



PERSPECTIVES

TODAY'S IDEAS FOR TOMORROW'S WORLD



Münchener Rück
Munich Re Group

Dear Reader,

Taking the events of the past as our starting point, we as reinsurers are concerned day in, day out with the potential loss scenarios of the future and their occurrence probabilities; we estimate the consequences of innovative technologies and assess the risks they involve. Changes to the setting in which we operate, e.g. population growth, dwindling natural resources, and the increasing strain on the natural environment, have a major influence on our business and are capable of subjecting it to lasting change.

For many years now Munich Re has met these global challenges by promoting rigorous risk prevention measures – which also means with a view to protecting the environment. We have even assumed a leading position in the worldwide discussion concerning the effects of climate change and the increase in natural catastrophes. The knowledge and experience of our experts in the various fields of insurance make a significant contribution towards reducing or minimizing the impact on the environment. We also consider the observance of environmental standards to be a measure of quality in the process of risk assessment and an important criterion in the management of the risks we assume.

As a major business enterprise operating on a worldwide scale, the Munich Re-insurance Company has a social responsibility in the shaping of a liveable world for tomorrow. As an institutional investor with a long-term view, for instance, we have a great interest in investing in sectors that convince us with future-oriented concepts. In order to guarantee that the value of our own investments will continue to grow in the long term, above all in the interest of our investors and our staff, we will increasingly gear our financial involvement to criteria of sustainable development.

In conjunction with our business partners we will continue to explore the scope and opportunities in which Munich Re can meet its responsibility for protecting the environment. In the process we will continue to be our clients' preferred partner in risk and together with them take advantage of every opportunity there is of exerting a positive influence and thus of protecting the environment. We will do this because we are convinced that economic success is inseparably linked with protection for people, the environment, and material assets.

Our first environmental audit has been completed successfully. And at this very moment you are holding a product of this process in your hands: our environmental statement, a thorough review of our current situation which will provide the basis for defining and realizing optimization potential, and our magazine "Perspectives", a presentation of some of the considerations with which in the framework of our core business we are seeking answers to the ecological challenges of our time. We are working on many other ideas – big and small. And look forward to your critical support.

Munich, March 2001

CHRISTIAN KLUGE



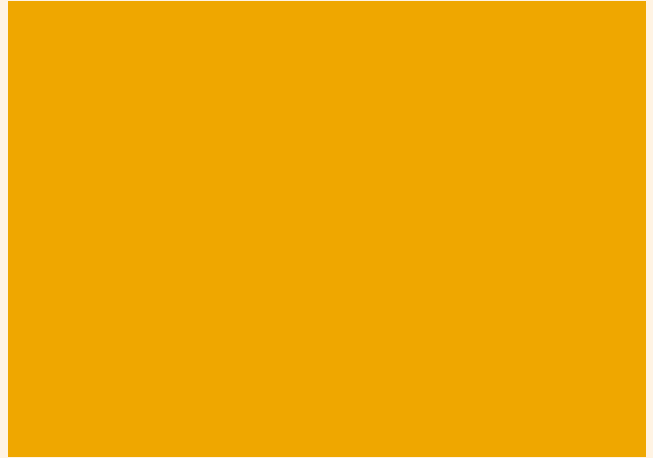
CHRISTIAN KLUGE

Member of the Board of Management
responsible for environmental issues



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“Perspectives” is Munich Re’s first environmental magazine. It appears on the occasion of the EMAS validation of the company’s Munich location.



Green investment

For many people jungles are only of any value if they can be chopped down or (as in the case of this rain forest in Irian Jaya, Indonesia) burnt down and converted into grazing land. In the future, however, it might be worth leaving them upright, because the projected trading of emission credits will mean that a living rain forest is worth cash. But this will depend on the nations of the world finally agreeing on measures designed to protect the earth's atmosphere. The article beginning on page 12 tells you about the contribution Munich Re's researchers are making.





Appetite reducers

Its advocates see it as a sign of hope for agricultural production and the world's food supply; the others consider it an incalculable risk for man and nature. No aspect of the young area of genetic technology is more controversial than what is termed green genetic engineering. Just by looking at the plants, though, it is impossible to tell whether they are conventional or genetically modified types (this is, by the way, a test field with conventional maize in the southwest of Minnesota). The dangers they involve and the chances we may expect are described in the article beginning on page 40.



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Oil crisis

Almost 30,000 vessels over 1,000 GRT are crossing the world's seas and oceans at this moment. Although the majority reach their destination ports in safety, there are a small number of low-standard vessels which are repeatedly the cause of major environmental catastrophes, involving for instance the contamination of entire coastlines with oil. Leading marine insurers have therefore developed a policy that rewards shipping company owners for investments in quality, thus contributing to more safety on the world's seas. How that works is described in the article beginning on page 25.



Financial services and the environment

A whole new world of opportunities is opening up for financial services providers to do something for the environment. Ernst Ulrich von Weizsäcker believes it is high time they take advantage of them too – in their own interest.

There is no doubt that the insurance industry is interested in a flourishing economy. After all, a sound economy is the only guarantee for lucrative markets and lasting premium volume. But what has that got to do with the protection of the environment? To answer that question, we will take a look at perhaps the two greatest ecological challenges of our time: climate change and the growing scarcity of natural resources.

Economic development, particularly in the energy sector, depends to large degree on the availability of natural resources. Fossil fuels continue to play a prominent role in today's energy mix and because of their high level of CO₂ emissions they are a principal factor in global warming and climate change. Insurance industry experts have been warning about the effects of the resulting natural catastrophes for years.

If we want to prevent climate change from accelerating and stabilize today's CO₂ concentrations, we will have to reduce annual global emissions by at least half. This will involve a distinct increase in energy efficiency and a shift away from fossil fuels to renewable energies. At the same time, fossil fuels are only available in limited quantities and as this will lead to a drastic increase in prices in the foreseeable future, it is in the economy's own interest to reduce its dependency on fossil fuels by saving energy and changing over to renewable sources of fuel with long-term availability.

Furthermore, the use of other raw materials like water and soil must be reduced dramatically if we want to give back to nature the space it needs and thus stop the horrendous loss of plant and animal species, currently to the tune of about fifty a day. If prosperity is to be increased throughout the world at the same time, we must become even more efficient in the use of our natural resources. That must be declared as the central ecological content of "sustainable development". Only if the consump-

tion of resources is radically lowered and resource efficiency rigorously increased will it be possible to maintain the economy's basis of existence and its prosperity.

But how can a reinsurer contribute towards attaining the two goals of protecting the climate and conserving resources?

Let us start by saying that even financial services providers must recognize the scale of this challenge and that there is a part they can play when financing and insuring industrial activities. As far as industrial insurance is concerned, the insurers have long been in favour of proactive environmental protection in their very own interest. An insurance company can use its expertise in many fields with the aim of advising its clients to take risk prevention measures and to prevent an unnecessary consumption of resources.

IN THE FIELD OF AGRICULTURAL INSURANCE, FOR EXAMPLE, ENVIRONMENTALLY SOUND AND SUSTAINABLE AGRICULTURAL PRODUCTION CAN MEAN ADVANTAGES FOR ALL SIDES TOO: PROTECTION FOR THE NATURAL ENVIRONMENT, A SECURE ECONOMIC BASIS FOR THE FARMER, AND A DEPENDABLE BUSINESS FIELD FOR THE INSURANCE INDUSTRY. AND NOT LEAST THE BSE CRISIS HAS DEMONSTRATED THAT UNNATURAL PRODUCTION METHODS ARE CAPABLE OF PUTTING A QUESTION MARK AGAINST AN ENTIRE BRANCH OF THE ECONOMY.

In addition, management companies can also have an environmental audit performed. As Munich Re has done. Such an audit reveals many areas with a potential for saving and improvement: from the consumption of energy in-house to the procurement of office materials and electronic equipment down to travel planning. Munich Re did not just leave it at an examination; once the environmental audit was completed, the company formulated its

own environmental programme incorporating objectives that contribute towards reducing the impact on the environment.

This does not exhaust the range of possibilities by any means. Of great and ever-growing significance is the influence that the large financial services providers exert on the global financial markets. Insurance enterprises, especially reinsurers, must maintain a large capital stock in reserve at all times. How is this structured? Of course it must be oriented towards the traditional investment standards and guarantee an appropriate level of interest.

But it is quite possible nowadays to pursue an investment strategy that considers environmental aspects without having to accept a lower return. Numerous funds have shown in the recent past that even above-average returns are possible with a sustainable investment concept. We can go even further and say that listed companies will only be successful in the long term if they are forward-thinking enough to avoid environmental impact and gear their plant technology and their product development to the increasingly rigorous requirements of environmental law. Companies which rely to a large degree on exhaustible resources will begin to have a difficult time – which means in terms of their share price too – at the latest when resources are short and hence expensive. Furthermore, it stands to reason, particularly for insurance companies, that, when investing their funds, they should consider the experience they have gathered in their risk-assumption business.

At the same time, the insurance industry is itself confronted with new legal requirements. In the United Kingdom, for instance, a law has been in force since July 2000, requiring pension funds to declare whether they consider ethical and ecological criteria in their investments and how. This requirement has now been incorporated in the

draft of a law on state support for private pension plans in Germany. The Netherlands has gone one step further in this respect and has introduced special tax advantages for returns from ecological investment funds.

Incidentally, the harmony between the ecological and economic aims of such funds will increase the more the state promotes general conditions that are conducive to the environment, e.g. by forging ahead with an ecological tax reform, and the more rigorously critical consumers keep an eye on the evolution of goods and services.

These examples show how much responsibility is borne by financial services and what opportunities for action arise from that responsibility. This environmental magazine demonstrates how one of the world's very big insurers meets this responsibility. It is the beginning and on no account the end of a development in the direction of ecologically responsible financial services.



DR. ERNST ULRICH V. WEIZSÄCKER is a Member of Parliament in Germany and Founding President of the Wuppertal Institute for Climate, Environment, Energy



10th August, 08.09 CET, ANDES

A dense network of geological and meteorological recording stations and observation satellites encompasses the globe. The data they collect are radioed to observation posts and research stations, where they are recorded and analysed.

Gauges

Whenever the coast of Florida is threatened by hurricanes or Bangladesh is hit by floods or Taiwan by a tsunami, the event is registered and analysed by Munich Re's Geoscience Research Group. Its experts are in demand throughout the world as authorities on natural hazards, natural catastrophes, and climate change.



10th August, 08.10 CET, EAST OF THE BAHAMAS

Showing up clearly in satellite images: a gigantic cyclone that has formed over the Atlantic. Meteorologists expect it to reach the US East Coast in about 50 hours.

They call it “The Submarine” – because to those inside it the world seems just as far away as if they were 1,000 m under the sea. No windows, no daylight, no view of the life outside; instead, air-conditioned oxygen, artificial sunshine from neon lights, and a large beech table that could really be standing in the officers’ mess of a submarine. And whether it is sweltering outside or snowing – the people in the room they call “The Submarine” are oblivious to it all.

Which is a particularly remarkable state of affairs because the people that meet here regularly to discuss their work are among the world’s most highly respected experts on the subject of natural hazards and climate change. Hardly anyone knows the current weather conditions throughout the world as well as they do. In “The Submarine” on this Wednesday morning in November, for example, Thomas Thumerer, a geographer, reports on the flood damage he investigated the previous day in southern England. Rita Hausmann, a meteorologist, gives an account of the latest findings on the climate phenomenon El Niño that have to be taken into account in future loss scenarios. Alexander Allmann, a geophysicist, describes the effects of an earthquake in Papua New Guinea that occurred the day before. Thomas Loster, another geographer, tells of the failure of

the climate summit in The Hague, which he had been following – partly on the spot. The nations had again failed to come to an agreement on concrete measures designed to curb the greenhouse effect. “At the end some of those attending the conference burnt their passports as a sign of their disappointment.” All in a day’s work for the Geoscience Research Group.

IN THE 27 YEARS SINCE ITS ESTABLISHMENT, THIS TEAM HAS GAINED WORLDWIDE RECOGNITION THROUGH ITS INTENSIVE MONITORING AND THOROUGH ANALYSIS OF NATURAL CATASTROPHES AND HAS EARNED THE (UNOFFICIAL) TITLE “MASTERS OF DISASTERS”. “AN IMPORTANT SOURCE FOR US ARE THE STUDIES UNDERTAKEN BY UNIVERSITIES, SCIENTISTS, AND AUTHORITIES THROUGHOUT THE WORLD”, SAYS GERHARD BERZ, HEAD OF THIS TEAM OF ABOUT TWENTY METEOROLOGISTS, GEOLOGISTS, GEOPHYSICISTS, GEOGRAPHERS, HYDROLOGISTS, AND TECHNICAL STAFF THAT OBSERVE WHAT IS HAPPENING THROUGHOUT THE WORLD FROM THEIR VANTAGE POINT ON THE 4TH FLOOR OF MUNICH RE’S HOME OFFICE.



12th August, 12.00 CET, NORTH CAROLINA

The first signs of the storm hit the coast south of Cape Hatteras. Scientists from the Geoscience Research Group follow its development on the Internet.

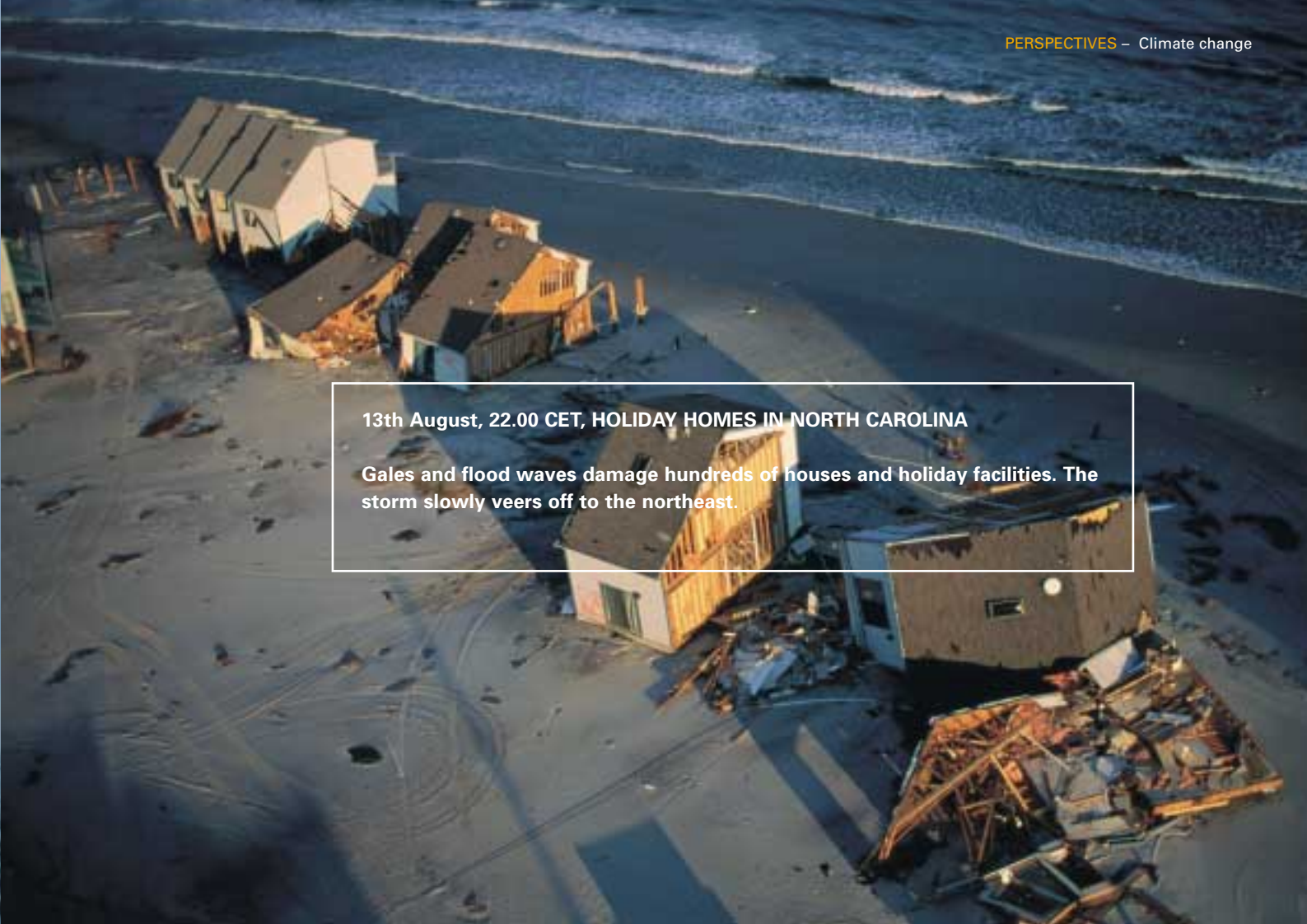
THE GROUP'S WORK MAY BE COMPARED WITH THAT OF A DOCTOR WHO SETS UP MANY DOZENS OF SENSORS ON THE BODY OF A PATIENT, IN THIS CASE THE EARTH, CHECKS THE READINGS AT REGULAR INTERVALS, COMPARES AND ANALYSES THE RESULTS, AND THEN FILTERS THEM INTO A CLEAR-CUT DIAGNOSIS.

And hardly ever overlooks a symptom. Take for example the hurricane season: as soon as a hurricane develops over the warm waters of the Caribbean, the experts in the windstorm unit go onto the Internet and follow the phenomenon's movements in real time. Satellite images are pinned on the office message board showing the track of the storm. At the same time a check is kept on the breaking news of the international news agencies, which are usually the first to report about losses. Frequently, journalists soon begin calling, asking for an assessment of the damage caused by the event – and usually have to be put off until later by the research scientists. Loster: "We are always able to keep up with the event, it is true. But we do not publish any data or analyses until we have verified all the facts."

To the Research Group "verify" means counterchecking all the reports thoroughly and discussing them with fellow scientists – the geoscientists' global "connections" stretch

from the US National Hurricane Center in Florida to the Earthquake Research Institute in Tokyo. Additional information comes from the local Munich Re offices. After major events the masters of disasters make their way to the disaster area themselves in order to get a first-hand impression. "If we want to improve our calculation models, we need exact loss data", explains Berz. "There are many things we need to know – such as: How are the different types of building affected? Are there any special features regarding industrial risks? And how effective were the precautionary measures?"

At this stage, however, the analysis of the event is still far from complete. Weeks and months later, when the cleaning-up operations have long been finished, Berz and his colleagues are still scanning through newspaper reports, studies, and scientific articles for more information on the event. The many professional journals analysed by the Research Group include the "Natural Hazard Observer", the "Journal of the International Society for the Prevention and Mitigation of Natural Hazards", the renowned "Bulletin of the Seismological Society of America", as well as papers published in extremely small numbers like the Mexican "Revista Geofísica" or the specialist newsletter "CO₂" – a global press review of natural catastrophes and the climate.



13th August, 22.00 CET, HOLIDAY HOMES IN NORTH CAROLINA

Gales and flood waves damage hundreds of houses and holiday facilities. The storm slowly veers off to the northeast.

The natural hazard experts filter the information gathered from all these sources to ultimately produce their own reliable picture of the natural hazard event. These catastrophe reports – 700 to 900 of which are added to Munich Re's NatCatSERVICE database each year – are regarded in professional circles as an indispensable source of information on natural catastrophes. If, for example, you want to do some private research into Lothar, the December 1999 gale, you will find about 5,000 unsorted sites on the Internet, with information that is in part outdated, in part contradictory. In Munich Re's NatCatSERVICE database, on the other hand, which stores data on all the major natural hazard events of the past 2,000 years – beginning with the eruption of Vesuvius in 79 AD – there is one single entry. It is only a ten-line note but contains all the essential data relating to the catastrophe.

The analysis of the past is only one of the aspects on which the team of experts concentrates. Another important aspect is making prognoses for the future. This is because loss data, occurrence probabilities, and other scientific facts provide a good basis for a pretty reliable estimate of loss potentials, without which no insurer could calculate premiums and reserves that are commensurate with the risk. Loster: "The kind of question we are typically asked

by clients is, 'What are the natural hazards I will have to reckon with if I insure a semi-conductor factory 60 km south of Taipei?'

"WE USE OUR DATA, HAZARD MAPS, AND RECORDS AS A MEANS OF HELPING THE CLIENT TO SEE HIS RISKS THROUGH THE EYES OF A SCIENTIST TOO."

This know-how, which was primarily built up for insurers and clients, has in recent years developed into a popular source of data among scientists, politicians, and journalists. "Financial Times" and "Time Magazine", NHK, non-government organizations, and even UN General Secretary, Kofi Annan, and UNEP Executive Director, Klaus Töpfer, take advantage of this knowledge. Like a team of doctors which issues bulletins on a patient's condition, the Geoscience Research Group also publishes regular trend reports on the development of natural catastrophes and on climate change. What this reveals is something that is rather worrying for insurers too:



14th August, 09.00 CET, MUNICH

Munich Re geoscientists begin with their loss analysis. They evaluate and compare the reports from the new agencies and geoinformation.

THE PATIENT'S TEMPERATURE CURVE HAS BEEN GOING UP STEADILY FOR YEARS AND ITS RECORD FILE IS BULGING. DIAGNOSIS: THE EARTH HAS A DANGEROUSLY HIGH FEVER.

There is now hardly any doubt about the causes of this phenomenon as far as the Munich climate experts are concerned. "According to our findings, climate change is almost certainly attributable at least in part to the combustion of fossil fuels", says Gerhard Berz, who has been looking into climate phenomena for Munich Re since 1974. Although noticeable temperature fluctuations have been recorded again and again in the history of the earth, what has been happening since the beginning of industrialization represents with a large degree of certainty an exceptional phenomenon.

The mean global temperature, for instance, has risen since the middle of last century by an average of just under one degree – although in line with its natural cycle it ought really to be falling in the long term. The past decade was also the warmest of the entire millennium. And almost every year brings new records both in terms of tempera-

tures and in terms of weather-related or climate-related natural hazard events.

This dangerous development is man-made on two counts. On the one hand, man is heating up the climate and is thus causing natural hazard events of increasing frequency and vehemence. And so – as the warmer air can absorb more steam from lakes, seas, and other reservoirs – the rain in some regions of the world is already much more intensive. "So it stands to reason that we will have to expect more floods in the future", says Berz.

On the other hand, man is putting himself in the path of these natural hazards more and more recklessly. The settlements on major rivers or in areas prone to landslides and avalanches, the dramatic influx of people into coastal regions, and also new infrastructures that are more prone to losses all stand for humanity's growing exposure to hazards. An end to this trend is nowhere in sight – on the contrary. "On every continent of the world there is evidence of more frequent and more intensive natural catastrophes", warns Loster.



14th August, 11.30 CET, MUNICH

A small crisis unit in the Research Group. By midday the company board members and clients have been informed of the initial loss estimates. Readings and loss data are being prepared for entry in the NatCatSERVICE database.

Consequently, the Geoscience Research Group has been calling for a reduction in man's interference with the earth's climate for years. "We have found that 29 of the 31 billion-dollar losses recorded by the insurance industry to date were caused by weather-related or climate-related natural catastrophes", reports Loster. "Of course we must take climate change and the associated risks of change very seriously." Unfortunately, as far as climate protection is concerned, little real action has yet emerged from the good intentions formulated at the Rio conference in 1992 – a development not only Loster and his colleagues are watching with concern. "If I am asked what the population trends mean", says the geographer, "I sometimes reply with a question myself and ask, 'Do you like bowling?' Because we inhabitants of earth are behaving like a bowling club who keep on placing more and more pins in the way of natural hazard events. These pins are our settlements, cities, and industrial facilities. Furthermore, climate change could even increase the number and size of the balls themselves. And what that means needs no explanation." All the same, nobody can predict how ecosystems will react to the average rise in atmospheric temperatures of between 1.4 and 5.8 degrees that has been forecast for

the next 100 years. All we know is that it could have a dramatic impact on the future living conditions of flora, fauna, and mankind. The geoscientists' conclusion:

"MANKIND IS CURRENTLY PERFORMING A GIGANTIC EXPERIMENT ON THE EARTH'S CLIMATE. AS YET IT HAS HARDLY ANY CONTROL OVER THIS EXPERIMENT AND HAS NO IDEA OF THE OUTCOME."

>> More on this subject in Munich Re's "topics 2000: NATURAL CATASTROPHES – THE CURRENT POSITION" (Order number 302-02354).

People. Resources. Ideas.

MAN IS BOTH THE GREATEST THREAT AND THE GREATEST HOPE FOR THE EARTH AS AN ECOSYSTEM. NO OTHER LIVING BEING INFLICTS SO MUCH DAMAGE ON THE PLANET – BUT NO OTHER IS MORE CREATIVE IN DEVELOPING IDEAS TO SAVE IT. IN THIS SECTION WE HAVE ASKED FIVE MUNICH RE STAFF MEMBERS TO TALK ABOUT THEIR IDEAS AND ACTIVITIES FOR THE ENVIRONMENT.

INGRID KAINDL, FINANCIAL EXPERT, expects good profits from green investments.

HANS-JÜRGEN SCHLUNZ, RETIRED LIFE REINSURER, recalls the time when “ecology” was still a foreign word.

DR. DETLEF SCHNEIDAWIND, MEMBER OF THE BOARD OF MANAGEMENT, sees environmental protection primarily as an educational assignment.

ALFONS GOTH, GARDENER, explains why some of the trees at Munich Re are full of flower pots hanging in them.

THOMAS POHL, ENGINEER, hopes for many small steps that will lead to success.

INGRID KAINDL

» You can get a lot moving with money, and that goes for environmental protection too. How that works is something we've been looking into since the start of the environmental audit at Munich Re. MEAG, a subsidiary of Munich Re and ERGO, invests tremendous amounts of money in the capital market. We have now asked MEAG to pay more attention to examining ecological investments.

This involves, among other things, the question of the difference between enterprises that genuinely adhere to the principle of sustainable development and those that don't. And whether it's worth investing in ecologically correct sectors or companies. Because in terms of security and profitability we will place the same demands on green investments as on traditional ones.

One of the results of these analyses could be that MEAG itself will establish sustainable funds. Or it could draw up a list of enterprises it won't invest in because they are detrimental to the environment. If a global player like Munich Re did that, it would obviously have a signalling effect for the financial markets and the public.

IT IS MY PERSONAL BELIEF THAT INVESTMENTS IN ECOLOGICALLY RESPONSIBLE ENTERPRISES WILL PAY OFF BECAUSE SUSTAINABLE DEVELOPMENT IS EFFICIENT AND INTELLIGENT. «



INGRID KAINDL, 27, works in Financial Management & Consulting

HANS-JÜRGEN SCHLUNZ

» I'm not an environmental activist by a long shot, but I've always been interested in the question of ecology. And I still read everything that comes into my hands on the subject. Professionally, though, it didn't necessarily play a central role in my field of business, life reinsurance. As far as the mortality of the people we insured was concerned, standards of hygiene, nutrition, and medical care were still more important than the condition of the environment. And I hope that won't change.

But there was one occasion when I was able to make use of my fascination with ecology in my job. 25 years ago we published a brochure on the significance of environmental pollution for insurance. Which was a pretty exotic subject at that time. I really put my back into the subject and propagated the idea of "ecological life insurance" – which meant that the premiums would be invested on the basis of environmental principles.

This proposal was scrapped, though. But today green investments are no longer an unknown number. Of course, Munich Re is not a company dealing with the public and does not reach millions of clients. All the same, it can do a lot for ecological awareness beyond employing ecological standards in-house.

IF – ON THE BASIS OF COLD ECONOMIC REASONING – THE COMPANY DRAWS ATTENTION TO THE DEVASTATING EFFECTS OF CLIMATE CHANGE, IT HAS MORE EFFECT THAN A CAMPAIGN LAUNCHED BY GREEN-PEACE.

Many people think, "Why should I be the one to do something for the environment? – The big firms make a thousand times more muck than I do." And that's precisely why the economy should go forward with a good example. «



HANS-JÜRGEN SCHLUNZ, 61, went into retirement in July 2000. He is still active for Munich Re in an advisory capacity.



DR. DETLEF SCHNEIDAWIND, 56, is a member of Munich Re's Board of Management

DR. DETLEF SCHNEIDAWIND

» There is no doubt that companies today – unlike just two generations ago – have a responsibility for the environment. But the question is how they meet this responsibility, and in this respect I feel a degree of scepticism is sometimes appropriate. When carrying out environmental audits, for example, we should remember that this kind of process tends to acquire a life of its own. But an environmental bureaucracy would be a waste of money and manpower. And I'd be very unhappy to see third parties interfering in our core business and trying to tell us we're no longer allowed to insure a certain project.

I think communicating this kind of factual information to the outside world makes more sense than repeatedly filling out questionnaires. To this extent, then, I'm a bit of an environmental sceptic, although it goes without saying that I'm in favour of preserving resources, avoiding waste, and reusing materials. And to make sure that as many people as possible do the same throughout the world, the most important thing is to do something to sharpen their awareness. In my opinion, environmental protection is first and foremost an educational assignment. I could easily see myself working on projects that are active in this direction. «

OUR MOST IMPORTANT CONTRIBUTION TO ENVIRONMENTAL PROTECTION IS AND HAS ALWAYS BEEN OUR OWN INDIVIDUAL BUSINESS. SUSTAINABLE DEVELOPMENT IS VITAL TO US AS REINSURERS IN OUR VERY OWN INTEREST – WHICH IS WHY WE ARE PLAYING A LEADING ROLE IN THE INVESTIGATIONS INTO GLOBAL CLIMATE CHANGE, FOR INSTANCE.

ALFONS GOTH

» When I began here as a gardener 16 years ago, they still used to fight the weeds with chemicals. That stopped a long time ago. Nowadays we flame them and if we do have to use plant protectants, then only ones that are easily broken down by nature. But the phone always starts ringing whenever other staff see me with the sprayer on my back. It's just that people are very sensitive when it comes to the environment nowadays.

THE TREND IS CLEARLY GOING IN THE DIRECTION OF THE CULTIVATED WILD GARDEN, AND NOT ONLY AT MUNICH RE. HERE WE HAVE HARDLY ANYTHING BUT NATIVE PLANTS – AND DAISIES ARE ALLOWED TO GROW ON THE LAWNS AS WELL.

And there are a few rare specimens I'm really proud of: ginkgoes, Antarctic beeches, tulip trees, and trees of heaven. Tending this kind of natural garden is much more demanding than taking care of a sterile patch of green. We fight pests with beneficial insects. For example, we breed ladybirds in flower pots filled with

straw, and these put paid to the aphids. Maggots – which are found in the soil – can be fought using nematodes. These eat up the larvae and then die when they run out of food. Nature often supplies the most elegant solutions.

If we put all our gardens together, they'd cover an area as big as ten football pitches. Things are coming up all over the place at the same time. This means that in spring and summer we have to take on additional people to keep the weeds under control. Chemicals would save on staff, of course. But I think it's a good thing that environmental protection creates jobs at Munich Re as well. «



THOMAS POHL, 40, is an underwriter at Munich Re of Africa in Johannesburg

ALFONS GOTH, 48, is a gardener at Munich Re



THOMAS POHL

» One of the songs I remember from my childhood goes, "Little drops of water, little grains of sand, make a mighty ocean, make a pleasant land." I think that's a rather fitting picture for environmental protection – there's something to do for everyone. One of my jobs as an engineer in the sector of engineering insurance is to carry out risk analyses at refineries, power stations, and steel works, and point out the weak spots to the operators. Every loss we can prevent is a benefit to the environment. Loss prevention by itself is not enough, of course. I often think how well the many hours of sun here in Africa could be used in the form of solar energy – if the political and economic environment were better. In global terms I think we ought to be doing more towards sustainable development.

I THINK IT IS VERY REGRETTABLE THAT THE NATIONS COULDN'T AGREE ON SOLUTIONS FOR A MAJOR REDUCTION IN CO₂ EMISSIONS AT THE CLIMATE CONFERENCE IN THE HAGUE LAST NOVEMBER.

New scientific findings on the rise in sea levels call for swift action. The threat of flooding in countries like Bangladesh is constantly increasing. The financial consequences would have to be borne by the world community. Then why not invest today and reap the benefits tomorrow? I hope very much, especially for our children, that this way of thinking will soon prevail. «



Change of course on the high seas

Every year five billion tonnes of goods are shipped across the seas. Environmental disasters occur in the process, and whilst they are relatively few, their impact hits the headlines and alarms the public. Though strict international quality standards are still waiting to be established, a novel insurance product could provide for enhanced safety in maritime shipping.

With hindsight the disaster seemed all but inevitable. The Erika, the Maltese-registered tanker whose name is now synonymous with one of the most horrendous ecological disasters in the history of European maritime navigation, was well past its heyday when it ran aground on 12th December 1999 off the coast of Brittany. It burst asunder, spilling a shimmering black carpet of oil weighing some 11,000 tonnes along more than 400 kilometres of coastline. "The ship's general condition deteriorated so drastically in the hours leading up to its sinking that there was no way to prevent the catastrophe", states the report drawn up by the state investigation committee. At least 100,000 seabirds perished in the disaster, with the tourist and fishing industries sustaining FF 100m in losses.

The sinking of the Erika threw a harsh light on an industry whose approximately five billion tonnes of cargo shipped annually – more than 97% of the global trade volume – make it the undisputed world champion in freight-carrying. This gigantic volume is handled by a merchant fleet with completely different players. At the top end of the scale are "industrial" shipowners, who invest continually in the modernization and maintenance of their fleet and in the training and vetting of their crews. Such ships are usually owned, managed, and staffed by one and the same competent entity.

Conversely, the dark side of the business is serviced by so-called “asset players”, who more frequently operate outdated freighters and tankers. Asset players are known for their low wages, poor quality standards, and high accident rates. It is not unknown for such craft to be owned by investment funds domiciled in Jersey, fly the colours of Honduras, be operated by a non-recognized Far Eastern or European ship management company, and manned with inadequately skilled crew from all over the world selected by a Philippine manning agent. Ship charterers around the world, who have yet to accept legal responsibility for the ships they charter, are meanwhile only too willing to contract these substandard ships in return for low freight rates. “These are the ghost ships you read about in the papers every once in a while”, says Tom Midttun, Senior Vice President of the Norwegian insurance manager Gard Services. Many of these ancient vessels are only fit for scrap. Lloyd’s has estimated that three

some 120,000 tonnes through tanker-related accidents. Experts are of the opinion that it will take considerable time for initiatives launched by the International Maritime Organization (IMO) – such as the International Safety Management Code of 1998 and the Standards of Training, Certification and Watchkeeping Code of 1997 – to take full effect.

Does this mean that the oceans do not stand a chance? Was EU commissioner Loyola de Palacio right when, just six months after the Erika disaster, she bemoaned the fact that “the willingness to take action declines as the memory of a tanker accident pales?”

Not quite. Intertanko, an independent organization for tanker owners representing 76% of the tanker fleet, has taken numerous voluntary initiatives to improve safety. Indeed, the vast majority of oil tankers today reach their destination without accident.



The dark side of shipping is repeatedly to blame for devastating catastrophes

quarters of all ships lost in 1991 were over 15 years old.

When it went down, the Erika had ploughed the oceans for over 25 years. The disaster spurred experts in Europe to make an attempt to establish common quality standards for maritime shipping similar to those introduced by the US government in 1990 in the aftermath of the Exxon Valdez catastrophe. (Among other things, these standards provide for theoretically unlimited liability on the part of the shipowner in the event of an oil spill.) The only problem is that the oceans are so vast that somewhere in the world there is always some miniature state only too willing to register a substandard vessel. Every year an estimated 550,000 tonnes of oil and oil compounds are released into the oceans as a result of maritime navigation,

Alongside this, a novel insurance product jointly designed by Gard and the Scandinavian insurer If Insurance in conjunction with Munich Re has recently given shipowners a powerful incentive to invest in the safety of their vessels. Andreas Molck-Ude of Munich Re describes the basic idea behind these so-called Fixed Price Products (FPP) as “quality in return for price stability”. Shipowners who undertake to maintain high quality standards for five years and to have these standards tested are given insurance coverage for the same period of time – something virtually unheard of in an industry whose premiums are subject to continual ups and downs.

Nevertheless, not all shipowners will be entitled to take out FPP policies. “Total transparency and mutual trust are absolute prerequisites”, says Midttun, who

played a major role in devising the conditions of the policy model.

A customer is required to undergo a thorough quality check before becoming eligible to conclude an FPP policy. Gard's assessment team of inspectors, captains, pilots, and engineers evaluates the crews' level of training, the ships' technical equipment, maintenance, and classification (which often provides an important indication of the vessels' condition) as well as the shipping company's quality management system. Their intention is to find out, for example, whether and how accidents or extraordinary events are reported and documented (a procedure that has been common practice in aviation for a long time but is still very unusual in shipping). They make enquiries about the age, education, and experience of the technical staff and whether crew members speak the same language as the captain. They look into the fleet's condition, maintenance, and accident his-

assessment. Those customers who score exceedingly well in the rating also pay less premium than those whose results are merely good. And those who are willing to invest in the safety of their ships tomorrow will obtain relief the day after tomorrow. In other words, for FPP customers every single dollar spent on quality pays.

Shipping companies agree that this unique safety partnership is a very promising idea. "FPP is an effective way of improving safety standards at sea", confirms Terje Adolfsen, insurance manager at the Norwegian shipping company Bergesen DY AS, one of the world's most significant shipowners with a fleet of 111 units of which the majority is LPG and crude oil carriers. In 1997 Bergesen was among the first partners to write FPP contracts. "To us it is important that our investment in safety and environmental protection is acknowledged by our clients and partners alike and that it plays a decisive role



The proportion of world trade transported by sea today is already 97% and rising

tory and even want to know whether the company has a bonus system that rewards outstanding crews (experience has shown that team members who are adjusted to each other and work on the same ship for extended periods of time cause far fewer accidents).

The entire process of evaluating and preparing for an FPP policy can take up to two months to complete. The results of the evaluation are incorporated into a quality management evaluation report that is signed and accepted by both the customer and the insurer. Only then can an FPP policy be signed.

"We demand more of our customers than any other marine insurer", concedes Midttun, "but we also give them more." The point is that the amount of the FPP premium is determined by the results of the quality

when prices and products are compared", says Adolfsen. "An insurance product like FPP is an important step in the right direction."

Andreas Molck-Ude of Munich Re, the leading reinsurer of FPP contracts, also draws positive conclusions: "Together with our clients we have succeeded in introducing the idea of sustainability in maritime shipping. We believe this model will be of direct benefit to the environment and we hope the idea will catch on."

>> More information on the subject of marine insurance may be found in the following brochures:

"360°, 24 h, 100%" (Order number 302-02815)

"Car transportation and insurance" (Order number 302-01062)

"Containers" (Order number 302-02657)



What does a dead seagull cost?

Can a court verdict improve our climate? Can claims for damages save plants and animals from extinction? The EU Commission is considering a stricter regime of environmental liability. As Christian Lahnstein explains in his capacity as an expert on liability law at Munich Re, this involves the role of the EU and liability law in environmental politics. And the question: How much is a tree, a bird, a landscape worth (to us)?

Mr. Lahnstein, the EU Commission has asked you to write a report on environmental liability law. What does this involve?

The Commission is debating whether it should issue a directive on environmental liability – as it did on product liability in 1985. It's a question that industrial associations and insurance associations, NGOs¹, and other lobbies have been discussing for years. We've been asked to present an account of liability law and insurance practice in some European countries.

What is meant exactly by environmental liability?

If emissions from a factory are deposited on a residential building, you can take the company to court for a reinstatement of the original condition and claim damages. That is environmental liability: the most immediate – but not the only – way of implementing the much-quoted polluter-pays principle in environmental law.

THE POLLUTER-PAYS PRINCIPLE MEANS THAT IT IS NEITHER THE STATE NOR THE GENERAL COMMUNITY THAT FOOTS THE BILL FOR ENVIRONMENTAL DAMAGE BUT THE POLLUTER. BUT WHO IS THE POLLUTER? THAT MAY BE A MATTER OF DISPUTE.

As it should be, of course – we need to know the cause of the damage if we want to prevent it in the future. Usually we find a number of different causes.

One problem lies in the fact that liability law protects private rights. And air, climate, landscape, water, or animals are often not the subject of private rights. Fishing rights are protected, not the fish; the soiled facade of the residential building, not the air. As far as liability law is concerned, therefore, environmental damage primarily means damage inflicted by the contaminated environment rather than damage inflicted on the environment.

On the other hand, every square metre of land in Germany – with all its ponds and frogs – has an owner. A contaminated biotope means damaged property, and that means damaged property even if the economic value is not impaired. The co-owners of a residential building can therefore demand the reinstatement of their biotope in the courtyard, even if the market value could be increased by installing parking spaces. And insofar as property owners press their claims for reinstatement and damages against those who have caused environmental damage, their own private interests promote the interests of the community as a whole. And that's the basis for the preventive effect of environmental liability.

The preventive effect means I don't pour my old oil in the ditch because I'm afraid of an expensive environmental liability suit?

More or less. Of course, liability law is masked by criminal law and administrative law, which in turn call for sanctions and the payment of fines and damages. That makes a comparative view of liability as it is practised in the various countries more difficult.

Why is the EU Commission considering a directive at all?

Various reasons have been given for this. It was claimed, for instance, that the different national regulatory mechanisms of environmental liability were leading to competitive distortion. That is a questionable argument: environmental liability as it is practised in any one country may be a location factor, but that can hardly be true of the rather subtle differences in legal dogma between the various countries.

Another argument is the frequency of cross-border pollution in Europe. The counter-argument there is that the liability problems linked with various cases of pollution in the Rhine in the past have been solved quite satisfactorily on the basis of the respective national laws and the regulations of international private law developed to supplement them.

What the EU Commission primarily wants to achieve is a situation in which the various national systems – each a hotchpotch of their own as it is – are based on uniform principles of environmental law and environmental liability. Among other things, environmental groups should be given more scope to press claims for damages as a result of damage to nature, the countryside, or biodiversity. This is regarded as a weakness common to all national liability systems. The industrial associations now fear that specialized and financially strong NGOs will gain too much influence as omnipresent task forces.

Is that the reason why the EU initiative is so controversial?

It's certainly a central point and one that triggers both justifiable and less justifiable fears. On the one hand, liability law in many countries – if, besides civil law, we also consider criminal law, administrative law, and constitutional law – already has an entire arsenal of weapons that has hardly been exhausted to date. On the other hand, when the causal conditions are diffuse, liability law is generally unsuitable. This applies to the traditional form of liability in connection with bodily injury and property damage, which does not attach to health impairment caused by air pollution or to forest damage caused by

¹ Non-governmental organizations.

sulphur oxides or nitrous oxides. The same will apply within the framework of the extended liability planned for ecological damage.

HERE TOO COMPLEX PROCESSES THAT RESULT IN DAMAGE TO NATURE AND THE COUNTRYSIDE, A LOSS OF BIODIVERSITY, AND A GENERAL DETERIORATION IN ENVIRONMENTAL CONDITIONS ARE LIKELY TO REMAIN IRRELEVANT IN TERMS OF LIABILITY LAW.

Who is actually entitled to sue when damage affects nature that doesn't belong to anyone? And how is the damage assessed?

There are several conceivable solutions as far as the entitlement to sue is concerned. One can nominate the responsible authorities or independent agents. Or one could institute popular action so that anyone can lodge a claim. A further instrument is civil proceedings instituted by common interest groups, which is the solution favoured by the EU Commission.

As far as evaluating the damage is concerned, the reinstatement costs would still be the easiest to calculate. Admittedly, this often means deciding how much effort is reasonable in a specific case: it would be reasonable to expend more effort for rare lizards on the Galapagos Islands than for species of seagull which are superior in number – at least from the ecological point of view.

But how do we determine the amount of damages when environmental damage is irreversible? Or when measures aimed at reinstatement or replacement are not appropriate because it's best to leave nature to its own devices? In such cases scientists, economists, and lawyers have developed a wide range of approaches.

Since the 1970s, German liability and motor insurers, for example, have assessed tree damage on the basis of a detailed table which includes factors for ecological and aesthetic aspects.

At the same time, the market also defines the prices for natural resources. And if trade is prohibited, the black market may provide indicators: the market value of tropical fish, for instance, or of stolen old olive trees, which appear to be in demand in northern Italy ... The world-wide debate on whether species of animals and plants can be patented may also be seen in this context of the commercialization of natural resources.

Conservationists go even further and demand that nature itself be issued with rights. If nature were granted its own rights, man's relationship to nature would also improve.

That's an old philosophical debate: the ideals of liberty and equality were pursued at the cost of non-human nature. Sometimes Schopenhauer is quoted: in his inaugural lecture at the University of Berlin he provoked Hegel with the remark that a horse can have motives too.

It's clear that rights are usually granted not only to people but also to legal entities, for example. Then why not to animals? Why can a man make a bequest to any organization he chooses, however ridiculous it may be, but not to the dog he may have lived with for many years?

Doesn't that underline a further allegation made by conservationists: that environmental law is hopelessly anthropocentric. Instead of protecting the rights of nature, aren't we only protecting the people's right to nature?

There was a famous court action about the scenic value of Mineral King Valley in California, which was to be converted into a ski resort. In a dissenting opinion, it was said that rivers, valleys, and the air should be admitted as plaintiffs.

If animals or plants or nature or parts thereof are to be granted rights, this means rights vis-à-vis humans.

BECAUSE OTHERWISE WE'D HAVE TO PROTECT NOT ONLY SEALS AGAINST INDUSTRIAL EMISSIONS BUT ALSO FISH AGAINST SEALS ... BUT NO DOUBT THE DREAM OF EQUALITY WILL CONTINUE TO BE RESTRICTED TO HUMANS.

Legal practice is concerned with constantly re-determining the value and status of ecological resources. This is an anthropocentric process insofar as it always involves our own human evaluation – how could it be any other way? But that does not mean our interests are the central issue in each and every case. In animal protection law, conservation law, and environmental law we consider other interests as well.

FOR INSTANCE, WE PRESCRIBE THE MINIMUM SIZE OF CAGES FOR LAYING HENS – IN WHAT IS PRESUMED TO BE THEIR OWN INTEREST – WITHOUT REALLY KNOWING EXACTLY WHAT THE HENS THINK ABOUT IT.

When you submit your study in a couple of weeks, will you speak out in favour of a European environmental liability directive – in spite of the many questions that remain unanswered?

Luckily this is not an issue for us to decide. As reinsurers we have gathered experience in various European and non-European markets. That allows us to investigate some of the common arguments and open up a few new aspects for the EU Commission to look at. What will come out at the end of the lengthy political process is something which, as always, even those involved do not know.

CHRISTIAN LAHNSTEIN is an expert on foreign and international liability law and on basic questions of casualty insurance at Munich Re





The quiet star

What do you do with a building whose time is up? Which is simply no longer state-of-the-art in terms of aesthetics or energy efficiency? The radical solution is to tear it down. The more intelligent solution is to modernize it. Munich Re is currently demonstrating with one of its office buildings how an energy waster can be converted into a model energy saver.



South 1 was completed in 1973 immediately after the oil crisis

It was a quiet parting – and at the same time a remarkable new beginning. When the bulldozers arrived at Munich’s Gedonstrasse in October 1999 and began removing the exterior shell of building No. 10–12, we bade farewell to one of the deserving veterans of the 1970s. When it was planned in the mid-1960s, South 1, as the five-storey office block was called, had been intended for renting by Munich Re, but once completed it was used without interruption for the company’s own purposes. Nobody was interested in particularly efficient heat insulation or a specifically energy-saving design. After all, what was the point? At that time, on what was the eve of the oil crisis, energy was generally considered to be in unlimited supply; it was cheap and could be burnt without a second thought. “Of course, this attitude has changed radically since then”,

says Dr. Jost Neuwald, Munich Re’s project leader, “and we spent a long time thinking about how we could improve the building’s energy efficiency. And optically it was not exactly a valuable addition to the area either, so we decided to refurbish it from top to bottom.” Which meant parting with the old building.

It was a new beginning in that the demise of the old block signalled the birth of a new and quite remarkable Munich Re office building. From all that we can tell at present, the new South 1 building, emerging now on the same site as its predecessor, will set new standards as far as use of space, incorporation in the district, aesthetics, and energy efficiency are concerned.



This new beginning is remarkable above all because the new DM-70m building is growing up around the bones of the old building, so to speak. The foundations, columns, floors, and girders that will carry the new five-storey South 1 will be the very same elements that carried the old building throughout the past thirty years. And what is more, the old concrete floor will have an entirely new function as a thermal storage mass for heating and cooling purposes, a function for which it was never intended but to which – as measurements have shown – it is excellently suited.

The foundation stone for this surprising renaissance was laid with a design competition that Munich Re conducted among ten architectural firms early in 1998. “For the refurbishment of the South 1 building we are striving for an energy-saving structure which will keep the expenditure of energy to a minimum”, it was announced. And: “Unconventional solutions and suggestions are desirable, but their feasibility must be verified.” Further important requirements were:

and atmospheric conditions. High-insulation glass in the windows will make sure that the majority of heat stays inside. The heat produced by staff and computers will be kept within the building by a ventilation system (hidden in the wooden ceilings and false floors). The heat and moisture in the used air will be transferred to the fresh air supply stream by what are called regenerative heat exchangers. Because what is elsewhere discharged without being used can serve very well as a genuine heat supplier. However absurd it may sound, then, the staff in the offices of South 1 will to a sizeable degree be generating their own heating.

Any additional requirements will be filled by heating coils integrated in the floor (and connected to the district heating). In the warm season the same system will be filled with cold water and cool the rooms. The levels of consumption calculated for the South 1 design were so low that the energy expert on the competition jury did not believe them at first, but they were correct – thanks to the architects’ holistic, networked concept.



THE BUILDING SHOULD FIT INTO THE DISTRICT BETTER AND THE EXISTING GREEN AREAS SHOULD BE USED TO OPTIMUM EFFECT BECAUSE SPACE IS AT A PREMIUM IN THE CENTRE OF SCHWABING.

The design the jury chose as the winner met the owner’s requirements in a way that was as unspectacular as it was intelligent. How is that possible? Well, in the new South 1 building, as conceived by the design team of Baumschlager & Eberle (from Lochau in Vorarlberg), everything relates to everything else in some way. In terms of energy efficiency, for example, Baumschlager and Eberle have from the very beginning restricted cooling and heating systems to a minimum by a finely-tuned holistic system. For instance, the compact design (a bar running in the shape of a mirror-reversed G) promises the least amount of heat loss from the very outset. A second curtain wall of angled glass elements will form a lightweight shroud around the building and protect it against extreme solar

“ALL FUNCTIONAL AND AESTHETIC ELEMENTS OF THIS BUILDING ARE INSEPARABLE FROM EACH OTHER”, SAYS CARLO BAUMSCHLAGER, THE ARCHITECT. “IF YOU TURNED ONE OF THESE SCREWS, YOU WOULD HAVE TO DO THE SAME ON ALL THE OTHER ONES AS WELL.”

And as a matter of fact, fine adjustments were still being made in the construction phase after measurements taken in a model of the building (a miniature version erected in the inner courtyard between Gedonstrasse and Giselastrasse which was used as the site office as well as for test purposes) had shown that improvements were possible. On the basis of these measurements we already know how much energy will actually be consumed in the new South 1: at most one-quarter of that used in the old building. “And that”, as Dipl.-Ing. Josef Gall, head of the construction section at Munich Re, “is something we are rather proud about.”

Carlo Baumschlager is in fact convinced that South 1 will be one of the ten most economical office buildings of its kind in Germany. The surprising thing is, however, that you would not think so by looking at it. “It’s just that there is little connection between what a building looks like and what it can do”, says the architect. This means that when South 1 is completed at the turn of the year 2001/2002, it will be one thing above all: a quiet star.

On the roof there is a 41.5-kW solar generator which is not immediately visible either but will supply about 40,000 kWh every year for the light installation created by the Icelandic artist Olafur Eliasson. Further ecological highlights are the rain-water collecting system for watering the green spaces and the optimum use of sustainable building materials like wood, natural stone, gypsum plasterboard, and glass.

For Munich Re as the householder and principal (the company has a total of ten office buildings used for its own

One day, disposable bottles and cans vanished from the company, while ecological produce began to be used increasingly in the canteen saucepans. Usable materials were collected, separated, and recycled, while substitutes were found for harmful substances in cooling systems and condensers. The toilet flushes in the Munich Re buildings were all equipped with water-saving devices. The new building on Leopoldstrasse, inaugurated in 1995, was equipped with a powerful rain-water collecting system, which supplied water for the toilets in the building and for the green spaces around it – to mention just a few of the many examples.

“This had nothing to do with any idealistic desire to improve the world and we never devised any kind of mission statement to this effect”, Dr. Jost Neuwald recalls. “We just went ahead and did it.” It is therefore all the more gratifying that this commitment will now be pursued systematically through the environmental audit. An environmental management manual will also formally define



business in the Schwabing district of Munich) this kind of orientation is nothing really new, though.

After moving into the newly renovated West 1 building at the end of the 1980s, staff began complaining of headaches and other ailments (exhaustive investigations ultimately revealed that this had been caused by vapours from solvents used in the new fitted cupboards). Since then it has been company policy to obtain a written statement from all its suppliers confirming that all the materials and processes they use are environmentally sound. “Similar to the asbestos shock of the 1970s, our experience at West 1 was a factor that certainly opened our eyes”, says Dr. Jost Neuwald, who for more than 20 years was responsible for construction projects involving buildings the reinsurer used for its own business. In subsequent years ecological aspects have continually been considered in construction projects and in the building automation systems.

for the first time ecological criteria that are to be considered in all future construction and refurbishment projects. From barring wood preservatives in interiors to using passive and active solar energy features down to giving preference to building materials with superior physical properties. The aims that Munich Re has set itself in ecology and construction are pretty ambitious. The new South 1 building is a quiet star that doesn’t need to hide.

Ecology and economy in architecture – do they really go together? An interview with South 1’s architect, Carlo Baumschlager.

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Projects by Baumschlager & Eberle. For projects like these the architects Baumschlager and Eberle

“It’s all about compactness”

Mr. Baumschlager, one of the terms that keeps on cropping up in the descriptions of Baumschlager & Eberle projects is “economy”. This is a concept that’s generally thought to be incompatible with ecology, isn’t it?

Baumschlager: The truth is in fact the very opposite. And how economy and ecology go together can already be seen in a building’s structure. If it’s very compact, it will be a success both economically and ecologically. From this point of view, then, the ideal form of construction would be a sphere.

Because it has the smallest possible surface ...

Baumschlager: ... compared with its volume and thus undergoes minimum losses of energy. But of course building in the shape of a sphere is rather unusual, so the next best solution is the cube. Have a look at our Mäder ecological school. We used nothing but ecological and biological building materials, we chose structures that conserved resources and were in line with recycling principles, we made use of solar collectors and renewable fuels, and altogether we achieved an extremely low heating energy consumption. It’s a modern building that’s highly sophisticated in ecological terms – and yet it’s the cheapest school of its kind built to date.

The design is decisive then.

Baumschlager: Absolutely. If you anchor the idea of compactness firmly in the design, you can save using expensive, complicated, fault-prone energy machines from the very start. And that means a lot of money too.

One of the reasons why ecological construction has not established itself on a large scale is the price of ecological construction materials. They are still much dearer than conventional materials.

Baumschlager: Not necessarily. Glass, for example, can give you optimum protection against heat and cold nowadays, while providing at the same time a high measure of transparency – and all that at a reasonable price. The insulating properties of glass have become so good that it is completely immaterial whether it is used on the south or the north side of the building. The old rule of thumb laid down by the energy gurus – thick walls towards the north, large windows towards the south – is therefore no longer applicable.

The question of construction materials must be looked at in the same way as the subject of energy – and that is primarily in terms of their sustainability. A material that appears cheaper when buying it today could turn out to be an enormous cost factor in a few decades. Asbestos-filled walls, for instance, were still state-of-the-art in the 1970s – today they have to be disposed of as expensive hazardous waste. This shows that it’s a completely different calculation if you buy construction materials in terms of their sustainability.

One of the most important requirements in the design competition for the Munich Re refurbishment project you are managing at the moment was that it should be an energy-saving structure. Was that just one constraint among many – or rather a stimulus?

Baumschlager: We took a very positive approach to this constraint because it contains something that should really be there all the time, but seldom is. We believe this sort of requirement has great promise for the future.

What makes you so sure?

Baumschlager: Well, it is evident that we have reached the limit as far as our consumption of resources is concerned. That has resulted quite automatically in some rethinking. You can see that very clearly in our project for Munich Re. Some of the details that are feasible today would have been unthinkable five years ago. Take the design of the facade, for instance, which is a direct outcome of our trying to save energy: here we had expected to encounter some problems with the approval authorities. But we didn’t. And that is clearly due to a greater awareness of the problem at all levels.

Awareness has certainly grown – but the question is whether that automatically leads to corresponding action? Many surveys show that people today are less prepared to invest in ecology than they were even five years ago.

Baumschlager: Of course there will always be fashionable trends, but I have no doubt that people are much more sensitized as far as ecology is concerned than they used to be. The simple truth is that for tens of years we have been wasting huge amounts of energy for a certain idea of comfort. It needed an oil price shock to create an awareness of this fact in the first place – because up until then nobody had been interested in it at all. This awareness faded again slightly, but an increase in oil prices like the one we are currently experiencing is



were awarded the international Green Pin prize for architecture and ecology in March 2001.

enough to trigger a hefty reaction. Because everybody knows immediately what it is all about.

Do you believe that ecologically sound construction will emanate in future primarily from the owners' sense of responsibility, from economic pressures (such as rising energy prices), or from new legal requirements?

Baumschlager: All those factors work together, although I do think that personal responsibility will play the greatest role. Legislative measures can only be set up across the board and the effect is often more of a hindrance than a help. So I hope that state measures are introduced in the form of a bonus ruling rather than in the form of further bans, penalties, and restrictions. There are too many of those in the construction trade as it is.

Why is it that what is sold today as ecological housing looks so strange? Many eco-buildings seem to be like a cross between a UFO and a hunting lodge.

Baumschlager: It's true that much of what goes under the name of ecological building today looks like a hand-knitted llama-wool sweater. The reason for this is that the owners have a fundamental bent and see ecological construction purely in terms of the materials used. So they overload their houses with shingle, wood, thatched roofs, and so on. But what a building looks like has little to do with what it can actually do.

True. For instance, you wouldn't think by looking at it that the refurbished South 1 building is exemplary as far as energy consumption is concerned.

Baumschlager: It's simply that we are aware of the fact that the majority of energy used in office buildings is used for the purpose of destroying energy that's already available. The people in the office generate large amounts of energy in quite natural ways and this energy has to be disposed of somehow. The problem is therefore the cooling, not the heating. And because of that, we have to develop systems that provide the building with cool energy in a way that conserves as much energy as possible and employs methods that are as simple as possible. And then you end up with a building that will live for decades in a way that is good for humans and the environment. In other words, sustainable.

Can you explain this approach using South 1 as an example?

Baumschlager: Well, the most striking example is the facade. In front of the insulating glass wall proper we've put a curtain wall that catches the sun's rays and these are then dissipated by the resulting up-currents. That's a really simple technique – but it's tremendously effective.

That works in the summer. But what about in the winter?

Baumschlager: In the winter we have the No. 1 fuel already inside the building, and that is the staff and their office equipment. We collect this exhaust heat and feed it into the fresh supply of new air using an exchange process. To cover the remaining needs, we're installing an ultra-modern heating system.

How much will that account for?

Baumschlager: An enormous amount. At this point, of course, we cannot say exactly what South 1 will actually consume. But we do know from our simulations, however, that – in relation to its contents – it will be one of the ten most economical buildings in Germany.

The twin glass facades you use are not praised to the same extent by all the experts. The Fraunhofer Institute for Building Physics, for example, criticizes some of the more recent buildings with double glass facades as "energy wasters".

Baumschlager: The fact is that there are architects who for formal reasons choose structures that make absolutely no sense at all from the energetic point of view. And the creation of energy wasters can be avoided quite simply by simulating the structural situation beforehand. The methods that have been developed are already quite sophisticated. You just have to use them, that's all.

Is it possible to continue making such technological advances ad infinitum? Or will we some day arrive at ecologically innocuous or even ecologically beneficial construction?

Baumschlager: Designing a building always means an interplay of comfort, costs, and ecology. At the moment we are exploring all the possibilities of cutting costs and energy consumption without having to make compromises in terms of our ideas of comfort. One day we will reach the limit there too. And then we'll have to talk about comfort.



Restrained growth

No other area of genetic engineering has taken off with such high expectations as what is called green genetic engineering; no other is exposed to such sharp criticism. Today the acceptance of genetically modified plants is crumbling, even in the United States. But what can we really expect from plants and animals that come out of the genetic laboratory? Karl Murr and Christoph Löwer, agricultural experts at Munich Re, on the opportunities and risks.

The use of genetically modified (GM) plants and animals – the genetic engineering potentials subsumed under the heading of green genetic engineering – is constantly gaining in importance today. The aim is, on the one hand, to solve the problem of dramatic population growth throughout the world and stamp out malnutrition and hunger; on the other hand, to achieve an environmentally compatible intensification of plant production with less crop protection chemicals and fertilizers.

Irrespective of these noble objectives, no other area of application for the young science of genetic engineering is currently the subject of such controversial discussion; no other is exposed to such fundamental and sometimes unqualified criticism. The fact is that green genetic engineering implies both opportunities and risks simultaneously. As reinsurers we therefore see it all the more as our job to identify its potential, evaluate it from an expert's van-

tage point, and contribute to making the discussion more objective.

NOBLE OBJECTIVES, HARSH CRITICISM

But what is it all about in particular? The main objectives pursued in the use of GM plants are the intensification of production (e.g. by means of higher nutrient efficiency), the adjustment to marginal locations (resistance to drought, tolerance of salt, resistance to cold), the influencing of ingredients (oils, starch, vitamins), resistance to pests and pathogens with positive ecological effects, simplified cultivation methods (tolerance of herbicides), and longer life (vegetables, tomatoes, flowers). In animal breeding, medical and pharmaceutical applications are still in the foreground. At the same time, however, the uses of genetic engineering are being explored to increase fattening performance and resistance to disease.

GENETIC ENGINEERING AND CROP PLANTS

The worldwide cultivation of GM plants has increased steeply since its introduction in the United States in 1996. In 1999 the total area of land used for growing the four main GM crop plants – soybeans, maize, cotton, and oilseed rape – was 41.3m hectares worldwide. (In comparison, Germany has a total surface area of 35.7m hectares, with about 11.9m hectares of arable land.) In the course of the year 2000, however, critical public discussions led to a distinct reduction in the growth rates.

In the United States, the main market for GM plants, GM **cotton** (resistant to herbicides and insects) accounted for almost 60% (3.2m hectares) in 1999. Other significant crop-growing countries are Australia, Mexico, and China. **Soybeans** play a major role as a source of protein for animal fodder, with large quantities being used in Germany. Soy lecithin is used in the food industry but, being a derivative, it does not need to be declared. In 1999 the area for growing GM soybeans in the United States totalled 15m hectares (approx. 50% of the total production area), while transgenic **maize** accounted for about 32% of United States' arable land (12.5m hectares). The cultivation of GM **oilseed rape** (resistant to herbicides) dominates above all in Canada (1999: 3.2m hectares, approx. 67% of the total oilseed rape area). There the use of transgenic seed rose by a factor of more than ten in the three years from 1997 to 1999.

We anticipate that the volume of GM plants being grown in the future will largely depend on two factors: firstly, on the attitudes of consumers and hence demand, which will develop in line with the public discussion on the risks of GM plants and their acceptance in the population; and secondly, on what the farmers decide to produce, which will also have an effect on the fate of GM seed. In view of the price of GM seed being up to 25% higher than that of conventional seed, the yield that can actually be achieved and the extent of savings on crop protection chemicals will also play an important role as well as the market opportunities.

The initial experience is, however, that the ambitious expectations have frequently been disappointed: so far at least, a higher yield from GM crop plants has often failed to materialize. What is more, acceptance of GM plants is declining even in the United States. In addition, the prices for GM maize and GM soybeans are coming under pressure because of the demand for conventional goods from the food and fodder industries outside the United States. Many US agricultural merchants are now calling for a distinction to be made between conventional and GM produce and sometimes impose surcharges of 10% for non-GM soy beans.

The farmers have gone up in arms against the planned use of the terminator gene, which results in the crop plants being sterilized, thus acting as a kind of genetic protection for patent rights to prevent the uncontrolled growing of crop plants with GM seed. The criticism of this genetic modification – particularly in the context of the hope that green genetic engineering could play an important role in the solution of worldwide food problems – has for the time being put the brake on the spread of terminator technology.

GM crop plants have not yet had much effect on farmers' income from production, on the sums insured, or on the insurance and reinsurance industry. Nevertheless, against the backdrop of the public discussion and the new biological risk (greater susceptibility to extreme weather-related events in some cases), agricultural insurers are faced with the question of reassessing GM plants for underwriting purposes, which could lead to a separation from the insurance of conventional plant production.

GENETIC ENGINEERING AND LIVESTOCK

Research with transgenic animals is being carried out in the medical and pharmaceutical fields as well as animal production. In the field of medicine, the focus is on donor organs from transgenic pigs for xenotransplantations and the production of the basic ingredients of pharmaceuticals from the milk of GM sheep and cows.

For animal breeders the most interesting aspects are increased growth rates, greater resistance to disease, and optimum reproduction performance. Scientists have succeeded, for instance, in maintaining the production of growth hormones in breeding salmon throughout the year, although in natural conditions it changes with the seasons. GM salmon are thus ready for slaughter in half the time. This does involve a certain risk, though: if these salmon were released from captivity, they would cause massive problems in the wild population. As the large breeding males have a reproductive edge over their natural counterparts, they would reproduce quickly in the wild and would spread their introduced gene over large areas. Natural food shortages in the winter and excessive size, however, could make it difficult for subsequent generations to survive. Also, because of their shorter life-span, transgenic salmon could cause the collapse of the natural population if they crossed with wild salmon.

Growth rate improvements in livestock must be accompanied, however, by optimum feeding which is adjusted to the improved potential of the animals. Transgenic pigs also have a 50% lower back-fat thickness and a heavily reduced overall fat content, which increases the animals' susceptibility to stress, e.g. due to fluctuating temperatures. However, these applications have not yet attained any practical significance in the agricultural sector.



To separate the DNA from other cell components, plant tissue is spun in a laboratory centrifuge

RECOGNIZABLE RISKS AND OPPORTUNITIES

We see green genetic engineering creating risks for the environment, consumers, and farmers, thereby generating a demand for insurance.

- The spread of allergies plays a major role in this. People who are allergic to Brazil nuts, for instance, may experience allergic symptoms if they consume soy products into which Brazil nut genes have been introduced. The current recall of GM maize in the United States is due to the possibility of an increased risk of allergies on account of the protein used in a new insect-resistance mechanism.
- The use of antibiotic resistance markers for quicker selection in the breeding process is also the subject of critical discussion on account of the increasing ineffectiveness of antibiotics in human medicine (although new selection methods are now available that do not require the use of antibiotics).
- If a crop's herbicide resistance were transferred into a related weed species, this could lead to a loss of herbicide effectiveness.
- The ecological risk of crossing transgenic crops with related plants is also to be taken seriously. A transfer of pollen from oilseed rape with a genetically manipulated fatty acid composition for technical uses could influence the production of conventional oilseed rape for food. The example of insect-resistant maize which had detrimental effects on the harmless butterfly population also shows the potential of ecological repercussions.
- The overcoming of genetically engineered resistance mechanisms could lead to a massive increase in pests or pathogens and cause resistance to collapse. In the case

of cotton that has been made resistant to butterfly-like pests by a toxin of *Bacillus thuringiensis* (Bt) the effectiveness of its resistance is showing the first signs of weakening. This is due to the continuous exposure of the pests to the insecticidal effect of Bt throughout the vegetation period. In contrast, conventional plant protectants are often broken down within a few days by UV radiation and other chemical and biological processes. It is therefore much more difficult for the pest populations to build up permanent resistance.

- Additional risks are inherent in the economic structure of GM plant breeding. As there are only a few seed manufacturers that can afford the costly development of GM plants, it is to be feared that in the medium term very few types will be brought onto the market and then sowed over such large areas that there is a distinct reduction in genetic diversity. Epidemics of pathogens against which resistance breeding has not been carried out may have dramatic effects on production. GM plants are often not attuned to the local conditions on account of the wide distribution of just a few types over large crop-growing areas and are often more susceptible to extreme climate-related events. In the case of GM soybeans, for example, reduced harvests have already been recorded locally on account of GM herbicide-resistant strains being less tolerant of heat and drought.
- Farmers could become dependent on a few producers that use their licence agreements to determine which plant types are to be grown and which plant protectants are to be used. Small companies growing conventional plants that are accustomed to the local climate would disappear – and with them diversification in the range of plant types. Whether uniform GM types that have not been adapted to local conditions will then produce higher yields appears doubtful.



Genetically modified maize plants growing at the Sungene Technologies Laboratory in Palo Alto, California



Is cultivating genetically modified plants in the greenhouse a solution?

But it is not only a matter of risks, there are also remarkable opportunities. Examples like the development of rice with a high vitamin A content, which is intended for use in fighting blindness caused by vitamin deficiencies, testify to the possible contribution that green genetic engineering could make to solving food problems in the Third World. But farmers in the industrialized countries are also opening up new opportunities for themselves by developing new products outside the realms of food production. Raw materials like starch and oils for technological and chemical applications offer the agricultural sector alternative sales opportunities besides the production of food, even if in the event of great demand they also increase the cultivation of monocultures with all the accompanying risks described above.

INSURANCE OF GENETICALLY MODIFIED FOOD

The yield of GM plants is covered by crop insurance on the same lines as conventional plants. Green genetic engineering also affects health insurers (allergies), engineering insurers (safety of production facilities), and liability insurers (e.g. in the case of product recall).

A topical example of product recall involves a strain of GM maize in the United States. Coming from a life science company with its seat in France, it is licensed in the United States for use in animal fodder and for the production of alcohol, but not for the production of food destined for

human consumption. After samples of food were found to contain this GM variety, major food companies recalled maize products from the supermarket shelves and had to shut down production facilities for a time. The entire recall campaign – which included buying back the harvested crops from the farmers with a surcharge of approx. 15% – is likely to cost €100m. What cannot be quantified, on the other hand, is the loss of image and trust suffered by the companies involved and the effects this will have on the price of their shares.

As far as insurers are concerned, each of these new developments entails at least one new loss potential. Munich Re has therefore set up an interdisciplinary working group on genetic engineering made up of experts from the affected lines of insurance: Its job is to analyse developments and the experience gained with genetic engineering and its applications. From these analyses we derive the effects on the demand for insurance and on the risk of change; we also give advice to Munich Re's partners and support them in the development of new insurance products.



DR. CHRISTOPH LÖWER

an agricultural engineer, is an underwriter at Munich Re and a specialist in the field of green genetic engineering



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Fuel for tomorrow

Boom for volatile energy. Electricity from liquefied natural gas is considered to be a model for the future both ecologically and economically. Work is currently being carried out on modern LNG power plants throughout the world.

Wednesday, 3rd January 2001: Voltage fluctuations occur in several transmission lines, the electricity network collapses in six states in India. In large parts of the country rail travel grinds to a halt; petrol stations, hospitals, and television stations are idle, the towns and cities in the region – including the capital, New Delhi – are plunged into complete darkness for ten hours. Altogether, 200 million Indians are without electricity.

Incidents like this are not uncommon on the subcontinent of India, which, like many threshold countries, faces the problem of a thriving economy and a growing population having to cope with a totally outdated energy supply system. At the same time, the governments of Third World countries are under the same pressure as those in industrial nations: of having to reduce their CO₂ emissions over the long term.

A remedy may now be available in the form of liquefied natural gas (LNG) technology, with which energy is produced decentralized, reliably, and with a high thermal efficiency. Two modern LNG facilities are being built at Dabhol, 140 km south of Mumbai. In a joint venture with the Indian government, the power company ENRON is building jetties, gas tanks, and a number of power plant units each with two gas turbines and one steam turbine, which together will generate about 2,400 MW. From Dabhol, which lies directly on the coast of the Indian Ocean, the power will be transported inland by overhead transmission lines. The highlight of the power station is its thermal efficiency of an ecologically exemplary 60%. In comparison, the thermal efficiency of conventional coal-fired power plants is just under 40%.

The second plus of co-generation plants is their economy. As the journal "Global Energy Business" (GEB) reports, the price of raw materials and the costs of LNG transport and LNG technology have fallen sharply in recent years. As the earth's gas supplies are much more plentiful than its oil reserves, LNG facilities are being planned throughout the world. All public buses and taxis in India's smog-laden cities are to be converted to LNG.

"Gas is currently the power plant fuel preferred by developing countries because it produces less air pollution than oil and far less than coal", writes Standard & Poor's energy expert, Jim Osten. Besides steam and carbon dioxide, the Dabhol power plant, for example, will emit only minimal amounts of polluting gases (nitrous oxides: < 25 ppm). The raw fuel for the Dabhol Power Company comes from the gas fields in Oman. There it is cooled to minus 160°C, liquefied, and transported by tanker across the Arabian Sea. Twice a week the LNG tanker docks at Dabhol's offshore mole and pumps its load into the meticulously insulated steel tanks on land. As the fuel is transported and stored in liquid form and not under pressure, LNG is also considered comparatively harmless.

ENRON is currently planning a whole network of LNG facilities for India which will be reinsured by Munich Re. "We support this technology because we regard it to be safe, environmentally sound, and future-oriented", to quote the Munich reinsurers, "and it can be used to generate energy in threshold countries too in an ecologically exemplary fashion."

ENVIRONMENTAL MAGAZINE

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More information on the subjects discussed in this environmental magazine may be found in the following brochures:

“Munich Re, topics 2000: NATURAL CATASTROPHES – THE CURRENT POSITION”
(Order number 302-02354)

“360°, 24 h, 100%”
(Order number 302-02815)

“Car transportation and insurance”
(Order number 302-01062)

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“Genetic Technology: Opportunities and Risks”
(Documentation of the Munich Re Management Symposium of 24th–26th November 1999;
Order number 302-02821)

Further information and publications may be ordered by e-mail from info@munichre.com.



PERSPECTIVES

TODAY'S IDEAS FOR TOMORROW'S WORLD



Münchener Rück
Munich Re Group

Munich Re Environmental Report 2000

The Munich Reinsurance Company's environmental statement

Munich, 21st December 2000

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1 Munich Re's first environmental report: an introduction

“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.”

This statement is taken from the preamble to our environmental guidelines, which Munich Re's Board of Management adopted in September 2000. It is clear from this that our commitment to environmental protection and sustainable development is not just a question of image. We see it as a necessity since, for example, the effects of global climate change have a major economic impact on the insurance industry. Our commitment in this area also results from our knowledge of world population development and the opportunities and risks involved in modern technologies.

This is the first time, however, that we have documented our commitment to the environment and sustainability so categorically, and in this respect the Board's resolution represents a milestone in Munich Re's 120-year history.

On the other hand, this commitment is actually nothing new for us, as the principle of value-based management from which the principles of sustained, environmentally sound work are derived have always characterized our work. Our participation in the Umweltpakt Bayern or Environmental Pact of Bavaria (signed in June 1998) and also in the United Nations Insurance Initiative on Sustainable Development and the Environment (February 1999) may be seen as evidence of this commitment.

Why publish an environmental report at this point in time? And what is the point of an extensive environmental audit requiring quite considerable effort from those involved in the various divisions? Why would we voluntarily open up our operations and business to critical scrutiny by independent experts?

The answer is simple: because we want to make our commitment and our contribution to environmental protection transparent within the company and also present them to the world at large in a credible manner. Because we want to bring our expertise and specialist knowledge on questions of environmental protection and sustainable development into our business activities even more than before. And because, from now on, we want to keep you, our readers, continually informed about Munich Re's developments in this area.

The most appropriate way of doing this seemed to be by taking part in the European Union's Eco-Management and Audit Scheme (EMAS), which requires us to systematically generate all the relevant data, identify weak points and potentials for optimization, define environmental protection targets in all the divisions, and regularly check that they have been met – which, in particular, also includes checks by independent third parties.

In 1999, in preparation for the environmental audit, the company's Board of Management set up the Environment unit, the main aim here being to coordinate our divisions' various environment-related activities in line with the environmental guidelines and to bring them together in an environmental management system.

In spring 2000, following a comprehensive orientation and conception phase, the actual preparation for the first environmental audit at the Munich location began in six pilot areas. These included the Central Division: General Services, which, in conjunction with other organizational units, is responsible for all of our company's main interests with respect to operational ecology, as well as three operational divisions from the field of reinsurance and two from the field of finance, in whose work ecological matters play a part. The intention behind piloting in a few selected operational divisions was to check the practical application of the concept developed and gather experience that will allow us to fully integrate other operational divisions.

With the experience and know-how of numerous members of staff from various sectors who have been personally and professionally associated with the subject for years and with the help of contacts in the pilot areas, we were able to systematically address and further pursue the environmental aspects of the business and the possibilities for exerting a positive influence. In particular, the way in which the requirements under the EMAS Regulation were applied to the specific features of a reinsurer when setting up an environmental management system may be seen as an innovative development. Hardly any experience had been gathered in this respect until then in the field of reinsurance business.

This environmental report summarizes the main results of the project and shows promising development potentials. At the same time, it constitutes the Munich Reinsurance Company's environmental statement for the Munich location and an important step on the path we shall continue to take with commitment.

The Board of Management paved the way for this in November 2000. Over the next three years, we aim to integrate more and more aspects of sustainable development into our activities and services. Geographically, we will incorporate the first pilot locations of our international organization into our environmental management system during this time.

As we continue along this path, we look forward to the interest, critical support, and suggestions of clients, business partners, staff, and the general public.



Dr. Dirk Johannsen



Claudia Wippich

2 The Munich Reinsurance Company

Our company, our business

The Munich Reinsurance Company (or 'Munich Re' for short) operates worldwide as a professional reinsurer in all classes of insurance (life, health, personal accident, liability, motor, marine, aviation and space, fire, engineering, and all other classes). It is the parent company of the Munich Re Group, which operates in the fields of reinsurance, primary insurance, and asset management.

As reinsurers, we assume risks emanating from natural disasters, marine shipments, major construction projects, cases of liability and bodily injury, as well as the countless other risk potentials of our partners in the primary insurance sector. Amongst other things, we offer preventive risk management and risk financing, tailor-made reinsurance solutions, innovative coverage concepts, and competent support with respect to new technologies. We advise over 5,000 clients in 150 countries and are represented around the globe by 60 business units in our international organi-

zation. The core of our success is the know-how of our more than 5,000 staff members, whose skills and experience are as varied as their cultural backgrounds, nationalities, and languages.

With the ERGO Group (in which we have a 62.9% stake) and the Karlsruher and Europäische groups of companies, we also offer private clients the highest possible degree of security. More than 15 million mostly European clients today trust in the security concepts of our primary insurers.

Another of the Munich Re Group's business areas is asset management, which is looked after by MEAG – a joint subsidiary of Munich Re and ERGO. MEAG manages investments worth more than €130bn and is also responsible for managing our properties used by third parties.

Key figures for Munich Re

(see Annual Report of the Munich Reinsurance Company 1999)

	1997/98 €m	1998* €m	1999 €m
Gross premiums written	9,943	9,952	10,955
Investments	33,904	36,062	40,211
Net underwriting provisions	28,394	29,227	32,355
Shareholders' equity	2,147	3,324	3,951
Profit for the year	155	158	328
Dividend	78	81	168
Dividend per share in euros	0.92	0.92	0.95
Share price at 30.06 or 31.12 in euros	226.11	206.31	251.80
Market capitalization at 30.06 or 31.12	38,052	36,103	44,548

* Balance sheet date changed over to 31st December.

Our responsibility for the environment

Anyone who, like us, has to deal with risks every day must constantly keep an eye on potential hazards, loss scenarios, and the long-term effects of their decisions.

The idea of sustainability has therefore always been an intrinsic part of our business. For example, way back in the early 1970s – i.e. at a time when the term “environmental protection” still had quite exotic overtones – we published a brochure in which environmental aspects of importance to the insurance industry were discussed and analysed for the first time. Its title was: “Die Bedeutung der Umweltverschmutzung für die Versicherung”.

Today, the most significant affirmation of our commitment to the environment is to be seen in the communication of our know-how to clients and the public at large. One example of this is the work of our Geoscience Research Group, whose experts have for years been observing and analysing changes in the world’s climate and advocating swift, comprehensive measures aimed at limiting human interference with natural equilibrium conditions. When it comes to reinsuring engineering risks, more than 100 experienced engineers worldwide examine operational risks, thereby helping to prevent environmental damage. Our agricultural experts advise agricultural undertakings worldwide on agricultural production that is sustainable and appropriate to the location.

For risk analyses at industrial and commercial enterprises, our business partners can call on the services of our subsidiary company Münchener Ecoconsult GmbH (MEC). In addition, environmental protection aspects have for many years been dealt with in our series “Technology for Underwriters” and in special publications. These aspects also play an established part in our training seminars.

But we also take our responsibility for the environment seriously within the company, i.e. as regards our operating procedures. Since the start of the 1990s, for instance, our central requirements for every building project have included a sound ecological concept. Measures such as separate waste collection at the workplace, the use of rainwater at the new building on Leopoldstrasse, and travel allowances for staff who use public transport were in part the subject of agreements with the Bavarian State Government and formed the basis for our admission to the Environmental Pact of Bavaria in June 1998.

These and many other environmental activities have developed out of our corporate identity. With the implementation of the environmental audit, we are now translating these into a structured environmental timetable for the first time. This environmental timetable concentrates initially on the Munich location, but international locations are already being considered for the future (see also Section 1).

The Munich location

Munich is the founding location and headquarters of Munich Re. Today around 2,200 staff members work in the neo-classical main building on Königinstrasse, which was completed in 1913, and nine other neighbouring buildings. These buildings which contain, in addition to offices and conference rooms, a large number of infrastructural facilities such as the computer centre, kitchens and dining rooms, cafeterias, underground car parks, the staff centre, the international training centre, and the building automation systems, are all connected to each other by means of an extensive network of tunnels.

3 Environmental guidelines

At the start of the new millennium, Munich Re's Board of Management defined and adopted the Munich Re Group's strategic orientation in a corporate vision. An important element of this vision is the idea of "sustainable added value". In the course of the year 2000, based on this vision and worldwide discussion – for which a "Guiding Principles Forum" was specially set up in the Munich Re Intranet – Munich Re's staff developed the guiding principles for the Reinsurance Group. An important part of this involved taking account of environmental protection interests and the requirement for sustainable corporate development. The guiding principles thus state, amongst other things: "We concern ourselves with today's great challenges – population growth, reducing resources, environmental pollution, climate change. From our knowledge of risk, we are competent to adopt positions on issues affecting society"

(Corporate Guiding Principles of the Munich Re Group, Basic Principle 1: Our claim).

Munich Re's vision and guiding principles thus form the overriding framework for our company's environmental guidelines. At the same time, they also stand for the firmly entrenched importance which environmental policy and awareness have in our strategic orientation. The environmental guidelines form an integral part of our corporate strategy. They were jointly developed, coordinated, and defined in the course of 2000 by the operational divisions, the central divisions, and the Board of Management. At the end of September 2000 they were then passed by the management.

Environmental protection and sustainability: our commitment

Preamble to the environmental guidelines of the 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 environment-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 environment-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 the
Munich Reinsurance Company
Munich, September 2000

Handwritten signatures of the Board of Management of the Munich Reinsurance Company, dated September 2000. The signatures are arranged in two rows. The top row contains six signatures, and the bottom row contains five signatures.

4 Product ecology

4.1 Reinsurance

Reinsurers and the environment

The initial question we asked ourselves in this area was: what does our core business as a reinsurer have to do with environmental protection? And following on from this: just to what extent can a reinsurer make a contribution towards protecting the environment?

The environmental impact of our products and services, i.e. the provision of reinsurance capacity, is after all minute compared to that of a company operating in the manufacturing sector. When “producing” our products, we cannot carry out any optimization of process engineering, adhere to emission limits, or make use of renewable raw materials (although actually in some areas we do – more on this in Section 5, “Operational ecology”). However, we can to a certain extent promote environmentally sound behaviour on the part of companies that have a direct impact on the environment, even if this can only be done indirectly and in cooperation with our clients, the primary insurers.

In endeavouring to protect the environment and achieve sustainability, reinsurers must therefore concentrate on the indirect environmental impact of their core business. The possibilities for exerting an influence here basically lie in the area of know-how transfer and in the development of suitable control instruments, i.e. the appropriate translation of risk experiences into their products and services. Among the questions to arise in this connection are those with respect to underwriting policy and the setting of premiums. These questions can only be answered with respect to individual classes of business, however, taking account of the relevant market environment.

In working out our environmental protection strategy, however, we did not want to confine ourselves solely to the most obvious insurance sectors affected – like environmental liability insurance, for example – but rather to develop a general approach which could later be applied to reinsurance business as a whole.

The environmental relevance of the pilot areas in the reinsurance sector

In the conception phase for the environmental management system, numerous intensive discussions were held with the section leaders of all classes of insurance (life, health, personal accident, liability, motor, marine, aviation

and space, fire, engineering, and all other classes). The points of contact with environment-related questions were first determined, along with the starting points for exerting influence in a positive way. Liability and two property insurance sectors were chosen as the pilot areas for this sub-project on product ecology since they are directly affected. In these sectors, reinsurance cover is provided for, among other things, environment-related liabilities and property risks from major technical projects (like the construction of industrial plants, dams, etc.), agriculture, buildings and contents insurance, and also contingency risks. In order to be able to define in greater detail both the qualitative and quantitative effects in these reinsurance sectors, a group of experts first developed a system for determining environmental relevance in an objectively understandable way.

The assessment of reinsured activities was carried out using the following criteria:

- 1 Relevance of the reinsured activities as regards **environmental legislation and voluntary environment-related commitments**
- 2 **Social acceptance** of the reinsured activities
- 3 Relevance of the reinsured activities as regards **global effects** (e.g. climate change)
- 4 Relevance of the reinsured activities as regards **local effects** (impact on local ecosystems)
- 5 Relevance of the reinsured activities as regards the associated **use of resources**
- 6 **Commercial relevance** of the reinsured activities

The various activities are assessed individually as having high, medium or low relevance and points are given for the assessment so that the overall relevance to the environment can be determined as a total rating.

As was to be expected, aspects of ecological significance were identified in all the pilot areas. The framework of possibilities in which Munich Re is able to influence these environmental effects appeared to be very varied, however.

LIABILITY

One example which illustrates the exertion of influence as practised experience is environmental liability, because it is in this class of business that environmental risks are insured. In the past, Munich Re has shown how as reinsurers we too can help avert direct and harmful environmental effects.

We have, for example, long supported our partners in the primary insurance sector in assessing environmental risks and have been showing them ways in which risk potentials can be reduced by means of suitable technical measures. A special team of experts is available to our underwriters and clients expressly for these tasks.

N.A.T.U.R., a software-based rating instrument for primary insurers, has already been successfully introduced on the German market. From 2001, we will be making available to our partners software that can be used internationally, under the name 'NATURE'. This is not only a rating aid but also an effective risk assessment tool.

Moreover, with its series of events called "International Liability Forum", Munich Re provides important information and knowledge which forms the prerequisite for understanding complex liability risks. We have also made such knowledge accessible to a wider audience by means of technical publications.

Our technical expertise is also in demand at the political level. Liability experts from Munich Re are currently working on an expert report for the EU Commission dealing with the harmonization of environmental liability law. As part of a project, we are also systematically examining global liability situations. Clarifying complex liability situations should make it possible to identify in good time any liability risks which in turn have an effect on liability insurers' management decisions and risk analyses. In this way, the intended effect of liability law under environmental policy, namely to prevent environmental damage through indirect behaviour control, is promoted in a decisive way.

PROPERTY INSURANCE

In property insurance, it was unusual to deal with the subject of environmental protection. However, our analyses showed that many property risks also involved environmental risks or environmental effects. Examples of this are the construction of industrial plants or dams, animal farming and agronomics, but also major sporting events. In the

future, we will therefore increasingly draw the attention of our primary insurers and their policyholders to potential environmental effects. This will be done within the framework of seminars, brochures, consultations, and site visits, as well as in the course of claims assessment and settlement.

In some areas of property insurance – such as, for example, agricultural insurance – a complex picture of potential and actual environmental effects emerged during the course of our observations. Complex situations that are of relevance to the environment may arise through the different priorities and standards applying in industrialized countries and developing countries, or through practices which, although they clearly reduce the risk of loss, nevertheless place a burden on the environment (through the use of fertilizers and pesticides, for example). Here, Munich Re will in the future support innovative insurance solutions and encourage basic research work. Our aim is to keep both risks and environmental effects as small as possible in the future.

Our objectives

Basically, every bit of knowledge we gain about the complex interactions between the classes of business we insure and the environment lies in Munich Re's very own interests. For the greater awareness that people show in dealing with their environment, the more careful they will be in their efforts to prevent property damage (preventing environmental damage often amounts to the same thing as preventing property damage). Munich Re is therefore very keen not only to support environmentally sound activities with innovative products and extended covers but also to intensify the technical knowledge of our clients and their policyholders with respect to environmentally sound measures.

This principle results in different conclusions for our pilot areas. In the liability sector, the emphasis is on further promoting liability law as a tool of environmental policy, for example by studying the complex liability situation in an international context (by October 2001) and producing an expert report for the EU's White Paper on the Harmonization of Liability Law in the EU (by March 2001).

In addition, we particularly want to enhance our clients' knowledge as far as environmental protection and environmental management are concerned. To this end, we will develop additional tools for assessing risks in environmental terms and make these available to the international market (initially the EU, by December 2001). In brochures

and training courses for our clients, we will in the future lay more emphasis on the use of environmental management – in the hope that more and more companies will make use of this effective risk management tool in their work.

With property insurance too, the first priority is to provide our clients with information and training on environmental protection. Here too, we will offer our clients and their policyholders concrete tips and aids with respect to environmental questions (by December 2001). In the case of claims assessment and settlement, we will take more account of environmental effects (by December 2001). We also aim to promote risk management in cooperation with partners in developing countries.

All in all, we believe our commitment to the environment and sustainability will result in a gain not only for the environment (and therefore for us all) but also directly for Munich Re's business.

Through basic research (e.g. in the area of liability law), improved service (by taking a holistic view of the challenges with which our clients are faced), innovative insurance products, and know-how transfer (for example through training courses, publications and consulting) we provide support for our clients and at the same time hope this will have a positive effect on our loss ratio. Should a loss nevertheless occur, we will do our utmost to ensure a settlement that protects resources. In most cases, this will probably help not only the environment but also our balance sheet.

What we are doing in the area of reinsurance

- Developing and applying a system that will allow the direct environmental effects of reinsurance to be followed objectively
- Encouraging the acquisition of knowledge on the complex relationships that exist between our fields of insurance and environmental protection and sustainability
- Contributing, within the framework of Munich Re's "International Liability Forum", towards clarifying complex liability situations, promoting improved risk perception, and complying with environmental protection standards

What we will be doing in the area of reinsurance

- Promoting clients' knowledge of environmental protection and environmental management by integrating environmental protection topics into brochures, technical information, and seminars
- Developing further tools for assessing risks in environmental terms and making these available to the international market (initially the EU)
- Providing stronger support for environmentally sound activities through innovative products and extended covers
- Promoting risk management in developing countries
- Developing concrete tips and aids with respect to environmental issues for our clients and their policyholders
- Taking more account of environmental effects in claims assessment and settlement

4.2 Finance

Profiting from green investments

On signing the insurance industry's UNEP declaration, we undertook to take greater account of environmental aspects when managing our investments. This means that, in the future, besides security, profitability and liquidity – the classic principles of investment policy – sustainability criteria will also play an additional part in our investment decisions.

It is quite difficult to assess the influence that investments exert on the environment. After all, investments (and their impact) do not affect and change the environment so much directly as indirectly, and there has so far been little research into the complex interactions that arise here.

As part of the environmental audit, we examined the environmental impact of our investments. These investments consist essentially of real estate and securities, which are looked after by our financial units, which lay down the rules for making investments. They are responsible for the strategic asset allocation of our investments, for measuring performance and results, and also for managing and organizing all of Munich Re's strategic holdings (especially for associated mergers and acquisitions).

Active securities trading and the management of the numerous Munich Re buildings used by third parties are in the hands of MUNICH ERGO Asset Management GmbH (MEAG), the joint asset management company set up by Munich Re and ERGO.

Analysis and definition of environmentally sound measures in the pilot areas

The prime objective of the environmental audit in the financial sector was to determine what environmental effects arise from investments and if necessary to devise appropriate measures. To this end, we applied the procedure used in the reinsurance sector, allowing us to assess the ecological consequences emanating from the business activities of both pilot areas in Finance.

The question also arose as to what ecological advantages would result if, when choosing its investments, Munich Re were in the future to increasingly lay down ecological criteria as a further benchmark and possibly even to launch an environmental fund?

In other words, what concrete benefit for the environment results from taking account of environmental aspects in investment decisions?

At first sight, the answer is: none at all. Anyone buying stocks or shares in a company from the point of view of sustainability does indeed increase demand for these securities; however, the funds invested flow not to the joint-stock companies engaged in sustainable economic activity, but to the sellers of the relevant blocks of shares. Only in the case of new share issues or capital increases do the earnings go directly to the issuing companies.

On closer examination, however, it turns out that integrating environmental criteria into asset management really does lead to a whole series of positive effects for both the environment and the investor. A number of examples are given below:

– **Long-term safeguarding of the investment:**

Environmental protection and sustainability have become a competitive factor. Increasing national and international regulations on reducing emissions and waste raise the costs and reduce the profits of those companies that fail to prevent environmental strains before they ever arise. Products which fail to keep pace with future environmental provisions will not succeed in the market in the long term.

– **Signalling effect:**

Companies recognize that environmental protection and sustainable development are increasingly being acknowledged as a success factor by the capital market too. Once companies see that environmental protection increases shareholder value and that without the relevant environmental performance they can no longer be included in the portfolios of important funds or share indexes, they will endeavour to meet investors' requirements and improve their environmental protection.

– **Access to the capital market:**

With increased demand, the share price of any company engaged in sustainable economic activity increases, which in turn triggers a series of positive effects. Thus it is easier for companies with a positive price performance to obtain outside funds (e.g. loans). In the case of a capital increase, more money goes to a company for its newly issued share certificates. This is particularly important for young companies which are not yet quoted (but also for secondary listed companies).

– **Exerting direct influence:**

Ecological questions can be raised at meetings of analysts and at annual general meetings. In the case of major holdings in particular, a seat on the supervisory board offers even more far-reaching possibilities for influencing companies in the interests of environmental protection.

– **Enhanced image:**

A good share performance increasingly draws the attention of the general public and investors to this market segment. This results in a competitive edge for companies offering products or services in this sector.

All in all, it can be said that a significant benefit for both sides can be achieved with an investment policy that is geared to sustainability. We believe an appropriate commitment on the part of Munich Re, as an investor with a considerable reputation and financial strength, would also result in a correspondingly clear environmental advantage.

An investment policy geared to sustainability requires an adequate knowledge base. In a comprehensive analysis, we therefore had a study carried out which looked at all the environmental funds, eco-efficiency funds, environmental technology funds, ethical funds, and sustainable development funds from Germany, Switzerland, and Luxembourg which were available on the market. As part of this, the shares and fixed-income securities contained in these funds on a particular key date were recorded and characterized, thereby enabling us to develop a target corridor for investing in specific companies.

Our objectives

From our financial analysis we derived a list of measures for our asset management which we aim to implement by the end of 2001.

- 1 In the area of asset management, we will continue to intensify research with regard to sustainability and compatibility with the environment and, in so doing, examine environmental aspects at companies which fit into our overall investment scheme. In addition, we will draw up and apply an environment-related negative list with elimination criteria for investment decisions.
- 2 By 31st December 2001, as part of its mandate assignment, Munich Re will examine investments in shares and funds which stand up to a sustainability test. These may also involve funds which are set up for third parties.
- 3 In the area of strategic holdings too, we will (by March 2001) add sustainability and environmental criteria to our list of investment criteria. In addition, we will draw up and apply an environment-related negative list with elimination criteria for investment decisions. Here too, we shall consider investments in shares and funds which stand up to a sustainability test.

Through these measures, we will put our asset management decisions on a significantly broader basis overall, thereby avoiding accumulations in our portfolio due to environmental risks and increasing the portfolio's sustainability.

- 4 In the case of companies in which we have a shareholding, we will also obtain information on environment-related aspects on an on-going basis. Any questions that may arise may be discussed at meetings of the Supervisory Board. We plan to have a corresponding list of questions drawn up by March 2001.

Our aim is sustainable investments. By supporting companies engaged in sustainable economic activity, we also safeguard our long-term profitability. In this way we also indirectly provide funds for sustainable development.

Our environmental management system applies to Munich Re at the Munich location. For its properties used by third parties, Munich Re has established a strategic framework in the form of a mandate to MEAG, which is responsible for managing and administering such properties. In order to identify and utilize the potentials that property management offers under ecological criteria, we plan to produce a concept for the implementation of environmental protection measures in Munich Re properties used by third parties. This concept will be based on a systematic analysis and should be completed by June 2003. The results and objectives will subsequently go into the mandate for MEAG.

What we are doing in the area of finance

- Using tools to assess the ecological consequences arising from our financial units' business activity
- Identifying the investment sectors that can have negative effects on the environment
- Designing efficient measures to reduce negative environmental effects
- Examining environment-oriented funds in order to develop a target corridor for business investments

What we will be doing in the area of finance

- Implementing the measures introduced by the end of 2001
- Adding sustainability and environmental aspects to Munich Re's internal list of criteria for investments
- Widening the knowledge base for our asset management
- Examining the possibilities for investing in direct investments and funds with a strategy which has been shown to be environmentally sound
- Examining the possibilities for setting up such funds, possibly also for third parties
- Continuously acquiring information on environmental aspects from associate companies and discussing any questions that may arise at meetings of the Supervisory Board
- Producing a concept for implementing environmental protection measures in properties used by third parties

5 Operational ecology

Analysing operational procedures and identifying potentials

Operational environmental protection measures have a long tradition at Munich Re (see also Section 2). This area is essentially taken care of by the Central Division: General Services (AD), which is responsible for procurement, catering for staff and visitors, and the vehicle fleet. However, AD is also responsible for the construction, maintenance, and management of our business premises, which are frequented each day by about 2,200 staff members and numerous guests from all over the world. These premises include the technical infrastructure and also Munich Re's grounds, the most beautiful and extensive of which border directly onto Munich's English Garden.

Installations and areas within our business premises which are of relevance to the environment are, in particular, those in which hazardous substances and water-polluting substances are handled and have to be disposed of after use. These include, for example

- hydraulically-operated conveying equipment (e.g. passenger/goods lifts),
- emergency generators (storage of diesel fuel),
- refrigerating plants (use of refrigerants),
- the rainwater utilization plant (water treatment),
- the garage,
- print film development.

However, other organizational units besides AD are concerned with questions of operational ecology. Our IT experts, for example, are concerned with providing and developing the information technology that links our Munich location with our Business Units throughout the world. The closer together we move this world on a virtual level, the more possible it becomes to avoid real, resource-intensive business trips.

A few examples illustrating the company's environmental review

This environmental review is based on the recording and assessment of resources and materials used in-house during 1999. As this is the first business year in which Munich Re's environment-related data has been recorded in this degree of detail, it is not yet possible to present any trends or tendencies in this first environmental report. However, according to the specialists in the relevant departments, the absolute figures already show important potentials for optimization, which we will make selective use of in the years ahead.

The data available relates to the ten office buildings owned by Munich Re, as well as to rented properties at the Munich location (the temporary use of third-party properties arose as a result of one of our office buildings being renovated). Considerable effort went into producing the data, which is partly based on extrapolations and estimates. Thanks to various measures (including automatic data acquisition in the areas of electricity, district heating, and water – see also under "Utilization and maintenance of our office buildings"), we expect to have an improved database in the next few years. The key figures were calculated using the VfU* method.

Environmental review 1999

FIXED ASSETS

Input		as at 31st December 1999		Output
not recorded	Land	38,892 m ²	Land	–
not recorded	Building area	103,167 m ²	Building area	16,011 m ²
not recorded	Building facilities and fixtures	393 pcs.	Building facilities and fixtures	not recorded
not recorded	Technical facilities and vehicles	728 pcs.	Technical facilities and vehicles	not recorded
not recorded	Office equipment	45,811 pcs.	Office equipment	not recorded

CURRENT ASSETS

Input		as at 31st December 1999		Output
21,990,500 sheets	Paper Copying paper	2,032,500 sheets	Paper Printed paper, forms	292,056 pcs.
31,560 pcs.	Sheet pads	3,158 pcs.		
295,335 pcs.	Envelopes, padded envelopes	31,805 pcs.		
508,366 units	Office articles	31,567 units	Refill articles	1,612 pcs.
24,712 units	Advertising gifts	23,321 units	Advertising gifts	14,864 units
16,120 pcs.	Electronic data media	4,797 pcs.	Electronic data media	6,055 pcs.
62,643 kg (est.)	Incoming mail	–	Outgoing letters	28,335 kg (est.)
			Outgoing packages	71,060 kg (est.)
223,200 pcs.	Packaging	790 pcs.	Packaging	8,428 pcs. (est.)
271,237 kg (est.)	Food, beverages	5,987 kg	Catering, food portions	455,756 pcs.

WATER

Input		as at 31st December 1999		Output
69,510 m ³	Drinking water	0	Waste water	69,510 m ³
not recorded	Rain water	not recorded		
not recorded	Groundwater and surface water	0		

ENERGY

Input		as at 31st December 1999		Output
11,778,949 kWh	Electricity		Energy output	not recorded
11,834,465 kWh	District heating		Supplied electricity	0
50 l	Emergency diesel			

(est.) = Extrapolations or estimates

Environmental review drawn up on the basis of the VfU* Standard "Accounting principles and guidelines for the environmental reviews of financial services providers with the standard chart of accounts"

*VfU – Verein für Umweltmanagement in Banken, Sparkassen und Versicherungen e.V.
(Association for environmental management in banks, savings banks, and insurance companies)

We have broken down the method we use for data analysis and for identifying suitable measures into two main elements:

– **Resource management**

We understand resource management to mean the comprehensive materials flow analysis of all the movable materials required for business activities on their way through our company. These include, for example, paper and office supplies, accessories and operating resources like batteries and oils, as well as inventory goods, catering supplies, and vehicles. In resource management we look at all the 'life stages' of a product from its procurement to its disposal.

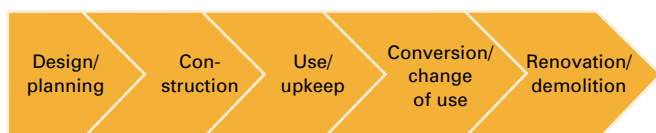
Current assets



– **Management of properties used by ourselves**

By this we mean viewing all our properties and technical installations in their entirety and over their entire life from planning to the carrying out of any renovation measures that may be necessary.

Fixed assets



This dual system will not only make analysis easier for us in subsequent years but will also help us to integrate environmental protection measures into our daily procedures more strongly than before, since in all individual activities we will keep an eye on the bigger picture. Our aim is to record, as soon as possible, as many operational procedures as possible and to identify and effectively implement their potential for ecological optimization. Many promising ideas have already emerged from the first stage of the project, which is now over.

Five examples are given below.

Procurement

Based on the data in the environmental review and an analysis of our procurement procedures (in which we examined questions like "Who procures what?", "What is it to be used for?", "With whom has this procurement measure been agreed?"), we have already defined ecological criteria for product groups like office supplies, computer equipment, and catering supplies. Procurement will in the future be based on these criteria as well as on technical and economic aspects. Besides the product groups already recorded, we will successively include further product groups in our environmental analysis.

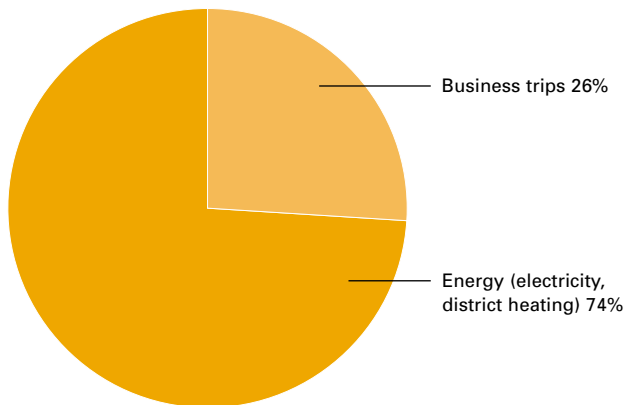
Transport

For a company operating on an international scale like Munich Re, which is represented by offices in 60 countries and works together with partners from 160 countries throughout the world, the amount of travel involved is naturally very high. We nevertheless do all we can to limit travel to what is necessary and to develop acceptable alternatives. We already have in-house videoconferencing facilities, and staff are increasingly using digital media for communication purposes. In the future, we want to further extend the use of the technical facilities available.

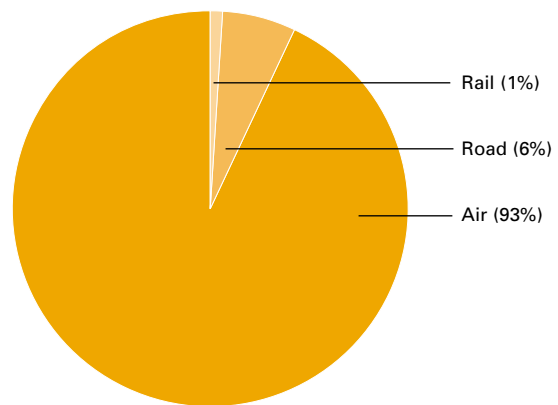
For business trips, our choice of airlines is particularly influenced by safety and quality aspects. Of course, Munich Re's preferred carriers – i.e. the airlines we use for over 70% of our business trips (in terms of our total expenditure on air travel) – each demonstrate their commitment to environmental protection in their own environmental reports. This includes the use of modern fleets of aircraft which have significantly lower emissions of pollutants and noise.

All Munich Re staff who regularly use public transport to get to work and therefore do not require a parking space in the underground car park receive a travel allowance. In 1999, these allowances totalled some DM 793,000. To get between our office buildings or to make other short journeys, staff may use bicycles from our bicycle pool. In the future, we hope to persuade more staff to change over to the public local passenger transport system by offering further incentives.

CO₂ emissions, total



CO₂ emissions due to business trips, broken down by means of transport



Deliveries of materials give rise to a quite considerable transport volume. Here too, further considerations with regard to logistical planning should help to reduce this volume. Some progress has already been achieved in this area: around 70% of the food making up our catering supplies is produced locally.

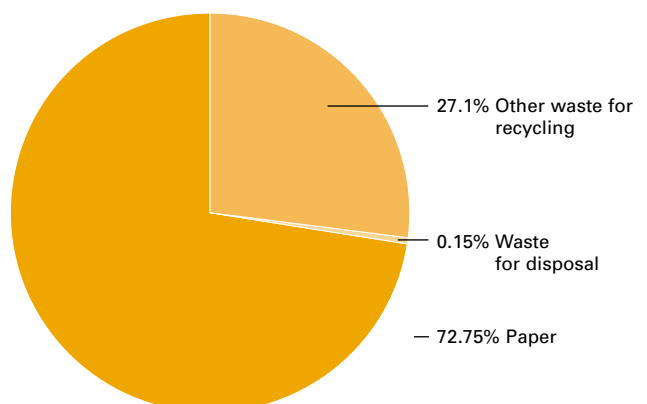
At present, waste as part of construction projects is resulting mainly from our current South 1 building project on Königinstrasse. In the course of renovating this 1970s building, we are bringing it up to modern thermal insulation standards. The re-building work began in mid-October 1999 and is expected to be completed by the end of 2001.

Waste disposal

For staff at Munich Re, the separate collection of paper, biowaste, and residual waste from the workplace has been taken for granted for a long time now. A central collection point has been set up for the separate collection and disposal and/or refilling of materials such as batteries, printer and copier films, toner cartridges in printers and copiers, highlighters, etc. To this extent then, we have already been preventing waste systematically in the past or making sure that it is disposed of properly.

However, we believe that there is still a lot more that can be done. In the future we will therefore further systematize our waste management and centralize the collation of information on the waste that accumulates. In this way it will be possible, for example, to take account of disposal aspects right at the procurement stage, track the flow of waste through the company in minute detail, and draw conclusions from this on the potential for preventing and reducing waste. Finally, with sound analysis, it should also be possible to optimize the methods of disposal and possibly develop alternatives. We believe these measures will also lead to a further reduction in our waste disposal costs.

Composition of waste from business operations



Waste	
Waste from business activities	
Paper for recycling	1,296.5 t
Other waste for recycling	483,205 t
Waste not requiring monitoring	
– Glass	17.9 t
– Metal	8.05 t
– Plastic	6.5 t
– Polystyrene	no quantities arising, as returned to suppliers
– Biowaste (compostable waste)	83.4 t
– Food scraps	156.82 t
Waste requiring monitoring	
– Mixed household waste	204.2 t
– Contents of grease traps	2.3 t
– Electronic scrap (computer equipment)	2.6 t
Waste requiring special monitoring	
– Developing agents	0.968 t
– Fixing agents	0.467 t
Waste for disposal	2.663 t
Waste requiring monitoring	
– Electronic scrap (data media)	1.7 t
Waste requiring special monitoring	
– Contents of sludge trap on car-wash	0.8 t
– Operating resources containing oil	0.05 t (est.)
– Used oil	0.113 t (est.)
– Fluorescent tubes	3,877 pcs.
– Energy-saving bulbs	1,648 pcs.
– Batteries (small quantity; half a 60-litre drum)	
Waste as part of construction projects	
Waste for recycling	1,925 t
– Rubble, coir, etc.	212 m ³
Waste for disposal	74.78 t
– Mineral fibres	15,606 m ²
– Rock wool	30 m ³

Planning and construction of properties used by ourselves

Wherever possible, our specialists responsible for structural engineering and building automation take account of ecological aspects when planning and executing new building projects and renovation projects. Here are just a few examples:

- When carrying out building projects, we always show the greatest consideration for staff and neighbours, keeping noise and other emissions as low as possible.
- In all new installations and modernization projects since about 1987, we have installed toilets with water-saving devices.
- In our new building on Leopoldstrasse we installed a rainwater collection system to supply toilet flushes.
- We always ask our materials suppliers for proof of the environmental compatibility of the building materials used.
- For our new South 1 building on Königinstrasse we held an architectural competition in which we asked for special attention to be paid to ecological aspects. We stipulated an integral concept which took particular account of modern low-energy standards.

We also want to improve our eco-efficiency in the performance of our construction, conversion, and renovation projects. We will therefore consistently integrate environmentally relevant aspects into all phases of the construction process and continue to gear ourselves to the state of the art in terms of ecological construction.

Use and upkeep of our buildings

In the use and upkeep of our buildings, we consume enormous amounts of energy and water (see table). The key figures in this area are in fact quite usual for the sector, but we have many further plans: at the beginning of 2001 we will start with the Energy Management project, which will involve recording the resources consumed and the building services systems used and optimizing these as far as possible. In the case of electricity, water, and district heating, all the consumption values are sent to the building automation management system. This gives us a comprehensive database of the consumption figures and a solid basis from which to work out strategies for operating and maintaining installations in a way that saves costs and is environmentally sound.

Munich Re's key environmental figures for 1999 at a glance

Staff at the Munich location	2,182	
Electricity consumption	5,398	kWh/person and year
Heat consumption	288	kWh/m ² and year
Water consumption	127	l/person and day
Copier paper	37	sheets/person and day
Business trips	7,507	km/person
CO ₂ emissions	22.3	kg/person and day
Waste from business activities	3.3	kg/person and day
Catering supplies		
Proportion of local produce	70%	
Prop. of vegetarian products	35%	

Our objectives

Conserving resources and saving energy

- Continuous updating and development of ecological criteria for procurement (e.g. in the area of office supplies, catering)
- Inclusion of other product groups in the environmental analysis (ongoing)
- Defining ecological criteria for products procured (e.g. paper, printers, printer supplies, servers, CPUs, etc.) and exploring ecological alternatives. In doing so, we will involve manufacturers and suppliers constructively (by March 2001)
- Introducing energy-saving kitchen appliances in our garden dining room by March 2002
- Reducing the frequency of thorough cleaning in our buildings (e.g. from twice a year to once a year in the case of stone floors) and saving (around 30%) on cleaning agents by using microfibre cloths (by December 2001)
- Reducing specific water consumption by around 10% by December 2001
- Energy Management project from the start of 2001 – detailed recording, analysis and optimization of the use of resources (water, electricity, district heating) and definition of quantified objectives in the area of electricity and district heating by June 2002

Preventing and reducing waste

- Introducing a central waste stream management system by December 2001
- Standardizing and reducing (as far as possible) the hazardous substances used (e.g. in the auto repair shop, reducing the quantities stored by around 20% by December 2001)

Reducing volume of transport and reducing CO₂ emissions

- Increasing the proportion of locally produced food in the catering department by a further 5% over the next two years
- Reducing air travel through the increased use of video-conferencing and digital media
- Creating further incentives to change over to the public local passenger transport system by December 2003
- Creating incentives to use rail instead of air travel by December 2003

Increasing identification with the subject of environment and sustainability

- Publishing environmental information sheets on selected subjects, e.g. paper consumption, energy and water consumption, and tips on individual behaviour
- Carrying out regular in-house campaigns on selected environmental subjects (about two campaigns a year)
- Giving out regular staff information over the Munich Re Intranet
- Setting up an 'environment page' on the Munich Re homepage (Extranet) by June 2001

What we are doing in the area of operational ecology

- Assigning a strict system to current and future environmental activities in the area of operational ecology at Munich Re
- Building up a sound database on operational ecology

What we will be doing in the area of operational ecology

- Further integrating ecological aspects into our business activities
- Expanding and refining the database by setting up an environmental information system
- Implementing the Energy Management project
- Developing further optimization potentials with regard to direct environmental effects
- Translating findings from data collection and analysis into appropriate measures

6 Environmental management

... made to measure

In adopting the environmental guidelines, Munich Re’s Board of Management gave voice to its beliefs about environmental protection and sustainable development. In order to now translate these environmental guidelines systematically into concrete terms for the operational activities and thus to integrate them into all operational procedures, we have developed an environmental management system. This should help us to firmly establish the environmental guidelines in the company and to bring all environmental activities together systematically and purposefully.

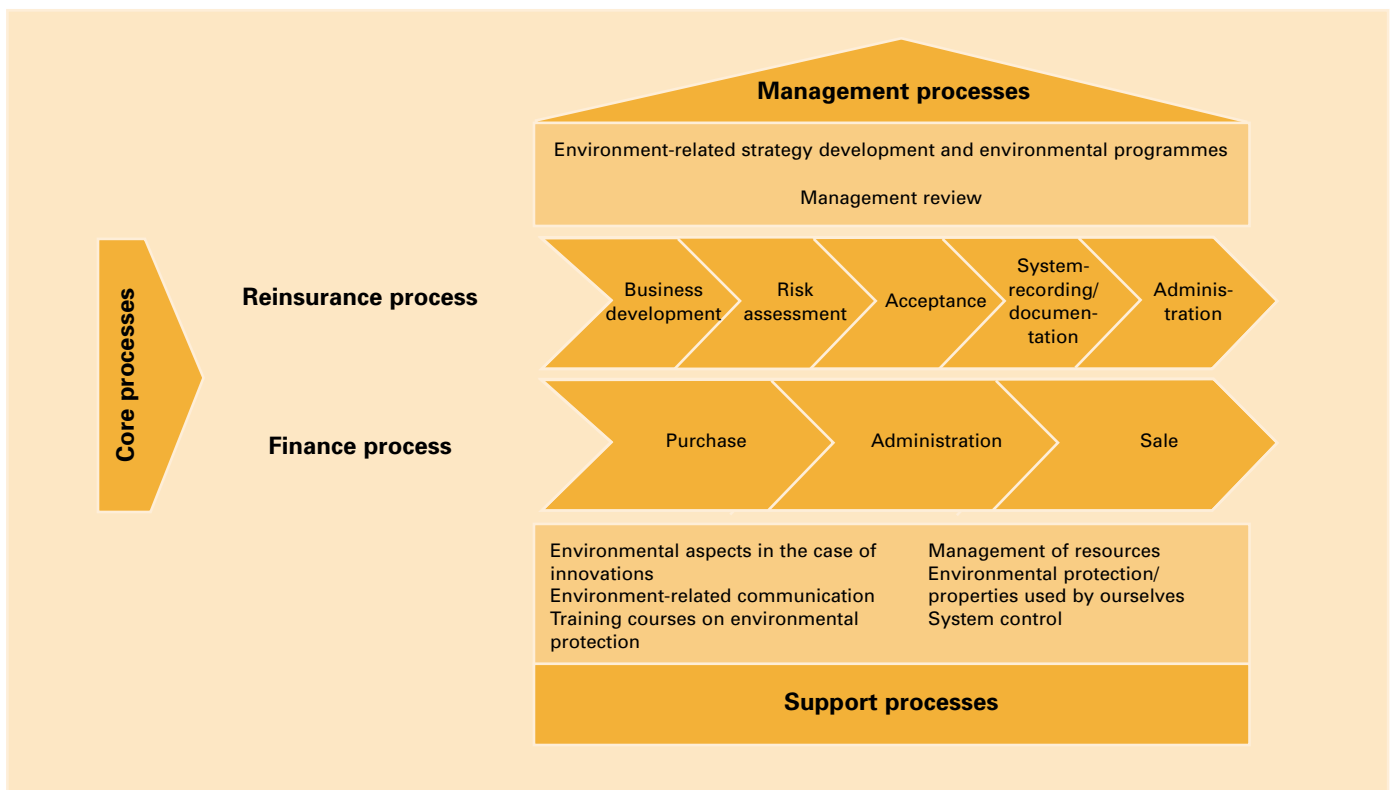
When building up the environmental management system, however, we were faced with the following challenge: the European Union’s Eco-Management and Audit Regulation, the basis for our auditing procedures, was originally “written” for manufacturing firms. The greater part of the requirements not only had to be interpreted in relation to their application within a service company but also had to be adapted to the special features of a reinsurance company – with which no-one had much experience at that time.

Munich Re’s environmental management system

In order to ensure that the environmental management system’s “architecture” was tailored to the specific features of Munich Re, we identified the most important processes at Munich Re in numerous interviews and in consultation with the various underwriting, operational, and central divisions.

Based on this, we developed a process model for Munich Re and thereby devised a structure which allows previous environmental activities to be recorded systematically and all future ones to be incorporated.

The process model for Munich Re



In the process model, we separated the company's core processes, in which Munich Re's products and services (i.e. its business results) arise, from the so-called "support processes". Strategic management processes make up another level.

The processes identified were checked for their environmental relevance. Here, in both the area of "operational ecology" and that of "product ecology", we asked the following question: does the process looked at have any effects on the environment and, if so, what are these effects? To analyse the complex relationships in the area of product ecology, the analysis and assessment tools presented in Section 4.b were specially developed.

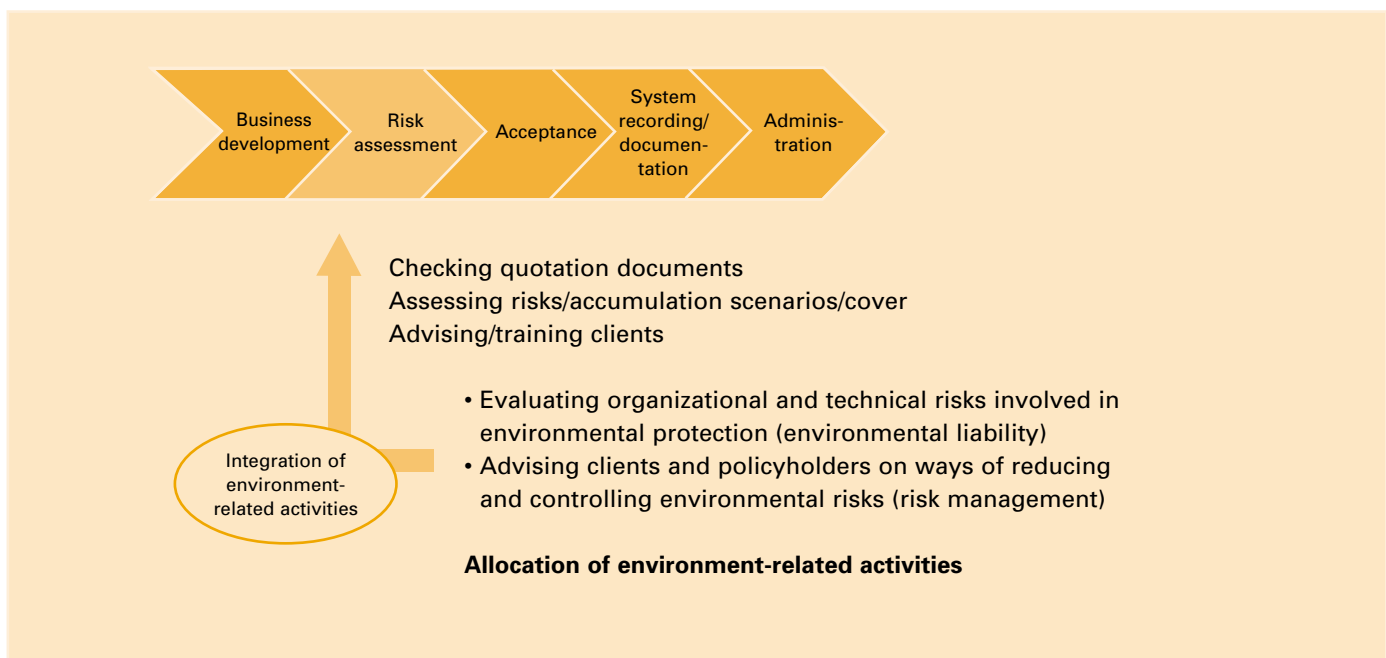
Next, the processes which demonstrably have an effect on the environment were examined to see whether Munich Re can exert a positive influence on them. In close consultation with the pilot areas, appropriate measures were devised as far as possible, taking account of the relevant features of the specific classes of business and the market environment.

These measures were integrated into the relevant processes or into individual partial steps. An example from the core process "reinsurance" illustrates our approach to integrating environment-oriented aspects into existing company procedures.

Many members of staff actively supported us in implementing the company's environmental management system. A whole group of colleagues who have been working in this area for years played an enthusiastic part in the project work. These included staff from the reinsurance and finance sectors as well as colleagues from Research and Development, Human Resources, General Services, Information Technology, and Accounting. During the conception and implementation phase, the project team met regularly to monitor and discuss the latest progress. By inputting their know-how, they made a vital contribution to the creation of a lively, realistic environmental management system which was above all tailored to the distinctive features of Munich Re.

Based on the analysis and the specific procedures described, the tasks and responsibilities with respect to environmental protection were defined by all those involved:

Reinsurance process (core process)



The Board of Management decides on Munich Re’s strategic positioning with respect to environmental protection. It adopted the environmental guidelines and appointed the Board member responsible for environmental issues.

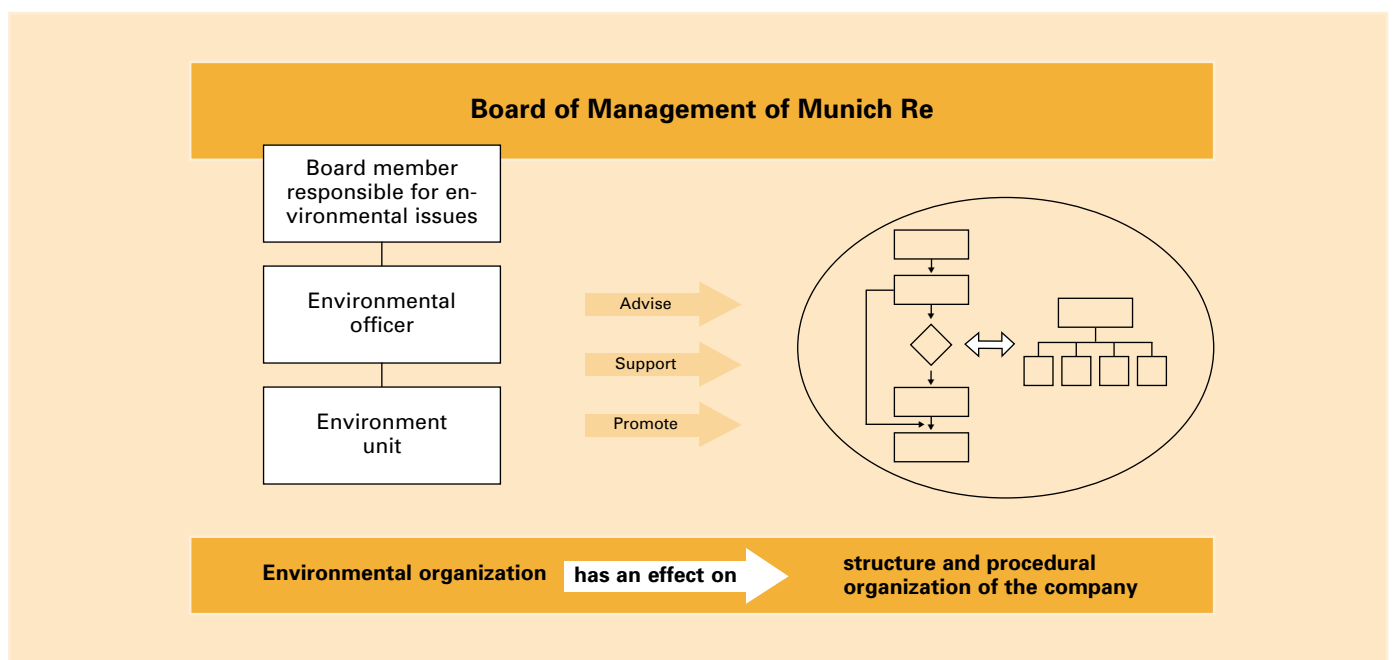
The Board member responsible for environmental issues is the contact for questions involving environmental protection and sustainable development at Board level. He is responsible for making sure that the company’s environmental objectives are in line with its overall strategy.

The environmental officer coordinates Munich Re’s overall image in the field of environmental protection and sustainable development vis-à-vis all target groups. He represents Munich Re in the area of environmental protection and sustainable development in international bodies and also vis-à-vis the general public. He regularly reports to the Board of Management on the company’s environmental protection performance and on the application and effectiveness of the environmental management system.

The Environment unit is integrated in the Central Division: Corporate Communications and is the operational unit responsible for coordinating actual environmental activities. It supports the Board of Management and the divisions in developing tools to realize environment-related goals in Munich Re’s business. The unit also organizes and implements the environmental management system and develops it further.

The operational divisions and central divisions are responsible for the practical implementation of environmental measures in the course of daily business. The responsible heads of the operational and central divisions assign environment-related tasks to technically qualified members of staff and see to it that the goals are achieved.

The diagram below gives a schematic representation of Munich Re’s environmental organization:



Our objectives

The environmental management system was first implemented at the Munich location; in the next few years we will develop it further, in terms of both its content and its regional scope. We understand further development in terms of content to mean a more extensive implementation of the environmental management system in the non-pilot areas by December 2003 and increased orientation towards the concept of sustainable development. Further development in the regional scope means the implementation of the environmental management system in our international organization too, initially in selected pilot locations by December 2003.

We will also carry out a comprehensive expansion of our environmental controlling system. We will shortly be setting up a computerized environmental information system (in June 2001).

What we are doing in the area of environmental management

- Formulating environmental guidelines in line with corporate strategy
- Incorporating responsibilities for environment-related activities into the corporate structure
- Systematically integrating environmental protection and sustainability aspects into the company procedures (initially in selected pilot areas)
- Drawing up an environmental programme, including the definition of objectives, resources, and responsibilities in the areas concerned
- Implementing a comprehensive environmental management system – initially at the Munich location

What we will be doing in the area of environmental management

- Implementing environmental management more extensively in the non-pilot areas at the Munich location
- Implementing objectives and measures from the environmental programme
- Comprehensively expanding our environmental controlling system
- Adapting and further developing the environmental management system in terms of content and regional coverage

7 Communication, training courses, and motivation

Generating awareness, encouraging motivation

The sustainable development of our company is not possible without the commitment of our staff. Members of staff whose activity has a direct or indirect influence on the environment must know, understand, and breathe life into their role and responsibility for complying with the environmental guidelines and implementing our environmental objectives and the functions of the environmental management system. In addition, we aim to motivate the people at Munich Re to develop their own ideas for improving our ecological performance.

Internal and external communication about our environmental activities

The intensive exchange of information within and between the various divisions has a long and fruitful tradition at Munich Re. This exchange is facilitated by a multitude of media and regular events and meetings which we are able to take advantage of for our own information and training events on environmental (management) issues. Among the standard events are regular discussions which, alongside special events, are also used for information and training purposes. As a form of on-the-job training, this has offered the advantage of greater practical relevance compared with off-the-job training. Wherever possible, we have integrated training into routine discussions and other existing events, thereby encouraging acceptance and motivation.

Training measures have been (and are) coordinated with the involvement of the Central Division: Human Resources. Additional support has been provided by the training coordinators in the operational and central divisions involved in planning and carrying out the environment-related courses. The Central Division: Corporate Communications is responsible for comprehensive information measures and coordinates a wide range of topics aimed at different target groups. The Environment unit, which is responsible for taking care of Munich Re's environmental management system, is assigned to the Central Division: Corporate Communications, an arrangement which gives rise to valuable synergistic effects.

In-house training and motivation

The environmental information and training events held in 2000 were as follows:

– Property insurance:

Information and training for underwriters and other officers as part of routine discussions and special events; presentation of the project's contents and objectives, as well as the measures agreed upon in this area.

– Liability:

Environmental protection and environmental management have always formed part of the content of internal information and training events here, for example in the general and advanced insurance courses (which are tailored particularly to underwriters in this sector); in addition, as part of the annual autumn courses, various events relating to the environment have been held for insurance clients and underwriters. Besides these, information events on environmental guidelines and objectives, the environmental management system, and the contents of the environmental programme specific to particular classes of business have also taken place.

– Finance:

Information and training for officers and other staff, as part of existing discussion routines, on the general principles of environmental protection at Munich Re, the current status of the project, and the measures planned.

– General Services:

The Central Division: General Services handles the most important tasks in relation to operational ecology within Munich Re. In the various sections of General Services (e.g. building automation, structural engineering, purchasing) several events have been held giving information on the general principles of environmental protection and environmental management at Munich Re, as well as job-specific matters.

For their part, Munich Re's technical project leaders also act as coordinators and multipliers for their operational divisions. We also plan to integrate the subjects of environmental protection and management into the introductory events for new recruits, as well as into the Munich Re Intranet.

External communication measures

Environmental protection and sustainability are subjects which we have, for some time now, repeatedly brought up in trusting, open dialogue with our clients (e.g. through seminars), our shareholders (e.g. through our Annual Report), our contacts in government departments, public

institutions and politics (e.g. through specialist lectures and studies), and the public at large. Numerous publications, papers, and other measures on the subjects of environmental protection and sustainability have contributed to establishing Munich Re worldwide as an important and competent contact with respect to this range of topics. A few examples of recent publications are the following:

- Publications and media appearances by staff from our Geoscience Research Group on the subject of natural hazards (e.g. “Topics” from the year 2000 on the worldwide effects of climate change, individual publications on flooding, windstorm hail from the years 1998, 1999 and 2000)
- “Recycling – Risk and Insurance” (1998)
- “Casualty Risk Consulting – Information for Insurers” (1998)
- “N.A.T.U.R. – New user-friendly rating system for environmental risks”, which first appeared in 1998
- Publications on fire prevention from 1999
- “Environmental Risks in Industrial Agriculture” (2000)

Our objectives

Priority is to be given to firmly establishing the environmental guidelines and the environmental management system with all Munich Re staff. Externally, we aim to make a contribution to shaping social opinion by communicating our technical expertise in the field of environmental protection and sustainability.

The following measures are planned:

- More advanced events for already trained staff, and also training courses for staff from areas which have not yet been fully involved, by October 2001
- Training courses for Munich Re trainees and scholarship holders in 2001 and in subsequent years until December 2003
- An ‘environment’ page is to be set up on the MRM Intranet; in addition, an MRWEB page (in German and English) is to be set up (by December 2003) aimed at all staff in the Munich Re Group
- A competition is to be held for ideas on how to further improve our environmental performance (by July 2001)
- Intensive use of the existing internal communications media with respect to environmental protection and environmental management (ongoing implementation).

All in all, we believe that the importance of issues relating to environmental protection and sustainability will continue to grow in the future. Each member of staff that we win over to this subject and qualify will therefore also mean a competitive edge for our company.

Any dialogue with the public at large which conveys Munich Re’s commitment and performance in environmental matters likewise strengthens us from the point of view of competition. This is another reason why we will continue to expand our communications and training measures in the future.

What we are doing in the area of communications, training, motivation

- Holding information and training events for all operational divisions directly involved and also for other indirectly affected target groups
- Using all available media to firmly establish Munich Re’s environmental guidelines and environmental objectives, as well as its environmental management system
- Communicating our technical expertise in the area of environmental protection and sustainability to our clients, shareholders, contacts in social institutions, and the general public.

What we will be doing in the area of communications, training, motivation

- Continuing and expanding our information and training activities
- Incorporating other operational divisions not yet involved in the pilot phase into the planning and implementation of information and training events
- Continuing and intensifying our environment-related communications outside the company.

8 Perspectives

In a long and successful tradition, Munich Re has developed into a major partner in the global discussion on the problems of environmental protection and sustainability. What we say counts, and our experts enjoy the greatest international recognition. However, as we have shown in this environmental report, we are making every effort to ensure that, in the future too, we continue to provide impetus for maintaining and restoring the natural foundations of life. We want our participation in the European Union's EMAS to be seen as a further step along this path.

This has only been possible thanks to the exceptional commitment of many members of staff from various areas of our company. Their motivation and expertise, the transfer of know-how and experience, and, not least, their constructive criticism have been – and will continue to be – the best resources available to us on our way. We would therefore like to take this opportunity to express our sincere thanks to all concerned.

Munich Re has taken on far-reaching commitments with respect to environmental protection and sustainable development at both the local level, with its membership in the Environmental Pact of Bavaria, and the global level, with its involvement in the United Nations' Insurance Initiative. The initial results have confirmed to us that we are on the right path. We regard the steps we have taken as an innovative contribution which shows that even a reinsurer and provider of financial services has a direct and indirect influence on the environment in various ways and can make a positive contribution to its protection.

Should you have any questions or suggestions, or if you would like further information, please get in touch with us.

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9 Certification of validity and next audit



