2004 Munich Re environmental magazine

Perspectives
Today's ideas for tomorrow's world

Münchener Rück
Munich Re Group

125 years
Preferred partner in risk

Knowing what's ahead
We simply don't know what the future will bring. But as the market leader, we have the knowledge to help shape the future. Together with you. We prepare you for new challenges, thus ensuring a future that is safe in the long term.

Stefan Heyd
Board Member responsible for environmental issues

Prof. Dr. Dr. Peter Höppe
Environmental Officer

Dear Reader,

How can a company combine its economic objectives, such as profitability and long-term value added, with the guiding principle of sustainable development? How can very short-term reporting and evaluation cycles mesh with long-term global trends?

In an age whose pace is dictated by terms of office, annual reports, and quarterly figures, there is a tendency to subordinate long-term developments to short-term demands. But in the face of such global challenges as climate change, the ongoing depletion of our natural resources by an ever-growing population, and the unprecedented dynamism of technological progress, we must not give in to this temptation. Instead we must ask ourselves: How should our world look in two or three decades and what paths must we follow given the foreseeable circumstances? What are the responsibilities to be borne by individuals – public policymakers, corporate leaders, NGO representatives – in their official and private capacities? How much scope can and must they have to shape the future?

Take climate change, for example. Scientists agree that global warming is a reality. A further rise in temperature of a little over 1°C before the end of this century is considered only just tolerable for human beings, the environment, and the economy. Another example is the global supply of energy. The International Energy Agency forecasts that energy demand will undergo a further increase of roughly 60% by the year 2030. It is quite probable that the struggle for limited resources like oil and water will intensify.

These trends will have a critical impact on the framework in which global businesses operate. So it is high time to look ahead and seek new paths. As professional risk carriers, our view is naturally directed far into the future. Not only because we know that "business as usual" will dramatically enhance the risks and economic burdens that lie ahead (striking proof of this was provided in 2004, the costliest natural catastrophe year in insurance history). But also because many a project that contributes to a sustainable future only becomes viable after a reliable risk transfer to the (re)insurance industry.

Our strategy for the future will not be to wait and see what happens: as in the past, with our innovative strength backed by 125 years of experience, we will take the initiative to ensure the sustainable development of our company – and of the world we live in.

Munich, July 2005

Stefan Heyd Prof. Dr. Dr. Peter Höppe

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The environmental report

"Sustainable investment – the engine of innovation for the financial sector" – Professor Dr. Rüdiger von Rosen, Deutsches Aktieninstitut.

How can the conventional capital market benefit from sustainable investments?

The sustainable investment market is not only witnessing double-digit growth, it is also increasingly acting as an engine of innovation for the entire financial sector and its movers and shakers. We are now observing a rise in sustainable investments in the conventional sector too.

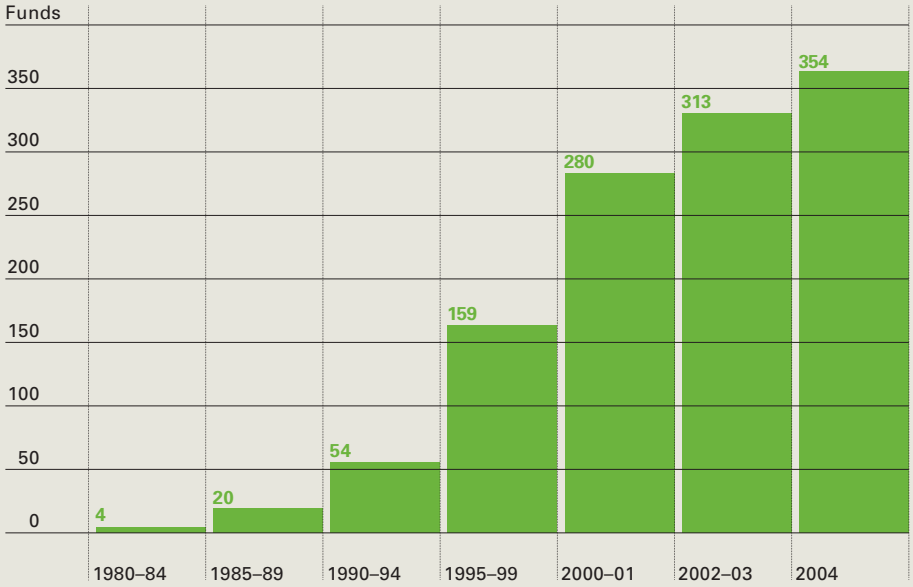
Prof. Dr. Rüdiger von Rosen, Deutsches Aktieninstitut

In terms of absolute numbers, sustainable investments in Germany are still a niche market. At a current total level of some €4.5bn invested, sustainable, ecological, and ethical funds in Germany rank behind closed-end real estate funds and shares in ships; in the total financial assets of households in Germany, they have a share of just one-tenth of a percentage point. And this is in spite of the fact that, contrary to general stock market trends, the market has been growing continuously at significant rates in recent years: since 1998, the volume of ethical and ecological retail funds in Germany has increased fifteen-fold; this is equivalent to an average annual growth rate of nearly 50%. The strength of the rise is largely due to the low base level. Worldwide, the percentage annual growth in the sector is assumed to be in the double-digit range. According to experts' estimates, private and institutional investors in the United States already hold over 10% of their investments in line with ethical considerations. In this respect, sustainable investment primarily means investment in funds. Direct investment in companies that operate in line with sustainable development principles is a definite rarity, all the more so since corresponding investments are hard to identify as such.

Besides the straight figures, more subtle developments which might prove to be even more important in the long term are also emerging: the growing market for sustainable investments is coming to be an engine of innovation for the entire financial sector and its movers and shakers, so that we are now observing sustainable investments in the conventional sector as well.

Moreover, investors in the sustainable investment market act as a role model for conventional market investors in a certain respect. They take a closer look at their investment, if only because the investment forms are more complex; also, their commitment tends to be more long-term. Both are patterns of behaviour that the Deutsche Aktieninstitut (DAI), an association of German exchange-listed stock corporations and other institutions, repeatedly propagates for classic investment forms.

Number of environment- und sustainability-geared funds in Europe



The number of environment- and sustainability-geared retail funds has risen considerably in Europe in recent years. The volume of investments came to some €19bn at the end of June 2004, about 50% higher than at the end of June 2003.

Source: Avanzi SRI Research/ SiRi Company, 2004.

Plethora of concepts: Problem or opportunity?

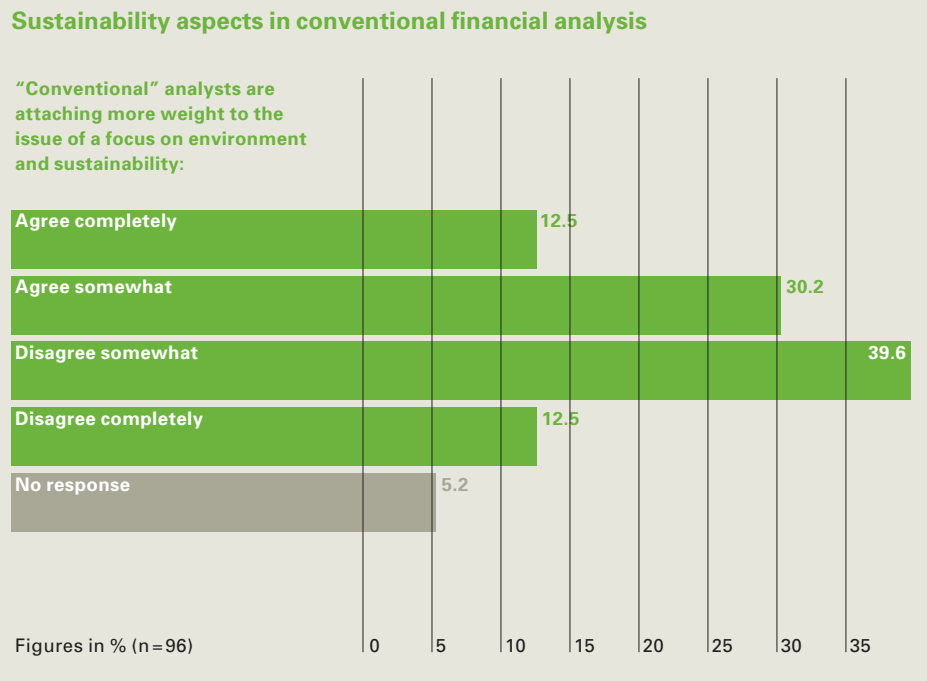
For many, sustainability has become an emotive term: in the conventional financial sector too, we regularly find products and services being described as sustainable when a closer look strips them of much of this quality. The problem lies in the nature of the concept itself: according to the classic definition given by the Brundtland Commission, sustainable development is "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" and choose their lifestyles. This concept is both capable of and in need of interpretation and has lent itself to a number of readings. In the event, differences in understanding may lead to divergent investment decisions, all of which may rightly claim to be "sustainable" or "ethical".

This being so, the efforts made by market operators to standardise the use of the concept (e.g. in April 2004 with the Darmstadt Definition of Sustainable Investments) are worthwhile. But such moves should not be overdone. The positive impact of sustainable investments on the conventional market is largely due to the discussion opening up and being coaxed out of the fundamentalist corner.

Companies are willing in principle

The importance of sustainability as an issue is now deep-rooted among listed companies. This was shown by a 2002 survey mounted by the DAI and the Institute for Environmental Management and Business Administration at the European Business School. More than three-quarters of the companies questioned saw, in principle, a positive link between their activities on behalf of environmental and social issues and their long-term corporate value. Most are adjusting to a still-growing responsibility in the social and ecological field. At present, 27 of the 30 DAX companies are represented in a sustainability index, 18 of them as top 10 investments in a sustainability fund.

One important factor powering this development has been the growing proliferation of the best-in-class approach. This means that when making an investment decision – e.g. in compiling a portfolio – a fund selects and hence "rewards" those companies that are forerunners in their sector in ecological or social respects. No area is ruled out from the outset. This exploits the opportunities offered by a market economy – viz. to direct resources to the most productive uses.



Almost half of German companies are of the opinion the sustainability-related criteria are playing an increasingly important role for conventional analysts.

Source: Deutsches Aktieninstitut, 2003.

Big firms, in particular – those that stand at the centre of investors' interest – now have to cope with a growing flood of inquiries and questionnaires from fund companies, index providers, or rating agencies specialised in sustainability issues. In 2002, two-thirds of companies were already receiving such inquiries. To enable them to respond, some of them deploy considerable human resources. Just under one-half of the firms were interested in being included in a sustainability fund or index. Hence, sustainability criteria have become a more fixed element of their PR efforts and financial-market communications.

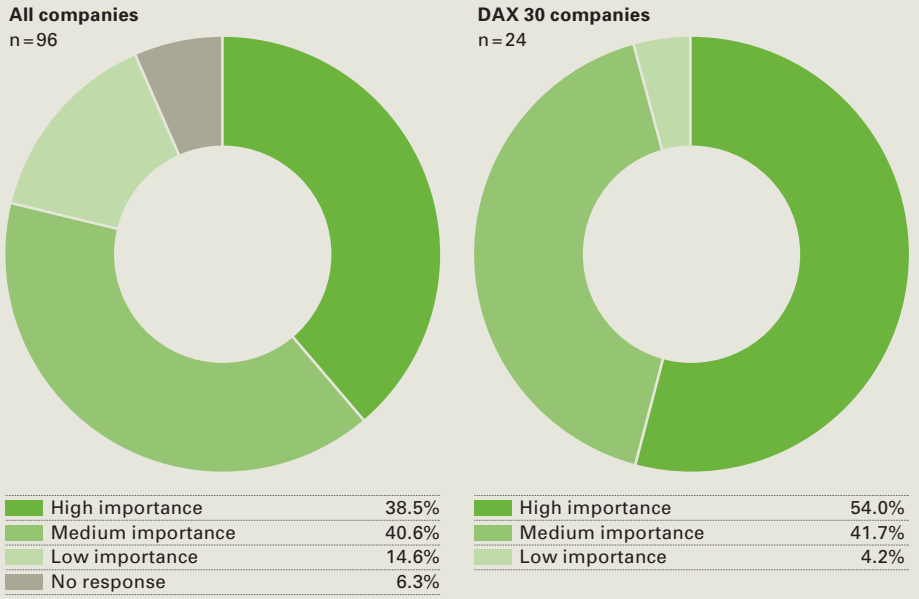
Sustainability criteria are becoming a fixed component of companies' public relations work and financial communications.

The growing number of sustainability reports also reflects the interest in this subject. According to the 2005 Sustainability Report Rankings (Ranking Nachhaltigkeitsberichte 2005), two-thirds of DAX companies draw up a sustainability or environmental report, and 28 German firms already report in line with the guidelines of the Global Reporting Initiative (GRI). The object of this initiative, which was set up in 1997 in collaboration with the United Nations Environment Programme, was to create internationally recognised and comparable guidelines for voluntary reporting on economic, social, and, ecological performance. These guidelines have since become an established standard: nine of the ten companies with the best German sustainability reports for 2005 report in line with GRI.

Sustainable corporate governance as extended risk management

Many companies have also come to recognise the close link between sustainability and corporate governance. As a rule, companies subscribing to the principle of sustainability pursue a strategy based on a long-term increase in value. Firms that systematically face the challenges of sustainable development also make an active contribution to comprehensive risk management, so that a responsible risk policy also enhances the appeal of sustainability-minded companies to those investors who are exclusively interested in classic shareholder value.

Significance of sustainability for corporate development



Sustainability is very important to corporate development – the majority of companies are convinced of this.

Source: Deutsches Aktieninstitut, 2003.

If account is to be taken of ecological or social aspects in investment decisions, the traditional share analysis, which is geared to straight financial performance indicators, must be extended. Conventional analyst firms are also building up appropriate know-how. This development is backed by such initiatives as the Enhanced Analytics Initiative, in which leading institutional investors and fund managers joined together at the end of 2004. With pinpointed assignments, they seek to encourage analysts to explicitly include non-financial criteria alongside the classic financial ratios. Behind this is a realisation that the quality of analyses, and hence of investment products too, can be improved if social and ecological aspects are considered.

Key factor of transparency

For all the receptiveness of companies, though, their relations with players in the sustainable investment market are not untroubled: most regard the assessment processes of the fund companies, index providers, and rating agencies operating in the sustainable investment market as a black box. Only 5% consider the present degree of transparency in the rating procedures to be adequate; just under two-thirds had some idea of how they work, while nearly one-third were completely unable to comprehend the processes.

For this reason, the establishment of the Association for Independent Corporate Sustainability and Responsibility Research in Europe (AICSRR) in November 2004 is much to be welcomed. Its object is to develop and implement professional standards for the sector.

Prof. Dr. Rüdiger von Rosen

Managing director of the
Deutsche Aktieninstitut e.V.

Prof. Dr. Rüdiger von Rosen has been managing director of the Deutsche Aktieninstitut e.V. (DAI) in Frankfurt since 1995. After working as an assistant at the Institut für Kapitalmarktforschung (Institute for Capital Market Research) from 1970 until 1973, he became management assistant of the Deutsche Gesellschaft für Wertpapiersparen. He started his career in 1974 at the Deutsche Bundesbank (German Central Bank), where he became head of the President's office in 1980 and as of 1984 head of the press and information department.

At the end of 1986, he was appointed executive vice chairman of the Federation of the German Stock Exchanges. From 1990 until 1993, he was speaker of the executive board of Frankfurter Wertpapierbörse AG (later Deutsche Börse AG).

Professor von Rosen is a lecturer at the Goethe University in Frankfurt and is author and editor of numerous books and publications on, inter alia, capital market policy, equity and social policy, corporate governance, corporate law. He is also honorary consul of Latvia.

Useful links
http://www.dai.de
http://www.nachhaltiges-investment.org/

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Nachhaltigkeit und Shareholder-Value aus Sicht börsennotierter Unternehmen; study by Deutsches Aktieninstitut, Issue 22, Frankfurt am Main, May 2003 (only German)

It is on the sustainable investment market that we see how companies can be spurred into action by their stakeholders without any need for statutory intervention.

On the other hand, stakeholders occasionally criticise the fact that corporate reporting on non-financial aspects like sustainability is dominated by corporate introspection. If firms are to be able to disseminate such information geared to specific target groups, they must find out in even greater depth how the information is received and processed by outsiders. The Global Reporting Initiative is a good example of voluntary standardisation and the further development of sustainability reporting.

Companies should be spared the strains and stresses of yet more reporting obligations. In view of the crisis of confidence in capital markets, firms have recently had many additional reporting and auditing duties imposed on them, for instance under the provisions of Germany's Investor Protection Improvement Act (AnSVG). In this connection, it is easy to overlook the extra outlays for companies which then have a negative impact on share performance. Voluntary developments toward greater standardisation suffice and are better than ever unsounder regulation. What is needed here is greater confidence in the sanction mechanisms of the capital market.

In the sustainable investment market, we see how companies can be spurred into action by their stakeholders without any need for statutory intervention. Here again, the conventional market can follow the lead of the sustainable investment market.

Iceland's natural resources are under threat from mega-construction projects – a conflict involving jobs, potential profits, the greenhouse effect, and species protection.

Environmental criteria in bond insurance

Most major projects today are only feasible if they are backed by bonds or sureties issued by specialised insurers. These insurers are well advised to examine how such projects may impact the environment because, in so doing, they can achieve a sustainable reduction in the risks for their own business.

Günther Kaulbersch

Take several dams of various sizes, the largest of them over 700 m long and nearly 200 m high. Plus a penstock for transporting water, 73 km long in all. Hydroelectric plants. An aluminium works, roads, and harbour installations. Add these up, and you have the Kárahnjúkar hydropower project in Iceland. A mega-project. Mega-big, and mega-expensive. Which is why it can only be implemented if it is backed by bond insurance that secures the construction work. Bond insurance is a form of guarantee pledge, with the insurance company entering into certain commitments and assuming certain obligations. In the construction sector, for example, such pledges are the usual way to give a client a guarantee that the construction contract will be fulfilled and the ordered structures completed.

Public authorities and big private-sector investors are the main clients for projects secured by bonds. The jobs are mostly extensive infrastructure projects like road construction, public local and long-distance transportation, telecommunication systems or energy-supply facilities, and the construction of power plants, dams, and other similar schemes.

The basic forms of these bonds are as follows:

– Bid bonds, which underscore the serious and dependable nature of a contractor's bid

– Performance bonds, which guarantee the completion of a project

– Maintenance bonds, which ensure that construction defects are removed during the guarantee phase

Bonds are normally issued by specialised insurers. In the underwriting process, the insurers have to examine the technical and financial feasibility of a project and, most of all, the technical and financial capacities of the implementing contractors. If a contractor drops out, the project cannot be completed on the agreed conditions, and the insurer is then obliged to pay the extra costs involved when a new contractor has to be taken on to complete the construction work.

Munich Re participates worldwide in bonds for projects within the framework of reinsurance treaty and facultative business.

In bond insurance, environmental aspects are becoming more and more important. The Icelandic Kárahnjúkar hydropower project is a case in point:

– Dams and penstocks are located on the northern side of the biggest Icelandic and hence the biggest European glacier – a region prone to earthquakes and volcanism. In 1985, a volcano erupted under a glacier; roads and bridges were destroyed.

– According to environmental audits, Iceland has a sufficient number of power plants. The only point of this project is to supply the planned aluminium works with the necessary energy.

– Aluminium production causes toxic emissions and contributes to global climate warming. The audits indicate that Iceland has neither the raw materials for aluminium production nor any need for major quantities of aluminium.

– The structure is located in a unique and very sensitive nature reserve that will be lost for ever once the reservoir is filled.

True, other environmental audits saw no dangers. Advocates consider the project to be necessary for Iceland's economy. Environmental associations and other interest groups such as farmers and fishermen, though, had serious misgivings. This led to disputes and, finally, to some firms withdrawing from the project.

In its environmental guidelines, Munich Re, as a leading risk carrier and a global financial services provider, has undertaken to assume responsibility for environmental protection and sustainability. For projects of this magnitude, therefore, it will lay down in its underwriting guidelines that environmental risks must be recorded and assessed before it reinsures such bonds.

Is a wilderness more important than clean power generation? Ecologists fear that the dam could devastate an entire area.

In its underwriting policy, Munich Re tries to relativise and objectivise subjective opinions. Projects of this kind are governed by many regulations nowadays. In the event of an infringement, Munich Re can point this out to those concerned and attempt to influence the project design. It also calculates how an infrastructure project will impact its own business in the short and long term. In the process, the consequences for bond insurance and for other sectors must be considered, especially in the case of natural hazards, but also the implications for customer relations.

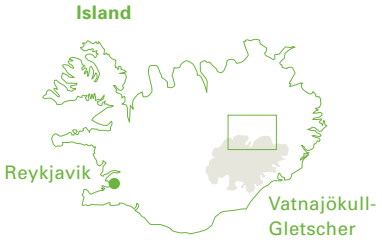
Munich Re must bear in mind that it may lose single transactions and displease customers if it includes environmental criteria when underwriting bond business. On the other hand, it is also important to check the longer-term implications of a project if it is to be backed by bond insurance. The aluminium works in Iceland, though supplied with hydroelectric power by the Kárahnjúkar project, will emit a large quantity of carbon dioxide owing to the specific production conditions. Iceland has even obtained an exemption from the Kyoto Protocol.

Yet, the greenhouse gas will add to the rise in the earth's temperature. Climate change and, in its wake, a proliferation of flooding, drought, and other environmental catastrophes are increasing the loss potential in other Munich Re fields of activity. In the long term, therefore, it is possible for one decision that seems positive for one class of reinsurance today to cause serious problems in others tomorrow. Also, a project in which Munich Re is involved may hit the headlines owing to its threat to the environment and lead to a loss of image.

After due consideration of all these aspects, Munich Re has decided against any facultative reinsurance for the bonds offered in the Iceland project, although the eventuality cannot be ruled out that liability will flow into our portfolio automatically via reinsurance treaties without our being able to influence this. In many economic sectors, however, we are examining the extent to which we can develop new business und back this with bonds. Many new projects are emerging, specifically in the environmental domain – wind power and solar power plants, for example – that have a high innovation potential but which in financial terms do not always meet Munich Re's underwriting standards. Selectively generating business here means reducing environmental risks and future loss potentials and securing the long-term future of Munich Re.

The planned Kárahnjúkar dam with the Hálslón reservoir.

The image above shows the planned penstocks, reservoirs, dams, and their connections. As the map below shows, the project is located in the east of Iceland.



Sensitising the industry

Munich Re has developed a set of instruments for vetting each single project it is offered on a facultative basis upward of a certain magnitude and category and checking its adherence to environmental criteria. These instruments are based on internationally recognised environmental standards: those of the World Bank and the International Finance Corporation (IFC) (on this, see also *Perspectives 2003*). Increasingly, banks which compete directly with bond insurers in bond business have also undertaken to observe the Equator Principles, international standards for project financing in order to protect the environment.

Munich Re's risk assessment also establishes whether a particular project consumes considerable quantities of natural resources, the extent to which sensitive areas such as rainforests or coral reefs are affected, and whether protests must be expected from the local population or from environmental organisations (NGOs).

Munich Re uses international forums like the International Credit Insurance and Surety Association (ICISA) to disseminate its ideas. The first step is to sensitise primary insurance staff to environmental criteria in bond insurance and persuade them to employ certain standards in the underwriting process. For it is they, above all, who are well placed to influence the environmental compatibility of projects.

Useful links
www.karahnjukar.is

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www.geo.de/GEO/wissenschaft_natur/oekologie/2002_06_GEO_island_vatnajoekull (only German)

Faxi Waterfall, where glacier water currently plunges unused into the depths. This is set to change.

Biodiesel produced from rapeseed oil methyl ester (RME) offers many advantages: reduced CO_2 and soot emissions, no petroleum taxes.

Insuring and securing tomorrow's power supply

Whether maize, potatoes, or rapeseed: they are all so-called regenerative resources. They can be used to make packaging or furniture, heat homes, drive motors, or generate electricity. The substitute for petroleum is growing in our fields and forests. However, regenerative resources involve certain risks – against which farmers can insure themselves.

Brigitte Engelhard

Regenerative resources are cultivated organic raw materials such as grain, straw, rapeseed, hemp, and wood. They can be used to generate energy, in other words to produce heat, steam, electricity, or fuel, and are industrially processed. In contrast to fossil fuels they grow back annually or within relatively brief periods. Regenerative resources are "biomass", as are organic residues such as biological waste, manure, and sludge, if they are combustible and utilisable for heating. Biomass is one of the renewable energies, along with hydro, wind, solar, and geothermal energy.

Generating energy from regenerative resources permits a virtually closed carbon dioxide cycle: firing only gives off as much carbon dioxide as the plants have bound from the atmosphere in the course of their growth. That is why regenerative resources are regarded as having no net impact on the climate. Demand is going to increase substantially, for regenerative resources are on the upswing as a form of biomass and as a source of renewable energy. By the year 2010, Germany plans to generate at least 4.2% of its primary energy from renewable sources; in 2004, it was already 3.6%. And by 2050, renewable energies are to account for 50% of Germany's total energy consumption.

Firing only gives off as much carbon dioxide as the plants have bound from the atmosphere in the course of their growth. This is what makes regenerative resources so environmentally-compatible.

The German federal government promotes renewable energies on the basis of, among other things, the Renewable Energies Act (EEG) and the related Biomass Regulation, whilst according subsidies for the cultivation of regenerative resources. The government estimates that by the year 2020 biomass could account for roughly 10% of both electricity/heating and fuel for passenger cars.

Wood and straw are examples of regenerative resources which are used as combustibles to generate power. For some time now, grain has also been increasingly under consideration as fuel, particularly in view of the steady decline in the price of grain as a foodstuff. Maize, rapeseed, and other regenerative resources can be processed to produce bioethanol and biodiesel, for instance.

Wood can be exploited as a material in any number of ways: as construction material, in furniture and packaging, as insulation material, and in papermaking. After being almost completely replaced by cotton and synthetic fibres, flax and hemp have for some years now been cultivated again on a modest scale for the manufacture of textile fibres and paper and as construction and insulation materials. The most important sources of oils and vegetable fats are rapeseed, sunflowers, and linseed: used to produce lubricants and hydraulic oils, they are regarded as potential biodegradable alternatives to petroleum-based substances. Fatty acids and glycerines are also used in detergents and cleansers. Starch extracted from maize, wheat, and potatoes can be processed into more than 600 different products: paper and cardboard, detergents, raw materials for cosmetics and pharmaceuticals, industrial materials like packaging, sanitary products, etc.

Rapeseed, sunflowers, and linseed oil can be used to produce lubricants and hydraulic oils, for example. They are prized as biodegradable alternatives to petroleum-based substances.

In order to avoid long-haul transportation, regenerative resources are usually processed close to where they are grown. Their transportation and storage are far less hazardous than in the case of petroleum. What is more, the net energy yield from biomass is positive: it yields far more energy in the form of heating than is required in its production. Less than 5% of the usable energy from wood chips, for example, is needed for the production thereof. The large-scale use of regenerative resources also creates many new jobs. According to the German federal government, some 200,000 full-time jobs could be created by 2030, particularly in rural areas with weak infrastructures and in the engineering industry. Finally, regenerative resources also reduce our dependence on gas and oil suppliers.

Regenerative raw materials

Industrial crops	Raw material	Examples of finished products
Rapeseed, sunflowers	Vegetable oil	Cosmetics, lubricants
Flax	Linseed oil	Paints, varnishes
Maize, wheat	Starch	Paper, packaging
Potatoes	Starch	Sheeting, detergents, paper
Sugar-beets	Sugar	Sheeting, detergents, paper
Medicinal plants, spices	Extracts	Pharmaceuticals, essential oils
Flax, hemp	Fibres	Textiles, paper, insulants
Wood	Cellulose, wood	Paper, pulp, furniture
Energy crops		
Sugar-beets, potatoes, maize, grain	Sugar, starch	Bioethanol (fuel), biogas
Rapeseed	Rapeseed oil	Biodiesel, rapeseed oil (fuel)
Wood, grasses, grain	Wood, straw, pellets	Heat, steam, electricity

Shirts or shelving, lubricants or electricity – the resources are growing in our woods and fields.

Energy from the forest: wood chippings from native trees heat the furnace but do not warm the climate, as they only release as much carbon dioxide during firing as they have bound from the atmosphere in the course of their growth.

Munich Re operates a wood chippings plant at its seminar centre, Akademie Schloss Hohenkammer. During the cold months, the plant heats three residential buildings with an area of 200 m^2 and a main building with an area of 600 m^2. In the summer, the plant is used to dry the grain produced on the estate belonging to the Akademie. The wood chippings are produced from waste wood from the estate's own forest.

Boiling, roasting, baking, washing: potatoes do not just taste good, they can be processed into washing powder, too.

Requirements for the production of regenerative resources

Regenerative resources can be cultivated on fallow farmland, though that will not suffice to meet substantially greater demand. The 2005 agricultural reform in Germany leaves it up to each individual farmer to choose which crops to grow. Subsidies no longer depend on the type of production, so the government accords subsidies for regenerative resources as well.

Farmers have to invest hefty sums. A multi-peril crop policy can give them the security they need for this investment.

Crops that are suitable for industrial use or energy production usually differ from traditional feedstuff varieties. Farmers have to make adjustments for the new varieties, which sometimes require different machinery. Furthermore, regenerative resources are cultivated on the basis of contract growing. In other words, before sowing their crops, farmers commit themselves to supplying certain quantities to their customers after the harvest. That alone necessitates safeguarding mechanisms that come into play if a crop fails, for example.

In addition, farmers need new storage areas since processing facilities such as bioethanol plants, for example, have to work to capacity on a continuous basis, and this can only be guaranteed if the crop can be stored for several months. They must also ensure that residue can be treated, which usually takes place in the field.

In a word, farmers have to invest considerable sums of money. These investments can be covered by a multi-peril crop insurance, which insures crops against natural hazards. Depending on the model, the list of perils covered can be quite extensive, including hail, windstorm, frost, drought, flood, and even diseases and pests in some cases. As a rule, the policies cover the quantitative yield and usually involve high deductibles and, depending on the crop and region, rates as high as 10–15%. Given the high risk potential, a decisive role is played by the risk partnership between farmer, insurer, and the state: to render the programme economically viable for farmers and insurers, the government usually subsidises premiums and provides catastrophe reinsurance.

But state subsidies entail dependence on government decisions. For this reason, a model is being developed in South Africa that does without state subsidies and is tailored to provide cover for regenerative resources. Together with local agricultural engineers, Munich Re's agricultural unit has been assisting in the development, establishment, and structural organisation of the programme since 1996. It provides support in the course of product, process, and risk analysis and is helping to adapt the system to meet needs in other countries.

The programme is based on a type of contract farming in which a company known as an integrator coordinates and oversees the entire production and processing chain and serves as an intermediary between farmers and processors. The integrator finances and supplies seed, fertiliser, and pesticides, for instance, and selects the participating farmers. It prescribes uniform methods of cultivation, centralises the sale of the crops, and guarantees the farmers minimum proceeds. The whole programme is insured under a master policy which covers the individual farmer's production and thereby also the output of the processing plant and the integrator's returns. In other words, multi-peril crop insurance prevents a situation in which crop losses due to natural hazards bring the whole process chain, from the farmer to the processing industry, to a standstill and cause the farmer to become insolvent. Instead, the farmer or the company can buy a replacement for the lost crop on the open market, meet the delivery deadline, and sow new seed the following year. A comprehensive risk management system for everyone concerned – and an innovative way of boosting the market shares of regenerative resources.

Useful links
www.nachwachsende-rohstoffe.de (only German)
www.carmen-ev.de
www.bmu.de
www.erneuerbare-energien.de (only German)

Protected natural resources: if companies damage them, they are to be held liable for this within the EU.

How much is a Hine's emerald dragonfly worth?

The new EC Environmental Liability Directive introduces liability for damage to nature. The insurance industry should develop its own tools for this sector to forestall the imposition of mandatory insurance.

Stefan Hackl

A dam bursts in a mine: mud contaminated with heavy metals inundates the nearby nature reserve. Streams and ponds become uninhabitable for flora and fauna, insects and birds run out of food: the natural balance is upset. Is the responsibility for that a question of money? Not yet. Nature as such has no price. Like other European environmental liability legislation, the German Environmental Liability Act only takes effect in cases of personal injury. Or in cases of property damage as defined by law, which, in turn, only applies to property that actually belongs to somebody. There are as yet no legal precedents for cases of damage to animals, plants, and ecosystems that belong to no-one but themselves. That is now going to change: in April 2004, the EC Environmental Liability Directive entered into force. The EU member states must transpose the directive into national law by 2007 at the latest. The purpose of the new directive is to help avoid or clean up environmental damage. It provides for the operator's normal liability to the authorities under public law: in other words, it is a matter of making amends for environmental damage. Under this new directive the member states take on the role of nature's guardians.

The polluter pays

The underlying principle of the new EC directive is that a company responsible for damaging the environment or for the imminent threat of such damage occurring has to make amends. The directive will induce operators to take every precaution to minimise the risk of environmental damage – if only to reduce their own financial risk. The authorities will instruct polluters to clean up the environmental damage they have caused. If they fail to do so, the authorities are entitled to clean it up themselves at the polluters' expense. These new rules will only apply when the directive has been transposed into national law; hence, past environmental damage will not be covered.

But how does one go about cleaning up ponds and streams contaminated with heavy metals? The authorities will specify the details and stipulate the processes to be adopted. They can also prescribe countervailing measures to be effected elsewhere. According to the directive, the clean-up measures must be efficient and proportionate to the damage. The question as to whether the best solution is for nature to help itself must also be considered.

Environmental organisations as nature's advocates

To give the directive "teeth", it includes a clause empowering organisations to take legal action. In other words, in addition to individuals, environmental organisations and other NGOs are entitled to call on the authorities to intervene and assess the environmental damage. The authorities' decisions can be appealed to the courts. The assessment should cover damage to protected species and natural habitats as well as bodies of water. Liability only extends to soil pollution if it poses a serious risk to human health.

The natural environment in 14% of the European Union's territory is under the special protection of the Council Directive on the conservation of natural habitats and of wild fauna and flora. The Environmental Liability Directive applies to any damage to these protected zones or bird sanctuaries. It also takes effect in cases of damage outside these areas if any plant or animal species are affected that are listed in the Fauna Flora Habitats Directive.

Liability under the directive requires only that a company be responsible for the environmental damage. Fault or negligence is not required, provided any of the following elements are involved:
– Industrial activities
– Contamination of surface or groundwater
– Handling of waste
– Transportation of hazardous goods
– Handling or use of hazardous substances, pesticides, or genetically modified organisms (GMOs) – the producers of GMOs are also held liable for placing them on the market.

Where does the new directive not apply?

The directive does not apply to such incidents as nuclear accidents or oil spills at sea. Member states may exclude liability for damage that results from the approved normal course of operations at a site or that is not foreseeable, provided the operator can prove it did not act negligently. Furthermore, operators do not have to accept responsibility for damage to protected species or natural habitats caused by authorised building projects such as airports or roads. Nowadays, protected species and natural habitats suffer most from the ever-increasing sprawl of roads, houses, and industrial estates. In Germany, more than 12 m^2 of land disappears under concrete and asphalt every second. That is 105 hectares a day! Or consider the damage to flora caused by pollutants that are often carried hundreds of kilometres through the air. The new directive does not address any of that.

How do insurers fit in?

As yet, operators are not required to take out insurance against environmental liability risks. But the directive does call for member states to provide incentives for such precautions. Six years after the directive goes into effect, the European Commission will present a report to the European Parliament and Council considering financial security elements such as "a gradual approach, a ceiling for the financial guarantee, and the exclusion of low-risk activities". The Commission is then "in light of that report, and of an extended impact assessment, if appropriate, to submit proposals for a system of harmonised mandatory financial security".

In other words, mandatory insurance might be feasible if no other insurance products for environmental liability are developed. So insurers should work out forms of cover tailored to best serve the interests of each particular member state.

Hine's emerald dragonfly: this species of insect is still common in, for example, the South of France. It is a prime example of typical European fauna and is thus classed as particularly worthy of protection under the Council Directive on the conservation of natural habits and of wild fauna and flora (Habitats Directive).

Useful links
http://www.europa.eu.int/comm/environment/nature/nature_conservation/eu_nature_legislation/habitats_directive/index_en.htm

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Climate protection: The slower you go, the harder the haul

Even drastic climate protection measures will not suffice to stop climate change in its tracks. But they may keep the impact to a manageable level. An elementary issue for the insurance sector: in 2004, it paid out more than ever before to cover losses from weather-related natural catastrophes.

Prof. Dr. Dr. Peter Höppe

The summer of 2003 was extremely hot in Europe. Statistically speaking, it only gets that hot once in 450 years. Signs of a change in the climate? Yes. And 2004 corroborated the trend: since the first systematic recording of temperatures in 1861, average annual temperatures near the ground have only been higher three times. The past four years were among the five warmest since 1861. The havoc wrought by hurricanes in the Caribbean, the United States, and Japan set new world records. The large number of tropical cyclones was linked to above-average sea-surface temperatures, a long-predicted, and lately scientifically proven, consequence of global warming. The insurance industry shelled out US$ 40bn in 2004 – more than ever before – to cover losses due to climate-related natural catastrophes. The facts testify dramatically to the urgent need for effective action to protect the climate. Even if it is too late to halt climate change, effective measures could keep the damage to a manageable level.

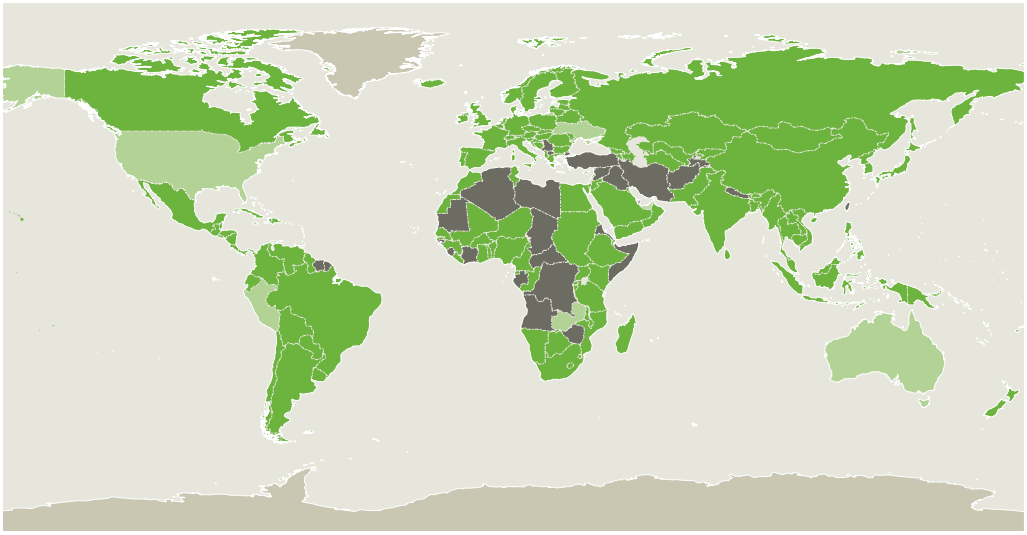
The first international agreement to protect the climate, the United Nations Framework Convention on Climate Change (UNFCCC), was signed in 1997 at the Third Conference of the Parties (COP 3). To take effect, it had to be ratified by at least 55 countries that were responsible for at least 55% of global CO_2 emissions in 1990 – a fairly complicated calculation. The first hurdle was surmounted when Iceland signed the treaty in 2002, the second when Russia signed in November 2004. Russia only stood to gain from the arrangement: in the wake of the collapse of the country's state-run industry, its emissions of greenhouse gases are 30% lower now than in 1990 anyway. So Russia can sell its "emission credits" for a tidy sum.

By the beginning of 2005, 141 countries had ratified the convention. On 16 February 2005, the Kyoto Protocol officially entered into force. The United States, responsible for over 25% of the world's greenhouse gas emissions, still has not signed. Nor have Australia and the newly industrialising and developing countries, including China and India.

The Kyoto Protocol obliges each signatory to reduce emissions of six climate-affecting gases (CO_2, CH_4, N_2O, HFCs, PFCs, SF_6) by 2012 to, on average, 5.2% less than their respective levels in 1990. The European Union has pledged to lower its emissions by 8% from 1990 levels during the period 2008–2012, to which end each member state has committed itself to national climate-protection targets. Germany intends to slash greenhouse gas emissions by 21% during the same period. The experts agree that, though an important step, the Kyoto Protocol will not be enough. Other initiatives must follow, for the emission cuts agreed to date will not even suffice to check the increase in global temperature by a mere tenth of a degree Celsius. So it will be essential to impose more radical restrictions on emissions in the next phase, i.e. post-2012.

The Kyoto Protocol provides for three instruments (so-called "flexible mechanisms") that allow the parties some measure of flexibility in attaining their reduction targets:

– Emissions Trading (ET)
– Clean Development Mechanism (CDM)
– Joint Implementation (JI)



The world in grey and green, showing which countries had ratified the Kyoto protocol in April 2005.

Ratified
Signed
Not signed
No data

Source: Munich Re

The basic idea behind these flexible mechanisms is that in some cases industrialised countries can reduce emissions at lower cost abroad – and for the global climate it makes no difference where they reduce emissions. Emission trading involves issuing "emission credits" (denominated in tonnes of CO_2) to producers of greenhouse gases. If they do not need these credits, they can sell them. A company that invests in cleaner technologies, for example, can amortise part of its investment through emissions trading, which thus provides a financial incentive to protect the climate. The number of credits issued will decrease each year – as will, consequently, overall air pollution by CO_2. Emissions trading got underway in the EU at the beginning of 2005, before the ratification of the Kyoto Protocol, and can now be extended to all the signatory countries. In June 2005, for instance, a tonne of CO_2 cost about €20 in the EU Emissions Trading Scheme.

The purpose of the Clean Development Mechanism (CDM) is to promote environmentally sound cooperation between industrialised and developing countries. It may be considerably cheaper, for example, to reduce CO_2 emissions by modernising an inefficient power plant in a developing country than to prevent the same amount of CO_2 pollution in a high-tech country. The available funds go where they do the most to protect the earth's climate – that is the principle. For it to work, the CDM process needs the support of financial services providers and insurers. A wind power station in a developing country, for instance, requires various services from banks and underwriters: start-up finance, marine insurance, erection insurance (EAR, CAR), third-party liability cover, and insurance for the emission credits.

Joint Implementation (JI) is similar to the Clean Development Mechanism, but involves only highly industrialised signatories of the Protocol that invest beyond their national frontiers to diminish greenhouse gas pollution abroad, for which they receive emission credits.

The greatest problem facing climate protection in the coming years is that developing countries like China and India are not part of the Kyoto process and therefore not yet subject to any restrictions. Emissions in these countries are rapidly increasing: all told, emissions in developing countries rose by about 58% from 1990 to 2003. During that period their share of worldwide CO_2 emissions grew from roughly a third to about 45%. Thus, to be effective, anti-pollution measures have to encompass developing countries.

The 10th Conference of the Parties (COP 10) – United Nations Framework Convention on Climate Change

In December 2004, the 10th world climate convention (COP 10) was held in Buenos Aires. A delegation from Munich Re took part in the conference. The delegates' optimism and enthusiasm waned after just a few days of negotiations in view of the ponderous political tug-of-war between the EU, the developing countries China and India, and the United States and Saudi Arabia.

The signatory states met at the 10th Convention on Climate Change in Buenos Aires in December 2004.

However, India and China did make a commitment in Buenos Aires to renewable energies – a vital element of future climate protection. Although the United States did not ratify the Kyoto Protocol, it pledged to remain "in the boat": in other words, there is hope that one day the country that remains the world's biggest CO_2 producer will join the Kyoto process – possibly when the US business community comes to appreciate the new "Kyoto markets" and brings its influence to bear on the political leadership. For the protocol is a portal to rapidly growing future markets and opportunities for a wide range of new products, services, and jobs.

After a 24-hour meeting on the last day of the conference, the delegates finally agreed to hold an informal meeting in Bonn in the spring of 2005 to discuss the future of climate protection.

Munich Re has been attending climate conventions since 1995 and various related events over the past few years. The company is, after all, one of the few institutions worldwide that can produce definitive figures on weather- and climate-related losses. For insured losses are paid claims and not just estimates or scientific models.

Munich Re's position was represented in Buenos Aires by the climatologist Thomas Loster, Dr. Gerhard Berz, who was head of Geo Risks Research/Environmental Management till his retirement at the end of 2004, and myself as his successor.

Munich Re's data and statements were cited in a number of speeches at COP 10, including those given by German Environment Minister Jürgen Trittin, Bavarian State Minister for the Environment, Health, and Consumer Protection Dr. Werner Schnappauf, and UNEP Executive Director Prof. Klaus Töpfer.

Munich Re has also made its viewpoint clear at several other related events, including an EU conference at which the Potsdam Institute for Climate Impact Research (PIK) presented the results of a workshop sponsored by Munich Re in Beijing. The subject of the workshop was the regional impact of climate change. Speaking after German Environment Minister Jürgen Trittin, I had an opportunity to explain our motives for supporting workshops of that kind. My presentation focused on the effects of climate change on people, particularly with regard to the spread of disease. At a World Health Organisation (WHO) event I discussed economic and insurance-related aspects of "Life and Health".

The next Framework Convention on Climate Change, COP 11, will be held in Montreal in December 2005. The aim is to agree on a road map for the next phase of the Kyoto Protocol as from 2013 – and to implement far more effective anti-pollution measures than in the current first phase. That would be an important step toward further slowing down the dangerous process of climate change.

An image of Hurricane Frances taken by a NASA satellite on 31 August 2004. The cloud formation covers parts of the island of Hispanola; the eastern section (Dominican Republic) is not visible. Parts of the western section (Haiti) are visible. The first archipelago of the Bahamas can be seen in the west and the eastern tip of Cuba to the south.

Climate change: Capital markets get cold feet

Insured losses of approx. US$ 44bn, economic losses of over US$ 145bn: damage due to natural catastrophes never cost the insurance industry as much as in 2004. Extreme weather events caused most of the damage. Munich Re is hit doubly hard in such cases: as both reinsurer and investor.

Ulrich Müller and Rolf D. Häßler

Climate-related natural catastrophes like the four hurricanes that struck the United States in the late summer of 2004 also affect capital markets: lost commodities, devastated production facilities, suppliers' shortfalls, and business interruptions have a serious impact on business results and, consequently, share prices. Large-scale devastation impairs the capabilities of whole national economies, checking their growth in the short and medium term; company sales and profit forecasts decline, the stock market tends downwards. Bond markets are likewise affected, since slower economic growth usually goes hand in hand with lower interest rates. That leads to lower returns and lower average interest on investments. Reconstruction and revitalisation measures, on the other hand, boost the gross national product. Companies in sectors that are involved in reconstruction benefit from the situation – and their stock market value rises accordingly.

Although climate-related natural catastrophes leave their mark on capital markets in the long term, that is hard to prove empirically in individual cases. For capital markets react to any number of factors. Short-term factors, for example, can overlap with the effects of a natural catastrophe on the stock market. An analysis of the S&P 500 Insurance price index, for example, which tracks the quotations of US insurance companies, shows that during the 2004 hurricane season the index reacted to the four hurricanes that swept through Florida within only a few weeks in quite different ways. The market did not show any clear-cut reaction. One reason is that although the general public and the capital markets may be paying the most attention to the damage right after a hurricane, the influence on stock prices is of a more psychological nature – the actual loss amount and specific effects on businesses can only be roughly estimated at this point.

Does anyone stand to gain from climate change?

Though it is hard to predict capital market reactions to climate-related natural catastrophes, this is an issue investors have to address. That goes for Munich Re in particular, which can be hit twice by the same disaster: for one thing, because it covers a portion of the loss in its capacity as reinsurer; for another, because it may also have invested in companies whose business has been interrupted and whose share prices may go down as a result.

Transparency is the key to assessing the climate-related risks of investments.

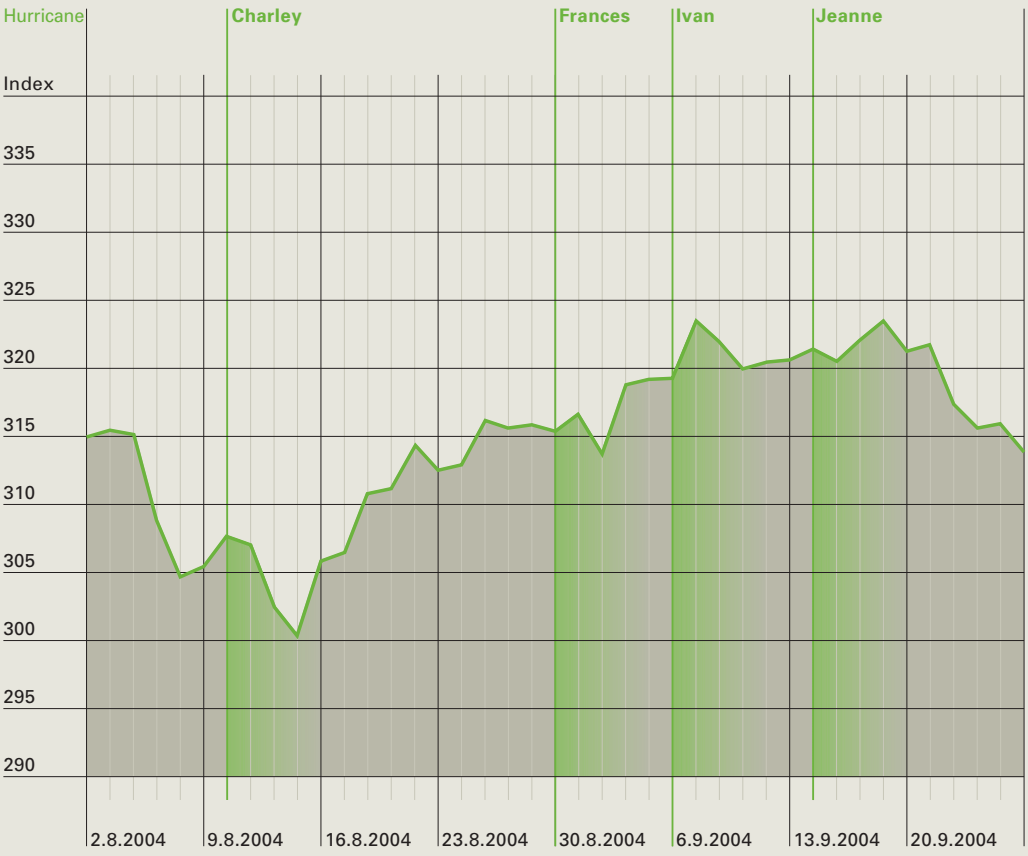
For this reason, in its Challenge of Climate Change project, Munich Re analysed how stock markets were impacted by the largest natural catastrophes, in terms of economic losses, from 1992–2004. It turns out that not all industries are equally hard hit by climate-related natural catastrophes: many lose out, but some actually benefit from such calamities, as in the case of the price indexes for the building industry in the United States and Japan. Similarly, business boomed for beverage producers during the hot summer of 2003. The retail price index, on the other hand, has consistently declined after natural catastrophes.

To estimate the impact of climate-related natural catastrophes on its investment portfolio, Munich Re drew up a grid showing the degree to which each industry is at risk. Munich Re experts divided the industries into different exposure brackets. In addition to the risk of more natural catastrophes, the analysis also includes the indirect consequences of climate change, such as stricter legislation for certain industries. The upshot is a useful in-house tool with which Munich Re can avoid risks.

Furthermore, Munich Re supports initiatives to increase the transparency of climate protection efforts on the part of investment objects, e.g. companies. This transparency is a key prerequisite for assessing the climate-related risks of investments. An important example is the Carbon Disclosure Project (CDP), in which institutional investors have joined forces to obtain information from the world's 500 biggest corporations about their greenhouse gas emissions and climate protection measures.

The current survey, begun in January 2005, is backed by Munich Re and 142 other institutional investors with total assets of roughly US$ 20 trillion. Projects like this can be of twofold benefit to Munich Re: for one thing, they provide a foundation for sound investment decisions; for another, they provide valuable insights into reinsurance risks and their probable evolution. And ultimately, it is also a matter of showing greenhouse gas emitters that groups like Munich Re are committed to climate protection because they take the dangers of climate change very seriously.

Chart of S&P 500 Insurance price index during the 2004 hurricane season in the United States



Development of the S&P 500 Insurance price index during the hurricanes which swept over the south of the United States in the summer of 2004.

Source: Munich Re

Hurricane and effects

Drilling for geothermal energy in Unterhaching – Claims-free productivity risk insurance

Geothermal energy, or heat from the earth, is, by human measure, inexhaustible: every day, the earth beneath our feet radiates into space a multiple of the energy we humans need. It goes unused. At Unterhaching, near Munich, this is about to change: here, a power plant is due to tap the heat from the earth's deep reservoirs. Munich Re has provided insurance cover for the objectives of the ambitious drilling project. A pioneering effort in every respect.

Dr. Thomas Arnoldt

It is 122°C hot, and, at a flow rate of 150 l/sec, would fill a respectable mountain stream, and it brought cheers from the bystanders on 27 September 2004: the "geothermal water" that a drill bit reached at a depth of no less than 3,446 m beneath Unterhaching. A historic breakthrough for geothermal energy and the moment for a sigh of relief from those involved. Now they knew that their efforts had paid off. The planned geothermal power plant to the south of Munich was within reach. At a binary cycle power plant, hot water is set to generate environmentally friendly energy in future: some 4 MW of electricity and up to 38 MW of heat. It will provide a climate-saving substitute for fossil energy sources; a total of 30,000 tonnes of carbon dioxide, 7 tonnes of sulphur dioxide, and 11 tonnes of nitrous oxides, which a conventional fossil fuel power plant would generate, can be saved here every year.

There was delight at Munich Re, too: it had created an innovative insurance solution for this drilling project which, besides providing premium income and service fees, also enhanced its international reputation thanks to its commitment to renewable energies.

One major investment obstacle in such a project is the productivity risk, i.e. whether a well will produce enough hot water for a geothermal power plant to operate economically. Depending on the depth and design of the well, this involves, after all, capital expenditure of between €3m and €5m per well. Munich Re specialists from Special and Financial Risks and Corporate Underwriting/Global Clients came up with an innovative and tailored-made insurance solution to cover this risk.

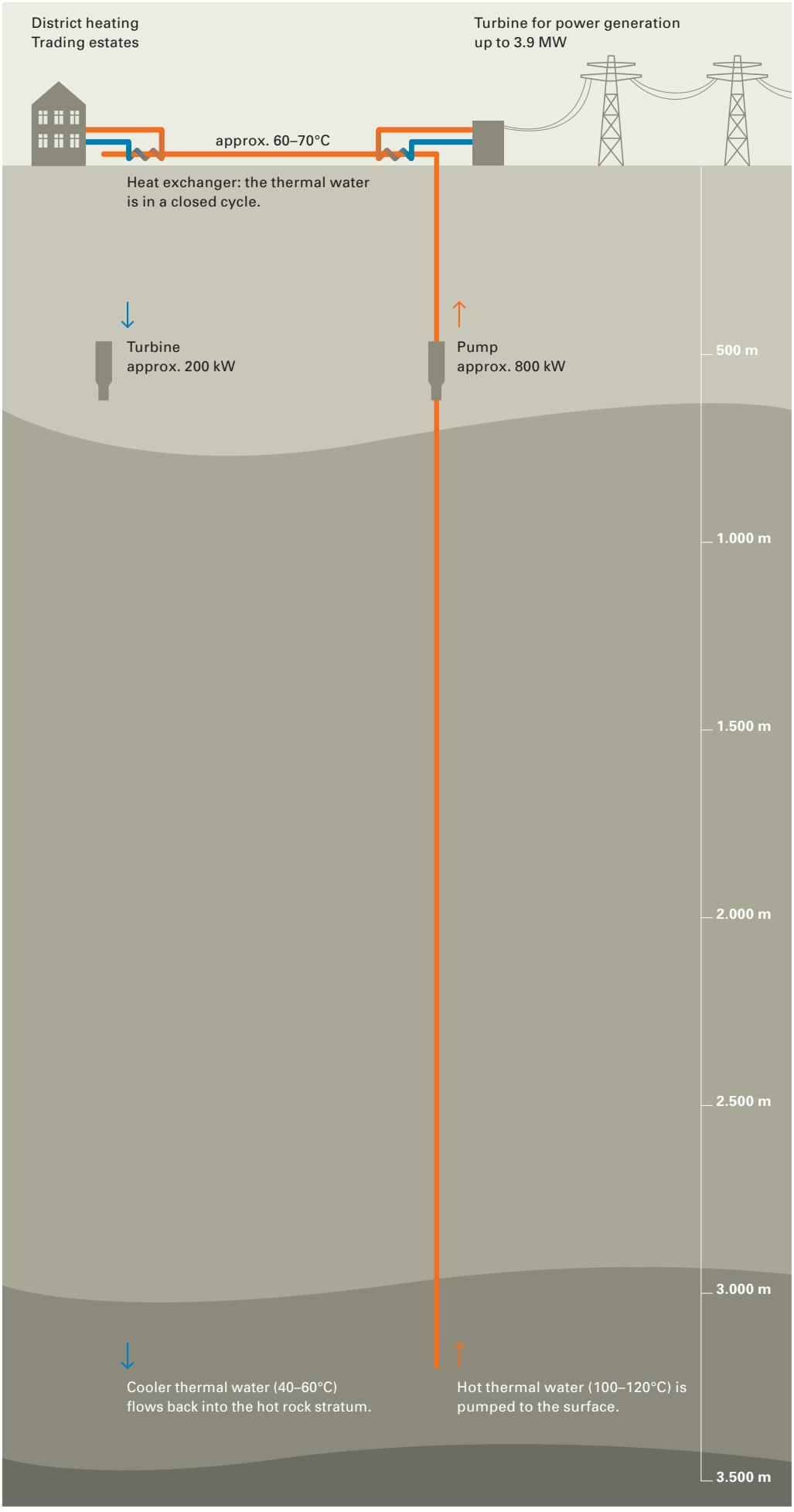
The requirements have now been fulfilled at Unterhaching to produce energy economically from geothermal water for district heating and, at the same time, for installing the world's biggest power plant using so-called Kalina technology. This is designed to enable a high energy exploit and, hence, high efficiency, even though the temperature of the produced water is relatively low. The German federal government is funding the approx. €35m project to the tune of €4.8m. Guaranteed prices for electricity supplied to the power grid, courtesy of Germany's Renewable Energy Sources Act (EEG), will be the basis for the project's economic success.

Unterhaching, a prototype project

The geothermal project in Unterhaching is a world's first in several respects: in terms of energy policy, technology, and insurance. In energy policy, the heat of the earth is gaining in importance because of its base-load capability, meaning that it can supply power at any time of day or night, no matter what the weather is like. Geothermal energy is one of the renewable types of energy, since it merely involves withdrawing heat from the earth which would otherwise be dissipated into space via the natural heat flow. The geothermal water produced to the surface is returned to its original reservoir once its heat has been withdrawn, so that the water balance in the reservoir remains stable. In Germany, three regions are suitable for this type of geothermal energy generation: the North German Plain, the Upper Rhine Valley, and the South German molasses basin, where Unterhaching is located.

Geothermal power in Unterhaching

In geothermal plants, the heat available in the deep layers of the earth is transported to the surface and made useable. The hot water from below ground is used either in district heating systems for buildings or in the generation of electricity.



The main precondition for operating a geothermal power plant successfully is that the produced geothermal water is hot and flows at high rates. At Unterhaching, it was very probable that a temperature of at least 100°C would be encountered. Whether the required flow rate of at least 100 l/sec would be reached was uncertain. A rate of less than 65 l/sec would be insufficient for district heating, let alone for generating electricity.

Applying the technical and specialist knowledge of its experts from many different disciplines, Munich Re has been able to develop the world's first private-sector productivity risk insurance.

This productivity risk is the major investment obstacle – if the conditions are not in place, up to €5m would flow down the drain. This classic entrepreneurial risk is currently limiting the willingness to invest in geothermal projects, since the state no longer grants any funds.

Munich Re has applied productivity risk insurance for the first time

By coming up with a pilot underwriting solution, Munich Re has helped to solve the problem. Applying the technical and specialist knowledge of its experts from many different disciplines, Munich Re has been able to develop the world's first private-sector productivity risk insurance. It covers project failure, i.e. a flow rate of less than 65 l/sec, or partial loss, i.e. a rate of more than 65, but less than 100 l/sec. To promote a positive outcome, Munich Re also supported the stimulation measures that became necessary after the initial well had failed to produce enough water.

Economic success of the project seems confirmed

The very good test result of 122°C and 150 l/sec suggests that the economic success of the project at Unterhaching is likely to be confirmed. It will now go ahead as planned: the next step is the drilling of the second well designed to return the water to its deep reservoir (reinjection well). This will be followed by the construction of the power plant, the surface geothermal water piping, and the district-heating grid. Munich Re will continue to examine other projects of a similar nature and offer tailor-made solutions.

Night-time performance test of the geothermal well.

Useful links:
www.roedl.de
www.unterhaching.de
(only German)
www.geo-energy.org

Clean drinking water is something we all take for granted. But will it stay that way?

Anything but a clear case

Water could become a highly coveted resource in this century. The insurance industry needs to keep a watchful eye on water quality in order to be equipped to cope with existing and future health risks.

Dr. Andreas Armuss

Since 1995, the International Day of Water has been celebrated each year on 22 March. This year's motto was "Water for Life". This motto also applies to the decade that began on 22 March 2005: "Water for Life 2005–2015".

Water covers more than 70% of our planet, but only 3% thereof is fresh water. And 95% of that fresh water, in turn, is frozen in the polar ice caps.

The aim of the Decade of Water proclaimed by the United Nations is to heighten our awareness of the vital importance of water for sustainable development, for the fight against poverty and hunger, and for human health and well-being. Efforts are to be redoubled to achieve international development goals with regard to water supply and sanitation. The primary aim as set forth in the UN Millennium Declaration is to halve the number of people who have no assured access to clean drinking water by the year 2015. This is a colossal task, seeing as in developing countries alone some 1.2 billion people live without such access. The World Supply and Sanitation Collaborative Council (WSSCC) estimates that every day 6,000 children die of diseases attributable to bad water or inadequate hygiene.

Water covers more than 70% of our planet, but only 3% thereof is fresh water. And 95% of that fresh water, in turn, is frozen in the polar ice caps.

Human health depends in large measure on the availability of water of adequate quality. Where the quality or supply of drinking water is inadequate, people get sick, or they die – whether due to infections or contamination with toxic substances. Water scarcity contributes to the spread of disease and impairs sanitation.

In most European countries, particularly in northern and central Europe, drinking water is generally not in short supply. Water quality is at risk, however, in many densely populated, highly industrialised regions. Despite strict regulations and close monitoring, it is always possible for pathogenic micro-organisms or hazardous substances, such as heavy metals, to pollute the water. Germs in the water can be especially dangerous for small children and the ever-growing number of senior citizens. Likewise, people with weakened immune systems, e.g. after organ or bone marrow transplants, are highly susceptible to undesirable substances in their drinking water:

Pathogens

Hazardous microbes are often conveyed into drinking water by the run-off from sewage plants, the direct discharge of sewage, or the rain-wash from agricultural land. Even in minute concentrations these germs can cause diarrhoea-related illnesses. Commonly occurring microbes include

– Escherichia coli, or E. coli for short (the concentration of these bacteria frequently being taken as an index of water hygiene) and
– parasites like cryptosporidia.

Far more alarming, however, is the presence in drinking water of such dangerous bacteria as legionella and vibriona, which cause legionnaires' disease and cholera, respectively, or any of a wide range of viruses.

Polycyclical aromatic hydrocarbons (PAHs)

are undesirable by-products of incomplete combustion. They are not readily biodegradable. A number of PAHs are carcinogenic, have a toxic effect on the immune system and the liver, damage the DNA, and irritate mucous membranes. In the 1960s, these toxins made their way into Germany's drinking water because at that time water pipes in West Germany were coated with coal tar, which contains PAHs.

Pharmaceutical residues and resistant genes

are water-soluble and can hardly be filtered out by the usual methods of waste water treatment. They even resist biological purification treatment in sewage plants. It is not yet clear how these residues affect people when ingested in foodstuffs or water. Resistance genes in bacteria from hospital waste water systems are another danger in drinking water. With their help, the bacteria can protect themselves against common antibiotics. The resistance genes could return to humans by being ingested with drinking water and could then make antibiotics ineffective.

A bath in drinking water which is continuously and carefully monitored – an unremarkable fact of life in Germany, but inconceivable in many other countries: 1.2 billion people in the world have no access to drinking water.

Pollutants with hormonal effects

like pesticides and breakdown products of detergents, by-products of industrial production, or residues of combustion processes (e.g. dioxins, tar).

Inorganic pollutants

Nitrate from fertilisers

Nitrate as such is not harmful to human health – but it is dangerous because with the aid of bacteria the body forms nitrite from it, which is harmful to infants in particular.

Copper, as a corrosion product from home plumbing systems

Copper is chiefly a problem for infants: if milk powder is mixed into the water, infants ingest a larger quantity of copper than is necessary for their metabolism.

In spite of better environmental protection regulations, groundwater pollution is steadily increasing. Global warming as a result of climate change could promote the propagation of thermophilic microbes in drinking water. Particularly before the backdrop of an ageing society and an HIV infection rate that will probably continue to rise, the result could be not only a higher morbidity rate but also – given the corresponding diseases – a higher mortality rate even in industrialised countries.

At present there is no telling exactly what effect the deterioration of drinking water quality will have on diseases and fatalities: there are no reliable data or observations on which to base predictions. As reinsurers, however, we seek to detect and counteract risks at an early stage. The increased pollution of drinking water, for example, might give rise to a higher frequency of certain diseases, which could impact future mortality statistics. The sooner that correlation is recognised, the sooner insurers will be in a position to take action to prevent losses. Death is covered by life insurance; and for illnesses that are not initially fatal but potentially impair the sufferer's ability to perform an occupation there is disability insurance. Insurers calculate the premiums for these policies on the basis of mortality and morbidity statistics and therefore monitor the corresponding risks on an ongoing basis.

Munich Re is keeping a close watch on water-related problems, identifying the risks and supporting measures designed to avoid or overcome them. Thanks to its unique international overview of loss developments, it can, in this as in other fields, make its expertise available at an early stage in organisations and networks and work towards finding solutions.

In most European countries, drinking water is generally not in short supply. Water quality is at risk, however, in many densely populated, highly industrialised regions.

Useful links:
www.thewaterpage.com
www.menschen-recht-wasser.de (only German)
www.who.int
www.munichre-foundation.org

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J.L. Lozán, Hartmut Grassl, Peter Hupfer, *Warnsignal Klima: Genug Wasser für alle?* June 2005, ISBN: 3980966801 (English summaries)

30 years of geoscientific and environmental risk research at Munich Re

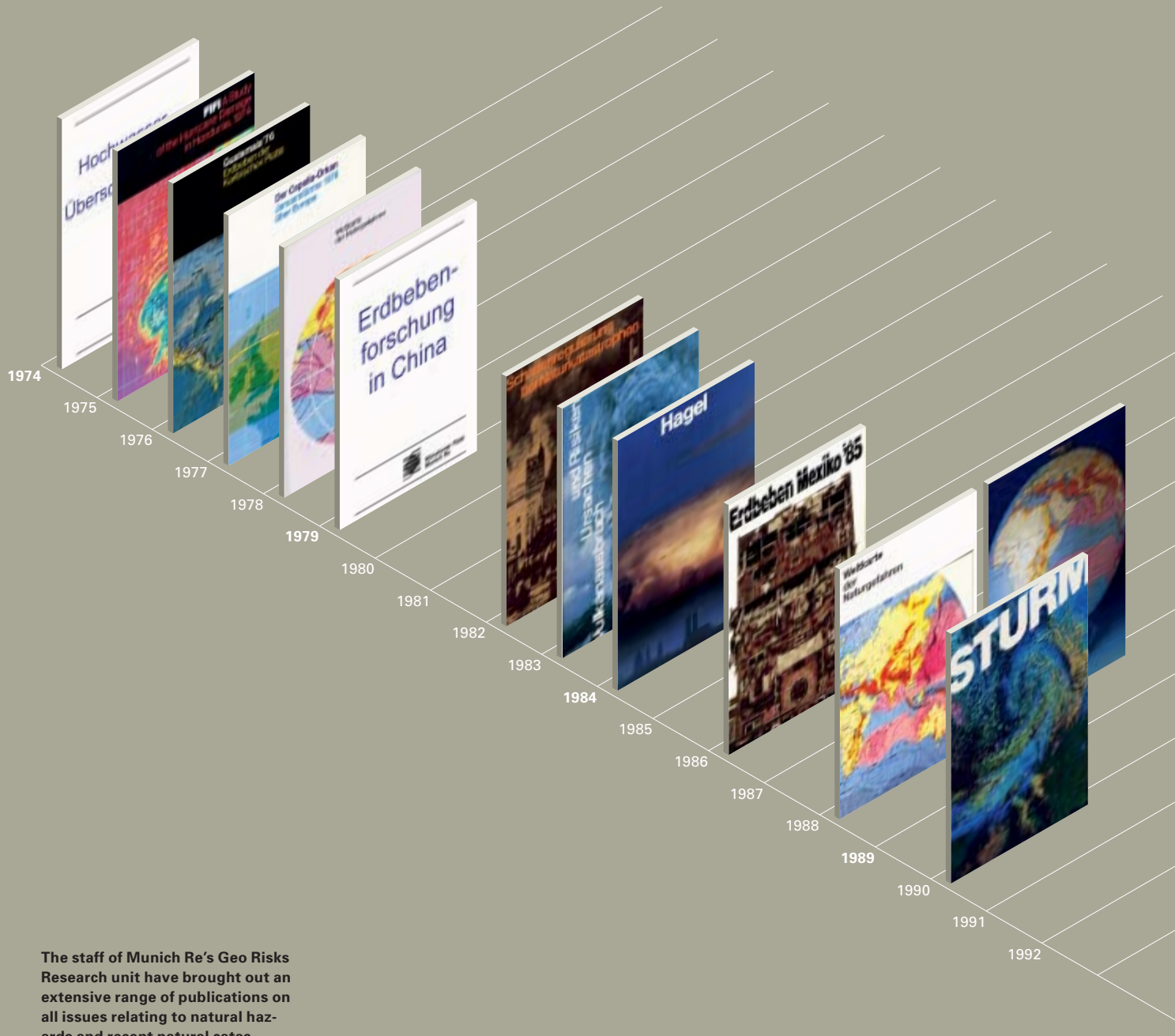
The year 2004 again leaves no doubt: the risks from natural and environmental catastrophes keep on growing. Thanks to its own experience, though, Munich Re is well prepared for this – not least because it set up its Geo Risks Research unit all of 30 years ago.

Dr. Gerhard Berz

It was in June 1974 that Munich Re took on its first geoscientist. This marked the birth of the Geo Risks Research unit. Long before that, however, the company's underwriters, actuaries, and engineers had been assessing natural hazard risks worldwide, and they had worked closely with a network of experts from the relevant research fields. After all, the history of the reinsurance sector had been marked by natural catastrophes from the very outset. This is especially true of Munich Re: it had been hard hit by San Francisco's 1906 earthquake, with an enormous loss of 12 million gold marks. Measured in terms of premium volume, this was to be the biggest loss from a natural catastrophe in the company's history. Its founder, Carl Thieme, took advantage of the crisis situation to speedily settle the losses, thus creating the basis for the tremendous trust placed in Munich Re: "Thieme is money".

After some decades of relative calm, catastrophes piled up in the 1950s and 1960s: Holland's flood disaster in 1953, the Agadir earthquake in 1960, Hamburg's storm surge in 1962, and Hurricane Betsy in 1965 (along the Gulf Coast in the US). At the same time, the reinsurance market was evolving at break-neck speed – this was the start of globalisation. The insured losses from natural catastrophes increased dramatically in the following period. Many primary and reinsurance companies, faced with the destruction left by the earthquake in Managua, Nicaragua, in 1972, and by Cyclone Tracy in Darwin, Australia, in 1974, were truly shocked. Not so Munich Re: it had already started to warn its clients urgently of the massive rise in loss potentials, and its special publications on flooding and inundation, earthquake, and storm damage in Europe met with strong interest. This encouraged the Board of Management to put the first geoscientist and two technical staff to the task of dealing with these subjects. The small group had hardly got to work in June 1974 when it was confronted with a string of disasters: Cyclone Tracy in Australia, Hurricane Fifi in Honduras, hailstorm in Bavaria, the Capella gale in North Germany, as well as earthquakes in Guatemala, Italy, China, and the Philippines.

The demand from within the company and from clients for geoscientific consultancy services boomed, so that Munich Re extended the team just three years later with another geoscientist. Shortly after, it published its first World Map of Natural Hazards. This has become a unique feature in the meantime, consulted and recognised the world over because it presents an overview of the most important risk criteria in a zoning system developed by Munich Re itself. The World Map has now evolved into an interactive tool based on a geographical information system: the CD-ROM "World of Natural Hazards". With a total of over 50,000 copies published, it is the most successful product in our range of geoscientific services. Other such products are the Globe of Natural Hazards, the millennium review of natural catastrophes, plus many more, including the most recent publications: "Storm warning", "Weather catastrophes and climate change", "Renewable energies" and "Megacities – Megarisks".



The staff of Munich Re's Geo Risks Research unit have brought out an extensive range of publications on all issues relating to natural hazards and recent natural catastrophes with particular relevance to the insurance industry. These publications have mainly been compiled in close cooperation with colleagues in underwriting and engineering divisions.

They have been published in numerous languages (even Chinese and Vietnamese) and have thus made their mark throughout the (insurance) world. However, none of these publications has become as much a "calling card" for Munich Re as the World Map of Natural Hazards (already reissued numerous times) with the attractive accompanying globe and the CD-ROM "World of Natural Hazards", now a standard tool for the risk assessment of natural hazards.

The purpose of all these publications and products is to convey scientific and underwriting knowledge in order to better prepare our clients, as well as the authorities, scientists, and engineers for these increasingly important problems and to offer them appropriate solutions.

We believe that this is the only way to abate the disastrous trend towards ever more frequent and ever more expensive natural catastrophes, possibly even to get them under control in the long term.

From the late 1980s on, further geophysicists, geographers, hydrologists, meteorologists, geologists, environmental scientists, and technical staff joined the team, and the total headcount increased to its current level of 25 – a development that almost kept pace with the rise in natural catastrophes; more than ever before, catastrophe losses now call for on-site investigations by geo experts, engineers, and insurance specialists.

Some issues are becoming more and more pressing: Is humankind changing the environment and the climate? How strong is the impact of the changes on weather extremes? What can this mean for the insurance industry? These issues have been studied by Munich Re since the early 1970s, when a series of severe winter storms swept across western and central Europe at ever shorter intervals. No coincidence, but an indication of a changing climate, it was suggested. In the 1980s, the signs of global warming became more pronounced: climate models supplied plausible, physico-chemical reasons for the observed trends. Munich Re's geoscientists were the first in their field to furnish proof of the conspicuous rise in the loss burdens from great natural catastrophes, most of which were triggered by extreme weather events. An analysis of the causes showed that the losses were largely the result of socio-economic changes: because, for example, more and more people were living in exposed regions such as flood plains, and ever greater assets were accumulating there. Even at that time, however, one thing was very evident: we cannot ignore the fact that humans are impacting the climate and interfering with balanced natural systems, by wiping out plant and animal species, for instance, felling primeval forests, contaminating the soil, and overfishing oceans – thus bringing about changes that are often irreversible. They threaten humanity, the economy, and nature. The longer we stand by and watch, instead of energetically fighting the causes, the harder it will be to come to grips with, or pay for, the (long-term) implications.

This being so, Munich Re has long been advocating a sustainable policy of environmental and climate protection, a policy which it actively promotes in conjunction with its partners in insurance and finance. Through its voluntary commitment within the framework of the UN's Environment Programme, the company is doing its bit – by lowering its own pollution levels and by sponsoring numerous climate protection projects, for instance. It takes account of sustainability aspects in both its reinsurance business and in its investments, proving itself, in this respect, one of the pioneers in the financial sector.

The future will also depend on the extent to which humans apply reason and stop unbalancing nature even further. As reinsurers, we view our remit not only as one of recognising risks and developing insurance solutions: we also make our knowledge of how to prevent these risks publicly available. This is our ethical duty – and in our business interest since our long-term economic survival depends upon the balance of nature.

Useful links:
www.munichre.com

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Munich Re environmental report 2004

01 Introduction

Dear Reader,

With overall economic losses of more than US$ 145bn and insured losses exceeding US$ 44bn, 2004 was the most expensive natural catastrophe year ever for the insurance industry. A large proportion of the losses were caused by weather-related natural catastrophes and are thus linked directly with climate change.

Against this backdrop, the ratification of the Kyoto Protocol by Russia at the end of 2004 gains additional significance. Although more than 100 nations had already signed the Kyoto Protocol, the conditions for it to come into force were not fulfilled until it was ratified by Russia. The United Nations Framework Convention on Climate Change became binding under international law mid-February 2005. In addition, the European emissions trading system was launched on 1 January 2005. In spite of a number of precursor systems, this system of emissions trading is a unique project which will make a central contribution towards attaining the targets set out in the Kyoto Protocol.

An important stimulus was provided by the first International Conference for Renewable Energies (renewables 2004) held in Bonn in the summer of 2004, at which representatives from 154 countries drew up in some cases ambitious targets for the International Action Plan aimed at promoting renewable energies. At this conference, Munich Re presented its expertise on the scientific and technological principles involved, the risk circumstances, and the relevance of renewable energies in the insurance context. Our innovative insurance solutions support the expansion of renewable energies as a means of reducing the emission of climate-changing greenhouse gases and hence fighting the trend towards rising losses from extreme weather events.

Capital markets are giving increasing attention to climate change and the response to it. In particular, institutional investors are joining forces in order to jointly obtain more information on the climate protection measures of their investments, which are mostly joint-stock companies. In the context, Munich Re supports the Carbon Disclosure Project, in which 141 investors with invested capital of approx. US$ 20,000 bn are represented.

Private investors too, in addition to making sure that their investments produce a good return, represent an appropriate risk, and have a high level of solvency, are keeping a closer watch on whether they show a positive sustainability performance. The number of investment funds in Europe with an environmental and sustainability bias continued to grow in 2004. As far as Munich Re is concerned, this mounting interest is reflected in an increasing number of enquiries from analysts who subject our activities for the environment and sustainability to a very meticulous scrutiny. Munich Re shares are included in the important sustainability indexes like the Dow Jones Sustainability Index (DJSI) and FTSE4Good. In other words, we are on the right track.

All this strengthens us in our resolve to step up our efforts towards environmental protection and sustainability even further. Our aim is to gear our long-term-oriented corporate activities and strategy to economic, ecological, and social aspects.

On the following pages you will find out more about what we have been concentrating on in our work during 2004. We report in detail on the tasks we have tackled and the objectives we have managed – or failed – to achieve. This report updates the environmental statement of previous years.

For the realisation of our environmental and sustainability goals in the future we will have to do without the support of Dr. Gerhard Berz, who went into retirement at the end of 2004 after 30 years in Geo Risks Research. Dr. Berz was an important pioneer in the cause of environmental and climate protection both inside and outside Munich Re. We would therefore like to thank him most sincerely for the valuable impulses and committed support he gave in the establishment and development of environmental management at Munich Re!

We look forward to continuing our dialogue with you that has developed over the past years.

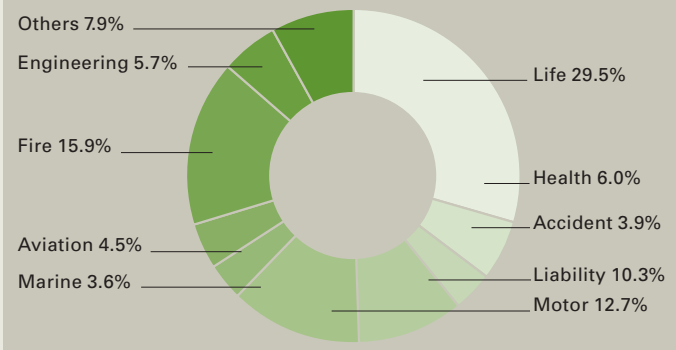
Prof. Dr. Dr. Peter Höppe Claudia Wippich

02 Munich Reinsurance Company

Our company, our business, 2004

This environmental report (environmental statement) relates to Munich Reinsurance Company in Munich. It is the parent company of the Munich Re Group, whose business encompasses reinsurance, primary insurance, and asset management.

Munich Re's gross premium income by class of insurance was as follows:



When Munich Reinsurance Company was founded in 1880, it was one of the first independent reinsurance companies that did not itself conduct primary insurance. Ever since this time, reinsurers have been risk managers, assuming the risks covered by primary insurers. In the insurance industry's value chain, reinsurers and primary insurers are two complementary elements.

Soon after its establishment, Munich Reinsurance Company expanded its activities to foreign countries. Starting in 1886, it set up offices in other European countries, followed by the USA in 1899. Today it is one of the largest reinsurers in the world: 5,000 insurance companies in around 160 countries rely on its expertise and financial strength.

Among other things, we reinsure the risks of natural catastrophes, oil rigs, and satellites, and the risks arising from the use of genetic engineering and information technology or from the management of companies.

With insured losses of approx. US$ 44bn (previous year: US$ 15bn), 2004 was the most expensive natural catastrophe year ever for the insurance industry. The tropical cyclones in the United States, the Caribbean, and Japan alone cost approx. US$ 40 bn. The overall economic losses exceeded US$ 145bn and were again much higher than the amount carried by the insurance industry. With some 650 loss events, the number of documented natural catastrophes in 2004 was in line with the average of the last ten years. The insured losses were mainly caused by windstorms and other severe weather events. Munich Re sees this as further confirmation of the assumption that the effect of climate change – which is very certainly anthropogenic – is and will be an increase in the frequency and intensity of exceptional weather events.

As of 2005, Munich Re will follow all of the recommendations of the German Corporate Governance Codex with the exception of individualised disclosure of Board of Management compensation. Information on the compensation structure may be viewed on Munich Re's website.

Munich Reinsurance Company in figures

(cf. Munich Reinsurance Company's 2004 annual report)

	2004 €m	2003 €m	2002 €m
Gross premiums	19,243	21,748	21,857
Investments	72,794	70,893	57,955
Technical reserves	55,102	52,099	46,091
Equity	11,866	11,375	7,115
Profit for the year	777	511	2,606
Dividend	459	286	223
Dividende per share (€)	2.00	1.25	1.25
Share price at 31.12. (€)*	90.45	96.12	108.43
Market capitalisation at 31.12.	20,766	22,067	20,368

* Share prices adjusted to take account of the capital increase in November 2003.

The fair value and carrying amount of Munich Reinsurance Company's most important investments (31.12.2004):

	Fair value €000	Carrying amount €000
Real estate	2,691,480	1,036,821
Investments in affiliated enterprises	12,982,571	11,929,167
Loans to affiliated enterprises	1,197,169	1,193,029
Participating interests	1,283,519	1,085,811
Loans to companies in which we have shareholdings	47,915	43,209
Other investments	35,263,312	31,365,811
Total	**53,465,966**	**46,653,848**

Further information can be obtained in Munich Reinsurance Company's annual report at www.munichre.com.

The Munich Re Group

After reinsurance, with its share of 54% of the total turnover, the second main pillar of the Munich Re Group is primary insurance business, involving 84% of our total workforce of almost 41,000. Our operations in this sector concentrate on Europe and above all Germany.

The Group's primary insurers include the ERGO Insurance Group, the Karlsruher Insurance Group, and Europäische Reiseversicherung.

The ERGO Insurance Group was created in 1997 by merging the long-established German companies VICTORIA, Hamburg-Mannheimer, DKV, and D.A.S. 2002 saw the acquisition of KarstadtQuelle Versicherungen. The main emphasis of the ERGO Group's business is on personal lines insurances, especially insurances of the person, i.e. life, health, and personal accident insurance. The ERGO companies also offer insurance for small and medium-sized commercial firms and operate in the industrial business sector. ERGO has a leading position in the health and legal expenses sectors in Europe through DKV and D.A.S. respectively.

The Karlsruher Insurance Group consists of five companies that operate for the most part in life insurance, but also in all lines of property-casualty business. They mainly offer personal lines insurance and products for small and medium-sized firms.

With numerous subsidiaries and affiliated companies in 11 countries, as well as a network of strategic cooperation agreements, Europäische Reiseversicherung is an effective international alliance. Mercur Assistance offers emergency assistance services worldwide in the field of healthcare and mobility. The Watkins Syndicate, which operates within Lloyd's of London, has belonged to the Munich Re Group since 1997. It specialises as a primary insurer in marine business.

MEAG MUNICH ERGO AssetManagement GmbH is the investment management centre of the Munich Re Group. It manages the lion's share of the Group's assets amounting to around €178bn (as at 31.12.2004), making it one of the major asset managers in the European financial sector. It is responsible for direct investment in securities and real estate, and for the assets held in segregated managed funds (special funds). Beyond this, it offers its expertise and know-how to both institutional investors and private clients.

The Munich Reinsurance Company has its own environmental management system (to which this environmental statement relates) as do some of the companies in the Munich Re Group, such as VICTORIA and D.A.S. UK. Europäische Reiseversicherung was a member of a successful project called Ökoprofit.

Further information can be obtained in Munich Reinsurance Company's annual report at www.munichre.com and at the following websites:

www.ergo.de
www.victoria.de
www.hamburg-mannheimer.de
www.das.de
www.dkv.com
www.erv.de
www.karlsruher.de
www.meag.de

03 Munich Re's environmental guidelines

The environmental guidelines form an integral part of our corporate strategy and are applicable throughout the reinsurance group.

Environmental protection and sustainability: Our commitment
Preamble to the environmental guidelines of Munich Reinsurance Company

As a leading risk carrier and provider of financial services operating worldwide, Munich Re acknowledges its responsibility for environmental protection and sustainability. Preserving the natural foundations of life is also a contribution to value-based management, as our economic success is inseparably linked with protection for people, the environment, and physical resources.

Seeing opportunities in risks

As reinsurers, we support and safeguard innovative technologies and large industrial projects. The risks associated with these form the focus of our interest and responsibility, both locally and globally.
We use our knowledge of climatic and environmental changes – which are increasingly caused by man – to manage risks by consistently promoting preventive measures.
In our financial sphere, we take account of environmental criteria when taking investment decisions. Through our investments, we promote suitable environmental related projects, and we observe ecological aspects when managing our property investments.
In close cooperation with our clients we develop our services further on an on-going basis in order to continually reduce environmental damage and environmental risks for everyone's benefit and to exploit the business opportunities inherent in the risks, both today and tomorrow.

Acting prospectively at our business locations

We aim to reduce as far as possible the environmental impact arising from our business operations and in connection with the use of our properties. Besides complying with statutory provisions, of course, we also need to pay particular attention to consistently avoiding waste and emissions, as well as to reducing our energy and water consumption. To this end, we orient ourselves towards the highest technical standards wherever economically reasonable. We also choose our suppliers and service providers according to these principles.

Learning from each other through dialogue

Intensive research and development help us to assess current and future risks and to find appropriate starting points for our environmental related activities. This enables us to exert a positive influence on our partners' risk behaviour, in order to meet the challenges of the future together.

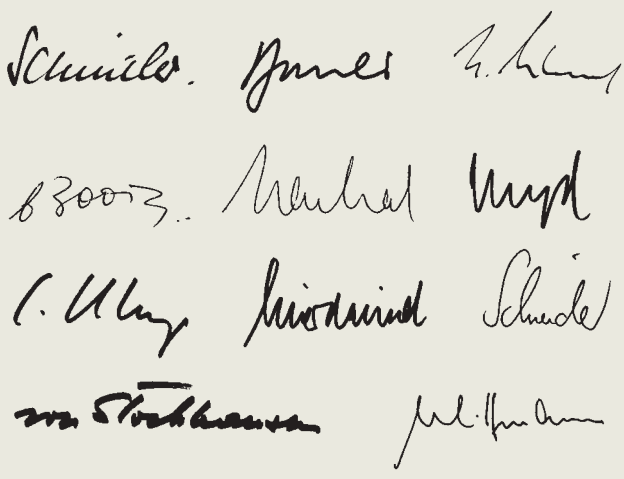
We take our knowledge and experience to the public at large and encourage the exchange of information on relationships in the area of environmental risks.
We communicate openly on the subjects of the environment and risk, both in house and with the outside world.

Taking responsibility with commitment

Our staff are responsible for implementing the environmental guidelines in their particular area of influence, observing the environmental impact of their actions and decisions. We agree concrete goals which we document each year in our environmental programme and against which we measure our performance. By means of targeted training and promotional measures as part of our environmental management system, we are continually developing our professional and personal skills as regards environmental protection and sustainability.

On the basis of our vision and our guiding principles, we declare these to be the general principles of our dealings.

The Board of Management of Munich Reinsurance Company
Munich, September 2000



04 Product ecology

Munich Re regards economy and ecology as two inseparably linked aspects of our business operations. By systematically anchoring our environmental guidelines in our core business, we ensure the highest possible quality in the acceptance of risks and thus further the lasting success of our business. A particularly important role is played by bringing our expertise to bear in international developments and discussions.

renewables 2004

Fossil resources are limited and the energy requirements of the world's growing population are increasing. The global energy mix will therefore have to undergo a major change in the future. In its latest World Energy Outlook, the International Energy Agency forecasts that by 2030 the world will need around 60% more energy than it does today. The World Summit on Sustainable Development in Johannesburg launched the global expansion of renewable energies. Further stimulus was given by the first International Conference for Renewable Energies, renewables 2004, in Bonn in June 2004.

Munich Re supports the distinct increase in the share of renewable energies in the global supply of energy in order to reduce the emissions of climate-changing greenhouse gases from fossil fuels. These emissions are very probably among the reasons for the increase in losses from extreme weather events. As a professional risk partner, we promote technological development in this area by means of underwriting solutions, because reliable insurance protection is the precondition for a willingness to make investments.

Munich Re was involved in the preparation phase of renewables 2004 as a member of the National Advisory Committee. Delegates and visitors to the conference were able to take advantage of our expertise by talking with some of our experts in person at Munich Re's stand and by listening to their presentations at various side events, such as the Sustainable Energy Finance Event (SEFI) and the Geothermal Days. A special brochure entitled "Renewable energies – Insuring a technology of the future" was published on the occasion of renewables 2004 and provides an overview of the following topic areas:

– Global energy consumption and climate change
– Types of renewable energy and their use
– Opportunities and risks for the insurance industry
– Limits of insurability and innovative coverage concepts

More details on the underwriting pilot project and the development of a productivity risk insurance for the geothermal project in Unterhaching near Munich may be found in "Drilling for geothermal energy in Unterhaching" in the magazine section.

More information may be found at http://www.renewables2004.de.

Tenth session of the Conference of the Parties (COP 10)

The tenth session of the World Climate Conference took place in Buenos Aires from 6–17 December 2004. Expectations were high in view of the Russian parliament's ratification of the Kyoto Protocol and the British Prime Minister's announcement that he would commit himself to making international climate policy a central issue during his G8 Presidency. The Buenos Aires conference set its sights on the future of the Kyoto Protocol after 2012, including the issues of how to involve the developing countries in reduction commitments and how to bring the United States back to the negotiation table. The negotiations were tough, however, and the delegates only managed to agree to meet again informally in Bonn in May 2005 to discuss the future of climate protection.

As in previous years, Munich Re was represented by a delegation of high-ranking staff who, in a number of side events, expounded their view on climate change and its effects on the insurance industry and stated that all treaty partners already have to undertake further commitments now for the time after 2012. Our data on losses from weather-related and climate-related events is a highly valued basis for argumentation in climate negotiations insofar as it does not contain estimates or scientific models that are subject to uncertainties but losses that have actually been incurred.

4.1 Reinsurance

How do reinsurers influence risks for the environment? Normally, insurance covers loss or damage involving property or people. Insurers and reinsurers prescribe measures to be taken by policyholders for the purposes of loss prevention, and these measures help to reduce the hazard posed by, for instance, industrial facilities. They are gaining in significance because as of May 2007 industrial plants and many commercial enterprises will be liable for environmental damage under the new EC environmental liability directive. More information on the content and repercussions of the new directive may be found in "How much is a Hines's emerald dragonfly worth?" in the magazine section. Besides product design, a further important part of generating awareness of environmental risks is the dissemination of knowledge.

To this end, Munich Re has developed a special computer-based training program on environmental aspects called "IQ Umwelt". It is designed to provide liability underwriters with knowledge about environmental risks in a simple and modern way. Illustrations and clips are used to explain the difficulties and complications that may be encountered in connection with environmental risks.

We also improve the risk situation for the environment in other areas besides environmental liability business. Here are a few examples.

Example: Marine underwriting

Last year we anchored our environmental guidelines in a further sector of our operative core business, marine insurance. We performed a systematic examination of how we can counter the major environmental risks in this line of business. Environmental risks in this context include the following:

– Risks during the transportation of chemical, petrochemical, and nuclear substances
– Oil pollution at sea (leakage of oil cargoes, discharge of fuel and bunker oil in port and at sea) arising from accidents and collisions or in the course of loading and unloading
– Vessel waste disposal procedures
– Ballast water
– Risks involving substandard vessels
– Emissions into the atmosphere caused by shipping

The main objective was to integrate sustainability aspects bearing in mind the specific features of this line of business and the market setting in each case. In many cases, however, it was found that there were only limited opportunities for direct influence, owing to, among other things:
– Our position as a reinsurer and thus our distance to the original risk
– The comparatively low level of statutory regulation in this international line of business
– The stiff competition in this line

Nevertheless, Munich Re continues to give firm support for initiatives aimed at safety in international ocean and road transportation, e.g. by the position it adopts in presentations and specialist publications.

Together with our clients we will continue to encourage developments like those connected with internationally recognised standards. And we will continue to stress that the consideration of environmental aspects is part and parcel of better risk prevention.

A further upshot of this project is that environmental aspects will in future be an integral component of our central knowledge management platform for marine underwriters in the reinsurance group. Our aim is to "…develop awareness with regard to environmental protection issues in all sectors of marine insurance and to provide underwriters with the skills they need within their spheres of responsibility to integrate sustainability aspects in marine reinsurance business."

Example: Bond insurance

In our 2003 environmental statement we reported on the anchoring of the environmental guidelines in bond insurance. Last year we began to take advantage of international forums like the International Credit Insurance and Surety Association (ICISA) to present the topic to an international public of specialists in this line of business. We also chose this as the focus for the Bond Forum, our biannual client event for insurance companies that write bond business. We arranged workshops in which we discussed with high-ranking representatives from international insurance companies issues relating to the code of ethics and to the establishment of principles for considering environmental aspects in the underwriting process. We will strive to promote further awareness among our insurance clients in this respect. That is one of the most effective ways for us to exert our influence. Unlike the reinsurer, the primary insurer is in direct contact with the policyholder and thus – in the case of surety business, e.g. with the building contractor for a large infrastructure project – can exert an influence on the original risk by way of the insurance contracts. You can read more on this topic in "Bond insurance" in the magazine section.

Example: Agriculture

The cultivation of genetically modified plants for commercial purposes began in 1994. By the year 2004, transgenic soy already accounted for 56% of the world's soy crop area, and in the case of maize it was 14%. The significance of transgenic plants has increased appreciably. The present total crop area is 81 million hectares and is constantly increasing. The main traits of GM plants in commercial cultivation are herbicide tolerance and insect resistance. The effects of genetically modified plants on agricultural insurance were the focus of a dissertation carried out in cooperation with the Institute of Agricultural Economics and Farm Management at the Technical University of Munich in Weihenstephan. This investigation resulted in various proposals for crop insurance, including the recommendation that conventional and transgenic plants be compared in terms of their risk exposure.

Implementation of measures specified in our environmental programme

The following table shows the status reached by the various projects in our current environmental programme at the end of 2004.

Objective: Realise Munich Re's environmental guidelines in the reinsurance divisions

Measure	Deadline	Status	Comment
Operationalise Munich Re's environmental guiding principles and anchor environmental criteria in the business of bond and marine insurance.	1st quarter 2005	Completed	See above.

Objective: Develop knowledge and transfer expertise inside and outside the company

Measure	Deadline	Status	Comment
Examine the correlation between production intensity and vulnerability to insurable hazards.	06/04	In progress	The first series of trials has been completed. It investigated the effects of hail on conventional and ecologically produced plants. The data are currently being analysed.
Support multinational institutions in the development of risk management instruments for the agricultural sector of developing countries.	12/03	In progress	Pilot covers for crop insurance with reduced state support are currently being tested in practice.
Draft an overview of the ways Munich Re can exert influence with regard to environmental standards.	04/04	Postponed	Completion planned for 2005.
Anchor World Bank standards in Munich Re's knowledge management.	2004	Completed	
Further develop didactic material on environmental liability and environmental liability insurance.	12/04	In progress	In-house workshops were held in response to the debate on the new EU environmental liability directive.
Draft a paper on environmental risks in eastern Europe (countries acceding to EU).	12/04	Completed	
Produce the publication "Environmental policy, liability and insurance".	06/04	In progress	This publication will deal with the role of private insurance and its options in environmental liability issues and with the role of environmental liability in national and international environmental politics. Completion planned for 2006.
Identify the problems relating specifically to water in megacities.	12/04	Completed	"Megacities – Megarisks – Trends and challenges for insurance and risk management" was published in Munich Re's knowledge series.

Objective: Improve data resources

Measure	Deadline	Status	Comment
Evaluate information on environmental losses and develop a concept for improving the documentation of environmental losses.	12/04	Completed	
Improve the availability of exposure and claims data in connection with weather-related natural hazards.	Ongoing	Completed	The aim is to quantify the effects that climate change will have on Munich Re and to use that as a basis for adjustment strategies.

Objective: Modify existing products and develop new products in connection with the Kyoto mechanisms

Measure	Deadline	Status	Comment
Examine business interruption (BI) and directors' & officers' (D&O) insurance with a view to making necessary adjustments.		Completed	

4.2 Finance

Sustainability and Munich Re shares

The market for Socially Responsible Investment (SRI) has continued to develop dynamically. According to a study carried out by Avanzi SRI Research and the SiRi Company, the number of mutual funds admitted in Europe continued to increase in 2004. On 30 June 2004, there were 354 such funds, 41 more than at the same time the previous year. According to the study, the investment volume has also grown, reaching a figure of approx. €19bn by the specified date, and thus 50% higher than the previous year. The proportion of sustainable bond funds has increased, accounting for about one-fifth of the total investment volume. The largest national market continues to be the United Kingdom, where 36% of the total is invested in these funds. The highest growth rates are in Belgium, the Netherlands, Switzerland, and the United Kingdom.

More information on the development of the European SRI market may be found at www.scoris.de.

MEAG's fund Nachhaltigkeit, set up in October 2003, was also included in the study. It is internationally oriented and invests solely in companies whose operations are in conformity with the principles of social and ecological sustainability. Vendors or manufacturers of tobacco, alcohol, armaments, or products and services associated with gambling are not admitted. On average, the fund contains about one hundred shares from various countries and business sectors. In its choice of company, MEAG uses the renowned Dow Jones Sustainability World Index ex All (DJSI) for orientation. 10 to 20% of the fund's volume is invested in so-called innovators. These are usually small companies that are not in the DJSI but make a contribution to sustainable development with innovative products like wind power plants or water treatment facilities.

More information on this may be found at www.meag.com.

Munich Re's shares have also featured in the DJSI without interruption since 2001. The Swiss financial services provider SAM, which established the index in cooperation with Dow Jones & Company, rates Munich Re as one of the most sustainable companies in the financial sector. Our shares are also contained in FTSE4Good and other important sustainability indexes.

More information on this may be found at the following websites:
www.sustainability-indexes.com
www.ftse.com/ftse4good

As a rule, SRI indexes and funds closely examine Munich Re's activities in terms of their environmental soundness and sustainability before they list its shares. In recent years, there has been a distinct increase in the number of inquiries from specialist research agencies and from banks and asset management companies that offer their clients these funds. Munich Re is convinced that the interest shown by investors will continue to grow. Coordinated by the Environmental Management Unit, a team of experts from various parts of the company is commissioned to deal with these inquiries. Our aim is to create a high degree of transparency regarding our many activities.

The listing in important sustainability indexes shows that we are on the right track. The SRI funds are taking increasing notice of our shares too. An analysis of European SRI funds reveals that Munich Re may be considered a sustainable investment for 50 of the 75 funds in the survey. The analysis only included funds whose exclusion of our shares was not due to sectoral or national restrictions.

Transparency is central to the development of the SRI market. MEAG therefore supports the internet platform of the Sustainable Business Institute at the European Business School as its partner. This platform is a product of a research project entitled "Environmental and Sustainability Transparency for the Stock Markets" in which Munich Re has been working since 2001. This project will end in April 2005 with a conference in Frankfurt.

More information on this may be found at www.nachhaltiges-investment.org.

Implementation of measures specified in our environmental programme

The measures from the environmental programme are the responsibility of Munich Re's two financial units.

– Financial Management & Consulting is responsible for, among other things, strategic asset allocation. It is also responsible for the mandate which specifies the framework for our asset managers' administration of investments held for trading purposes and real estate.
– Group Investments is in charge of shareholdings in companies and takes care of Supervisory Board memberships.

MEAG MUNICH ERGO AssetManagement GmbH handles the active portfolio of securities for all investors of the Munich Re Group and manages for them the real estate used by third parties. More information on this may be found at www.meag.com.

As far as investments in shares and corporate bonds are concerned, we have been guided since 2002 by the requirement that 80% of them should satisfy sustainability criteria in the long term. Leading sustainability indexes have been our yardstick in this context. The examination of our portfolio as at 31 December 2004 revealed that this value had fallen to approx. 67%, after reaching 78% in 2003. This drop was mainly due to the reduction in our shares in Allianz and HypoVereinsbank. Both companies are listed in the underlying sustainability indexes.

Setting up a comparable ruling for government bonds has proven to be more difficult than expected. This is due, for one thing, to the principle of currency matching. This means that, for technical reasons, capital must be allocated in the currencies in which we write a relatively large volume of insurance business. On the other hand, there are numerous different approaches to measuring and evaluating a country's position in terms of environment and sustainability. These include, for example, one-dimensional approaches which focus on one particular aspect like human rights. Then there are multi-dimensional approaches that consider, for example, which international agreements on environmental and climate protection the country has signed. Others concentrate on specific environmental and social indicators. We examine which approaches are suitable for Munich Re.

We are continuing with our in-house Challenge of Climate Change Project, which calls for climate risks to be considered in investments. This includes the task of documenting and analysing the effects of climate-related natural catastrophes on capital markets. A distinction may be made between two time horizons. The short-term chart analysis does not show any uniform response of share prices and indexes to such events. The short-term effects of natural catastrophes on capital markets, sector indices, and share prices are therefore almost impossible to forecast. It is a different matter when one considers the long-term effects of climate change. The fundamental analysis shows that there are various sectors that can be severely hit by climate change and its political and social effects.

Like Munich Re, other institutional investors are increasingly keeping track of how climate change is affecting their investments. Numerous initiatives have been launched which focus on trying to find out more about what companies that appear suitable as an investment are doing for climate protection. A particularly significant initiative is the Carbon Disclosure Project (CDP), which Munich Re has been supporting actively since 2002. The CDP asks the 500 largest companies in the world to publish their emissions of the most important greenhouse gases. They are also asked to disclose their targets and the steps they are taking to reduce their emissions.

The support provided by numerous institutional investors gives force to this inquiry. The number of supporters has risen from 35 in 2002 to the current figure of 143 investors. The amount of money managed by these investors increased in the same period from approx. €4,000bn to around €15,700bn. These figures also testify to the increasing significance attached to the subject of climate change on the capital markets. More information on this may be found at www.cdproject.net.

Within the framework of our membership in the Climate Change Working Group of the UNEP Finance Initiative, Munich Re supports the call for more attention to the impact of climate change for the financial sector. The aim of this working group, which was led by a Munich Re staff member in 2004, is to sensitise financial sector companies to the topic and to develop solutions for the problems involved. Munich Re has been involved in a number of publications on such subjects as emissions trading, Clean Development Mechanism (CDM), and renewable energies. More information on this may be found at www.unepfi.org.

Munich Re also considers sustainability aspects in its long-term investments. In 2001 we drew up and adopted a set of sustainability criteria for the acquisition of participations. At the end of 2004 we also decided to integrate sustainability criteria – initially on a trial basis – in our regular screening of shareholdings. The particular challenge in this is to develop as uniform a system as possible for these companies, which are of diverse sizes and come from very different sectors. The experience we gain in this trial run will be incorporated in the update of our sustainability criteria for the acquisition of shareholdings planned for 2005.

Implementation of measures specified in our environmental programme for 2004–2006

The following table shows the status reached by the various projects in our current environmental program at the end of 2004.

Objective: Realise Munich Re's environmental guidelines in the finance divisions

Measure	Deadline	Status	Comment
Check the proportion of investments in companies that are included in one of the most important sustainability indexes, with the aim of keeping this proportion at around 80% in the long term.	Annually	Completed	See text.
Develop sustainability criteria for German state bonds; plan and perform screening of German states using suitable sustainability criteria.	06/04	In progress	The selection of a suitable evaluation system for German states has not been completed on account of the large number of approaches used and the special requirements of a reinsurer.
Analyse Munich Re's investment risks in terms of climate change. Analyse the influential factors and repeat this risk analysis and the respective documentation on a regular basis.	Annually	In progress	
Improve the data situation with a view to attaining a better assessment of the effects that developments linked with climate change will have on the management of investments.	06/04	Completed	In a long-term study we analysed the influence of natural catastrophes on share markets. It gave valuable indications of the different exposures of individual sectors to climate change and its effects.
Analyse the most important European sustainability funds in terms of their relevance for Munich Re.	Annually	Completed	See text.
Plan and perform a screening of real estate used by third parties with the aid of suitable sustainability criteria, including in particular energy efficiency.	12/05	In progress	
Draft investment plans for measures that are necessary to reduce the CO_2 emissions of real estate used by third parties.	12/05	In progress	
Update sustainability criteria for the acquisition of shareholdings.	06/05	In progress	

05 Operational ecology

Since 2004, our Munich site has comprised fourteen buildings. In the spring the two new office buildings at Münchner Tor went into operation. Around one-third of all staff at our Munich site now work in these buildings. This took some of the pressure off the situation in our other offices so that we were able to reduce the amount of office space we needed to rent. The working conditions for our staff were improved by the addition of the new offices. More space and comfort also means an increase in the consumption of energy and raw materials. In order to keep this increase to a minimum, particular attention was given to the new buildings fulfilling ecological criteria (cf. *Perspectives 2003*, "Once a goods station, now a natural asset").

Our office buildings provide workplaces for approx. 3,300 staff. They accommodate not only offices and conference rooms but also infrastructure installations like kitchens, dining rooms and cafés, computer centres, building automation systems, our international training centre, the staff centre, and underground car parks, partially linked by underground passages that have been designed by artists.

The following areas are of particular relevance in environmental terms:
- The hydraulically-operated conveying equipment (use of hydraulic oil, a potential water pollutant)
- The emergency generators (use of diesel fuel, a further potential water pollutant)
- The refrigerating plants (operation of facilities using ammonia refrigerant)
- The rainwater utilisation plant (reduction of water consumption)
- The garage (handling of hazardous substance: disposal of cleaning water)
- The nursery and gardening facility (handling of hazardous substances and machinery)
- The use of groundwater to cool structural components (there are restrictions on the amount of water to be used and the temperature)

In 2004, we took many small steps and a few not so small steps to develop environmental protection further. We report on what this entailed on the following pages.

Input and output balance sheet 2004

FIXED ASSETS		as at 31.12.04
60,188	m^2	Land
166,605	m^2	Building area (net)
89,974	*m^2*	*Of which heated*
739	pcs.	Building facilities and fixtures (incl. cooling, ventilation, heating, electronic, and conveying equipment)
3,063	pcs.	Technical facilities and vehicles
80,748	pcs.	Office equipment
CURRENT ASSETS		**January–December 2004**
In		
32,003,075	sheets	Copying paper
18,650,000	*sheets*	*Of which recycled paper*
43,222	pcs.	Sheet pads
9,588	*pcs.*	*Of which recycled paper*
541,771	pcs.	Envelopes, padded envelopes
280,621	*pcs.*	*Of which recycled paper*
166,412.12	kg	Printed advertising material/publications
42,196	units	Advertising gifts
4,002	pcs.	Electronic data media (incl. chip cards, CD-ROMs, diskettes, magnetic tapes)
1,029,194	kg	Food, beverages, tobacco
Out		
645,050		Food portions
WATER		**January–December 2004**
In		
77,180	m^3	Drinking water
1,351	m^3	Use of rain water
n. r.		Groundwater and surface water
Out		
78,531	m^3	Waste water
ENERGY		**January–December 2004**
In		
21,503,851	kWh	Electricity
40,320	kWh	Emergency diesel (not for heating)
195,350	kWh	Gas
13,240,422	kWh	District heating
37,882	kWh	Regenerative energy
Out		
37,882	kWh	Electricity supplied by photovoltaic cells

Changes in drawing up the input and output balance sheet

Munich Re's input and output balance sheet used to be produced in line with the recommendations issued by the Association for Environmental Management in Banks, Savings Banks, and Insurance Companies (VfU) in 1996. These environmental auditing principles were supplemented in 2003 by the VfU Indicators 2003. We have adjusted our environmental auditing procedures accordingly so that not all of the items in the 2004 balance sheet are completely compatible with the items of previous years.

There follow some examples of environmental protection in operations at the Munich site.

Procurement

In the procurement of materials and services we consider not only economic and technical aspects but also environmental aspects, focusing on the protection of resources, manufacturing processes, and recyclability and environmentally sound disposal. All these aspects may be in accord with economic considerations.

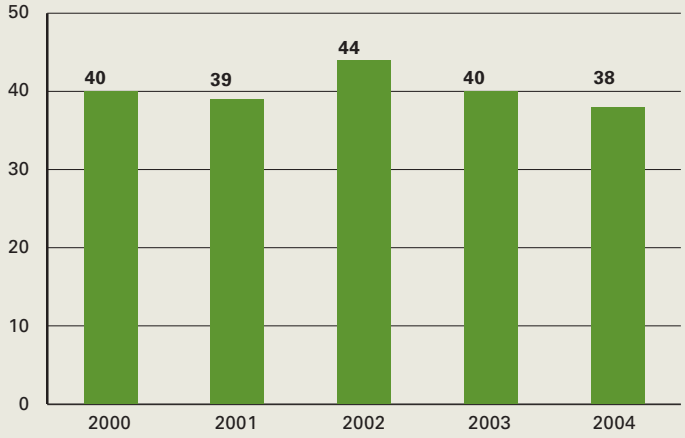
– Paper

Paper consumption is an important environmental aspect at a service provider. The amount of printing and copying paper used by each staff member at Munich Re has remained almost constant in the course of recent years (2004: approx. 38 sheets per person per day). For some years now, we have been using bright white TCF paper (total chlorine-free paper, for which the cellulose is bleached without using chlorine) for external correspondence and high-quality recycled paper for internal documents. Recycled paper again accounts for a large proportion of our total consumption: 58% – a result of the high level of environmental consciousness among our staff. Software was installed throughout the company which makes it possible to print several pages on one sheet, thus reducing the total amount of paper required for printing. This measure was received very positively. Recycled paper accounts for 22% of the sheet pads used and 52% of the standard and padded envelopes.

A major part of our business is providing our clients and the general public with information in the form of high-quality publications. For the production of these publications and those for in-house use only 166 tonnes of paper was printed in 2004 (previous year: 123 tonnes). It has been our policy for some time now to print all our in-house publications on recycled paper (2004: 8.3 t; previous year: 8.8 t). *Perspectives 2003* was the first external publication ever printed on recycled paper.

The largely positive response encourages us in our opinion that high-quality publications can be printed on recycled paper. We are therefore continuing this practice with *Perspectives 2004*.

Copying paper (sheets per person per day)



– Office supplies

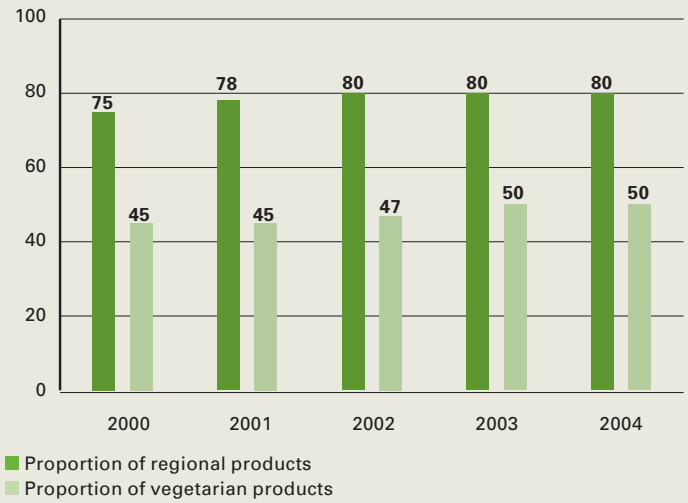
Our staff are also free to decide whether they wish to take advantage of more ecological alternatives. Products that exert less of a strain on the environment are specially marked in our electronic materials procurement system eCOS. We are offering more and more such products. Our assessment of how environmentally sound office supplies are is geared to recognised ecological manufacturers and the criteria they have devised. In our decisions on where to procure supplies and services, environmental aspects are weighted at up to 10%.

– Staff catering

We favour regional products in our staff catering. They not only involve less transportation but also enjoy greater confidence among our staff. The proportion of regional products remained constant at approx. 80%. At least one vegetarian meal is always on offer at the staff dining rooms. Then there are salad bars with a variety of choices. Lunch at Munich Re is free for the staff – and has been for over a hundred years.

In response to a suggestion from one of our staff members, the cafeteria vending machines have been offering fair-trade products since 2004. The reaction has been positive. Since 2003 we have also been selling certified ecological products.

Staff catering (%)



We support the "regional plate scheme" throughout Germany in the form of financial donations. The aim of this scheme is to provide the needy with food of impeccable quality that can no longer be used in the economic process. We concentrate on helping "regional plates" that otherwise receive less attention.

– Transport

Car pool management provides purchasers of vehicles with advice on, among other things, ecological aspects. The recommendations were revised in 2004. However, the final choice lies with the vehicle user.

Waste

	2004	2003
Waste from business operations	**633.4**	**844.0 t**
Other waste from recycling	632.7	843.6 t
Waste not requiring monitoring (recycling)	**501.8**	**619.7 t**
Glass[1]	7.1 t	46.0 t
Metal	3.2 t	5.2 t
Plastics[2]	21.0 t	2.0 t
Biowaste (compostable waste)[3]	12.5 t	78.0 t
Paper for recycling	332.0 t	445.0 t
Food scraps[3]	101.0 t	41.0 t
Electronic scrap, mixed	1.8 t	0.0 t
Contents of grease traps[4]	23.2 t	2.5 t
Waste requiring monitoring (recycling)	**129.0 t**	**219.0 t**
Mixed household waste[5]	129.0 t	219.0 t
Waste requiring special monitoring (recycling)	**1.9 t**	**4.9 t**
Electronic scrap (IT equipment)	1.0 t	4.4 t
Mixtures of solvents	0.9 t	0.5 t
Waste for disposal	0.7 t	0.4 t
Waste requiring monitoring (disposal)	**0.0 t**	**0.0 t**
Waste requiring special monitoring (disposal)	**0.7 t**	**0.4 t**
Contents of mud collecting and cleaning unit	0.7 t	0.0 t
Operating resources containing oil	0.0 t	< 0.1 t
Laboratory chemicals	0.0 t	0.2 t
Fluorescent tubes	4,337 pcs.	3,209 pcs.
Energy-saving bulbs	3,365 pcs.	1,460 pcs.
Batteries	0.0 t	0.1 t
Waste from building projects	**155.4 t**	**546.6 t**
Mineral construction materials	107.4 t	486.7 t
Metal construction materials	7.9 t	18.4 t
Insulating and sealing materials	0.4 t	4.3 t
Wooden materials	3.9 t	21.6 t
Plastics	10.7 t	9.9 t
Charge materials and fuels	0.0 t	< 0.1 t
Mixed forms	25.0 t	5.7 t

Notes:

[1] Amounts can be shown more precisely now than in previous years, when the only figures available were estimates.

[2] Prior to 2004, plastics were disposed of as residual waste. As of 2004, these are now separated and collected in the "Yellow Bin" for recovery.

[3] Prior to 2004, food scraps were recorded as biological waste, now there is a more exact separation and recording.

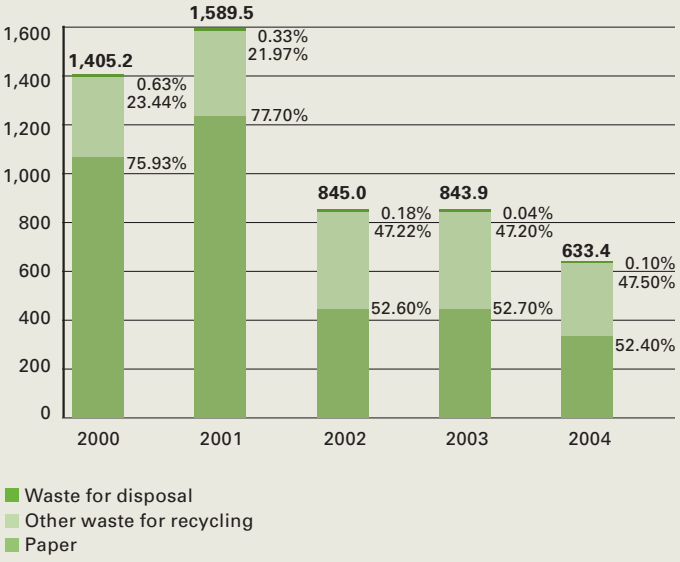
[4] Amounts can be shown precisely now, whereas in previous years there were only estimates based on total figures.

[5] Sorting has improved with more separation since 2004. The data basis has also improved insofar as many items had only been estimates in previous years.

Waste disposal

Even at the purchasing stage, Munich Re considers how waste can be avoided. Nevertheless, waste still occurs, and to enable recovery of the materials involved, it is separated into paper, biological, and residual waste at the workplace. For some years now, we have been working successfully with recycle-it GmbH, a firm which specialises in the reconditioning and reselling of IT hardware on the basis of ecological principles. Staff members can access its internet marketplace to purchase used but operable hardware. This prolongs the useful life of equipment – a further contribution to protecting resources and avoiding waste. The reduction in the volume of waste we produce shows that our efforts are worthwhile. Each staff member produced on average 0.8 kg of waste a day (previous year: 1.1 kg).

Composition of waste from business operations (t)



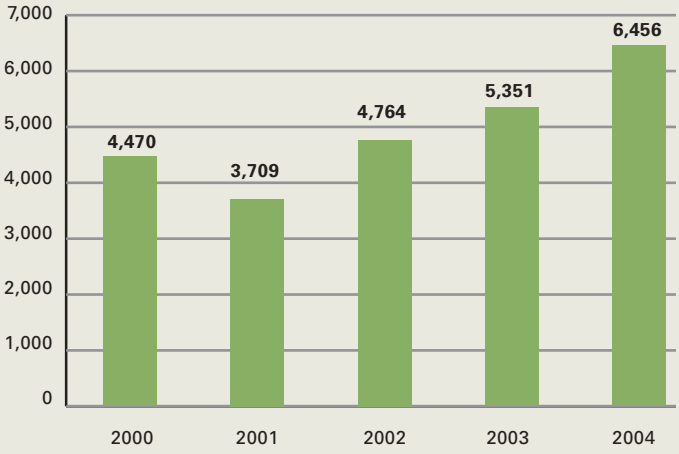
Use and upkeep of our property

In its function as a building owner, too, Munich Re pays great attention to the environment. We have already had the energy efficiency certified for two of our office buildings although energy performance certificates for buildings will not become obligatory until 2006 in the case of new buildings or when buildings change hands. These energy certificates have been produced as prototypes by the Fraunhofer Institute for Building Physics. The Institute is developing a new form which is to be used for evaluating the overall energy efficiency of buildings and which will supplement the methods laid down in the Energy Saving Ordinance. The two Munich Re buildings were examined by the Institute to find out whether the method of calculation used for the new directive is confirmed by practical experience. The certification of these two buildings means that Munich Re is one of the first operators of office buildings to receive a deed under seal for the efficiency of the energy concepts used in its buildings. Further buildings are to follow soon.

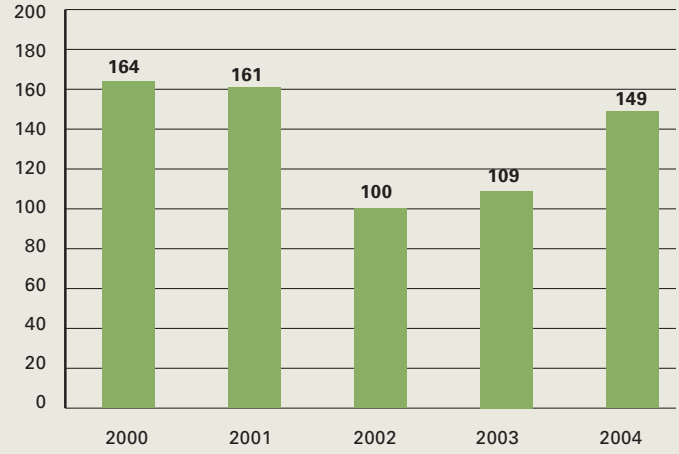
In spite of these endeavours, our energy consumption increased again in absolute terms in 2004 (power consumption +29%, district heating +30%). In the case of electricity this was due to the fact that a new computer centre and a new kitchen were installed at Münchner Tor. One reason for the general increase in power consumption and district heating is that the figures for the office buildings we used to rent were only estimates, as opposed to the accurate figures for our own buildings that have replaced them.

The development in terms of water consumption is more favourable. Although our workforce increased during the year, water consumption went down slightly. It fell to 94 litres (previous year: 102 litres) per person per day. Also, the consumption of drinking water was reduced by the use of rainwater for the flushes in some of the toilets.

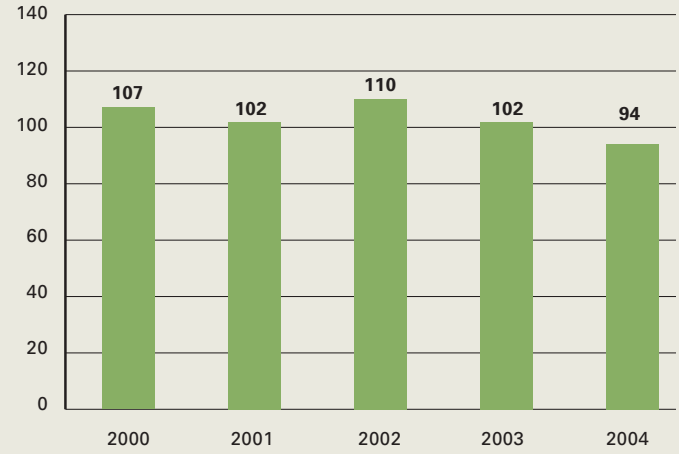
Power consumption (kWh per person per year)



District heating and gas requirements (kWh/m² per year)



Water consumption (litres per person per day)



CO_2 emissions

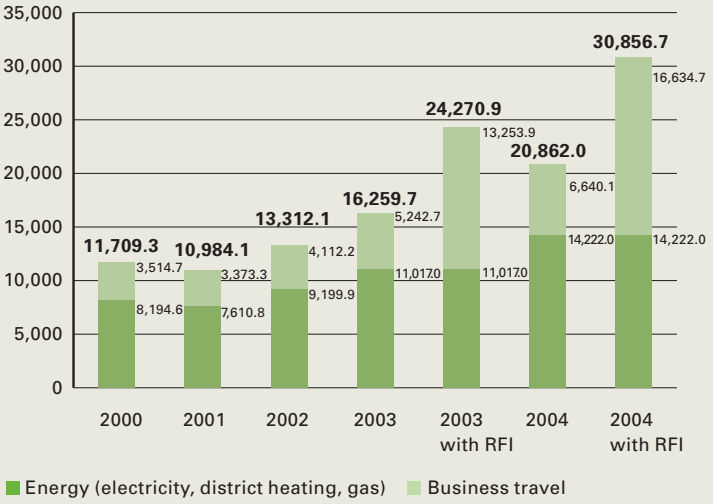
The emission of carbon dioxide is a very important indicator of a company's environmental performance because of its contribution to global warming. For this reason, we are devoting a separate section to this for the first time in our environmental report.

On the basis of the power and heat generated, Munich Re indirectly caused the emission of 14,222 tonnes of CO_2 in 2004, representing an increase of 29%. We were able to avoid the emission of 19 tonnes of CO_2 by using solar panels installed on one of our office buildings.

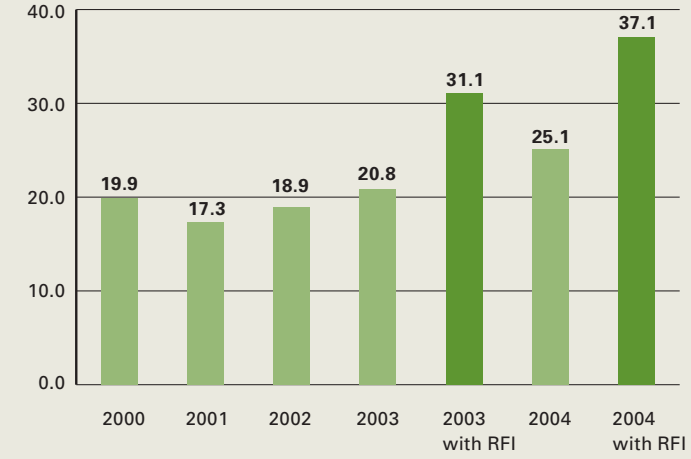
There was also a further marked increase in CO_2 emissions resulting from business travel in 2004, rising to a total of 6,640 tonnes of CO_2 (previous year: 5,243 tonnes). Emissions resulting from air travel rose by almost 25%, from car journeys by 45%, and from rail travel by 22%. On account of the global nature of our operations, flying is the dominant form of travel, accounting for 91% of the total distance covered. In 2003, we began applying the Radiative Forcing Index (RFI) with a factor of 2.7 in our calculations as a means of expressing the particular impact of air travel on the greenhouse effect. Greenhouse gas emissions resulting from air travel, which are thus translated into climate-changing CO_2 equivalents, were responsible for an increase in travel-related CO_2 emissions caused by travel from 13,254 t in 2003 to 16,635 t in 2004.

In 2004, our staff travelled an average of 11,179 km for business purposes, 1,722 km more than in 2003. The increase in air travel was primarily due to the renewed escalation of short-hop trips at home and abroad, mainly in connection with large multi-site projects. The increase in car travel is partly to be explained by the increased accuracy and precision of the technology we use to recording and analyse journey data. It used to be the case that car journeys could only be recorded in connection with other travel-related bookings, e.g. hotel reservations. As of 2004, car journeys as such are included in the statistics.

CO_2 emissions, total (t)*

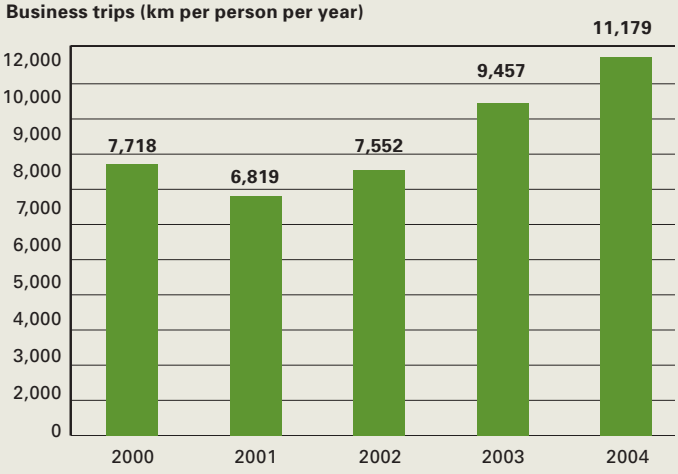


CO_2 emissions (kg per person per day)*



*The RFI factor of 2.7 was applied to air travel for the first time in 2003. For the sake of comparison, the years 2003 and 2004 are shown excluding and including the RFI factor (cf. *Perspectives 2003*, Transport).

Business trips (km per person per year)



Implementation of measures specified in our environmental programme

The following table shows the status reached by the various projects in our current environmental programme at the end of 2004.

Objective: Raise the proportion of materials procured in line with ecological criteria

Measure	Deadline	Status	Comment
Continuously maintain and further develop the lists of criteria for staff catering.	Ongoing	In progress	
Supplement the catalogue for in-house purchase requisitioning (eCOS) with ecological classification and appropriate information.	12/04	Completed	Improvements are also being examined, together with the addition of explanations and illustrations.
Set up a management system for outside firms which incorporates the observance of ecological criteria, principles, and regulations (approval of materials used, e.g. paint and hazardous substances; conduct regarding the use of hazardous substances; instructions regarding waste disposal).	12/04	In progress	The management system for outside firms is in place. In annual talks with service providers and in the context of invitations to tender, a checklist of questions is used with regard to environmental criteria and certifications and the response verified. Requirements on hazardous substances and waste disposal are incorporated in the bid documents and in skeleton agreements. House rules have been produced with instructions on the proper conduct on company premises.
Step up the use of recycled packing material for transportation and shipments.	03/04	Completed	Cardboard boxes are shredded and used as stuffing material.

Objective: Consider environmental aspects in connection with company cars and the use of vehicles

Measure	Deadline	Status	Comment
Include manufacturers' data on combined consumption when entering vehicle-related data in order to generate figures on car pool consumption.	06/04	In progress	Date have been recorded but there are no data for the year yet. Conversion to a car pool management system will permit the recording of actual consumption.
Examine the degree to which ecology-oriented incentive systems can be created in connection with selecting a company car.	12/04	Completed	An examination showed that this is not feasible. As an alternative, ecological recommendations were devised for selecting company cars.
Purchase a shelf with collecting basins for the storage of hazardous substances.	03/04	Completed	
Examine whether environmentally sound energy systems (e.g. natural gas propulsion, eco-diesel, electric vehicles) can be used for regular logistical journeys commissioned by Munich Re.	06/04	Not performed.	An examination of whether they can be used in relocations, for example, is planned.

Objective: Consider environmental aspects in the context of business travel

Measure	Deadline	Status	Comment
Examine the establishment of decision-making aids for staff planning business trips (on the intranet), particularly comparing the times required using various means of transport (aspects: e.g. time, costs, ecological criteria).	06/04	In progress	We are still awaiting figures from external service providers. Completion is planned for June 2005.

Objective: Energy saving

Measure	Deadline	Status	Comment
Save energy by modernising the kitchen equipment.	06/04	Completed	This was completed in December 2004.
Examine offers for the supply of electricity from renewable sources.		Completed	
New buildings: within the framework of the specifications to be defined for construction project management, define primary energy indicators (best practice) for energy management depending on user requirements.	12/05	Completed	Projects were performed in cooperation with various specialist institutes to find ways of reducing energy consumption in individual buildings. An energy performance certificate was issued for the new office building at Münchner Tor.

Munich Reinsurance Company's key environmental figures 2002–2004 at a glance

	2004	2003	2002
Staff at the Munich site	3,331	3,122	2,821
Working days per year	250	250	250
Power consumption: kWh per person per year	6,456	5,351	4,769
Heating: kWh/m² per year	149	109	100
Water consumption: litres per person per day	94	102	111
Copying paper: sheets per person per day	38	40	44
Of which recycled paper %	*58*	*59*	*50*
Business trips: km per person per year	11,179	9,457	7,552
CO_2 emissions including RFI: kg per person per day	37.1*	31.1*	-
CO_2 emissions excluding RFI: kg per person per day	25.1	20.8	18.9
Waste from business operations: kg per person per day	0.8	1.1	1.2
Staff catering			
Proportion of regional products (%)	*80*	*80*	*80*
Proportion of vegetarian products (%)	*50*	*50*	*47*

* The RFI factor of 2.7 was applied to air travel for the first time in 2003. for the sake of comparison, the years 2003 and 2004 are shown excluding and including the RFI factor (cf. Transport in *Perspectives 2003*).

06 Environmental management

At the end of 2000, Munich Re introduced an environmental management system at its headquarters in Munich and has continually improved it since then. The system met the requirements of the Eco-Management and Audit Scheme (EMAS) from the very start and since 2003 has also conformed to the international norm DIN EN ISO 14001. Munich Re's aim is to implement its environmental guidelines in its operative business and the various supporting processes. This must take account of the variety, complexity, and dynamism of our business particularly in the individual lines of business and markets around the globe.

Munich Re integrates environmental aspects in existing processes and instruments in order to do justice to their multidisciplinary character.

In many cases, this initially entails sensitising the staff, familiarising markets with new topics, creating awareness, conveying knowledge, and adapting existing instruments. To this extent, it becomes particularly clear that environmental management involves a continual process of improvement. The environmental programme draws together the many separate activities performed in the areas of reinsurance and investments, operational ecology, and communication. The Environmental Management Unit supports the divisions in the implementation of the various projects. To this end, the heads of the divisional units and Environmental Management define new targets designed to improve environmental performance and set the respective timeframes. These targets only need to be established in qualitative terms and do not have to be quantified.

The impact of Munich Re's business on the environment can also be expressed in figures – e.g. operational ecology parameters like power, water, and paper consumption and the accumulation of waste. This is an area that we have completely revised following the amendment of the VfU Indicators 2003. We therefore see the recording of informative and controllable parameters as a central task for us in the future (cf. Chapter 5, Operational ecology).

As a means of putting us in a better position to produce these environmental indicators, we will be making use of new environmental review software. We will switch over to the new software, which generates a balance sheet in line with the VfU norm, in 2005.

We see these measures as further steps towards improving the cross-corporate comparability of environmental indicators.

Objective: Enhancement of Munich Re's environmental management system

Measure	Deadline	Status	Comment
Maintain and further develop our environmental management system.	Ongoing	Completed	See the example of marine insurance in Section 4.1.
Perform monitoring audits to test the compliance of Munich Re's environmental management with EMAS and DIN EN ISO 14001.	Annually	Completed	The independent accredited environmental verifier did not identify any deviations during the audit. He again attested a high level of implementation.
Adapt our environmental review to relevant units and parameters (VfU Indicators).	12/04	In progress	See above.

Responsibility for environmental protection at Munich Re is divided up as follows:

The full Board of Management

– decides on Munich Re's strategic position in the field of environmental protection and sustainable development,
– passes the environmental guidelines,
– names the Board Member responsible for environmental issues.

The Board Member responsible for environmental issues

– is the person to contact at Board level regarding environmental protection and sustainable development,
– is responsible for environmental protection goals being in line with the company's overall strategy.

The Environmental Officer

– coordinates Munich Re's presence in the topic area of environmental protection and sustainable development with all target groups,
– represents Munich Re on international committees and vis-à-vis the general public on all facets of environmental protection and sustainable development,
– reports to the Board of Management regularly on our environmental protection performance and the application and effectiveness of the environmental management system.

The divisional units and central divisions

– set environmental goals and decide on the measures that are appropriate for their respective area of responsibility and are responsible for their implementation,
– are responsible for the observance of statutory and administrative environmental protection regulations and laws.

The Environmental Management Unit

– shapes and implements Munich Re's environmental management system and develops it further,
– supports the Board of Management and the divisional units and central divisions with a view to attaining the goals relating to environmental protection and sustainable development,
– encourages an open dialogue with the staff and external target groups on aspects of environmental protection and sustainable development,
– coordinates and monitors the attainment of goals relating to environmental protection and sustainable development.

If you have any questions or suggestions, please contact us:

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07 Communication, training courses, motivation

The knowledge Munich Re has acquired on the risks of the world is at the source of the company's duty to make an active contribution to solving global problems. In order to attain this objective, we share our expertise and our long years of experience with our clients and investors, political circles, and national and international institutions. This also applies to the subjects of environmental protection and sustainable development. There follow some examples of this from 2004.

External communication measures and training courses

In the summer of 2004, Geo Risks Research celebrated its 30th anniversary. Its research work on natural hazards has earned it a strong international reputation, as the large number of external requests for presentations and expert opinions testifies. As in the years before, the presentations focused on the subject of climate change. Munich Re's specialist knowledge is also valued on topics like flood control and earthquake prediction.

What is more, an audience of millions has become familiar with Geo Risks Research's findings and professional competence through numerous reports in the press, interviews with the media, and television features. In 2004, its staff again answered many inquiries from television, radio, and print media journalists.

The CD-ROM "World of Natural Hazards" was updated in 2004 and reissued. This means that 67,000 copies have now been produced.

A milestone in the unit's development was the publication of its book on the climate "Weather catastrophes and climate change – Is there still hope for us?" This work provides a comprehensive rundown on the current state of knowledge on climate change. Besides staff from Geo Risks Research and other parts of Munich Re, numerous external experts worked on this compendium of climate research. The book pays tribute to the achievements of Dr. Gerhard Berz, who, after leading Geo Risks Research for thirty years, went into retirement at the end of 2004.

The range of information provided by Geo Risks Research on the internet was completely revised in 2004. In the wake of the general revamping of Munich Re's website at the beginning of 2005, these pages now include an impressive array of valuable background information on the subject of natural catastrophes.

The online presentation of information relating to environmental protection and sustainability at Munich Re has also been redesigned. The website now contains a detailed and up-to-date account of our activities in the areas of reinsurance, insurance, asset management, and operational ecology. For more details go to www.munichre.com.

As in past years we made our knowledge on environmental protection, environmental risks, and prevention strategies available to our clients in many seminars within the framework of our client seminar programme "Knowledge in dialogue" – mostly free of charge. In 2004, we systematically examined the entire content offered in our client seminars as to how topics relating to environment and sustainability are to be incorporated effectively. The outcome of this analysis will serve as the basis for reworking the content in 2005. This is an ambitious project with a broad effect that should not be underestimated: after all, Geo Risks Research alone provided instruction for some 200 clients in 2004.

As in past years, promoting the next generation of scientists was of particular concern to us. In 2004, twelve trainees were able to gain professional experience at Geo Risks Research. In addition, we supervised and sponsored four dissertations and four theses.

Conference highlights

Geo Risks Research representatives attended a large number of conferences in 2004, taking part in most cases as speakers. There follows an account of some of the year's conference highlights.

renewables 2004

One of the year's highlights was Munich Re's participation at renewables 2004, the international conference in Bonn. Detailed information on this event may be found in Chapter 4, Product ecology. In the magazine section there is an article with the title "Drilling for geothermal energy in Unterhaching", in which we present a practical example to illustrate how Munich Re promotes renewable energies by means of innovative insurance solutions. More information on this may also be found at www.renewables2004.de.

COP 10

The tenth session of the Conference of the Parties (COP 10) in Buenos Aires was attended by a Munich Re delegation led by the new head of Geo Risks Research, Prof. Dr. Dr. Höppe. In a number of side events, Munich Re expounded its view on issues relating to climate change and climate protection. At one special event captioned Carbon Solutions, the climate working group of the UNEP Finance Initiative presented its latest publication on the opportunities and limitations of the Clean Development Mechanism (CDM).

Triple Bottom Line Investing Conference

The TBLI Conference in Amsterdam is one of the central events on the subject of Socially Responsible Investment (SRI) in the European area. As in past years, experts from various countries and lines of business met to discuss the current position of Socially Responsible Investment and the prospects for the future. Munich Re was represented by a speaker in the workshop Climate Change – Financial Sector Initiatives.

Successful relaunch of the environmental report *Perspectives*

Perspectives is Munich Re's annual environmental report which informs its stakeholders both inside and outside the company on its activities relating to environmental protection and sustainability. It is distributed to all the staff at our Munich office, the chief executives of our global organisation, our clients, investors, and the interested public.

The new design of *Perspectives 2003*, which appeared in 2004, received a very positive response, with praise being expressed for the layout and the look and feel of the recycled paper. The changeover to recycled paper also reduced printing costs considerably.

Internal communication measures and training courses

In-house communication, in which the staff are the target group, continues to focus on providing information that is related to specific occasions and activities. At the same time, however, various information channels have also been established to report on current environmental and sustainability-related topics. These include:

– the regular appearance of our staff magazine go ahead,
– regular information in go ahead online, the magazine on the intranet in Munich,
– regular presentations on environmental topics in the Munich Re Forum, e.g. on renewable energies, and
– Munich Re colloquia.

In order to sensitise new staff to environmental protection and to inform them of the current status of our activities in this respect, the environment is a regular feature in the three-day induction course. After a presentation by Geo Risks Research on natural catastrophes, the implications for underwriting, and the services provided, the Environmental Management Unit introduces itself at an in-house fair. The presentation of the sphere of activities involved in environmental management was linked for the first time in 2004 with an environment quiz, which met with great interest from course participants.

Implementation of measures specified in our environmental programme for 2004–2006

The following table shows the status reached by the various projects in the environmental programme for 2004–2006.

Measure	Deadline	Status	Comment
Incorporate the subject of environmental protection and sustainable development in the training of insurance specialists.	12/05	In progress	The formulation of a concept is planned for the first half of 2005.
Publish communications regularly on environmental protection and sustainability with the following aims: – Internal marketing – Motivation of staff to promote environmental protection and sustainability – Activities with striking visual information	As the occasion arises	In progress	
Make a contribution to the international conference on renewable energies in Bonn in June 2004.	06/04	Completed	See above and Chapter 4, Product ecology.
Further develop the environmental report and the reporting process in the direction of sustainability.	12/05	In progress	
Systematically examine the contents of seminars for which the departments are responsible in terms of the relevance of environment- and sustainability-related topics.	12/04	In progress	The examination has been concluded. Building on this, we are now examining the topics that should be integrated in the seminars and in what form.

Memberships and dialogue

Staff of Geo Risks Research, the Environmental Management Unit, and our environmental liability insurance experts are active members of numerous national and international committees and working groups and bring their expertise to bear in them. Here are a few examples:

National organisations

– German Committee for Disaster Reduction
– German Research Network Natural Disasters
– Permanent Conference for Disaster Reduction and Disaster Management
– German Society of Earthquake Engineering and Structural Dynamics
– DECHEMA – Society for Chemical Engineering and Biotechnology: Technical Committee for Plant Safety

International organisations

– European Climate Forum
– Earthquake Engineering Research Institute
– Seismological Society of America
– GeoHazards International (Board of Trustees)
– International Early Warning Conference: Steering Committee
– UN International Strategy for Disaster Reduction (ISDR): Task Force
– UNEP Finance Initiative – Climate Change Working Group
– United Nations University, Bonn
– World Bank Disaster Management Facility, Natural Catastrophe Databases Working Group

As in recent years, our involvement in the banking and insurance initiative of the United Nations Enviroment Programme (UNEP FI) was one of the main aspects of our work. Munich Re joined the initiative in 1999. Today, more than 200 companies in the finance sector are represented in the initiative, making it one of the most important drivers of the integration of environmental and sustainability aspects in the business processes of the financial sector.

From 2003 to the end of 2005, Munich Re was head of the Climate Change Working Group of the UNEP FI. The aim of this working group is to sensitise the financial sector to the causes and effects of climate change and to develop tangible contributions towards a solution. Besides special events and presentations, this involves in particular a series of publications called CEO Briefing. This series gives a brief summary of the working group's positions on various topics relevant to our business. The following briefings have already been published:

– Climate risk to global economy
– Emissions Trading
– Renewable Energy
– Finance for Carbon Solutions

These publications appear in several languages and may be accessed at www.unepfi.org.

Munich Re publications in 2004 on the subjects of environment, environmental impairment, climate, and natural catastrophes:

	Order no.
Perspectives 2003	302-04160
Renewable energies – Insuring a technology of the future	302-04062
CD-ROM: World of Natural Hazards – 2004 version	302-02650
Megacities – Megarisks: Trends and challenges for insurance and risk management	302-04271
Genetic testing and insurance – A global view, 2nd edition	302-02706
TOPICS geo – Annual Review of Natural Catastrophes 2003	302-03971
IQ environment (in German)	302-04420

Weather catastrophes and climate change – Is there still hope for us?
This book can be ordered at Munich Re's website www.munichre.com for a nominal fee of €29.90.

Validation

The environmental policy, environmental objectives, environmental programme, environmental management system, and environmental audit implemented by

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comply with the requirements of Regulation (EG) 761/2001.

The data and information in this environmental statement are reliable. They provide a fair and true picture of the environmental relevance of all activities at the site.

The next consolidated environmental statement will be published in December 2006. The environmental statement will be updated in the spring of 2006.

Braunschweig, 20 April 2005

Accredited environmental verifier
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