new formulas, we make all efforts to ensure inks deliver better results than competing and previous Marabu products, and reduce process-related emissions, waste, and energy consumption – while safeguarding cost-efficiency.

These dual goals – cost efficiency on the one hand, and human safety and resource conservation on the other – reflect our focus on responsible business practices. An integrated management system across the Marabu Group guarantees consistent standards worldwide, with clearly defined annual goals, action plans and audits.

Certification of our international subsidiaries to DIN ISO 14001 played a pivotal role in this context, contributing to effective organisation and a positive corporate culture.

We would like to thank all Marabu staff for their hard work and dedication – and for their essential contribution to our ongoing focus on good corporate citizenship and ever-greater sustainability.

And we would like to thank our customers for recognising the quality that drives and characterises our products – and for their enduring loyalty.



A handwritten signature in black ink, appearing to be 'R. Simon'.

Rolf Simon



A handwritten signature in black ink, appearing to be 'York Boeder'.

York Boeder (CEO)



"We will deprive many people of the prospect of a peaceful future if we believe that we can simply continue with the status quo. [...] The transition to an economy and lifestyle that respect the limitations of our planet is one of the greatest challenges of our time. It is the foundation for the future of coming generations."

*Barbara Hendricks,
German Federal Minister for the Environment, Nature Conservation,
Building and Nuclear Safety*

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kommunikation + design,
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Thermographic inspection of Tamm plant

New online management handbook and global guide

ISO 9001
ISO 14001
certification for China



1985	1986 - 1990	1991 - 1995	1996 - 2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Low-hazard LIBRA product range launched 	Production of first UV-curable printing inks – 100% solvent-free	Introduction of system for the return of packaging 	ISO 9001 certification for Tamm Thermal exhaust air purification with heat recovery 	Heavy-metal pigments eliminated from all products NVP-free UV-curable inks 	Establishment of recycling and waste management programme State-of-the-art underground solvent storage tank commissioned 	ISO 9001 certification for Tamm ISO 14001 certification for Tamm New production facility in Bietigheim-Bissingen built to latest standards 	ISO 14001 certification for Tamm New production facility in Bietigheim-Bissingen built to latest standards 	ISO 9001, ISO 14001 certification for Bietigheim-Bissingen SGIA Environmental Award 	Office building in Tamm refurbished to enhance energy efficiency 	Carbon-neutral electricity from renewables (Bietigheim-Bissingen and Tamm) 	Launch of Ultraglass UVGCC (cradle-to-cradle ink for glass)	Company car policy updated; definition of reference vehicle with low CO ₂ emissions	Publication of first Marabu Environmental Report 	UV-curable inks developed for LED UV dryers 	Maquajet – water-based inks for digital printing 	ISO 9001 certification for USA ISO 14001 certification for USA ISO 9001 certification for Brazil ISO 14001 certification for Brazil 	ISO 9001 certification for Sweden ISO 14001 certification for Sweden 	Energy audit at Tamm plant and Bietigheim-Bissingen plant First CDP CO ₂ report submitted 	Step-by-step implementation of energy monitoring system in Tamm



OHSAS 18001 certification for Bietigheim-Bissingen and Tamm



ISO 9001 certification for France



ISO 9001 certification for Sweden

FSC certification for Bietigheim-Bissingen

SGIA – Sustainability Recognition Award

Tampatex TPX – OekoTex® Standard 100 certification



TIMELINE OF GREEN MILESTONES

KPIS

Input – Tamm plant

		2012	2013	2014	2015	2016
Energy						
Electricity	[kWh]	2,336,706	2,399,362	2,297,776	2,551,467	2,518,215
Natural gas	[kWh]	2,750,007	3,526,717	2,857,858	3,007,862	2,891,256
Total energy consumption	[kWh]	5,086,713	5,926,079	5,155,634	5,559,329	5,409,471

Input materials						
Fresh water	[m ³]	4,592	4,947	6,200	4,642	4,121
Binders and resins	[t]	591	571	581	600	576
Solvents	[t]	1,374	1,375	1,426	1,343	1,483
Pigments	[t]	340	318	349	334	356
Fillers	[t]	147	144	157	148	146
Additives/agents	[t]	110	113	114	118	118
Metallic and glitter effect materials	[t]	13	12	13	15	13

Output – Tamm plant

		2012	2013	2014	2015	2016
Emissions (gaseous)						
CO ₂	[t]	928.7	1,093	931.9	947.4	920.6
CO	[t]	0.3	0.4	0.4	0.4	0.4
NO _x (as NO ₂)	[t]	0.6	0.6	0.6	0.6	0.6
Total carbon	[t]	0.8	1.2	1.3	1.2	1.2

Emissions (solids)						
Hazardous waste						
Paint and distillation sludge	[t]	94.3	91.9	100.1	92.1	90.9
Waste paint and ink	[t]	10.7	4.5	11.7	13.1	11.2
Other	[t]	1.8	3.8	27.7	12.2	4.7
Total hazardous waste	[t]	106.8	100.2	139.5	117.4	106.8

General waste						
Mixed plastic and other waste	[t]	38.4	35.6	33.7	33.5	36.9
Paper/cardboard	[t]	34.5	33.0	37.8	34.6	32.4
Wood	[t]	4.7	2.9	2.8	2.9	6.4
Scrap metal	[t]	48.6	25.1	29.1	41.3	46.9
Other	[t]	1.5	5.2	4.6	6.2	4.1
Total general waste	[t]	127.7	101.8	108.0	118.5	126.7

Emissions (liquid)						
Waste water	[m ³]	4,592	4,947	6,200	4,642	4,121

Products						
Total quantity	[t]	2,494	2,483	2,324	2,561	2,539

Input – Bietigheim-Bissingen plant

		2012	2013	2014	2015	2016
Energy						
Electricity	[kWh]	712,091	558,034	618,133	620,953	758,653
Natural gas	[kWh]	741,097	685,697	549,360	674,475	961,738
Total energy consumption	[kWh]	1,453,188	1,243,731	1,167,493	1,295,427	1,720,391

Input materials						
Fresh water	[m ³]	1,845	2,149	2,456	4,349	3,382
Binders and resins	[t]	131	186	239	218	325
Solvents	[t]	8.0	12.0	18.0	14.0	22.0
Pigments	[t]	21.2	31.0	68.0	33.0	58.0
Fillers	[t]	48.4	69.0	94.0	104	120
Additives/agents	[t]	30.3	48.0	58.0	42.0	48.0
Metallic and glitter effect materials	[t]	0.6	1.0	1.7	1.6	2.0

Output – Bietigheim-Bissingen plant

		2012	2013	2014	2015	2016
Emissions (gaseous)						
CO ₂	[t]	271.8	247	218.6	238.5	305.7
CO	[t]	0.71	0.56	0.62	0.62	0.76
NO _x (as NO ₂)	[t]	0.14	0.11	0.12	0.12	0.15
Dust	[t]	0.007	0.006	0.006	0.006	0.008

Emissions (solid)						
Hazardous waste						
Paint and distillation sludge	[t]	6.4	11.2	16.2	11.1	9.1
Other	[t]	0.0	10.5	24.8	3.2	9.9
Total hazardous waste	[t]	6.4	21.7	41.0	14.3	19.0

General waste						
Mixed plastic and other waste	[t]	14	10	18	20	21
Paper/cardboard	[t]	23.9	27.0	38.7	36.5	40.3
Wood	[t]	2.1	4.2	5.1	7.5	2.1
Scrap metal	[t]	3.7	10.4	2.2	1.2	2.4
Other	[t]	0.8	2.1	3.8	10.7	0.0
Total general waste	[t]	44.6	53.8	67.7	76.3	65.8

Emissions (liquid)						
Waste water	[m ³]	1,845	2,149	2,456	4,349	3,382

Products						
Total quantity	[t]	388	506	789	624	974

