Solutions Beyond Tomorrow.

The Linde Corporate Responsibility Report 2008.

LeadIng.

THE LINDE GROUP

Solutions Beyond Tomorrow.

The Linde Corporate Responsibility Report 2008.

At the Linde Group, we place great importance on recording the impact of our business operations on people, communities and the environment. The effect we have on our surroundings feeds into every decision we make. Our products and services solve the most diverse technical challenges. At the same time, however, they answer some of the biggest issues facing society today.

For example, how can we secure our future energy supply? Or how can we increase the efficiency of biofuel production?

In this report, we therefore focus on our products and processes that make renewable energy commercially viable, minimise depletion of natural resources and help reduce or eliminate waste and harmful emissions.

Contents

From oxygen therapies to medical-grade specialty gases, our healthcare products and services help improve quality of life for countless patients.

Employee health and safety is one of our main priorities, as testified by the zero-accident commitment at all Linde Group locations.

The future is looking good for biofuels. Our research efforts focus on efficient production methods.

The Linde Group

Driving efficiency and success.


Linde

The Linde Group

Linde undertakes to behave responsibly towards its shareholders, business partners, employees, society and the environment – in every one of its business areas, regions and locations across the globe. We are committed to technologies and products that unite the goals of customer value and sustainable development.

Company Profile

The Linde Group

The Linde Group is a world-leading gases and engineering company with more than 50,000 employees working in around 100 countries worldwide. In the 2007 financial year, it achieved sales of EUR 12.3 billion. The strategic focus of The Linde Group is on earnings-based and sustainable growth, driven largely by the expansion of its international business through next-generation products and services.

Organisation

The Group comprises three divisions: Gases and Engineering (the two core divisions) and Gist (logistics services, see www.linde.com). The largest division, Gases, has four operating segments – Western Europe, the Americas, Asia & Eastern Europe, and South Pacific & Africa. These, in turn, are subdivided into nine Regional Business Units (RBUs). The Gases Division also includes two Global Business Units (GBUs) – Healthcare (medical gases) and Tonnage (on-site), plus two Business Areas (BAs) – Merchant & Packaged Gases (liquefied and cylinder gases) and Electronics (electronic gases).

Gases Division

The Linde Group is a world leader in the international gases market. Positioned as an important and reliable partner across a huge variety of industries, we offer a wide range of compressed and liquefied gases as well as chemicals. Our gases are used, for example, in the energy sector, steel production, chemical processing, environmental protection and welding, as well as in food processing, glass production and electronics. We are also investing in the systematic expansion of our fast-growing Healthcare business, i.e. medical gases, and are a leading global player in the development of environmentally friendly hydrogen technologies.

Engineering Division

Our Engineering Division is successful throughout the world, focusing on state-of-the-art plants for promising market segments such as olefin, natural gas and air separation, as well as hydrogen and synthesis gases. In contrast to virtually all our competitors, we are able to call on our own extensive process engineering know-how to cover the entire value chain in the planning, project development and construction of turnkey industrial plants. Our plants deliver gases to a wide variety of fields – including the petrochemical, chemical and pharmaceutical industries – as well as to refineries and fertiliser plants. They are used to recover air gases, produce hydrogen and synthesis gases and treat natural gas.

Linde Financial Highlights

in € million	2007	2006[1]
Sales	12,306	8,113
In Germany %	10.2	14.6
Outside Germany %	89.8	85.4
Sales – comparable[2]	12,306	10,803
Operating profit[3]	2,424	1,586
EBIT[4]	1,591	989
Earnings before taxes on income (EBT)	1,375	363
Earnings after taxes on income – attributable to Linde AG shareholders	952	1,838
Earnings per share[5] €	5.02	4.66
Closing price €	90.45	78.26
Year high €	91.75	79.56
Year low €	75.26	56.32
Dividends	283	241
Market capitalisation	15,046	12,579
Capital expenditure	1,035	776
Cash flow from operating activities as percentage of sales	14.4	10.5
Equity ratio %	36.9	29.5
Return on capital employed (ROCE) %	10.3	11.4
Cost of materials	4,662	5,834
Personnel costs	2,449	2,809
Group employees	50,485	51,038
In Germany %	14.1	14.1
Outside Germany %	85.9	85.9

Key figures by division – comparable[2]

in € million	2007	2006
Gases Division		
Sales	9,209	8,421
Operating profit	2,314	2,035
Number of employees	39,577	39,142
Engineering Division		
Sales	2,750	1,958
Operating profit	240	172
Number of employees	5,637	5,166

1 BOC data included as of initial consolidation in September 2006 to year-end. The figures reflect continued business operations of The Linde Group and therefore do not include data for KION and BOC Edwards Equipment.
2 Prior-year values including twelve months of BOC.
3 Operating profit: EBITDA before non-recurring items including share of income from associates and joint ventures.
4 EBIT before non-recurring items and before amortisation of fair value adjustments identified in the course of the purchase price allocation.
5 Adjusted for the effects of the purchase price allocation and non-recurring items.

Letter to the Stakeholders

The success of sustainable technological progress hinges on the ability to factor in the economic and social implications from the very outset. In other words, innovations must be both economically viable and accepted by society as a whole. And our corporate culture encourages precisely this kind of wide-angle view, or an understanding of how new ideas fit into the bigger picture. This is the true secret of our success.

Tackling global warming while at the same time meeting growing energy demands from emerging economies is one of the most complex tasks we face today. Linde is working on a variety of solutions to these issues. Which is why we have chosen Clean Technologies as the focus of our Corporate Responsibility Report 2008. Whether it be by raising plant efficiency levels, reducing emissions or enabling energy resources to be tapped in environmentally sound ways, each of the technologies showcased in this report has the potential to reduce our carbon footprint – either today or in the near future.

We are very much aware that compromises have to be made. Coal-fired power plants, for example, have a negative impact on our climate. Yet our technologies can help significantly reduce the carbon dioxide emissions from these plants. At the same time, we remain committed to developing fuels from renewable energy sources. Our hugely promising hydrogen technology is going from strength to strength. Similarly, our proven processes help to efficiently capitalise on natural gas resources.

Our gases are making a very real and substantial contribution to climate control across a wide spectrum of industries, solar power included. And yet there still remains vast scope for improvement. Each year, we develop new applications that help our customers streamline their production processes and reduce their environmental footprint – the steel industry is a case in point here.

However, at Linde, sustainability is not just a question of searching for Clean Technologies and establishing ourselves as a key partner for the energy industry. We believe that the social impact of our business activities is just as important when planning for sustainability.

A global review of our social projects at local, regional and international level revealed huge commitment on the part of our employees. Yet it also highlighted the complexity of managing these kinds of programmes from a central location. The best way of identifying local needs is of course at local level. We therefore empower local management to support the community and provide rapid aid in the event of crises, as was the case following the earthquake in China's Sichuan province. These local activities are framed within a wider policy that defines our main spheres of action. At Linde, these are educa-

tion, science and research. Last year saw us again support a large number of initiatives in these areas. Detailed reports on these projects can be found on our website.

We have also made good progress with regard to safety in the workplace and environmental protection – two key areas for The Linde Group. All Group affiliates have acknowledged the importance of these issues. Best practices are not merely dictated from above – our managers lead by example.

Reducing energy consumption and using resources more efficiently are top priorities in our gas production processes. Here we identify best practices within the company and transfer these to our other production sites.

Corporate responsibility is firmly anchored in our corporate strategy. We know that our long-term success is intrinsically linked to key factors such as employee satisfaction, environmental protection and ethical business practices. Linde is committed to upholding the principles set down in the UN's Global Compact initiative. In other words, it undertakes to respect human rights, comply with labour and environmental standards and combat all forms of corruption.

This report and the additional information available on our website will help you judge for yourself to what extent we have been able to align sustainability with business success.

With this in mind, I hope you enjoy reading our Corporate Responsibility Report 2008.

Professor Dr Wolfgang Reitzle
Chief Executive Officer of Linde AG

Values and Guidelines

The Linde Spirit

The Linde Group is a world-leading gases and engineering company with more than 50,000 employees working in around 100 countries worldwide. The people who work in our company come from a wide range of cultures, each with a unique set of traditions, languages and values. Yet the vision and core values captured in the Linde Spirit provide a joint framework, guiding the way we do business and providing us with an identity that unites all our employees across the globe. All other Group-wide guidelines align with these values. We rely on everyone at Linde – at all levels of the Group – to actively live our values and guidelines.

Vision and values

Our corporate mission is clear – we aim to be the leading global industrial gases and engineering group, admired for our people, who provide innovative solutions that make a difference to the world.

Today, our products and services already have a major impact on the lives of a great many people, both in medicine and industry. The technologies we deliver are also helping protect the environment and climate. Personal development through ongoing learning is also firmly anchored in the Group philosophy and we offer our employees a wide variety of opportunities to achieve their personal potential.

Our activities are guided by four values:

- → Passion to excel.
- → Innovation for customers.
- → Empowering people.
- → Thriving through diversity.

Code of Ethics und Integrity Line

Our position as a world-leading gases and engineering company is based on certain rules and standards. The Linde Group Code of

Identifying corporate responsibility action items

Corporate responsibility – organisational roots

Corporate responsibility management focuses on how our guidelines and core values are to be gradually woven into our daily operations and dealings. We identify core action items, aligning the ecological and social challenges of our core business with the requirements of our stakeholders, and prioritising them accordingly (see graphic on previous page). We then initiate specific measures and programmes to address these action items. These measures are specified each year by a high-ranking Corporate Responsibility Council. Professor Dr Wolfgang Reitzle, Chief Executive Officer of Linde AG, and Dr Aldo Belloni, Member of the Executive Board, are members of the Council together with Group managers responsible for Corporate Communications & Investor Relations, Human Resources, Internal Audit, Legal and SHEQ[1].

Our Corporate Responsibility roadmap is geared towards five main areas of activity: employees, SHEQ, corporate citizenship, ethics and compliance, and capital markets (see also page 13 et seq., CR roadmap).

Ethics provides a sound basis for exemplary behaviour in our daily operations and activities.

The Code of Ethics comprises around 20 key rules that apply to all employees in our company.

Launched in 2007, the Linde Group Integrity Line is a reporting system designed to record all violations of the Code of Ethics. The Integrity Line is available to employees and third parties 24 hours a day, seven days a week. It can be accessed from a web portal or by phone, post, e-mail and fax.

Our Integrity Line records any violations of our Code of Ethics.

We encourage our employees to initially discuss any issues with their line manager.

All issues reported via the Integrity Line are coordinated by the Linde Compliance Facilitator in line with data protection regulations.

Corporate Responsibility Policy

The Linde Group Corporate Responsibility Policy defines the principles of our responsibility towards our stakeholders – our shareholders, business partners, employees and the general public. It outlines our voluntary commitment to sound corporate governance and dedication to providing technologies and products that harmonise customer value with sustainable growth.

Safety, Health, Environment, Quality (SHEQ) Policy

Effective management of issues surrounding safety, health, environment and quality (SHEQ) is of key importance to Linde. The Executive Board at Linde AG drafted a SHEQ Policy specifically for this purpose. As with the Code of Ethics, this policy applies to all Linde Group employees and centres on the following core principle: "At The Linde Group, we do not want to harm people or the environment."

Our SHEQ Policy builds on a range of key corporate objectives including a zero-accident rate, a safe, healthy environment for all Linde employees and everyone who works with us, non-polluting processes and conservation of natural resources.

www.linde.com/cr

One Voice Policy
Ethical purchasing
Sponsoring and donations

[1] SHEQ: safety, health, environment, quality.

About this Report

Following on from the Linde AG 2005 and 2007 sustainability reports, this Corporate Responsibility Report 2008 is our third to date. As in previous years, it reports on the five dimensions of employees, SHEQ, ethics and compliance, corporate citizenship, and capital markets (see also page 13 et seq., CR roadmap). To set the spotlight clearly on our focus topic – Clean Technologies – we have moved some background information on some of these dimensions to our dedicated website at www.linde.com/cr.

We have chosen Clean Technologies as our focus because Linde's many and varied solutions make an important contribution to sustainability – both in terms of gas applications and plant engineering.

We continue to assign high priority to acquiring and consolidating key data on health, safety, the environment (HSE) and employees (see page 70, Facts and Figures). We are making ongoing efforts to increase standardisation of our data collection methods and improve the quality and scope of our key indicators. During the reporting period – fiscal 2007 – we made significant progress here, particularly in broadening the reach of our reported metrics, but also in programming standardised web-based capture tools for these core areas. We will be rolling out web-based data collection tools in 2009.

Introducing key performance indicators (KPIs, see glossary) for non-financial metrics remains an important goal for us. In the absence of recognised, industry-wide KPIs, Linde initiated a research project as an interim step during the reporting period, with the objective of defining environmental KPIs for our company. The outcome of this project will flow into our KPI development process from 2009.

This report is structured around our Gases and Engineering Divisions, reflecting the close interplay between these fields of business. We provide detailed information about activities and initiatives within the nine Regional Business Units (RBUs) of the Gases Division on our website.

The Corporate Responsibility Report 2008 covers all consolidated companies in which Linde has at least a 50 percent stake.

It follows current, internationally recognised recommendations by the Global Reporting Initiative (GRI, see glossary or www.globalreporting.org) and is available in German and English. The copy deadline was 30 June 2008. It also includes the annual Communication on Progress (COP) report under the UN Global Compact (see page 82). The Linde Group intends to continue publishing regular sustainability reports. The year of publication for the next report will be announced in good time on our website.

Corporate Responsibility Roadmap

We are committed to continually improving, benchmarking and documenting our performance in the five key dimensions that govern our approach to corporate responsibility.

Individual activities in these areas are coordinated throughout the Group by the central departments of Human Resources, SHEQ, Corporate Communications & Investor Relations, Legal and Internal Audit, each of which reports directly to the Chief Executive Officer (see page 11). Each year, we create a roadmap detailing the objectives and measures of our corporate responsibility policy (see following fold-out pages). The content of the roadmap is approved by the Corporate Responsibility Council.

During the preliminary stages, these Group departments work closely with corporate responsibility experts. This not only ensures that the objectives and measures for each area of activity align with actual requirements, it also helps us establish realistic goals that harmonise with the aims of our corporate responsibility policy.

In the long term, we intend to improve the significance, measurability and transparency of the information presented in our CR report by quantifying goals in our roadmap based on our key indicators (see on page 70, Facts and Figures).

As sustainability is an increasingly important indicator of a company's value, our roadmap is evolving into a key benchmark for analysts.

People excellence – in other words, best-in-class training and continuous advancement of all employees – is crucial in ensuring the long-term success of our company. Subsequently, career and succession planning together with targeted employee training represent cornerstones of our corporate responsibility activities. Work/family balance and consistent encouragement of innovative practices are also firmly anchored in our corporate responsibility roadmap.

In order to promote science and research and nurture young, highly qualified talent, we have strengthened existing cooperations with a wide range of educational establishments. Our primary aim here is to create benefits for all partners on both the corporate and educational sides.

The majority of our efforts in the field of safety, health, environment and quality (SHEQ) is channelled into further developing data collection systems and processes. Increasing the number of sites certified to internationally recognised standards is a particularly important metric for our customers.

In the Ethics & Compliance sphere, 2009 will see us finalise the revision of our Group-wide ethical procurement guidelines.

As sustainability is an increasingly important indicator of a company's value, our roadmap is evolving into a key benchmark for analysts.

Corporate Responsibility Roadmap

Area of activity	
Employees	Integration
	Driving innovation
	Work/family balance
SHEQ	Organisation, management, programmes
	Environmental and climate protection
	Product stewardship
	Health and safety
	Health, safety, environment* metrics, key performance indicators**, reporting
Corporate citizenship	Education, science, research
	Healthcare
	Environmental protection
	Local commitment/charity work
Ethics & compliance	Guidelines, management, programmes
Capital markets	Guidelines, management, programmes

* HSE (health, safety and environment)
** KPIs (key performance indicators)

2007/2008 objectives

→ Anchoring the Linde Spirit (our vision and values) worldwide.
→ Ongoing implementation of human resources (HR) roadmap.

→ Presentation of Linde Group Patent Award (2008 onwards: The Linde Group Patent and Innovation Award). Prizes given to a total of ten winners in 2007 in the categories "technological innovation" and "innovation with the highest monetary value". The winners also become members of the Linde Innovators' Club, a high-profile initiative to bundle the company's innovative strengths.

→ Expansion of family-oriented offerings beyond allocation of childcare services.

→ Implementation of a global SHEQ information and documentation management system.

→ Development of an employee information platform for SHEQ.

→ Concentration on individual aspects of climate protection, e.g. participation in Emission Trading Scheme (ETS) and optimisation of energy efficiency in production facilities.

→ Increased efficiency for our transport fleet.

→ Improved product information in line with international guidelines such as REACH and Globally Harmonized System (GHS, see glossary).

→ Targeted audits for new product launches.

→ Continuation and further development of health and safety programmes with zero-accident target.
→ Enhancement of training measures.

→ Group-wide introduction of web-based reporting tool.
→ Expansion of scope of gathered HSE metrics.
→ Coordination and introduction of KPIs as measurement tool and identification of objectives.

→ Evaluation of opportunities to promote education with targeted recruitment support.
→ Launch of new initiatives if applicable.

→ Aiming to become the research partner of choice for the development of innovative therapies using medical gases.
→ Strengthening of research collaboration with scientists in hospitals and universities worldwide.

→ Evaluation of opportunities to promote environmental protection within a global framework.

→ Ongoing projects and activities.

→ Revision of ethical procurement guidelines for The Linde Group.
→ Establishment of a global compliance organisation.

→ Publication of Corporate Responsibility Report 2007.
→ Socially responsible investments (SRI) roadshow.

Achieved by June 2008

→ Linde Spirit successfully rolled out across entire Group.
→ Implementation of HR roadmap ongoing. Addition of various topics, particularly related to staff development.

→ Award ceremony in September 2007 in Dresden (see also page 67).

→ Invitation to join The Linde Group Patent and Innovation Award in 2008.

→ Eldercare service available to all employees in Germany from 1 January 2008, providing advice and support for staff with relatives requiring care and assistance.
→ Foundation of Work and Family taskforce.

→ Establishment of Linde Management Systems & Standards (LiMSS), containing binding documents and process descriptions and subject to continual expansion.
→ LiMSS made accessible to all employees with PCs.
→ Introduction of Group-wide SHEQ information symbols (see page 42).
→ Generation of "LeadIng. in SHEQ" roadmap to chart SHEQ policy goals.
→ Group-wide alignment of SHEQ standards, e.g. through introduction of SHEQ programme for construction sites in the Engineering Division (see page 65).

→ Ongoing.

→ Ongoing.

→ Ongoing.

→ Ongoing, see also page 41.

→ Ongoing.
→ Ongoing.
→ Introduction of Group-wide Safety Award (see page 45). First award ceremony at 2008 Management Meeting.

→ Web-based reporting tools introduced for occupational safety and environmental metrics.
→ Scope expanded to include additional metrics such as water and materials consumption and water emissions.
→ Research project on KPIs.

→ Ongoing.
→ Engineering Division: research collaboration with Deggendorf University of Applied Sciences; LKCA Dresden: establishment of field engineering course in cooperation with Dresden International University (DIU).

→ Ongoing, see also page 35.

→ Ongoing.

→ Ongoing projects and activities.

→ Ongoing.
→ Ongoing.

→ Publication of Corporate Responsibility Report 2007.
→ Ongoing.

2008/2009 objectives

→ Ongoing implementation of HR roadmap with particular focus on “People Excellence” objectives, equipping all employees with outstanding skills. New staff development programmes to ensure prerequisites for high-performance, achiever-oriented company culture.

→ Awarding of 2008 Patent and Innovation Awards to a total of nine winners. Three prizes in each of the categories:
  → Technological innovations.
  → Innovations with the highest monetary value.
  → Business innovations.

→ Development of comprehensive programme to improve work/family balance.

→ Planning for nursery in Pullach, Germany (largest Linde Group location).

→ Further development of LiMSS.

→ Global implementation of icons.
→ Ongoing support for SHEQ programme in the regions, including expansion of internal auditing.
→ Expansion of external certification to internationally recognised standards.

→ Implementation of programmes and best practice projects to improve energy efficiency and reduce CO_2 emissions.

→ Analysis of environmental management at all locations and enhancement to align with internal standards where appropriate.
→ Lifecycle analyses of selected industrial gases.
→ Further development of Group-wide climate protection strategy, including definition of concrete measures and targets.
→ Active support for emission trading policy framework and its implementation.
→ Initiatives to reduce CO_2 emissions from company cars and business travel in Germany.

→ Prompt implementation of REACH regulations; compliance with deadline for preregistration of relevant substances (1 December 2008). Parallel preparations for GHS implementation.
→ Ongoing.

→ Ongoing.
→ Ongoing.
→ Continuation of Safety Award.

→ Ongoing.
→ Ongoing.
→ Conclusion of research project; subsequent coordination and introduction of Group KPIs.

→ Ongoing.
→ Ongoing.

→ Ongoing, see also page 35.

→ Ongoing.

→ Ongoing projects and activities.

→ Integration of ethical procurement guidelines in supplier agreements by Gases and Engineering Divisions.
→ Ongoing.

→ Publication of Corporate Responsibility Report 2008.
→ Ongoing.

Employees

The long-term success of our company is built on the talent and dedication of our employees. Our far-reaching, Group-wide human resources strategy focuses on advancing and motivating staff, maintaining their loyalty in the face of stiff competition from other companies, and sparking potential candidates' interest in working for a global technology player such as Linde.

Alongside equal opportunities, which are hardwired into our values, best-in-class employee training and continuous advancement are additional cornerstones of our HR policy at all our locations. Our role as a responsible employer also includes offering our staff the greatest possible social security worldwide.

SHEQ

Extensive, effective management of issues surrounding safety, health, environment and quality is of key importance to all our stakeholders, but particularly to our customers and employees.

Behaving responsibly towards other people and our environment is crucial to sustaining the high quality of our products and services, and – by extension – to the long-term success of our business. Our efforts in these areas are integrated in the central Group function SHEQ.

Corporate citizenship

Corporate citizenship is an important facet of our identity at Linde. We take great care to ensure that our communal activities underpin the strategic areas we wish to promote – education, science and research. Against this background, we get involved in projects that are closely linked to our core business, and play an active role in the societies where Linde people live and work around the globe. We achieve this by collaborating with numerous scientific institutions and schools, as well as through our foundations, awards and grants. In addition, we actively support individual projects selected for their specific contribution to the local community.

Our commitment in these fields embodies the traditional values advocated by company founder Carl von Linde.

Ethics & compliance

Ethics and compliance represents a consistent, values-based approach to business that incorporates statutory and internal corporate regulations. Adhering to sound business principles both within and beyond our core working hours has enabled us to gain our stakeholders' trust. We know that strengthening our reputation considerably increases our value base, which is why we have made the incorporation of ethics and compliance in all areas of company life a primary objective.

The Linde Group Code of Ethics provides our employees with rules and standards to help them navigate an increasingly complex business world.

Capital markets (socially responsible investments)

In the medium term, Linde aims to be admitted to indices and funds that exclusively list companies managed in accordance with the principles of sustainable growth. Companies that qualify for these indices must satisfy strict criteria. Alongside economic factors, prospective companies are also evaluated for the degree of responsibility they show towards natural resources, employees and society as a whole. Linde's Corporate Responsibility strategy is specifically geared towards these aims.

Spotlight on Clean Technologies

Consequences of climate change

In his report "The Economics of Climate Change"[1] published in 2006, former World Bank Chief Economist Sir Nicholas Stern warns of severe economic fallout from global warming. If the international community does not take fast and decisive action to combat the effects of climate change, the earth may be facing floods and droughts that could lead to millions of environmental refugees, erode agricultural land and threaten many species and plants with extinction. According to Stern, failure to act may reduce global gross domestic product (GDP) by 20 percent over the coming years and plummet the world economy into a depression on an even greater scale than that of the 1930s.

Mitigating the greenhouse effect

Humans are responsible for the rising concentrations of certain greenhouse gases in the atmosphere, which is why experts also refer to the anthropogenic greenhouse effect. The Kyoto Protocol, ratified in 1997 and effective as of 2005, requires the member countries to reduce greenhouse gas emissions to the levels specified for each of them in the treaty by 2012. The agreement covers carbon dioxide (CO_2, baseline value), methane (CH_4), nitrous oxide (laughing gas, N_2O), hydrofluorocarbons (HFC) and perflurocarbons (PFC) as well as sulphur hexafluoride (SF_6).

In terms of bulk, CO_2, CH_4 and N_2O are the major greenhouse gases. They are the by-products of any number of natural and industrial processes. It is possible to mitigate the volumes of these gases released, but they cannot be fully eliminated.

HFC, PFC and SF_6 are industrial gases produced for specific applications. Purely in terms of volume, these gases are not particularly significant. However, their impact on climate is massive. In the medium term, it should be possible to replace these gases with other substances or technologies.

Protecting the climate and environment

Data released by the United Nations Framework Convention on Climate Change (UNFCCC) indicates that the industrial countries that ratified the Kyoto agreement have fallen far short of the agreed targets thus far and are in fact releasing more greenhouse gases than ever.

The Stern Review[1] estimates that only 1 percent of global GDP, which corresponds to around EUR 275 billion, is required to fund fast, global and far-reaching action to reduce greenhouse gas emissions. In other words, the benefits of strong, early action on climate change far outweigh the costs. The authors of the Review are even of the view that international, collective action and environmental investments to mitigate the greenhouse effect could end up saving more money than they cost.

As a world-leading industrial gases and engineering company with far-reaching technical expertise, Linde is ideally positioned to make a valuable contribution to environmental protection efforts.

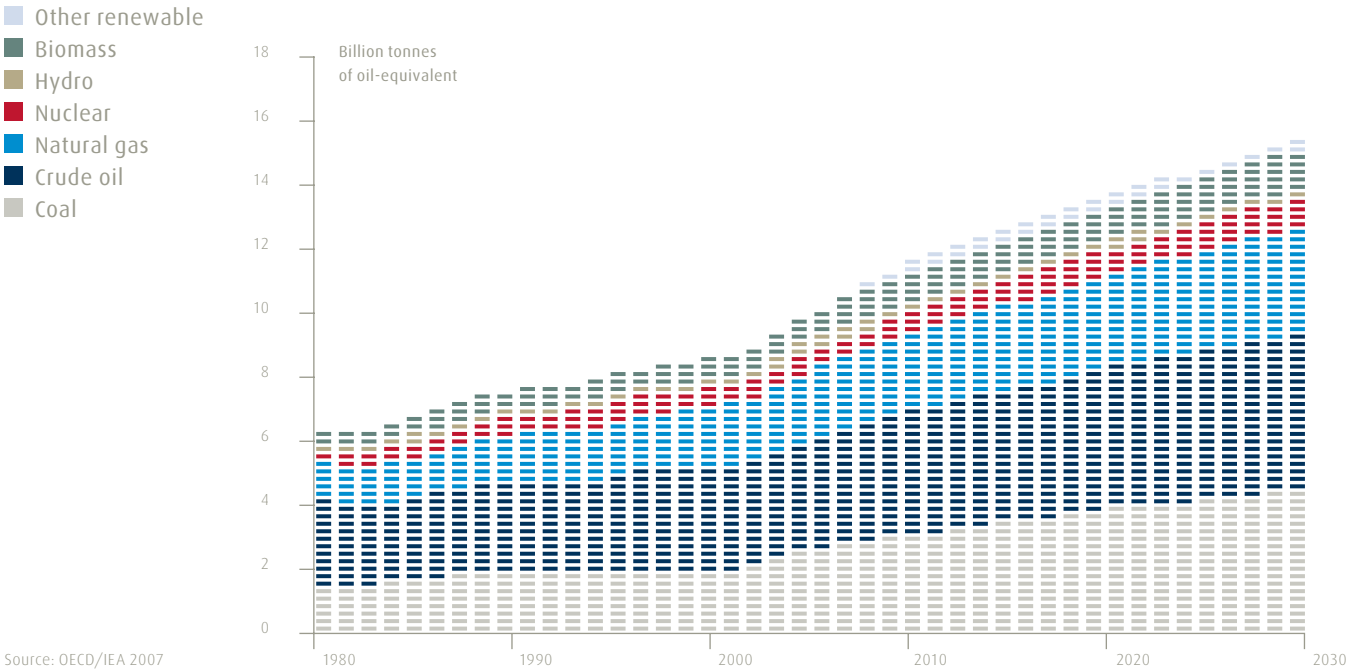
Synergising our gases and engineering know-how, we deliver a broad range of products and processes to capture renewable energies cost-effectively, dramatically cut consumption of natural resources and help reduce or even eliminate harmful emissions and waste levels. We group our processes and pilot projects in this area under the umbrella of "Clean Technologies". You will find details on our various Clean Technology solutions in the individual division chapters.

Greenhouse gases

Greenhouse gases are components of the atmosphere that contribute to the greenhouse effect. They allow sunlight through but absorb or trap some of the heat (infrared rays) released by the sun-warmed surface of the earth that would otherwise escape into the atmosphere. Depending on their temperature, these gas molecules thus magnify the natural effect of the sun in warming the earth's surface. This trapping of heat creates an effect in the earth's atmosphere similar to that found in a greenhouse.

[1] Stern Review: The Economics of Climate Change, London, 2006.

Global energy demand



Source: OECD/IEA 2007

The energy mix of the future

Global energy production is at a turning point. Although current fossil fuel reserves are sufficient to meet the forecast increase in demand, an almost complete dependence on fossil energy carriers must give way to a growing reliance on renewable sources of energy. Growth rates for renewable energy are still low due to their high cost in comparison with fossil fuels. However, as associated costs sink and technology becomes ever more sophisticated, renewable energy is set to play an increasingly important role in tomorrow's energy mix.

Securing future energy supplies

Despite all the efforts to promote renewable sources of energy, non-renewable carriers will remain the world's primary source of energy for several decades to come (see graphic above).

Both our Gases and Engineering Divisions are working specifically on ways to tap and consume fossil fuels with the lowest possible environmental and climatic footprint.

For example, we apply the expertise we have gained using hydrogen in refinery processes to desulphurise crude oil, liquefy and regasify natural gas (see glossary), and feed pure oxygen to the lignite combustion process (see page 61, oxy-fuel process).

UN Global Compact: "Caring for Climate" initiative

An active member of the UN Global Compact, Linde joined 150 other international companies in signing the Global Compact "Caring for Climate" statement (www.globalcompact.org) in July 2007. Through this voluntary business leadership platform, we are demonstrating our commitment to develop solutions for climate protection and to report on our emissions every year (see page 73). This move gives a transparent overview of our environmental activities and the impact of our business operations.

Gases Division

Enabling resource-friendly processes.

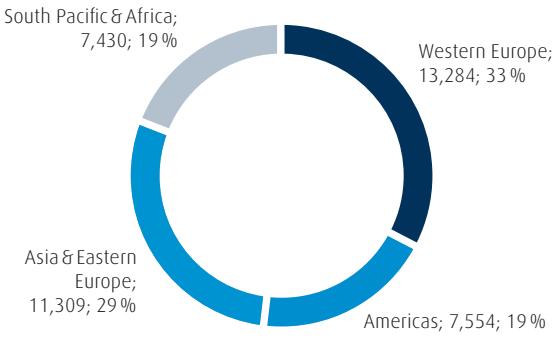
Gases Division

Across the widest range of industries – from semiconductors to healthcare and from metals to foodstuffs – we offer our customers a lot more than gas molecules. We deliver applications and process enhancements that enable efficiency gains and responsible use of natural resources.

Diversity is the key to success in the industrial gases business. Our extensive product portfolio ranges from the production of industrial gases to the delivery of processes, plants, equipment and services for the widest scope of gas applications[1]. We supply many different industries in almost 100 countries across the globe. Our gases are deployed in the steel, glass and chemical industries, for example, as well as in food processing, environmental protection, welding and electronics.

Acetylene, argon, helium, carbon dioxide, oxygen, nitrogen and hydrogen are the main gases we produce. However, our core competencies also extend to a range of specialty gases and additional noble gases. Our dense production, sales and distribution network enables the fast, safe, cost-efficient supply of cylinder, tank, on-site (production) and pipeline gases to our customers.

Gases Division employees by region, 2007



With a headcount exceeding 39,500[2], the Gases Division generated sales of around EUR 9.2 billion in 2007. Almost half of this was attributable to the Western Europe operating segment, while a quarter was generated in the Americas.

The acquisition of the British BOC Group has given our gas business a more global footprint, thus enabling this division to capitalise more effectively on growth opportunities and weather unfavourable regional dynamics. Our outstanding market position is further strengthened by our operating model, in other words the organisational structure of our Gases Division. It empowers our local management teams to provide their customers with the best possible service, thus consolidating customer relations and creating a solid base for stability, growth and profitability.

Our operating model empowers local management to provide local customers with the best possible service.

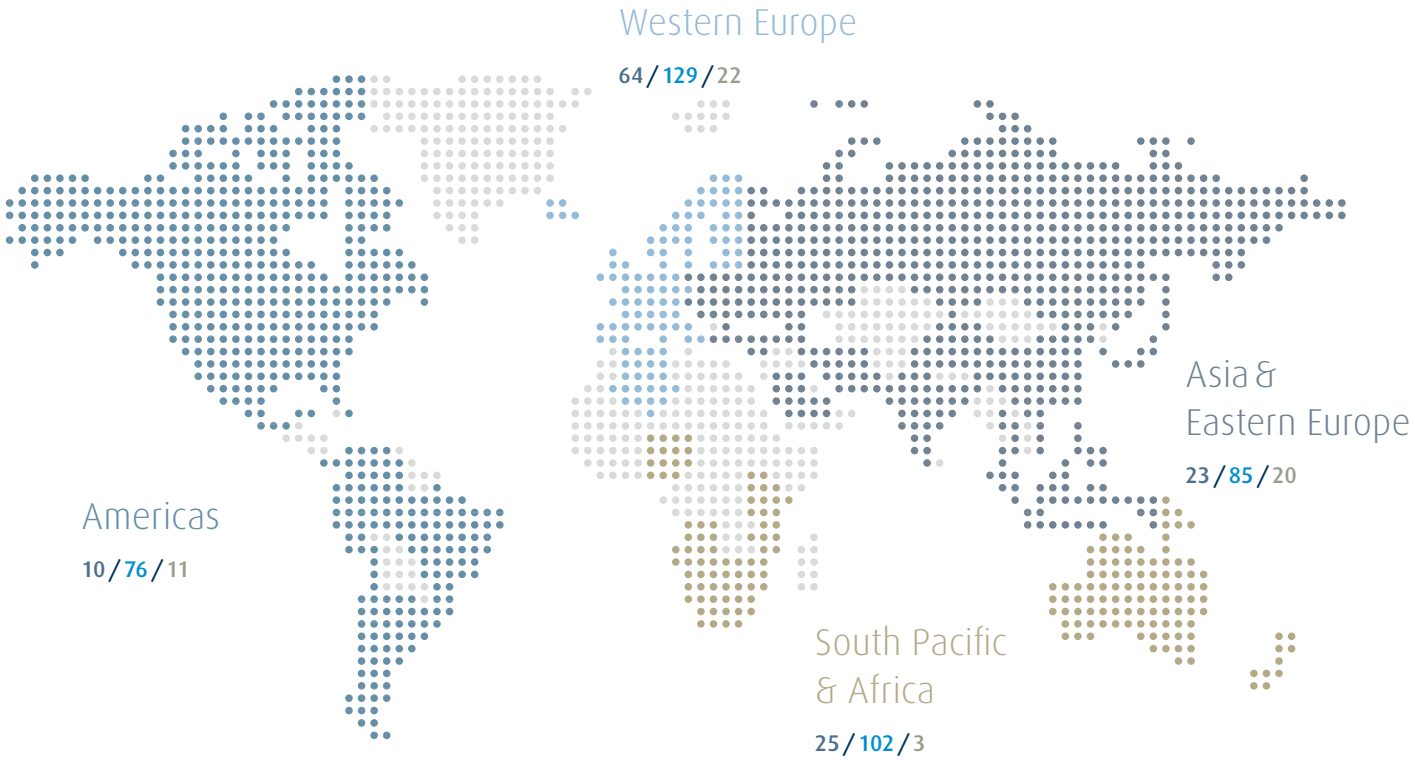
The organisational model we introduced in 2007 encompasses the following nine Regional Business Units (RBUs): Continental & Northern Europe, UK & Ireland, Eastern Europe & Middle East, Africa, North America, South America, South & East Asia, Greater China and South Pacific. Continental & Northern Europe is the largest RBU in terms of sales and headcount, followed by North America. The RBUs are allocated to four operating segments: Western Europe, Americas, Asia & Eastern Europe, and South Pacific & Africa. These segments are responsible for their own financial results and the medium-term development of their respective product areas. This structure reflects our commitment to accommodating the vast variations in the market dynamics of the gases business at local and regional level.

Our on-site business involves installing industrial gas plants at customer sites to ensure a local supply. These activities are coordinated centrally in the Global Business Unit (GBU) Tonnage, allowing us to cater to the international requirements of our major on-site customers.

1 www.linde-gas.com
2 As of 31 December 2007

Certified locations by operating segment

DIN ISO 14001
DIN ISO 9001
OHSAS 18001 and SCC



Proven safety and environmental protection
The internal environmental and safety audits run by our Gases Division comply with the main internationally recognised standards. Responding to the demands of our customers, most of our local offices and companies are also certified to DIN ISO 9001. Many locations are also certified to the environmental management standard DIN ISO 14001, the Safety Certificate for Contractors (SCC) and/or the Occupational Health and Safety Assessment Series (OHSAS 18001). We are constantly working to extend certification to more Linde companies.

The second GBU covers the Healthcare (medical gases) business. This area is further split into the divisions Hospital Care (medical gases and equipment for hospitals) and Homecare (gases and equipment for out-patients). This centralised approach enables us to bundle our research and development activities and bring product innovations to market even faster.

We have also established two Business Areas (BAs) for Electronic Gases and Merchant & Packaged Gases – in other words, the supply of liquid and cylinder gases.

Our operating model for the Gases Division is also reflected in the individual responsibilities assigned to members of the Group Executive Board. This structure enables us to transfer best practices incorporating local know-how, strengths and core competencies from one region to another and leverage cross-regional synergies.

Gases Division – Clean Technologies

Our Customers Expect Answers

Our gas customers expect answers. And they deserve nothing less. Increasingly, they want to know what contribution Linde is making to sustainable development. They are also asking where and how our CR principles are anchored and how we deliver on our CR vision. Customers from the food industry, for example, are interested in the extent to which we use renewable sources of energy to manufacture our gases and what we are doing to reduce packaging. If you look at steel and metal industry customers, however, the main focus lies on employee loyalty schemes. When they run into complex technical challenges, customers want to know that they can always turn to trusted, long-standing Linde specialists for process advice. Moving on to the chemical sector, customers are asking us how our gases can help reduce carbon dioxide emissions.

At first glance, corporate responsibility appears to be adding layers of complexity to our business. A closer look, however, reveals that it in fact adds value to all players – to us as a gas supplier, our customers and their customers. The bottom line is that all players in the value chain are getting progressively better at sustainability. This development opens up new business opportunities for us and is creating new prospective customers.

Sustainability is long-established as a strategic topic in particular in the Merchant & Packaged Gases BA. For example, drinks companies that purchase carbon dioxide (CO_2) from us for fizzy drinks expect us to minimise energy consumption and harmful emissions in the production and delivery of that CO_2. We respond to those understandable expectations with an end-to-end service model. Looking far beyond the actual gas molecules, we deliver comprehensive, end-to-end solutions plus complementary consulting services that are all geared towards raising the sustainability bar.

Food Industry

Industrial gases are increasingly giving an invisible helping hand to the food, beverages and water treatment industries. This move is being accelerated in particular by rising demands among consumers and the authorities concerning the quality and shelf life of foodstuffs and drinks.

Food-grade gases are used for a variety of applications including shock-freezing and cooling, protecting against germs, keeping packaged food fresh and protecting food during transport. They are also used to carbonate drinks. In many instances, they cut the energy consumption of various production processes and reduce harmful emissions, thus making a tangible contribution to a sustainable economy.

> Our customers want to know what role renewable energy plays in the production of our gases.

Eco-friendly freezing with CRYOLINE® MT

Launched in 2005, our CRYOLINE® MT cryogenic tunnel freezer is successfully deployed by numerous customers in the food industry worldwide. They rate in particular its efficiency and reliability. Building on the success of this freezer thus far, we decided to launch it in the US in October 2007. CRYOLINE® MT is the first cryogenic freezer to comply with the strict US health regulations. This tunnel freezer raises quality and hygiene standards in the freezing of fresh foods such as fish, meat, fruit and vegetables. CRYOLINE® MT uses cryogenic liquid nitrogen (–196°C) and carbon dioxide (–78°C) to freeze foodstuffs rapidly and gently. Compared with other freezer systems, CRYOLINE® MT is more powerful and draws less moisture out of the food, thus preserving flavour and appearance. Most importantly, perhaps, this tunnel freezer requires less coolant, making it a considerably more environmentally friendly option than conventional processes.

Sparkling water on tap

Our new tap water carbonator is currently enjoying huge market success in Sweden. The carbonator is attached directly to the water pipe in the home and supplies carbonated or fizzy water on demand. Our Swedish subsidiary AGA launched this new product in June 2007 against the backdrop of a public debate on the environmental and economic impact of buying bottled water when high-quality tap water was available in every home. We plan to roll out this carbonator across all Scandinavian countries, thus reducing the volume of empty water bottle returns. This, in turn, will substantially cut down the number of recycled bottles that require chemical cleaning.

Salmon farming in Norway – oxygen helps prevent disease.

Sureserve presents Safe Cellar Award

In October 2007, our British subsidiary BOC Sureserve presented its gas management award for the safest and best-maintained pub cellar for the first time. This inaugural prize went to the publicans of the Ship Inn in Winchester, Adrian Broome and Becci Rawlings, for gas storage and safety systems, ease of access and effective lighting in their cellar. BOC supplies more than 53,000 British pubs, restaurants and bars with dispense gases, dispense systems and safety systems.

Aquaculture and water treatment

Industrial gases supplied by Linde are used for a wide variety of water and waste water treatment applications. Highlights include the effective neutralisation of basic waste water with CO_2 and the treatment of waste water with industrial oxygen. The water industry is increasingly turning to CO_2 as an effective way of meeting base water neutralisation regulations. Compared with the aggressive mineral acids traditionally used for this purpose, CO_2 is a much safer option. We supply special tanks for CO_2 treatment, which can be tailored to individual application needs.

Enjoy your swim with POOLGON

Imagine an odour-free swimming pool that did not irritate your skin and eyes? A pool that did not need chlorine-based chemicals to keep the water pure and fresh? That is exactly what POOLGON achieves. Developed by PanGas, our Swiss subsidiary, this water purification system uses the natural gases carbon dioxide and oxygen to purify pool water. The POOLGON mixture maintains the pH value of the water at an optimum level thanks to carbonic acid, while also raising the ratio of pure oxygen in the pool. To ensure lasting protection throughout the entire swimming pool, a small amount of water is constantly extracted downstream of the circulation system filter. This is channelled through a plate capacitor, creating an electric field, which then disinfects the water. This process kills bacteria and germs throughout the entire pool. This environmentally friendly solution can be easily installed in any swimming pool.

Fish farming with oxygen instead of antibiotics

Pure oxygen can be fed into fish farms to protect the health of the fish and to increase yields. Oxygen enables an increase in fish density (production capacity) and accelerates fish growth as the fish can absorb food better in the absence of weather-related fluctuations in oxygen levels. They are also more immune to disease, thus progressing from a juvenile to a mature fish even faster. Our SOLVOX® solution is a highly effective way of injecting oxygen into farm waters. To ensure cost-effective delivery of the oxygen, we complement our extensive process know-how with the accompanying hardware, including perforated hoses and oxygen reactors.

By keeping many diseases at bay, oxygen helps eliminate the need for antibiotics in fish farming.

Intensively farmed fish are often plagued by diseases that can jeopardise the entire stock. This risk can be mitigated by feeding ozone into the water. Ozone improves the quality of the water by killing germs and spores. Not only does it eliminate the need for chemicals, it clearly cuts disease-related losses and residual ozone is converted back to harmless oxygen.

Blast furnace in a rolling mill – our REBOX® technology saves energy and reduces emissions.

Metallurgy and Glass

REBOX® oxy-fuel technology

Our REBOX® oxy-fuel solutions have been successfully deployed by around 110 reheat and annealing furnaces across the steel industry worldwide. Using pure oxygen instead of air for combustion greatly increases combustion efficiency and heat transfer. This, in turn, saves significant volumes of energy. The potential savings of this technology become clear when you consider that around 1.2 billion tonnes of steel are melted worldwide every year and that each one of those tonnes passes through a furnace twice before it is fashioned into the final product.

REBOX® oxy-fuel solutions consume around 15 percent less energy.

Conventional combustion processes using ambient air require at least 1.3 gigajoules to heat one tonne of steel to the temperature required for rolling. REBOX® oxy-fuel solutions require around 15 percent less energy, even taking account of the energy required to produce the oxygen. Potential savings are actually much higher, reaching somewhere between 40 and 70 percent in some instances as only a fraction of furnaces apply the best ambient air technologies currently available.

In 2007, for example, we converted a furnace from air to oxy-fuel for our customer ArcelorMittal in Shelby, Ohio. This turnkey solution increased heating power by 25 percent, cut energy consumption and CO_2 emissions by 65 percent and cut nitrogen emissions significantly. Plants already equipped with REBOX® save more than 1,000 gigawatt hours (GWh) each year. This is enough to power 200,000 average households for an entire year, according to the German Aerospace Centre (DLR).

Recycling aluminium with WASTOX®

Our oxy-fuel technology also helps to reduce energy consumption and emissions when recycling aluminium scrap. WASTOX® combines oxygen burners with WASTOX® oxygen lances, combusting unwanted contaminants directly in the furnace. Using the WASTOX® control panel, the operator can regulate the oxygen lances and oxygen burner in parallel to burn any uncombusted hydrocarbons or carbon monoxide (CO) directly in the furnace. This laser-enabled system measures the flue gas composition, allowing tight control over the combustion process, turning unwanted organic contaminants into fuel and reducing dependency on fossil fuels.

By analysing the flue gas composition carefully, WASTOX® enables tight control over the combustion process. This patented, versatile system is successfully deployed by numerous customers worldwide. Tests run by Linde and our partners from the aluminium industry aimed at maximising combustion efficiency have shown that combustibles react more efficiently to a pure oxygen stream than to an oxygen-enriched flame. Tests to recycle used drinks cans with a straightforward air-fuel burner showed that between 20 and 50 percent of the carbons on the processed scrap (paint, coatings) are released as volatile organic compounds (VOCs) and carbon monoxide. An oxygen-enriched oxy-fuel flame reduced these emissions to 1 percent. With the WASTOX® oxygen lance and an oxygen burner in stoichiometric mode (see glossary), combustion was almost complete, with emissions down to less than 0.01 percent.

Chemical Industry

Our gases are used across the widest application spectrum in the chemical and energy industries. In collaboration with our customers, we are always working on new processes that are safer, cleaner and more energy-efficient. Our development engineers are constantly looking at ways of moving closer to a sustainable economy with innovations ranging from a proprietary waste water treatment system to solutions for odour control in water purification plants, fire protection and pest control.

We work together with our customers to develop safe, clean, energy-efficient processes.

Safe control of fires in waste bunkers

Environmental protection and safety inspired our innovative solution for combating fires in waste bunkers at incineration plants. Smouldering fires frequently break out in the stored waste, often releasing highly toxic fumes deep down in the deposits. While fires on the surface of the waste can easily be removed by grabbers and transferred to the incinerator, fires deeper down cannot be extinguished with water or foam, since these agents are not able to reach the source of the fire. Our new process solves this problem by using special nozzles to pipe carbon dioxide directly to the source, where it quenches the fire, preventing further release of toxic and pollutant fumes. An additional benefit is that carbon dioxide keeps the waste dry and easier to incinerate than it would be following the use of liquid fire-fighting agents. We have applied for a patent on this innovative extinguishing system. It has already been installed in ten large German waste incineration plants, where it is setting new safety standards. The solution offers promising growth prospects for The Linde Group.

Clean air for Chile

Santiago de Chile is one of South America's most polluted cities. The extremely high levels of air pollution are mainly attributable to the one million or so cars using the city's roadways. The authorities have undertaken to significantly clean up the air in Santiago by 2011 in order to improve quality of life for the five million inhabitants. One of the key enablers of this initiative is the transition to low-sulphur fuels for road traffic. Essentially, sulphur in petrol is a big contributor to air pollution and can cause serious health problems. High sulphur levels also inhibit a vehicle's exhaust cleaning system as they interfere with the catalytic converter.

ENAP Refinerías S. A., a subsidiary of the national Chilean oil company ENAP, operates all three refineries running in Chile. It supplies 85 percent of the total Chilean diesel and petrol market. It concluded an agreement with Linde to construct a hydrogen plant at its largest refinery site near Santiago. Our Chilean subsidiary AGA S. A. is financing, constructing and operating the plant, which is the first on-site project of its kind in South America. ENAP is using the hydrogen supplied by Linde to produce low-sulphur diesel. Not only does low-sulphur diesel reduce sulphur dioxide emissions, it also enables the latest automobile exhaust cleaning systems.

Separate safely with CO_2

In the plastics processing industry, moulds for manufacturing plastic parts from polyurethane (PUR) foam are coated with wax, which acts as a separating agent. Previously, applying the wax to the surface of the mould involved dissolving it in organic solvents or VOCs (volatile organic compounds, see glossary) and spraying it into the mould using compressed air. The VOCs then evaporate from the hot mould into the surrounding atmosphere – with damaging effects for employees and the environment. The European Union has therefore imposed stringent restrictions on the use of VOCs. Linde has now developed a far more eco- and health-friendly alternative to this process that also eliminates the need for suction facilities. Our solution uses compressed liquid carbon dioxide as the solvent and carrying agent for the concentrated wax. This enables a significant reduction in the use of VOCs without necessitating any large technical investments. This substantially reduces the impact on the environment. In addition, this process allows manufacturers to comply with new, stricter environmental regulations. For this application, the development engineers in our Gases Division work in close collaboration with our customers and Chemtrend, a leading producer of separating agents.

Eco-inerting for magnesium

Magnesium, the lightest structural metal currently available, is growing in popularity in the automotive industry in particular. In the past, manufacturers relied on sulphur hexafluoride (SF_6) or sulphur dioxide (SO_2) to avoid fires in magnesium melting processes and oxidation of the liquid metal. SO_2 is highly toxic and requires extensive safety precautions before it can be used in foundries. SF_6 is not ideal either due to its high global warming potential (GWP). Hence SF_6 has been banned for magnesium melting since 2007. The only exception is foundries requiring less than 500 kg of SF_6 per year.

Recycling paper at a factory in Austria (left).

Energy-saving production of glass perfume bottles (centre).

Electronic gases play an important role in manufacturing semiconductors (right).

Our Gases Division has developed a new, patent-pending process that overcomes these challenges. This process uses CO_2 snow to shield the melt against the ambient atmosphere during treatment and protect against oxidation. Subsidised by the German Federal Ministry of Education and Science (BMBF), we brought this CO_2 solution to market in cooperation with various other partners. And our Gases Division received an environmental award for this technology at the world's largest, international conference for engineering innovations.

High-purity oxygen increases efficiency in glass industry

Our gas experts have also been working to reduce the environmental impact of glass production. They applied the benefits of our oxy-fuel processes, which has proven its value in several other industries, to the glass melting process to dramatically increase burner efficiency. The addition of oxygen significantly reduces energy consumption and the volume of harmful flue gases, including nitrogen oxides (NO_X) and CO_2. Melting furnaces retrofitted with oxy-fuel technologies have reported a drop of up to 50 percent in energy consumption.

Oxygen reduces CO_2 footprint of paper production

Despite the growing popularity of digital content and email, the paper industry continues to grow each year. Market researchers predict that the annual demand for paper will have risen to 450 million tonnes by 2015. It is expected that Asia – and China in particular – will experience the most dynamic growth. Against this backdrop, the pressure to reduce the CO_2 footprint of paper production is growing. Linde has been involved in efforts to clean up paper production from the very outset. The use of oxygen, ozone and carbon dioxide has already increased process efficiency and reduced the environmental impact of pulp and paper production. These gases are proving an increasingly attractive alternative to harmful chemicals. Our offering in this area extends far beyond the supply of industrial gases. We deliver patented solutions, complemented by operation and monitoring services and training courses.

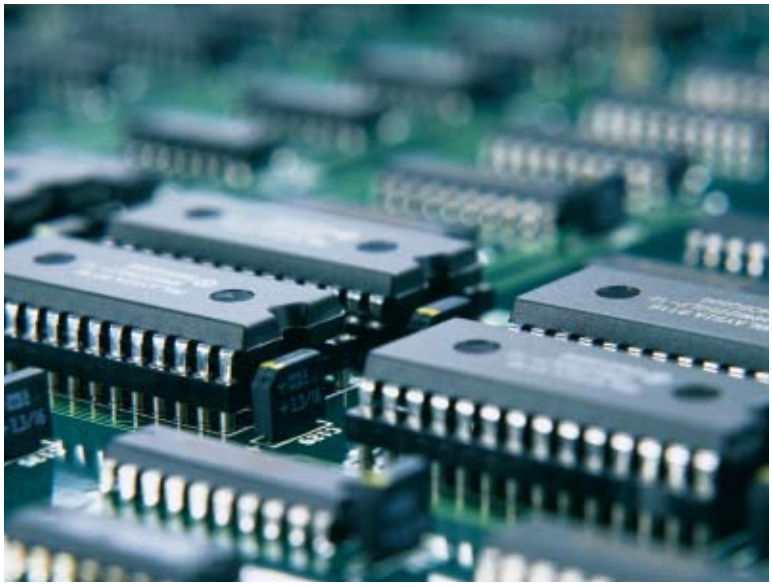
Replacing environmentally harmful chemicals with gases is helping paper production go green.

The most important gases for pulp and paper are oxygen and ozone. The latter is a popular bleaching agent for pulp, as its eco ratings are as high as those of oxygen. Oxygen also plays an active role in the wastewater treatment system that is an indispensible part of pulp mills today. Here bacteria degrades organic matter. To do this, the bacteria requires oxygen, which is injected into the waste water with air. However, this process also produces foul-smelling sulphur compounds, which are highly objectionable to people living in the vicinity. Once again, Linde has developed an innovative solution to this problem. The use of pure oxygen blocks the formation of sulphur compounds and increases the throughput of the treatment facility.

Linde engineers have also developed a process for converting pulp residue into biofuel. Turning waste into fuel that can then be used to power the paper mill improves the overall energy balance.

Enabling environmental technologies

In the expanding environmental technologies market, our gases help identify and eliminate pollutants, re-use raw materials and conserve natural resources. We deliver the full range of gases,



gas mixtures and hardware for monitoring process liquids, waste streams and emission levels.

Regional, national and international legislation imposes strict controls on the pollution levels created by waste incinerators, power plants and industrial manufacturers. This throws the spotlight on water, soil and air testing. Highly accurate tests are required to measure levels of pollutants such as VOCs and polychlorinated biphenyls (PCBs) within the plant, and in the ambient air and surroundings. A wide variety of industrial plants including electric power stations, refineries, chemical plants, plus pulp and paper mills are required to carry out Continuous Emission Monitoring (CEM) to quantify the amount of critical pollutants such as SO_2, NO_X, and CO_2 in the facility's exhaust stream. CEM systems must be calibrated on a regular basis, using gas calibration standards governed by a stringent manufacturing protocol. Our gas mixtures enable our customers to comply with all monitoring requirements and regulations.

Environmentally friendly cooling for pharma products

There are a variety of pharmaceutical processes and devices where cryogenic gases such as liquid nitrogen and carbon dioxide or dry ice present an attractive, environmentally friendly alternative to mechanical cooling with ozone-depleting substances such as hydrochlorofluorocarbons (HCFCs). In fact, cryogenic gases optimise many pharmaceutical processes such as grinding, chopping, mixing, granulating, cooling, freezing and shock-freezing. Liquid nitrogen enables goods in storage and transit to be kept at precisely regulated cryogenic temperatures as low as –196°C. And cryogenic condensation is an innovative process that uses cryogenic gases at around –100°C to comply with environmental regu-

Electronic gases – growth opportunity for Linde

Demand for electronic gases in the semiconductor and solar cell industries is continuing to increase at over twice the rate of global GDP growth. In traditional semiconductor segments such as microchips and flat-panel displays, market researchers expect sales growth of around 8 percent per year until 2010 – and for the solar segment, the annual forecast lies at around 30 percent. Experts anticipate that from 2012, photovoltaic producers will spend more on gases than flat-screen manufacturers, and from 2017 they are even set to overtake the chip sector. Although only a handful of different gases are used in solar-cell manufacturing – in comparison with more than 20 for semiconductors – the volumes required are significantly greater. As a leading partner for the electronics industry, Linde supplies electronic gases to eight of the top ten semiconductor manufacturers worldwide and is now gaining an increasingly strong foothold as a supplier to the photovoltaic industry.

lations by purifying exhaust gases and capturing VOCs from process gases.

Manufacturing Industry

New applications for dry ice

Our Gases Division developed an eco-friendly technology for cleaning textiles using dry ice several years ago. This involves projecting rice-sized pellets of dry ice onto the clothes at high speed. The pellets penetrate the dirt particles, sublimate (i.e. turn into gas) and expand to drive the dirt from the surface of the textiles. The cryogenic temperature of the carbon dioxide (minus 78.5°C) embrittles the dirt, which can then be easily removed. Cleaning with dry ice is a lot kinder to the environment than water. Not only is it gentler to the fabrics, it also eliminates the need for hazardous chemicals. To meet growing demand for dry ice for cleaning applications, we operate the world's largest dry ice plant at Ludwigshafen and a number of smaller sites at other locations. The Ludwigshafen plant has a daily capacity of 150 tonnes.

Photovoltaic and Solar Cell Industry

The solar cell industry is currently experiencing a major growth spurt, with new production facilities springing up across the globe – and particularly in Europe and East Asia. Electronic gases play a key role in photovoltaic cell manufacturing. Our Electronics BA and subsidiaries the Linde Nippon Sanso Group and Eco-Snow™ systems have established themselves as trusted partners and suppliers in this field. Our activities here involve providing innovative solutions to replace harmful gases with climate-neutral ones and enable further expansion of the eco-friendly solar cell industry.

Major new orders from the solar industry

In Europe, the Linde Nippon Sanso Group – a joint venture between Linde and the Taiyo Nippon Sanso Corporation (TNSC) – supplies customers in the semiconductor and solar cell industries primarily from our electronic gases facility in Unterschleißheim, near Munich, which opened in 2006. Since mid-2007, these customers include the Hamburg-based Conergy AG, with its new production plant in Frankfurt (Oder), Germany.

In Austria, Blue Chip Energy GmbH has invested EUR 50 million in constructing the nation's first photovoltaic cell plant. This began producing highly efficient silicon-based solar cells in May 2008. Linde Nippon Sanso is providing all gases and supply equipment and delivering a total gas management service here. At full capacity, the plant is geared to supply 800,000 square metres of solar cells annually – enough to provide power to 16,000 households.

Reducing emissions

Gases play a versatile role in a wide range of process steps in the manufacture of semiconductors (see glossary) and solar cells. Electronic gases are used for etching, doping (see glossary), layer removal and cleaning process chambers, for instance.

However, this increasing consumption of electronic gases also has its downside – the conventional cleaning gases SF_6 and NF_3 are harmful to the climate. An NF_3 molecule has a global warming potential around 11,000 times greater than that of a carbon dioxide molecule and an SF_6 molecule 22,000 times greater.

Linde is rising to this challenge by developing solutions to prevent these gases being released into the atmosphere – either by recycling or through alternative applications using more eco-friendly gases. We have devised a process, for example, to recycle around half the unused SF_6 from the epitaxy chamber, feeding it back to the production process following purification. This closed-loop technology recaptures 100 percent of the residual gas for cost-

Nitrogen trifluoride (NF_3)

NF_3 is a colourless, toxic, non-flammable gas, transported in high-pressure cylinders. One molecule of this greenhouse gas has a global warming potential 11,000 times greater than that of a carbon dioxide molecule. However, the Kyoto Protocol makes no reference to it, because it was only produced in negligible quantities when the Protocol was adopted in 1997. Even now, the concentration of NF_3 in the atmosphere is not subject to continuous measurement and monitoring. However, according to estimates, approximately 4,000 tonnes of NF_3 will escape into the atmosphere this year – and that is set to double in 2009.

Turning sunlight into electricity – solar cell production at Conergy AG in Frankfurt (Oder), Germany.

effective reuse. Two of these SF_6 recycling systems are already in operation in German solar cell plants.

Eco-friendly alternative: on-site fluorine generator

Another option is to eliminate the use of greenhouse gases in cleaning entirely, instead generating fluorine F_2 – the active cleaning agent – directly where it is required. In contrast to NF_3, pure F_2 does not contribute to global warming.

Tests in Linde's development laboratory in San Marcos, California, have shown that pure F_2 significantly speeds up cleaning, as well as improving the results. So it increases productivity and cuts NF_3 consumption. It is also possible to switch from NF_3 to a fluorine generator without major modifications to existing distribution systems.

Linde had already developed the enabling technologies by the end of the 1990s and has been gathering experience with on-site fluorine generators for semiconductor customers since 2003. From there it was just a short step to implementing this process in solar-cell production, and over 20 customers across the semiconductor, solar-cell and LCD industries are now using our fluorine generators.

Eco-Snow™-CO_2 system cleans up MEMS sensors

Environmental sustainability and cost-efficiency also take centre stage in a research project conducted by our subsidiary Eco-Snow™ systems in collaboration with the Belgian research centre IMEC. Its purpose is to assess the effectiveness of cleaning electronic components with carbon dioxide 'snow' in conjunction with solvent-based, non-oxidising chemicals. The aim is to establish a reliable and cost-effective method of removing photoresist after it has been implanted with high doses of ions (see glossary), without damaging exposed, nanoscale semiconductor structures on the wafers. This is therefore a key technology with the power to enhance the manufacture of silicon-based electronic components.

Cleaning is an important process step to minimise the number of defective components due to foreign particles. The Eco-Snow™ system provides a reliable means of removing these particles without damage to the components themselves. In comparison with traditional wet cleaning, this Linde-engineered process is cost-effective and reduces environmental impact, as CO_2 has lower global warming potential than the solvents previously used.

On-site F2 generator wins awards

In summer 2007, the trade journal EUROAsia Semiconductor recognised Linde's on-site F2 generator with its Materials – Improvement Award 2007. And in 2008, Linde's F2 team was proud to receive an innovation prize from the prestigious Institute of Engineering and Technology (IET).

Chemical-free cleaning – carbon dioxide is tough on dirt.

Mites and mould don't stand a chance at Fred Butler® cleaning facilities.

Two major MEMS (microelectromechanical systems) manufacturers have already installed Linde's Eco-Snow™ system for component cleaning. MEMS components are used in a wide variety of applications, ranging from ink-jet printer heads to airbags.

Fred Butler®

Clean clothes, clean environment

Until a few years ago it was a classic dilemma – if you wanted your clothes cleaned thoroughly, chemical cleaning was the only option. But this also left a stain on your conscience, as the agents used had a damaging impact on the environment.

Rather than just putting up with this, researchers at the Linde Group company Cleaning Enterprises GmbH set about building on the basic properties of carbon-dioxide (CO_2) cleaning. In 2006, they launched the resulting method under the Fred Butler® brand name. Linde had procured the license for this technology in 2000 as part of the acquisition of the Swedish gas company, AGA, which had already trialled the procedure successfully in Scandinavia.

The innovative Fred Butler® technology uses liquefied CO_2 in a closed cycle to clean textiles with minimal impact on the environment, skin and fibres. The CO_2 feedstock occurs as a by-product of industrial production processes and simply has to be preprocessed. 98 percent of the carbon dioxide can be reused after purification and our new technology even allows the use of exclusively biodegradable washing agents.

Fred Butler® has been awarded the most important European environmental certificates for this innovative procedure, including the Scandinavian "Nordic Swan" label. In 2007, Fred Butler® was the only German cleaning concept to receive "Blue Angel" approval. And in December of that year, the company became a member of Germany's Environmental Pact of Bavaria (Umweltpakt Bayern) thanks to its Erlangen and Nuremberg locations in that state.

> The innovative Fred Butler® method has been awarded Europe's most important environmental certificates.

This pioneering cleaning process is also sustainable in a wider sense, making an active contribution to health protection. Our special deep-cleaning method, in which we combine our CO_2 procedure with mild wet-cleaning, provides a reliable means of eradicating mould spores, bedbugs and their eggs. This is proven to reduce the risk of allergic reactions. Thorough cleaning of bedding and home textiles is often neglected but its importance becomes clear on considering that, according to the World Health Organization (WHO), one fifth of the world's population suffers from allergies and one in ten Western European children from asthma. In Germany, every fourth citizen displays symptoms of allergies, with bedbugs the most frequent cause. The incidence of these illnesses has been increasing steadily over the past 20 years.

Healthcare – Researching for Better Patient Care

You can't see, taste or touch them, but you can certainly feel their effects – medical gases relieve pain, accelerate the healing process and even save lives. Indeed, certain innovations in medical technology would not be possible without them. Gases have been used for medical purposes for almost 200 years now, with applications ranging from anaesthesia through surgery to out-of-hospital ventilation for patients suffering from lung diseases. Providing doctors with an invisible helping hand, they improve the quality of patients' lives.

GEMI Fund

Gas-Enabled Medical Innovations

Promoting research and development is particularly important in our Healthcare GBU – after all, tapping new markets in this pioneering segment depends on ongoing innovation and continuous enhancement of existing products and services. Our activities here harmonise business goals and our social commitment to help patients and serve as a trusted partner in important aspects of preventative healthcare and medical research. For many years now, we have particularly supported research focusing on medical applications of gases and development of equipment to treat chronic respiratory conditions.

The foundation of our Gas-Enabled Medical Innovations (GEMI) Fund in 2003 marked an important milestone in this area. In partnership with Harvard Medical International, a non-profit subsidiary of Harvard Medical School, and the Swedish Karolinska Institute, one of Europe's leading medical universities, we provide USD 1 million every two years to fund innovative research. The grant is divided between five to ten projects, researching medical applications of gases such as oxygen, xenon, nitric oxide, carbon monoxide and carbon dioxide in the prevention, diagnosis and treatment of diseases.

By supporting these research projects, we are helping to increase the use of gases in medicine. This benefits both patients, who receive faster, better care, and wider society, as new and improved treatments accelerate healing and therefore save health costs in the long term.

Thanks to intensive research in these areas, aided by the GEMI Fund, medical applications of gases are now more varied than ever before.

Treating malaria with nitric oxide and carbon monoxide

It is just a tiny sting, but for an estimated 1.5 to 2.7 million people around the world each year, the results prove fatal. Every year, between 300 and 500 million people fall ill with malaria for the first time. Around half of these are children under five, and 90 percent of the victims are located in Africa. Malaria is transmitted by the female anopheles mosquito. Numerous scientists are battling against the devastating consequences of this infection, exacerbated by the fact that patients in poor regions cannot afford the relatively expensive conventional treatment. However, Portuguese medical professors Maria Mota and Miguel Soares are now developing a new method. Supported by the GEMI Fund, they are examining the role of nitric oxide and carbon monoxide in fighting this dreaded disease.

> We support research investigating effective therapies for stroke patients.

Healing With Oxygen

Oxygen therapy for stroke patients

Is rapid treatment with oxygen really helpful for stroke patients? A neurologist at the Heidelberg University Hospital, one of the world's leading stroke centres, is working on an answer to this question – supported by the GEMI Fund.

200,000 people in Germany suffer a stroke each year, but research in this area is relatively underfunded in comparison with heart disease or cancer, for instance. This is one of the reasons why treatment for acute strokes is still severely limited. However, research into a new

Mobile oxygen solutions improve quality of life for patients suffering from respiratory conditions.

therapy has been underway in Heidelberg for the past few years, aiming to demonstrate the potential of oxygen to protect the brain. Sufficient evidence of the effectiveness of this oxygen therapy has now been gathered to start clinical trials. These will be carried out over the next two years, sponsored in part by the GEMI fund.

Treating chronic wounds with oxygen

Linde has developed a method of treating chronic wounds with pressurised oxygen. According to estimates, up to 2 percent of the world's population suffers from chronic lower-leg wounds, which remain unhealed for years and cause pain and unpleasant odours. Many patients therefore avoid social contact, often leading to depression. The new therapy involves placing the affected foot and lower leg in an encapsulating chamber, into which oxygen is intermittently pumped at a pressure between 0 and 50 mbar for an hour.

Argentina is the first country in the world to authorise Linde to market this treatment. At the same time, we are also conducting studies in Chile and Columbia. The first results from Chile are certainly promising – all wounds treated with this method so far have either reduced in size or healed completely.

High-flow oxygen treatment can bring about significant pain relief within 15 minutes following the onset of an attack.

International meeting of cluster-headache experts

Cluster headache is another condition where oxygen can be of use. Also known as "suicide headaches" due to the severity of the pain, cluster headaches occur as attacks that last 15 to 180 minutes if untreated. Men between 20 and 50 years of age are particularly susceptible. Recent tests show that many patients experience significant pain relief within 15 minutes of the onset of an attack when treated with high-flow oxygen (see glossary).

The Linde Group is committed to taking a lead role in the ongoing research and treatment of this condition, harnessing our wide-

The Lasik method

The Lasik method uses a cold-light laser such as the excimer laser. The term "excimer" is short for "excited dimer" – excited two-atom molecules – and refers to a gas-discharge laser. Electrodes conducting high-energy pulses excite the gas mixture, which consists of an inert noble gas and a highly reactive halide. This ionises the atoms and results in an energised state. The gas mixture discharges in a similar way to gases in a fluorescent tube. Energy is released as light, and the gas particles then revert to their original state.

Supporting the "Healthy China" programme

The Ministry of Health of the People's Republic of China recently launched a new and ambitious project: Healthy China. Its aim is to provide all Chinese citizens with access to public healthcare by 2020, while also improving the quality of treatment available. Medical gases from Linde play an important role here, used in China's hospitals for anaesthetics, for example. And our experts are in demand in establishing the infrastructure, from training for doctors through to service delivery. The Linde brand enjoys a strong reputation in China, where it is synonymous with high quality and safety standards.

ranging expertise in oxygen therapy. We offer training for doctors on the safe application of oxygen, for instance, and have already launched our own cluster-headache website in Austria (www.cluster-kopfschmerz.at). This site provides useful information, including the addresses of doctors specialising in the diagnosis and treatment of this condition.

Specialty Gases in Medicine

Laser surgery applications

It is now possible to correct even severe sight problems with the help of lasers. Each year, all over the world, more and more people are discarding their glasses and contact lenses in favour of laser surgery. To perform these high-tech operations, ophthalmologists in practices and hospitals require particularly pure specialty gases. That is why Linde researches and produces gas mixtures that are specially tailored to laser treatment.

The Lasik method allows precision work at ranges far below a thousandth of a millimetre. This enables laser specialists to tailor the correction of refractive errors responsible for visual impairment (ametropia) to the individual patient. The surgeon uses a microkeratome – a tiny, mechanical precision scalpel – to create a thin flap of around 0.15-millimetre thickness in the top corneal layer, folding it to the side like the cover of a book. A laser is then used to ablate unwanted tissue on the deeper corneal stroma, before repositioning the flap. This adheres naturally, protecting the eye like a plaster. The whole operation only lasts a few minutes, with the laser used for around 40 seconds. Within 24 hours, most patients can already see without glasses or contact lenses – and the procedure leaves no incision pain or scarring.

Home-Based Ventilation

Improved quality of life for patients

Respiratory failure has many causes, including damage to the brain stem following an accident and weakening of the respiratory muscles due to illness. Such cases necessitate artificial, mechanical ventilation or respiratory support. Here, medical equipment takes over the functions usually performed by the organs, pumping air into the lungs.

Modern ventilation equipment places fewer restrictions on patients than ever before.

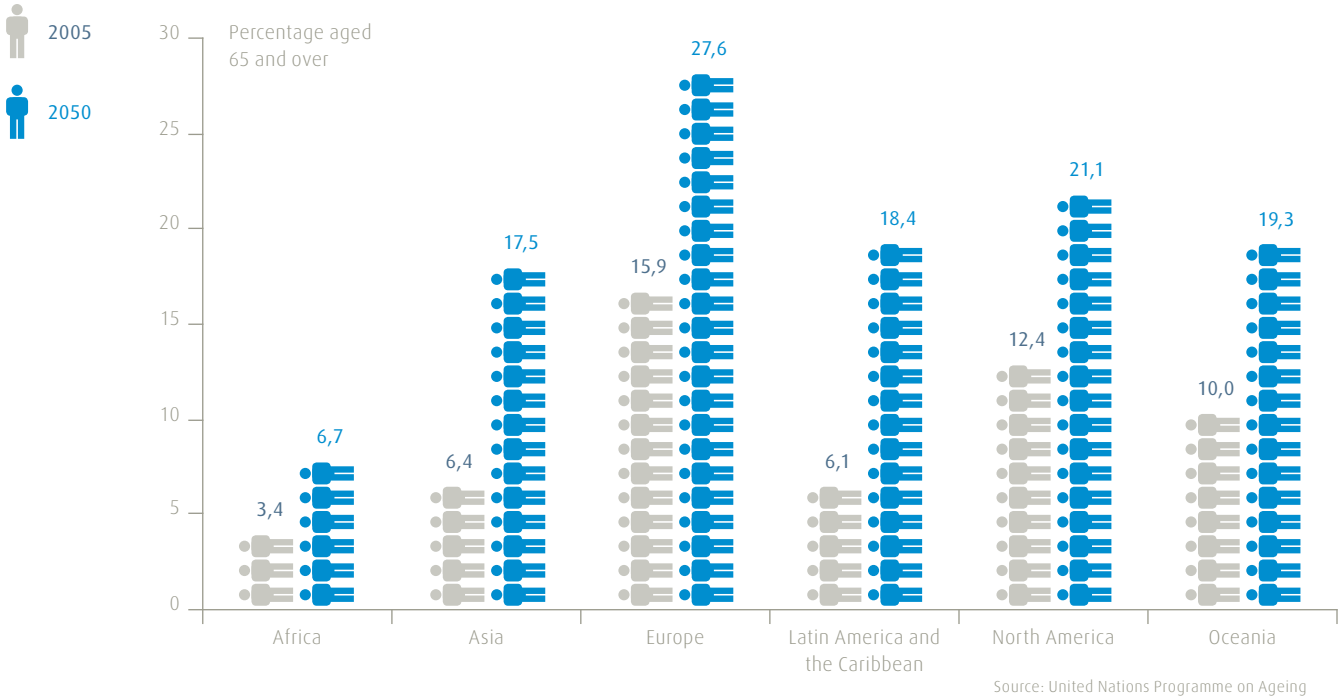
This type of therapy dates back to the well-known "iron lung" of the 1950s. Today's solutions pose far fewer restrictions on the patient and offer various types of ventilation, depending on the level of support required. Home or out-of-hospital ventilation refers to the long-term treatment of patients with respiratory insufficiency in their own houses or at nursing or care homes. The respiratory care centre and on-call technicians offer a 24-hour service here, ensuring uninterrupted patient care.

For many patients, these new technologies and services have had a major, positive impact on their daily lives. Out-of-hospital ventilation not only cuts costs, but also enables patients to maintain a high degree of mobility and good quality of life despite serious respiratory problems.

Treating bronchiolitis with helium

The Linde Group is collaborating with a medical team at the prestigious Imperial College, London, on a three-year clinical trial to investigate heliox – a mixture of helium and oxygen gas – as a treatment for the viral lung disease bronchiolitis. This illness affects the bronchioles (smaller airways branching off the bronchial tubes) and is particularly painful for babies, even proving fatal in isolated cases. Heliox is already used successfully in adults and older children, but there had not previously been any research into its suitability for infants under two years. The current trials started in three London hospitals and were then continued in Australia over the last year. Many doctors are convinced that heliox ventilation could benefit thousands of babies, as it alleviates coughing and breathing

The 65+ age group is growing worldwide



Source: United Nations Programme on Ageing

Increase of age-related illness

The world's population may be ageing at different rates, but the overall global trend is unmistakable. The percentage of over 65s is set to rise considerably by 2050. This development is most striking in Europe and North America. However, a long life does not always equate with a healthy life in retirement. Our research focuses on enabling people with respiratory conditions to maintain a dignified, independent way of life. It also minimises healthcare costs by eliminating the need for expensive hospital-based treatment.

difficulties associated with bronchiolitis and significantly reduces the duration of the illness. To provide scientific support for these assumptions, we contributed GBP 2 million as well as providing the gases for the clinical tests.

Paediatric pain relief

LIVOPAN™, another gas from our therapeutics portfolio, has already proven its worth in the treatment of children. This analgesic is widely used for both outpatient and inpatient care. The gas mixture consists of nitrous oxide or laughing gas (N_2O) and oxygen (O_2) in equal parts. Its analgesic and sedative qualities make it ideal for use in infant medicine, for instance for injections or lumbar punctures, outpatient surgery or suturing wounds. Information collected from children, parents and medical staff confirms the positive impact of LIVOPAN™. In one study, 90 percent of parents and nurses surveyed reported positive effects from treatment with nitrous oxide and oxygen. Other analyses showed that 95 percent of children did not notice receiving an injection after treatment with LIVOPAN™ and that its analgesic effect leads to improved acceptance of subsequent treatment stages.

Inspire Award – clinical tests on Mount Everest

We established the Inspire Award in 2005 to promote empirical research into clinical applications of gases.

Last year, we used it to support a remarkable project – Caudwell Xtreme Everest. This entailed a team of doctors climbing Mount Everest, the highest mountain in the world. Led by the doctor and mountaineer Mike Grocott from the Centre for Aviation, Space and Extreme Environment Medicine (CASE) at University College London (UCL), 23 scientists and 200 volunteer test subjects climbed to the base camp at 5,300 metres. Their mission was to research the impact of lack of oxygen on the heart, cognitive abilities and muscular system.

Our gases are also used for anaesthetics.

Thanks to numerous tests and blood samples taken at extreme altitude and low oxygen levels, the project provided new insights into the optimum treatment of patients suffering severe oxygen deficiency or chronic respiratory diseases. This has enabled development of new treatment methods and ventilation equipment. The expedition also increased medical understanding of how the human body adapts to low oxygen supplies and why people react differently to oxygen deficiency.

23 scientists and 200 test volunteers made their way to Everest base camp at 5,300 metres, with the aim of researching the impact of oxygen deficiency on the heart, cognitive abilities and muscular system.

These findings and resulting improvements to treatment methods will ultimately be of particular benefit to patients suffering acute respiratory distress syndrome (ARDS) – progressive lung failure – and cystic fibrosis, as well as to "blue babies", who suffer from oxygen deprivation at birth.

To attain important basic data, 40 Linde Group employees at our Guildford location in Surrey, South England, volunteered to participate in several cardiovascular and blood tests prior to the expedition. Our Healthcare GBU supported Caudwell Xtreme Everest with financial aid totalling GBP 300,000, as well as providing calibration gases (see glossary) and medical oxygen for the project.

www.linde.com/cr

Effect of oxygen in the treatment of strokes

Sense of Responsibility Extending from Procurement to Disposal

At Linde, we make sure that all processes relating to the manufacture, transport and use of our gases run smoothly. For us, this means managing all safety, health, environment and quality (SHEQ) issues in a way that reflects the interests of all our stakeholders, particularly those of our employees and customers. Our central SHEQ department controls all activities in this area across the entire Group to ensure that we achieve this goal.

Product Stewardship

End-to-end view

Dealing with people and the environment in a responsible manner is not only crucial to maintaining the consistently high quality of our products and services, it also underscores our long-term success. And we expect the same sense of responsibility from our business partners. This is something that starts with the purchase of raw materials and supplies. We only select suppliers that display the same commitment to safety, health, environment and quality as Linde and are able to back this up with hard facts, for instance in the form of a documented quality management concept.

This holistic approach to product responsibility is known as product stewardship and covers a clear set of criteria. It involves identifying and evaluating the possible hazards and risks that may stem from a product throughout all stages of its lifecycle. The risk potential is assessed in relation to employees, neighbours, customers and the environment. The aim is then to avoid these risks or ensure they are kept to a minimum.

Product stewardship plays a key role in our SHEQ concept. In the Gases Division, for example, we regularly perform customer screening. These assessments are designed to minimise risks that may arise when handling gases and chemicals, in particular as a result of improper use. We only deliver products to our customers once they have clearly demonstrated that the gases will be deployed correctly and that all safety precautions can be met. Specially trained Linde technicians perform regular checks at customer sites to ensure that this really is the case. We have drawn up a product list specifying the gases that necessitate customer screening. By the same token, our customers can expect outstanding, round-the-clock service.

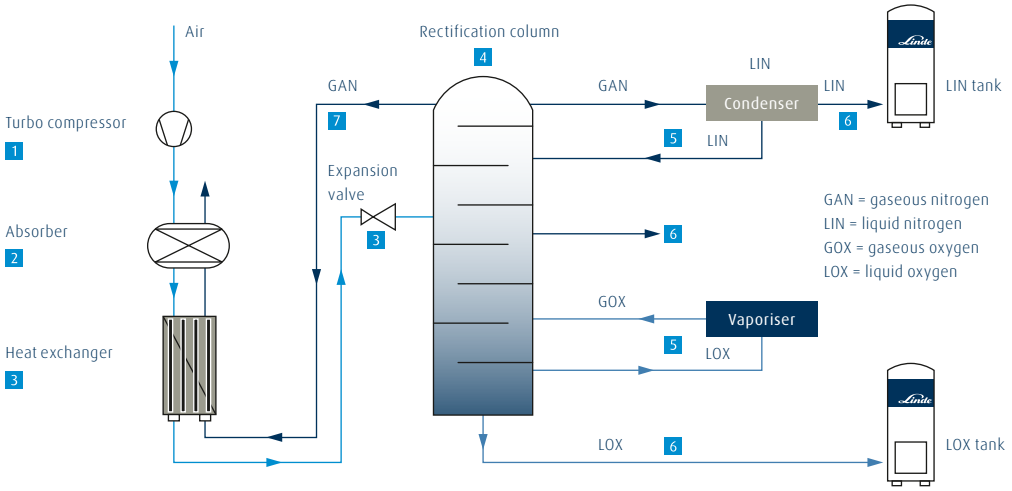
Should any problems with gas cylinders arise outside business hours or at the weekend, our emergency teams are on hand to prevent accidents resulting, for example, from leaks.

Driving efficiency in air separation plants

We are continually working on improving our air separation plants with a view to conserving resources and preventing indirect greenhouse gas emissions. Our top priorities here include cutting energy consumption and making more efficient use of resources without impacting plant capacity levels. We are achieving this through a variety of approaches at our sites across the globe. These measures include improved plant management, deployment of energy-saving turbo compressors (see graphic, above right) as well as reductions in the amount of energy required for producing and recycling coolant. To spur our technicians on to achieve further gains, the most energy-efficient air separation plants are officially recognised by the Group.

To document our success in this area, we regularly evaluate the environmental and climate protection data from our air separation plants and publish it once a year (see page 76).

Air separation at a glance



Source: Linde Gases Division

Yet product stewardship does not stop with safe delivery. Indeed, our responsibility extends beyond use of the gas at the customer site. It involves, for example, disposal of surplus CO_2 when storage facilities and tanks are dismantled or tested. We are the only gases manufacturer with a vehicle specially designed to empty CO_2 from customer tanks and pump it into a standby container. A separate supply vehicle is then used to refill the tanks.

We also encourage customers to return surplus gases, cylinders and valves, or offer our services to help them recycle and reuse gases in an appropriate manner.

New Product Introduction

Launching new products usually involves entering uncharted territory and as such requires particular care and diligence. To compensate for the lack of hands-on experience, we have developed a New Product Introduction (NPI) process. This programme defines the steps that need to be taken before a product is released for sale. It includes an assessment of the entire product lifecycle, performed by operational management. At the same time, SHEQ management checks whether there have previously been critical situations or accidents anywhere in the world involving the product in question.

Resource-Saving Processes

Cutting emissions and energy bills

Conservation of natural resources during production is at the heart of our corporate environment and safety management policy. Our aim is to continuously cut water and energy consumption, at the same time permanently reducing emission and waste levels.

Programmes that have successfully minimised environmental impact are transferred to projects at other sites across the globe in line with our best practice policy.

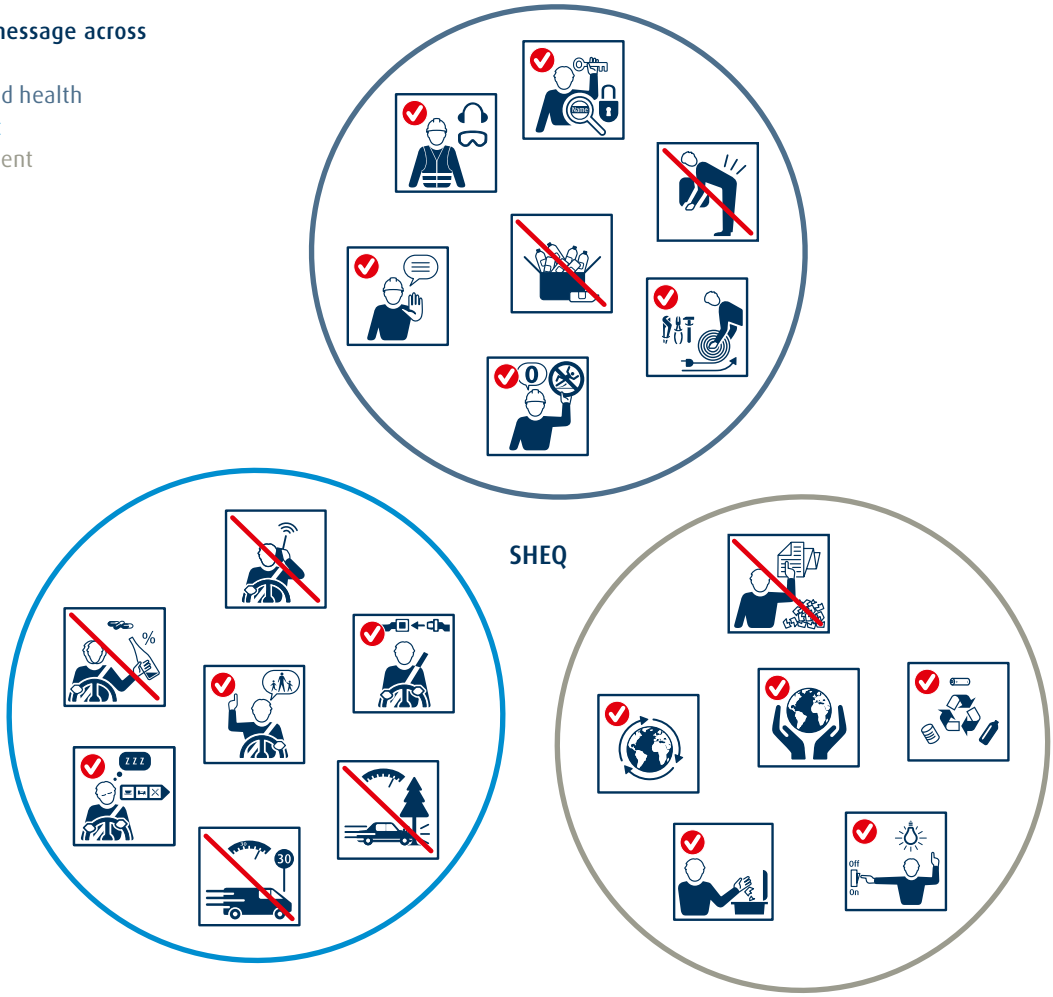
Production safety is just as important as responsible management of natural resources. Here we set a clear – if ambitious – goal: zero accidents. Stringent safety guidelines govern all of our high-risk processes. Since 2002, our Major Hazard Review Programme has helped us prevent accidents that could result in damage to people, property and the environment. Over the years, the programme has evolved dynamically to include real-life examples, which are communicated in the form of safety alerts to all relevant employees. These alerts contain detailed guidelines governing critical workflows such as the disposal of liquid gases in air separation plants. Other examples define protective measures that must be in place when steel gas

Ethylene

Pure ethylene or an air-ethylene mixture (combined with nitrogen or carbon dioxide) is an example of a volatile substance, used as a ripening agent for fruits, vegetables and tobacco. Before such gases are delivered to agricultural customers, we must ascertain that they can safely handle these, in some cases, highly explosive mixtures and have the requisite infrastructure and technical equipment on site.

Getting the message across

- Safety and health
- Transport
- Environment



Clear communication for safety and environmental protection
Our standardised system of icons alerts employees to risks and highlights correct procedures. These symbols have become the universal language for environmental protection and safety – getting the message across without using words. This is particularly important in ensuring safe working conditions on our international construction sites, where people from different nationalities work side by side.

cylinders are used in the same rooms as magnetic resonance imaging (MRI) scanners. The magnetic fields generated here are strong enough to propel the cylinders at great speeds across a room and injure people. Our regular safety training sessions raise employee awareness surrounding these and other sources of danger.

To ensure safety at our plants, the Gases Division has developed specific rules and guidelines for visitors and employees from partner companies. This external stuff are additionally bound by the safety and environmental guidelines in our “Working with Partners” information sheet. This document is a standard element of all contracts we conclude with third-party companies.

In addition to accident prevention, we also protect our employees from other health risks such as damage to hearing. This can occur during gas compression if employees do not wear the compulsory hearing protectors at all times.

Employees who frequently have to deal with heavy gas cylinders risk spinal injuries and other orthopaedic problems if they are not taught how to handle them in a way that minimises impact on joints. Our special training programmes do just this. They also keep staff focused on the importance of health and safety in the workplace.

Protective clothing is a must – Linde staff at our Murray Hill site in New Jersey, USA.

Our "zero-accident" objective is particularly relevant when transporting gases by road.

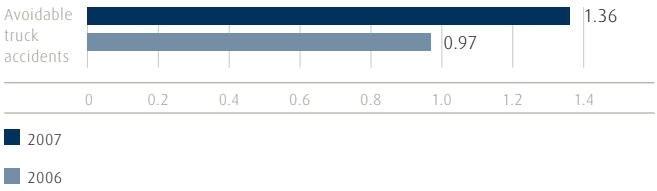
Transport Safety

Getting there safely

Many of our gases are not produced at customer sites but have to be brought in from other locations. Safe, efficient transport is therefore of paramount importance in our business.

One of our top priorities is to harmonise the goals of safety and efficiency. Of course, ensuring that our products reach customers on time and in the best possible condition is our primary concern. But this must not be accomplished at the expense of driver safety, for example, or of the environment through increased emissions.

Safety Transport – Gases Division (per 1 million km travelled)



Over the years, we have implemented numerous measures to improve our SHEQ performance in relation to gas transport. These range from the use of fuel-efficient tyres (where weather conditions permit) to detailed safety guidelines for transporting dangerous substances. In fact, these exceed the legal requirements in many countries. Our drivers, for example, are not allowed to make phone calls while driving, regardless of whether this is permitted in the country in question.

Safety training for drivers is a further key enabler in our zero-accident strategy. In these courses, our employees learn a variety of skills such as eco and defensive driving as well as safe vehicle refuelling. Internal controls ensure that employees attend these training courses and observe the guidelines. Drivers who maintain clean accident records over a long period of time are awarded prizes.

Customer safety

We continue to assume responsibility for the quality and safe handling of our gases even after delivery to end customers. Linde customer service provides extensive support, including emergency assistance at customer sites in critical situations involving cylinder gases. Our customers can rely on our help following fires, for instance, or when gas is escaping from a cylinder and the valve can no longer be closed.

But our primary aim is to prevent accidents ever arising by avoiding dangerous situations when dealing with gases. In order to achieve this, we perform customer site assessments for operators of air separation plants, for example. These enable us to identify and eliminate safety gaps in processes – a must at older plant locations, in particular. We then have the opportunity to remove potential sources of danger before serious accidents occur. A concrete example here is the replacement of carbon steel valves, which can ignite on contact with oxygen in high-pressure environments.

A range of brochures provide end customers with information on the safe transport of our gases. Visitors to our website (www.linde-gas.com) can also obtain information about the colour coding used for cylinder gases (for example, red denotes flammable gases) and find out about any changes to these designations.

At Linde, sustainability extends to health and safety in the workplace (left).

Filling and loading cylinder gas for transport at our site in Singapore (centre and right).

Dangers of oxygen deficiency

Linde is supporting a campaign launched by the European Industrial Gases Association (EIGA) aimed at cutting cases of asphyxiation caused by lack of oxygen in the air. The majority of fatalities each year results from victims entering confined spaces or containers with oxygen-deficient atmospheres that contain inert gases (see glossary) such as nitrogen, argon, helium and carbon dioxide. These gases are colourless and odourless and do not lead to perceptible shortness of breath. In other words, they cannot be detected by the human body.

The average oxygen content of air is 21 percent. A drop in concentration to below 18 percent impairs our subjective ability to assess the danger of a given situation. Less than 10 percent oxygen leads to lasting brain damage, and causes death within just a few minutes. As a representative of all major industrial gas players, EIGA lists the three main causes of death through oxygen deficiency as incorrect implementation or failure to adhere to regulations, insufficient training or supervision, and inadequate or unclear delegation of tasks or responsibilities.

Everyone working with inert gases must be aware of the risks and hazards of oxygen deficiency. Responsible behaviour and observance of safety regulations are key to preventing accidents.

Certified safety with gases

The Association of German Safety Engineers e.V. (VDSI) evaluated the LIPROTECT® safety seminars developed by Linde's Gases Division and awarded them the status of an approved training programme. The VDSI evaluated the seminars using an extensive catalogue of 16 criteria, covering content and organisational issues. Both training modules were judged to meet these criteria. Module 1 relates to the safe transport of gases. It covers topics such as current regulations governing the labelling of vehicles and hazardous goods, transport documentation and secure loading and stowage of cargo. On completion of module 2, participants are awarded a certificate verifying their ability to handle gases safely. This module uses extensive practical experiments to build on participants' background knowledge. It also deals with the operation, inspection and maintenance of gas plants.

Cutting resource consumption for tonnage customers

Our on-site business involves supplying industrial gas customers from facilities installed at their own premises. Here, we inform customers about the savings and cost efficiencies they can achieve through our ECOVAR® systems. Thanks to their standardised, modular design, these systems not only significantly reduce development, manufacturing and installation costs, they are also easier to maintain and considerably decrease consumption of resources – in particular electricity and water. Linde's ECOVAR® systems are far more environmentally sound than traditional supply concepts. Gases produced on site reduce transport costs and consumption levels to a minimum, which is a definite plus for the environment.

REACH

Greater transparency

REACH stands for Registration, Evaluation and Authorisation of Chemicals, and is an EU directive passed in December 2006 to reform European chemicals legislation. It came into force on 1 June 2007 and stipulates that within the EU, the health and environmental impact of chemical substances must be tested and registered when annual production or import volume reaches one tonne. It also applies to substances that are already available on the European market.

REACH aims to assess the risk posed by these chemicals, thus protecting health and the environment. A further objective is to make it faster and easier to assess chemicals.

REACH does not apply to substances that it does not make sense to register or ones that do not infringe on the aims of this legislation. The following pure gases and gas mixtures manufactured by Linde are exempt from REACH: carbon dioxide (CO_2), hydrogen (H_2), nitrogen (N_2), oxygen (O_2), argon (Ar), helium (He), neon (Ne), xenon (Xe) as well as medical gases, food-grade gases, natural and liquid gases.

Implementing REACH

The Linde Group is fully committed to the REACH directive and the pre-registration and registration timeline obligations. REACH regulations are complex and have a significant impact on all manufacturers, importers and downstream users of chemical substances in the European Union (EU).

We intend to comply with the statutory obligations of REACH as a manufacturer, importer and downstream user and have made all necessary preparations for this. However, we cannot assess the complete impact of REACH on our product portfolio until certain key technical details have been clarified by the EU. These include guidelines that are currently still in the preparation phase (REACH Implementation Projects or RIPs).

Safety data sheets (SDS)

REACH has altered various aspects of the content and structure of safety data sheets for our customers. However, no transition period has yet been announced for the provisions concerning these data sheets. Linde intends to proceed in accordance with the recommendations from the European Industrial Gases Association (EIGA) and European Chemical Industry Council (CEFIC). However, not all REACH guidelines had been published at the time this report went to press. We will therefore adapt the data sheets gradually, as announced in our 2007 Corporate Responsibility Report. We do not feel it is necessary to amend existing safety data sheets solely on account of the formal changes prescribed under REACH. So existing sheets that comply with current regulations may still be distributed to new and established customers following 1 June 2007.

www.linde.com/cr

Safety awards

Engineering Division

Pioneering ways to handle CO_2 responsibly.

Engineering Division

From India to China and Italy to Sweden, our Engineering Division bundles and synergises the know-how of numerous Group organisations across the globe. The activities of these affiliates are coordinated from our headquarters in Pullach, near Munich, in Germany.

The reach of Linde's Engineering Division extends to every continent, with around 5,200 employees staffing branch offices and sales and service points across the globe. More than 4,000 plants in 100 countries and over 1,500 process engineering patents bear testament to the exceptional scope of this business area.

Our Engineering Division leads the market for plant production in each of the air separation, olefin, synthesis gas, hydrogen, adsorption and natural gas segments. To secure and build on this position in the long term, the individual organisations within the division maintain a close technical and organisational partnership, extending not only to plant planning, construction and delivery, but also to research and development.

With a headcount of around 2,600, our headquarters in Pullach, near Munich, Germany, houses our largest engineering location worldwide. Here we control and coordinate the operations of our subsidiaries, the largest of which are based in China, India and the US. Our Chinese engineering branches primarily plan and construct air separation plants and coil-wound heat exchangers (see glossary).

Linde-KCA-Dresden GmbH, our largest subsidiary in Germany, is among the world's leading construction companies for chemical, gas, biotechnology and pharmaceutical plants.

SELAS-LINDE GmbH in Pullach focuses on the production and advancement of specific plant components. In close cooperation with its affiliates, Selas Fluid Processing Company in Philadelphia (USA) and Linde Impianti in Rome (Italy), this subsidiary plans and delivers tailored, turnkey coke oven plants to the petrochemical industry, refineries, pharmaceutical manufacturers and gas treatment, steel production and environmental engineering groups.

The individual organisations within the division maintain a close partnership that also extends to research and development.

Further Engineering Division subsidiaries develop and construct helium and hydrogen liquefaction plants and cryogenic refrigerators. The largest manufacturer in this segment worldwide is Linde Kryotechnik, headquartered in Pfungen, Switzerland. Subsidiaries in France, Great Britain and Sweden are also active in this field.

Addressing customer needs

Services offered by our Engineering Division include engineering consultation, project management, planning and monitoring of deadlines, capacities and costs plus customer service. It also delivers training programmes tailored to the needs our customers' plant operators.

A dedicated team of service technicians is also on hand to respond to emergency situations. Based at our headquarters in Pullach, plant operators can contact our experts via a hotline number 24 hours a day, seven days a week.

Clean Technologies – Our Know-How Harnesses Renewable Energies

Our Engineering Division builds plants to process and convert raw materials, also applying its wealth of process know-how to advance the field of renewable energies.

We work closely with a number of partners to further the production, processing, storage and distribution of gas and fuels obtained from biomass. Green hydrogen – in other words hydrogen obtained from renewable energy sources – and heat storage in solar power plants are two further key research areas aimed at making the most of renewable energy sources.

Biogas

Harnessing landfill gas

The development of alternative fuels has long been part of our renewable energy portfolio. Our hydrogen and biogas technology solutions extend along the full supply chain from production to fuelling.

Biogas plants are becoming an increasingly important alternative source of electricity and heat based on renewable sources. Methane (CH_4) and carbon dioxide (CO_2) are the two main gases generated when organic waste decomposes under anaerobic (oxygen-free) conditions, accounting for up 70 and 30 percent respectively. The gas generated when biomass is gasified has a similar composition.

At a chemical level, biogas is identical to this fermentation gas. Its most valuable component with regard to fuel production is methane, as this can be harnessed to generate energy. Methane is twenty-five times more damaging to the earth's atmosphere than carbon dioxide, making landfill sites the world's largest man-made sources of methane – unless the gas is captured before escaping into the atmosphere.

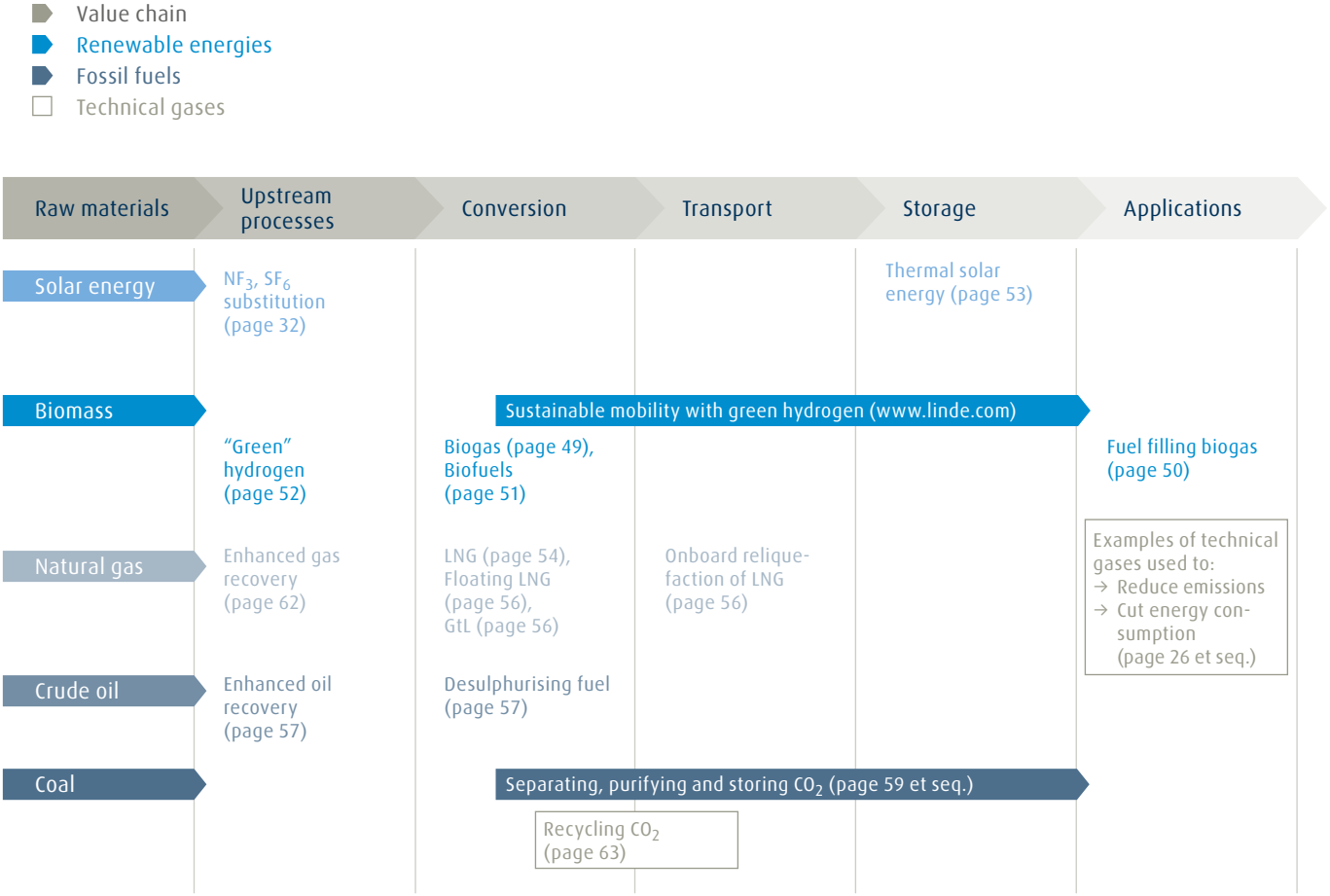
The Linde Group is partnering with US company Waste Management Inc. to build the world's largest facility for converting landfill gas into biogas in Livermore, California.

The Linde Group formed a joint venture with US company Waste Management Inc. to build the world's largest facility for converting landfill gas into ecologically sound biogas. The plant, worth USD 15 million and located in Livermore, California, is scheduled to start production in 2009. The liquefied biogas will be used to fuel 300 of Waste Management Inc.'s refuse collection trucks in California. Linde is responsible for engineering and building the plant, as well as for purifying and subsequently liquefying the landfill gas. Waste Management, North America's leading waste management company, will

Purification and liquefaction of CO_2

Linde-KCA-Dresden GmbH engineers and constructs plants that support every step in our customers' process flows. This extends from separation and preliminary purification of CO_2 from source gas (off-gases from chemical and petrochemical processes or natural gas) through liquefaction and storage to the production of dry ice. The company also delivers additional catalytic treatment processes if high levels of purity are required. Our plants easily fulfil the CO_2 purity requirements of food industry customers.

Global energy megatrend – helping to secure future energy supplies



Full range of process technologies
Our technologies and procedures extend across the entire renewable and non-renewable energy value chains. And we are increasingly focusing our activities here on renewable energies. Our customers in the steel, solar or chemical industries, for example, use industrial gases to drive energy efficiency levels and cut emissions. The page numbers in the graphic refer to specific examples in the individual areas.

be supplying the gas obtained from biological compost. The facility is set to produce up to 50,000 litres of liquefied biogas per day.

In addition to the joint venture with Waste Management Inc., Linde supplies customers and partners around the globe with technologies for processing, purifying, transporting and storing biogas. Our eleven biogas fuelling stations in Stockholm and the surrounding area are just one example of this. We also supply gas to further fuelling stations and provide the requisite pumps for refuelling. The biogas itself is produced at landfill sites nearby.

Eco-fuelling with natural gas and biogas

In September 2008, Linde entered into a partnership with Flowserve Corp., headquartered in Irving, Texas, US. The aim of this cooperation is to market iKompressor™ natural gas and biogas refuelling systems. Both partners are driven by a shared vision to promote alternative fuels and protect the environment. The iKompressor™ systems are based on a new technology developed by Linde that harnesses ionic compressors to compress gas. The joint venture itself – Flowserve Compression Systems GmbH – will be based in Brunn am Gebirge, near Vienna, Austria.

The efficient, low-maintenance iKompressor™ refuelling systems will be marketed in Germany, Austria and neighbouring EU countries – at least 70 such systems are scheduled to be delivered by 2009. In addition to cutting energy costs by up to 20 percent at low inlet pressures, iKompressor™ systems also reduce maintenance costs without impacting reliability levels. This will lead to future cost

Creating biogas – researching how biogas can be obtained from fermenting corn silage at the University of Hohenheim, Germany.

savings for owners of compressed natural and biogas refuelling stations. This partnership bears testament to our wealth of expertise in developing technologies that enable fossil and alternative fuels to be used in an environmentally friendly manner.

Fuel production must not jeopardise food supplies.

Ionic compressors are the key enablers behind the innovative gas compressor technology deployed in iKompressor™ systems. Instead of solid, metal pistons, this approach uses ionic liquids to compress gases at an almost constant (isothermal) temperature. These fluids are organic salts that remain liquid within the specified temperature range. Replacing solid components with liquids reduces wear and tear of parts as well as frictional losses within the compressors. This in turn significantly increases energy efficiency and extends maintenance intervals ten-fold.

The demand for alternative fuels such as natural gas or biogas is set to rise in the coming years in line with the EU's target of meeting around 20 percent of total energy needs with renewable sources by the year 2020. The International Energy Agency (IEA) estimates that up to two million natural gas vehicles will be on the roads in Germany alone by 2020.

Biofuels

No conflict with food production

At the end of 2007, we entered into an exclusive cooperation agreement with Süd-Chemie AG, a world-leading manufacturer of catalyst and adsorbent materials (see glossary), to develop and market plants for the production of second generation (2G) biofuels. Under this agreement, we will be using biotechnology to obtain ethanol from lignocellulosic biomass, in other words, substances such as wheat and maize straw, grasses and wood.

The decision to develop this kind of process using regenerative sources was influenced by environmental and economic factors. On the environmental side, it presented us with an opportunity to

Big market potential for ethanol-based fuels

Ethanol production is on the rise. In 2005, global ethanol production totalled 35 billion litres. By 2007, however, this amount had already increased to 47 billion litres, accounting for an estimated four percent of fuel consumption worldwide. According to management consulting firm McKinsey & Company, the entire global market for biofuels is set to grow to USD 61 billion by 2010. Furthermore, a new US law mandates that around a quarter of the fuel consumed today in the USA must be replaced by biofuels by the year 2022.

develop sustainable, CO_2-neutral liquid fuels. Dwindling crude oil resources and rising oil prices were the main economic drivers.

One of our key concerns at Linde is to ensure that fuel production does not come into conflict with food production, especially in emerging economies. In contrast to first generation biofuel processes, second generation biofuels secure food supplies by exclusively using plant waste from food production. Furthermore, existing infrastructures and technologies can be used to obtain biofuels such as bioethanol. This not only ensures acceptance of this process among the general public, it also eases market introduction. Experts are forecasting a great future for this technology.

The process itself involves thermal-mechanical pretreatment of the biomass, saccharification, fermentation to obtain ethanol, and subsequent purification.

Saccharification and lignocellulosic biomass

In biotechnology, ethanol is obtained through the fermentation of monosaccharides. Since sugar only occurs as polymers in lignocellulosic biomass, these must be converted to monosaccharides using suitable enzymes (biocatalysts) before ethanol fermentation takes place. In the resulting sugar solution, lignin is only present as a solid residue. The lignin can be separated from the monosaccharide solution and used to produce energy or other materials. The sugar solution is then fermented to obtain ethanol.

Lignocellulosic biomass is the generic term for plant biomass comprising a mixture of sugar polymers (cellulose and hemicellulose) and the aromatic polymer lignin. Cellulose is made up of the C6 sugar glucose, while hemicellulose consists of a mix of different C6 and C5 sugars.

Turning straw and wood byproducts into fuel

Industrial-scale gasification of biomass enables regenerative raw materials such as straw, organic waste or wood byproducts to be harnessed as potential sources of fuel. In order to obtain liquid fuel or hydrogen from biomass, these raw materials must first be converted to a synthesis gas. This is done by applying heat and a gasifying medium, oxygen for example, under pressure. The resulting synthesis gas primarily comprises hydrogen (H_2), carbon monoxide (CO) and carbon dioxide (CO_2).

The synthesis gas must then be purified and the right balance of hydrogen and carbon monoxide (2:1 ratio) achieved before it is liquefied. The actual liquefaction process is carried out using the Fischer-Tropsch synthesis (see glossary), a key step in converting biomass to liquid (BtL) fuel. It is here that synthesis takes place, as the hydrogen and carbon monoxide react to become long-chain hydrocarbons. The resulting substance is a high-purity, sulphur-free, odourless, low-emission fuel, which can not only be reproduced with a high degree of precision, but also has an excellent carbon balance.

Partnering with CHOREN for pilot project

In 2008, CHOREN Industries, based in the town of Freiberg in Germany, opened the first commercial plant dedicated to producing biomass to liquid (BtL) fuels.

The facility has capacity to produce 15,000 tonnes of second-generation biofuel per year from around 68,000 tonnes of biomass. Our Engineering Division partnered with the company for this pilot project and assumed responsibility for numerous process steps.

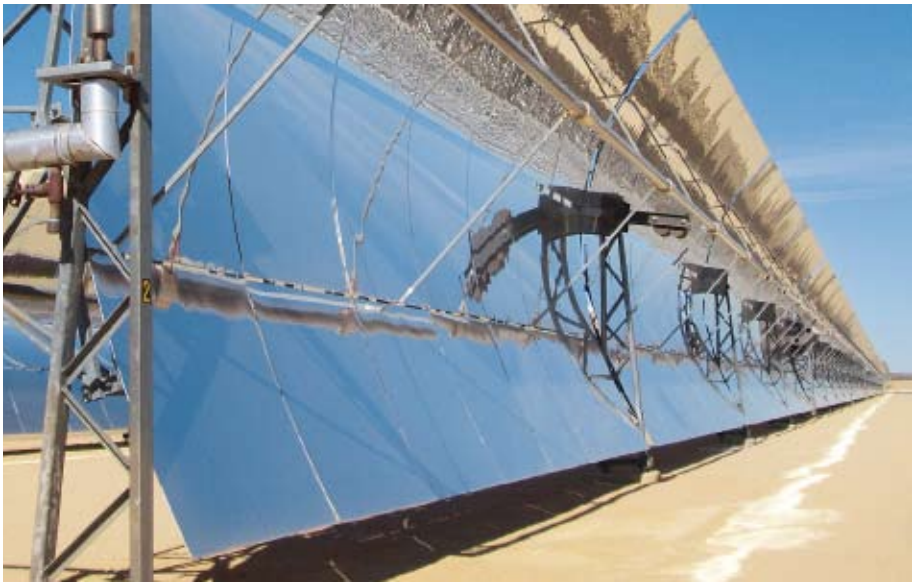
Linde is also one of the cooperation partners involved in CHOREN's industrial-scale plant, currently scheduled for construction in the town of Schwedt in Brandenburg, Germany. From 2012 onwards, this plant will have an annual biofuel production capacity of 200,000 tonnes.

"Green" Hydrogen

Hydrogen is widely regarded as the energy carrier of the future. And once a way can be found to produce hydrogen from regenerative energy sources on a commercial scale, this energy carrier will be in a league of its own. In addition to gasification of biomass, several other promising developments are being made in this area. However, all of these are still in the early stages of development.

Carbon zero balance

When agricultural crops grow, they use sunlight, CO_2 and water to generate lignocellulosic biomass. This process is referred to as photosynthesis. The energy stored in the biomass can be converted to a form that can be used directly in combustion engines. This process – the combustion step included – does not release more CO_2 than that originally stored in the vegetation if no fossil fuels are used to produce the biofuel. In other words, the only energy required is that released by the waster matter. This is referred to CO_2 neutral energy or a carbon zero balance.



Solar panels at a facility in the USA. The parabolic reflectors concentrate the sun's rays, which heat thermal oil in the collector's manifold.

For several years now, Linde has been involved in a research project at the University of Kiel in Germany aimed at producing hydrogen using green algae. Green algae and cyanobacteria need only light, water and carbon dioxide to produce hydrogen. With the help of light-absorbing dies, the algae use sunlight, water and carbon dioxide to generate oxygen and sugar. The sugar is then converted to starch or biomass. If the algae are deprived of oxygen, they use solar energy to create hydrogen instead.

Heat stored by thermal solar power plants during the day is used to generate electricity at night.

This procedure shows great promise and is set to become a key milestone in the journey towards the sustainable production of hydrogen. After all, microorganisms in nature generate approximately 200 million tonnes of hydrogen each year, all of which is immediately consumed by other neighbouring single-cell organisms. Yet if microalgae were used to generate hydrogen on a large scale in controlled environments, the economic benefits could be considerable.

Storing Solar Energy

The 2007 acquisition of Swiss plant construction firm Bertrams Heatec AG has expanded our portfolio to include solar power technologies. Bertrams is a leading specialist in the construction of systems for the safe transport of process heat. These systems are used in many different industries. They also play a major role in thermal solar power plants.

Unlike photovoltaics, thermal solar power plants use mirrors to concentrate sunlight. The resulting heat (hence the term thermal) is used downstream to create steam, which is harnessed to create electricity in generators. Heat storage is a particularly important feature for these kinds of power plant. Effective storage allows the heat captured during the day to be used at night for uninterrupted electricity supply.

Heat-transfer salts are the ideal heat transfer medium here. During the day, they are heated and transferred to insulated tanks. This heat is then used at night to generate electricity – a key technological step towards a non-stop, efficient and renewable flow of energy.

Fossil Fuels

Natural Gas – Growing LNG Market

Global reserves of the fossil fuels coal, crude oil and natural gas will run out over the next few decades. Yet new forms of renewable energy are not mature enough to effectively bridge the resulting deficit if worldwide energy demand increases as expected. So in order to gain time to further advance renewable energy technologies, it is crucial that we also work on improving the recovery, transport and processing of fossil fuels.

We are helping to ensure that natural gas remains an affordable source of energy for decades to come.

Natural gas plays the most important role here as it offers three major benefits. Firstly, it has a higher heating value than coal or crude oil. In other words, more energy can be gained from gas than from the equivalent amount of coal or crude oil. Secondly, natural gas combustion produces fewer pollutants, residues and carbon dioxide emissions. And finally, at current consumption levels, global natural gas reserves are forecast to last for at least 60 years, whereas experts anticipate that oil wells will run dry within the next 40 years.

However, the technologies for processing natural gas need to be improved if this fuel is to supersede crude oil as the number one source of energy. This applies to the entire value chain, from efficient, environmentally sound development of reserves, extraction, purification and liquefaction, to transport of the liquefied natural gas. Our Engineering Division is a trusted partner to many natural gas energy players. Our technologies not only drive efficiency levels, they can also help ensure that natural gas remains an affordable source of energy for decades to come, despite increasing demand from fast-growing economies such as China.

Liquefied natural gas – LNG

Natural gas liquefaction plants are one of our core competencies. We build these LNG (liquefied natural gas) plants in a range of different sizes and for various purposes and applications. Our most important reference project here is Europe's largest LNG plant at Hammerfest, in Norway. Designed and constructed by Linde, this facility commenced operations for the Norwegian energy company StatoilHydro at the end of September 2007. The plant separates CO_2 contained in natural gas and pipelines it back into storage 300 metres below ground. The energy required to produce LNG is generated by highly efficient gas turbines, which significantly reduce emissions levels.

Before raw natural gas, which is composed primarily of methane, can be liquefied, components such as carbon dioxide, nitrogen and water have to be removed. Only then is natural gas cooled to its liquefaction point (–162°C), enabling it to be transported by boat or

Transporting natural gas – pole position for LNG tankers

Transport was key in the elevation of natural gas to the number two energy carrier worldwide. When Godfrey Cabot succeeded in liquefying gas in the USA in 1915, he also presented the world with a new challenge: the safe handling, storage and transport of liquid gas at extremely low temperatures. In fact, it was not until the beginning of the 1960s, following many years of experimentation, that liquefied natural gas was first transported across the Atlantic from Louisiana to London in tanks on board a specially designed ship, the "Methane Princess". Today, a fleet of around 280 LNG carriers is on hand to transport this resource to and from the four corners of the globe. More than 40 percent of all traded natural gases is transported as LNG.

LNG tanker in the North Atlantic.

truck. LNG has over 600 times less volume than its gaseous state. A further advantage of LNG is that, unlike the gaseous state, it is not restricted to pipelines for long-distance transport.

LNG carriers have been brought back into the public eye since Russia's conflict with the Ukraine and other countries in the Commonwealth of Independent States (CIS). During this confrontation, Russia temporarily cut off gas supplies via pipeline, triggering fears of supply bottlenecks in the West.

Loaded with cryogenic liquefied natural gas, tank ships carry their cargo to LNG terminals on land. From here, the liquid gas is shipped by truck to further destinations. Alternatively, the LNG may be converted back to a gaseous state in the LNG terminal and pumped to pipelines for further transport. Our Engineering Division also supports this process step by constructing regasification plants the world over.

Merging natural gas markets

New transport methods are overcoming the previous limitations of gas pipelines and bringing large yet remote natural gas reserves ever closer to industrialised countries and consumer hotspots. What were once regional natural gas markets are increasingly merging into a single global market.

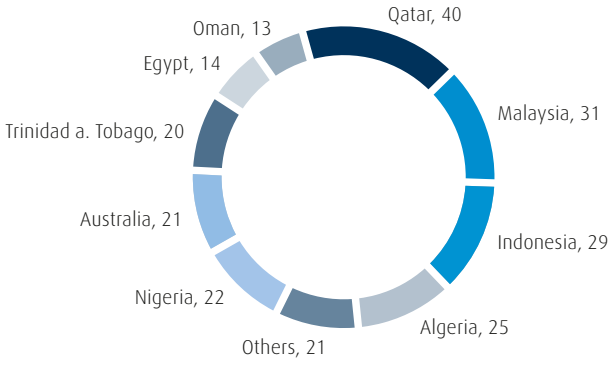
In 2004, the LNG plant we built in Shan Shan, in the Chinese province of Xinjiang, helped usher in the dawn of a new era in energy supply. In conjunction with the requisite transport infrastructure, this facility (the first of its kind in China) opened up the local natural gas market, fuelling dynamic growth. The use of natural gas instead of coal in China's booming coastal provinces is also bringing long-term gains for the environment.

Making the most of "associated gas"

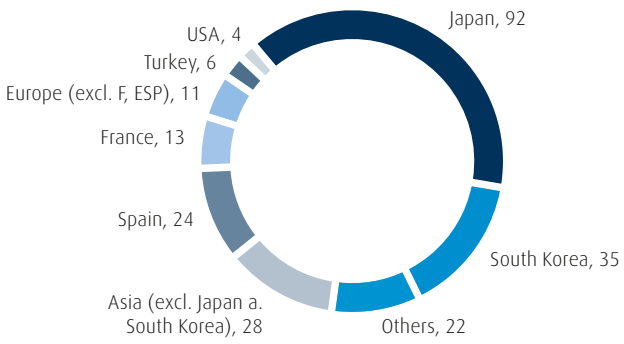
Natural gas is often found in association with crude oil deposits and extracted with the oil. If this "associated gas" cannot be transported, it has to be either pumped back into the deposits or removed by combustion, in a process called flaring. Each year, up to 170 billion cubic meters of natural gas, with a value of around USD 40 billion, goes up in smoke in this way, churning out approximately 400 million

Global LNG market: Producer and consumer countries in billion m³

Producers in 2007 (total: 236 billion m³)



Consumers in 2007 (total: 236 billion m³)



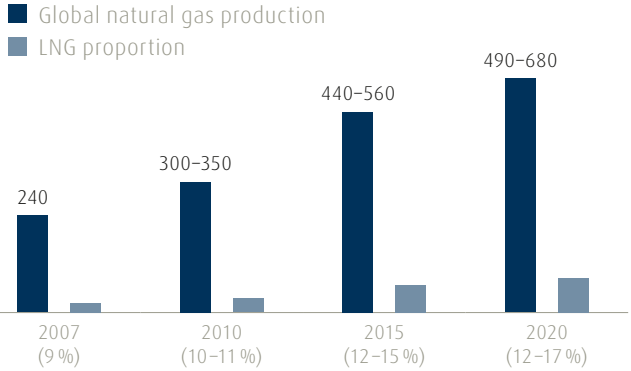
Source: Handelsblatt

Europe's largest LNG plant on the island of Melkøya, Hammerfest, Norway.

tonnes of CO_2 into the atmosphere. This represents about one seventh of the amount of CO_2 industrialised countries aim to save in line with the Kyoto Protocol. Yet despite compelling economic and environmental arguments, there are a number of technical and practical obstacles that need to be overcome before flaring can be significantly reduced and associated gas put to good use.

Most oil fields are located far away from established infrastructures, in places such as the Arabian Desert or Siberia. So, in addition to oil pipelines, gas pipes would also have to be laid across many thousands of kilometres in order to transport the gas to customers. Collecting, liquefying and transporting this gas by sea to customers further afield is one possible solution to this transport dilemma. Oil producing countries and oil companies can apply the "Clean Development Mechanism" (CDM, see glossary) from the Kyoto Protocol here. Under this arrangement, organisations or countries that invest in technical innovations, for example, by constructing an LNG plant, can claim emission reduction credits to the amount of CO_2 their investments have saved. This credit can then be sold on emissions trading exchanges.

Predicted LNG production worldwide in billion m³
(percentage of LNG compared with total amount of natural gas)



Source: Handelsblatt

LNG production far out to sea

Linde has formed a technology alliance with Dutch company SBM Offshore N.V. with a view to tapping off-shore natural gas fields without the need for laying pipelines. The two companies have joined forces to develop floating production, storage and offloading (FPSO) units. In the future, these floating platforms will enable natural gas to be liquefied, stored and loaded onto tank ships in coastal waters or far out at sea.

Linde's Engineering Division aims to have the first floating unit up and running by 2012.

Efficiency counts

Linde delivers a wide range of processes across the entire value chain. Each of these is aimed at raising efficiency levels of individual process steps or reducing emissions. Onboard reliquefaction of LNG on tank ships is a particularly relevant example here. Cryostar, a Linde Group subsidiary and leading outfitter of LNG tankers, was awarded a contract by Samsung Heavy Industries totalling over USD 50 million. As part of this order, Cryostar will supply onboard boil-off gas reliquefaction plants for five LNG tankers currently under construction. With a cargo capacity of 265,000 cubic meters, the modern membrane carriers will be the largest ever built and are destined to transport LNG between Qatar and the USA. Boil-off gas management becomes increasingly important as vessel capacity increases, since it is an effective method for ensuring that the maximum amount of LNG, stored on board at –163°C, reaches its port of destination.

Gas to liquids (GTL)

Natural gas is an extremely versatile substance that can be used for power generation or directly in private households. It can also be converted and used as a fuel. Liquid fuels such as diesel or kerosene that have been produced from natural gas can easily meet the increasingly stringent emissions standards in North America and Europe.

In contrast to conventional fuels, GTL fuels primarily comprise paraffins (see glossary) and are almost completely free of harmful aromatic hydrocarbons, nitrogen oxides and sulphur.

Converting natural gas into liquid fuels is a multi-step procedure known as gas to liquid (GTL). First of all, oxygen is used to convert natural gas to a synthesis gas made up of hydrogen and carbon monoxide. The Fischer-Tropsch process is then applied in a second step to convert this synthesis gas to sulphur-free, liquid hydrocarbons.

Research institutes and companies see great commercial opportunities for GTL fuels. Volkswagen AG anticipates that annual GTL production will reach around 28 million tonnes of crude oil equivalent (see glossary) by 2015, in other words, approximately 205 million barrels. In comparison, around eleven million barrels of conventional diesel fuel are currently produced each day. GTL could be used to substitute part of this production.

Increasing demand for air separation plants required to produce GTL fuels is opening up a new growth market for Linde Engineering.

Crude Oil

Enhanced oil recovery

As an oil field becomes depleted, the flow pressure declines, and after a while, the feed rate starts to slow down. It is an inevitable consequence that reminds us how finite the earth's crude oil reserves are. However, it is possible to exert some influence over this process using enhanced oil recovery (EOR). This method involves injecting gas or water to heat the oil, or using chemicals to reduce surface tension. This delays or reduces the drop in feed rates.

Depending on the field, traditional procedures only allow extraction of around 15 to 20 percent of the oil reserve, with the majority remaining in the ground. EOR encompasses a range of techniques that increase the recovery rate during a second and sometimes even third production phase. The most common, known as water flooding, entails pumping water into the reservoir. The increased pressure displaces significantly more oil for extraction from the well, allowing recovery of around 20 to 40 percent of the reservoir total. However, this method also increases production costs, also due to the effort involved in sourcing and disposing of the water.

Carbon dioxide (CO_2) or nitrogen (N_2) flooding works along the same lines but is even more efficient. Here, water and CO_2 or N_2 are pumped into the reservoir alternately. This yields significantly better results than water alone, allowing recovery of at least another 10 to 15 percent of the oil reserve. A further benefit is that the gas, injected under high pressure, is easy to separate from the produced oil and can then be pumped back into the system.

Linde supports this procedure by constructing air separation plants to generate the necessary quantities of nitrogen. An outstanding example of our activities in this field is the world's largest air separation plant, which we constructed in the Gulf of Mexico. We launched operations there in 2000, going on to expand it in 2006. Our customer is the state-owned Petroleos Mexicanos Coportivo (Pemex) oil company, which has been drilling the Cantarell oil field since 1976. This is located in a giant crater below the seabed in the Bay of Campeche.

Desulphurising fuel with hydrogen

Linde's expertise is also helping to increase the efficiency and reduce the environmental impact of crude oil processing. Alongside its role as an alternative energy carrier, hydrogen (H_2) is also used to purify and desulphurise crude oil. This application is growing in importance as government authorities tighten environmental regulations covering emissions. Refineries generally rely on on-site facilities to supply the H_2 they need to desulphurise their petrol and diesel. Customers such as these benefit from the synergised, single-

Linde helps secure oil flow at Cantarell

Cantarell, one of the world's largest offshore oil fields, is also Mexico's most significant source of crude oil, accounting for around a third of that nation's total output. Large amounts of nitrogen must be pumped into the reservoirs to increase pressure and maintain the oil flow. However, daily production might drop to 500,000 barrels in 2008, and experts anticipate that the reserves will be completely exhausted within a few years. The Linde-designed air separation plant helps postpone this point for as long as possible, closing the energy gap that looms if fossil fuels run out before we can secure an adequate supply from renewable sources.

source offering of The Linde Group, spanning both engineering and operation of on-site plants.
A good example of this is the major hydrogen contract our Gases Division placed with our US subsidiary Linde Process Plants (LPP) in fiscal 2007. This entails building a second hydrogen plant at our Lemont site in Illinois and then supplying the neighbouring refinery, run by CITGO Petroleum Corporation, with around 1.3 million standard cubic metres (scm) of H_2 per day. CITGO will use the hydrogen to treat high-sulphur (or sour) crude oil from Canadian oil sands.

Linde's expertise is also helping to increase the efficiency and reduce the environmental impact of crude oil processing.

We have also constructed hydrogen plants in Salt Lake City, Utah, and in Mobile, Alabama, both of which went on stream in 2007. With a capacity of 700,000 scm a day, the steam methane reformer (SMR) in Salt Lake City provides several refineries with pure hydrogen, including Chevron and Holly refineries. The Mobile plant has a capacity of around 300,000 scm a day and supplies H_2 to the local Shell refinery.

Our Engineering Division also gained two further contracts for hydrogen plant construction in the period under review. One of these came from Markwest Hydrogen Inc. in the US, and the other from our Taiwanese customer CPDC in Kaohsiung.

Oil sands – a century's worth of black gold?

Around 60 percent of the world's economically viable oil sand reserves lie at the heart of Canada, in the province of Alberta. But here, the valuable resource does not flow from a well as smoothly as in the Middle East. Oil sand, technically known as bituminous sand, is a sticky mass that looks and smells like melted tar.

This mixture of sand, water and bitumen, a type of heavy oil, is a source of high hope for energy companies – the synthetic crude oil obtained from it would meet current global oil demand for another 100 years, or even 150 according to more optimistic experts.

The aim now is to expand oil extraction from sands, using both surface mining and in-situ methods. In contrast to surface mining, which uses bucket-wheel excavators and large trucks to transport the oil sand elsewhere, in-situ extraction is performed on the sands in their underground layers. Heating increases the flow rate of the bitumen, which is then pumped from depths of 800 to 1,200 metres. Refining two tonnes of oil sand produces one barrel of crude oil.

Today, oil sands in Alberta already supply around one million barrels of oil daily. By 2015, this is set to increase to 2.8 million barrels. And the deposits are extensive, with estimates exceeding 170 billion barrels of crude oil – making Canada home to the second largest oil reserves in the world.

For as long as oil was cheap, refining companies showed little interest in oil sands, as recovery effort and costs were high. The more oil sands are refined, the more hydrogen is required to produce light synthetic oil from the bitumen. Linde is now experiencing strong demand as a partner for the design, construction and operation of hydrogen and synthesis gas plants for this purpose.

Air separation plants in Abu Dhabi

We are also participating in projects on the Arabian Peninsula to improve the efficiency of fossil fuel recovery – in this case, natural gas. To this end, we established a joint venture, Elixier, with Abu Dhabi National Oil Corporation (ADNOC) in 2008. In the first phase of this venture, Elixier will construct two large air separation plants in Abu Dhabi (United Arab Emirates), at a total investment of around USD 800 million. The new plants will be connected to the local supply and pipeline network from the end of 2010 and provide nitrogen for natural gas extraction. The nitrogen is used for injecting condensates at the on-shore field in Habshan (Abu Dhabi). Together, the two plants will have a capacity of 670,000 scm of nitrogen per hour, enabling more productive gas extraction from the deposits. So expertise from Linde is also helping to increase the efficiency of fuel production in the Persian Gulf.

Coal

At the end of 1998, with oil prices below USD 10 a barrel, searching for alternatives to traditional fuels did not seem an urgent task. Ten years on and the other side of the hundred-dollar barrier, all that has changed. Alongside renewable energy sources, coal has also re-entered the picture as a promising alternative to oil and gas. Liquefaction using coal-to-liquids (CTL) technology enables coal to be used as a direct alternative to crude oil, even as fuel. And thanks to greater reserves and the number of years it is estimated to last, coal would seem to have a clear edge on gas-based fuels, too.

High oil prices make coal an attractive alternative

What today sounds like a ground-breaking technology, actually has long-established roots. In fact, direct coal liquefaction was first performed at the start of the last century. In 1925, Franz Fischer and Hans Tropsch pioneered a new method, which still bears their names today – the Fischer-Tropsch synthesis. This allows direct and indirect coal liquefaction. All three underlying processes – coal hydration, coal extraction and gasoline synthesis – were developed in Germany.

High crude oil and natural gas prices also mean coal is becoming increasingly important as a raw material in synthesis gas production based on coal gasification, both as an energy source and as feedstock. Against this background, the Linde Group is constructing a gas purification pilot plant in China for Shell. These plants are an important building block for future CTL (coal to liquid) fuel projects.

Coal was first directly liquefied at the start of the last century.

As part of a joint venture with our Chinese partner, Shanghai Coking & Chemical Corporation, we have concluded a long-term agreement to supply Bayer Polyurethane Shanghai Ltd. Co. with hydrogen and carbon monoxide. The feedstock for the production process is a synthesis gas generated by Shanghai Coking & Chemical Corporation, using environmentally friendly coal gasification.

This agreement spans 15 years and includes construction of a hydrogen plant on Bayer's premises in the Shanghai Chemical Industry Park in Caojing. Bayer Polyurethane Shanghai, the Linde Group and Shanghai Coking will also be collaborating on a future capacity expansion at the same location.

Carbon Capture and Storage

How can we capture the carbon dioxide (CO_2) released when we generate energy – and particularly coal-powered electricity – to prevent this harmful gas ever entering the atmosphere? And, once separated, where should we store and ultimately dispose of it? To answer these questions, Linde is working closely with energy providers to develop technical solutions for greener electricity and fuels. We are collaborating on three key methods to enable zero-emissions energy by separating carbon dioxide in coal-fired power plants.

Pilot plant for post-combustion capture

Post-combustion capture uses chemicals to separate the carbon dioxide in conventional coal-fired power plants following desulphurisation of the flue gas. It is the only method suitable for retrofitting existing power plants and therefore particularly valuable. Widespread implementation of new power plants with integrated CO_2 separation will take several more decades due to lengthy investment cycles – 40 years being the norm.

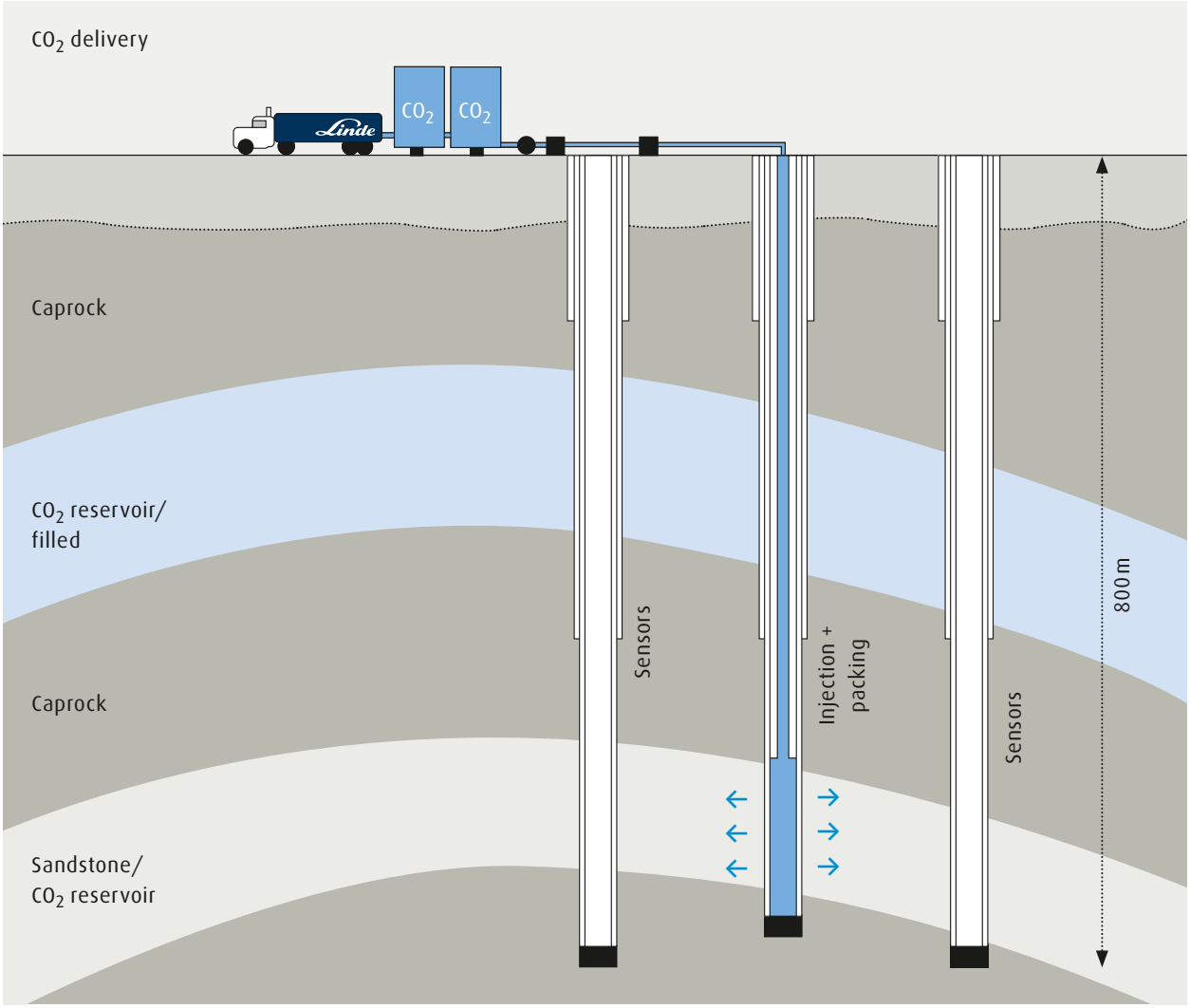
In 2009, Linde will be launching operations at a pilot facility for this process, known as CO_2 scrubbing, in collaboration with BASF and RWE. The facility will be located at the lignite power plant in Niederaußem (North Rhine-Westphalia, Germany) and will trial new scrubbing liquids aimed at substantially improving the separation process.

With a net efficiency of over 43 percent, the 1,000-megawatt lignite-fired BoA 1 unit in Niederaußem that will house the pilot facility is the most efficient in the world. The test programme for the new CO_2 scrubbing agents from BASF will run here until early 2010. On successful completion of the pilot phase, construction of an industrial-scale plant is planned. The objective is to make CO_2 capture technology commercially available with a view to retrofitting existing modern plants and incorporating it in new ones from 2015.

Key CO_2 figures

Percentage in mineral water	→ 6 g per litre
Percentage in the earth's atmosphere	→ 0.04 percent
Concentration in exhaled air	→ 4 percent
CO_2 emissions from all power plants in Germany	→ approx. 350 million tonnes
Amount of CO_2 used in photosynthesis to produce 1,000 kg of wood	→ 1,851 kg

Source: IZ Klima Tsp/Schilli



CO_2 sequestration
One method of reducing harmful emissions in the atmosphere involves the separation of CO_2 emitted by major power plants and industrial facilities and its long-term storage in geological formations deep under the earth's surface. Also known as carbon dioxide capture and storage (CCS), this technology is still being tested for industrial-scale use. Linde is involved in a number of pilot projects including research work being carried out at Ketzin in Germany.

The German Federal Ministry of Economics and Technology is supporting the pilot facility with around EUR 4 million in funding.

The energy group Vattenfall Europe is also planning to retrofit a block-unit power station with this post-combustion capture technology, making it a CO_2-free lignite-fired pilot plant. Linde's Engineering Division is participating in this project too.

Pre-combustion capture in combined cycle power plants

Pre-combustion capture separates CO_2 in power plants using integrated gasification combined cycle (IGCC) technology. This occurs after coal gasification but prior to combustion of the purified combustion gas, which primarily consists of hydrogen. The key benefits of this process are lower energy consumption and relatively simple CO_2 separation from the combustion gas.

RWE Power is currently developing the world's first CO_2-free coal-fired power plant with CO_2 transport and storage using IGCC technology. The company aims to commission this industrial-scale plant in 2014, engineered for 450-megawatt capacity and 40 percent efficiency. The CO_2 generated will be compressed and transported via pipeline to storage sites, probably in saline aquifers. The plant's location and type of fuel (lignite or pit coal) will be decided in the near future.

CO_2SINK project – underground carbon dioxide storage at Ketzin, Germany (picture by GFZ German Research Centre for Geosciences).

Oxy-fuel process – pilot projects with Linde expertise

In the oxy-fuel process, coal is combusted in an atmosphere consisting of pure oxygen and CO_2. This means the resultant flue gas is not diluted by nitrogen from the air, but primarily consists of CO_2 and water vapour. This vapour is easily condensable, leaving a highly concentrated CO_2 stream. The CO_2 can then be compressed and transferred to storage.

As part of its efforts to promote this method, the energy group Vattenfall has commissioned a 30-megawatt pilot facility on the site of the Schwarze Pumpe lignite power plant in Brandenburg, Germany. Linde is supporting this project by delivering numerous components and contributing its extensive expertise in cryogenic air separation and CO_2 recovery. We have also brought our wide-ranging process and design know-how to bear.

Construction of a 250-megawatt oxy-fuel power station at the Jänschwalde location in Brandenburg is also planned within the next decade, advancing the technology to industrial-scale maturity. Linde will be producing a feasibility study here, focusing in particular on plant efficiency. A final step then entails construction of a 1,000-megawatt commercial plant in 2020, generating power at competitive prices.

Carbon dioxide storage – sequestration

Using the processes described to separate CO_2 is an important step along the route to green energy generation. However, we do not yet have a mature solution for the disposal of this gas. One method currently on trial is sequestration, i.e. CO_2 storage below the ground or seabed. The gas can be stored in crude oil or natural gas reservoirs, saline aquifers or coal seams. This is part of the carbon capture and storage (CCS) process chain, which extends all the way from CO_2 separation to final disposal, making an important contribution to sustainable energy production. However, the CO_2 sequestration step is still in the development stages.

CO_2SINK project

Supported by Linde, the GFZ German Research Centre for Geosciences, Potsdam, Ketzin, in the German state of Brandenburg, is investigating the feasibility of permanent underground CO_2 storage under the umbrella of the CO_2SINK project. The carbon dioxide for Ketzin originates at the Leuna industrial park, 175 kilometres away, where it occurs as a by-product of ammonia synthesis. Linde then purifies it in a multi-step preparation process and liquefies it at between –35°C and –25°C. The liquefied CO_2 bound for Ketzin is

Injection below the Barents Sea

Underground CO_2 injection is also taking off in other parts of the world. In the Algerian desert, the BP oil group captures one million tonnes of the CO_2 that would otherwise be released into the air at its natural gas plant and re-injects it back into the ground annually. And the Norwegian company StatoilHydro is following a similar pattern at the Snøhvit gas field, below the Barents Sea. Gas recovery and liquefaction began here in October 2007, with Linde providing the technology for CO_2 separation, compression and re-injection (see also page 54).

An employee in front of a CO_2 storage tank in the pilot power plant located in Schwarze Pumpe, Germany (left).

Carbon dioxide is injected into layers of rock underground (centre).

Growing faster with CO_2 – Plant cultivation in the Netherlands (right).

delivered by road tanker and initially stored in Linde silos. To prepare it for injection, it is then gasified, increasing the temperature to 30°C and the pressure to between 70 and 100 bar. The technology used here is similar to that of a water carbonator, where carbon dioxide is injected from a metal cylinder into a water bottle. In Ketzin, this process occurs 700 metres below ground. The CO_2SINK project began pumping 1.5 tonnes of carbon dioxide per hour into the plutonic rock through arm-width pipes at the end of 2007, and this will continue over a period of two years in total.

In Ketzin, the CO_2 is injected into saline aquifers, i.e. porous sandstone reservoirs filled with highly concentrated salt water. If the gas is injected at high enough pressure, a certain amount dissolves into the water. The rest of the CO_2 forces the water out through the pores in the rock. What happens next is the actual focus of the CO_2SINK research, which aims to provide measurements that will give the first detailed picture of the way CO_2 dissipates underground.

But the most important question of all is whether the final storage sites are leak-proof. The prevailing view among geologists is that the layer of plaster and clay that caps the several square-kilometre sandstone formation should be completely impenetrable, even if it had to cope with ten times the planned 60,000 tonnes of CO_2. The amount injected at Ketzin is also at a level naturally emitted by bacteria or from rock, for instance through soil erosion.

Carbon dioxide for enhanced natural gas recovery

Gaz de France Produktion Exploration Deutschland GmbH (GDF-PEG), which operates the Altmark gas field in Saxony Anhalt, Germany, is approaching CO_2 sequestration from a different angle. Altmark is Western Europe's largest substantially depleted gas reservoir and the site of GDF-PEG's new pilot project, which will investigate the use of carbon dioxide to increase recovery rates and therefore extract more gas. The Linde subsidiary LKCA in Dresden is responsible for planning and constructing the CO_2 injection system here.

The enhanced gas recovery (EGR) method is designed to extract additional natural gas that could not otherwise be recovered. The carbon dioxide injected will remain in the field. According to investigations by independent research institutes, this procedure can increase natural gas recovery by 5 to 10 percent. The pilot project aims to provide definitive answers to all remaining questions surrounding carbon dioxide injection. It is scheduled to begin in early 2009, with an anticipated runtime of three years. Around 100,000 tonnes of CO_2 will be injected during that time.

For the first time, a full-chain trial of CCS technology is currently being run in Germany.

Also partnering GDF-PEG is the energy group Vattenfall Europe, which launched operations at the world's first oxy-fuel pilot facility at the Schwarze Pumpe lignite power plant in August 2008 (see also page 61). Vattenfall will be transporting the CO_2 generated here to Altmark, 400 kilometres away, where the greenhouse gas will be injected into the heavily depleted gas field. Together, Germany's Schwarze Pumpe separation facility and Altmark project constitute the world's first full-chain trial of CCS technology.

Linde's expertise in CO_2 purification, liquefaction and storage once again comes to the fore here. As soon as all the above-ground technical components are delivered to Altmark, work to start filling the CO_2 tanks for the first time can start at the beginning of 2009, with injection feasible from February of that year. We will initially be transporting the liquefied, cryogenic (approx. –28°C) carbon dioxide from our Schwarze Pumpe pilot facility to Altmark by road tanker, but this is just a solution for the test phase. Industrial

implementation of the CO_2 capture process will require pipeline (onshore) and ship (off-shore) transport to the storage sites.

CO_2 Recycling

Helping plants grow

Linde already has a method on the market to recycle CO_2 in the agricultural industry.

Carbon dioxide is, of course, essential for plant growth. On that basis, Dutch greenhouse operators previously used gas furnaces even in summer to increase plantation productivity with the CO_2-rich flue gas – heating up the atmosphere as they did so. So supported by Linde's Dutch subsidiary, Hoek Loos, two engineers from the Netherlands kicked off a project to supply greenhouses with CO_2 from a nearby refinery instead. A bright idea with double the benefit – the diverted CO_2 from the crude oil refinery no longer escapes into the atmosphere as a greenhouse gas, and the plants in the real greenhouses grow faster. In 2004, the construction company VolkerWessels and Hoek Loos founded a joint venture called OCAP (Organic CO_2 for Assimilation by Plants), with seed capital of EUR 100 million. An investment that certainly paid off, as OCAP convinced the Shell oil group to connect its Dutch refinery in Pernis to the pipeline. First, VolkerWessels took care of pipeline cleaning and connection to potential customers. Experts from Hoek Loos then went on to install a compressor station on the Shell refinery site, compressing the carbon dioxide by a factor of 22 for transport. This allows injection of a good 105 tonnes of CO_2 into the pipeline per hour, or even up to 160 tonnes in peak periods.

The OCAP venture is enjoying great success. Almost 400 greenhouse operators entered preliminary agreements when the project was announced, corresponding to around 60 percent of the target market. And a year after work first began, customers already numbered 500. Since go-live in September 2005, this project has therefore cut the CO_2 entering the atmosphere by several thousand tonnes.

www.linde.com/cr

LNG project in Stavanger
Pearl GTL site

Focus on Safety and Quality

The Linde Group aims for a leading and exemplary role across all areas of competence. This also applies to matters of quality, health, safety and the environment (QHSE).

For our Engineering Division, these considerations have always taken high priority in planning and implementing plant engineering projects all over the world. They are a key success factor, driving competitive advantage and sustainability for our plant engineering business.

In March 2007, Engineering management replaced the guidelines on quality, health, safety and environmental protection introduced in 1994 with a new, overarching QHSE policy[1]. This was rolled out at all subsidiaries during the reporting period.

To facilitate the concrete implementation of this new QHSE policy, management also defined HSE essentials, including:

- central HSE documents that must be completed in every plant engineering project,
- HSE requirements for construction sites,
- procedure in the event of unacceptable risks for Linde Engineering employees at construction sites not managed by Linde,
- usage of environmentally friendly technologies,
- performance of risk assessments and HSE training,
- raising awareness of HSE issues in meetings and discussions.

These essentials are also binding for all the subsidiaries of the Linde Engineering Division.

QHSE as a management task

Company managers have a particular responsibility to lead by example, sensitising all employees to the key importance of QHSE. In 2007, Linde Engineering therefore held HSE workshops at its headquarters and subsidiaries. This provided an opportunity for managers to discuss the new QHSE policy and dedicated HSE strategy with the Group's Executive Board, as well as their role in its implementation and the importance of visible leadership here.

HSE Essentials

Plant planning

Almost every plant we build is unique; tailored to individual process requirements, capacity demands and site conditions.

> We also accommodate individual customer needs. Almost every plant built by our Engineering Division is unique.

To ensure effective project execution that complies with all QHSE specifications, Linde's plant planning follows a clearly defined, step-by-step procedure. Design reviews play an important role here, with interdisciplinary teams checking requirements are implemented in line with QHSE regulations. These mandatory reviews also include

Autonomous plant and environmental safety department

For over 40 years now, our Engineering Division headquarters – and more recently also the LKCA subsidiary – have benefited from an autonomous department for plant and environmental safety. With a headcount of around 40 HSE specialists, the department is involved in the planning stages of all plant construction projects and develops tailored solutions to individual challenges.

[1] Since the vast majority of the Engineering Division's customers uses the abbreviation "HSE", the division decided in consultation with the Executive Board to adopt "QHSE" instead of the "SHEQ" abbreviation usually employed at Group level. This is not indicative of any shift in emphasis on the individual aspects.

Certification to international standards

The Linde Engineering strategy defined in 2007 is to roll out an integrated management system based on the DIN ISO 9001, OHSAS 18001 and DIN ISO 14001 standards at all operating companies in the medium term. In 2007, 13 of our division's 15 operating companies were certified to the DIN ISO 9001 quality standard. The remaining two are currently preparing for this certification, which is scheduled for the end of 2008.

Our Engineering Division headquarters and, since 2008, our LKCA subsidiary are certified to the internationally recognised OHSAS 18001 standard for occupational safety management systems. OHSAS stands for Occupational Health and Safety Assessment Series.

the hazard and operability study (HAZOP) – another HSE essential for all plant engineering projects.

In future, gate reviews will be performed at the end of each planning phase. These will entail systematic inspection to ensure compliance with the applicable QHSE requirements. The Engineering Division defined this stringent procedure in 2007 and is now rolling it out in stages across the globe.

It allows us to ensure consistent observation of our QHSE regulations throughout all planning phases at every plant.

Construction sites

Core HSE requirements for construction sites are defined in our HSE Programme Site manual. This regulates areas such as risk assessment, HSE coordination, work-permit procedures, HSE training, personal protective equipment (PPE), scaffolding work, and health and environmental protection. Compliance with these core requirements is not only a binding HSE essential for all Engineering Division employees, but also an integral element of our agreements with contractors working on sites on our behalf.

Where hazardous operations are involved, our experts conduct a thorough inspection of safety measures before work gets underway.

Our close coordination of contractors in relation to HSE extends well beyond legal regulations. This is essential in order to guarantee the highest possible safety standards on our construction sites, particularly in view of the global shortage of qualified site staff.

Where hazardous operations are involved, our own experts conduct a thorough inspection to ensure adherence to safety measures before work begins. We are rolling out this procedure across all Engineering Division subsidiaries.

If our employees identify unacceptable risks at customer construction sites not under Linde's jurisdiction, they are obliged to make an immediate request that the supervisors undertake appropriate improvements. If no such measures are taken, we reserve the right to withdraw our staff from the site for safety reasons.

Environmental protection

Whenever possible, our Engineering Division offers tried-and-tested process technologies that extend beyond the customer's request for quotation and/or local environmental regulations. Here we always undertake to advise our customers of the benefits of these solutions and demonstrate how they could be integrated in the relevant project to reduce the environmental footprint.

Another of our HSE essentials, this undertaking is a further example of our new QHSE policy in practice. This policy sets out our commitment to providing safe and eco-friendly products to our customers, protecting the environment and taking a responsible approach to natural resources.

Healthcare for employees

For many employees, a role in our international plant engineering business means living and working abroad. However, unfamiliar climates and standards of hygiene can quickly cause illness and premature termination of overseas postings. We therefore place great value on offering our staff comprehensive healthcare services.

We provide our employees with appropriate medical check-ups prior to any business travel abroad and on-site assignments. These ascertain medical fitness for overseas travel, for instance via stress ECGs, and ensure that the employee has the requisite immunisations. In addition, every employee receives a first-aid kit tailored to their particular country of destination. We also ensure it is clear beforehand how they can obtain reliable medical care once they have relocated.

Hydrogen production plant in Leuna, Germany.

HSE and social standards for business partners

Linde's global procurement standards, which apply to the entire Group, outline our ethical and social guidelines for the procurement of goods and services. These align with the International Labour Organisation (ILO) conventions and the UN's Universal Declaration of Human Rights.

Our agreements with contractors incorporate detailed, project-specific HSE specifications.

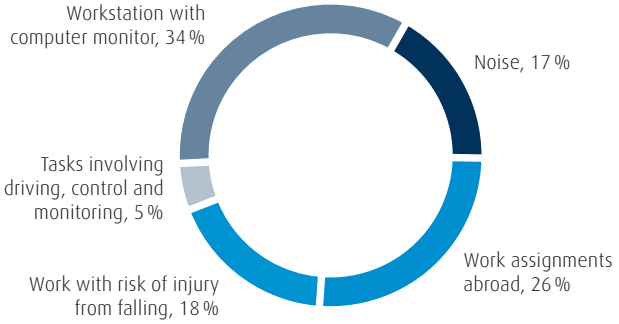
For procurement, for instance of plant components, our project managers, technical experts and procurement staff work together to ensure that our orders meet all QHSE requirements. Linde Engineering monitors compliance with QHSE regulations both throughout order execution and at the subsequent acceptance stage.

Our agreements with contractors working on construction sites on our behalf incorporate concrete, project-specific HSE requirements. The central source for these is the HSE Programme Site manual, described above. Analysis of previous contractor evaluations shows that project-specific framework conditions have a significant influence. So in 2007, Linde Engineering decided to repeat the authorisation process for site contractors with each new project. We view this as an important precondition in ensuring compliance with QHSE standards on our construction sites.

Research and Development

For our Engineering Division too, technical innovation is the key to ensuring our long-term success in the face of global competition. Our central Research and Development (R&D) department supports

Main focus of health checks



the units responsible for each plant type in making ongoing improvements to their processes. The department has defined key performance indicators (KPIs) to measure progress, for instance in terms of competitive ability, resource utilisation, collaboration skills, external and internal communication, innovative power, quality, safety and environmental protection.

Our research activities focus on biogenic substances in hydrogen production.

In 2007, our R&D activities in international plant construction focused on methods to enable the use of biogenic substances in hydrogen production and to separate carbon dioxide and sulphur from flue gases using washing processes.

Suggestion scheme and patent applications

Every organization within the Engineering Division maintains its own suggestion scheme, rewarding outstanding ideas with bonuses. Our central patent department ensures that all rights to innovative technical solutions are promptly secured for Linde.

The foundation of The Linde Group Innovators Club (see also page 13 et seq., CR roadmap) in 2005 is indicative of our increasing emphasis on systematically driving innovation within the Group. This forum serves to foster creativity and new ideas throughout our organization, with prizes for the ten best patent applications during each calendar year. 2007 saw the second award ceremony, held in Dresden, where winners received prizes in the categories "Technological inventions" and "Inventions with the highest financial value".

The majority of our award-winning patent applications is directly linked to environmental and climate protection. Examples include innovations in the fields of renewable energy and hydrogen, CO_2-free power generation and emissions reduction, as well as new technologies to increase plant efficiency.

Key healthcare figures

In the reporting period, the Engineering Division's medical service performed 2,224 occupational healthcare check-ups for approximately 2,000 employees at the Pullach location, for instance. These are generally valid for multiple years. They mainly focused on employees seconding to countries with different climates and levels of hygiene. They also concentrated on employees doing noisy work or work with risk of injury from falling.

Facts and Figures

Measuring our performance in safety, environmental protection and human resources.

Facts and Figures

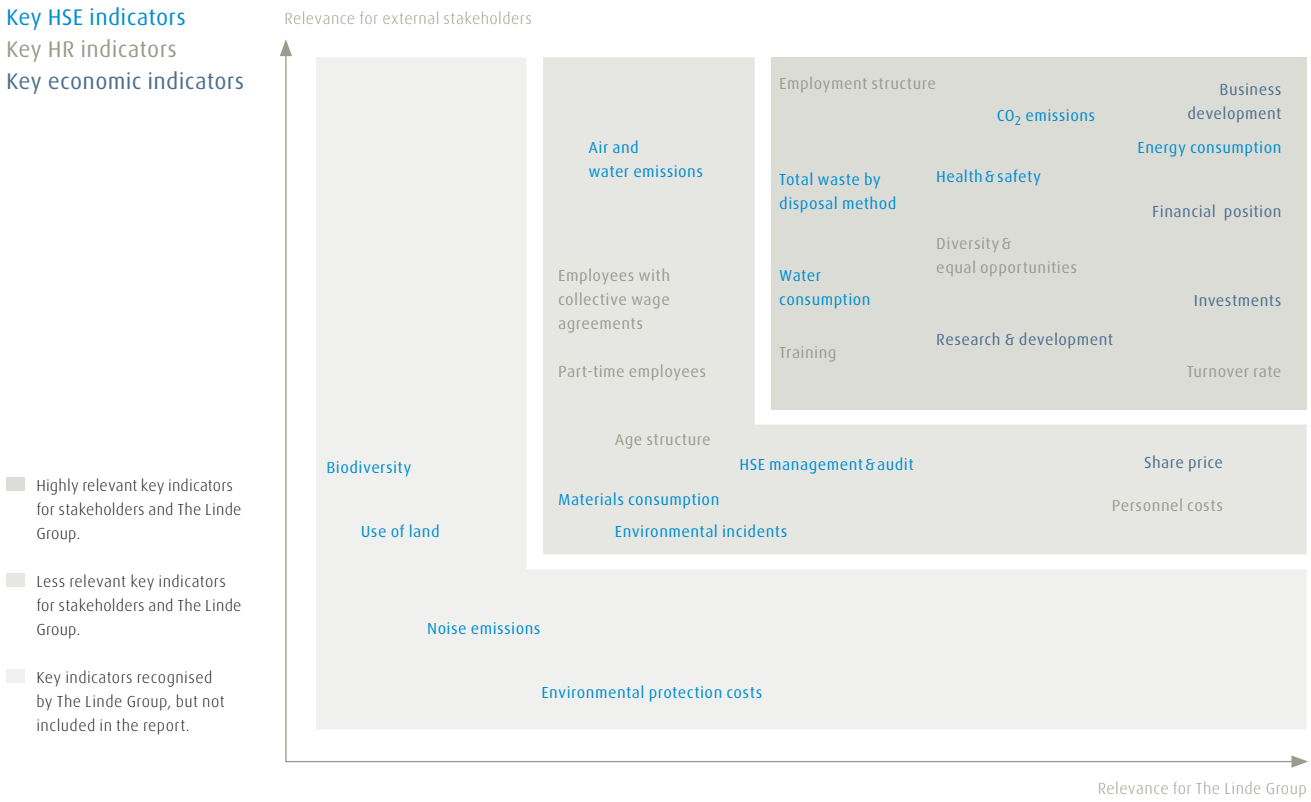
To improve our performance in all areas, we need to know how we are doing. Which is why we track non-financial key indicators and publish this information each year in our Corporate Responsibility Report.

Our CR data traces development over recent years in the areas of health, safety, and the environment (HSE), human resources (HR) and economics.

The data captured and benchmarked provides key impetus for the internal management of our CR activities. It enables us to systematically plan and steer strategies in our five key CR dimensions. It also gives our stakeholders a precise and meaningful source of information.

In selecting our key indicators, we are guided by stakeholder requirements as well as international recommendations and guidelines governing the reporting of sustainability issues, including the Global Reporting Initiative (GRI). The information is honed and supplemented to reflect company- and industry-specific issues. To cater for the varying informational demands of our stakeholders, the key indicators in the CR Report 2008 are a mix of economic, ecological and social figures that outline our company's performance in these areas. We have presented this information visually to give readers a clear impression at a glance. This format also enables us to plot the importance our stakeholders attach to individual indicators against the data's relevance for company management in ensuring sustainable corporate governance.

Key indicators for the CR Report 2008[1]



[1] The indicators displayed in the lower section of the graphic are examples only. To provide a clear overview, only selected entries from the analysis are presented.

The acquisition of the British gases company BOC in September 2006 continues to present us with a number of challenges in our efforts to record and consolidate HSE and HR data. Against this backdrop, we continue to further systematise data collection and consistently drive the quality and scope of our indicators. We were able to make significant headway here in 2007, in particular by implementing the following measures:

- Expanding the scope of HR and environmental data in line with internationally recognised standards and stakeholder requirements.
- Improving quality of data by revising key indicator definitions and extending data acquisition to all consolidated companies and locations.
- Aligning data from 2006 with the new Linde Group corporate structure.
- Programming standardised data capture tools for HSE and HR.

Presentation of key indicators

Our key indicators span a period of up to four years. In each case, the data corresponds to the financial year in question (1 January to 31 December). To ensure meaningful comparison, the data has been aligned with the new corporate structure of The Linde Group and also reflects the Group's continued activities. Consequently, figures for BOC are incorporated in the values for fiscal years 2006 and 2007. However, our former forklift division, the KION Group, which was sold in 2006, as well as further lines of business sold as part of the BOC transaction are not included in the year-on-year comparison.

We have continued to improve the acquisition of environmental data. This has led to minor adjustments to the figures for 2006 and 2007. As a result, the figures shown here may deviate from the information provided in our CR Report 2007 or the 2007 Financial Report.

Data collection

Our key indicators relate to all national and international organisations and locations included in our consolidation structure. Data is collected using various input tools. The SHEQ, HR and finance departments are responsible for collating the data for their respective areas.

Outlook

As part of our continued drive to optimise the quality of our data, we have set a number of ambitious objectives for our future reporting activities. These include the following measures for the coming financial year:

- Group-wide implementation of standardised, web-based data capture tools for HSE as well as the entry of data in those systems.
- Further development of our reporting standards to improve data quality, in particular with regard to environmental data.
- Gradual expansion of the scope of data collection, in particular for HR.
- Further development of Group-wide quantitative environmental objectives.

www.linde.com/cr

CR indicators by divisions

Health, Safety, Environment (HSE)

Our key HSE figures relate to national and international production, sales and administration locations, covering around 85 percent of the Group's employees.

Our key environment indicators are primarily absolute figures. When viewing these, it is important to bear in mind our increased production levels following the BOC acquisition in 2006. Given the breadth and diversity of our portfolio, it makes little sense to provide relative figures based on product units across the Group.

Management systems

We place high importance on achieving certification to internationally applicable standards for our locations across the globe. During the past year, we have significantly broadened external certification of our SHEQ management systems and successfully attained recertification. The DIN ISO 9001 set of standards is of particular significance for quality management within our gases business in terms of ongoing improvement to our products and services. For locations with high environmental impact, we aim for certification to the environmental management standard DIN ISO 14001. And, as far as health and safety management is concerned, many of our locations are certified to the OHSAS 18001 standard or to SCC (Safety Certification Contractors).

Certified locations

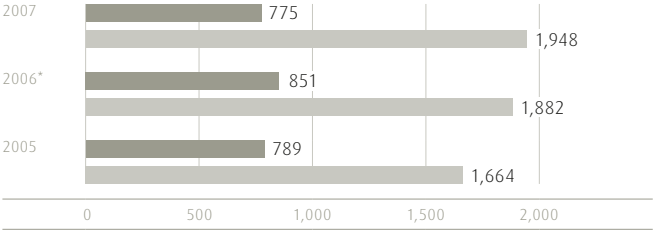
	2007
Percentage of locations certified to DIN ISO 14001	> 20 %
Percentage of locations certified to DIN ISO 9001	> 65 %
Percentage of locations certified to OHSAS 18001 or SCC	> 9 %

We will continue to expand external certification to applicable standards for our SHEQ management in the future, focussing on locations with a high impact on the environment, quality and safety. We are currently planning further certification to DIN ISO 14001 or OHSAS in the Africa, Eastern Europe and Asia regions, for instance.

Audits and training

To systematically improve our HSE performance, we use regular audits to establish and document the success of our measures against standards recognised across the industry. The following graphic shows the number of internal and external audits performed at our operating locations.

Number of audits performed



Environmental protection audits.

Occupational safety and health protection audits

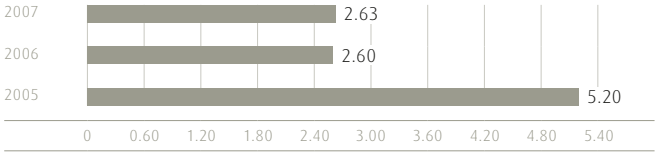
* Figures for 2006 apply solely to Linde and do not include data from BOC. At BOC, 1,084 integrated audits were performed in 2006.

In 2007, 31.0 percent of our employees participated in training courses in the fields of occupational safety and environmental and health protection.

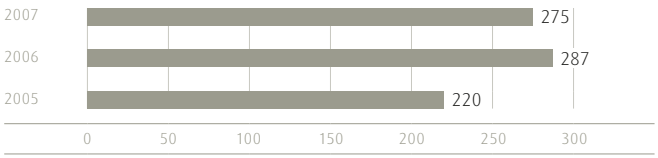
Accidents at work

By either improving or at least remaining steady for the year under review, our key safety indicators reflect The Linde Group's efforts to continually increase occupational safety at its locations. Thanks to our comprehensive safety strategy and preventative measures, we have reduced the number of workplace accidents entailing at least one day of absence, and significantly lowered the total number of working days lost due to accidents in comparison with the previous year. Unfortunately, The Linde Group recorded six employee workplace accidents leading to fatalities in 2007. Discounting divested holdings, there was one fatal accident in 2006 and three in 2005. We have determined the exact cause of these accidents, and implemented appropriate measures and programmes.

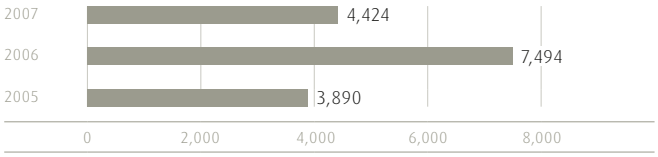
Number of workplace accidents per million hours worked (lost time injury rate; LTIR)



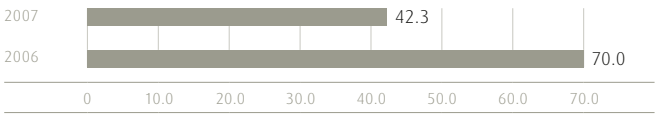
Number of workplace accidents entailing at least one day of absence



Number of working days lost due to accidents



Number of working days lost per million hours worked

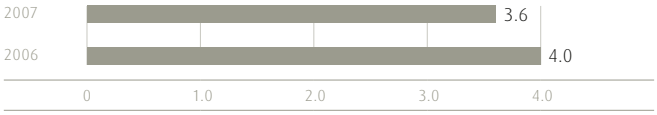


Our safety standards also apply to employees of third-party suppliers working at Linde locations. Our HSE approach forms a binding part of our contracts with partner companies and we regularly conduct on-site training, thus ensuring our contractual partners also uphold Linde's high standards.

Health protection

We protect the health of our employees by continually optimising processes in this respect and offering wide-ranging healthcare provision. These measures helped reduce the average number of days lost due to sickness to 3.6 per employee in 2007.

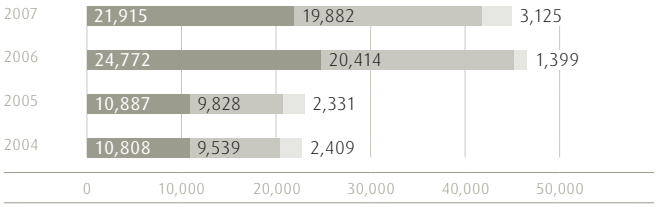
Average number of days lost due to sickness per employee



Energy consumption

We were able to achieve a slight reduction in our total consumption of electricity, natural gas, fuel oil, district heating, butane and propane in the reporting period. At a total of 41.8 Terawatt hours (TWh), electricity and natural gas were the most heavily used energy sources (down from 45.2 TWh in 2006). These are required for production in our HyCO (see glossary) and air separation plants, in particular. The reduction in natural gas consumption in 2007 was due to increased reliance on other energy sources.

Linde Group energy consumption in GWh*



Natural gas
Electricity
Fuel oil, district heating, butane and propane

* Gigawatt hours

Direct and indirect greenhouse gas emissions

2007 saw a slight increase in our total direct and indirect energy-induced carbon dioxide (CO_2) emissions. Direct CO_2 emissions primarily arise from hydrogen production in our HyCO plants and from energy-generating processes.

Indirect CO_2 emissions are a by-product of energy procured from third parties (electricity, district heating, steam). Our consumption levels here are due to the large amounts of energy required by our air separation plants (see plant-specific environment data).

CO_2 emissions*

	2007	2006	2005	2004
Total CO_2 emissions in million tonnes	14.4	14.2	6.6	6.1
Direct CO_2 emissions in million tonnes	4.7	4.2	2.3	1.9
Indirect CO_2 emissions in million tonnes	9.7	10.0	4.3	4.2

* Values for direct and indirect CO_2 emissions have been calculated at Group level. A description of the calculation methods is available on the Internet at www.linde.com/cr.

For the first time, we have now collected data on all the greenhouse gases specified in the Kyoto protocol. In 2007, direct emissions of methane (CH_4), nitrous oxide (laughing gas; N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6) totalled around 540,000 tonnes of CO_2 equivalent (see glossary). Our total direct greenhouse gas emissions therefore amounted to 5.2 million tonnes of CO_2 equivalent.

Other air emissions

Our production processes result in air emissions of inorganic gases such as carbon monoxide (CO), sulphur oxides (SO_X), nitrogen oxides (NO_X), ammonia (NH_3) and volatile organic compounds (VOC_S, see glossary). The VOC emissions are primarily released during the painting and cleaning of metals such as gas cylinders, storage tanks and plant components. The majority of CO, NO_X and SO_X emissions arises from combustion processes, while NH_3 may be emitted during nitrous oxide or acetylene production.

Air emissions in tonnes

	2007*
VOC_S	330
NH_3	323
CO	2,341
NO_X	812
SO_X	74

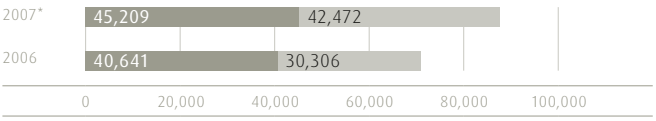
* During the year under review, we modified our definitions for air emissions reporting. To improve objectivity, we have therefore only included figures for 2007 here. According to the definition we use, the values stated apply to all locations legally obliged to report these air emissions.

Waste management

In 2007, Linde generated approximately 99,145 tonnes of waste, of which 11,465 were metallic.

We distinguish between hazardous and non-hazardous waste in line with applicable national categorisations here. In 2007, the proportion of total waste that was hazardous amounted to 42.8 percent (2006[2]: 42.7 percent).

Proportion of hazardous and non-hazardous waste in tonnes



Non-hazardous waste

Hazardous waste

* Not including metallic waste

In order to reduce our waste volumes, we intend to increase the efficiency of our waste management system and make further improvements to our disposal policy. Our aim is to continue increasing our recycling ratio, which currently lies at 54 percent.

[2] When viewing the waste data, it should be noted that the figures for 2006 cover fewer locations and do not include Spain, Portugal, France and certain locations in North America and Africa. In 2007, these locations generated 10,918 tonnes of waste.

Waste in tonnes

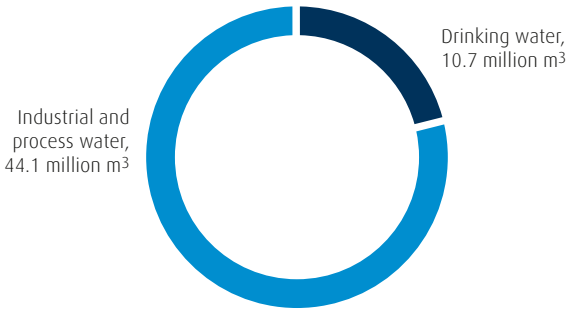
	2007	2006
Total recyclable materials	53,523	20,626
Total landfill waste	31,804	37,016
Total incineration waste	13,818	13,306
Total waste	**99,145**	**70,948**

Water management

In 2007, The Linde Group's water usage exceeded 290 million m³. Around 80 percent of this is used as once-through water for cooling systems. This involves taking water, which then simply absorbs heat, before it is pumped back with no further treatment.

Our consumption of drinking and process water in 2007 totalled 54.8 million m³. Industrial and process water accounted for around 80 percent of this, and drinking water 20 percent. The Linde Group's wastewater for the year amounted to 8.2 million m³.

Water consumption for 2007 in million m³



At around 60 percent, the majority of the water we consume is used in cooling processes in our air separation plants (see plant-specific environment data, page 76). The wastewater resulting from these processes contains heavy metals, for example, present in the metal pipes themselves and in their protective coating and released by corrosion. We use phosphates as anti-corrosion agents here.

Water emissions in tonnes

	2007*
Chemical oxygen demand (COD)	203
Biochemical oxygen demand (BOD)	147
Nitrates	93
Phosphates	11
Heavy metals	2

* According to the definition we use, the values stated apply to all locations legally obliged to report these water emissions.

Materials consumption

In 2007, The Linde Group consumed 40,843 tonnes of metal, of which around 68 percent was attributable to the Engineering Division. Here, metal consumption rose from 24,048 tonnes in 2006 to 27,628 tonnes in 2007. Consumption of packaging materials amounted to almost 16,500 tonnes in the reporting period.

Environmental incidents

In 2007, The Linde Group recorded 21 complaints related to the environment and 13 environmental incidents that had to be reported to the authorities (2006: 11). The resultant level of fines and warning fees was below that of the previous year.

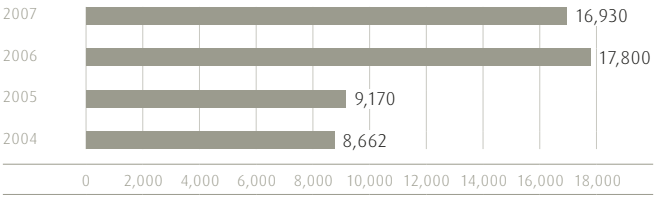
Plant-specific environment data

Our plant-specific environment data provides the key indicators of our environmental performance, as our air separation and HyCO plants account for the proportionately highest use of resources. Linde now operates over 290 air separation plants and 55 HyCO plants worldwide.

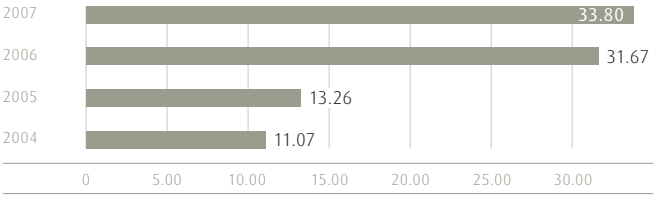
Air separation plants split air into its main components of nitrogen and oxygen, as well as carbon dioxide, argon and other noble gases. High quantities of electricity and water are required to operate these plants, with production of air gases accounting for around 60 percent of total water and over 80 percent of total electricity consumption. However, we managed to reduce the ecological footprint of these plants in 2007 compared with the previous year. Thanks

to targeted energy saving projects, we lowered their electricity consumption at various locations, which in turn cut indirect CO_2 emissions accordingly.

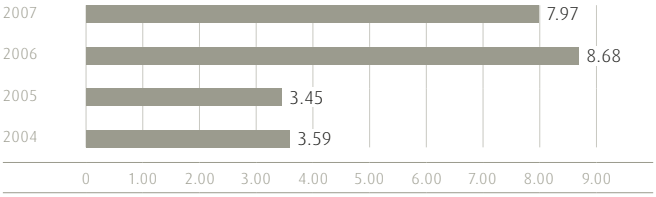
Air separation plant electricity consumption in GWh



Air separation plant water consumption in million m³

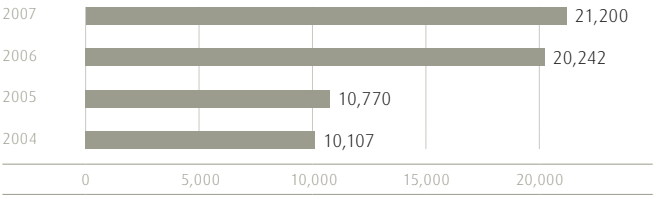


Air separation plant indirect CO_2 emissions in million tonnes

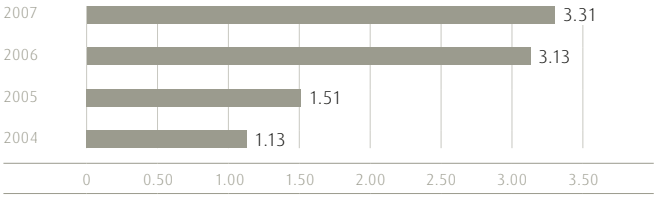


HyCO plants denote various types of plant that produce hydrogen and carbon monoxide. The common methods of hydrogen production are steam reforming of natural gas and partial oxidation (see glossary) of heavy hydrocarbons. Hydrogen synthesis generates direct CO_2 emissions through the use of fuel to reach the reaction temperature required.

HyCO plant natural gas consumption in GWh



HyCO plant direct CO_2 emissions in million tonnes



Human Resources

Our human resources indicators are displayed, where possible, on a year-on-year basis spanning the last three years[3]. We have adapted and consolidated the data to reflect The Linde Group's organisational structure (see page 70). 31 December is the reporting date for each year.

Employment structure

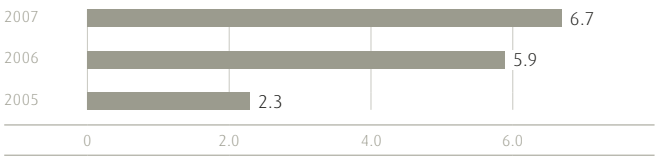
At the end of 2007, a total of 50,485 people were employed by The Linde Group in over 100 countries (2006: 51,038; 2005: 22,906). The majority of our employees is based in the continental Europe and the UK regions (see page 24). Around 14.5 percent are employed at locations throughout Germany.

Employees

	2007	2006	2005
Gases Division	39,577	39,142	17,783
Engineering Division	5,637	5,166	4,408
Other activities	5,271	6,730	715
Group	**50,485**	**51,038**	**22,906**

The number of Linde staff on limited contracts rose slightly in the period under review. In the Gases Division, the majority of staff with limited contracts was located in the operating segment Asia & Eastern Europe.

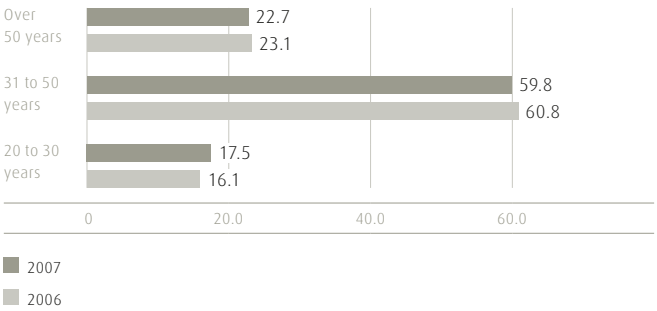
Percentage of employees with limited contracts



Age structure

Approximately 60 percent of our permanent staff is between 31 and 50 years of age. The average age of employees at our organisations in Germany is currently around 42.

Age structure of permanent staff in percent



Personnel costs and social security contributions

Linde Group personnel costs amounted to EUR 2,449 million in 2007, EUR 360 million less than 2006. This decrease is due to the slight drop in headcount. Pension costs and personnel welfare costs totalled EUR 151 million (2006: EUR 165 million), of which EUR 141 million was allocated to pensions (2006: EUR 162 million).

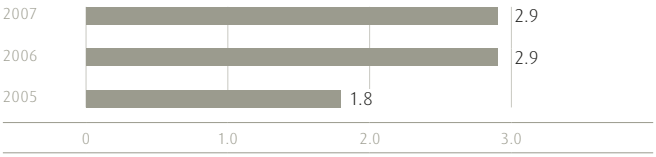
Flexible work models

Linde offers its employees various models that give them the freedom to manage the hours they work. The most popular options are flexi-time, remote or home office models, sabbaticals (see glossary) and part-time contracts.

The number of part-time staff at Linde in 2007 was roughly level with the figures reported over recent years. The majority of part-time staff in 2007 was employed in the Engineering Division.

[3] Since the only data available for 2004 includes the KION Group, figures from that year are not reported here to ensure meaningful comparison.

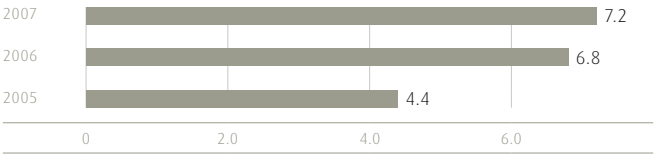
Number of part-time employees in percent



Employee retention

In the wake of our extensive reorganisation following the 2006 BOC acquisition, the percentage of employees who left Linde on a voluntary basis increased. There are no recognisable regional trends in employee fluctuation. We have not further broken down turnover statistics to reflect gender or age due to varying dynamics at country level.

Turnover rate in percent



In 2007, the average length of service at Linde was 8.6 years, compared with 7.4 in 2006.

Employee rights

The Linde Group is committed to protecting employee rights across the globe. We maintain confidential and constructive working relationships with employee representatives and trade unions worldwide and aim to achieve a fair balance between the economic interests of the Group and the interests of our workforce.

In 2007, 51.2 percent of The Linde Group payroll was employed under collective wage agreements, compared with 47.6 percent in 2006 and 58.2 percent in 2005.

We ensure that our employees are informed of significant operational changes promptly and in detail, in accordance with national and international guidelines. We have not been able to present consolidated figures on minimum notice periods due to the differences between individual countries.

Diversity and equal opportunities

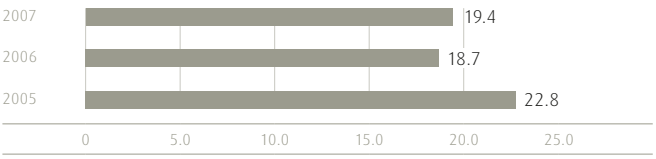
Equal opportunities are a cornerstone of our value system (see CR roadmap, page 13 et seq.). As an international company, we understand the fundamental importance of integrating diverse cultures and fostering close communication between colleagues.

We enhance employees' inter-cultural skills by encouraging them to work abroad. Around 200 managers were seconded as expatriates (see glossary) to locations abroad in 2007. Our senior management comprises employees from 45 nations.

We actively promote gender equality and implement various measures to make Linde a more attractive employer for women (see CR roadmap, page 13 et seq.). 2007 saw us again move closer to our goal of substantially increasing the proportion of women working in The Linde Group.

The number of women employed in the Engineering Division was up by around 10 percent on the previous year. In 2007, female employees accounted for 7.8 percent[4] of senior management. Linde does not have different pay scales for men and women.

Percentage of women



Our equal opportunities policy also involves proactively supporting employees with severe disabilities or health issues. In Germany, the proportion of disabled employees was up slightly on the previous year. Around 240 people with severe disabilities were employed at Linde's German organisations in 2007. This corresponds to a ratio of 3.3 percent. In 2006, approximately 3.1 percent of our workforce was judged to be severely disabled (over 220 employees). The 2007 volume of orders placed with workshops for disabled people was up by more than 10 percent on the previous year. We also offer per-

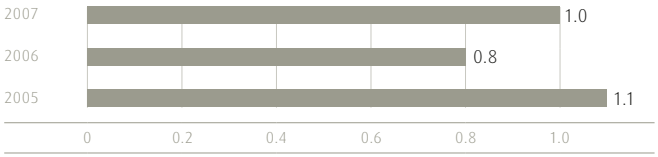
[4] As the role evaluation systems of Linde and BOC were harmonised in 2006, we do not have relevant data for that year.

sons with disabilities work opportunities tailored to their abilities at our locations outside of Germany where there are no comparable statutory regulations, for example at our South African or Australian sites.

Training

Continuous training and employee development are key enablers in enhancing our competitive abilities. They also allow us to position ourselves as an attractive employer and secure sustainable success in the future. In 2007, we were able to offer more trainee positions than the year before, thus increasing the percentage of trainees among the entire workforce.

Percentage of trainees



The majority of our trainees is based in Germany. In 2007, 250 of our employees in Germany were trainees. This corresponds to 3.4 percent of the entire German workforce (2006: 3.6 percent, 240 employees).

Focused employee development is a top priority for Linde, and our systematic training programmes have been designed to promote and enhance employee skills. As our key indicators on employee development show, the uptake on training opportunities was slightly higher than the year before.

Employee development

	2007	2006	2005
Percentage of employees who have taken up training opportunities	54.1	53.1	64.1
Average number of training days per employee	1.5	1.4	1.7
Average expenditure on training programmes per employee in €	323	263	442

In 2007, almost one percent of our personnel costs was channelled into employee training.

Economics

To ensure meaningful comparison of our financial indicators, we have only presented data relating to the 2007 and 2006 financial years. The values shown here relate to continuing operations of The Linde Group. Unless otherwise stated, values for BOC organisations are included pro-rata from the date of acquisition (September 2006) onwards. Further data is available on page 07 and in our 2007 Financial Report. You will find current figures for the 2008 financial year on our website at www.linde.com.

Business development[5]

In fiscal 2007, The Linde Group achieved sales of EUR 12,306 million, up 13.9 percent on the previous year. Our operating profit (EBITDA) rose at a higher rate than sales at 18.1 percent. The Gases Division continued its positive growth path, seeing sales rise by 9.4 percent. Our Engineering Division was also able to build on the exceptional success of 2006 and significantly increase sales by 40.4 percent in the 2007 financial year.

Return on capital employed (ROCE) is the central benchmark against which we measure the success of the Group's earnings-based growth strategy. In the reporting year, ROCE – which has been adjusted to reflect the new company structure – totalled 10.3 percent (2006: 11.4 percent). This means that we have met our objective of double-digit adjusted ROCE one year ahead of schedule. The slight decline in comparison with the previous year is due to an increase in the levels of average capital employed.

Financial position

Following the reorganisation of The Linde Group in the wake of the BOC acquisition, our main focus in fiscal 2007 lay on consolidating our net assets and financial position. We were able to reduce financial debt faster than planned to EUR 6,427 million (2006: EUR 9,933 million), instead of the forecast figure between EUR 7,200 and 7,500 million. Equity was up from EUR 8,225 million to EUR 9,210 million, which corresponds to an equity ratio of 37 percent (2006: 29 percent).

Capital expenditure

In 2007, we continued to channel investments into fast-growing areas. Measured against Group sales, our investment ratio in 2007 was 8.4 percent (2006: 9.6 percent)[6]. Our total capital expenditure

Sales and operating profit by division in EUR million

	2007		2006**	
	Sales	Operating profit	Sales	Operating profit
Gases Division*	9,209	2,314	8,421	2,035
Western Europe	4,026	1,097	3,811	1,037
Americas	2,348	447	2,306	403
Asia & Eastern Europe	1,618	467	1,199	313
South Pacific & Africa	1,284	303	1,169	282
Engineering Division	2,750	240	1,958	172
Other activities	580	40	581	49
Group*	**12,306**	**2,424**	**10,803**	**2,053**

* Sales and operating profit of the Gases Division and the Group reflect the consolidated figures and the result of corporate activities. To ensure meaningful comparison, these are not listed separately here.

** Prior-year figures including twelve months of BOC.

[5] To ensure comparability of our business figures, we have adjusted the prior-year figures for sales and operating profit to reflect the new Group structure. The figures for 2006 therefore include the BOC Group's operations for the full twelve-month period and exclude companies sold as a result of the BOC Group transaction.

[6] It should be noted that some of the capital expenditure originally scheduled for 2007 will not be incurred until the first six months of 2008 due to the nature of the projects in question.

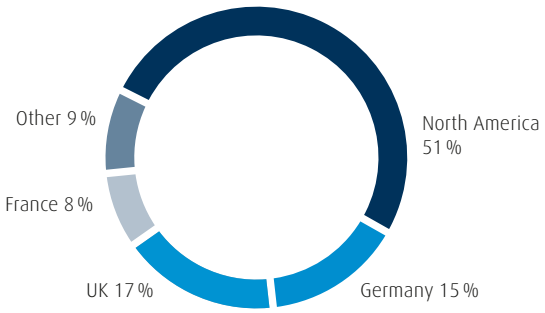
(excluding financial assets) for financial year 2007 amounted to EUR 1,035 million (2006: EUR 776 million). The lion's share of investments was channelled into international expansion of our gases business. The main focus here was once again on fuelling expansion of the fast-growing on-site business. The majority of investments in the Gases Division was made in the operative segments of Western Europe (35.5 percent) and Asia & Eastern Europe (31.5 percent).

Linde shares and share structure

2007 proved to be another year in which our shareholders benefited from the strong performance of our shares. With an increase of 15.6 percent, the Linde share price achieved double-digit growth for the third year in a row, earning us 13th place in the DAX 30 share index.

The proportion of institutional investors was once again up on the previous year. As of 31 December 2007, around 63 percent of Linde shares were held by institutional investors (2006: 53 percent). Major shareholders accounted for approximately 21 percent (2006: 27 percent), while private investors held 16 percent of our shares (2006: 20 percent). 2007 saw our shareholder structure become even more international, with the proportion of North American investors rising from 38 percent in 2006 to 51 percent in 2007. The proportion of German investors dropped to 15 percent during the year under review (2006: 23 percent).

Institutional investors – holdings by region



Research and development

As a technology company, innovative drive is key to Linde's success, which is why we have continued to increase expenditure for research and development and expand headcount. At 31 December 2007, a total of 480 people were employed in this area (2006: 438). 238 of these were with the Gases Division and 242 with the Engineering Division.

Expenditure in EUR million

	2007	2006
Gases Division	68	72
Engineering Division	29	20
Total	**97**	**92**

In 2007, the Group filed 219 new patent applications for inventions. In total, our technologies were protected by 4,062 patents at 31 December 2007.

GRI and UN Global Compact Index

The Linde Corporate Responsibility Report 2008 is based on key indicators for sustainability as defined by the Global Reporting Initiative (GRI) in its current version (G3). The report corresponds to GRI application level "B". The indicators also meet the requirements of the Communication on Progress report that Linde submits each year as a member of the UN Global Compact initiative. The methods we used to weight the relevance of the subjects chosen from the entire spectrum of our corporate responsibility activities are explained in detail on page 12 and on our website at www.linde.com/cr.

The page numbers given under "Page; Internet" refer to the pages in the Corporate Responsibility Report 2008 that contain the corresponding content. We have also included references to further relevant information on individual topics, e.g. The Linde Financial Report 2007 (FR) or www for our corporate responsibility website (www.linde.com/cr).

UN GC[1]	GRI[2]	Name of GRI key indicator	Status[3]	Page; Internet
	1.	**Strategy and analysis**		
*[4]	1.1	Statement from the Chief Executive Officer	▬	8
	1.2	Description of key impacts, risks and opportunities	▬	10, 13, 20; www
	2.	**Organisational profile**		
	2.1	Name of the organisation	▬	6
	2.2	Primary brands, products and/or services	▬	6
	2.3	Operational structure	▬	6, cover, FR 189
	2.4	Location of organisation's headquarters	▬	88
	2.5	Countries where the organisation operates	▬	6, FR 189
	2.6	Nature of ownership and legal form	▬	81, FR 32
	2.7	Markets served	▬	FR 44, FR 52
	2.8	Scale of the reporting organisation	▬	7, 80, FR 40, FR 52
	2.9	Significant changes during the reporting period regarding size, structure or ownership	▬	81, FR 34, FR 40
	2.10	Awards received in the reporting period	▬	33, 34; www
	3.	**Reporting parameters**		
	3.1	Reporting period	▬	12
	3.2	Date of the most recent previous report	▬	12
	3.3	Reporting cycle	▬	12
	3.4	Contact point for questions	▬	88
	3.5	Definition of report content and stakeholders	▬	10, 12, 20, 70
	3.6	Boundaries of the report	▬	12
	3.7	Limitations on the scope of the report	▬	12
	3.8	Joint ventures, subsidiaries, outsourcing	▬	12
	3.9	Data measurement techniques and basis of calculations	▬	70; www
	3.10	Effects of new re-statement of information	▬	12, 70
	3.11	Changes from previous reporting periods	▬	70
	3.12	GRI content index	▬	82
	3.13	External assurance statement	✖	

[1] **UN GC:** Communication on Progress (the ten principals of the UN Global Compact initiative, see also page 83).
[2] **GRI:** GRI key indicator number.
[3] **Status:** ▬ Covered in full ▭ Covered in part ▭ Not covered ◆ Low priority ✖ Not usable/relevant
[4] Additional information.

The Ten Principles of the UN Global Compact

The numbers in the first column (UN GC) for each of the key indicators denote which of the guidelines, programmes and management systems support the following principles of the UN Global Compact initiative:

Human Rights // Principle 1: Businesses should support and respect the protection of internationally proclaimed human rights; and **Principle 2:** make sure they are not complicit in human rights abuses.

Labour Standards // Principle 3: Businesses should uphold the freedom of association and the effective recognition of the right to collective bargaining; **Principle 4:** the elimination of all forms of forced and compulsory labour; **Principle 5:** the effective abolition of child labour; and **Principle 6:** the elimination of discrimination in respect of employment and occupation.

Environment // Principle 7: Businesses should support a precautionary approach to environmental challenges; **Principle 8:** undertake initiatives to promote greater environmental responsibility; and **Principle 9:** encourage the development and diffusion of environmentally friendly technologies.

Anti-Corruption // Principle 10: Businesses should work against corruption in all forms, including extortion and bribery.

UN GC[1]	GRI[2]	Name of GRI key indicator	Status[3]	Page; Internet
	4.	**Governance, commitments and engagement**		
	4.1	Governance structure, including responsibility for sustainability	■	11, FR 21
	4.2	Independence of Supervisory Board Chairman	■	FR 21
	4.3	Management bodies and statement regarding independence of members of the highest governance body, senior managers and executives	■	FR 21
	4.4	Mechanisms to provide recommendations to the highest governance bodies	■	FR 21
	4.5	Linkage between the compensation for members of the highest governance body, senior managers and executives, and the organisation's performance with regard to sustainability	■	FR 26
	4.6	Processes to ensure conflicts of interest are avoided	■	FR 21
	4.7	Qualifications and expertise of the members of the highest governance body with regard to sustainability	■	11, 13; www
1	4.8	Missions, values and codes of conduct	■	10; www
	4.9	Procedures employed by the highest governance body to monitor the organisation's performance with regard to sustainability	■	11, 13; www
	4.10	Processes for evaluating the highest governance body's own performance	■	FR 21
7	4.11	Implementation of the precautionary principle	■	10, 40, 64, FR 76
	4.12	Support of external initiatives	■	21; www
	4.13	Memberships in associations	■	www
	4.14	List of stakeholder groups engaged by the organisation	■	10; www
	4.15	Basis for identification of stakeholders	■	10; www
	4.16	Approaches to stakeholder dialogue	■	www
	4.17	Statement on key concerns raised by stakeholders	■	www
		Key economic indicators		
		Management approach	■	6, 10, 70, FR; www
	EC1	Direct generated economic value	■	7, 80, FR 42
7	EC2	Financial implications of climate change	■	13, 20, 26, 49; www
	EC3	Scope of the organisation's defined benefit plan obligations	■	FR 71, FR 144
	EC4	Financial assistance received from government	□	
	EC6	Procedures for selecting local suppliers	◧	40; www
6	EC7	Procedures for local hiring	◧	www
	EC8	Infrastructure investments and services provided primarily for public benefit	■	www

1 **UN GC:** Communication on Progress (the ten principals of the UN Global Compact initiative, see above).

2 **GRI:** GRI key indicator number.

3 **Status:** ■ Covered in full ◧ Covered in part □ Not covered ◆ Low priority ✖ Not usable/relevant

UN GC[1]	GRI[2]	Name of GRI key indicator	Status[3]	Page; Internet
		Key environmental indicators		
		Management approach	▬	10, 13, 40, 64, 70 ; www
8	EN1	Materials used by weight or volume	◧	75
8, 9	EN2	Percentage of materials used that are recycled input materials	◆	
8	EN3	Direct energy consumption by primary energy source	▬	73
8	EN4	Indirect energy consumption by primary source	◧	73; www
8	EN8	Total water withdrawal by source	◧	75
8	EN11	Land in, or adjacent to, protected areas	◆	
8	EN12	Impact on biodiversity	◆	
8	EN16	Greenhouse gas emissions	▬	73
8	EN17	Other greenhouse gas emissions	▬	www
7, 8, 9	EN18	Initiatives to reduce greenhouse gas emissions	▬	13, 40, 64, 75
8	EN19	Emissions of ozone-depleting substances	▭	
8	EN20	NO_X, SO_X and other air emissions	▬	74
8	EN21	Water discharge	▬	75
8	EN22	Waste by type and disposal method	▬	74
8	EN23	Total number and volume of significant spills	▭	
7, 8, 9	EN26	Initiatives to mitigate environmental impact of products and services	▬	26, 49
8,9	EN27	Reclaimed packaging material	▭	
8	EN28	Sanctions for non-compliance with environmental laws and regulations	◧	75
		Key social indicators: Labour practices and decent work		
		Management approach	▬	10, 13, 70; www
	LA1	Total workforce by employment type, employment contract, and region	▬	24, 77; www
6	LA2	Employee turnover	▬	78
1, 3	LA4	Employees covered by collective bargaining agreements	▬	78
3	LA5	Minimum notice period regarding significant operational changes	▬	78
1	LA7	Rates of injury, occupational diseases, lost days, and absenteeism	▬	42, 65, 72; www
1	LA8	Risk-control programmes in place regarding serious diseases	▬	42, 65; www

[1] **UN GC:** Communication on Progress (the ten principals of the UN Global Compact initiative, see also page 83).

[2] **GRI:** GRI key indicator number.

[3] **Status:** ▬ Covered in full ◧ Covered in part ▭ Not covered ◆ Low priority ✖ Not usable/relevant

UN GC[1]	GRI[2]	Name of GRI key indicator	Status[3]	Page; Internet
	LA10	Employee training	▬▭	79; www
1, 6	LA13	Composition of governance bodies	▬	77
1, 6	LA14	Differences in salary according to gender	▬▭	78
		Key social indicators: Human rights		
		Management approach	▬	10, 13; www
1 to 6	HR1	Significant investment agreements	▬▭	www
1 to 6	HR2	Screening of suppliers with regard to human rights issues	▬▭	www
1, 2, 6	HR4	Incidents of discrimination	▬▭	www
1, 2, 3	HR5	Operations involving significant risk to exercise freedom of association and collective bargaining agreements	▬▭	www
1, 2, 5	HR6	Operations involving significant risk of child labour	▬▭	www
1, 2, 4	HR7	Operations involving significant risk of forced or compulsory labour	▬▭	www
		Key social indicators: Society		
		Management approach	▬	10, 13; www
	SO1	Impact on local communities	▭	
	SO2	Risks related to corruption	▬▭	www
10	SO3	Anti-corruption training	▬▭	www
10	SO4	Actions taken in response to alleged incidents of corruption	▬▭	www
10	SO5	Public policy positions and lobbying	▬▭	www
	SO8	Sanctions for non-compliance with laws and regulations	▭	
		Key social indicators: Product responsibility		
		Management approach	▬	10, 13, 40; www
1	PR1	Impact on health and safety throughout the product lifecycle	▬▭	40, 64
8	PR3	Product information	▬▭	43
	PR6	Laws and standards related to advertising	▬▭	www
	PR9	Sanctions for non-compliance with laws and regulations concerning products and services	▭	

1 **UN GC:** Communication on Progress (the ten principals of the UN Global Compact initiative, see also page 83).

2 **GRI:** GRI key indicator number.

3 **Status:** ▬ Covered in full ▬▭ Covered in part ▭ Not covered ◆ Low priority ✖ Not usable/relevant

Glossary

Adsorbents
Solid substance with an active surface which accumulates gas or liquid. Activated carbon is often used as an adsorbent.

Calibration gases
A mixture of pure gases used to ascertain and document the extent to which a measuring instrument aligns with the baseline (target value).

Clean Development Mechanism (CDM)
The Clean Development Mechanism is one of the project-based, flexible mechanisms of the Kyoto Protocol and is defined under Article 12. The CDM allows industrial countries to invest in emission-reducing projects in developing or newly industrialising countries. The states or businesses making the investments can use the resulting emission reduction credits to meet their own emission reduction targets. The CDM is designed to cut emissions, although its primary aim is to help developing countries achieve sustainable development.

CO_2 (carbon dioxide) equivalent
Unit of measurement used to express the effect different greenhouse gases have on the climate compared with a carbon dioxide (CO_2) baseline.

Crude oil equivalent
Unit of energy used to rate the energy content of different energy carriers.

Doping
Process of deliberately modifying the conductive properties of semiconductor material by adding additional atoms. Semiconductors are only capable of conducting electricity once they have been doped.

Expatriates
Employees temporarily seconded to locations abroad by their employer.

Fischer Tropsch synthesis
A process used to produce synthetic fuels. The raw material used for the Fischer Tropsch synthesis (FTS) is synthesis gas, a mixture of carbon monoxide and hydrogen. The synthesis gas can be produced from coal or natural gas (and also from oil fractions such as heavy oil). It is completely sulphur-free, although purification is sometimes required to achieve this. Consequently, the fuels produced by FTS are also completely free from impurities.

GHS
GHS stands for Globally Harmonised System of Classification and Labelling of Chemicals. The system uses internationally standardised classification and warning symbols in an effort to minimise danger to health and the environment in the manufacture, transport and application of chemicals. In the European Union, GHS will be introduced as an EU directive in parallel with the REACH chemicals system. The Commission approved the proposed directive on 27 June 2007.

Global Reporting Initiative (GRI)
International initiative bringing together numerous stakeholders, founded in 1997 with the aim of generating recognised, comparable guidelines for corporate reporting on economic, social and environmental activities.

Heat exchangers (coil-wound)
Heat exchangers transfer heat from one liquid or gaseous medium to another. Coil-wound heat exchangers are suitable for treating pure liquids and gases at high and low temperatures, and can be used for cooling, heating, liquefaction and evaporation, or as isothermal reactors. Coil-wound heat exchangers are primarily used in chemical and petrochemical plants, as well as in gas separation and natural gas liquefaction plants.

High-flow oxygen
Term used to classify the rate of flow during oxygen delivery. In addition to standard flow regulators, special regulators are available for low (low-flow) or particularly high (high-flow) oxygen requirements.

HyCO plants
Collective term for plants producing hydrogen, carbon monoxide and synthesis gas. These HyCO plants primarily comprise steam reformers, partial oxidation plants and methanol crackers.

Inert gases
Inert gases are non-reactive gases such as noble gases, or gases with low chemical reactivity such as nitrogen and carbon dioxide. Inert gases are used to prevent unwanted chemical reactions.

Ion dose
Physical indicator used to measure the electric charge created as a result of ionizing radiation.

Key performance indicators (KPIs)
Operating metrics that allow measurement and/or evaluation of progress and performance levels in relation to important targets or critical success factors within an organisation.

Paraffin
The common name for a group of long-chain, saturated hydrocarbons with low reactivity to a wide range of chemicals. During the gas-to-liquid process, paraffins and other long-chain hydrocarbons are cracked to obtain synthetic fuels.

Partial oxidation plants
Partial oxidation plants are used to produce synthesis gas and hydrogen. This sophisticated process primarily uses heavy hydrocarbons such as naphtha or refinery residues, combining them with oxygen or air. In steam reforming, process steam is mixed into the feedstock at very high temperatures to convert it into carbon monoxide (CO) and hydrogen (H_2). Partial oxidation plants are generally found where heavy hydrocarbons are available cheaply or need to be disposed of (e.g. refineries).

Regasification
The process of converting liquefied gases to a gaseous state.

Sabbatical
A flexible work model in which employees are given the opportunity to take an extended leave of absence from work and can then return to their jobs following this break.

Semiconductor
A semiconductor is a solid material with electrical conductivity somewhere on the scale between that of a conductor and a non-conductor level. A semiconductor's conductive properties are closely linked to temperature, with conductivity increasing as temperature rises. Silicon and germanium are often used as semiconductors.

Stoichiometric mode
Stoichiometric mode delivers the exact amount of air required for complete fuel combustion. In this case, the minimum amount of air is added.

VOCs
Volatile organic compounds. This describes various different compounds that are usually used as solvents in paints and varnishes. They are major precursor substances in the formation of ground-level ozone.

Imprint

Imprint

Published by
Linde AG
Klosterhofstrasse 1
80331 Munich
Germany

Design
Peter Schmidt Group, Hamburg

Text
Linde AG

Photography
Rüdiger Nehmzow, Cover and pp. 02, 04, 22, 36, 43 (left), 44, 45, 46, 66, 68
Claudia Kempf, p. 09
Linde AG, pp. 27, 28, 34 (right), 39, 43 (right), 53, 63 (right)
Luigi Caputo (laif), p. 30
Benoit Decout (laif), p. 31 (left)
MIXA (Getty), p. 31 (right)
Paul Langrock (laif), Conergy AG, p. 33
JurgaR (iStockphoto), p. 34 (left)
Henrik Spohler (laif), p. 51
StatoilHydro, Eiliv Leren, p. 55
StatoilHydro, p. 56
Paul Langrock (laif), GFZ German Reserach Centre for Geosciences, p. 61
Patrick Pleul (dpa), p. 62
Fotosearch, p. 63 (left)

Production, typesetting and lithography
Brand Implementation GmbH, Hamburg

Printed by
Offsetdruck Raff, Riederich

Contact information

Linde AG
Klosterhofstrasse 1
80331 Munich
Germany
Phone +49.89.35757-01
Fax +49.89.35757-1075
www.linde.com

Communications
Phone +49.89.35757-1321
Fax +49.89.35757-1398
E-mail info@linde.com

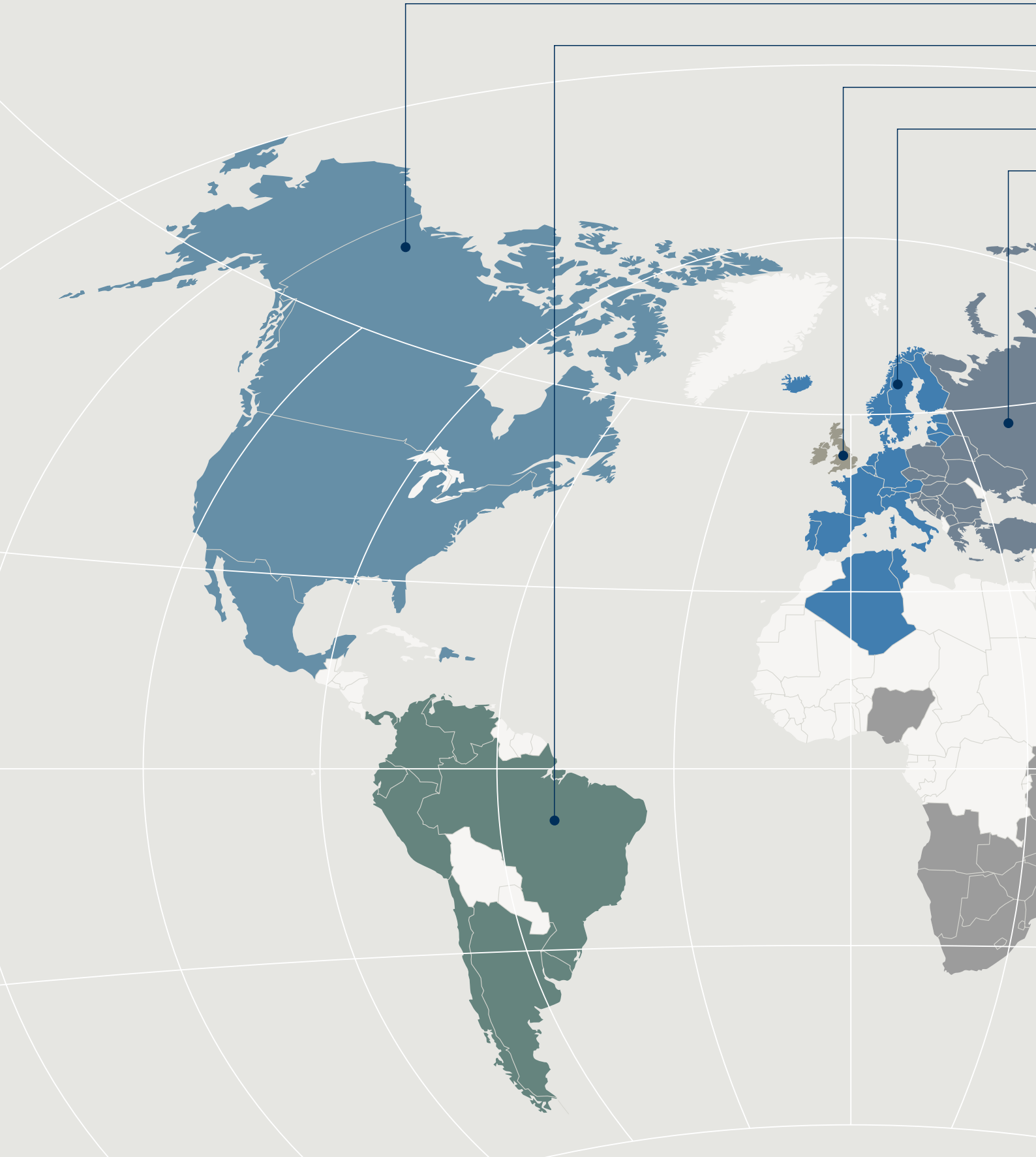
Corporate responsibility
Phone +49.89.35757-1321
Fax +49.89.35757-1398
E-mail corporate.responsibility@linde.com

Investor relations
Phone +49.89.35757-1321
Fax +49.89.35757-1398
E-mail investorrelations@linde.com

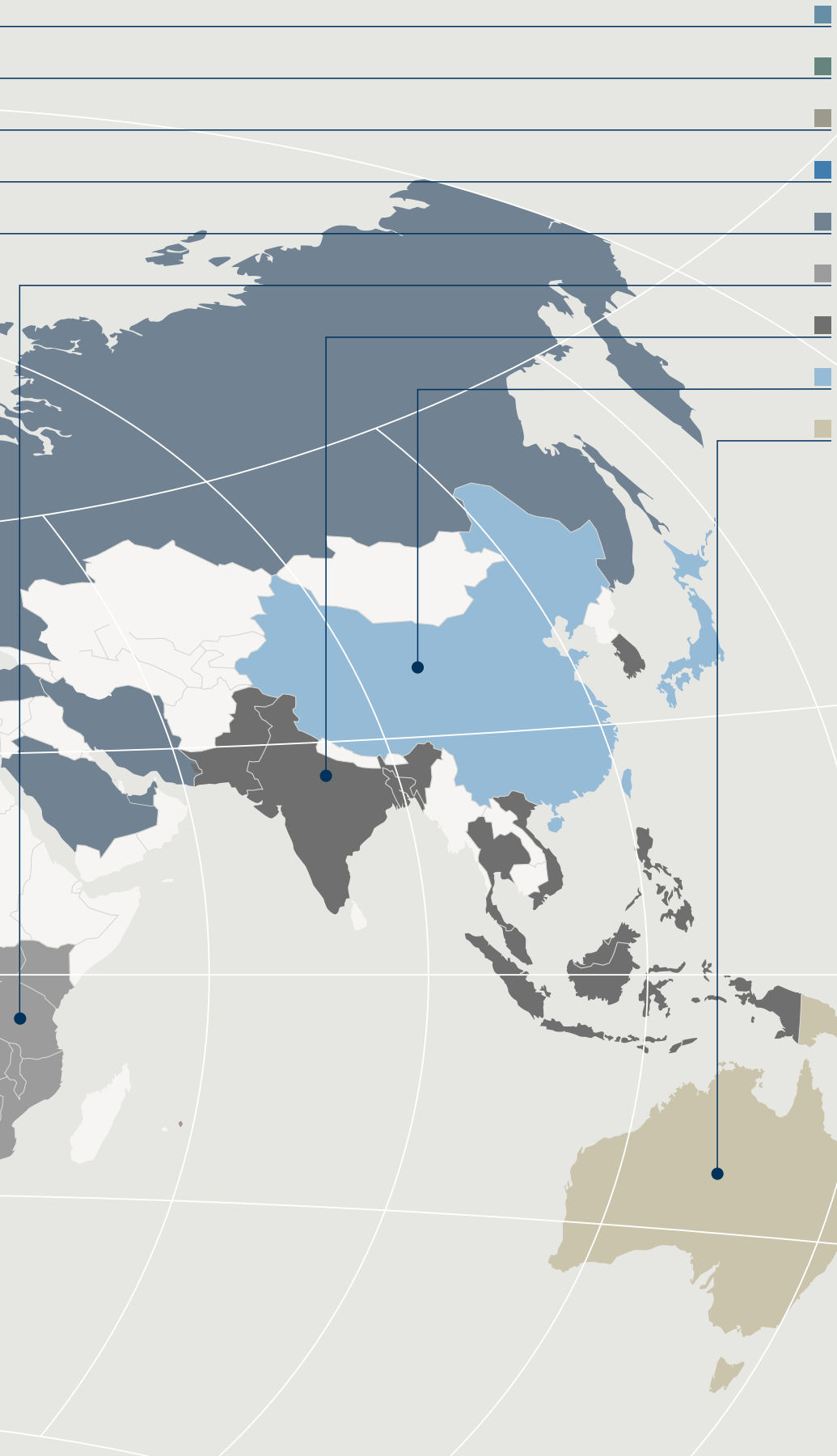
The Linde AG Corporate Responsibility Report is available in English and German. Further documentation and an electronic version of the report can be downloaded at www.linde.com/cr. On request, we would be pleased to forward additional information about Linde free of charge.

→ The Linde World

The Linde World



The Regional Business Units of the Gases Division



- North America
- South Amerika
- UK & Ireland
- Continental- & Northern Europe
- Eastern Europe & Middle East
- Africa
- South & East Asia
- Greater China
- South Pacific

The Gases Division has four operating segments, Western Europe, the Americas, Asia & Eastern Europe, and South Pacific & Africa, which are subdivided into nine Regional Business Units (RBUs). The Gases Division also includes the two Global Business Units (GBUs) – Healthcare (medical gases) and Tonnage (on-site) – and the two Business Areas (BAs) – Merchant & Packaged Gases (liquefied and cylinder gases) and Electronics (electronic gases).

Linde AG
Klosterhofstrasse 1
80331 Munich
Germany
Phone +49.89.35757-01
Fax +49.89.35757-1075
www.linde.com