Rüdersdorf Site

Environmental Statement 2003

Rüdersdorfer Zement GmbH

Readymix Zement

Content

Rüdersdorfer Zement – Helping to protect the environment in the 21st century

Rüdersdorfer Zement GmbH can now look back over twelve successful years – years in which we have faced considerable challenges and gone through a process of profound change. It was necessary, in only a short period, to transform an uninspiring and inefficient unit of the socialist planned economy into a competitive, publicly accepted company. This not only required adopting completely new attitudes throughout the firm, but also investments of hundreds of millions of euros.

Modern, cost-effective and environmentally-friendly process technology has been introduced, and major environmental protection projects accounted for no less than 20 % of the total sum invested. The range of products was developed to meet demand, and the customer has been firmly established as the focus of our attention.

With this development we have also met our responsibility towards our region. The quality of life of local residents has improved markedly. Today, Rüdersdorf has a good name as a location for the building materials industry. The project "Cement between Two Millennia" which was presented within the framework of the EXPO 2000 World Exposition is only one example of how our reputation now extends far beyond Brandenburg.

We believe that we have every reason to be proud of what we have achieved. Our Rüdersdorf cement works today can stand up to comparison with the best cement works anywhere in the world, both economically and from an environmental point of view.

Of course, none of this would be possible without our well-trained and dedicated co-workers. But it was also important to establish a well-structured organisation, provide clear guidelines for key operational procedures, and to specify responsibilities and suitable control mechanisms. Our environmental and quality management system, which has been an element of our work for many years now, and has meanwhile become part of an integrated management system, has proved very helpful in this respect.

One of the key steps forward for us was the publication of an Environmental Statement in the year 2000. This was the first environmental report to be presented by a German cement works according to the Environmental Management and Audit scheme (EMAS). It has proved to be a very important source of information, and a useful tool in our dialogue with all interested parties – neighbours, customers, decision-makers, organisations, and authorities. One consequence of this work has been our membership in the Environmental Partnership Brandenburg, a joint initiative of the Brandenburg Ministry of the Environment and the Chamber of Industry and Commerce (IHK).

With the presentation of this second Environmental Statement, we hope to continue the fruitful environmental protection dialogue with all interested parties.

Our integrated management system should continue to help us in the process of continual improvement which is essential if we are to rise to the new challenges arising for example from the continuing globalisation of markets, the introduction of trading in emissions certificates, and the goal of sustainable development.

Rüdiger Wirthwein, Managing Director

Peter Scur, Manager Environmental Affairs

A portrait of the company

A view of the Rüdersdorf cement works with its modern plant and the adjacent limestone quarry

Rüdersdorf – a location with a rich tradition

Rüdersdorf, situated on the eastern outskirts of Berlin, has a rich tradition as a location for the production of building materials. The best-known limestone outcrop in the North German Plain can look back in 2004 on a 750-year history of quarrying. Already in the 16th century, the limestone was being processed in kilns, and in 1885 the history of cement production began in Rüdersdorf.

Since then, a number of cement works have been set up in Rüdersdorf. The last of these, in 1966, was the Cement Works 4 which is still in operation. One of the main markets was and still is the nearby Berlin.

Promoting technological developments

Over the centuries, Rüdersdorf has exerted considerable influence on developments in limestone and cement technology, and several innovations were introduced there: in the 19th century these included innovations in limestone transport, or the development of the first continually operating limestone kiln – the principle of the Rumford kiln – and the 20th century has seen the use of power station ash as a raw material component, or recently the integration of gasification technology in the cement kiln for the optimum utilisation of secondary fuels.

Visitors to the industrial museum park in Rüdersdorf are given a very interesting view of the technological developments and the rich history of this location.

Cement works in Rüdersdorf-Kalkberge, about 1900

Wider range of products with slag blend cements

With the commissioning of the Cement Work 4, the annual cement production in Rüdersdorf could be increased to approx. 2.5 million tonnes. Twelve kilns were operated in three works until 1986. Since 1953, the Rüdersdorf cement works has also had a milling operation in Eisenhüttenstadt, about 100 km away on the river Oder. This plant was erected in the direct vicinity of the iron works Eisenhütten-Kombinat Ost (EKO) in order to make use of the blast-furnace slag for the production of slag blend cements, which considerably expanded the range of products which could be provided.

From dust-bowl to model region

In the past, the growth in production was not accompanied by appropriate measures to protect the environment, and the region around Rüdersdorf soon acquired a very negative image due to the all-pervasive coating of white limestone dust.

Following the integration of the Rüdersdorfer Zement GmbH in the Readymix Group in 1990 and the introduction of a very extensive refurbishment programme, it proved possible to reverse this development. Within the framework of the modernisation programme, state-of-the-art technology was introduced for cement production and a comprehensive environmental protection programme was implemented. Another element of the refurbishment programme involved the demolition of the old cement works and the conversion of the cleared site into an industrial and commercial park.

The overall result of all these measures has been to restore trust between the cement works and the local population.

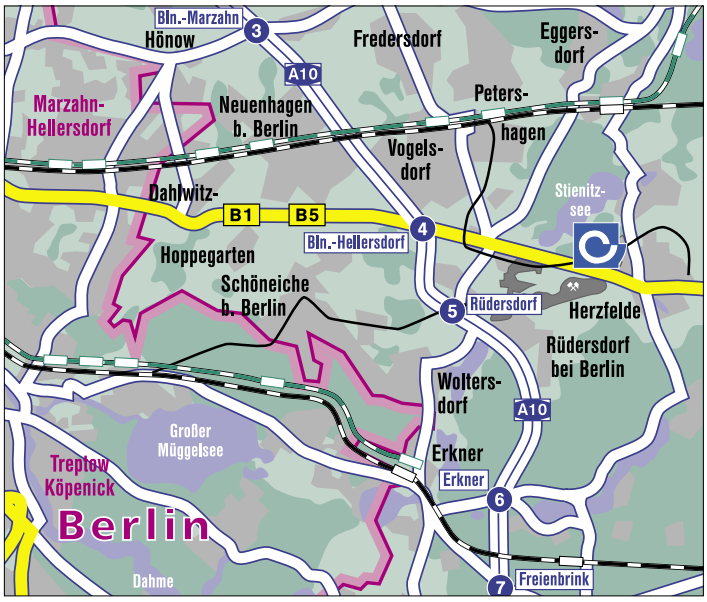
Today, cement production in Rüdersdorf is concentrated in one works, and at its heart is the Kiln Line 5 with a daily capacity of 6 000 tonnes of clinker and a powerful cement grinding plant.

Milestones in the environmental programme since 1990

- **1991** Thermal upgrading of kilns 3 and 4
- **1992** Conversion of cement mill 1 to cycle grinding with a new de-dusting unit,
  Environmental Impact Assessment for the construction of kiln line 5
- **1993** Enclosed limestone storage in blending bed,
  New de-dusting units for kilns 3 and 4,
  New de-dusting system for cement mills 2 to 5
- **1994** Commissioning of roller presses, with energy-efficient combined grinding for cement,
  New de-dusting of the coal mills 1 and 2,
  Commissioning of rainwater collection tank, and oil monitoring in the cooling water cycle
- **1995** Commissioning of kiln line 5 with circulating fluidised bed
- **1996** De-dusting for the clinker storage hall, following up on the construction in 1994 of two new clinker silos,
  New de-dusting for the raw mills 4 to 7,
  Opening of the environmental laboratory
- **1997** First use of secondary fuels (waste wood),
  Start of desulphurisation measures for kiln line 5,
  Initiation of a noise abatement programme
- **1998** First use of dry processed waste as a secondary fuel and mineral residues as secondary raw materials
- **1999** Improved control of mercury emissions for kiln line 5 with continuous monitoring and filter dust extraction
- **2000** Certification of the environmental management system in accordance with ISO 14001 and the Environmental Management and Audit scheme
- **2001** Use of meat and bone meal as a secondary fuel
- **2002** Ground blast furnace slag production at Rüdersdorf

The works is located in an industrial zone and together with the limestone quarry it covers an area of 3 km². For transport purposes, the Rüdersdorf cement works has a very convenient location directly on the main B 1/5 road and very close to the A 10 autobahn (Berlin Ring orbital motorway). It also has a rail connection and its own inland waterways harbour.

Readymix attaches great importance to customer relations and environmental protection, and about 300 well-trained and dedicated personnel implement these goals at Zementwerk Rüdersdorf.



Our range of products

"Three shovels of sand, one of cement" – this well-known "recipe" for concrete might be fine for simple building jobs – and in particular for DIY applications – but most of our customers place much higher demands on their concrete.

Our affiliated company Readymix Beton, for example, supplies some 30 different concrete mixtures. In particular modern self-compacting concrete or easily worked Aaton concretes require cements which reliably comply with the highest standards.

The central building of the new BMW works in Leipzig, constructed to the design of the architect Zaha Hadid using Aaton Ultra self-compacting concrete on the basis of our CEM II/B-S 32.5 R.

Manufacturers of lightweight foamed concrete require a cement that is directly matched to their production technology, and they place demands on quality that go far beyond those specified in industrial cement standards. Producers of concrete products need cements with high early strength and final strength, and very good colour constancy.

In order to be able to satisfy the wide-ranging demands of our customers, we have set up the application groups "Ready-mixed concrete", "Concrete products", "Civil engineering/ Environmental technology", "Traffic areas" and "Construction products".

The analysis of customer requirements at the Rüdersdorf works has led to an expansion of our range of cements, special binders and limestone dusts from five products in 1995 to twelve in 2004. In addition, a further eight products are provided by the Eisenhüttenstadt works.

In addition to their compliance with "standard specifications" many of our products offer additional advantages in use, and a technical back-up service is also available.

Our products are not only based on Portland clinker. Readymix Zement has played a leading role in promoting the use of ground blast furnace slag as a major component in cementin Germany. This trend will grow in future, and contribute to further CO_2-reduction in cement production. Slag blend cements (CEM II/-S and CEM III) are becoming steadily more popular, and over recent years the production of CEM II/-S cements has increased by about 10 %. With the certification by the building supervision authorities of CEM II/B-S cements with low alkaline content, our customers will also be able to choose from a broad range of products in this sector. And CEM II/B-S 52.5 R has been developed specially for concrete products production.

In addition to Portland clinker and ground blast furnace slag, limestone dust will also have a significant role to play in future as a main component in cement. With the controlled combination of these three main components, it will in future be possible to meet the demands of our customers by improving the working and hardening characteristics of our ready-mixed concretes, while at the same time reducing the use of clinker – the CO_2-intensive component. In addition, limestone meal is a valuable admixture for modern concretes.

Products for special civil engineering projects and ground stabilisation round off the range of products which we produce. Under the names PREDUR, PREFILL and PREMIX they have already established themselves as favourites with our customers. In 2003 we also introduced GLASAND CEM III/B 32.5 N as a new product.

Just-in-time delivery of our products to the customer.

The production process at the Rüdersdorf cement works

Raw material extraction

Limestone is the most important raw material component for the production of cement.

At Rüdersdorf it is extracted from the local quarry by blasting and then passed through a stationary crusher before being transported on belt conveyors to a blending bed, where it is homogenised and then stored.

Raw material extraction in the limestone quarry

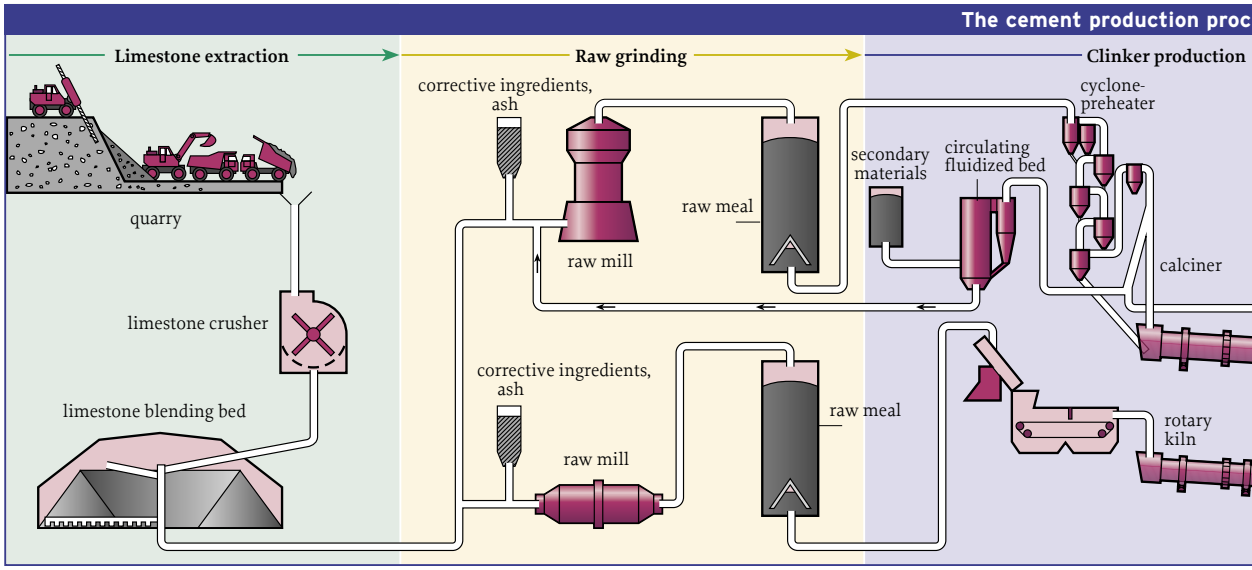
Raw grinding

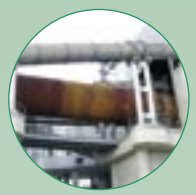
In the raw material blending, sand, iron ore and ash are added in a variety of compositions. The precisely measured mixture is ground and at the same time dried in a raw mill. Following this, the raw meal is transferred into silos for intermediate storage, providing further homogenisation.

Ash produced by the circulating fluidised bed

Limestone supply hoppers

The homogenised raw meal is subsequently burned in rotary kilns at 1450°C to form clinker. The chemical reactions that take place give the cement its hydraulic properties.





Clinker production

The largest part of the clinker is produced in the modern kiln line 5 by the dry process using a 5-stage cyclone pre-heater and a calciner. The necessary energy is provided by pulverised coal and also by suitable waste materials, which first have to be subjected to quality-checks. In an upstream circulating fluidised bed, a gas is generated from these secondary fuels at approx. 950°C, and this is then burnt in the calciner of the kiln line. The residue ash is utilised as a raw material component in the raw mills.

In addition to the kiln line 5, a further two lepol kilns are in operation. With these kilns, the raw meal is first mixed with water to form granules, so that a travelling grate can be used as a pre-heater in front of the rotary kiln.

Directly after the burning process in the rotary kiln, the red-hot clinker is cooled with fresh air in clinker coolers. The warmed air is then returned to the kiln and used as combustion air.

Rotary kiln with tertiary air ducts

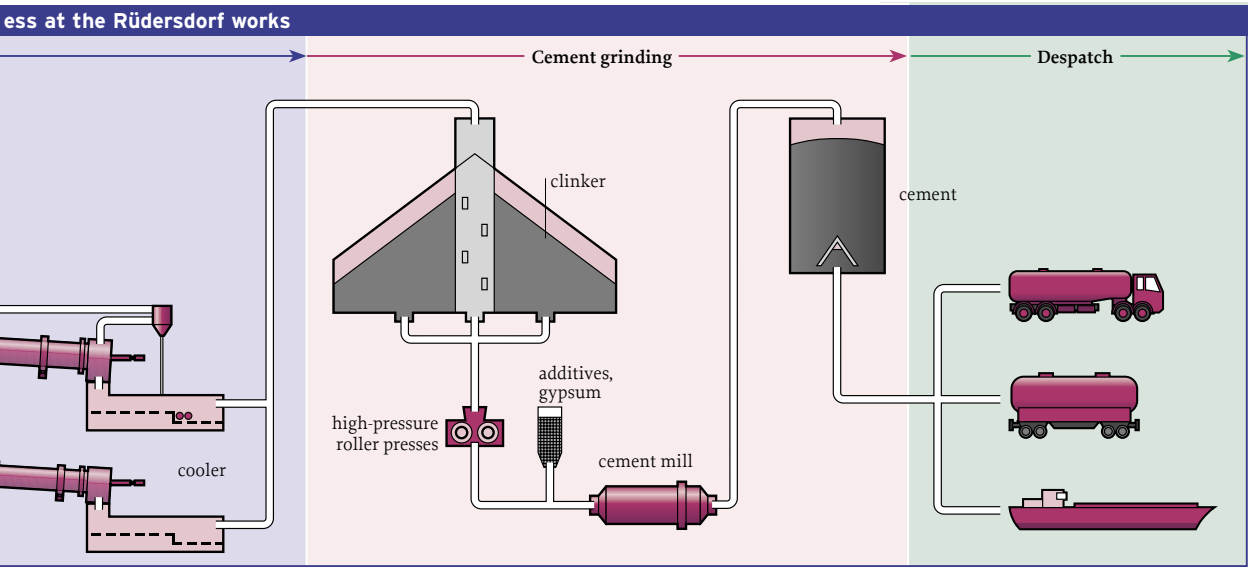
Cement grinding

In the final production stage, the clinker is ground with a sulphate agent, e.g. gypsum, and other additives such as ground blast furnace slag, to make the cement. Two combined grinding facilities, each with a set of high-pressure roller presses and two ball mills, as well as an air-separator mill are available for this purpose. As admixtures are becoming increasingly important in cement production, additional grinding capacity has been created for the raw milling plant in Rüdersdorf to supply ground blast furnace slag.

The final grinding of the cement has a positive effect on the working properties.

Transport

The finished cement is shipped in bags or in bulk container vehicles by road, rail or waterways.



Our environmental policy

Our environmental policy is intended to ensure a continuous process of improvement in the environmental performance of our company, while at the same time implementing the environmental policy remit established by our corporate management. With these goals in mind, we have defined the following principles for our management, all our employees and the individual environmental sectors:

Environmental management
The protection of the environment forms an integral part of all our activities. The minimum goal is compliance with the legislative requirements. Beyond this, we consider the further potential for **reducing harm to the environment**. We also view environmental protection in the context of sustainable development, and take into consideration questions of economic viability, effectiveness and utility.

When undertaking investments, modifying industrial plants, or developing new products, we consider potential environmental impacts right from the start of each project, and state-of-the-art precautionary and preventive measures are included in the planning where appropriate. As is the case with production supervision and the development of measures to prevent and contain environmentally harmful accidents, we always cooperate closely with the relevant authorities.

We adopt **open and transparent information policies** both within the company and in external communications, we support educational institutions with **teaching about environmental protection**, and we also **train** our own personnel so that they are able to fulfil their own responsibilities to the environment.

We **inform** suppliers, service providers, contractors, and outside firms working on our site about our environmental policy, and we make sure that these firms also behave in an environmentally appropriate manner.

Raw materials extraction and recultivation
The limestone quarrying necessary for the production of cement unavoidably has an impact on the natural environment, but this is kept as small as possible by means of appropriate preventive measures and after-care. Wider measures in the sense of nature conservation and the development of tourism amenities are intended to increase the attractiveness of the region, as will the greening of our works' site.

Air-pollution control and noise abatement
Emissions into the air are the main factor in our environmental impact and are correspondingly the focus of our environmental protection measures. In addition to the monitoring and analysis of emissions, we also review local pollution levels, taking prevention-oriented protection standards as our guide. We find it very important that our pollution monitoring equipment is in good working order at all times, and carry out regular checks.

Water conservation
We handle water very carefully and take all possible precautions to avoid pollution of surface waters when discharging process water and rainwater.

Conserving natural resources by using secondary materials
We conserve natural resources by means of the environmentally-friendly utilisation of suitable waste, for example as secondary fuel, and in this way help to reduce the pressure on land-fill disposal sites, etc. We view this as a real contribution towards protecting the environment, going beyond our obligation to comply with statutory emission limits. When using secondary materials, we take great care to ensure that the production processes and the final product are environmentally acceptable. The requirement is met by a specially developed quality assurance system and an extended range of tests.

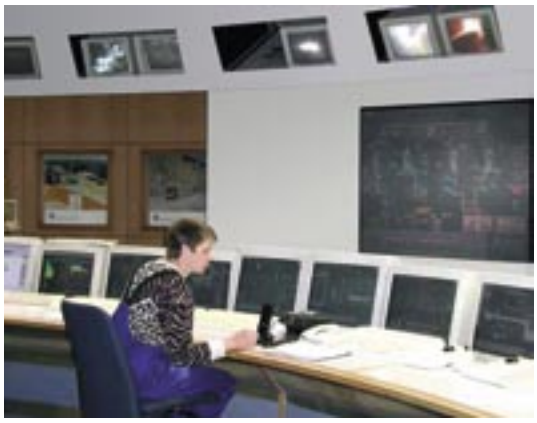
Integrated environmental protection and energy management
We regard environmental protection as an integral aspect of the production process and this puts us in a better position to exploit opportunities for in-process environmental protection. When choosing production methods and developing production processes we pay attention to low energy consumption.

Waste management
We do all we can to avoid all waste in the production process. Unavoidable waste from peripheral sectors such as maintenance or administration is properly disposed of.

Company management and our environmental management system

In 1999, when our environmental management system was first certified by an accredited environmental expert, it still existed as an independent system.

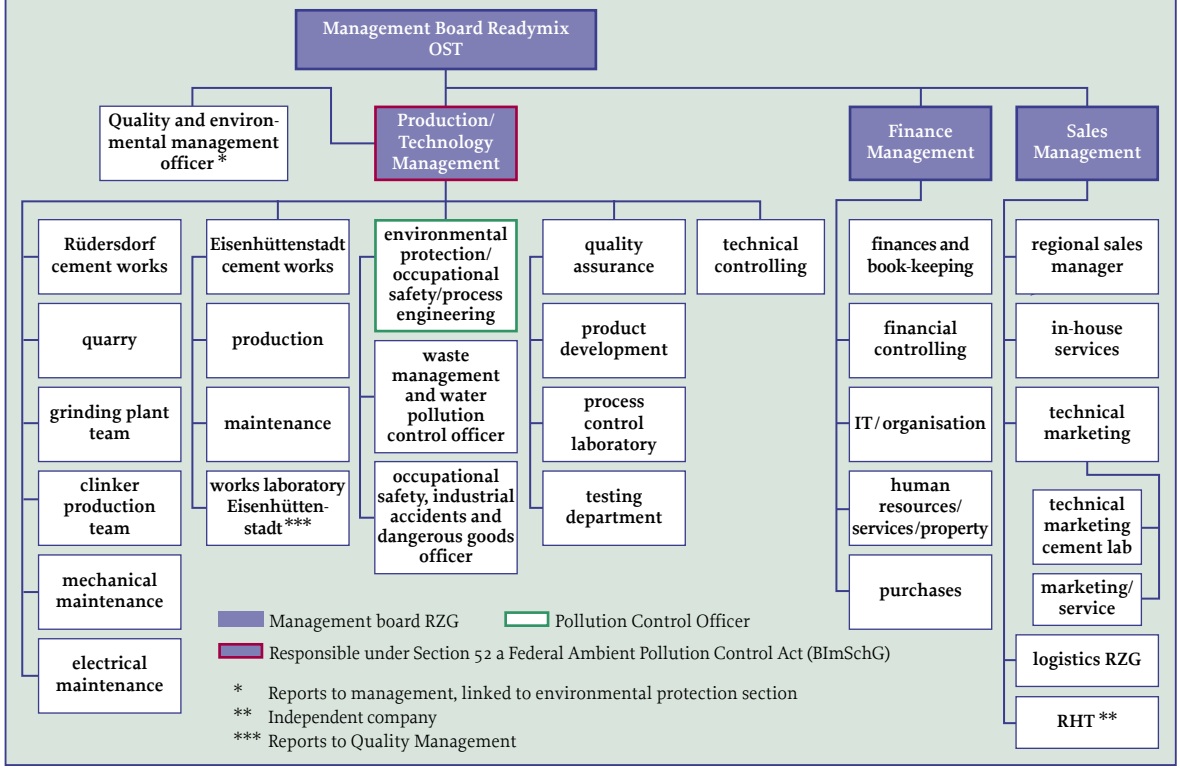
Meanwhile, we have integrated the environmental management system with our quality management system, which has allowed us to benefit from a number of positive synergy effects. Our current integrated management system is more transparent and therefore more effective. The main requirements regarding the organisational structure, and also necessary procedures and responsibilities are contained in a joint manual. Company surveys will be carried out jointly, and there will be undivided responsibility for the maintenance and supervision of the integrated management system. In future evaluations, increased use will be made of process performance parameters.



Inside the central control room

The central control room is the heart of the cement works.

Organisational structure of Rüdersdorfer Zement GmbH



Environmental protection as a company goal anchored in the company structures

The company management has agreed on a mission statement for Rüdersdorfer Zement GmbH with the following six objectives:

1. We make our customers successful.
2. We feel committed to protect the environment.
3. We are an attractive employer.
4. We rely on decentralised organisation and the delegation of responsibility.
5. We feel a sense of responsibility towards the region and the Rüdersdorf tradition.
6. We provide satisfactory returns on investments.

These objectives highlight the importance attached to environmental protection, and the company's commitment to "sustainable development", bringing together economic performance, social responsibility and the protection of the environment.

The promotion of the environmental management system and the establishment of an environmental policy with specific principles for environmentally-related actions are the logical extension of this development.

Continuous system maintenance and open communication

The efforts to achieve continual improvements is documented by the reviews of the recent environmental programmes (see pages 28/29). The central elements of this process are the internal environmental audits and the annual management reviews.

The internal environmental audits have the following goals:

- Evaluation of the existing management system
- Examination of environmental policies
- Environmental performance in compliance with the relevant regulations
- Discussion of potential for improvement taking process performance parameters into consideration
- Implementation of the environmental programme

In 2002, we carried out a total of 16 internal environmental audits, and following a revision of the entire system documentation we carried out a further six audits in 2003 in the most important areas. As a consequence, we have drawn up an extensive environmental programme for the coming years (see page 30).

The environmental protection dialogue made use of the environmental policy statement, and also drew on our web-site and our "Information sheet for co-workers". Other topics for personnel training in 2002/2003 included integrated management system, environmental impacts, and secondary materials. Company representatives delivered a total of eleven public lectures on environmental topics, some at international conferences and meetings. In addition we were able to present our cement works to a considerable number of visitors in guided tours. In 2002, our personnel accompanied a total of 56 guided tours, not including the tours of the industrial museum park in Rüdersdorf; in 2003 there were 42 tours.

The Building Materials Training Centre

Input-Output Analysis 2002

INPUT

1. Input materials

Limestone	10^3 t	2 700
Sand	10^3 t	144
Ash	10^3 t	155
Iron ore	10^3 t	26
Mineral residues	10^3 t	12
Slaked lime	10^3 t	13
Sulphate agent	10^3 t	88
Blast furnace slag	10^3 t	432

2. Energy

Coal	10^3 t	171
Petroleum coke	10^3 t	14.5
Secondary fuel	10^3 t	114
Meat and bone meal	10^3 t	36.7
Natural gas	10^3 t	1.2
Electrical power	GWh	240

3. Water

Surface water	10^3 m³	447
Potable water	10^3 m³	32

4. Consumables

Lubricants	t	25
Refractory material	t	1 000
Metal wearing parts	t	70
Grinding aids	t	170
Explosives	t	360
Fine chemicals	t	0.4
Test gases	10^3 l	6
Test sands	t	10
Packaging materials	t	995
Heating oil	10^3 l	41
Diesel	t	990

OUTPUT

1. Products

Cement	10^3 t	2 320
Clinker	10^3 t	200
Limestone meal	10^3 t	86
Ground blast furnace slag	10^3 t	1

2. Water

Discharged water	10^3 m³	235
Quarry dewatering	10^3 m³	13 100

3. Waste

for utilisation	t	2 510
for disposal	t	22

4. Emissions

Staub	t	109
CO_2 (raw materials)	10^3 t	1 008
CO_2 (fuels)	10^3 t	653
of which SBS + MBM	*10^3 t*	*212*
CO_2 electrical energy	10^3 t	137
SO_2	10^3 t	1.8
NO_x	10^3 t	2.1

Limestone extraction

The limestone deposits in Rüdersdorf provide the basis for cement production on this site.

Unavoidably, the extraction of the limestone involves an intrusion into nature and the landscape; it requires the lowering of the groundwater level, and is also associated with blasting vibrations. However, the resultant environmental impacts can be evaluated and the effects can be reduced to environmentally-acceptable levels. Targeted measures can also off-set negative consequences.

Heavy equipment in the limestone quarry

Re-cultivation

A quarry provides favourable conditions for ecologically diverse natural spaces, as well as offering scope for outdoor recreational areas and amenities. By means of a well-planned recultivation strategy, these benefits can already be enjoyed even while quarrying is still in operation.

The special ecological value of the Rüdersdorf area is directly associated with the limestone outcrops and the use of this natural resource, which make this site unique in Brandenburg.

The re-cultivation programme for the Rüdersdorf quarry takes this into account, and contains a range of goals to suit the location and the use of the various areas:

- Promoting natural succession
- Site-specific species protection
- Initial planting above the projected lake waterline
- Creation of green corridors (primarily to link biotopes)
- Diversified plantations to restrict dust propagation
- Provisions for recreation and education (nature trails, platforms)
- Integration of the historical relicts in the greening measures
- Creation of park-like structures (green spaces, pathways)

Since 1993, a total of 71 300 plants from 75 species have been planted and tended around the quarry and on the outlying spoil tips.

Over the past three years, 15 760 mainly native hardwood plants were planted, with a high proportion of ecologically valuable shrubs, such as buckthorn, dogwood, elder, honeysuckle, and hazel.

Development of a green belt along the eastern perimeter of the quarry

The special character acquired by the quarry area over centuries of use make it an ideal habitat for a varied group of animals, and in particular for bats. The excavation work has left large number of shafts and tunnels in the limestone, and for more than 70 years Rüdersdorf has provided one the few mass hibernation quarters for bats in Central Europe. In the 1930s, naturalists developed the method of ringing bats. At that time, more than 3 000 animals were registered in the winter. Since the beginning of the 1990s between 1 000 and 1 500 bats have been counted, although it is now no longer possible to check a large part of the old shafts for safety reasons.

Ringed bats in a shaft

In cooperation with the Brandenburg Ministry of the Environment, the mining authorities and the Nature Protection League, a plan was agreed on in 1993 to implement measures to protect the bat hibernation quarters which were coordinated with the on-going quarrying operations. This involved, among other things:

- No quarrying from the old shafts from October to April
- Fencing off all openings, but allowing access for bats
- Regular inspection tours.

Since in the long-term the number of available winter quarters in the quarry will decline, old industrial buildings outside the quarry and above the groundwater table (cellars, bunkers and disused tunnels) have been converted to provide a permanent alternative. This involves:

- Emptying and cleaning
- Frost-proof covers and screens
- Installation of slit walls and hollow-block ceilings.

As a result of this work, in 2003 the bat hibernation quarters in Rüdersdorf with five specific locations were designated as an FFH (flora-fauna habitat) by the Brandenburg Ministry of the Environment.

A bunker has been converted into winter quarters for hibernating bats.

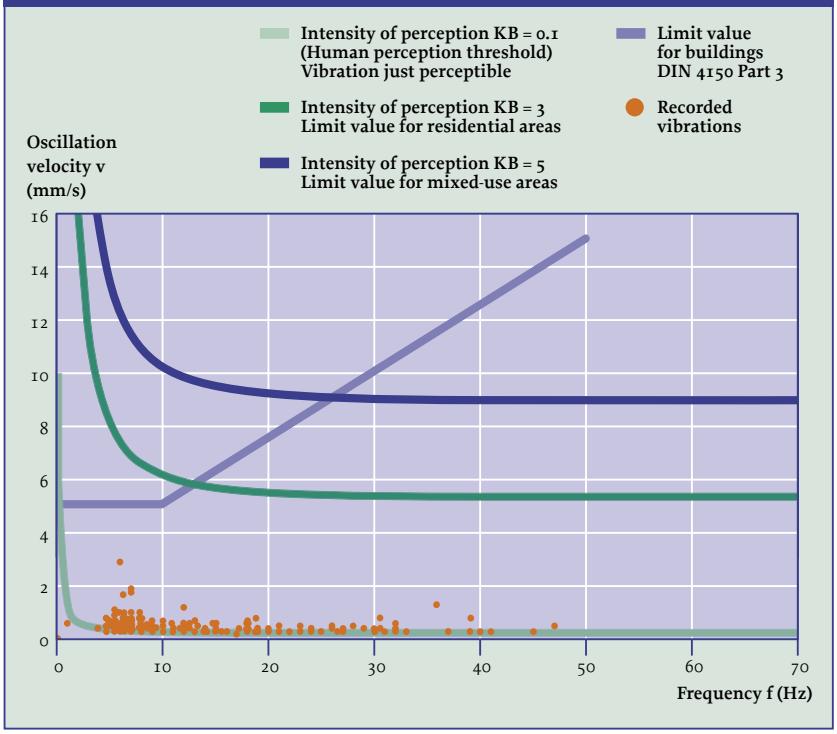
Blasting vibrations

Blasting has been used in the quarrying of limestone in Rüdersdorf for almost 200 years. Over this period, blasting technology has been constantly developing. Nevertheless, today the local residents in Rüdersdorf and Herzfelde can still feel the explosions. Why is this?

Blasting releases a large amount of energy, which is necessary in order to break out the solid limestone from the deposit. But some of this energy is transmitted as seismic waves through the rock and leads to vibrations elsewhere. It is technically impossible to prevent the formation of these shock waves, and thus to stop the vibrations. There is no blasting without vibrations. However, it is possible to influence the severity of the shock waves. The strength of vibrations depends mainly on the amount of explosive which is detonated at any one time (load per detonation phase) and also the distance from the point of detonation. But the geological and hydrological conditions also have an influence on the damping of the shock wave.

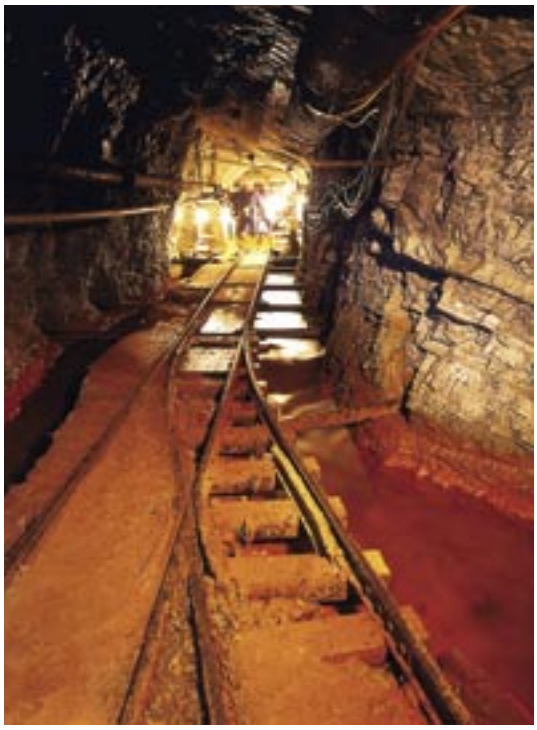
The blasting vibrations can be measured in terms of the oscillation velocity in mm/s. In order to evaluate the effects vibrations can have on buildings, the recorded measurements can be compared with the specifications in industrial standards and codes of practice.

Blasting vibration measurements (data for 2002) compared with the permitted limit values



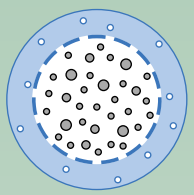
Rüdersdorfer Zement GmbH carries out an extensive programme to monitor blasting vibrations, in order to ensure that these do not exceed the permissible limit values. Since 1995, a total of more than 2 300 seismic measurements have been made. Vibrations are monitored at critical points during blasting, and the results are subsequently analysed. As the figure shows, the shock waves from the blasting are certainly perceptible, but there is no possibility of buildings being damaged. It is quite clear that the vibration levels registered to date are less than half the limit values for residential buildings.

In view of public interest, in 2003 the Rüdersdorf cement works held two meetings on this topic and an information sheet was distributed.



The 11 km long underground tunnel system for the de-watering of the quarry will be extended in the coming years. The quarry water is used among other things for trout farming, and has a positive effect on the quality of the water in the surrounding lakes.

Air pollution control

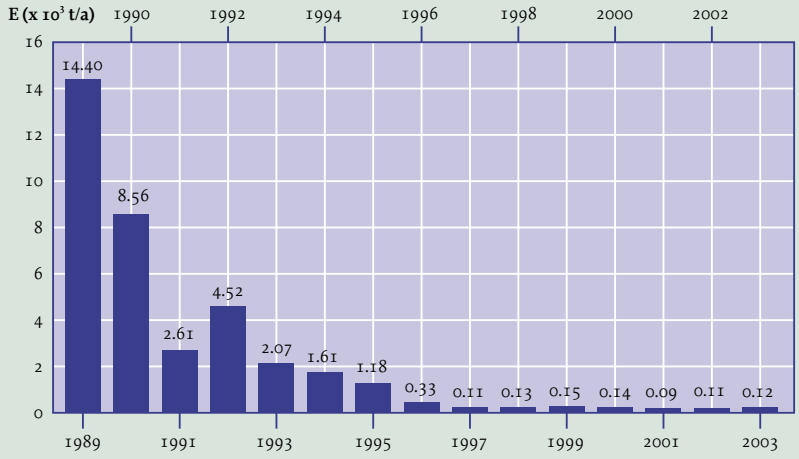


Filter systems

A view of the measuring platform at the stack of kiln line 5, and a look inside showing the emission monitoring system

In order to avoid dust emissions at the Rüdersdorf cement works, a total of 238 dust filters are in operation – 5 electrostatic precipitators linked to the two chimney stacks for the flue gas from the kilns, and 233 fabric filters. The total surface area of the fabric filters is about 22 500 m². This emphasises that keeping the air clean is the predominant environmental consideration for our operations. As a result of the effectiveness of the filters – operating with availabilities and efficiencies of close to 100 % – the impacts on the environment can be kept very low. Since completion of the dust control programme last year, dust emissions have been kept stable at a very low level.

The reduction of dust emissions



An examination of the fabric filters for the raw mills showed that all dust emissions were below 2 mg/m³, i.e. close to the limit of detection.

Results of kiln flue gas measurements 2003 (in mg/Nm³tr)

Substance	kiln line 5		kiln line 3/4	
	Limit value	Measurement	Limit value	Measurement
Dust	20	15	50	6
SO_2	390	375	400	377[1)]
NO_X	480	310	800	605[1)]
HCl	10	1.6	10	5
HF	1	0.1	–	1
Heavy metals				
Hg	0.03	0.006	0.2	0.06
Cd + Tl	0.03	<0.002	–	<0.002
Σ As, Co, Ni	0.38	<0.01	1	<0.01
Σ Sb, Pb, Cr, Cu, Mn, V, Sn			5	<0.01
Organics				
Total carbon	30	11	–	–
Benzene	5	0.32	–	–
PAH	5	<0.015	–	–
PCDD/F (ng/Nm³tr)	0.05	0.003	0.1	0.07

[1)] Annual mean

Emission monitoring

In addition to the continuous monitoring of most important emissions from the kilns and mills, in 2003 a total of 14 different measurement assignments were passed on to certified external measuring institutions. The focus for measurements lay on the kiln plant, with more than 50 different individual components.

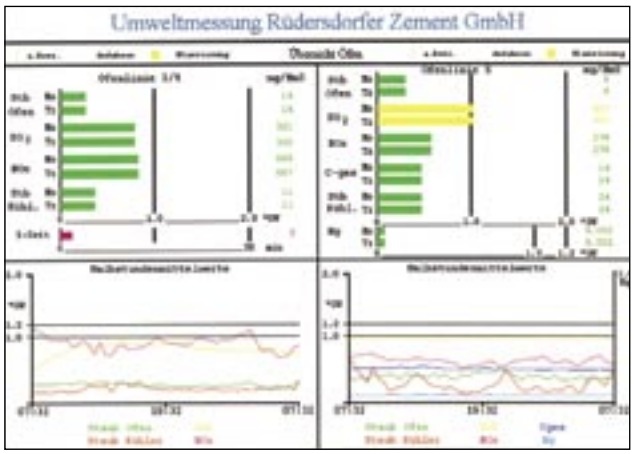
The tabular overview shows a comparison of measurements and limit values. Particularly noticeable are the very low values on kiln line 5 for mercury and NO_X, both substances which are frequently regarded as problematic with cement kilns.

Efforts to reduce emissions

In future it should be possible to exert a more direct influence on the emissions of SO_2 and NO_X from kilns 3 and 4. For this reason, experiments have been carried out involving the injection of hydrated lime or urea into the kiln system. The results show that there is potential for improvements and the tests are therefore being continued.

The situation is similar with the controlled combustion for the reduction of NO_X for the kiln line 5. Under best operating conditions it is already possible today to achieve results over long periods which stand up to any international comparison. The aim now is to stabilise these results on a permanent basis.

Injection of hydrated lime in the kiln system



The results of the continuous emissions monitoring are showed on the control panel and are also recorded.

A more comprehensive programme investigating the mercury emissions from kiln line 5 was concluded. By analysing the behaviour of this volatile metal in the material cycle by means of extensive sampling and Hg-measurements, as well as by exerting targeted influence on the degree of circulation of mercury, we have been able to achieve a significant improvement here.

All fabric filters contain some 15 000 filter bags.

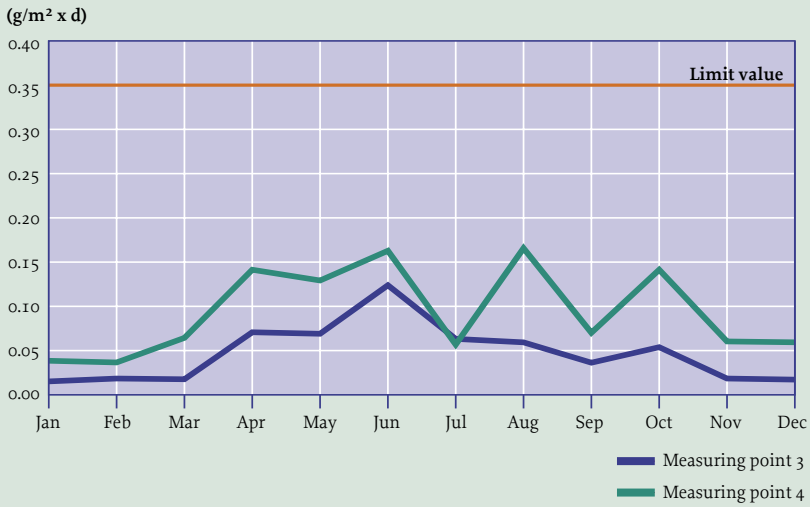
Heavy metal contents in soil (in mg/kg)

Metal	Reference value*	Measurements** 1993	1997	2002
Mercury	0.5	0.11	< 0.17	< 0.17
Cadmium	1	0.53	0.27	0.3
Thallium	0.5	0.22	< 0.40	< 0.33
Arsenic	20	4	1.7	1.6
Lead	100	35	24	22

* Reference value for multifunctional use of soil (after Eikmann/Kloke)
** Average of 4 soil samples in the main wind direction

In addition to carrying out very extensive monitoring programmes for emissions from our plant, we also evaluate the effects the emissions have on the neighbourhood around the works. We have a measurement network for dust precipitation, and at regular intervals we carry out surveys of heavy metal concentrations in soil. The results proved comparable with those from non-industrial areas. A more precise evaluation of the influence of the cement works, however, can be obtained by means of propagation distribution calculations on the basis of emission data. We commissioned such a propagation calculation from an expert in 2002 (see table below). The results show that the pollution from the cement works, in particular for heavy metals and organic pollutants, is very low.

Dust measurements in Herzfelde 2003

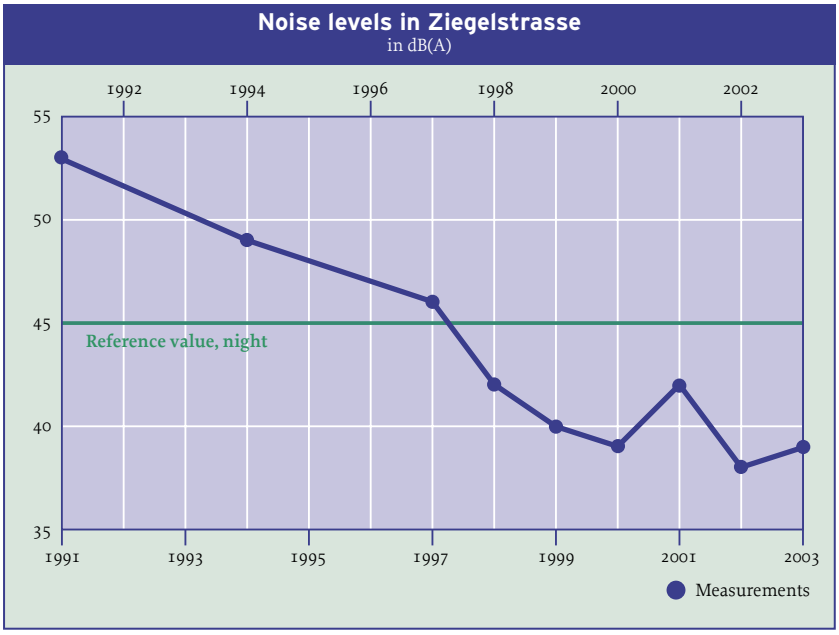


Local environmental impacts at calculated points of max. pollution
in comparison with standards and normal urban levels

		Calculated pollution level: based on emission limit values	Calculated pollution level: based on emission-measurements	Comparison pollution level: Standard (source)	Comparison pollution level: Usual urban levels
Dust	µg/m³	0.234	0.029	40 *TA Luft**	30 – 60
SO_2	µg/m³	2.61	1.8	10 *TA Luft*	20 – 50
NO_X	µg/m³	3.26	1.41	40 *TA Luft*	40 – 60
Hg	ng/m³	0.232	0.161	50 *LAI***	4 – 13
Cd	ng/m³	0.339	0.003	20 *TA Luft*	2 – 5
As	ng/m³	0.352	0.009	2.5 *TA Luft*	3 – 20
Pb	ng/m³	3.56	0.063	500 *TA Luft*	100 – 400
Benzene	ng/m³	0.019	0.002	5 *TA Luft*	5 – 10
Dioxins	fg/m³	0.432	0.31	150 *LAI*	100 – 200

* Clean Air Directive ** Combined Committee for Control of Pollutant Dispersal

Noise abatement



Improvements as a result of the noise abatement programme

Noise levels [at night, in dB(A)]				
Measured in Herzfelde	Ref. value	1997	2002	2003
1 Hauptstrasse 85	45	53	41	40
2 Hauptstrasse 70c	45	50	38	43
3 Ziegelstrasse 2	45	46	39	39

The process of producing cement involves a large number of potential sources of noise, including ball mill grinding, material transport, transmission units, or fans. In order to successfully reduce noise levels, it is important to develop specific measures for each individual source of sound. An important tool here proved to be the detailed works noise map.

On this basis, a noise abatement programme was started in 1997 and this led to a considerable improvement in the noise levels recorded both within the works and in the local residential areas. The measures were targeted at the specific problems that were identified, with sound-barriers for the transport bridges, cladding for outer walls, the installation of silencers, the use of quieter machinery and gear units, and the use of sound insulation hoods.

Silencer on a filter system

Water conservation

The nearby Stienitzsee lake is a ready source of water for production purposes.

Water requirements

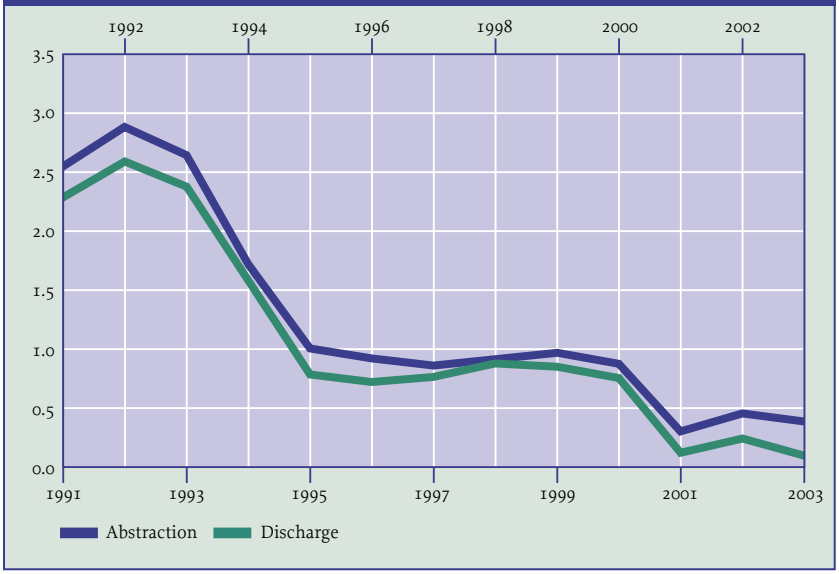
The cement works requires water for three different applications:

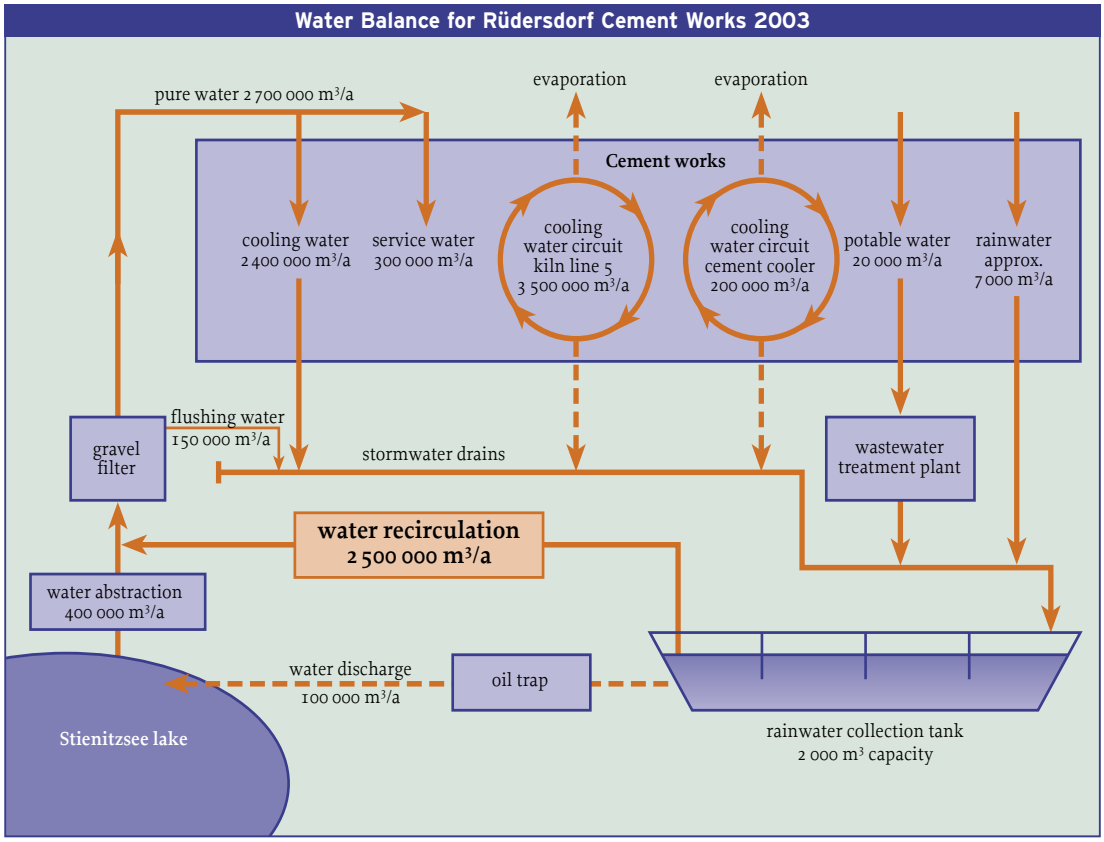
- Cooling water for plant and machinery
- Service water for the production process
- Potable water for general supplies and sanitary purposes

In total, the works has a water requirement of about 6.5 million m³ per annum. 99 % of this is cooling water and service water, and until only a few years ago this was all taken from the local Stienitzsee lake. Water extraction from the lake has meanwhile be reduced by more than 90 %. This change is mainly attributable to three measures:

1. With the construction of the new kiln line 5 and a cement cooler, separate cooling cycles were established with cooling towers. With these in operation it was only necessary to replace evaporation losses.
2. The construction of a rainwater collection tank opened up the possibility of recirculating cooling water, so that annual water abstraction could be reduced to below 1 million m³.
3. In 2001, further technical improvements to the water recirculation led to a further halving of water abstraction levels to below 0.5 million m³ per annum. The slight rise in water abstraction and discharge in 2002 is due to an increase in production levels, which brought with it a higher water requirement. The final optimisation stage also meant that water was only discharged into the Stienitzsee lake very intermittently.

Water taken from and discharged into the Stienitzsee lake
(in million m³ p.a.)





In addition to enabling recycling of the cooling water by feeding it into the rainwater collection tank for subsequent recirculation, the tank has another very important safety function in the event that there is an oil spill in the cement works.

Even the smallest amounts of oil will be identified by an oil sensor at the inflow to the rainwater collection tank, and an alarm is set off. With a capacity of 2 000 m³, the rainwater collection tank calms the water flow considerably, so that any oil will collect on the surface. From there it can be removed by absorbent substances or sucked into a collector and then disposed of. Before being discharged into the Stienitzsee lake, water is additionally passed through an oil trap. Over the years this has proved its value on various occasions.

Using secondary materials

A comparison of the raw waste before preparation (left) and the secondary material as it is delivered to the Rüdersdorf cement works (right).

Combined thermal and material utilisation

Economically-viable recycling requires cost-effective solutions for the use of waste by the manufacturers of new products. Cement production, which is a raw-material- and fuel-intensive process offers interesting possibilities. In addition to using combustible waste as a secondary fuel, the ash that remains after combustion can also find an appropriate application as raw material components. The cement production process therefore operates without any residues.

High temperatures of 1 450°C, the long retention time of the clinker in the burning zone of the kiln and the chemical reactions form the basis for the good environmental compatibility of the process and the finished cement. Additionally, the substitution of coal makes a contribution to the reduction of greenhouse gas emissions.

Developing the utilisation of secondary materials

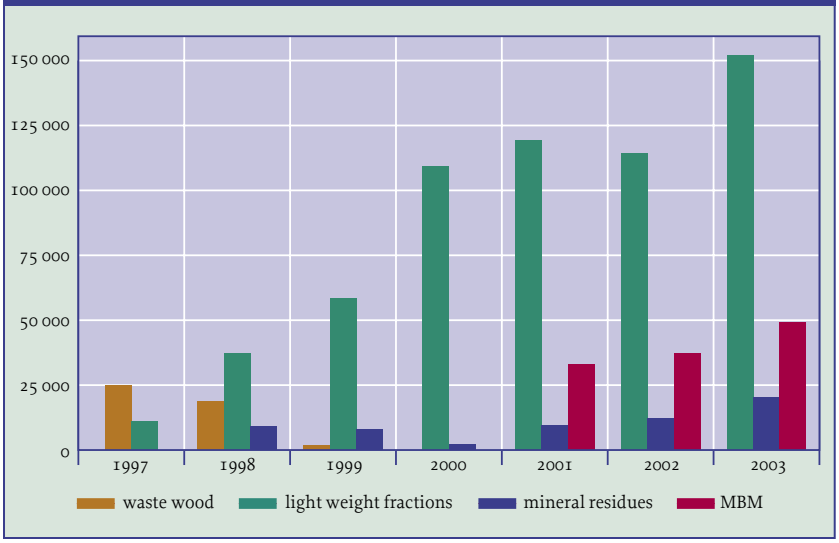
Over the past two years, the development of the utilisation of secondary materials in our works has been focused on the following aspects:

- Optimisation of the use of circulating fluidised bed technology, with increased availability, improved preparation quality, and increased capacity
- Use of meat and bone meal directly in the kilns
- Increased use of ash and other mineral substances as raw material components.

On this basis, 45 % of the fuel requirements in 2003 were met by secondary fuels. Some 7 % of raw materials were secondary.

Meat and bone meal is used in a closed system. Here it is being unloaded into the special silo.

Use of secondary materials
(in tonnes per annum)



Environmental impact

The use of secondary materials should not have negative effects on emissions, the production process, or the final product. We carry out extensive investigations and in view of the use of increased quantities we commissioned a detailed expert's report in which the environmental compatibility was confirmed.

Further information can be found in the chapters "Air pollution control" and "Our products and the environment".

We use advanced apparatus, such as this spectrometer, in our environmental laboratory to monitor the quality of secondary materials.

Quality assurance

An important parameter affecting process stability and the environmental impact is the quality of the secondary materials that are used. Therefore rigorous checks are carried out on all deliveries both by the suppliers as well as by our own environmental laboratory during the production process. In addition, samples are stored and tested biennially by an approved external laboratory.

Heavy metal contents in secondary materials

		Mineral residues				Production residues			Building site and domestic waste		
		Permissible 90th percentile	No. of Analyses	Median	90th percentile	Permissible 90th percentile	No. of Analyses	Median	90th percentile	No. of Analyses	Median	90th percentile
Cadmium	mg/kg	10	114	0.53	2.5	10	560	2.5	7.1	576	3.25	8.5
Mercury	mg/kg	1.5	114	0.09	0.58	1.5	560	0.22	0.49	576	0.51	0.85
Thallium	mg/kg	3	113	< 0.5	< 0.5	3	560	< 0.5	< 0.5	576	< 0.5	< 0.5
Arsenic	mg/kg	30	114	7.35	21.4	20	560	0.56	1.8	576	1.2	2.4
Cobalt	mg/kg	50	114	7.25	15	20	560	4.1	8.92	576	6.2	11
Nickel	mg/kg	100	114	22	64.4	100	560	19	38	576	26	50
Lead	mg/kg	350	115	36	146	350	560	69	171	576	190	314
Chromium	mg/kg	350	114	160	270	200	560	42	100	577	70	170
Copper	mg/kg	750	114	40.5	447	750	560	95	402	577	170	750
Beryllium	mg/kg	–	113	0.64	1.4	2	560	0.08	0.26	576	0.21	0.41
Sulphur, tot.	%	1	114	0.22	0.4	1	559	0.16	0.33	571	0.26	0.44
Chlorine, tot.	%	2	113	0.02	0.11	2	559	0.54	1.0	571	0.56	1.01
PCP	mg/kg	5	59	0.05	0.05	5	23	0.05	0.23	29	0.05	0.32
PCB	mg/kg	5	59	0.02	0.06	5	23	0.11	0.26	29	0.16	0.58

Median: The central value in set of measurements, dividing the values into two equal parts.
90th percentile: 90% of all measurements are smaller than this value.

January 2004
(using analyses since 1 Jan 1999)

Waste management

Waste disposal 2002

Waste	Ref. no.	Quantity (t)	Category
Used oil	13 02 05	52.2	Re-use
Transformer oil	13 03 07	5.2	Re-use
Fatty waste	12 01 12	8.8	Disposal
Contents of grease traps	02 02 04	17.5	Re-use
Oily operating materials	15 02 02	9.3	Disposal
Slurry from oil traps	13 05 01 /02 /03	54.4	Re-use
Solvents, mixed, halogen-free	07 05 04	0.2	Re-use
Cleaning agents	07 01 04	0.3	Re-use
Coolants	16 01 14	0.8	Re-use
Used chemicals and paint residues	diverse	0.4	Re-use
Contaminated building waste	17 01 06	4.8	Re-use
Lead batteries	16 06 01	2.3	Re-use
Fluorescent light tubes	20 01 21	0.2	Re-use
Piping contaminated with bone meal	10 13 99	0.7	Disposal
Filter bags and sacks	15 02 03	3.5	Disposal
Mixed packing materials	15 01 06	3.7	Re-use
Foils	15 01 02	35	Re-use
Waste paper	15 01 01	136	Re-use
Oversize from ash sieving	19 01 12	272	Re-use
Building waste (metallic)	17 09 04	331	Re-use
Building waste (clean-up waste)	17 07 01	254	Re-use
Waste from kiln clearance	17 01 01 /02	1 242	Re-use
Domestic-type industrial waste	20 03 01	96	Re-use
Overall total		**2 530.3 t**	
Total Re-use		**2 508.0 t**	
Total Disposal		**22.3 t**	

The principles of our waste management are based on the Waste Management and Recycling Act (*Kreislaufwirtschafts- und Abfallgesetz*).

When inviting bids for waste management contracts, we look first for possible ways of utilising the material. If a lack of possible uses means that disposal is unavoidable, then importance is attached to choosing an environmentally compatible option. In order to ensure this, it is preferable to choose specialist waste management firms to carry out the work.

Collecting old oil for disposal

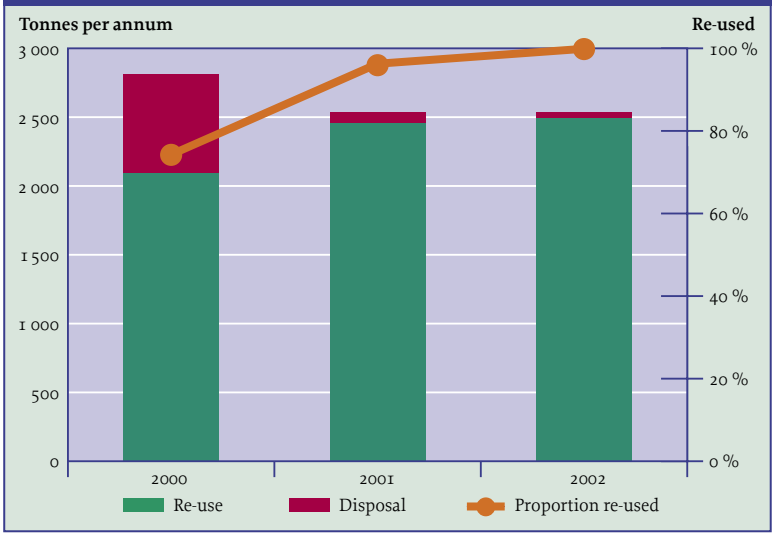
Separating waste

In recent years, we have been able to increase the proportion of waste that is utilised from 74% to 99 %. This was achieved by no longer taking the residential-type waste and the waste generated during cleaning work to a municipal waste tip, but by taking it to a waste sorting plant. This filters out everything that can be recycled and allocates it to further industrial utilisation.

The new ordinance on waste from trade and industry which came into effect in 2003 confirms the approach we have adopted of keeping production-related industrial waste such as foil residues, or used packaging separate, so that it can be put to a specific use.

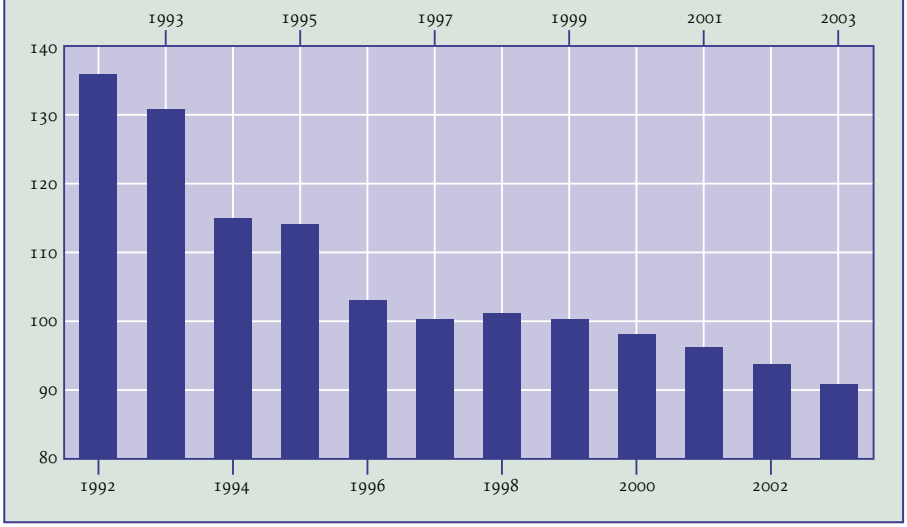
The new ordinance also confirms that domestic-type trade waste should be sent to a sorting plant or a plant to produce secondary fuel. The only new aspect is that fractions which are unsuitable for recycling should be kept in separate containers at the point of generation. As a result of this provision, the utilisation rate will fall again in future.

Development of waste handling



Energy management and CO_2-emissions

Specific electric power consumption
(in kWh/t cement)



Reducing energy consumption by technical adaptation and optimisation

Improving the energy efficiency of our production process remains one of the focal points of our work – both in the longer term and in our daily operations. In this way it is possible to make a contribution towards reducing costs and increasing competitiveness, while at the same time contributing to environmental protection. A look at the figures for fuel and electrical power consumption and a comparison with average values in the sector underline the success that has been achieved.

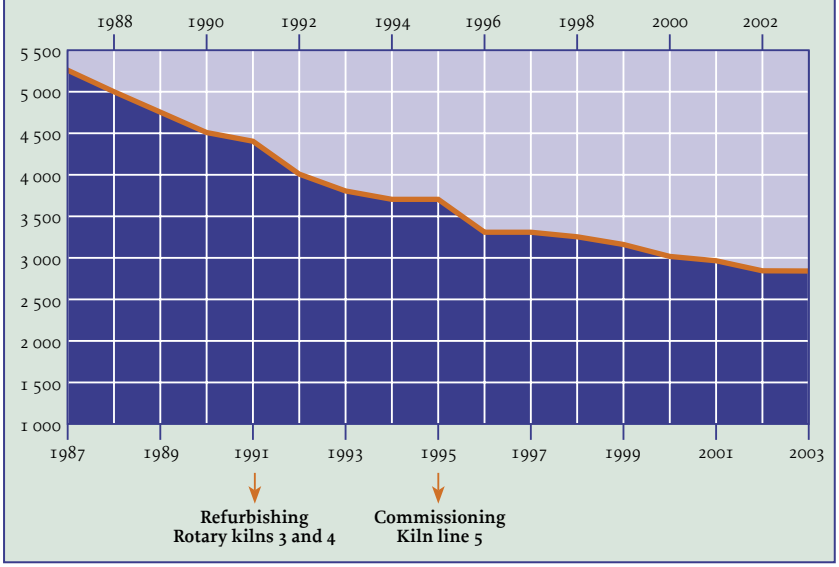
This was influenced in recent years in particular by the following activities:

- Operation near full capacity of the thermally efficient and highly optimised kiln line 5
- Improvement of the grinding media grading for cement grinding
- Improvement of the process control technology by the introduction of expert systems

Comparison of fuel and electricity consumption

	Average specific fuel consumption (kJ/kg cement)	Average specific electricity consumption (kWh/t cement)
VDZ, German Cement Works, 2002	2 789	103
International Cement Review, Benchmarking, 1999	3 150 – 4 750	98 – 134
Zementwerk Rüdersdorf	2 767	91

Specific fuel consumption
(in kJ/kg cement)



Unloading lignite dust

All options are being explored to reduce CO_2-emissions

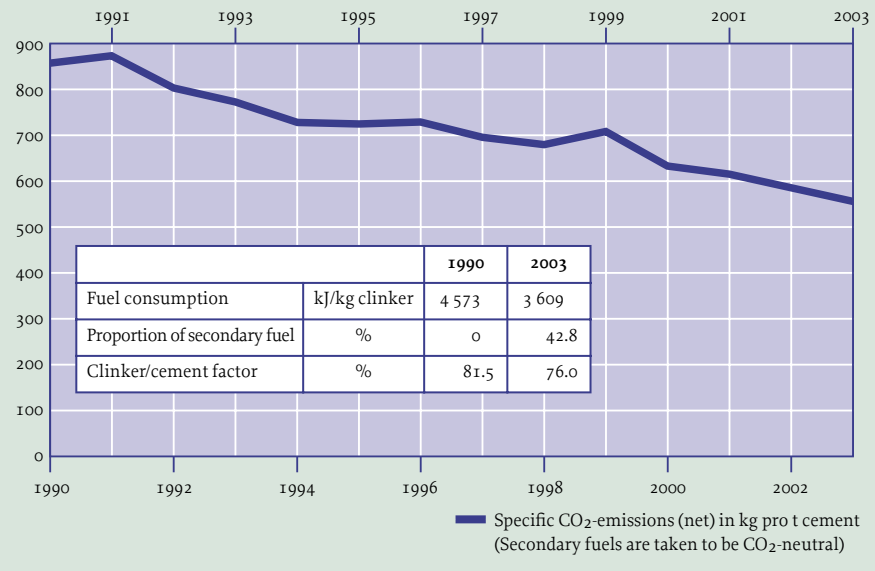
The comparatively low energy consumption has led to a marked decrease in the emission of the greenhouse gas CO_2. We are also utilising further possibilities to reduce CO_2-emissions:

- Partial substitution of clinker by CO_2-neutral admixtures, e.g. ground blast furnace slag
- Partial substitution of coal by CO_2-neutral secondary fuels (which then will not have to be incinerated or otherwise disposed of).

These options are also elements of our environmental protection programme. In this way it was possible to reduce product-related CO_2-emissions from 1990 to 2003 by 42 % and thus we have already exceeded our contribution to the undertaking made by the cement industry to the German government, to achieve a 28 % reduction in CO_2-emissions by 2008/2012.

The scope for reducing CO_2-emissions is therefore largely exhausted and new legislative activities, such as the introduction of European emissions trading in 2005, will not lead to any further significant improvements.

CO_2-emissions (in kg CO_2/t cement)



		1990	2003
Fuel consumption	kJ/kg clinker	4 573	3 609
Proportion of secondary fuel	%	0	42.8
Clinker/cement factor	%	81.5	76.0

Our products and the environment

When evaluating the properties of products, it is increasingly common for questions to be raised about health and environmental protection.

With regard to cement, the most frequently asked question is about the release of trace elements (heavy metals). Scientific investigations show that the chemical and physical processes involved in the production of cement, in particular during hydration, result in virtually total immobilisation of heavy metals.

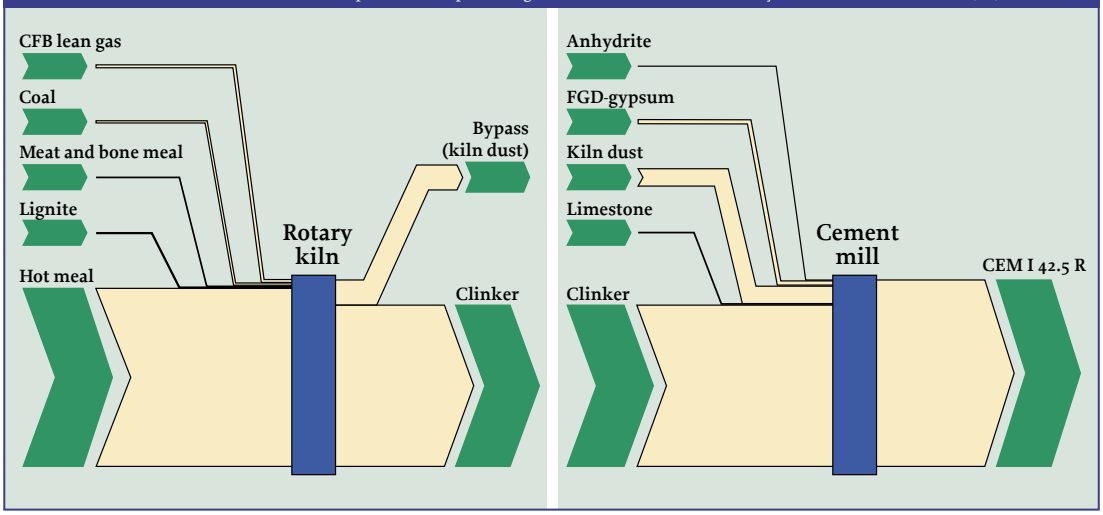
Heavy metal compounds in cement

chemical	physical
● Integration in the crystal structure ● Precipitation as insoluble hydroxide ● Adsorption in and on calcium silicate hydrate gel	● Formation of a dense cement structure ● Intergrowth of the reaction products of hydration ● Low porosity
→ 99.9 % of heavy metals integrated	→ Diffusion reduced by a factor of 5000

In tests, even under artificially stringent conditions the heavy metal concentrations which were washed out were generally below the limit of detection and were safe within the framework of the drinking water ordinance.

Example of a heavy metal balance for the production process

The thickness of the arrow corresponds to the percentage of the mass flow for the heavy metal – in this case lead (Pb).



It is only possible for the proportion that is dissolved in pore water to be washed out, and this generally is less than 0.1 % of the total heavy metal contents, and then of this only that fraction which is near to the surface would come into question.

In our own laboratory we have been carrying a comprehensive, systematic survey of the heavy metal contents of our cements and all input materials over the past seven years. A particularly interesting question concerns the extent to which the use of secondary materials affects heavy metal concentrations in cement and its environmental compatibility.

The heavy metal input comes mainly from the natural materials which make up more than 90 % of the materials used.

Test apparatus for investigating elution in concrete

The comparison below shows that even when the introduction of secondary materials after 1996 led to an increase in the heavy metal contents in cement (Cu, Cd, Pb and Zn), the levels remained within the usual range, and would not have been critical even disregarding the immobilisation described above.

Heavy metal contents in Rüdersdorf cement
compared with German standard cements and
the requirements for playgrounds under soil protection legislation (BBodSchV)

Parameter	CEM I 52.5 R			Standard cements*	BBodSchV: Limit for playgrounds
	1996	2001	2002		
Arsenic	4.6	4.5	2.9	1 – 55	25
Lead	12	27	28	2 – 200	200
Cadmium	0.1	0.34	0.83	0.1 - 8	10
Chromium	33	42	43	12 – 105	200
Cobalt	3.9	5.5	4.9	1 – 30	–
Copper	26	81	82	5 – 280	–
Nickel	17	19	18	5.5 – 80	70
Mercury	–	0.054	0.04	0.02 – 0.35	10
Thallium	< 0.5	< 0.5	< 0.5	0.5 – 2.0	–
Zinc	59	95	95	20 – 450	–

* VDZ-Summary Report 1999 – 2001

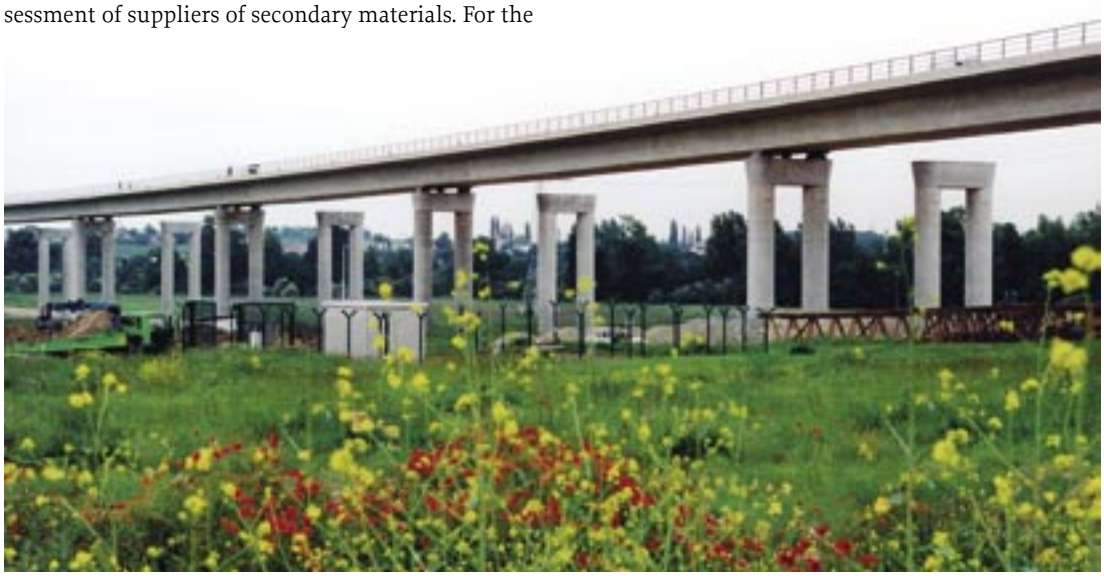
In a second stage, we have now begun to study the washing out of heavy metals in detail. The first reliable results will be available in 2004.

Indirect environmental aspects

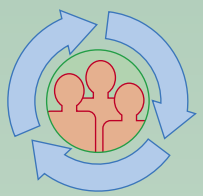
The environmental compatibility of our products is one of the most important indirect environmental aspects, i.e. environmental aspects which do not lie fully within our control. In this matter we are in a continuous exchange of views and opinions with research institutions and our customers.

Other indirect environmental aspects include the emissions relating to our consumption of electrical energy, which has already been considered, and also environmentally appropriate purchases and transport. These two aspects are, however, comparatively unimportant.

One focal point of the purchasing process is the provisions of the purchasing contract and the assessment of suppliers of secondary materials. For the transport of material flows within the works, continuous-flow conveyor belts are used, with mechanical systems being preferred to pneumatic ones where possible for reasons of energy-efficiency. Trucks have to be used to transport the limestone within the quarry and for the delivery of additives and fuels. When it comes to delivering our products, we have been able to profit in recent years from our good rail connections and in 2003 approx. 25 % of our cement was dispatched by rail. This was possible and necessary because the average transport distance almost doubled as a consequence of the crisis in the German construction sector.



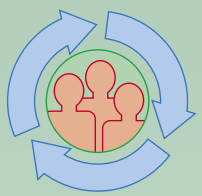
Motorway construction near Schkortleben



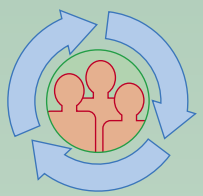
Review of the environmental programme 2000/01

	Targets	Measures	Achieved
Environmental management system	Raising the environmental awareness and the environmental knowledge of our employees	Including environmental topics in the in-house newspaper and in team meetings	✓
	Ensuring environmentally responsible behaviour of all outside contractors on our site	Including environmental protection in all contracts and joint site inspections	✓
	Extending public relations activities	Internet, Open Day 2000, Environmental Forum 2001	✓
Air pollution control	Determining reliable values for and evaluation of mercury-emissions	Verified datasets available	✓
	Reduction of dust emissions from the lepol kilns during start-up by 50 %	Installation of a water-spraying system / in part; Kiln 4: yes, Kiln 3: no because of under-capacity utilisation	✓ X
	Reduction of SO_2-emissions from the lepol kilns by 30 %	Study completed, investment not made due to under-utilisation of kiln	X
Noise abatement	Reduction of sources of noise	Insulation measures on limestone bunkers	✓
Water conservation	Reduction of abstraction from surface waters by 10 %	approx. 40 % reduction against 2000 by improvement of water cycles	✓
Utilisation of secondary materials	Secondary fuels to provide 50 % of total energy requirements for kiln line 5 and 25 % for the lepol kilns 3 + 4	> 50 % for kiln line 5 and up to 25 % for kilns 3 + 4, with new authorisation and including the main burner	✓
	Use of an extended range of secondary raw materials for kiln line 5	3 additional groups of substances approved	✓
Waste management	Ensuring the highest possible quality of disposal of any unavoidable waste	All waste disposal contract partners subjected to appraisal	✓
Hazardous substances / Water endangerment	Optimisation of procedures for handling substances which represent a hazard or which endanger surface waters	Dangerous substances register and safety data sheets revised	✓

Review of the environmental programme 2002/03



Targets	Measures	Achieved	
Training programme for personnel	Training carried out	✓	**Environmental management system**
Development of a new manual for quality management + environmental management system	Manual completed	✓	
Development of a procedural briefing "Environmental Protection Data"	Not concluded because of new demands arising from emissions trading	X	
Experiments with SNCR technology (selective non-catalytic reduction) for NO_x-reduction	Experiments carried out and evaluated	✓	**Air pollution control**
Increased use of ground blast furnace slag in Rüdersdorf (CO_2-reduction)	Creation of production capacity for ground blast furnace slag	✓	
Strategy for partial extraction without explosives	Strategy developed	✓	**Quarrying**
Environmental impact assessment for increased use of secondary materials	Study completed	✓	**Evaluation of secondary materials**
Increase use of meat and bone meal by 10 000 t over 2001	Achieved since 2003	✓	
Approval for substitution of meat and bone meal by other secondary materials	So far for calciner kiln line 5	✓	
Removal of works dump, Eisenhüttenstadt	Removal completed	✓	**Waste management**
Heavy metal balances for overall process	Data collection and evaluation so far for three metals	✓	**Environmental impacts**
Elution of heavy metals	Investigations have started	✓	



Environmental programme 2004/2005

	Targets	Measures	Responsible	Deadline
Environmental management	Informing the public	Presentation of environmental topics at the 750th Anniversary of limestone quarrying	Management board/Quarry management	II/2004
Air pollution control	SO_2-reduction kilns 3 + 4 by 20 %	Investment hydrated lime	Construction Department	II/2004
	NO_x-reduction kiln line 5 to < 300 mg/m³	Investigations for further reduction potential	Environmental Protection Dep't.	2004/5
	NO_x-reduction kilns 3 + 4 to < 500 mg/m³	Investment SNCR (Selective Non-Catalytic Reduction)	Construction Department	2005
Limestone quarrying	Introduction of non-explosive quarrying close to township	Trials with excavator technique	Quarry management	2004/6
	Reduction of diffuse dust	Use of a larger spraying truck with a capacity of 45 t in the quarry	Quarry management	2004
Greenhouse gases	8 % reduction of specific CO_2-emissions by 2007 (2 % p. a.)	Stepwise reduction of clinker/cement factor to 70 %	Grinding Plant Team/Marketing	2004/7
Water conservation	Reconstruction of company wastewater-treatment plant (high efficiency)	Optimisation of wastewater treatment (nitrogen, phospho-rus)	Water pollution control officer/ Team Ancillary plant	2004/5
Use of secondary materials	Expansion of range of materials	Investment-Container unloading facility for lightweight fractions	Construction Department	2004/5
Environmental impact of products	Positive EIA for cement	Completion and evaluation of elution trials	Quality manage-ment	2004
		Publication in journal	Quality manage-ment/Environ-mental protection	I/2005

Validation

GÜLTIGKEITSERKLÄRUNG

Dem Unternehmen

Rüdersdorfer Zement GmbH
Zementwerk Rüdersdorf
Frankfurter Chaussee
15562 Rüdersdorf

wird nach Durchführung der Prüfung gemäß den Vorgaben der Verordnung (EG) Nr. 761/2001 über die freiwillige Beteiligung von Organisationen an einem Gemeinschaftssystem für das Umwelt-management und die Umweltbetriebsprüfung (EMAS) bestätigt,

- dass das Umweltmanagementsystem, die Umweltbetriebsprüfung und ihre Ergebnisse sowie die Umwelterklärung den Anforderungen der Verordnung (EG) Nr. 761/2001 entsprechen und
- dass die Daten und Angaben der Umwelterklärung zuverlässig und glaubwürdig die Umweltaspekte aller Tätigkeiten des Unternehmens wiedergeben.

Die Norm DIN EN ISO 14001 ist Bestandteil der Verordnung (EG) Nr. 761/2001 (EMAS).

Hamburg, den 01.02.2004

Dr. Erwin Wolf
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TÜV CERT

CERTIFICATE

The TÜV CERT Certification Body of RWTÜV Systems GmbH hereby certifies in accordance with TÜV CERT procedure that

RÜDERSDORFER ZEMENT GMBH
15558 Rüdersdorf / Germany
with the plants Rüdersdorf and Eisenhüttenstadt

has established and applies a quality and environmental management system for

Production and distribution of portlandcementclinker, cements, hydraulic sub-base binder and limestone fillers

An audit was performed, Report No. 2061238
Proof has been furnished that the requirements according to DIN EN ISO 9001 (2000) and DIN EN ISO 14001 (1996) are fulfilled. The certificate is valid until 15.12.2006
Certificate Registration No. 04100 19970511 / 04104 20000201

Essen, 16.12.2003

RWTÜV

The next consolidated Environmental Statement will be presented in January 2007.

EMAS
GEPRÜFTES
UMWELTMANAGEMENT
D-148-00017

Glossary

Ball mill: Rotating mill containing balls which grind down the material fed into it.

Calciner: An airflow reactor installed in front of the rotary kiln to provide energy efficient decalcination, improving the performance of the kiln.

Circulating Fluidised Bed reactor (CFB reactor): Vertical reactor in which ash and fuel are fluidised in the air flow, creating very good conditions for combustion; ash is separated from the flue gas in a recycling cyclone and returned to the reactor.

CO_2: Carbon dioxide is a gas released during the burning of fuels which contain carbon, but also e.g. by the decalcination of limestone ($CaCO_3$). The emission of carbon dioxide is one of the causes of the greenhouse effect.

Cyclone preheater: In a series of cyclone stages, raw materials are preheated using the heat of waste gases from the kiln.

Eluate: A solution washed out of a solid.

Emissions: Solid, liquid or gaseous substances released into the environment. Noise and odours are also emissions.

Environmental audit: A management tool comprising a systematic, documented, periodic and objective evaluation of performance with the aim of helping to safeguard the environment. The audit should facilitate management control of environmental practices and assess compliance with policy objectives and regulatory requirements.

Hydration: Generally, the addition of water to anhydrous minerals; also used to refer to the hardening processes this can lead to.

Lightweight fractions: Collected fibres and other debris from production and domestic waste with higher calorific value.

MBM: Meat and bone meal

Mineral residues: Secondary raw materials used with a CFB reactor (does not include ash).

NO_x: Oxides of nitrogen formed during combustion processes. Important as ozone precursors.

PAH: Polycyclic aromatic hydrocarbons

PCDD/Fs: Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans

Secondary fuel: Carbon-rich secondary materials which can replace fossil fuels in the burning process. Some of the carbon may be biogenic in origin and therefore CO_2-neutral.

Secondary materials: Any materials not derived directly from natural resources. Their use can conserve natural resources and diminish problems otherwise linked with their ultimate disposal.

Secondary raw materials: Carbon-poor secondary materials which can replace in part the raw materials used in cement production (limestone, sand, clay, or iron ore).

SO_2: Sulphur dioxide is a colourless gas with a pungent smell, often an unwanted by-product of burning fossil fuels (coal, lignite, oil) or various industrial processes. Responsible for acid rain.

Succession: The natural stages of development of vegetation from colonisers such as lichens and moss through to a stable climax community in equilibrium with the local conditions.

Sustainable development: Development which meets human needs without depleting natural resources or irrevocably damaging the systems which produce those resources, while establishing equitable and viable patterns of living throughout the world.

Waste: All materials that are not prime products and for which the generator has no further use.

See also: http://glossary.eea.eu.int/EEAGlossary

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Text and editing:

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10589 Berlin
Germany

Translation:

R. J. Holmes, Berlin

Presentation:

Senkbeil Mediendesign
www.senkbeil-mediendesign.de

Photographs:

Photostudio Potsdamer Platz, Berlin

Photo-Fabry, Rüdersdorf

Readymix-Baustoffgruppe

Printers:

Köllen Druck + Verlag GmbH, Berlin