Environmental Report 2006/2007

arvato

BERTELSMANN

arvato at a glance

Company figures

	2006
Sales (€ million)	4,782
Operating EBIT (€ million)	367
Employees	46,584

Environmental figures

Input	
Raw materials (tons)	1,330,407
Auxiliary materials (tons)	90,626
Operating materials (tons)	7,447
Fresh water (m^3)	1,507,966
Energy sources (MWh)	1,471,594
Output	
Waste (tons)	280,878
• Waste for recycling	256,838
• Waste for disposal	24,041
• Share of waste that requires special monitoring among both types	4,658
Sewage water (m^3)	1,040,547
Emissions (tons)	
• Carbon dioxide, fossil	627,299
• VOC	1,705
• Sulfur dioxide	1,059
• Nitrogen oxides	938
• Carbon monoxide	385
• Dust / particles	120

Conscious in thought and action

Environmental protection and business go hand in hand

Dear Readers,

Many people have gained a much deeper awareness of environmental and climate protection, energy efficiency, and sustainability as a result of intensive reporting in the media and scientific discussions. An obvious indication is the awarding of the Nobel Prize for Peace to Al Gore and the UN climate council IPCC (Intergovernmental Panel on Climate Change). The direct connection between each person's behavior as a consumer and the global impact on the environment and the climate is becoming more and more apparent. All of us are being confronted by terms like "climate change" or "the greenhouse effect" – and we are all being called to action.

In issuing arvato's environmental guidelines at the end of 2003, we assumed our corporate responsibility. In our second environmental report, we once again present scientifically based results arising from our group-wide environmental activities. Through the use of the key figures that we published in the Environmental Report 2004/2005, and applied as the baseline for our future actions, initial improvements have already been achieved. The progress made by our group-wide activities encourages us to continue pursuing our binding environmental guidelines. We are pleased that this new attitude about the need for strengthened environmental-protection measures has taken on a life of its own. Thanks to the commitment of our employees, customers, partners, and suppliers, a resolve has evolved into a movement. With their ideas and their energy, many people are working hard to bring our environmental guidelines to life. We would also like to thank our partners for the constructive support they have provided to our activities.

As a global production and service company, arvato is committed to linking business success to environmentally friendly action. Our Environmental Report 2006/2007 makes one point: Business and respectful use of our environment are not a contradiction in terms. The opposite is actually the case. Within production and logistics, in particular, efficient technical management systems and professionally analyzed processes result in significant savings of energy, conservation of resources, and reduced exposure of our employees to emissions. These initiatives result in significantly lower amounts of greenhouse gases. Our investment

Markus Dohle
Rolf Buch
Günter Wilmsmeier
Eckhard Südmersen
Hans-Peter Hülskötter
(from left)

in progressive energy supplies, including the expansion of combined power and heat production through the use of cogeneration, will pay off double in the future – for the environment and for increased efficiency.

For this reason, we view environmental protection as an opportunity for business. Sustainable production methods do more than just ease the burden put on the environment. They also lead to the development of new types of technology – and, as a result, are engines of progress and growth. The combination of economy and ecology belongs to the future. We would like to invite you to continue this journey with us.

Rolf Buch

Markus Dohle

Hans-Peter Hülskötter

Eckhard Südmersen

Günter Wilmsmeier

arvato: international service provider

arvato is a division of the international media company Bertelsmann. Bertelsmann AG is comprised of the television channels, television production companies, and radio stations of Europe's largest entertainment group, RTL Group; the publishing houses of Random House, the world's largest trade book publisher; and the Sony BMG joint venture in the BMG division. Furthermore, arvato supplies media and communication services, and the direct-to-customer businesses are unified within Direct Group: book clubs as well as book retailers in France and Portugal.

Strong growth through intelligent services

The media and communications industries require service providers if they are to work efficiently and effectively. arvato offers a large assortment of intelligent services, ranging from printing to service centers, customer loyalty systems, financial clearing, mobile services, and comprehensive IT solutions, for all types of business. Our company's business strength is reflected in our success over the years. With revenues of around € 4.8 billion (fiscal year 2006) and currently more than 50,000 employees in approximately 270 subsidiaries in 37 countries, we are one of the largest internationally networked media and communication service providers.

arvato's business activities can be broken down into six functional areas:

Content creation
Formulating and designing information and texts that speak directly to target groups – arvato's editorial teams and agencies provide the support our customers need.

Data management
Data forms the basis of successful businesses – when it is systematically administered, processed, and linked to relevant information. arvato offers its customers efficient data management through the use of media-neutral databases, our specially designed and innovative content and knowledge management systems, as well as data-processing technologies.

Duplication
Information needs media in order to reach recipients. Such media could be classic printed products or digital data carriers like CDs, DVDs, or the Internet. We offer a comprehensive range of solutions that are optimized in terms of time and can be highly customized.

Processing
The quality and profitability of printed matter are determined to a large degree by processing. This means the printing press is hardly the final step of the operation. From finishing and binding to insertion and attaching to personalized shipping – arvato does it all.

Logistics
To enable customers to focus on their core businesses, we take care of the complex logistics jobs – with IT solutions tailored precisely to address individual needs. Our services include all components of supply chain management, including order management, warehousing, shipping, and transport as well as returns management and repair services.

Customer service
Customer service is at the heart of strong customer loyalty and is an important element that enables our customers to outperform their competitors. In this area, we offer reliable solutions: operation of service centers, management of customer data, customer information systems, and financial services such as factoring and online payment systems.

Four divisions for more customer service

We have organized our broad range of services into four divisions:

arvato services is a global service provider for customer communications and logistics. More than 27,000 of our employees work in this division. Customer communications is one of our strengths. We offer our customers tailored solutions in more than 20 languages. Our lineup of services ranges from systemic acquisition and use of qualified addresses through the outsourcing of customer contact work in service centers, to the development and implementation of customer retention programs and handling of payment transactions.

Our logistics solutions extend well beyond the delivery of products and their coordinated and managed shipment to customers. Consulting, procurement, and even production are also part of our services, just like order management, warehousing, financial services, returns processing, and repair services.

The business area of arvato print includes 17 printing companies with approximately 13,000 employees working in seven countries. We offer a complete range of services: From consultation and conception through prepress operations (image processing, layout, creation of printing plates), printing (offset, rotogravure, and digital printing), and finishing (binding, personalization, addressing, delivery) to supplementary services (storage, distribution, etc.).

On October 1, 2007, the division of arvato digital services was created, merging arvato storage media with several units from arvato services. arvato digital services has 8,000 employees around the world and works as a provider of integrated service packages for the industries of video, audio, games, and IT/technology. Its services range from post-production, replication, fulfillment, distribution/supply chain management, and financial services to electronic content distribution, supported by innovative end-to-end IT systems. The environmental balance sheet 2006 is based on the former division arvato storage media, one of the world's leading producers

of CDs, DVDs, and CD-ROMs with 5,000 employees.

arvato systems has more than 25 years of experience as the IT service provider for Bertelsmann AG, and uses its large computer centers to offer comprehensive, "round-the-clock" service to external customers. The value chain extends from consultation, conception, development, and implementation to the operation of complex IT systems. This division also includes arvato mobile (a provider of digital entertainment content and interactive applications) and empolis (innovative content management products).

Customer success is the gauge by which we define our actions. Because we have energetically pursued this philosophy, we have become leaders in our markets. The lifeblood of our products and services is the skills and professionalism of the people who provide this assistance. Our workforce is the key to success – and we are well aware of this.

Environmental guidelines for arvato AG and its member companies

1. Responsibility

A key part of the corporate philosophy at arvato AG is that each employee feels responsible for the company in terms of both environmental protection and striving towards economic success. One important condition for this is continuous training of our workforce who we actively encourage and develop. We oblige ourselves and our employees to act in an environment-oriented manner without merely restricting ourselves to adhering to environmental laws and guidelines. Part of this responsibility also includes the introduction and maintenance of an effective environmental management system in all relevant corporate areas.

2. Acting for the future

arvato AG observes the social standards and values as well as the personality of each individual employee. We keep our employees and interested members of the public informed about the environmental effects of our activities, down to individual plants. We attach great importance to the sustained development of our business. This includes analyzing and evaluating all environmental aspects prior to launching new products and processes, which in turn enables us to offer our customers innovative technologies and tailor-made solutions in all our divisions without neglecting our high requirements as regards protection of the environment.

3. Together with customers and suppliers

What applies for our employees within the framework of internal processes is also transferred to our relationships with customers and suppliers. We work closely with them to develop solutions to problems which are equally economically successful and environmentally friendly. The environmental benchmarks applied in our company are also applicable when selecting contract partners and suppliers. Environmental aspects are increasingly gaining in importance when it comes to advising our customers.

Seeing and experiencing responsibility

Environmental protection requires binding rules. With the introduction of group-wide environmental guidelines at the end of 2003, arvato AG firmly anchored environmental thinking into the company's business profile. These guidelines offer all arvato companies a compass and serve as a road map for our employees' actions. Systematic, company-wide environmental reporting ensures that the guidelines are actively implemented and documented – and we have succeeded. As a review of the past three years clearly shows, we have taken the correct approach. Numerous environmental projects that have produced some impressive results reflect these strides. In this report, we will tell you about a few of them.

4. Precautionary measures

It is the declared objective of our company management to optimize the consumption of raw materials, energy, and water ensuing from our activities and to minimize pollution in the form of emissions, sewage water, and waste. Executive management at arvato AG and all of its associated companies also undertake every effort to prevent emissions that result from on-site accidents. If, however, such an event should occur, our employees are well prepared to deal with it, and the appropriate rules of conduct ensure minimum effect on the environment.

5. Transparency and dialogue

Cooperation with the authorities and community groups is something we do on a day-to-day basis at arvato AG and at all our companies. Both now and in the future, we will continue to design our working methods in a transparent manner and discuss openly with our partners. This willingness to maintain dialogue is a key component of our corporate philosophy. Furthermore, we offer each of our member companies the opportunity to have their environmental activities and performance surveyed within the framework of a neutral certification process.

6. Commitment and permanence

These guidelines are binding for each employee at both arvato AG and its member companies. If parts of these guidelines should prove insufficient or inapplicable in practice, they will be reworked as required by those responsible within the framework of regular revision.

Conclusion

The activities performed by arvato AG and its member companies will continue to be characterized by the objective of constantly improving environmental protection. Protection of our environment and natural resource management will also continue to play a significant role in discussions and negotiations with our customers and suppliers. We reach out to our partners to ensure their support for environmental protection. Our efforts to protect resources and the basic necessities of life extend far beyond statutory requirements. With this, we are not only complying with our own idea of sustained development. We are also working toward the greater goal of preserving the earth for future generations and passing on to them a positive place in which to live.

A challenging benchmark for the paper industry

"Working at the European level, the WWF, and 47 other NGOs, developed a vision on the subject of paper. Since the vision was presented in January 2006, it has been considered the benchmark for both the paper industry and paper users. The vision includes the following core goal – minimize paper use. When possible, recycling fibers should be used. But when fresh fibers are required, they should come from FSC-certified forests. In terms of paper bleaching, TCF remains the defining standard. Given the growing number of environmental problems and rising amount of paper consumption – both in Germany and throughout the world – the WWF thinks that these goals will have to remain in effect for years to come and that they should be seriously considered by the paper industry. arvato AG has added its voice to the dialogue about sustainable development. Even though the NGOs' vision about paper poses a demanding challenge to the paper industry, arvato AG has taken a major step in the right direction. When it joined the WWF Wood Group at the beginning of 2006, it pledged to integrate these standards into its business processes. By actively and intensely advising its customers, arvato AG has already achieved a number of successes, and has emerged as a role model for other companies in the printing and media industry. There is still much to do – for this reason, the WWF hopes that it will continue to have arvato AG as a dedicated environmental ally on its side."

Johannes Zahnen
World Wide Fund for Nature (WWF)

Progress in environmental protection

The dramatic evolution that arvato has undergone in the past 15 years can be concisely described this way: From a successful group of printing companies to a service provider with a comprehensive value chain. During this period, the group has also continuously expanded its international activities. Our companies do business in 37 countries and generate about two-thirds of their revenues outside Germany. Because we committed ourselves to the digitalization of the media world at an early point, arvato became a forerunner in the effort to link the old and new economies. We have continued to strengthen our profitability in recent years.

Cornerstone of success

Our success is also based on customer focus and flexibility. To preserve these strengths, we at arvato are committed to creating a work atmosphere that offers the freedom to launch entrepreneurial initiatives. We also consider a decentralized organizational structure to be a pillar of success. This principle provides each subsidiary with a high level of flexibility, reaction speed, and efficiency. This, in turn, forms the foundation of our international competitiveness and the expansion of market leadership.

Initial successes in environmental protection

Achieving such success in the area of environmental protection and responding to the growing importance of the issue – these were the goals that arvato AG set out to accomplish at the end of 2003 when it approved the group-wide environmental guidelines. An initial review of environmental data found various levels of environmental activities in the subsidiaries. Since then, we have been working systematically to introduce the guidelines across all companies. A related goal for the future was to learn from one another through intensive discussions, cooperation, and coordination, and to combine current activities in order to achieve progress throughout the entire group. Our aim was to encourage our subsidiaries to write their own target agreements, to promote activities, and to coordinate programs with one another. The required personnel infrastructure was introduced at an early stage. One example of this work was the appointment of a central environmental officer who acts as an adviser and coordinator at arvato companies around the world. The results of the first three years show that arvato AG has done its homework. In recent years, numerous companies in the group have successfully introduced all sorts of environmental projects. We describe several of them in this second environmental report. These projects should serve as an incentive for all employees to continue moving ahead with environmental protection work in our companies.

Less carbon dioxide using intelligent logistics

As part of its new logistics concept, the arvato subsidiary VVA (Vereinigte Verlagsauslieferung) proved that new buildings can be erected in a way that is economical, easy, and environmentally friendly. The energy consumption for warehouse 10 that was completed in September 2006 at the Gütersloh location shows that its use of primary energy is below the allowed maximum level. Overall, 480 tons of carbon dioxide is being saved each year.

A major share of these savings is being achieved through the use of natural gas as an energy source. VVA decided to use "dark radiator" technology to heat the hall. This technology requires a relatively small investment and is highly economical with an efficiency level of more than 92 percent. The heating system is called "dark radiator" because it produces no visible light. Rather, it emits only infrared radiation – heat, that is. Compared with the system of oil-fired radiant heaters at the previous external warehouses, emissions of carbon dioxide can be cut by more than 400 tons. The new building's insulation includes not only the floor, facade, and the roof, but also functional elements like the ramps, gates, and light domes.

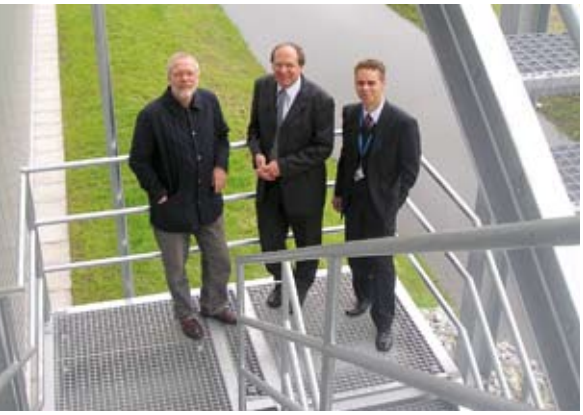
"The German Energy Saving Regulation always serves as the standard for our building projects," says Uwe Diekmann, head of facility risk management at arvato services. "In addition to that, we also take a look at the economic efficiency calculations and system-related energy requirement forecasts when we make a decision. In the end, it is the combination of all measures that leads to effective insulation."

New logistics location	
Operation	warehouse 10
Year of construction	2006
Floor space (m^2)	7,500
Height of hall (m)	13.7
Palette capacity	31,000

Basic data for the new warehouse

CO_2 impact in kg	Old	New	Difference
Heating energy	537,585	101,587	435,998
Electricity	130,929	94,200	36,729
Transport energy	9,867	2,000	7,867
Total savings (in kg CO_2)			480,594

Comparison of old and new warehouse



arvato services' environment protection experts (from left): Uwe Diekmann, Hans-Jürgen Eickhoff, and Stephan Voigt

New ideas take hold

Because the lighting system that covers more than 7,500 m^2 of space uses the largest share of electricity, special attention was paid to the selection of energy saving systems. With various levels of illumination, the 70 kW system, equipped with fluorescent lamps with electronic ballast, meets the needs of the respective working areas. A close examination was also made of the energy needs of the logistics systems, the control systems, and the administration area with computers and printers. A review of the latest usage data shows annual savings of around 37 tons of carbon dioxide.

Thanks to the concentration of many elements at the location, 15,000 transport kilometers can be saved annually, cutting CO_2 emissions by about eight tons each year. Finally, with the selection of the swale infiltration trench system for the direct seepage of rainwater, the company chose the most environmentally friendly option because it serves to balance the groundwater level.

Intelligent programming technology saves energy

At the end of 2006, Mohn media presented a balance sheet that was successful both in business and environmental terms. Our company, one of the world's leading offset printers, set an ambitious goal to cut the use of natural gas. As a result of investments in intelligent machine technology, up to 30 percent of energy use could be saved by 11 drying units. These savings resulted from years of continuous work to optimize drying technology and a close working relationship with the units' manufacturer.

As part of web-offset printing presses, the so-called hot-air flotation dryers play an important role. They dry the solvent-based ink printed on the paper web by evaporating the solvents. During the drying process, a combustion chamber fired by natural gas is used to heat air to temperatures ranging from 180 – 220°C.

External post-combustion systems usually destroy the solvent vapor released in a process performed at temperatures of about 800°C. Afterward, the heated web is cooled to 25°C in a chill roll unit. Here, Mohn media uses modern, intelligent drying technology. The units contain an integrated thermal post-combustion system in which the solvent vapor in the discharged air is directly channeled into the combustion chamber and is incinerated there. Using this technology, the discharged air is cleansed and the energy contained in the solvent vapor is used to heat the air for the dryer.

Depending on the amount of printed ink and, as a result, on the

Jörg Lindemann, development engineer at Mohn media, explains the business and environmental benefits of intelligent drying technology.

amount of emitted solvents, the dryer draws 20 percent to 50 percent of the energy needed to heat the air from the solvent vapors. The cleansed air is passed through a heat exchanger, enabling the heated air to produce hot water or steam.

"The results of the gas-reduction programs show us that you can do more than just conserve financial resources through the use of intelligent machine technology. Reducing the use of primary energy while maintaining quality levels and production security actively contributes to the ongoing discussion about energy efficiency," says Jörg Lindemann, development engineer at Mohn media.

Sonopress Forbach significantly reduces acetone consumption

Well-trained and informed employees can play a decisive role in implementing arvato's environmental guidelines. sonopress (now arvato digital services, formerly known as arvato storage media) in Forbach, France, is one good example. sonopress, a world-leading manufacturer of DVDs and CDs, has reduced consumption of the environmentally questionable and noxious substance acetone by up to 80 percent.

Data collected for the first arvato environmental report showed that the amount of acetone used in production at the Forbach site was initially above the average of all other sonopress factories. In response to this finding, a working group led by Raphael Meyer, a job-safety specialist, alerted machine operators to the effects that excessive use of acetone could have on the environment and humans. As a result, shift supervisors immediately limited the use of acetone and the disbursement of the substance by issuing strict regulations.

At the same time, the company developed alternative solutions for certain applications, such as for screen and slide cleaning. This suggestion, made by the specialist printer Bertrand Bare, was particularly successful.

"His strong desire to achieve our targets prompted Bare to experiment. His idea was to replace acetone with a biodegradable mixture of water and cleaning agent," Raphael Meyer says.

The first results were very promising, so the technical department made sure the newly developed solution could be distributed automatically. Since then, all employees have been using the substitute – and acetone consumption plunged by up to 80 percent in just a few months.

Minimizing the use of fossil fuels with solar energy

Thanks to the installation of solar panels on water heating systems in 2006, the arvato subsidiary printer portuguesa has minimized the use of fossil fuels. For this purpose, the company built a system with 12 solar panels that have a total surface area of 40 square meters. The system is connected directly to the water mains. The water is heated to 41°C and stored in an insulated 3,000-liter tank, where it can then be used to supply bathrooms and the factory canteen.

Production manager Artur Baptista explains how the investment has paid off: "Since it was put into operation, the system has saved 19 oil equivalent tons or approximately 221,000 kilowatt hours (kWh). This equals approximately 2 percent of the total energy consumption of printer portuguesa." The new solar panels were set up within the scope of the environmental management system, with which the arvato subsidiary identifies improvement potential aimed at conserving natural resources. In addition, issues such as legal security in the area of environmental law and waste reduction are continually monitored, assessed, and provided with target objectives. printer portuguesa has been using a management system based on the ISO 14001 standard for years, and has already identified considerable potential for savings, and has achieved it. In one example of this work, processes have been optimized to reduce the consumption of chemicals and spoilage, and an energy-saving program has also been launched.

printer Barcelona certified under FSC criteria

As one of the first printers in Spain, printer indústria gráfica in Barcelona has achieved certification according to criteria laid down by the Forest Stewardship Council (FSC). As a result, the arvato subsidiary meets the requirements needed to market products bearing the FSC label. printer indústria gráfica is the third company in the arvato group to support sustainable forestry. "The certification allows us to provide our customers with an additional service and to support them in their commitment to protect the environment," explains managing director Jörg Naescher.

The company embarked on the path to FSC certification in close cooperation with its client Circulo de Lectores, the Spanish book club that is part of the Direct Group. Michael Herzog, production manager at Circulo de Lectores, says: "We are glad that with printer indústria gráfica, we can combine business with environmental awareness. We can now provide our authors and their readers with clear evidence of the environmental compatibility of book production. In this sense, we can view this step as a win-win situation for everybody involved."

Bertrand Bare, a specialist printer at sonopress in Forbach, developed a particularly successful idea to reduce acetone consumption.

Production manager Artur Baptista of printer portuguesa reduced total energy consumption by 2 percent with new solar panels.

Michael Herzog (left), production manager of Circulo de Lectores, and Jörg Naescher, managing director of printer indústria gráfica.

In conversation with one of our clients: Andreas Henrichs, environmental officer of arvato AG (r.) with Peter Rasper, CFO SAP.

Award for the future

The €10,000 prize money for the "Global 100 Eco-Tech Award" won by arvato in 2005 for promoting sustainable forestry was used to support a future-oriented project of the Forest Stewardship Council (FSC). Using the FSC as a positive example, the work strives to promote responsible use of natural resources in textbooks and teaching materials. In cooperation with textbook publishers, the FSC wants to achieve this in two ways. First, textbooks are to contain information on the importance of sustainable forestry. Second, increasing numbers of books and materials are to be printed on FSC-certified paper or recycled paper.

In doing so, the FSC working group is pursuing a twofold strategy. During initial discussions, great interest was shown by textbook publishers and a leading publisher of atlases, who will help develop a map showing FSC-certified forest areas and illustrating the significance of FSC. At the same time, the FSC working group is thinking about how to develop and produce in-depth teaching materials that, on one hand, can be provided to teachers and students as a primary source of information, and, on the other hand, can intensify cooperation with the publishers of textbooks.

"The FSC working group thanks arvato AG for its support and long-standing cooperation, during which we have achieved a great deal together. With the help of project funding, the 'FSC in textbooks' campaign has taken a major step forward," says Uwe Sayer, managing director of FSC's Germany working group. "We are confident that, based on the work

Peter Rasper, chief financial officer SAP

Searching for new approaches

"Saving the environment where we live and work may not be such an easy task – but it is a concern for us at SAP. Even if the IT industry is among those sectors that are more likely to have a smaller impact on the environment, we realize that every company must do its part to conserve available resources. The issue of environmental protection has a high priority within our portfolio of services. We offer integrated solutions that enable all processes governing compliance with regulations, including RoHS (Restriction of Hazardous Substances), REACH (European chemical law), the occupational safety law, and the Greenhouse Gas Emission Trading Law, to be improved.

For our company, this means one thing: We do not just simply comply with the respective environmental regulations in countries where we do business. We also search for new approaches designed to responsibly use natural resources, and we expect our suppliers to do the same."

done so far and the exchange with important organizations that has already taken place, we can increasingly involve the FSC in generating content and producing the textbooks."

New directions: first climate-neutral catalog

arvato subsidiary Vogel Druck produced the first climate-neutral offset print product in early 2007. The company embarked on a new direction by printing a catalog for a mail-order company specializing in sustainable office supplies. The use of 100 percent recycled paper contributed to the environmentally friendly printing process. Moreover, Vogel Druck offset the CO_2 emissions, an unavoidable by-product of production and processing, by investing in recognized climate protection projects.

An external consultant specializing in voluntary environmental protection projects, in accordance with the mechanisms of the Kyoto Protocol, assisted Vogel Druck during the process. First, the CO_2 emission impact of paper production, the entire printing and processing operations, and the shipment required for the printed product were calculated based on scientific data. These emissions were offset by purchasing greenhouse gas emissions trade certificates.

Forest Stewardship Council

The Forest Stewardship Council (FSC) is an international non-profit organization based in Bonn, as well as other working groups in 35 countries. The FSC brings together all types of groups that provide support – environmental organizations (including WWF and Greenpeace), labor associations, and numerous companies. The aim of the FSC is to preserve forests. Applying "guidelines on good forestry," experts evaluate and certify forestry companies, and their wood products may be marketed with the FSC label. The organization itself does not issue any certificates. Instead, it supervises the certifiers to ensure that they apply the principles and criteria.

Uwe Sayer of the FSC working group

Rolf Lenertz, managing director of Vogel Druck, thinks that awareness of environment protection projects will continue to grow among clients. "We want to boost customer loyalty by offering clients added value."

Climate neutral

"Climate neutral" is defined as offsetting emissions by neutralizing them somewhere else. Greenhouse gases have damaging effects around the globe. Therefore, it makes no difference where these emissions are created and where they are neutralized. Compensation is achieved by purchasing emission reduction certificates from recognized, superior environmental protection projects.

Waste heat used to save energy

Responsible use of resources is becoming increasingly important for manufacturing companies as well as for IT service providers. That is why arvato systems has implemented numerous measures to improve energy efficiency in the past years.

Operating the computer centers of arvato systems requires a large amount of energy. Sensitive IT infrastructures require uninterrupted supplies of electricity around the clock, 365 days a year. A recent concept for improving energy efficiency helped reduce maintenance expenses and nearly eliminated the demand for stand-by energy to meet overcapacities. The specialists in our company did this by structuring the energy supply (air-conditioning and uninterrupted power supply) to make it scalable. Scalable systems are flexible and can be adjusted to new requirements with a minimum effort. This concept allows arvato systems to react flexibly to changing market conditions.

By employing technology that uses the waste heat from computer centers to warm offices, gas consumption for building services was reduced by approximately 60 percent. This type of waste heat utilization was made possible by so-called "concrete core activation": A network of pipes is installed inside the concrete ceilings of offices. Depending on the season, they are used to cool or heat the offices. At the same time, a refrigerating unit in the computer center was equipped with an additional heat exchanger. In winter, it supplies warm air using the waste heat from the computer center. In summer, it provides the desired cooling capacity for office areas.

The high utilization level that the computer center reached in mid-2004 made further measures to increase energy efficiency seem appropriate from an economic and environmental point of view. In the winter of 2004, the existing cooling equipment was replaced with a system based on the principle of "free cooling." With this new technology, the water from air conditioners heated by waste heat from hardware in the computer centers is no longer cooled using electric compressors. Instead, cooling takes place directly via the outside air using large dry liquid coolers.

It was possible to generate 1.26 megawatt hours (MWh) of refrigerating output during the first 21 months of operation. In this case, the system is set up in a way that allows it to be flexibly switched on and off. "When the waste heat increases, the free cooling can be increased as well, and the computer center operation can be economically and environmentally optimized even further," says Jörg Missling, head of facility management at arvato systems.

Alternative CD and DVD packaging: attractive, efficient, environmentally friendly

As an alternative to conventional CD and DVD packaging made of polystyrene or polyethylene, arvato digital services and arvato print are now offering the Disc Box Slider (DBS) in the United States. The DBS has already been put to successful use by the arvato digital services subsidiary topac. It consists of two parts – a case and a tray that holds the CD or DVD and booklet – and is made completely of recyclable cardboard. The production equipment is provided by the arvato print subsidiary Coral Graphics, one of the world's leading printers of book covers.

An active relationship with customers is the aim of Rolf Lenertz, managing director, and Christoph Vogel, head of the catalog production line (both Vogel Druck), with the help of voluntary environmental protection projects.

Jörg Missling, head of facility management at arvato systems, ensures optimal energy supplies.

Alternative packaging for CDs and DVDs is being offered to our customers by Axel Kruse, CEO arvato digital services NA, as well as by the arvato subsidiary topac.

The DBS's environmental benefit is reflected in an energy assessment commissioned by the license holder. The analysis examines all environmental aspects, from raw materials production and costs of shipping and energy to calculation of carbon dioxide emissions using LCA methods based on ISO 14040. The study shows that the amount of carbon dioxide emissions associated with the production of materials is significantly lower: Compared with the CD plastic packaging Jewel Case, about 90 percent of so-called "greenhouse gases" is saved. With the DBS for DVDs, it is more than 80 percent lower. Carbon dioxide emissions created by transport are reduced by more than 40 percent through the use of DBS packaging, thanks in particular to its considerably reduced weight: The weight of cardboard packaging for CDs is half that of conventional packaging on average, and the DBS for DVDs is 40 percent less. And while huge amounts of fossil fuels are consumed in the production of plastic packaging, the manufacturing process for the new cardboard packaging uses 68 percent renewable energy. In addition, 83 to 86 percent of the DBS can be recycled.

The DBS performs well in business terms as well. The production process uses special equipment that automatically glues the cardboard sections, folds them together, and inserts the CD or DVD as well as the booklet. This delivers cost efficiency. "With the DBS, we offer our customers an efficient and environmentally friendly alternative to conventional packaging. And it looks very good to boot," says Axel Kruse, CEO of arvato digital services North America.

Keen awareness

Intelligent conveying systems: less energy, maintenance, and noise

By installing an automatic conveyor system, arvato services has had both a positive environmental and business effect on the French location Bussy Saint Georges. The automated system ensures that the conveyor belts used to move products that are ready for delivery run only when they really must. The result: Our company uses 20 to 40 percent less electricity. In the process, the load on mechanical parts is eased, reducing wear and, as a result, maintenance costs. Another positive aspect is noise reduction.

arvato services achieved this environmental protection accomplishment by installing more than 20 photo cells in various sections along the conveyor belt and by adding a so-called PLC (programmable logic controller) into the electric control unit. When a carton or a container passes one of these optical sensors, a timer in the PLC is activated. This timer turns on the respective section of the conveyor belt for precisely the amount of time that the container needs to reach the next photo cell. If no other container passes the first

Séverine Noyer, responsible for quality, safety, and environmental protection at the Bussy Saint Georges location, presents the benefits of the new automated conveyor system.

optical sensor during this period, the section of the conveyor belt that is no longer needed is automatically shut off.

During the manual packing operation, the containers are pushed onto the main conveyor belt after processing. This activates the corresponding segment, and the container is automatically moved.

"Cutting the electricity usage of the conveyor systems represents an improvement in all areas; maintenance and energy costs fall, and the environment profits. The work environment improves as well, because the noise level in the area near the conveyor belt has dropped," says Séverine Noyer, responsible for quality, safety and environmental protection.

Sony for "Green Management 2010"

"We at Sony Chemical & Information Device Corporation see global environmental protection as one of the most important tasks facing the human race. Our efforts are aimed at limiting the strain that our business activities place on the environment to the greatest extent possible. To achieve our environmental goal 'Green Management 2010,' a program that applies to the entire Sony group and is based on the Sony group's environment vision, we have set individual goals and work to achieve continuous improvements."

Seiichi Tsukioka, board chairman of Sony Chemicals & Information Device Corporation

Using all energy effectively

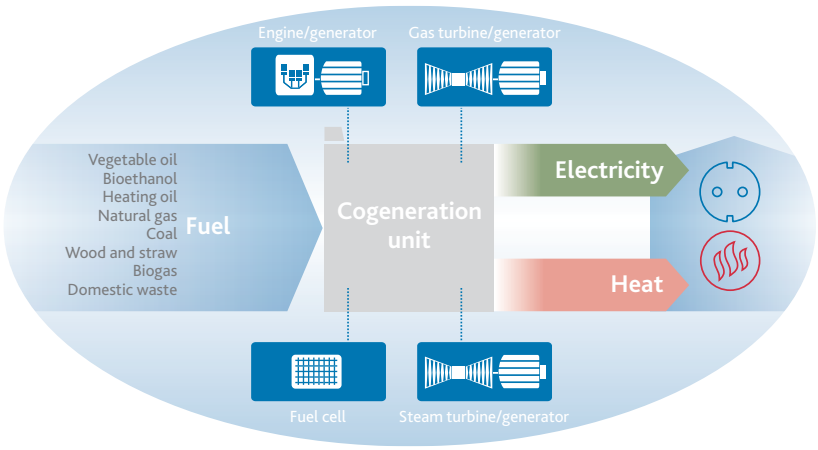
Cogeneration saves energy and sustains the environment

Given the world's rising demand for energy, the climbing costs of energy, and the discussions about climate change and greenhouse gases, demands for responsible use of energy are growing louder and louder. But one highly efficient and production-ready technology already exists: cogeneration, or combined heat and power generation. Its strengths include high efficiency levels – the primary energy is almost completely converted into heat and power. arvato companies have committed themselves to this advanced technology at three locations: Mohn media in Gütersloh, Germany; Eurogravure in Treviglio, Italy; and Eurohueco in Barcelona, Spain. They operate energy centers that efficiently produce energy through the use of cogeneration right at the production site.

How does cogeneration work?

All energy centers in the arvato group use environmentally friendly natural gas as the primary energy source. The cogeneration plants use it to produce heat and power.

In the most efficient version, the gas and steam turbine system, natural gas is burned in a combustion chamber after being mixed with combustion air. The hot gases produced in the process can reach temperatures of nearly 900°C and drive a turbine. The turbine is connected to a generator that produces electricity. The process also produces exhaust gases heated to temperatures of more than 500°C. These gases are used to produce steam through the use of heat recovery boilers. If this steam is not directly used in operational production processes like rotogravure printing, it can drive downstream steam turbines that also generate electricity. The result is significantly higher levels of energy efficiency.



Operational principle of a cogeneration plant (Source: German Cogeneration Association)

In addition, an intelligent control system ensures that the steam can be used once again after it leaves the turbine. Through the use of absorption units, the leftover heat can produce chilled air like a refrigerator to do such things as create a comfortable work environment in offices or to regulate the ambient temperature of machinery and systems in production. This is known as trigeneration.

By comparison: high efficiency, low emissions

Conventional power plants are designed to produce only electricity. In the process, just about 35 percent of fossil fuels such as lignite or anthracite, heating oil, and natural gas are converted into electrical energy. The lion's share of potential energy is lost as waste heat.

This is not the case with cogeneration plants. Because they generate both heat and power at the same time and use both in a profitable manner, they reach extremely high efficiency levels of 80 – 90 percent, compared with conventional power plants.

In addition, cogeneration technology produces – particularly in connection with the environmentally friendly energy source natural gas – significantly less emissions of carbon dioxide. This, in turn, reduces the load placed on the environment. Natural gas has relatively few pollution-producing elements, meaning that flue gases produced

The energetic saver

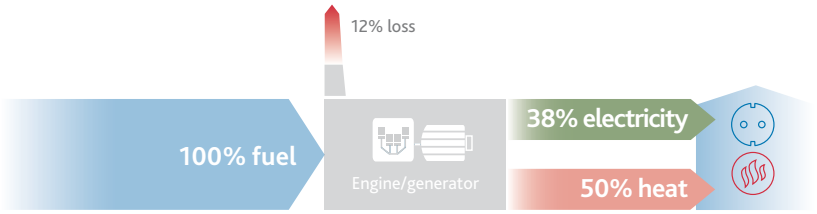
"Conserving natural resources is really important to me. By using the latest heating technology and insulation, I cut the energy consumption of my house, which was built in 1922, by 75 percent. I'm also as energy aware as I can be. I don't have a freezer or use the standby function. Of course, I'm really glad that my employer thinks environmental protection is important, too. After all, it pays off for all of us. I have cut my house's gas consumption by one-sixth, and I use so little electricity that even the municipal utilities can't believe their eyes.

In doing so, I have kept 10,000 kilograms of carbon dioxide out of the environment. This shows just what individuals can do in their private lives to help the environment. Of course, I'm saving money, too. What I'm really excited about is that some of my colleagues are now beginning to make the move to environmentally friendly heating systems. My next major project is a photovoltaic unit to produce solar power."

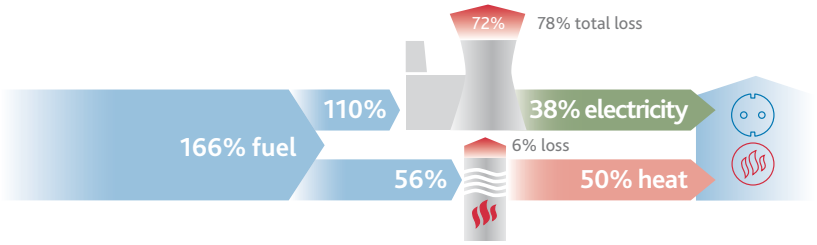
Günter Plachta, prepress specialist, Mohn media

during combustion contain almost no sulfur dioxide, dust, heavy metals, or halogen compounds. Natural gas is also the fossil fuel that has the least impact on the greenhouse effect. A gas-fired cogeneration plant saves up to 80 percent of so-called greenhouse gas emissions compared with today's coal-fired plants and heating stations. One other benefit is that the decentralized form of energy production through cogeneration right at the site of usage also conserves resources because energy is also lost during the transmission of heat and power over long distances.

Cogeneration (block-type power plant)



Separate production (electricity in a power plant/heat in a boiler)



A comparison of primary energy utilization (Source: German Cogeneration Association)

Location 1: Mohn media, Gütersloh, Germany	
Output, electric	21.0 MW_{el}
Output, thermal	69.0 MW_{th}
Annual power production	111,628 MWh
Annual heat production	140,034 MWh
Annual CO_2 savings*	37,172 t CO_2

Location 2: Eurogravure, Treviglio, Italy	
Output, electric	11.0 MW_{el}
Output, thermal	17.0 MW_{th}
Annual power production	41,382 MWh
Annual heat production	69,012 MWh
Annual CO_2 savings*	15,509 t CO_2

Location 3: Eurohueco, Barcelona, Spain	
Output, electric	5.5 MW_{el}
Output, thermal	12.2 MW_{th}
Annual power production	39,613 MWh
Annual heat production	44,597 MWh
Annual CO_2 savings*	3,592 t CO_2

** Compared with national energy supply*

Adi Golbach, managing director of the German Cogeneration Association

Invest locally today, profit globally tomorrow

Thanks to today's gas turbines, gas and steam turbine units, and motor cogeneration plants, cogeneration is a highly efficient technology that has immense potential for protecting the environment and conserving resources. Over the middle term, at least, it can take a tremendous load off the budgets of companies and consumers. Acting primarily out of concern for the environment, but also seeking to reduce dependency on energy imports, the European Union decided in 2004 to introduce cogeneration guidelines aimed at intensifying the use of cogeneration in the member states. The national governments were directed to do studies on the potential for this type of energy usage and on the barriers to its introduction. These studies were to serve as the basis for pertinent strategies to promote cogeneration technology. One such study for Germany was commissioned by the Federal Economics Ministry in 2006. It determined that cogeneration's share of electricity production could rise from the current level of about 10 percent to nearly 60 percent and made economic sense. The precondition for this change: The restrictions created by the old monopolistic structures must be eliminated, and political leaders must send clear signals to energy companies in the form of incentives to expand the use of cogeneration technology. In a reflection of this need, the German government added an amendment to the previously restrictive cogeneration law as part of its efficiency offensive. The goal now is to implement this amendment quickly. Parallel to this effort, companies must increasingly recognize the immense potential offered by cogeneration. After all, production of power and heat with cogeneration technology requires a certain amount of individual initiative and the willingness to investment money. Over the middle term, these investments will amortize themselves through lower energy costs. In the years ahead, energy will become more and more expensive – and the more expensive energy becomes, the more it pays to invest in energy-efficient programs. Companies that decide today to produce their own energy through cogeneration will gain a competitive edge tomorrow.

The second arvato environmental balance sheet

For the arvato group's second environmental balance sheet, data was again separately collected from each of our subsidiaries. In fiscal year 2006, arvato employed more than 46,000 people and operated in 37 countries. Thanks to the previous environmental report submitted in 2005, the first comparisons can be made with the information that it provided from fiscal year 2004.

The arvato group's product portfolio varies extensively, causing differing impacts on the environment. The divisions of arvato print and arvato storage media are conventional industrial manufacturing companies, and the divisions of arvato services and arvato systems are service and logistics providers.

arvato print and arvato storage media manufacture printed products such as books, catalogs, and magazines as well as storage media such as CDs, DVDs, and MCs from raw materials, mainly paper and plastics, using energy and a wide variety of auxiliary and operating materials. Because of the significant amount of materials these manufacturing divisions use, they have the greatest environmental impact within the arvato group. The environmental balance sheet presents the production divisions together.

arvato services and arvato systems offer a wide range of services, for example, running service centers for companies from a variety of different branches as well as operating computer centers and selling digital content. These services produce only a limited number of goods themselves. As a result, these divisions use little in the way of materials and energy, and their impact on the environment is of minor significance. The environmental balance sheet presents arvato services and arvato systems together.

Input	2004 arvato, total	2006 arvato, total
Raw materials, total (tons)	**1,491,975**	**1,330,407**
Paper / cardboard	1,426,830.0	1,270,439.7
Ink / lacquer	34,687.9	23,790.0
Plastics (PC, PS, PE, etc.)	30,260.9	35,751.3
Other raw materials	196.4	426.1
Auxiliary materials, total (tons)	**100,560**	**90,626**
Glues	5,862.4	6,871.6
Binding materials / plastic films	15,667.7	21,765.4
Packaging	79,029.8	61,988.8
Operating materials, total (tons)	**13,334**	**7,447**
Chemicals	928.7	1,830.3
Cleaning agents	373.8	375.5
Solvents	2,623.0	2,796.3
Lubricants	125.8	921.1
Other operating materials	9,282.8	1,524.0
Fresh water, total (m^3)	**2,749,261**	**1,507,966**
Energy sources		
Electricity (MWh)	650,618.5	633,937.3
Thermal and process heat (MWh)	653,005.8	632,829.0
Natural gas (MWh)	105,988.5	204,827.2
Fuels (l)	4,083,528.9	3,571,933.3
Output		
Waste (tons)	**272,206**	**280,878**
Waste for recycling	223,451.6	256,837.5
Waste for disposal	48,754.0	24,040.8
Share requiring special monitoring among both types	1,111.9	4,657.6
Sewage water, total (m^3)	**2,082,739**	**1,040,547**
Emissions (tons)		
Carbon dioxide, fossil	701,643.7	627,298.7
Carbon monoxide	442.6	384.6
Nitrogen oxides	956.5	937.9
Sulfur dioxide	963.9	1,059.2
Dust / particles	118.7	119.6
VOC, total	1,800.5	1,705.0

arvato print and arvato storage media

In fiscal year 2006, arvato print and arvato storage media produced nearly 9.5 billion **products** using around 1.33 million tons of raw materials. This represents a drop of nearly 1 billion products, in operations that lowered raw-material usage by about 160,000 tons, compared with the first arvato environmental report.

This comparison reveals only one overall decrease. This does not, however, actually reflect the significant increase in production. The drop occurred solely through the transfer of one of the arvato group's largest rotogravure printers to the new joint venture PRINOVIS, which operates throughout Europe. For this reason, it does not appear in the fiscal year 2006 balance sheet. Using 374,000 tons of raw materials and manufacturing 2.6 billion printed products in 2004, the printer contributed significantly to the use of materials and the environmental impact in the arvato environmental balance sheet.

The rotogravure printer in Treviglio that opened in early 2006 will partially offset the drop, as will the increase in production in other divisions.

While the total number of printed products decreased by about one quarter, the number of storage media rose to more than 2.3 billion. The 82 percent increase is primarily due to the growing DVD market worldwide. With 1.4 billion units produced – an increase of more than 1.05 billion compared with 2004 – DVDs now represent the largest share of store media manufactured by arvato storage media. The production volumes for CDs have remained about the same compared with 2004, and those for cassettes dropped further.

For production, 1.33 million tons of **raw materials** were used, primarily paper and cardboard (1.27 million tons) as well as plastics like polycarbonate and polyolefine (34,550 tons) and ink and lacquers (23,780 tons). The amount of **auxiliary materials** contained in the products totaled almost 57,000 tons, with packaging (28,505 tons) and bookbinding (21,765 tons) materials together accounting for the major share of this, followed by 6,700 tons of glues. This represents a slight increase of 4.4 percent compared with the 2004 reporting year. Additional **operating materials** needed to manufacture products amounted to almost 7,500 tons, with solvents (2,791 tons), manufacturing chemicals (1,827 tons), and lubricants (921 tons) constituting the main share of this. Compared with 2004, the amount of operating materials used dropped by a significant 44 percent. At a total of 1.24 million cubic meters, water use was also only half as much as two years ago.

The **energy** required for production fell slightly compared with 2004, and included 513,422 MWh of **electricity** (–9.4 percent), 535,021 MWh of **thermal and process heat** (–4.3 percent), and 23.1 million cubic meters of **natural gas** used directly during manufacturing. A heating volume of 739,848 MWh was consumed, constituting an increase of 11 percent. Fuel for company vehicles and internal transportation totaled more than 2.8 million liters of gasoline, diesel, and liquefied gas, 16 percent less than two years earlier. Producing nearly 9.5 billion printed products and storage media generated altogether more than 253,000 tons of different kinds of **waste,** the majority of which was wastepaper and used plastics and metal. Of this, 92 percent (232,795 tons) was recyclable and only 1.8 percent was classified as waste requiring special monitoring. The volume of waste materials requiring special monitoring more than quadrupled compared with 2004. This figure, however, reflects the growing trend worldwide to strictly monitor dangerous waste materials. Materials that were earlier declared ordinary waste for disposal are increasingly being classified by the law as requiring monitoring. A total of

Input	2004 arvato print and arvato storage media	2006 arvato print and arvato storage media
Raw materials, total (tons)	**1,484,990**	**1,325,147**
Paper / cardboard	1,420,953.4	1,266,395.3
Ink / lacquer	34,687.9	23,778.9
Plastics (PC, PS, PE, etc.)	29,152.9	34,546.4
Other raw materials	196.3	426.1
Auxiliary materials, total (tons)	**54,605**	**56,992**
Glues	5,846.1	6,721.7
Binding materials / plastic films	15,667.7	21,765.4
Packaging	33,091.3	28,505.2
Operating materials, total (tons)	**13,228**	**7,406**
Chemicals	928.7	1,827.2
Cleaning agents	352.9	365.1
Solvents	2,622.0	2,791.5
Lubricants	125.8	920.9
Other operating materials	9,258.8	1,501.5
Fresh water, total (m^3)	**2,538,876**	**1,237,514**
Energy sources		
Electricity (MWh)	566,870.6	513,422.1
Thermal and process heat (MWh)	559,249.3	535,021.1
Natural gas (MWh)	105,551.9	204,827.2
Fuels (l)	3,353,045.4	2,817,061.7
Output		
Products, total (number in million)	**10,433.4**	**9,455.8**
Printed products	9,075.5	7,021.6
Mailings / shipments	33.5	29.0
Cardboard containers	64.0	113.0
Storage media, total	1,260.4	2,292.3
Waste (tons)	**253,024**	**253,234**
Waste for recycling	207,341.7	232,794.8
Waste for disposal	45,682.1	20,438.7
Share requiring special monitoring among both types	1,097.2	4,509.2
Sewage water, total (m^3)	**1,912,797**	**803,268**
Emissions (tons)		
Carbon dioxide, fossil	629,528.9	531,520.8
Carbon monoxide	410.1	347.4
Nitrogen oxides	853.5	800.0
Sulfur dioxide	959.1	953.1
Dust / particles	115.4	109.9
VOC, total	1,591.9	1,436 4

810,000 cubic meters of **sewage water** was generated worldwide, 6.2 percent less than 2004.

Energy use, heat consumption in manufacturing, and transportation are always tied to **emissions** stemming from the combustion process. As a result of using fewer raw, auxiliary, and operating materials (–10.1 percent) as well as due to the lower volume of products (–9.4 percent), emissions of carbon dioxide, a gas causing greenhouse effects, dropped by 15.6 percent to 531,521 tons. Carbon monoxide emissions experienced a similar decrease, dropping by 15.3 percent to 347 tons. Other significant emissions included nitrogen oxide, methane, and dust particles. The volume of nitrogen oxide fell by 53.3 tons to 800 tons and the noxious gas methane, also a gas causing greenhouse effects, declined by 145 tons. The volume of volatile organic carbons (VOC) totaled 1,436 tons. Use of environmentally friendly cogeneration technology in portions of the arvato group resulted in a limited volume of dust and particles that totaled only 110 tons. This represented a drop of 4.8 percent.

arvato services and arvato systems

The arvato services and arvato systems divisions have experienced major growth since the first environmental balance sheet for 2004. At that time, there were a total of 18,000 employees. By 2006, this number had shot up to 28,000. Because nonmaterial services such as telephone customer services, sales, and service of computer centers and shipping, storing, and returns processing were primarily carried out, it is not possible here to specify production volumes. Because of the service nature of these divisions, the volume of materials in use compared with the manufacturing companies was more limited. The use of **raw materials,** therefore, dropped slightly to 5,260 tons despite the growing number of employees. This constituted just 0.4 percent of the overall volume for all arvato companies. Particularly worth mentioning here were the decreases in the use of office paper at 4,044 tons and in plastics at 1,205 tons. With a total volume of 33,634 tons, **auxiliary materials** used – primarily glues (150 tons) and packaging (33,484 tons) – also declined (–27 percent). At 41 tons and declining by 11 percent, use of operating materials also improved. **Operating materials** included cleaning agents (10.4 tons) and solvents (4.7 tons). Because of the increased number of employees, **water use** climbed by 28.6 percent to 270,452 cubic meters in 2006. The water used here was exclusively sanitary and drinking water.

With a significant increase of nearly 44 percent, **electricity** was the most prominent form of **energy** used. In fiscal year 2006, 120,515 MWh were used. Two years earlier – with around 10,000 fewer employees – it was 83,748. **Thermal heat** rose less significantly to 97,808 MWh. One reason for the disproportionately small increase was that a number of arvato companies installed energy-saving heat pump systems. The number of company-owned vehicles also only rose somewhat. Their **fuel** use increased by only 3.3 percent, or 24,388 liters, over 2004 and totaled 754,872 liters.

With strong growth in the service divisions, overall **waste** disposal rose. In 2006, this totaled 27,645 tons, 8,462 tons more than two years earlier. This waste consisted of 87 percent recyclable materials (24,043 tons), and only 148.4 tons were classified as requiring special monitoring. The disproportionately large increase of 133.7 tons – as stated previously – is primarily

Input	2004 arvato services and arvato systems	2006 arvato services and arvato systems
Raw materials, total (tons)	**6,985**	**5,260**
Paper / cardboard	5,876.6	4,044.4
Plastics (PC, PS, PE, etc.)	1,108.1	1,204.9
Other raw materials	0.1	11.1
Auxiliary materials, total (tons)	**45,955**	**33,634**
Glues	16.3	150.0
Packaging	45,938.6	33,483.7
Operating materials, total (tons)	**46**	**41**
Cleaning agents	20.9	10.4
Solvents	1.0	4.7
Other operating materials	24.0	25.8
Fresh water, total (m^3)	**210,385**	**270,452**
Energy sources		
Electricity (MWh)	83,748.0	120,515.2
Thermal and process heat (MWh)	94,193.1	97,807.9
Fuels (l)	730,483.5	754,871.6
Output		
Waste (tons)	**19,182**	**27,645**
Waste for recycling	16,109.9	24,042.6
Waste for disposal	3,071.9	3,602.1
Share of waste that requires special monitoring among both types	14.7	148.4
Sewage water, total (m^3)	**169,942**	**237,279**
Emissions (tons)		
Carbon dioxide, fossil	72,114.8	95,777.9
Carbon monoxide	32.5	37.3
Nitrogen oxide	103.0	137.9
Sulfur dioxide	55.9	106.1
Dust / particles	4.4	9.6
VOC, total	208.6	268.5

attributable to altered legal conditions. The overall volume of **sewage water** rose by 39.6 percent to 237,279 cubic meters.

Because of the increase in energy use – as stated previously, the rate of increase for electricity was nearly 44 percent – **emissions** from arvato services and arvato systems rose. Carbon dioxide emissions from fossil sources rose by 32.8 percent to 95,778 tons. Other significant emissions loads included nitrogen oxides at 138 tons (+34 percent), VOCs at 268.5 tons, methane (+29 percent), and dust and particles at nearly 10 tons.

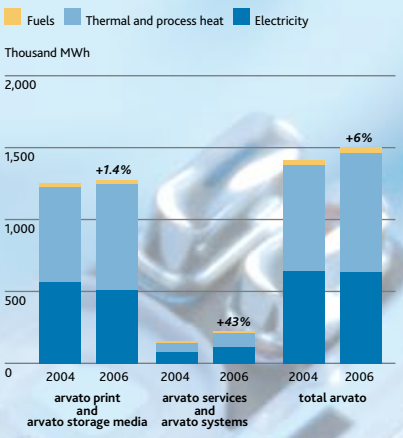
Key figures

To envision arvato's environmental impact, we are continuing to use the system of key figures developed for the 2004 report. This system allows a company's environmental achievements over several years to be compared, independent of current production and employee fluctuations.

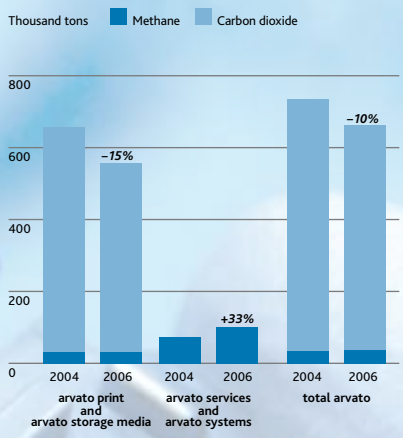
Because of the heterogeneous structure of the companies bundled under arvato AG, the system of key figures has to be organized differently for arvato print and arvato storage media than for arvato services and arvato systems. In this way, the present balance sheet contains comparable data for two reporting years that are independent of production and employee fluctuations.

Product weight was chosen as the reference ratio for creating key figures in print and storage media production in the production sector. It is defined as the sum of purchased raw and auxiliary materials minus disposed waste from production. Product weight decreased by 12.3 percent to 1.13 million tons in 2006. The reason for this is the previously mentioned transfer of arvato group's largest rotogravure printers to the new joint venture PRINOVIS. As a result, about 0.33 million tons of product weight were eliminated from the environmental balance sheet.

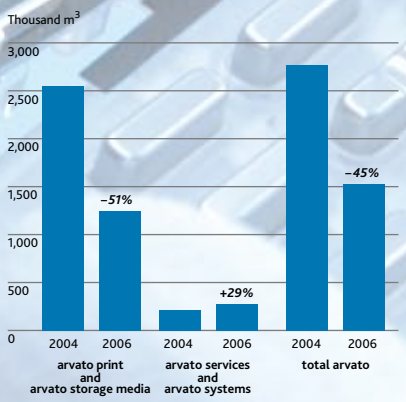
Energy consumption



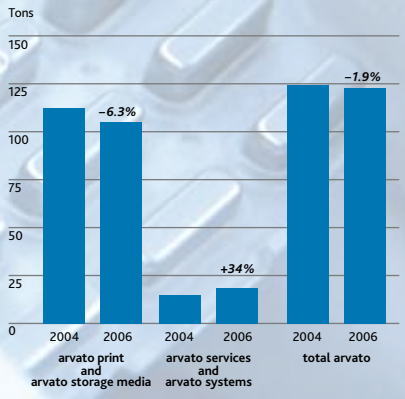
Greenhouse effect in CO_2 equivalents



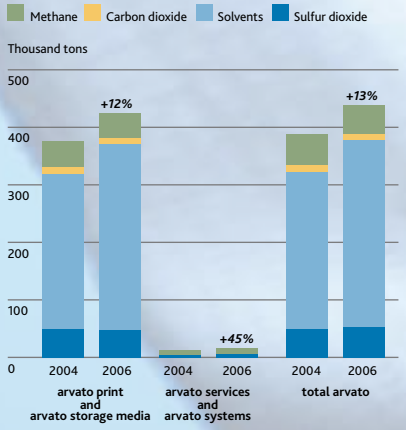
Water requirements



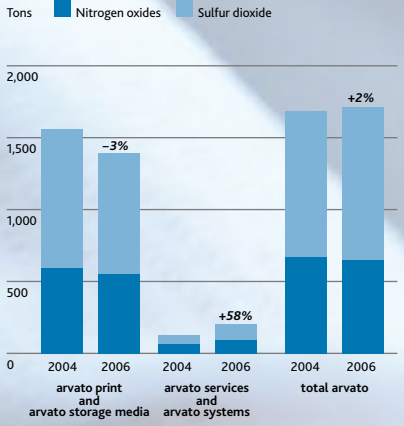
Eutrophication in phosphate equivalents



Summer smog potential in ethene equivalents



Acidification potential in SO_2 equivalents



The lower product volume and decrease in electrical energy use with the simultaneous increase in fuel and heat consumption impacted the emissions-related key figures differently. As a result, the greenhouse effect dropped to 0.5 tons CO_2 equivalent. The summer smog potential rose slightly to 0.38 kg ethene equivalent, the acidification potential to 1.34 kg SO_2 equivalent. The eutrophication potential – a gauge for the overfertilization of soil and water by air pollution – remained nearly unchanged. Requirements for raw materials – a measure of production efficiency – rose, in terms of lower production output, just as overall energy requirements did. Water requirements fell significantly.

The 2004 reference to the number of employees was also retained for the arvato services and arvato systems divisions. The number of employees used in calculating the reference values rose by more than 50 percent to 28,000 employees in the period under review, and this had a significant effect on the development of the key figures. All impact categories presented pointed to rates that had significantly decreased. As it is not possible to define product volumes for this service sector and calculate related product weights, the balance sheet once again does not present key figures for raw materials requirements.

The tables indicate the changes compared with 2004.

Key figures arvato print and arvato storage media (amount per ton of product weight)

	2004	2006	Dimensions
1. Energy requirements	0.98	1.13	MWh
2. Raw material needs	1.20	1.22	tons raw material
3. Water requirements	1.97	1.10	m^3
4. Greenhouse effect	0.76	0.50	tons CO_2 equivalent
5. Summer smog potential	0.30	0.38	kg ethene equivalent
6. Acidification potential	1.17	1.34	kg SO_2 equivalent
7. Eutrophication potential	0.09	0.09	kg PO_4 equivalent

Key figures arvato services and arvato systems (amount per employee)

	2004	2006	Dimensions
1. Energy requirements	13.11	10.00	MWh
2. Water requirements	14.90	12.00	m^3
3. Greenhouse effect	5.40	4.50	tons CO_2 equivalent
4. Summer smog potential	0.70	0.63	kg ethene equivalent
5. Acidification potential	9.09	8.99	kg SO_2 equivalent
6. Eutrophication potential	0.95	0.80	kg PO_4 equivalent

Acidification potential	Describes the degree of acidification of soil and water by the formation of reference figures (SO_2 equivalents). Also referred to as acid rain or forest damage.
Carbon dioxide	CO_2; gas arising from the complete combustion of organic substances (gas, oil, coal, wood, etc.). Is a major contribution to the greenhouse effect.
Carbon monoxide	CO; toxic gas arising from the incomplete combustion of organic substances.
Environmental guidelines	Environmentally oriented guidelines and instructions of an organization.
Environmental management system	Voluntary instrument of precautionary protection of the environment for systematic investigation and decrease of companies' environmental effects.
Eutrophication	Overfertilization of soil and water. The main polluters causing eutrophication are nitrogen oxides and phosphoric compounds (NOx). The reference unit is phosphate (PO_4) equivalents.
FSC	Forest Stewardship Council; international organization with headquarters in Bonn and national working groups in 35 countries.
Greenhouse effect	Describes the effect of transformation of sun rays into heat under the influence of greenhouse gases as CO_2 and certain VOCs. The greenhouse effect causes a global warming of the Earth's atmosphere. The reference unit is CO_2 equivalents.
kWh	Kilowatt hour; physical unit for energy, 1,000 kWh = 1 megawatt hour (MWh).
Nitrogen oxides	NOx; primarily from oxidation of airborne nitrogen in combustion processes, co-responsible for acid rain and eutrophication.
Sulfur dioxide	SO_2; arises during the combustion of fuels containing sulfur, particularly coal. It has a negative effect on human health and vegetation and contributes to the creation of acid rain.
Summer smog	Describes the formation of ozone mostly near the ground and is influenced by heat and sun energy. It requires certain volatile organic hydrocarbons (VOC) and catalyst substances (NOx). The reference unit is ethene equivalents.
VOC	Volatile organic compounds; are compounds containing organic carbon which are co-responsible for the formation of summer smog and the greenhouse effect.
WWF	World Wide Fund For Nature ("World Wildlife Fund" in North America); an international, non-governmental organization for the protection of nature and the environment. WWF is active in almost 100 countries. www.panda.org

Dr. Achim Schorb, IFEU Institute for Energy and Environmental Research

"arvato's second environmental report continues to determinedly promote data collection in the areas of production and services.

As a comparison with the key figures from the 2004/2005 report shows, the first successes have already been achieved in energy savings and emissions reductions.

The IFEU Institute will continue to serve as an objective and critical mentor for arvato in the company's drive to achieve its goals."

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