

2005

Taking a stand. Our positions
on sustainability. The Linde
Corporate Responsibility Report.

Linde Group

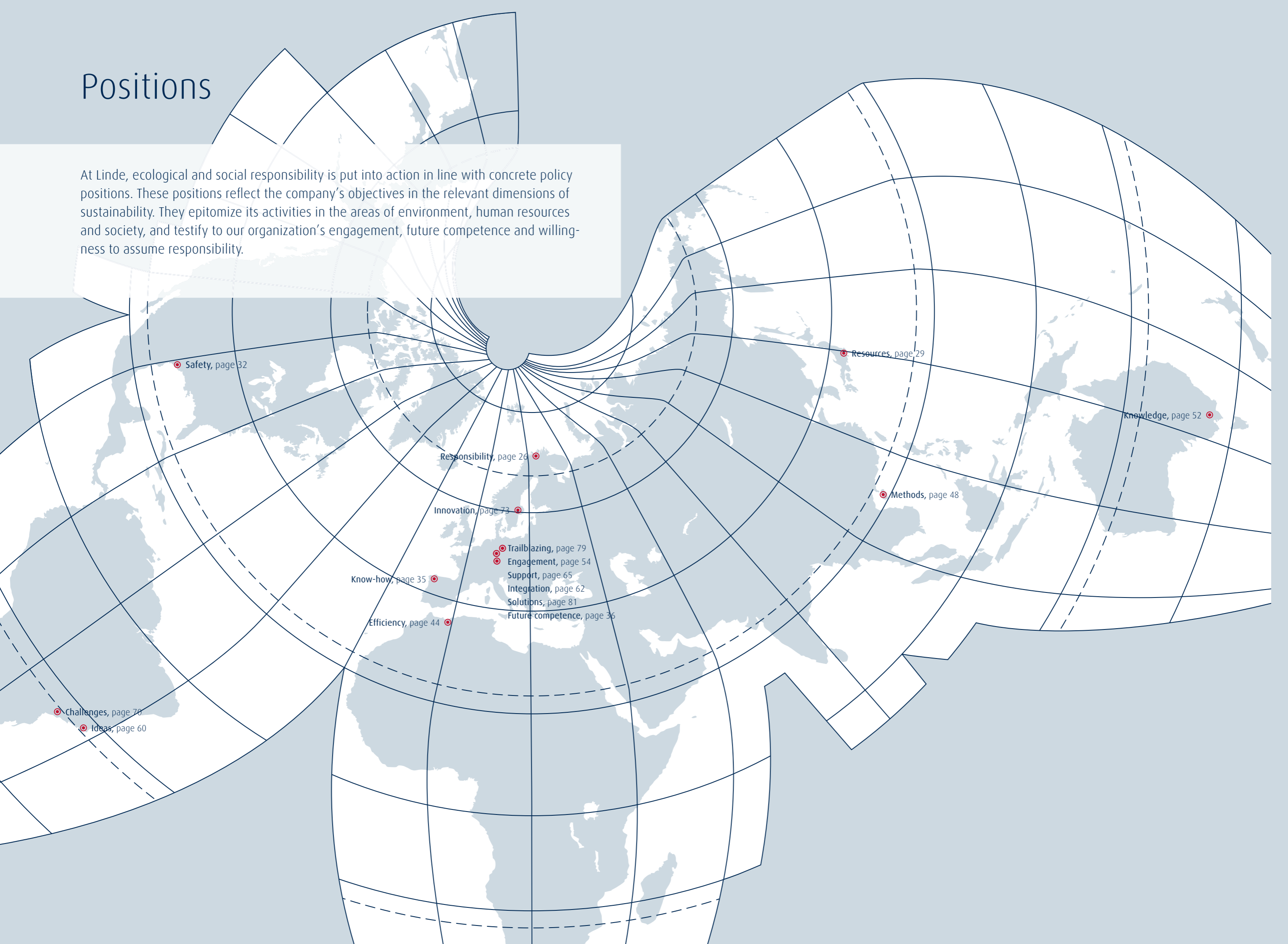
Linde





Positions

At Linde, ecological and social responsibility is put into action in line with concrete policy positions. These positions reflect the company's objectives in the relevant dimensions of sustainability. They epitomize its activities in the areas of environment, human resources and society, and testify to our organization's engagement, future competence and willingness to assume responsibility.



Linde Corporate Responsibility Report 2005

Today Linde is an international player with locations around the world. Every day people of diverse nationalities and cultural backgrounds come into contact with our company and its products. As a result, everything we do as an enterprise has consequences – as does everything we choose not to do. To us, engaging in business today extends beyond the delivery of local services and facilities. It demands that we adopt global positions and embrace responsibilities that transcend national borders. At its locations worldwide, Linde is therefore assuming economic, ecological and social responsibility. This report bears witness to the positions it has taken.

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Company Profile

Linde Group

Linde is an international technology group which has a leading market position in both its business segments, Gas and Engineering, and Material Handling. After the sale of the Linde Refrigeration business segment at the end of the third quarter, we achieved sales in fiscal 2004 of 9.421 billion EUR with some 41,000 employees worldwide.

We will continue to concentrate on the expansion of our international business and pursue with vigor our strategy of earnings-based growth. With forward-looking products and services, we are well-positioned not only in our core markets of Germany and Europe but also in the growth markets of Asia, the United States and Eastern Europe.

Gas and Engineering

The Gas and Engineering business segment comprises our activities both in industrial and medical gases and in plant construction. Both these areas benefit from mutual exchanges of expertise on major projects in all regions of the world. An example of this successful cooperation is our on-site business, where Linde Gas and Linde Engineering work together to supply major industrial consumers with industrial gases from plants installed directly on the customer's own site.

As a leading international supplier of industrial and medical gases, we are also focusing on expanding our fast-growing Healthcare section and are in the vanguard of the development of environment-friendly hydrogen technology.

Linde Engineering, with its technological focus on promising market segments such as hydrogen, oxygen and olefin plants and natural gas processing plants, is successful throughout the world. In contrast to virtually all our competitors, we have extensive process engineering know-how in the planning, project development and construction of turnkey industrial plants.

Material Handling

With its three brands, Linde, STILL and OM Pimespo, as well as its strategic partner Komatsu, our Material Handling business segment is one of the biggest manufacturers of industrial trucks in the world. Very few of our competitors are able to offer, as we do, a complete range of products: engine-powered forklift trucks, electric trucks and warehouse equipment. Our business success in this segment is based on products at the cutting edge of technology and an extensive range of service options from financing to full fleet management, and we are strengthening our position as a leading service provider in all areas of intralogistics.

Linde Financial Highlights

in € million	2004	2003	Change
Share			
Closing price	€ 46.06	42.70	7.9 %
Year high	€ 49.10	43.40	13.1 %
Year low	€ 40.50	22.80	77.6 %
Market capitalization	5,496	5,092	7.9 %
Group			
Sales	9,421	8,992	4.8 %
Incoming orders	9,637	9,079	6.1 %
EBITA before special items	785	683	14.9 %
EBITA	785	556	41.2 %
Earnings before taxes on income (EBT)	518	287	80.5 %
Net income	274	108	153.7 %
Return on capital employed (ROCE) before special items	9.5 %	7.7 %	n/a
EBITA return on sales before special items	8.3 %	7.6 %	n/a
Capital expenditure (excluding financial assets)	987	856	15.3 %
Cash flow from operating activities	1,249	1,281	-2.5 %
Equity	4,081	3,886	5.0 %
Total assets	11,591	11,915	-2.7 %
Number of employees at December 31	41,383	46,164	-10.4 %

Business segments 2004

in € million	Sales	Incoming orders	EBITA	Capital expenditure*	Number of employees
Gas and Engineering	5,406	5,394	684	511	21,787
Linde Gas	4,003	4,007	640	528	17,570
Linde Engineering	1,581	1,525	69	13	4,217
Material Handling	3,372	3,442	191	428	18,878
Refrigeration (until 09/30/2004)	578	733	9	17	-

* Excluding financial assets.

Responsibility in Action – a common theme throughout the organization

Dear Stakeholders,

How can a company stay successful for over 125 years? By remaining true to its core principles. Technological competence, an international mindset, an enthusiasm for research, the urge to innovate, a strong customer orientation, and complete dependability have always formed the pillars of commercial activity at Linde. Weighing ethical factors in our entrepreneurial decisions and practicing honesty in our business activities: these have been fixtures of our corporate culture since the day the company was established. Building on this tradition enables us to master the challenges of today and design new solutions for tomorrow. Our vision of Leading crystallizes our goal of being an exemplary and preeminent technology enterprise in every respect. Our actions and behavior are rooted in our core principles of future competence, dedication and responsibility – throughout the organization, in every corner of the globe.

It was from this platform that we began, in 2004, to integrate corporate responsibility into our management activities with even greater emphasis. For to sustain competitiveness on a long-term basis, companies need to look beyond economic success: they must act responsibly and remain open to dialog. The first Corporate Responsibility Report produced by Linde AG demonstrates how we have woven this issue strategically into the very fabric of our organization. This is necessary if we are to achieve continuous improvements in each of the four focuses we have defined: the environment, our human resources, society and the capital market. Our Corporate Responsibility Roadmap lays out the timetable we have set ourselves for attaining these goals.

The Corporate Responsibility Policy of Linde AG, a declaration voluntarily issued by the Executive Board, stipulates the mandatory Group-wide guidelines that we are determined to implement, and be judged by, in the future. These guideline document the commitment we have undertaken to act responsibly towards our stakeholders, i.e. towards our customers, shareholders, business partners, employees, society – and, not least, the environment.

In order to preserve a high standard of living and a healthy environment for generations to come, we have geared our R & D activities towards melding sustainability with customer benefit in our products and technologies. The vocational programs and comprehensive training opportunities we offer our employees represent a key element in our sustainable corporate strategy. These programs illustrate our contribution to enhancing their professional prospects and potential. After all, our employees are the ones whose ideas, creativity and dedication will drive our innovation and therefore play a pivotal role in keeping our customers satisfied.



Through their everyday work, these people are the most important multipliers and propagators of our corporate responsibility. For only if each and every one of them embodies high standards of integrity, displays respect in their behavior toward others, and embraces accountability in all of their actions, can we truly hope to be lead by example. For this reason we expect our entire workforce to recognize the Code of Conduct approved by the Executive Board in 2005 as binding for their behavior.

Carl von Linde succeeded in building bridges between the worlds of science and commerce. The company founder both preached and practiced the importance of improving society and taking responsibility for one's own actions. We vigorously uphold this legacy by promoting education and learning as part of our commitment to society. The Carl von Linde Academy – which we established at Munich's Technical University in 2004 – is but one example. Specifically keyed to cultural issues, the courses are designed to give students of engineering and the sciences the skills that will help them develop their careers in the global marketplace. In this report you will find further examples of how we are forging our company's future, contributing to technological innovation worldwide, and hence energizing economies both in Germany and beyond. With the launch of regular reports on our corporate responsibility activities, we are simultaneously increasing the company's transparency. The Corporate Responsibility Report augments our annual report by providing detailed environmental and personnel data, thereby creating a comprehensive repository of information that will help us benchmark our goals and activities in the future.

In our conviction, a sound commercial performance is not the only yardstick for corporate success. At Linde, corporate success means more: it is inextricably bound up with the concept of corporate responsibility. This added dimension derives from a commitment to the company's historical roots and a loyalty to central tenets we uphold today as proven values.

A handwritten signature in black ink, appearing to be 'W. Reitzle', written in a cursive style.

Prof. Dr. Wolfgang Reitzle
President and CEO
Linde AG

Corporate Responsibility

Global economic, ecological and social trends and events are increasingly defining market parameters for international businesses. As a consequence, the Linde Group has decided to bolster its long-term shareholder value policy with a corporate responsibility strategy. For us, corporate responsibility means adopting a responsible approach toward employees and natural resources, toward the funds entrusted to us, and toward the promotion of societal interests.

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Our Responsibility

Like our business strategy, our corporate strategy is based on our vision of Leading. The embedding of the four dimensions of corporate responsibility – environment, human resources, society and the capital markets – into our everyday business activities creates our platform for long-term commercial success.

Vision and values

Oriented internationally from the very outset, Linde has distinguished itself from the day of its founding by technological competence, innovative engineering, customer orientation, and dependability. The values and objectives of today’s Linde Group are a natural outgrowth of this fertile philosophy.

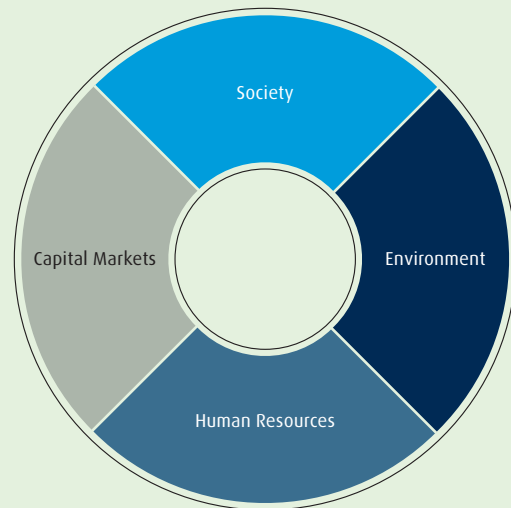
“Leading” is the word we have chosen to describe our potential and corporate ambition of being a leading player worldwide in each of our fields of operation and an exemplary enterprise in every respect. Future competence, a dedication to our beliefs, and an awareness of responsibility define the core ethos by which the Linde Group is seeking to attain this goal.

Strategy

Our strategy of corporate responsibility is keyed to these basic beliefs. It is designed to incorporate the key criteria relevant to the four dimensions cited above into our corporate decision-making and to progressively advance Linde’s status as a global leader in these areas as well.

In August 2005, the Linde AG Executive Board voluntarily adopted a Corporate Responsibility Policy as a central component of its corporate responsibility strategy. This policy is obligatory for all of our business segments.

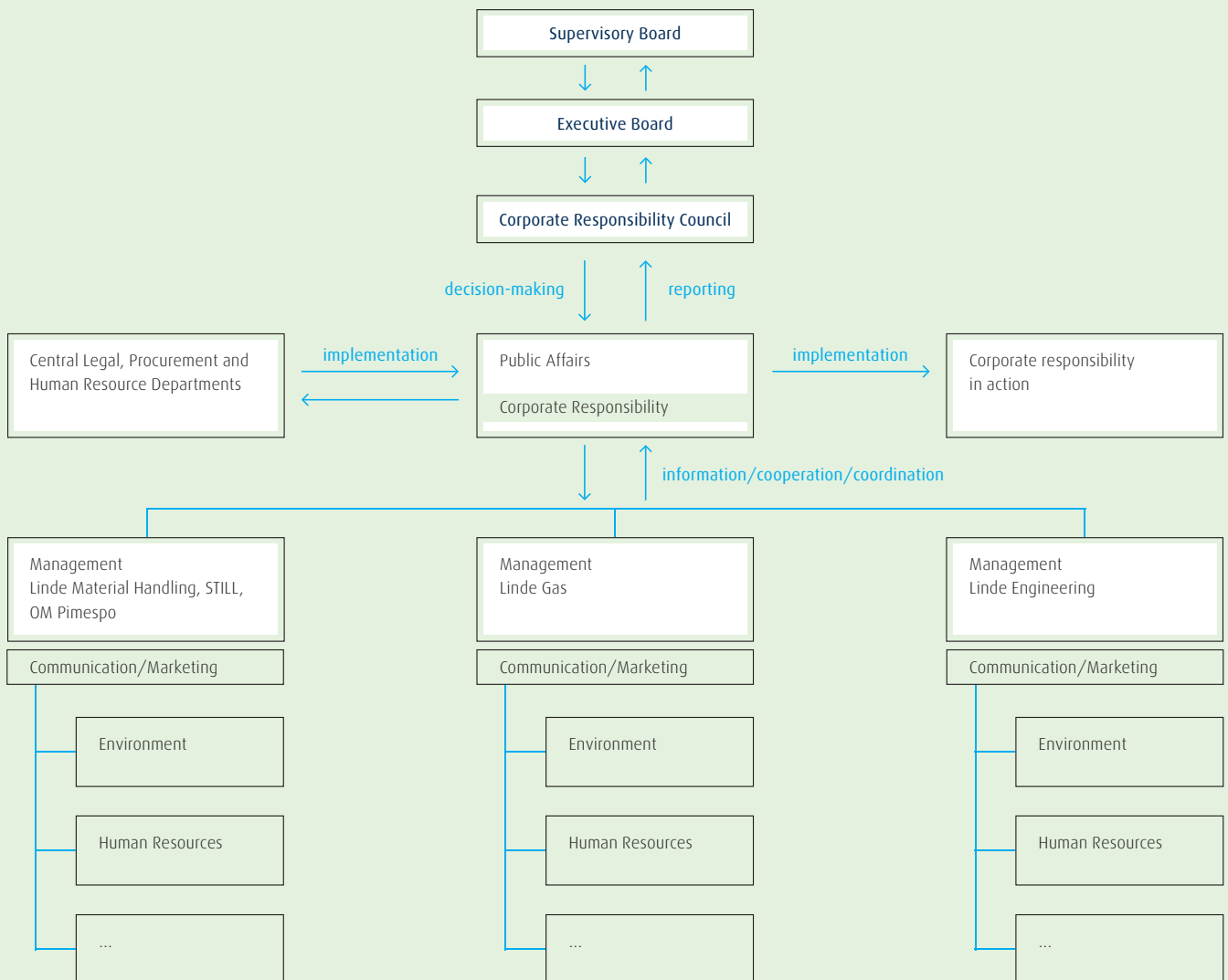
The four dimensions of Corporate Responsibility at Linde



About this Report

Together with the information available on the internet (www.linde.com), this Corporate Responsibility Report marks the commencement of regular reporting by the Linde Group. Wherever possible, this report adheres to internationally recognized standards. Our core concern is to credibly convey the institutionalized importance of corporate responsibility at Linde. The report covers environmental and personnel-related data and statistics for the calendar year 2004, although the topics and information presented in its various chapters transcend this time frame. The editorial deadline for the report was June 30, 2005.

Institutionalization of Corporate Responsibility within the Group



The central Corporate Responsibility unit was established at Linde in late 2004. Located within the Public Affairs department, it reports to the newly-created Corporate Responsibility Council.

Organization

At the end of 2004, the Executive Board at Linde instituted a central Corporate Responsibility unit. Its mission entails identifying potential for action in the four dimensions of environment, human resources, society, and capital markets. It is further charged with setting relevant targets and designing measures that will produce ongoing and verifiable improvements in our performance – both in these four dimensions and within the enterprise as a whole. The Corporate Responsibility

unit is located within the Public Affairs department and reports to the likewise newly-established Corporate Responsibility (CR) Council. This body is responsible for making strategic decisions, determining and adopting targets, and approving concrete measures for their implementation. The composition of the CR Council, which includes both Executive Board Chairman Prof. Dr. Wolfgang Reitzle and Dr. Aldo Belloni (who represents the Gas and Engineering business segment on the Board), testifies to the importance ascribed to corporate responsibility by the Group's management.

Corporate Responsibility Policy

Philosophy

Future competence, dedication and responsibility: these are the basic values with which we, as a leading global technology enterprise, have aligned ourselves. We view these values as driving the competitiveness and the long-term success of Linde AG, as well as securing the organization's pivotal place in society.

All Linde AG employees are required to recognize the guidelines derived from this Corporate Responsibility Policy as mandatory and to implement them in our everyday business activities.

Principles

Linde undertakes to act responsibly toward its shareholders, business partners, employees, society, and the environment – in every segment and at every business location worldwide.

Linde commits itself to technologies and products that combine customer benefit with the promotion of sustainable development.

Linde will secure the sustained success of the enterprise by investing in its employees, in research and development, and in solutions to social problems and challenges.

Guidelines

Markets

- We pursue value-oriented business policies that are aligned with the interests of the enterprise, its shareholders, and its stakeholders in general.
- Responsibility, as part of the management and supervision of Linde AG, will be continuously optimized to reflect good principles of corporate governance.
- Our activities are centered on the needs and desires of our customers.
- We deliver innovative and comprehensive solutions for the market with the aim of playing a sustained role in shaping improvements to society.
- We declare our firm commitment to free and fair competition and act accordingly toward our competitors and business partners.

Employees and society

- We promote respect and openness both within the organization and when we interact with partners.
- We seek to advance the company through a continuous learning process and by offering our employees an array of opportunities for leveraging their potential.
- We place our knowledge and expertise at the disposal of society and secure our own success through a readiness to cooperate.
- We are receptive to other cultures and harness their diverse experiences and perspectives to everyone's advantage.
- We shape a work environment in the company that ensures equal opportunities.
- We actively support educational and research projects that are related to our core business areas.

Environmental protection and safety

- We commit ourselves to the responsible treatment of natural resources.
- We continuously integrate controls relating to safety, environmental protection and quality into our work processes and refine our management systems with the aim of cementing our competitiveness.
- We conduct research and development on sustainable technologies and products, and promote their application on the market.



Prof. Dr. Wolfgang Reitzle



Dr. Aldo Belloni



Dr. Peter Diesch



Hubertus Krossa

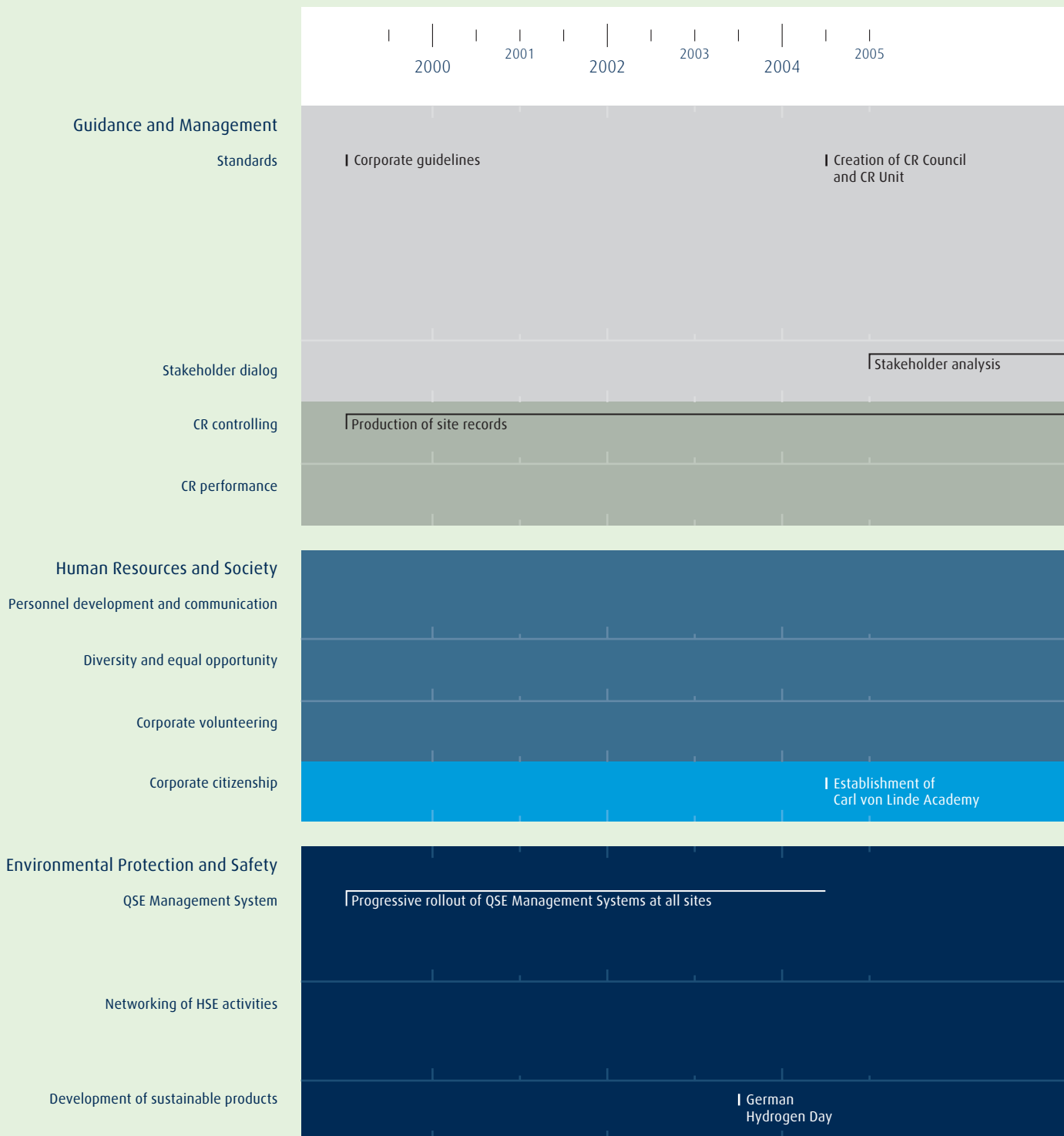
Obligation

- We demonstrate our accountability toward our shareholders, employees, customers, business partners, and the general public by issuing regular and accurate reports.
- Any and all other company guidelines are compatible with our Corporate Responsibility Policy.

Corporate Responsibility Roadmap

We have set ourselves ambitious goals with our corporate responsibility strategy. Having detailed these in the form of a roadmap, we have already achieved important milestones during the course of 2004 and 2005:

- the institutional cementing of corporate responsibility within the Group as a whole
- the creation of an enterprise-wide database for environmental and personnel-related statistics as a reporting tool
- the formal adoption of a Corporate Responsibility Policy
- the publication of a Code of Conduct for all employees and the establishment of a Corporate Compliance Committee.

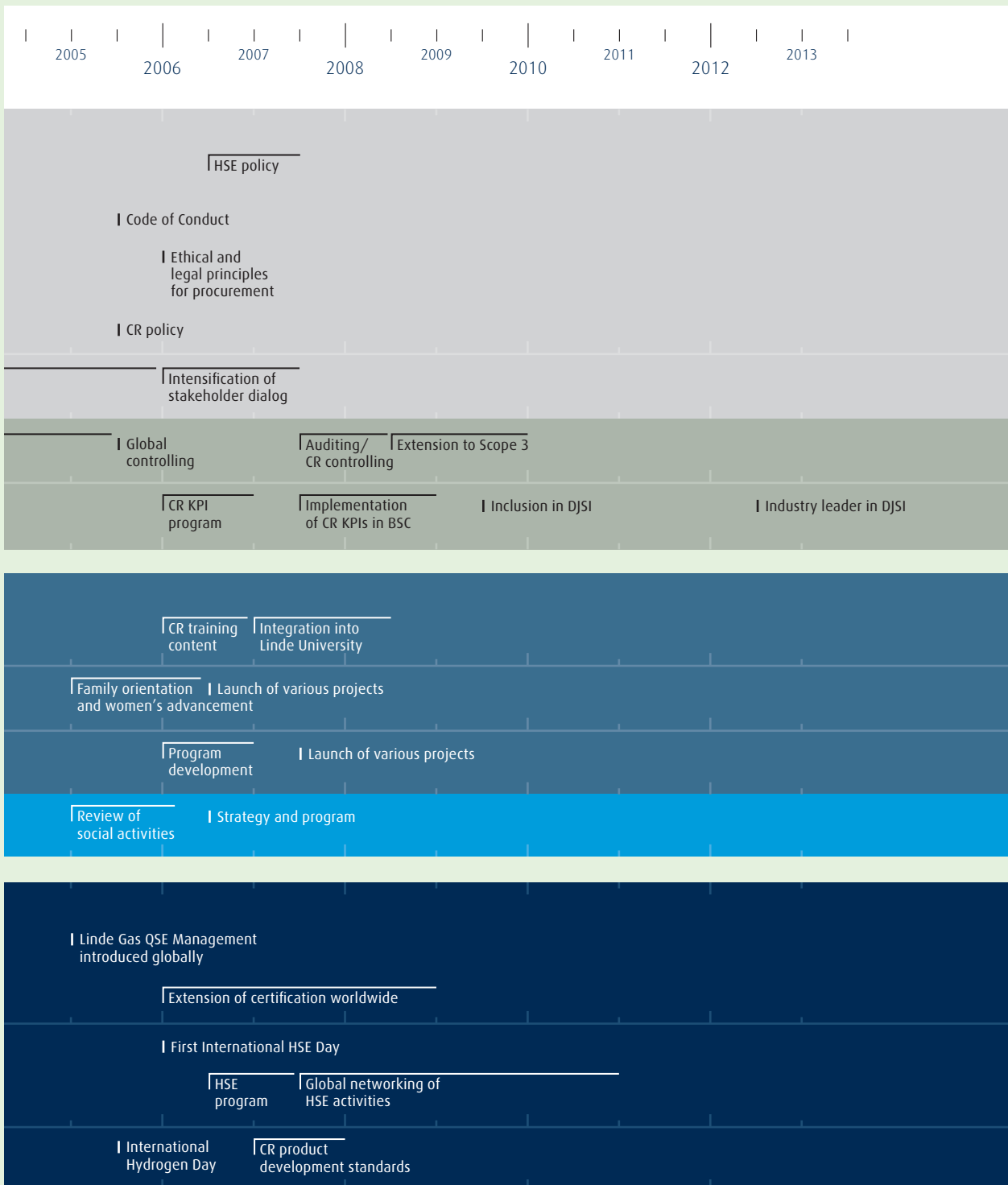


Organizational implementation of the Corporate Responsibility Strategy at Linde

The implementation of the corporate responsibility measures will further heighten an awareness of these important issues in our workforce. All Linde employees are kept regularly informed about our goals and actions through our internal communication media, such as the international company publication "Linde Today." A number of projects – which will culminate in the Group-wide networking of areas relevant to corporate responsibility – are currently underway.

For explanations of abbreviations, see Glossary.

- → Capital Markets
- → Human Resources
- → Society
- → Environment



Corporate Governance

The principles of corporate governance ensure that our company is managed and supervised in a manner that is both responsible and geared to sustained value creation. Corporate governance creates transparency, thereby promoting the trust of our national and international investors, our business partners, our employees and the general public. At the same time, corporate governance is an applied form of risk prevention, systematically safeguarding our company from potential damage.

Management Philosophy

We believe that responsible corporate management, as guided by the principles of good corporate governance, also implies the voluntary assumption of responsibility in relation to human rights, employer relations and environmental protection. We subscribe fully to the principles contained in the UN Universal Declaration of Human Rights, the ILO Declaration on Fundamental Principles and Rights at Work, and the Rio Declaration on Environment and Development.

Values and guiding principles

In 2005, as a tangible manifestation of its forward-looking strategies, commitment and responsibility, Linde adopted a Corporate Responsibility Policy. That policy forms the core of the company's voluntary espousal of corporate responsibility and is outlined in detail in the section "Corporate Responsibility" (pp. 12–13).

The "Code of Conduct" (see "People," p. 56), which was also adopted this year, is based on the Corporate Responsibility Policy and defines the corporate values in more concrete terms. The Code of Conduct imposes significant demands on all employees of Linde AG, and is the yardstick of all our activities. Linde expects its employees to acknowledge the Code of Conduct – and, indeed, all other guidelines – as binding. The central Corporate Compliance Committee regularly reviews the development of the Code and monitors its compliance.

The German Corporate Governance Code

The German Corporate Governance Code sets out the German guidelines on sound and socially acceptable corporate management in detail, making it easier for foreign investors in particular to understand the specific provisions relating to the supervision and management of listed German companies. The Code contains selected rules of applicable German corporate law as well as internationally and nationally recognized standards, which are provided in the form of recommendations and suggestions. Companies may choose not to adopt the recommendations, but are required by law to disclose this annually. Deviations from the suggestions contained in the Code are permissible without disclosure.

On March 14, 2005 the Executive and Supervisory Boards issued an updated annual declaration pursuant to Section 161 of the German Stock Corporation Law ("Aktiengesetz") that we comply with the recommendations of the Government Commission on the German Corporate Governance Code, as amended on May 21, 2003 and published by the Federal Justice Ministry in the official section of the electronic German Federal Gazette ("Bundesanzeiger"). In such declaration, we also indicated which of the recommendations we have not

adopted. The declaration is available to shareholders at all times on the Linde website. Linde AG deviates from the recommendations of the German Corporate Governance Code (in the wording valid at May 21, 2003) only inasmuch as we have opted not to publish details of the compensation paid to individual Executive and Supervisory Board members.

Linde AG also complies with virtually all of the suggestions contained in the Code, and deviates in only three instances: the Code suggests that the General Meeting should be broadcast on the Internet. We transmit the speeches held by the chairpersons of the Supervisory and Executive Boards, but not the general discussion that follows. The company's Articles of Association do, in principle, allow the entire General Meeting to be transmitted via the electronic media. However, in view of the technical complexities and the possible duration of General Meetings, we do not consider that the costs associated with such transmission can currently be justified by the benefits it would provide to the shareholders. Furthermore, we are reluctant to infringe upon the personal rights of individual speakers by publishing their contributions. We will, however, be following further developments very closely.

We believe that the suggestion to elect or reelect members of the Supervisory Board at different times and for different terms of office is inappropriate for a Supervisory Board which is constituted in accordance with the German Codetermination Law ("Mitbestimmungsgesetz"). Due to the fact that the employee representatives are elected for a period of five years, this would result in unequal treatment of the shareholder representatives. Here as well, we will be tracking further developments.

Finally, the Code suggests that the variable component of compensation paid to Supervisory Board members should be keyed to the long-term performance of the company. The General Meeting of June 8, 2005 resolved that the arrangements relating to the compensation paid to members of the Supervisory Board should be revised. A conscious decision was made not to introduce a long-term component. We believe that arrangements concerning such components are a critical issue, and prefer to retain a system of compensation that is transparent and easy to understand.

The latest version of the German Corporate Governance Code and further information on corporate governance at Linde are available on our website at www.linde.com.

Responsibilities of the Executive and Supervisory Boards

The Executive Board of Linde AG directs the company and manages its business. It is bound by the interests of the company and committed to increasing its long-term value. Our control and management system is guided by the objective of value generation within the Linde Group. The system guarantees that our corporate values are firmly anchored in the decision-making processes of the Executive Board and the company's staff. The benchmark for success in the individual business segments and in the Group as a whole is the return on capital employed (ROCE).

The Executive Board is responsible for developing the company's strategic direction, in consultation with the Supervisory Board, and for its implementation. In all measures which are adopted, the Executive Board complies with the legal requirements and ensures that statutory rules and regulations are observed throughout the Group. The Executive Board also ensures that an appropriate system of risk management and risk controlling is in place, and that effective planning systems are established and developed. The efficacy of the risk management system is subject to constant review, and is set forth in the Annual Report.

The Supervisory Board consists of 16 members. In accordance with the German Codetermination Law, it is constituted in equal parts by shareholder representatives and employee representatives. The shareholder representatives are chosen by the General Meeting, while the employee representatives are elected in accordance with the provisions of the German Codetermination Law. The Supervisory Board appoints the Executive Board, and advises and supervises the Executive Board in its management of the company.

The Supervisory Board has constituted three committees: a Standing Committee, an Audit Committee and – as prescribed by Section 27 (3) of the German Codetermination Law – a Mediation Committee.

Emoluments

The emoluments of the Executive Board are performance-related and comprise both fixed and variable components. The remuneration scheme for the Executive Board consists of cash remuneration and share options. The cash remuneration is based on an annual target income, 40 percent of which is paid in fixed monthly amounts. Sixty percent of the income is variable and comprised of a dividend-related component and earnings-related bonuses which are determined by individually agreed targets. In 2004 the cash emoluments paid to members of our Executive Board totaled 8,435,000 EUR (2003: 6,929,000 EUR), made up of fixed emoluments totaling 2,690,000 EUR (2003: 2,839,000 EUR) and variable emoluments of 5,744,000 EUR (2003: 4,909,000 EUR). As in 2003, a total of 240,000 subscription rights were issued to members of the Executive Board under the share option program (Linde Management Incentive Program), with a market value of 1,900,000 EUR on the date of issue (2003: 1,718,000 EUR).

Subject to amendments in the relevant legislation, we do not publish the individual emoluments received by members of the Executive Board. We believe that the publication of a single figure indicating the total emoluments paid underlines the principle of the collective responsibility of the Executive Board. We are also of the conviction that the disclosure of individualized figures counteracts the advantages conferred by differentiating salaries based on performance. New arrangements governing the compensation paid to members of the Supervisory Board were adopted at the Linde AG General Meeting on June 8, 2005.

The compensation, as set forth in the Articles of Association, comprises a fixed fee and a variable component that hinges upon the company's success. From fiscal 2005 onwards, the latter component will be determined not merely by the dividend, but also by the ROCE achieved by the Linde Group in the year in question. Additional remuneration is paid to the Chairperson, Deputy Chairperson and members of the Standing Committee as well as to the Chairperson and members of the Audit Committee. If a member of the Supervisory Board holds several offices simultaneously, each of which entitles him or her to a higher level of compensation, that member receives

only the remuneration applying to the most highly paid office. In fiscal 2004, the total remuneration paid to the Supervisory Board for the discharge of its responsibilities in the parent company and subsidiaries was 1,739,000 EUR (2003: 1,543,000 EUR).

Further details on the remuneration of the Executive and Supervisory Boards can be found in our Annual Report and on the Internet.

Risk management

As a global company, Linde is exposed in the course of its business operations to a number of risks. We counter these risks by applying a comprehensive risk management system which forms an integral part of our business processes and the basis for all corporate decision-making. The aim of the system is to identify potential risks arising from our activities at an early stage, to monitor those risks, and to reduce them by adopting appropriate control measures. The main components of the risk management system are the planning system, internal reporting procedures and an extensive risk reporting process.

Internal auditors perform regular reviews of the efficiency of our risk management operations and processes and the reliability of the systems employed. In this context, checks are made to ascertain whether those responsible for controlling risk attend the relevant management meetings, and to ensure that the current risk status is accurately delineated. In line with the latter objective, appraisals of risks which have already been identified are regularly reviewed, information is updated as necessary, and potential new risks are identified and assessed at their inception. Internal auditors attend selected meetings. The measures adopted to minimize risks, as outlined above, and the implementation of those measures form a key part of the review. In addition, an external auditor examines whether any developments which might endanger the existence of the Group as a going concern would be identified at an early stage and reports its findings to the Executive and Supervisory Boards.

By implementing standardized internal reporting procedures throughout the Group, we ensure that we monitor and control all economic risks arising from ongoing business operations. A monthly report is provided to the Executive Board and the various tiers of management assessing the economic situation and the extent to which targets have been met. In addition, the Balanced Scorecard (see Glossary) system introduced in 2003 ensures that the critical success factors necessary to achieve our corporate goals are subject to constant review. We implement this tool to identify any deviations from targets early on and institute appropriate countermeasures. In the medium term, Corporate Responsibility Key Performance Indicators (KPI; see Glossary) are to be integrated in the Balanced Scorecard (see CR Roadmap, pp. 14–15).

The principal risks that might significantly impact our business performance, net assets, financial position and results of operations are set out below. A comprehensive presentation of the entire risk management process, along with a list and an assessment of all risks to which Linde AG is exposed, can be found in the Annual Report.

Market risk

As a global technology group, Linde is subject to market risk in respect to both purchasing and sales. As far as purchasing is concerned, the major risks relate to the availability and cost of raw, input and intermediate materials along with energy.

As a general rule, our procurement policy – and hence the selection of our suppliers – is keyed to performance and quality. Early in the process, we take action to minimize risk arising from dependency on one supplier, or several suppliers, by increasing the diversification of our procurement activities.

To avoid risks inherent in sales, we have launched a large number of optimization programs in the Group's individual divisions. The introduction of the Six Sigma program some two years ago (see Glossary) has enabled us to increase our competitiveness.

As a global company, Linde is exposed in the course of its business operations to a number of risks. We counter these risks by applying a comprehensive risk management system which forms an integral part of our business processes and the basis for all corporate decision-making. Internal auditors regularly review the efficacy and efficiency of our risk management operations and processes.

Production risk

To manage quality risk, quality control is prioritized by Linde right at the beginning of the value creation process. From the very start, Linde delimits the quality-related risks by setting demanding quality standards for development, performing rigorous reviews throughout the process chain, and by maintaining close contacts with suppliers.

Financial risk

We systematically control financial risks with the aid of our mandatory risk policy guideline. This sets out the type of financial instruments that may be used, the limits for individual transactions and the list of participating banks. For every commercial transaction, there is a strict personnel and organizational division between negotiations, contract performance and monitoring.

We make financing and hedging decisions on the basis of our financial and liquidity forecasts, which include all the main business units in the Group. Our multi-currency rolling 15-month forecast is embedded in our financial reporting system – which is also used for accounting and financial control purposes – providing a consistent basis for figures. In the Gas and Engineering business segment, we also deploy financial instruments as a safeguard against fluctuations in electricity prices.

Personnel risk

In the Linde Group, we have always set great store by the integrity of all our employees in both their internal and external dealings (see the detailed information contained on our Code of Conduct in the section entitled “People,” p. 56). All Linde Group employees who have access to confidential or internal information are under obligation to comply with the relevant statutory regulations and to treat such information responsibly. The strict separation of management and control functions limits the risk that personnel may act in ways that are detrimental to the company.

An Antitrust Compliance Program has been established to prevent risks connected with cartel and antitrust law; within its scope, we have issued an information brochure to our employees. We also sponsor talks on anti-trust regulations, outlining the risks infringements may entail for the company and its staff.

Managing risks arising from absenteeism and succession issues forms an integral part of our personnel policy, and is explained in detail in the section “People.” Information on the measures we have adopted to prevent risks to the health of our employees can be found in the section entitled “Environmental Protection and Safety.”

Legal risk

In the course of our business activities, we are exposed to various liability risks. These may arise from potential claims for damages relating to product liability (the Healthcare division in particular is exposed to heightened risk, due to its range of pharmaceutical products) and from any noncompliance with statutory requirements. In addition to applying high quality and safety standards to preempt claims, we have taken out insurance to protect us from potential consequences, should damage occur.

We continue to face a number of suits brought against the gases industry in 2002 for compensation; these relate to health problems allegedly caused by the use of asbestos or certain welding materials.

The majority are class actions filed in the United States, a few of which have been brought against Linde companies based in the U.S.A. In our current assessment, the risk of these actions affecting the Linde Group is low, but cannot be completely discounted.

We maintain an open dialog with our stakeholders, i.e. our employees, customers, suppliers, the general public and government institutions. We encourage our employees to voice criticism and submit suggestions in a spirit of openness and candor. When interacting with suppliers and customers, they are expected to conduct themselves in a manner which is impartial and completely free of personal motivation.

Overall risk

During the year under review, there were no risks which threatened the existence of the Linde Group. Seen from today's vantage point, no risks have been identified which could jeopardize the continued existence of the Group as a going concern.

We consider the specific social, ecological and ethical risks addressed in this report to be an important element of our risk management system and therefore adopt a systematic approach to countering them. Detailed comments can be found in the sections "Environmental Protection and Safety" and "People."

Stakeholder relations

In addition to the interests of its shareholders, Linde takes account of the interests of other groups that contribute to the company's success as well. All these groups – the so-called stakeholders – are included as far as possible in the company's corporate communication network. Linde defines its stakeholders as including all its employees, customers and suppliers, the general public, the relevant associations and government institutions.

Our stakeholder relations are handled by the managements of our business units and segments. Where issues arise which affect the Group as a whole, a dialog is initiated by the central Communication department in Wiesbaden. To ensure that we are able to identify and respond to our stakeholder groups even more effectively in the future, we are planning a comprehensive stakeholder review for 2005/06.

The aim of this review will be to define and characterize all our stakeholders, and also to assess the relevance of each stakeholder group for the company more accurately than has been done in the past. This will enable us to engage in an even more focused and strategic dialog, to the benefit of both the organization and its stake-

holders. A few examples serve to illustrate ways in which we already engage in dialog today. We encourage our employees to voice criticism and submit suggestions in a spirit of openness and candor. In anonymous surveys, employees are given the opportunity to express their views on their working environment to the Human Resource department of their relevant business segment, where the findings are instrumentalized for planning and implementing improvements.

All the divisions in the Linde Group deploy customer surveys and market analyses to measure their level of satisfaction with Linde products and services. The individual segments draw on the feedback generated by these tools in designing strategies to promote the successful development of activities.

As a listed company, Linde is clearly focused on the capital market. We communicate on a regular basis with our private and institutional shareholders, as well as with potential investors, via a large number of one-on-one meetings and telephone conferences, at roadshows and investors' meetings. The members of the Linde AG Executive Board also take part in these events.

In the Socially Responsible Investment (SRI) segment, which is becoming increasingly important, the Linde share is currently underweighted. This is principally due to the fact that we are not yet listed in the key sustainability indices. In order to remedy this, we will be constantly improving our corporate responsibility performance as well as our communications with the appropriate ratings agencies.

We call on our employees to comply with the rules of fair competition. When interacting with suppliers and customers, they are expected to conduct themselves in a manner which is impartial and completely free of personal motivation.

In their business practices and dealings with public authorities, our employees are expected not to offer or grant any unlawful benefits to other parties, and similarly not to request or accept any such benefits.

Linde endeavors at all times to report accurately and fully to government agencies, business partners, investors and the general public in accordance with the statutory requirements. We further use our best efforts to ensure that our accounts accurately document our business operations in compliance with internal and external accounting standards.

Linde collaborates with the public authorities in a spirit of cooperation and supports their efforts while safeguarding its own rights. In their dealings with government agencies, our employees are required to comply with applicable laws and guarantee a sufficient degree of transparency.

The Internal Audit department regularly monitors compliance with these principles.



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Hammerfest, page 26

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Tokyo, page 28

Haikou, page 48

Environmental Protection and Safety

Linde is committed to the responsible treatment of both human beings and the environment: the standards it upholds – governing quality, environmental protection, and product and workplace safety – are documented in guidelines for the various business segments and form an integral part of the Group's corporate strategy.

We view the systematic integration of quality and environmental protection management practices, alongside product and workplace safety, into all our work processes as a core requirement for providing safe, environment-friendly and cost-effective products and services.

Continuous improvements to these management systems ensure that hazards for humankind and the environment are preempted wherever possible.

Innovative technologies and products that protect and conserve natural resources form a major focus of Linde's research and development activities.

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Responsibility

Hammerfest, Norway

Every company bears responsibility. Down to the final detail. The Barents Sea, one of the world's key fishing grounds, will be home to Europe's largest natural gas liquefaction plan – built with Linde know-how. Here, off the Norwegian coast, is the world's first LNG processing facility to return the carbon dioxide contained in natural gas to sub-seabed storage. Nothing escapes into the atmosphere; nothing upsets the precarious ecological balance.





23-MA-112 SWL-3.0T

50-MA-109 SWL-6.0T

36°

Tokyo, Japan

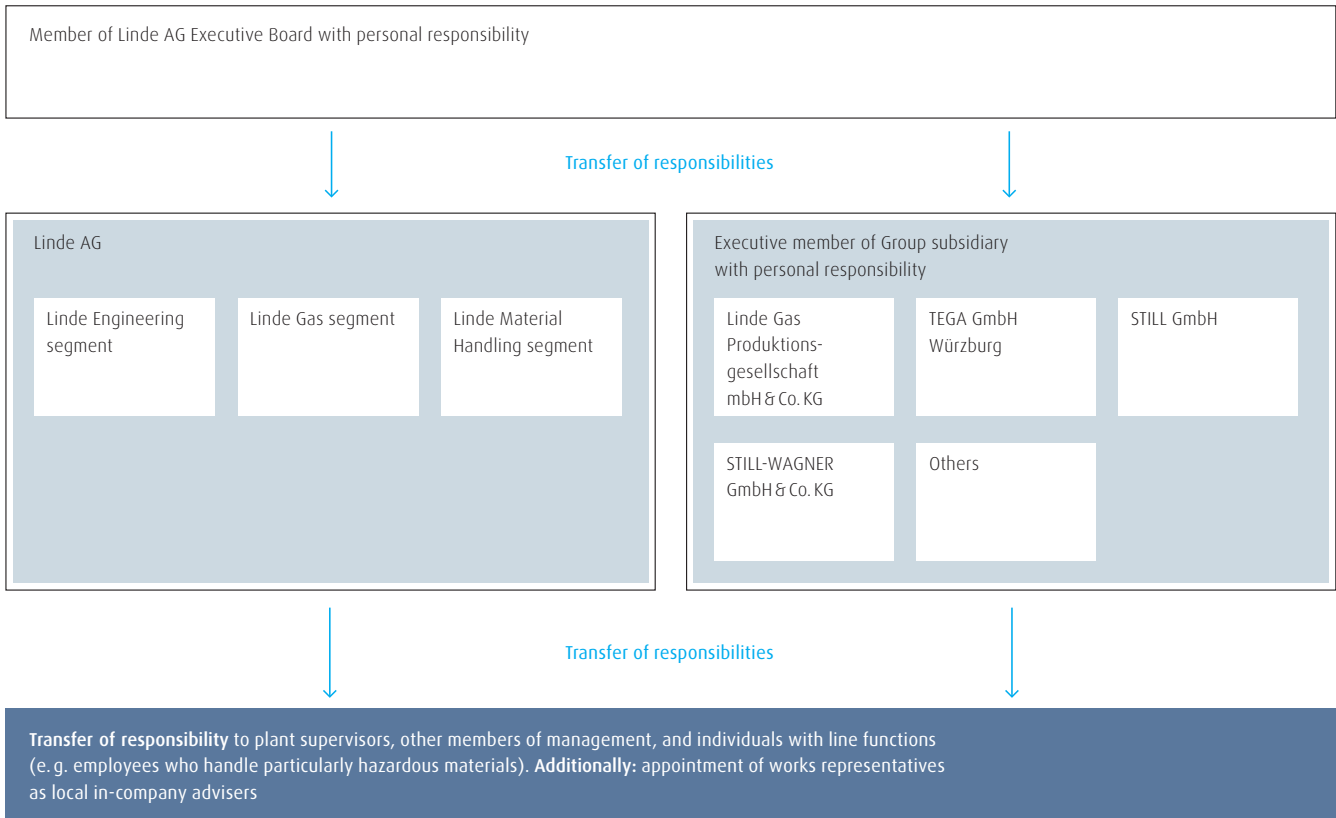
Natural gas is environment-friendly – and it pays! Natural gas is an environmentally compatible alternative to petroleum – and it is still available in abundance on our planet. It can be transported from its source to users in either gas or liquid form. We produce liquefied gas at our plants and dispatch it all over the world on tankers – e.g. to the rapidly growing market in Japan.

Resources 

140°



Assignment and Delegation of Employer Responsibilities¹



In Germany, the responsibilities are clearly and hierarchically defined when it comes to accidents or major disruptions to operations within the scope of environmental protection and safety. Beyond this, the divisions and subsidiaries are separately responsible for compliance with the relevant legislation and any specific company regulations which exceed the statutory requirements.

Cemented in the corporate management system

Even the best information campaigns and precautions cannot guarantee absolute safety and completely eradicate error; even in the most reliable risk management system, a residual risk always remains.

When accidents or major disruptions to operation occur, the responsibilities need to be delineated clearly. If the problems can be attributed to infringements of the relevant statutory regulations, the company may be subject to sanctions or damage claims.

As a matter of principle, the Linde AG Executive Board is responsible for passing all central regulations. In accordance with German legislation and a resolution of the Executive Board, Dr. Aldo Belloni has been designated the Executive Board member personally respon-

sible for environmental protection and safety. With active assistance and backing from corporate headquarters, information is regularly exchanged between the environmental protection and safety departments of the Group's various business segments.

Beyond this, the business segments are independently responsible for adhering to the relevant laws and complying with any supplementary company-specific provisions.

Given the different structures, implications and characteristics of the various industries that we serve, the following section contains separate appraisals of environmental protection, workplace and product safety, and quality management for Linde Gas, Linde Engineering and Material Handling.

¹ According to German law.

Linde Gas

At Linde Gas, ongoing improvements to safety, environmental protection and product quality are keyed to defined global targets achieved through a system of reviews and adjustments. The key principles underlying this process are detailed in a policy on Safety, Environmental Protection and Quality.

This policy in turn reflects the principles of environmental protection and safety set forth in the Corporate Responsibility Policy – which applies throughout the Group. The policy extends beyond compliance with the statutory regulations in the various countries of operation: on the one hand it represents a voluntary and self-imposed commitment to entrepreneurial responsibility and, on the other, a crucial requirement for the success of Linde Gas in the international marketplace. Linde Gas pursues policies of preemption and precaution and demands a similarly responsible approach from its business partners.

Products and production processes

Linde Gas manufactures industrial and medical gases. The most important of the products offered by Linde Gas are acetylene, argon, carbon dioxide, helium, hydrogen, nitrogen and oxygen. These are complemented by a number of special gases and other noble gases. Several of these are supplied in food-grade quality.

Just as varied as the actual gases produced by Linde Gas are their respective applications and methods of manufacture. The many different processes involved are described in detail on the Linde Gas website (www.linde-gas.com).

Thanks to our tightly-knit production, sales and distribution network, we can guarantee customers rapid and reliable supplies: ranging from bottled gas and tank delivery through to on-site generation plants and pipelines.

Systematic environmental protection and safety management

Systematic QSE management at Linde Gas

Implemented worldwide, our integrated management system for quality, safety and environmental protection (QSE) defines the key issues in occupational health, environmental protection, and workplace and product safety. In addition, the QSE management system also lays

down standards that provide for the highest possible safety levels for individuals handling our gases and operating supply equipment and facilities.

The system's full integration into our complete flow of operations brings myriad benefits. Accidents at the workplace and healthcare costs can be avoided, for instance, while disruptions to operations can be reduced. Furthermore – thanks to process optimization – costs can be lowered and customer requirements satisfied with even greater efficiency.

The QSE management system ensures that potential hazards are preempted for all employees, contracted companies and customers. Similarly, at all of Linde's locations throughout the world, we run intensive personnel training courses covering this area; these are also offered to employees at contracted companies.

The QSE management system

QSE training and communication extends to all tiers of the Group's management. Rules and instructions laid down in a QSE manual explain the operation procedures, which are in turn subject to regular reviews and inspections. The QSE manual also specifies the standard procedures to be followed in the event of emergencies. Regular, independent assessments of the QSE management system help to identify and eliminate any shortcomings.

Web-based document management

Linde Gas monitors the content of its QSE documentation by means of the web-based document management system PrismaDoc. This can be accessed by all employees throughout the world. Updated information and important recommendations are funneled into PrismaDoc by all the national subsidiaries, and can be made available to others whenever and wherever required. This worldwide networking and rapid availability of information facilitates the intensive and transparent exchange of knowledge within the Linde Gas organization: an essential benefit in the continuous optimization of safety and environmental protection.



Safety

La Porte, TX, U.S.A.

Safety is a basic human need. That's why, for us, it's the number one priority. Linde customers and employees alike can count on the high safety standards of our products – in both manufacture and application. Every year, to heighten awareness of safety issues in our workforce, we confer a "Site Safety Award." In 2004, this distinction went to Linde Gas in La Porte, Texas, U.S.A. Between 1999 and 2004, its workforce amassed 620,000 hours of accident-free operation.

SEQ database

The English-language Linde Gas SEQ database (SEQ = Safety, Environment, Quality) can be accessed by all Linde Gas employees around the globe using the Group's communication software. The SEQ database contains details of accidents that have occurred and property damage that has been incurred. It describes any remedial actions to be taken, ideally ensuring that the events culminating in the injury or damage are not allowed to recur. It also contains training materials, key data and audit reports. All of this goes towards providing the national companies with the greatest possible repository of useful knowledge on how to prevent accidents, damage and personal injury.

Major Hazard Review Program

Launched in 2002, the Major Hazard Review Program was introduced to supplement the QSE management system in the main Linde Gas production and filling plants. As a component of the risk management program, it helps provide advance warning of risks that may lead to accidents or potentially damage property or the environment – thereby allowing appropriate protection and control measures to be instituted.

Certification

Our QSE management fundamentally ensures compliance with the relevant standards. Given the expectations of our customers, the vast majority of our national companies are additionally certified to the ISO 9001 quality standard. Furthermore, a number of companies hold certificates for environmental management (ISO 14001) as well as for safety in accordance with the SCC (Safety Certificate for Contractors) or OHSAS 18001 (Occupational Health and Safety Assessment Series).

Further information can be found in the table on p. 95 of the "Facts & Figures" section. Our efforts are directed towards increasing the number of company units holding certification.

Communication and employee awareness

Another significant aim of the QSE management system is to eliminate any negative effects on the health of employees, business partners and customers. This entails arranging seminars that provide appropriate levels of expertise on safe working methods, product safety, occupational health and environmental risks.

The SEQ database – which stores the most important information on the subjects of safety and the environment – is a key element in these training activities. The primary goal is to ensure that personnel are sufficiently knowledgeable about risks; this awareness then safeguards them from exposing themselves or others to unnecessary hazards that might jeopardize health or life.

As part of a Group-wide competition designed to promote a heightened awareness of safety, quality and environmental protection, Linde Gas employees designed a logo that has been used throughout the division since 2003.

A safety award system was also introduced as a further incentive for employees. Every year the Group company reporting the lowest accident figures receives this prize. In addition, a "Site Safety Award" has also been established. This is presented to the workforce recording the highest number of working hours since the last employment-related accident. In 2004, this award went to the La Porte, Texas, site operated by Linde Gas LLC. At this location the employees worked 620,000 hours between 1999 and 2004 without any down time lost to accidents.

In order to improve its accident statistics, Linde Gas Thailand organized a Safety Day for the second time in its history. Targeting the entire workforce, its main objective was to enhance employees' awareness of on-the-job safety.

In recent years, the South American region has hosted the successful "Zero Accidente" ("Zero Accidents") program, which also involves the employees' families.

In 2004, all management personnel at Linde Gas Germany participated in training sessions focusing on safety-conscious conduct and management. This has already produced improvements in safety statistics throughout the organization. In order to reduce the CO₂ emissions generated during the road transport of gas, Linde Gas Germany has not only run “Drive and Save” training sessions for its drivers, but has also established a route-optimizing system that calculates the shortest and hence most environmentally compatible and cost-friendly delivery itinerary – without impinging on safety in any way.

Commitment to environmental protection and safety

Relevance of legislation

Environmental protection is increasingly becoming a fixed component in national legislation around the world. This is due to the growing importance attached to cutting emission levels and waste volumes, as an awareness of environmental issues increases. The safety of industrial plants is acquiring a similar status; in Germany the safety regulations form an integral part of the environmental legislation contained in the country’s pollution control law.

Much of this legislation has been harmonized at the EU level; nevertheless, there are still many specific national laws that have to be observed – both inside and, above all, outside the EU.

It is therefore only logical that the QSE management system is being implemented independently by the national companies and local representatives.

Participation in industry associations

Linde Gas and its national subsidiaries are committed members of the regional and national associations representing the gas industry. Our objective is to help establish the highest possible safety and environmental standards among member organizations – in production, transport, storage, and industrial and medical gas application. By means

of engaging in dialog and sharing experiences, these associations draft codes of best practice (see Glossary), compile training materials and establish common positions – all in compliance with the relevant antitrust legislation (see Glossary). This knowledge is then channeled into the definition of international standards. The associations have also made it their task to advise legislators on the drafting of new laws and regulations and to continue developing solutions for compliance with these provisions.

Linde is a member of various associations, including EIGA (European Industrial Gases Association) and CGA (Compressed Gases Association U.S.A.). Linde AG Executive Board member Dr. Aldo Belloni is currently the president of EIGA. The EIGA Industrial Gases Council is also currently chaired by Linde.

In recent years, these combined efforts have contributed to raising environmental and safety standards – benefiting not only Linde Gas but the environment as well. As a result, our experts are becoming acknowledged partners to the legislative bodies, approval boards and supervisory authorities.

Membership in “Responsible Care”

The international Responsible Care program is a worldwide initiative sponsored by the chemical industry. Independent of any legal requirements, its aim is to continuously improve protection for health and the environment, and to maximize safety for workers and residents who live in close proximity to industry facilities.

As a member of the German Chemical Industry Association (VCI), Linde Gas Germany joined Responsible Care in the year 2000. Other national subsidiaries have since followed suit.

The ten key tenets of Responsible Care detail how companies should best act responsibly in accordance with their stated intentions.

→ Emission trading

Inside the European Union, the first phase of emission trading began in 2005; it will extend to the end of 2007. According to EU directives, the emission trading system initially applies to emission-intensive plants, i.e. sites that generate more than 20 megawatts of combustion heat. Linde Gas plants are not affected in this phase.

There is insufficient data on factors such as the industries and types of plant included in the second phase of trading to determine whether Linde Gas will be affected. Moreover, it is still not clear which threshold values will apply for CO₂ and other greenhouse gases, and whether emissions from plants not subject to authorization will be incorporated in the future.

Linde Gas fulfills the requirements of the Responsible Care initiative by maintaining records demonstrating that safety, reliability and environmental protection are always assured. Responsible Care actively promotes the objectives of Agenda 21. At the global summits in Rio (1992) and Johannesburg (2002), this chemical industry initiative received explicit recognition.

Products

Customer requirements

Our customers are our most constructive and critical observers. They rightly expect Linde Gas to satisfy the highest standards of quality, safety and environmental protection, and to adhere to the relevant laws and industrial standards. The investments in professional QSE management are paying off for Linde Gas. On the one hand, these persuasive concepts facilitate contacts with the authorities; on the other, they are spawning a whole new market as customers and competitors adopt the same high standards.

Employees who are meticulously trained in the areas of quality, safety and environmental protection also make an essential contribution to establishing long-term customer relationships built on trust.

Additive and integrated environmental protection measures

In line with the determinations of the Product Stewardship program, Linde Gas operates according to the principle of comprehensive product responsibility – with the aim minimizing hazards for people and the environment throughout the life cycles of its products.

Where environmental solutions for our customers are concerned, we distinguish between additive and integrated environmental protection measures. Additive environmental protection refers to applications that reduce harmful emissions; integrated environmental protection measures preclude the occurrence of environmental hazards from the very outset.

A comprehensive overview of the array of environmentally relevant applications delivered by Linde Gas is shown on pp. 38–39. The following section details a few particularly relevant examples.

Fuels: an environment-friendly boost to efficiency

One good example of integrated environmental protection is the process of desulfurizing fossil fuels using hydrogen. This process reduces the environmental impact of the waste gases generated during combustion. In a context of continual decreases in the permissible sulfur content of fuels, Linde Gas has been offering refineries an efficient process for increasing desulfurization performance for several years. Adding hydrogen converts the sulfur present in the crude oil into gas, thus enabling it to be separated more readily from the liquid petroleum.

Given the ongoing depletion of fossil fuels, hydrogen also plays a major role as an energy source for Linde. For this reason, we ultimately see the projected expansion of our hydrogen activities as an active contribution to safeguarding the environment. Detailed information on the hydrogen technologies delivered by Linde can be found in “Markets” on pp. 78 ff.

Paper manufacture: gases enhance environment-friendly paper production

In the paper industry, environmental protection is crucial throughout the value chain – from its raw material wood to the end product, paper. Significant improvements can be achieved, for example, through the use of industrial gases, above all in the cleaning and bleaching of the cellulose suspension known as paper pulp.

To produce high quality white paper, the lignin responsible for its brown coloration must be extracted from the pulp. Lignin is the binding agent that holds the wood fibers together. The aim is to selectively remove the lignin without reducing the length of the fibers, which play a key role in determining paper strength. This is traditionally achieved by means of a bleaching process using an agent that contains chlorine.



Know-how

Galician Coast, Spain

We are familiar with the risks involved in modern technology. Our answer: clean solutions. Many still recall the trail of destruction when the “Prestige” spilled oil off the Spanish coast in November 2002: birds covered in black oil, emulsified clumps littering the beaches, huge slicks floating on the water. The leak sparked an ecological catastrophe of unprecedented proportions. Linde helped clean up the coast-line – with environmentally friendly dry ice.

However, the use of these chemicals generates powerful environmental toxins such as chlorinated phenols and dioxins, making them unsuitable given the ecological requirements for today’s industrial processes.

Linde Gas helps paper manufacturers improve their environmental audit figures. With our process, the substances used for bleaching – chlorine dioxide and hydrogen peroxide – can largely be replaced by oxygen. The advantages lie in the reduced emissions from the bleaching process, an increased level of whiteness in the existing bleaching sequence, plus an improved fiber structure combined with constant cellulose strength. Furthermore, this is a well-tested technology that may also prove suitable for future process optimization measures.

Dry cleaning: highly effective and environmental-friendly with CO₂

CO₂ textile dry cleaning is an environment-friendly alternative to conventional methods; it harnesses carbon dioxide and an innovative dry cleaning detergent. The environment benefits because the cleaning agents generate no hazardous waste products. People benefit because the customers and employees of dry cleaning companies are no longer exposed to chlorinated solvents such as perchloroethylene. A detailed description of the process is contained in the section entitled “Markets” on pp. 84–85.

Dry ice: opening up new areas of application

For many years Linde Gas has been delivering a dry-ice cleaning technology that is safe for the environment. The method involves firing dry ice pellets the size of rice grains at the contaminated surfaces. The pellets penetrate the layer of dirt, assume a gaseous state, and – as they expand – remove any impurities from the surface. The cooling effect – dry ice is nothing more than carbon dioxide cooled down to minus 78.5 degrees Celsius – makes the dirt brittle and easy to remove. As a surface cleaner, dry ice is far more environment-friendly than water because it does not attack the surfaces, and therefore does not expel any toxins they may contain.

In order to satisfy the rising demand for dry ice in cleaning applications, Linde Gas operates the world’s largest dry ice production facility at its German Ludwigshafen plant. This site has a daily capacity of 150 metric tons. Linde also runs numerous other dry ice production plants, while Linde Gas offers the equipment required for the cleaning process.

After the oil tanker “Prestige” sank off the Spanish coast in 2002, Linde helped clean the oil from the beaches using dry ice.

Treating water with CO₂ and oxygen from Linde Gas

The industrial gases provided by Linde serve a number of applications in the realm of water and sewage treatment. In the area of additive environmental protection measures, the effective neutralization of alkaline effluent using CO₂ and sewage treatment by means of industrial oxygen are of particular importance.

Carbon dioxide is being used by industry in increasing quantities for the legally prescribed neutralization of alkaline effluent. Linde supplies the requisite carbon dioxide tank systems – precisely tailored to specific customer requirements. The major advantage of carbon dioxide in sewage treatment lies in its relative safety of use compared to the aggressive mineral acids that are conventionally deployed. Additionally, carbon dioxide does not produce corrosion; nor does it increase the salt content of the effluent and lead to excess acidification.

Future Competence

Hanover, Germany

There is no magic formula for solving global problems. But there are innovative ideas from Linde. A magnesium liquefaction technology developed by Linde uses dry ice to protect highly sensitive magnesium from atmospheric oxygen. Sulfur hexafluoride, which has been traditionally used, has a global warming potential nearly 24,000 times higher than that of carbon dioxide. This innovation represents our contribution to making magnesium processing more environmentally compatible.

52°

10°

Using pure oxygen from decentralized on-site plants supplied by Linde Gas, sewage treatment facilities – which are also built by our subsidiary Linde-KCA-Dresden GmbH (LKCA) – can be operated in a more environment-friendly and cost-effective way, and largely without any odor pollution. In this process, the selective addition of oxygen to the clearing basins produces a reduction in the hydrogen sulfide generated by the treatment and decay processes. On the other hand, the addition of oxygen also prevents acute oxygen depletion in the basin.

Linde Gas has now installed gas applications for wastewater treatment at more than 400 sewage treatment plants around the globe, among them the world's largest plant in Los Angeles, California.

Environmentally compatible protective gas solution for cast magnesium

The use of magnesium, the lightest metallic construction material, is on the rise – above all in the automotive industry. To lower the attendant risk of a magnesium fire triggered by oxygen, sulfur hexafluoride (SF₆) or sulfur dioxide (SF₆) have been used to date. Sulfur dioxide is toxic and therefore subject to rigorous safety precautions when used in foundries. Sulfur hexafluoride, in turn, has a high global warming potential or GWP factor of 23,900 – with respect to the damage caused to the earth's atmosphere by CO₂. The use of sulfur hexafluoride for cast magnesium has therefore been banned with effect at January 1, 2007, unless the quantity involved remains below 500 kilograms per annum.

Linde Gas has developed and filed a patent for a procedure that eliminates these problems. Using dry ice as a covering agent and protective gas, magnesium melts are effectively shielded from the ingress of oxygen.

This procedure was developed as part of a research project funded by Germany's Ministry for Education and Research (BMBF) together with a number of other partners.

At this year's "TMS 2005" conference, the world's largest international congress on new developments in the field of materials engineering, a Linde Gas application was one of the eleven entries to win an environment prize – from a total of 2,300 submissions.

Glass melts: more cost-effective with ultrapure oxygen

Thanks to a specially designed technology, Linde Gas also ensures environment-friendly production for suppliers of glass products. In the so-called Oxy-Fuel process, the performance of burners is significantly enhanced through the addition of industrial oxygen as opposed to combustion air, reducing both toxic waste gases and energy consumption. Emissions of carbon dioxide and nitrogen oxides (NO_x) can, for example, be lowered substantially in plants equipped with Oxy-Fuel. At the same time, energy input can be reduced by up to 50 percent. The result is a considerable improvement in cost-efficiency and environmental audit results.

Procurement

Raw materials, technical modules for the on-site business, and IT systems constitute the main procurement requirements at Linde Gas. The total worldwide procurement volume for the division amounts to over half of its entire turnover. Energy was the largest procurement item in 2004.

Our main purchasing department manages the central procurement of key raw materials, processing aids and fuels, and only selects suppliers that comply with the requirements for safety, environmental protection and quality as laid down in the QSE guidelines. We achieve this primarily through the close cooperation between our employees and suppliers. To further improve performance in these areas, a set of Group-wide standards will be drawn up containing ethical and legal guidelines for all procurement activities. These will detail minimum requirements for employees and suppliers on matters relating to fair competition and compliance with environmental, safety and social standards.

→ CO₂

The carbon dioxide sold by Linde Gas is obtained by extraction from natural sources or by purifying the raw carbon dioxide generated in operations such as petroleum and natural gas processing.

Thanks to CO₂ recovery, Linde Gas is also helping operators of plants that produce large volumes of carbon dioxide to solve their emission problems. One example of the large-scale industrial application of this technology is the Chemical Industrial Park at Marl (Germany). Since 2004, we have been tapping off a raw gas (from our customer, Sasol) that is liberated during the production of ethylene oxide – a base product used in detergents, personal hygiene items and plastics. The gaseous raw material is conveyed directly from the chemical park to the Linde plant via a pipeline, where it is purified, dried and then processed to produce food-grade liquid carbon dioxide. Some 70 percent of processed carbon dioxide is sold to the food industry for use in applications such as beverage production and conservation. At 20 percent, industry is another important customer for the division; the remaining 10 percent is predominantly used in water treatment processes.

Furthermore, the minimization of defects in accordance with Six Sigma along with quality management in conformity with the ISO 9001 standard provide the platform for optimum quality assurance – and not only in the division's own processes. As the cornerstone of its procurement policy, Linde Gas also demands that suppliers demonstrate that they maintain an effective quality management system.

Environmental protection in production

The primary aims of the Linde Gas environmental management program are twofold: conserving natural resources, e. g. by lowering water and energy consumption; and avoiding environmental pollution, as can be achieved by reducing emissions.

QSE managers keep records of the environmental effects of their respective locations. For each process stage in production, the effects on the environment are analyzed and measures defined with the goal of minimizing any negative impact – above all at the certified locations.

The processes that entail particular environmental effects include the production and filling of acetylene, the manufacture of gases from air liquefaction and other procedures, along with the repair and transport of gas cylinders and bulk transport tanks.

Customer service: emergency services and gas disposal

As competent, responsible partners, the gas experts at Linde are equipped to provide "first aid" whenever emergencies occur in conjunction with the handling of gas cylinders. Such a need arises if, for example, gas cylinders in a critical state need to be recovered following a fire, or if a gas leak cannot be stopped. This is a service benefiting both our customers and the public at large. The key objective here is to safeguard human life, the environment and property.

We also offer the expert disposal of critical residues in gas cylinders. In Unterschleissheim near Munich, we have set up a large-scale disposal laboratory – as we have done at other locations around the world – that provides both specially trained personal and sophisticated safety infrastructure. As part of our service, we offer individualized advice to our customers, and always ensure that disposal is performed in a safe, ecologically sound manner and in accordance with the relevant legislation.

LIPROTECT™: our customer safety program for handling gases

Linde has developed a comprehensive safety concept called LIPROTECT™ that has been successfully implemented both within Linde and at our customers' sites. The concept comprises training sessions, services and products that promote the safe handling of gases and supply equipment.

Linde has been offering safety seminars since 2004 that are specifically adapted to customers' needs and, upon request, take place on their premises. As part of the LIPROTECT™ concept, customers are also offered instruction on the preventive maintenance of gas installations. This is aimed at guaranteeing protection against damage and interruptions to production.

As a component of our supply package, safety increases customer satisfaction levels and cements confidence in our application technologies.

Applications and Environment Linde Gas

Market segment	Application	Impact on environmental protection	Market segment	Application	Impact on environmental protection
Food			Chemistry		
Food	Atmospheres		Chemistry	Pipe freezing	low
Food	Modified atmospheres	low	Chemistry	Catalyst cooling	low
Food	Inerting/Sparging	medium	Chemistry	Dry ice blasting	high
Food	Other atmosphere processes	medium	Chemistry	Plastic processing	
Food	Freezing & cooling		Chemistry	Gas injection molding	medium
Food	Freezing of food	low	Chemistry	Plastic injection molding	low
Food	Cooling of food	low	Chemistry	Foaming of plastic material	high
Food	Transport cooling	medium	Chemistry	Microcellular foaming of plastic material	medium
Food	Other freezing/cooling processes	medium	Chemistry	Extrusion of plastics	medium
Food	Dry ice		Chemistry	Blow molding	low
Food	Dry ice-related courier systems	medium	Chemistry	Cryogenic polishing	medium
Food	Dry ice-related catering systems	low	Chemistry	Cryogenic grinding and crushing	medium
Food	Other dry ice applications	low	Chemistry	Rubber industry	
Food	Fish farming	high	Chemistry	Vulcanizing of rubber	high
Food	Others		Chemistry	Deflashing of rubber	low
Food	Hydrogenation	low	Chemistry	Cryogenic grinding of scrap tires	high
Food	Carbonation	medium	Chemistry	Cooling of hoses	low
Food	Fertilizing	medium	Chemistry	Debonding	medium
Food	Dispensing beverages	low	Chemistry	Tire inflation/filling	low
Food	Dissolving of gases in water	low	Chemistry	Construction industry	
Food	Stunning	low	Chemistry	Ground freezing	high
Food	Ozone applications Food	medium	Chemistry	Concrete cooling	low
			Chemistry	Cooling of asphalt	low
			Chemistry	Prestressed steel conservation	low
P&P²/Special Projects			Chemistry	Water treatment an environment applications	
P&P/Special Projects	Textile cleaning	high	Chemistry	Condensation of volatile substances	high
P&P/Special Projects	Parts cleaning	high	Chemistry	Neutralization of waste water	high
P&P/Special Projects	Chemical pulp production and bleaching	high	Chemistry	Waste water treatment with Lindox® process	high
P&P/Special Projects	Pulp wash	medium	Chemistry	Capacity increase of waste water treatment plants	high
P&P/Special Projects	Recycled fibers	medium	Chemistry	Aerobic sealing	high
P&P/Special Projects	Oxygen in recovery boiler/capacity increase	medium	Chemistry	Wet oxidation/Super critical water oxidation	high
P&P/Special Projects	Oxygen in lime kiln/causticizing	medium	Chemistry	Corrosion and odor control in sewers	high
P&P/Special Projects	Soap acidulation	medium	Chemistry	Odor control in waste water treatment plants	high
P&P/Special Projects	Mechanical pulp production and bleaching	low	Chemistry	Treatment of soil and solid waste	high
P&P/Special Projects	ADALKA process stabilizer	medium	Chemistry	Removal of water contents by biological filtration	high
P&P/Special Projects	CODIP process improver	medium	Chemistry	Hardening of drinking water	high
P&P/Special Projects	GRAFICO calcium carbonate saver	medium	Chemistry	Adjustment of the lime/CO ₂ balance	high
P&P/Special Projects	Improved dewatering in paper machine	medium	Chemistry	Adjustment of pH in drinking water treatment process	high
P&P/Special Projects	pH control in paper machine short circulation	medium	Chemistry	Autotrophic denitrification of drinking water	high
P&P/Special Projects	Others: Pulp & paper	medium	Chemistry	Conditioning of process water with O ₂	high
P&P/Special Projects	Hard coating/Lacquering of plastics (CC300, CC1200)	low	Chemistry	Oxygen removal from process water	high
			Chemistry	pH control of swimming pool water	high
			Chemistry	Oxygen-enrichment in lakes and rivers	high
Chemistry			Chemistry	Well regeneration with Fresh Flow®	high
Chemistry	Refineries & petrochemistry		Chemistry	Deliming & dehairing of leather	high
Chemistry	Homogeneous oxidation	low	Chemistry	Bleaching of textiles	high
Chemistry	Heterogeneous oxidation	low	Chemistry	Recycling (cryogenic)	high
Chemistry	Hydrogenation	high	Chemistry	Ozonation	high
Chemistry	Gasification	medium	Chemistry	Fine chemistry and pharmaceutical industry	
Chemistry	Fluid Catalytic Cracking (FCC)	medium	Chemistry	Inerting, purging and blanketing	low
Chemistry	Claus process	high	Chemistry	Acetylene for specialty & fine chemical production	low
Chemistry	Industrial service		Chemistry	Reactor & process cooling	low
Chemistry	Pigging and displacement	medium	Chemistry	Production of solid particles from melts	low
Chemistry	Cleaning of furnaces/pipes/pipelines with nitrogen-abrasive mixtures	medium			
Chemistry	Drying of industrial plants	medium			
Chemistry	Leak detection/Pressure testing	medium			

² "P & P" stands for "Pulp and Paper."

Market segment	Application	Impact on environmental protection	Market segment	Application	Impact on environmental protection
Chemistry			Metallurgy & Glass		
Chemistry	Other applications		Metallurgy & Glass	Electronics	
Chemistry	Fire protection	high	Metallurgy & Glass	Wafer fabrication	low
Chemistry	Pyrolysis	medium	Metallurgy & Glass	Storage & clean room	low
Chemistry	Pest control/Fumigation	medium	Metallurgy & Glass	Thermal cycling	low
Chemistry	Shrink fitting	low	Metallurgy & Glass	Plasma-soldering and -cleaning	medium
Chemistry	Cooling during machining	medium	Metallurgy & Glass	Others: electronic	low
Chemistry	Cool smoke production	medium	Metallurgy & Glass	Soldering	low
Chemistry	Paint removal (cryogenic)	high	Metallurgy & Glass	Heat treatment	
Chemistry	Cold2Move/Lab2Lab	low	Metallurgy & Glass	Annealing	low
Chemistry	UV/EB-curing	medium	Metallurgy & Glass	Hardening	low
Chemistry	Deburring of metal workpieces (thermally)	low	Metallurgy & Glass	Carburizing	medium
			Metallurgy & Glass	Decarburization	low
Manufacturing Industry			Metallurgy & Glass	Nitriding, nitrocarburizing	medium
Manufacturing Industry	MIG & MAG Welding (GMAW)		Metallurgy & Glass	Sintering	low
Manufacturing Industry	MIG & MAG Welding: Mild steel	low	Metallurgy & Glass	Brazing	medium
Manufacturing Industry	MIG & MAG Welding: Stainless steel, nickel base	low	Metallurgy & Glass	Vacuum & gas quenching	low
Manufacturing Industry	MIG & MAG Welding: Aluminum	low	Metallurgy & Glass	Sub-zero treatment	low
Manufacturing Industry	MIG & MAG Welding: Other	low	Metallurgy & Glass	Others: heat treatment	low
Manufacturing Industry	TIG Welding (GTAW)		Metallurgy & Glass	Nonferrous metals	
Manufacturing Industry	TIG Welding: Mild steel	low	Metallurgy & Glass	Ladle preheating	low
Manufacturing Industry	TIG Welding: Stainless steel, nickel base	low	Metallurgy & Glass	Oxy lancing and enrichment	high
Manufacturing Industry	TIG Welding: Aluminum	low	Metallurgy & Glass	Air/Oxy melting	high
Manufacturing Industry	TIG Welding: Other	low	Metallurgy & Glass	Oxy melting in rotary furnaces	high
Manufacturing Industry	Plasma Arc Welding (PAW)	low	Metallurgy & Glass	Oxy melting in reverb furnaces	high
Manufacturing Industry	Other welding processes	low	Metallurgy & Glass	Oxy melting in other furnaces	high
Manufacturing Industry	Backshielding and purging	low	Metallurgy & Glass	Extrusion	low
Manufacturing Industry	Autogenous technique/Cutting		Metallurgy & Glass	Refining, purging	low
Manufacturing Industry	Gas welding	low	Metallurgy & Glass	Hydrometallurgy	low
Manufacturing Industry	Flame cutting	low	Metallurgy & Glass	Dross cooling	medium
Manufacturing Industry	Plasma arc cutting	low	Metallurgy & Glass	Flash smelting, roasting	low
Manufacturing Industry	Flame heating, flame straightening	low	Metallurgy & Glass	Melt protection	high
Manufacturing Industry	Other autogen, plasma	low	Metallurgy & Glass	Glass melting	
Manufacturing Industry	Flame/Arc brazing		Metallurgy & Glass	Oxygen enrichment & lancing	high
Manufacturing Industry	Flame brazing	low	Metallurgy & Glass	Oxygen boosting/Oxy fuel boosting	high
Manufacturing Industry	Arc brazing (MAG, MIG, plasma)	low	Metallurgy & Glass	All oxy fuel	high
Manufacturing Industry	Thermal spraying		Metallurgy & Glass	Special melting	high
Manufacturing Industry	Flame spraying	low	Metallurgy & Glass	Glass forming and processing	
Manufacturing Industry	Plasma spraying	low	Metallurgy & Glass	Inerting	low
Manufacturing Industry	Others	low	Metallurgy & Glass	Surface coating	high
Manufacturing Industry	HVOF spraying	low	Metallurgy & Glass	Flame treatment/Fire polishing	medium
Manufacturing Industry	Cold spraying	low	Metallurgy & Glass	Reheating	low
Manufacturing Industry	Laser beam treatment		Metallurgy & Glass	Filling etc.	low
Metal Processing	Laser cutting	low			
Metal Processing	Laser welding	low	Metallurgy		
Metal Processing	Other laser beam treatment	low	Metallurgy	Iron & steel	
			Metallurgy	Reduction	low
			Metallurgy	Melting	medium
			Metallurgy	Primary refining	high
			Metallurgy	Reheating	low
			Metallurgy	Secondary metallurgy & casting	high
			Metallurgy	Preheating	low
			Metallurgy	Recycling	high

A significant number of gas applications have a positive impact on the environment. This list enumerates all the applications with an environmental dimension, together with a rating of their contribution to environmental protection (low, medium, high).

Linde Engineering

Quality, safety and environmental protection (QSE) are critical factors in the planning and execution of Linde Engineering projects the world over. To meet the high demands, Linde Engineering installed an integrated QSE management system that has enjoyed ISO 9001 and OHSAS 18001 certification for more than ten years.

Products and production

Involved in large-scale plant production for decades now, our Linde Engineering division has acquired its own process engineering expertise in the planning, project management and construction of turnkey industrial installations. Our activities are concentrated on the high-growth markets in plant construction, namely those for olefins, hydrogen and synthesis gas, adsorption and natural gas plants, and air separation plants.

With the exception of South America, Linde Engineering – which is headquartered in Höllriegelskreuth near Munich – operates its own subsidiaries and sales or service centers on every continent on earth. In addition to chemicals, gas and pharmaceutical installations, Linde-KCA-Dresden GmbH (LKCA), a wholly owned subsidiary of Linde AG, also plans and constructs environmental plants and offers state-of-the-art environmental engineering products. Some 500 plants around the world are proof of LKCA's marked level of expertise in this field (see also p. 44 of this section). Another Group company, Selas Linde GmbH, supplies equipment for the purification of waste gases containing pollutants, such as those from pharmaceutical production sites.

Systematic management of environmental protection and safety

Guidelines

The guidelines for quality, safety and environmental protection (QSE) were first adopted by the management of Linde Engineering in 1994. They are fully harmonized with Linde's CR Policy, and specify high degrees of personal responsibility for employees at all levels of the hierarchy, as they do for employees of external companies and suppliers.

In order to install and operate industrial plants without accidents, harm to human life or the environment, and commercial losses, maximum attention is concentrated on preventing and avoiding defects within a continuous optimization program. In short: prevention has priority over remedy. All our actions are aimed at producing the maximum possible level of customer satisfaction. All the QSE management information available is placed at our customers' disposal during a project's realization.

Safety and environmental protection from the outset: integration into the plant design

Linde Engineering has set forth the basic structure of its QSE management system in a manual which is updated on an annual basis.

To plan an installation so that it can be operated safely and comply with the health and environmental protection regulations, we have devised a QSE planning concept that we apply to every project. This concept has been derived from Linde Engineering's own minimum requirements, the statutory regulations and codes, as well as official requirements and customer demands. It is implemented on three levels. These are the avoidance and reduction of potential hazards and their effects on humans and the environment; the prevention of disruptions to operation; and the limitation of the impact of such disruptions, e. g. by having safety systems in place to protect health and the environment.

Autonomous safety department for plant design

As long ago as 1965, we set up a specialist department for safety, environmental protection and approvals procedures (TAS) in Höllriegelskreuth as an integral part of our project management organization. The experts there are responsible for ensuring that, right from the planning stages for all Linde plants, the latest legislation on safety technology is taken into account and the greatest possible level of

environmental protection is guaranteed – without compromising a facility’s cost effectiveness. Close cooperation with the customer is required throughout this process.

Given the global scope of their activities, the 32 members of the TAS department have amassed extensive knowledge and experience in conducting hazard analyses, compiling noise studies and drawing up noise abatement plans. Their expertise also extends to specifying equipment parts with a safety function – from safety valves and fire protection equipment through to complete flare lines. From a world-wide perspective, Linde Engineering is therefore one of the few companies to have instituted its own safety organization for plant construction. This guarantees that all projects have been subjected to a comprehensive review of their safety and environmental engineering characteristics. Customers also appreciate having a single, fixed point of contact for their inquiries.

The staff of the TAS department covers all the process engineering technologies used in the division’s various plant types. The data in the TAS safety and environmental concepts is leveraged by other specialist departments as well. The specifications the concepts contain serve as parameters for the entire design of a plant, and help determine the components to be procured. For instance, the precise configuration of the electrical engineering system and the instrumentation used in explosion protection are based on the detailed data supplied by the TAS department.

Ensuring consistently high QSE standards

Every facility we build is unique. This is precisely why our experts constantly face major challenges when assessing the specific environmental protection and safety requirements. We work according to a predefined procedural model to guarantee a systematic approach from the planning stage through to the handover of the turnkey plant – despite the individual and frequently enormous differences

between the various plants’ dimensions, site conditions and hazard potential. A standard feature of every project implemented by Linde Engineering, this model lays down the specific rules, the approach to risk determination, the required actions and the desired results for each site. Supplementary reviews performed at the end of every construction phase and an effective change management system provide ongoing safeguards that the procedural model has been correctly implemented.

Health, safety and environmental protection at construction sites worldwide

In its guidelines the QSE manual specifies that the requirements governing safety technology, accident prevention and environmental protection for all individuals involved in construction, installation and commissioning – as well as for any uninvolved third parties – must be included and implemented early on in the drafting and planning phases. At the initial stages of plant design, the project manager arranges for a requirements schedule to be drawn up detailing safety, health and environmental protection (called “SHE”) needs at the construction site.

MEMVIS central knowledge database

No amount of precautions can completely rule out errors and accidents during the execution of a project. If they lead to planning modifications and remedial work at the construction site, additional costs will necessarily be incurred. Consequently, in-depth error analyses and appropriate preventive measures offer a considerable savings potential.

In 2004, to provide a more efficient framework for the processing of errors, cooperation between QSE management and a project group led to the creation of a new fault detection, reporting, management and information system known as “MEMVIS.” This system documents defects and any steps taken to remedy or avoid them. MEMVIS is uti-

lized to support the elimination and prevention of faults and errors at an operating level and to direct improvement proposals to the responsible personnel faster than before. Like the Linde Gas SEQ database, it functions as a central error detection database – to which every Linde Engineering employee has access. This approach to fault management complies with the Linde Engineering mission statement. It also provides a secure user permissions system which excludes access to outside parties and any external workers on the company’s premises or construction site. To date, some 200 managers at the project, departmental and specialist project levels have been trained in the use of MEMVIS. Given the particular importance of on-site fault detection, numerous MEMVIS training courses are currently being held on construction sites.

Hazard and Operability Study (HAZOP)

Linde Engineering also compiles a Hazard and Operability Study (HAZOP) for each of its projects. Within the scope of this study, an interdisciplinary group of experts managed by a – usually external – chairperson performs detailed analyses of the safety and operation of each single plant component. Depending on the size and type of plant, this process – which is stipulated as a requirement by many customers – takes between one and two months.

Procurement at Linde Engineering

As a plant construction company with worldwide operations, our Linde Engineering business segment is constantly striving to optimize its procurement of plant components, materials and services. Given the fact that conditions may vary from plant to plant, the placing of orders

occurs on the basis of both general and project-specific arrangements and purchasing terms. In collaboration with the purchasing departments at Linde Engineering, our subsidiary LKCA-Dresden leverages this worldwide network for its own procurement needs.

Fixed procurement principles apply across the entire Linde Engineering business segment. We only commission service providers and suppliers who have references that match our strict criteria, have earned a good reputation through their work, and can claim a high degree of integrity and impeccable creditworthiness. They must be able to demonstrate an internationally recognized quality management system to our purchasers, one that also covers the areas of environmental protection and safety. Linde Engineering maintains registers of authorized suppliers for all the products and services it requires; these suppliers were selected during a comprehensive supplier assessment program. The principles comprising the procurement policy at Linde Engineering are fully documented in the QSE Management Manual.

Environmental protection and safety in practice

Innovations in Hammerfest

In what is currently our largest project – the natural gas liquefaction facility (LNG plant; see Glossary) in Hammerfest in the north of Norway – particularly high standards apply to quality, safety and environmental protection.

At this site we employ a range of innovative measures to comply with both the stringent national regulations and the environmental protection targets laid down in international agreements and treaties.

Hammerfest is, for example, the world’s first LNG plant that not only physically separates the carbon dioxide contained in the natural gas, but subsequently dries, compresses and pumps it back into the

The natural gas liquefaction plant in Hammerfest, northern Norway, meets stringent standards of quality, safety and environmental protection. Beyond physically separating the carbon dioxide contained in the natural gas, it is the world's first plant to dry, compress and then pump this CO₂ back into the reservoir via a pipeline – a total annual volume of approximately 700,000 metric tons.

reservoir via a pipeline – some 700,000 metric tons per year. In contrast, most of the LNG plants in existence today release the carbon dioxide unfiltered into the atmosphere.

In addition, the energy required for natural gas liquefaction is generated with the aid of highly efficient gas turbines, requiring roughly one-third less fuel input than conventional models. The hot exhaust gas from the steam turbines passes to a heat transfer medium, known as hot oil, which then supplies the heating energy for the entire plant. This obviates the need for a gas-fired furnace, keeping emissions significantly below the levels at previous plants. The gas turbines used are themselves equipped with special burners that guarantee especially low levels of nitrogen oxide formation in the fumes.

In a world premiere, electric motors are being used to power the refrigeration compressors in Hammerfest. This enables the entire plant to adapt more easily to the fluctuating load conditions. The results are extremely low energy losses and emission minimization.

As another world first in Hammerfest, we are applying a technology in which the gases generated during the loading of tank vessels are collected, fed back to the LNG plant and then reliquefied. At traditional facilities, these are flared off and then escape into the atmosphere.

Safety consultancy continues after plant handover

Like every plant constructed by Linde Engineering, the natural gas liquefaction facility in Hammerfest boasts unique safety engineering features.

At this location, Linde Engineering devised a special concept for fire and explosion prevention. One key element in this integrated concept is a computer-assisted 3-D simulation of potential explosion scenarios during construction and operation. Although the customer is officially responsible for the safety of the plant after handover, we continue to provide intensive consultancy services, training and support at all times, including during operation.

Environmental protection at the LNG project in Bergen

Quality, safety and environmental protection were also the focuses of our LNG project in Bergen, Norway, which was completed in 2004. At this major facility, the creation of a management system for quality, safety and environmental protection – developed in tandem with the actual engineering work – ranked among our most important contributions.

Norway's coastal shipping services are the main customer for the liquid natural gas produced at Bergen. The first ferry fueled by liquid natural gas initiated operation back in the year 2000. Ferries of this kind are deployed along the country's rugged coastline as an environment-friendly alternative to conventional ships with diesel engines – wherever bridge construction over the fjords and bays is considered too costly.

Efficiency

La Fontaine, Algeria

By the year 2050, nearly one in four people will live in a country suffering from water shortages. We're already working on strategies to combat this problem. By definition, a water shortage exists if the annual freshwater reserves of a country drop below 1,700 cubic meters per capita. In Algeria, less than half that figure is already the norm. Linde has made a contribution to alleviating this problem in La Fontaine: by installing a seawater desalination plant that harnesses environment-friendly technology to produce drinking water.

2°

35°

Specialist for environmental plants: Linde-KCA-Dresden

Clean solutions for the environment

Linde-KCA-Dresden GmbH (LKCA), a wholly owned subsidiary of Linde AG, is part of Linde Engineering. Within this division, its responsibilities include environmental plants. The company's products cover a broad segment of environmental engineering, ranging from mechanical biological waste disposal and effluent purification through to water treatment and the cleaning of exhaust fumes and waste gases.

In recent years, LKCA has intensified its activities in the planning, design, construction and commissioning of water treatment plants. An overview of all the plants and products involving environmental technology is available on the Internet at www.linde-kca.com.

Environmentally compatible water purification

The growth of the world's population and advancing industrialization are causing a constant increase in the worldwide demand for drinking water. To safeguard the water supply, surface waters and groundwater need to be protected from the discharge of sewage. Simultaneously, treatment and management capacities for drinking water need to be expanded. LKCA offers a variety of environment-friendly procedures for treating groundwater and surface waters which harness methods such as membrane technology to disinfect the water without the input of chemicals.

If freshwater is not present in sufficient quantities to produce drinking water, LKCA can desalinate brackish water and seawater by means of reverse osmosis (see Glossary). To increase cost effectiveness, the plants are equipped with a turbine for recovering energy. Designed on a modular basis, the sites are also distinguished by their compact size and short construction times. For instance, our seawater desalination plant in Algeria was completed in just four months. Other Linde installations for producing drinking water from saltwater are currently in operation in Saudi Arabia, Florida and Texas (U.S.A.), Bahrain, Ecuador, France, and on the Canary Islands.

Material Handling

It is Linde's aim to instrumentalize its corporate activities for the common good – by making a significant contribution to preserving the environment for future generations as well. Even today our customers, employees and the environment are reaping the benefits of an exacting approach to quality that systematically anchors environmental protection and safety at every stage: from product development through manufacture to waste disposal.

In production, we have made each and every step count: environmental protection and safety have been incorporated into daily processes at all our sites. This commitment far exceeds the scope of legally prescribed levels and norms. Our emphasis is on the individual's part in assuming responsibility and taking the initiative, and we actively support our workforce in their efforts on behalf of our environment.

Products and sites

Material Handling is a globally operative business segment, forming the umbrella for the activities of three brands: Linde Material Handling, STILL and OM Pimespo. The division is comprised of 17 production sites and a worldwide sales network (see p. 46).

The principle business of all three brands centers on the production and marketing of forklift vehicles powered by electric and combustion engines, along with other warehousing equipment such as seat- or floor-mounted appliances and stock operating units. Although our brands are positioned independently with our customers, some sites assume cross-brand production functions. STILL headquarters in Hamburg, for example, not only produces electronic and diesel counterweight vehicles for STILL, but also manufactures tilt, steering and lifting cylinders as well as electronic components for the entire business segment. Drive axles for all electronic forklifts are produced in the Český Krumlov plant.

Environmental protection and safety management

The systematic integration of environmental protection and safety in the production process is further safeguarded in the Material Handling division by efficient management systems.

These systems operate in compliance with emission control legislation, regulations governing the disposal of waste and water, as well as those ensuring on-the-job safety. On a broader scale, these management systems are shaped by the corporate objectives shared throughout our organization.

The environmental protection and workplace safety systems implemented in our largest plants in Aschaffenburg (Linde Material Handling) and Hamburg (STILL) define the benchmarks within the Material Handling business segment.

Linde Material Handling

The management system at Linde Material Handling in Aschaffenburg is called ArGUS (a German acronym signifying "Work, Health and Environmental Protection Management System"). In order to guarantee vital uninterrupted communication and improvement processes at the operational level, the system leverages existing process structures. However, the management system is keyed primarily to the personal responsibility of management and the workforce.

ArGUS draws on the following elements to drive a continuous process of review and improvement:

- comprehensive environmental and workplace safety inspections whenever production procedures and systems are updated or new substances introduced
- evaluations of potential risks to staff at the workplace by means of risk analyses
- the coordinated organization and management of employees through instruction, motivation and supervision, supported by ArGUS operational manuals tailored to the individual processes for the separate sections of the company
- internal ArGUS system audits to mutually and systematically support operational areas, and identify and implement potential for improvement.

Brand	Production Sites
Linde Material Handling	Aschaffenburg (Germany)
	Basingstoke (Great Britain)
	Chatellerault (France)
	Merthyr Tydfil (Great Britain)
	Summerville, SC (U.S.A.)
STILL	Xiamen (China)
	Hamburg (Germany)
	Montataire (France)
	Reutlingen (Germany)
	Rio de Janeiro (Brazil)

Brand	Production Sites
OM Pimespo	Bari (Italy)
	Luzzara (Italy)
	Xiamen (China)
Component Manufacture	Production Sites
All brands	Ballenstedt (Germany)
	Brno (Czech Republic)
	Český Krumlov (Czech Republic)
	Dinklage (Germany)
	Geisa (Germany)

In this way, Linde Material Handling provides flexible yet pragmatic solutions to the demand for environmentally compatible and safe production systems. By its very nature, the ArGUS management system is process-oriented and designed to be fueled by ongoing refinement.

Linde Material Handling is also committed to the Agenda21 Council of the City of Aschaffenburg. The company's environmental protection officer, by definition a representative of local business, is actively involved in shaping local and wider-reaching processes devoted to comprehensive sustainability in socio-cultural, ecological and economic spheres – much in the spirit of the Rio environmental summit.

STILL GmbH

Since 2001, STILL has had in place an integrated management system ensuring quality (ISO 9001:2000) and safety at work (following OHSAS 18000). Beginning in 2000, all key environmental data has been compiled in reports that are made accessible to all STILL employees. Among other factors, this forms an important cornerstone in the Hamburg site's current endeavors to secure the certification of its corporate environmental management program in line with DIN EN ISO 14001.

In recognition of the extensive achievements in improving on-the-job safety at STILL, the Hamburg Office for Occupational Safety has placed STILL in the category of 'Companies with an exemplary occupational protection system.' In 2004, the Hamburg site was awarded a certificate in recognition of its active involvement in environmental partnerships, a program accorded great importance by Hamburg's city council. As part of this program, STILL participated in a pilot project entailing voluntary CO₂ monitoring.

Employees develop an enhanced awareness of environmental issues by way of information made available through the intranet, on bulletin boards and in panel discussions. Seminars keyed to specific work conditions treat work safety and environmental issues and thus help generate a heightened sense of responsibility.

Conserving resources in production

Reducing water consumption

In the environmental audit of any forklift, water consumption has the biggest impact, far outweighing other factors such as energy usage, emissions and waste. Rigorously implemented conservation measures have led to continuous reductions in the water used at STILL and Linde Material Handling. For example, Linde Material Handling reported water consumption of 18,600 liters per forklift in 1993 and only 6,020 liters in 2003. Prioritized goals include economizing on fresh water, recycling process water, and using rainwater for internal cleaning operations.

Economical use of energy

Electrical energy indirectly releases harmful CO₂ emissions. Measures to reduce energy consumption include optimizing individual process steps, improving efficiency, and harnessing alternative sources of energy. STILL has played an exemplary role in installing district heating systems. District heating is produced in a refuse incineration plant. In this way, STILL has been able to cut direct annual CO₂ emissions at its Hamburg site by 80 percent, i.e. by some 4,800 metric tons, since 2002/2003. District heating accounts for 75 percent of heating needs, which in turn make up 40 percent of total energy requirements.

At Linde Material Handling in Aschaffenburg, the proportion of heating oil has been consistently reduced by opting for more environmentally-friendly natural gas. Further steps include tapping into the air circulation system and using the heated air from the foundry extractor; this both reduces dust levels and saves energy, easing the burden on the heating system during cold spells. The energy for the thermal afterburning in the paint shop not only benefits the drying process; inside the chimney, extracted warm air is drawn off and routed back to the production hall.

Efficient management systems ensure that environmental protection and safety are systematically integrated in the production process. These systems operate in compliance with both the relevant laws and any corporate objectives or guidelines that extend beyond this legislation. The environmental protection and workplace safety systems implemented in our largest plants in Aschaffenburg (Linde Material Handling) and Hamburg (STILL) represent our best practices in this area.

Reducing emissions

Emissions are not limited to gaseous, harmful substances released into the atmosphere. Odors, heat, noise and electrosmog also fall into this category. Those emissions which are specifically damaging to the environment include solvents, volatile organic compounds (called "VOCs"), dust matter, particulates and exhaust fumes. Environmental protection measures implemented at Material Handling target the reduction of harmful emissions above and beyond the minimum legal requirements, and ultimately strive to eliminate all damaging emissions. Reducing greenhouse gases such as CO₂ is the overriding priority. In this context, Group synergies come into play in the cause of environmental protection. Thanks to a procedure developed by Linde Gas, Linde Material Handling adds technical oxygen when melting iron for forklift counterweights, enabling exhaust volumes to be substantially reduced. Dedusting systems and networked emission monitoring units ensure reliable emission control.

Since the early introduction of a powder coating procedure in 1979 and the conversion of the cleaning system to water-based washing materials, the organic solvents released at STILL are confined to those produced during premium painting, repairs and finishing work involving certain paints and hardening agents (a detailed list of emissions can be found in the section "Facts & Figures" on p. 98).

Environmentally compatible waste disposal

A differentiated attitude is taken toward waste disposal as well at Material Handling. The golden rule is: avoid, reduce, reuse, and recycle wherever possible before disposing. When forklifts are produced, this generates wastewater, foundry waste, and phosphate, powder and paint sludge, all of which must be disposed of, in addition to domestic type industrial waste. At STILL, for instance, the mains water used in production processes is divided into process wastewater, disposable sewage, and general evaporation loss. The discharge of wastewater in the urban sewage systems is subject to government legislation as well as rigid in-house and external monitoring. At Linde Material Handling,

surplus paint spray particles from the paint shop are removed by washers. This procedure concentrates the paint particles and simultaneously conserves water, allowing the particle waste to be reused. Metallic sludge from the foundry is recycled to the construction industry; old sand from the molds serves as an aggregate in concrete mixing, offering an economical alternative to high-quality pit sand.

Steel scrap and metals, cardboard, paper and plastic materials are all routinely recycled.

The environmental report "Communicating with the Environment" published by Linde Material Handling presents an exemplary picture of production recycling at work.

Careful handling of hazardous substances

Production operations occasionally call for substances which are categorized as hazardous and require special care during handling. These substances are consistently subjected to high-level safety regulations applying to storage, transshipment and use and, where possible, replaced by less hazardous alternatives. Production site inspections at regular intervals guarantee a maximum degree of safety in stock maintenance. All handling complies with the safety specifications supplied and regularly updated by manufacturers.

Reusable packaging

Another objective of our corporate environmental protection activities lies in reducing packaging and increasingly opting for reusable solutions.

The Linde Material Handling and STILL brands, for example, utilize reusable packaging which has been manufactured in-house for large components such as doors, windscreens, driver cabs, axles and transmissions. Moreover, containers made of EPP (expandable polypropylene) are used for numerous electronic components. EPP is fully recyclable, and the containers can be reused in material flows by the manufacturer. EPP is utilized in the packaging of consoles, displays and small engines.



Methods

Haikou, China

Clean water isn't simply a given. Sometimes it's the product of innovative technology. Water purification is environmental protection in action. For decades, Linde has been perfecting innovative processes to sustain the water quality for generations to come. One such method is the anaerobic sludge treatment of wastewater containing heavy metals at our plant in Haikou, China. This technology dispenses with the use of ecologically unsound chemicals and thus makes an important contribution to cleaning industrial wastewater.

Procurement

As part of the current optimization program in Material Handling, "TRIM 100," our procurement and quality specialists have built up a web-based supplier evaluation system over the last two years. This has facilitated supplier assessments beyond the scope of Material Handling alone. To ensure that environmental protection and safety guidelines – as well as social standards – are being observed in supplier companies, Linde has integrated relevant criteria into its evaluation system in the course of 2005. The evaluation of our suppliers has already commenced and will soon produce increased transparency throughout the value chain.

Product development and use

At Material Handling, conserving resources and reducing emissions are not viewed solely in the context of technical and organizational production processes. Environmental issues are also taken increasingly into account in terms of product use.

Trials of fuel-cell powered forklifts

Linde firmly believes that hydrogen-based (H₂) technology represents the key component for an efficient and sustainable energy industry in the long term.

Growing numbers of hydrogen-powered vehicles are being used in the logistics industry. STILL has been working with various partners on hydrogen-based drive technologies and supplying their power needs since 1999. One of these partners belongs to the Group: Linde Gas, which is responsible for the planning and construction of H₂ components. A STILL forklift vehicle equipped with a fuel-cell system is currently being tested by Cargogate as part of the ARGEMUC Munich airport project.

The aim of the trial phase at the Munich Airport is to monitor the technical and economic risks of this advanced technology, which is regarded as having huge worldwide market potential. (Full information on hydrogen-based technology can be found in the section entitled "Markets" on pp. 78 ff.)

Reducing toxic discharge

We are also working to reduce the toxic discharges from ICE-powered forklifts. Linde and STILL forklifts produce only a small proportion of the environmentally damaging hydrocarbon, carbon monoxide and nitrogen oxide in their exhaust fumes. A particle filter (offered as an optional extra for diesel-driven forklifts of both brands) retains the solids content of the emissions. In addition, Linde forklifts have been cleared to run on methyl ester of rapeseed oil, also known as "biodiesel." This means they can be operated in water reserves, for instance, because biodiesel has less impact on water.

Longer life, lower maintenance costs


To minimize negative environmental impact and the costs of using forklifts, Linde has reduced energy consumption in vehicles with combustion and diesel engines by continually refining their efficiency. Longer, waste-reducing maintenance intervals, high quality standards, and the resulting longevity of our products also contribute to protecting natural resources. A good example is the virtually non-wearing hydrostatic drive in Linde's ICE-powered forklifts which replaces the conventional clutch, gears, mechanical transmission and even the brakes. This translates into a considerable reduction in the volume of oil required, and completely eliminates the fine dust generated by the brake pads. As a consequence, the maintenance and service costs are low.

Nor has the issue of energy recovery been neglected: with STILL's electronic forklifts, for instance, up to 15 percent of the energy used in braking is now recoverable.

Ergonomic issues

The people who use our products work in industrial environments, and we understand their needs. As early as the product development stage, we take into account any physical and psychological stresses they may be subjected to when using the products. It is our aim to cut the stress levels associated with their occupations. For instance, forklifts from Linde Material Handling come equipped with an optional Linde "load control" function. The highly sensitive control unit is integrated in the driver's armrest, enabling full mast management with only minimal hand movement. By decoupling the mast from the vehicle, the newer series allow the power used to drive the mast to be delivered directly to the wheels via the drive axles. Jolts caused by loads are no longer transferred to the chassis and therefore do not discomfort the driver.



 Munich, page 54
Karlsruhe, page 65
Aschaffenburg, page 62

Canberra, page 52 

People

Human resources, i.e. people form the basis for lasting success in any organization. A comprehensive, system-wide personnel policy is our key to supporting and motivating staff, keeping them loyal despite competition with other corporations, and sparking potential candidates' interest in working for a global technology player such as Linde.

The founder of Linde AG, Carl von Linde, was a lifelong advocate of vocational training and higher education. For many years now, we have honored his tradition by taking responsibility both for our employees and for their social environment, in Germany and throughout the world.

36°

Knowledge

148°

Canberra, Australia

Knowledge grows when it's shared. Our continuing education programs are open to everyone in the Linde organization. The Linde Learning Management System is a comprehensive, web-based program that will ultimately enable Group-wide knowledge management. Its focuses lie on the international coordination of advanced education, e-Learning programs and the global exchange of knowledge within our organization. This is our way of supporting each individual's ambition to further his or her skills and expertise.

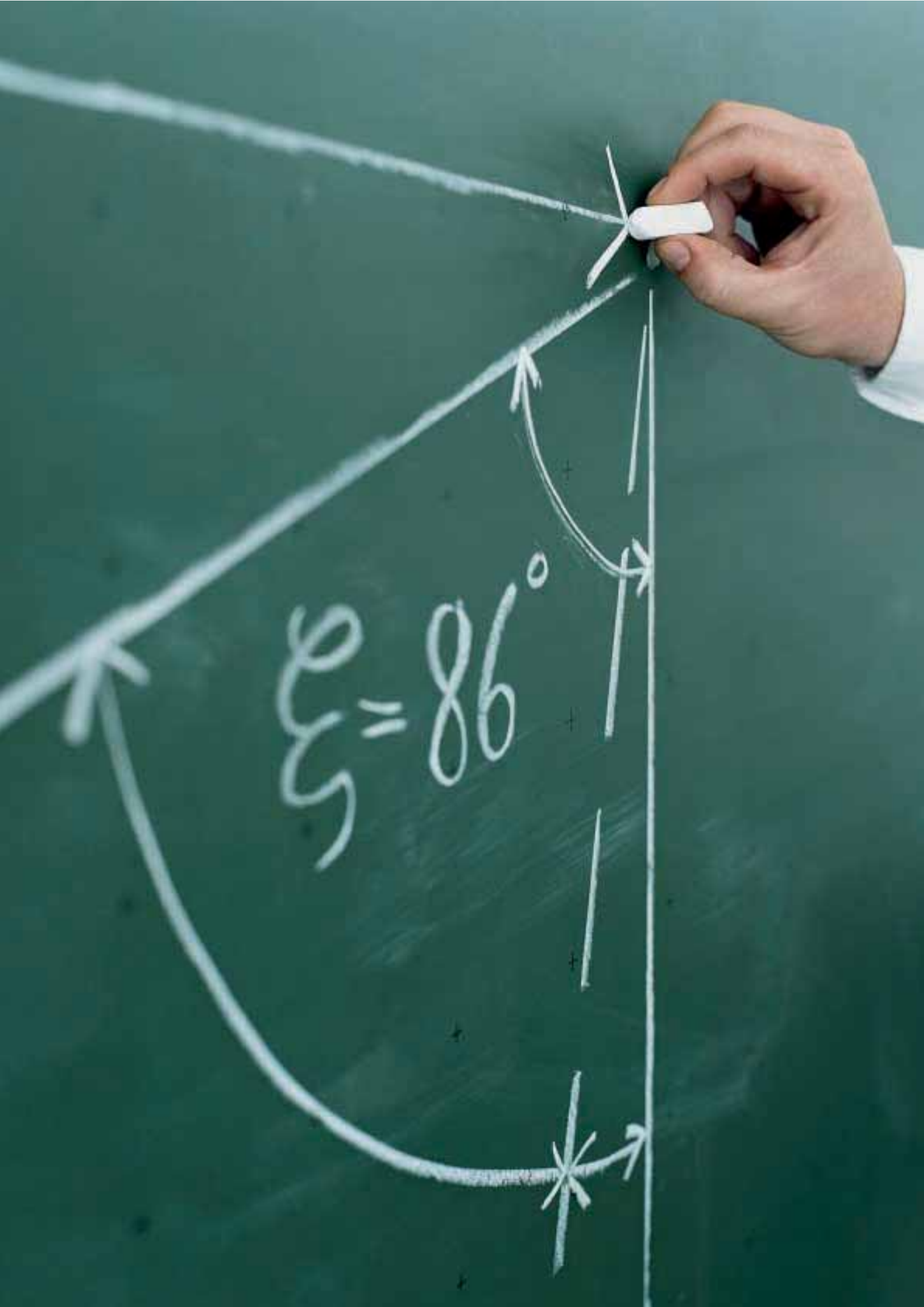


Munich, Germany

Innovative ideas don't fall from the sky. They fall under our responsibility. The Carl von Linde Academy at the Technical University of Munich (TUM) is an established institution. Founded by Linde AG, the Academy is dedicated to educating engineers – a key factor in innovation. It bridges the gap between commerce and science, sustaining the example set by our founder Carl von Linde, a former faculty member at the TUM.

Engagement





$$\alpha = 86^\circ$$

Human Resources

We expect our employees on every level of the hierarchy to adhere to the demanding ethical norms that are set down in writing in the Linde Code of Conduct, which has been in effect since mid-2005. Only if every single individual daily maintains a full measure of integrity, mutual respect and on-the-job responsibility can we hope to realize, step by step, our aim of being a model enterprise in every respect.

Guidelines

The Code of Conduct constitutes the basis both for internal cooperation and for Linde's dealings with customers, suppliers, and all other external partners. In the Code, we expressly declare our commitment to the United Nation's "Universal Declaration of Human Rights." The chief elements of the Linde Code of Conduct are:

- adherence to the law
- a commitment to free and fair competition
- observance of export restrictions in international trade
- product standards
- environmental protection and occupational safety
- data protection
- mutual respect in interaction with others
- the protection of business secrets and assets
- avoiding conflicts of interest
- integrity in dealing with suppliers, customers and the authorities
- communication and transparency
- social involvement.

Additional information on our Code of Conduct can be found at www.linde.com.

In order to enforce the Code of Conduct throughout our organization, we ensure that every employee understands its precepts: this is why the Code has been made accessible in seven languages. At its enactment, the executives of all our Group companies were asked to make certain that the Code was given to each and every employee. We also publicized the Code through our international in-house newsletter. All new employees are given a copy upon joining the company.

The local human resources divisions provide advice and support to all employees to help prevent or curb breaches of law and the Code. In some cases, confidential reports are sent directly to the central Corporate Compliance Committee (see Glossary). The Linde Corporate

Compliance Committee, acting in tandem with the legal division, ensures that no employee suffers reprisals for reporting violations. The Compliance Committee is responsible for monitoring compliance with the Code of Conduct. It is also charged with further refining and adapting the Code in light of new developments and insights.

Global human resource management

The cornerstones of our personnel strategy are professional recruiting of qualified specialists and managerial staff, the support and training of junior employees based on a Group-wide hiring plan, and systematic further education on all levels.

In 2003, a Group-wide optimization plan extending over several years was instituted in the area of personnel development. Among other measures, it covers potentials management, the systematic fostering of dialog with employees, and the expansion and reorientation of further education programs. Global personnel management is handled by Linde AG headquarters with the goals of tapping cross-divisional personnel synergies and attaining a uniformly high qualification standard.

Recruiting

To continue attracting highly qualified personnel in the years to come, especially in the fields of engineering and the natural sciences, we have reinforced our marketing activities at the universities. One example is our commitment to the Carl von Linde Academy at the Technical University of Munich (see p. 57 of this section).

We are investing now in helping qualify the international business leaders of the future. Toward this end, Linde AG has underwritten scholarships and sponsorships for foreign students at the International Department of the University of Karlsruhe. Chinese students, for

example, who receive support for their mechanical and electrical engineering programs at Karlsruhe have the opportunity to coordinate their studies closely with Linde in both Germany and China.

There are additional key contacts to technical universities, among them the Institute for Mobile Machinery at the University of Karlsruhe, the Technical College of Aachen, the Technical Universities of Munich and Hamburg-Harburg, the German Armed Forces University in Hamburg, and the Technical Colleges of Aschaffenburg and Osnabrück. Moreover, all of the leading national and international branches of Linde AG maintain contacts to institutes of higher learning in their vicinities.

Vocational training

Today's trainees and apprentices are the qualified experts of tomorrow: this is a time-honored maxim at Linde. As an organization mindful of its social responsibility, we are strongly committed to providing basic training. In 2004, we trained 685 young people in Germany (previous year: 789); the reduction is due to the divestment of our refrigeration technology segment. Our activities also take into account the growing popularity of the new dual studies programs at vocational academies as an attractive alternative to classical university study in Germany. Additionally, we have updated the contents of several apprenticeship programs and adapted them more closely to the requirements of our business segments and subsidiaries. Currently we offer 37 different vocational training programs. To a large extent, apprentices and university students work independently at Linde, with clear-cut responsibilities for their own projects. Last year 77.5 percent of our trainees were given jobs after completing their apprenticeships.

To interest potential professional and management staff early on, we have for many years now been assigning thesis projects to exceptionally talented students in fields that match our core business areas. In 2003/04, for example, our Hydrogen Solutions unit, the hydrogen team at Linde Gas, subsidized the diploma theses of several German university students. One interdisciplinary thesis ("Industrial Design &

Marketing Communication") probed the introduction of hydrogen technology as a key future energy source and explored avenues for increasing its acceptance.

A future scenario which also includes an original brand of hydrogen energy provides impulses for ways in which Linde can establish hydrogen on the markets and with its customers.

Assessing positions and identifying potential

The starting point for potentials management within our organization is the internationally uniform seven-stage Linde Grading System. Introduced in 2003, the system constitutes a major improvement and serves to describe the value and importance of various functions based on uniform standards. It helps maximize transparency for the individual employee and facilitate accurate comparability.

Individual functions are weighted in terms of their importance for the organization and classified according to a point system devised jointly with the Hay Group consultancy firm. High on the scale are not only tasks involving major leadership responsibilities, but also those requiring exceptionally specialized expertise. The classification of all managerial functions throughout the Group is scheduled for completion by mid-2006.

Management development: Linde University

Under the umbrella of its virtual Linde University, Linde AG implements a comprehensive human resource development concept offering sophisticated continuing education programs for the various target groups within the organization. In cooperation with leading international business schools, junior staff is trained both nationally and internationally for future leadership, and global development opportunities are provided for middle and senior management (see fig. on p. 59). In addition, we offer specific continuing education programs in our various business segments. Examples include the Linde Gas University, the Linde Engineering Ethylene University, and the STILL Management Academy.

The Linde Competence Model

Competence profile	1	2	3	4	5
Technical competence	x	-	-	-	-
Strategic competence	-	x	-	-	-
Entrepreneurial competence	x	-	-	-	-
Leadership competence	-	x	-	-	-
Change competence	-	-	x	-	-
Implementation and value-creation competence	x	-	-	-	-
Social and intercultural competence	x	-	-	-	-

The Competence Model identifies the specific competences required from employees aspiring to qualify for management positions within the company. An important element within the personnel development strategy, this system is applied in numerous Human Resources processes and tools.

In 2004, we introduced the Global Leadership Program for selected top executives in conjunction with the highly respected Insead Business School in Fontainebleau, France. Combining hands-on learning with theory and extending over several months, the course focused on system-wide projects that were defined by the Executive Board and are now to be progressively implemented in the various business segments.

As a further component of the Linde University, we instituted the Global Leadership Development Circle in February of 2005 for 40 of our top executives. This program was undertaken in cooperation with North Carolina's Duke University and likewise involves concrete projects.

The success of these ventures is evaluated by periodic human resource development discussions. Using the Linde Competency Model (see fig.), the strengths and weaknesses of individual leaders are assessed according to Group-wide performance standards. Based on the results, additional dialog serves to develop potential and fine-tune cooperation.

Continuing education

Parallel to developing leadership qualities, we also vigorously promote the advancement of junior staff. In the Material Handling division, for example, an international trainee program was initiated in early 2005; the program is designed for up-and-coming executives from our subsidiaries in Great Britain, France, Spain, and Germany.

Since 1998, we have also been fostering promotion through the ranks by means of interdisciplinary "Junior Circles" conducted regularly throughout the organization. Comprised of employees with some professional experience who have not yet held positions of responsibility, these multinational groups cooperate on concrete projects for periods of approximately 18 months and are mentored by an experienced executive. Toward the end of this work-and-learn phase, during which participants also acquire basic managerial skills, the group presents its proposals to the Linde AG Executive Board, which then weighs their implementation.

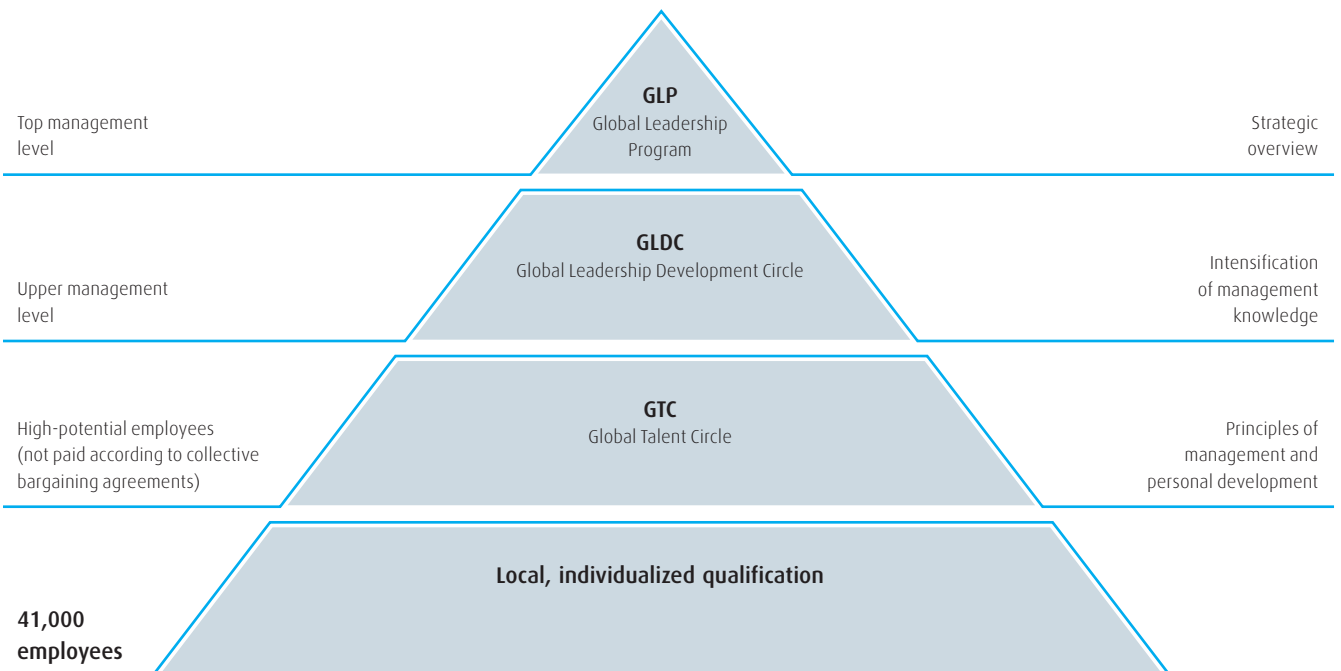
In order to facilitate lifelong learning for all of our employees – with the aim of generating added value for our organization – we constantly seek to optimize our array of disciplinary and interdisciplinary continuing training courses. The emphasis is on qualifying specific target groups: employees engaged in plant operation, for instance, or sales representatives from Linde Gas Therapeutics – or staff requiring IT and language courses. Above all, the language programs play an increasingly important role in view of our growing international orientation. Last but not least, these measures also enhance the employability of our staff.

A total of 61.1 percent of employees participated in continuing education programs in 2004. The average number of training hours per employee was 1.5 days.

The average cost of the training programs per employee was 350 EUR.

Target Group

Contents



Linde University is an important feature of the organization's management development activities. Under the umbrella of this virtual university, Linde AG possesses a comprehensive personnel development concept that offers high-quality learning opportunities for various target groups within its workforce.

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 Ideas

22°

Rio de Janeiro, Brazil

People who champion candid criticism need to lead by example. Even in the corporate arena, learning never stops. At Linde Gas, employee surveys act as important tools, providing us with insights into the needs and wants of the men and women who make up our organization. At Linde, no one need be afraid to speak their mind. Frank feedback from our workforce gives us the motivation and the ability to preserve what is good and improve what could be better.

Cementing expertise

Succession planning

In order to maintain and reinforce our ability to foster careers internally and fill vacancies with qualified candidates from within, a plan of succession for all key positions with identical standards and criteria around the world was first put into place Group-wide in 2004. This step serves to anchor the continued success of our enterprise. In the future, our objective is to fill more than half of all newly advertised managerial positions from within our own ranks.

Knowledge management

Linde know-how is most valuable when made available to all employees who can make productive use of this asset. Access to relevant information is therefore expressly granted on all levels of the hierarchy. Each of our business segments maintains intranet-based knowledge databases with comprehensive information on the market and our competitors. Depending on the data's degree of specialization, the network links are designed to be system-wide or segment-wide.

Another example of our activities: the "R & D Globe" system instituted at Linde Gas in 2005 made it possible to link our worldwide research activities on the intranet and to provide broad access to product information.

The informal exchange of knowledge is also furthered by way of the continuing education courses offered by Linde University. By strategically interfacing our various business segments, we facilitate inter-segment dialog and promote the sharing of best-practice solutions.

Our continuing education programs increasingly tap the potential offered by computer-assisted learning options. The newly developed Linde Learning Management System (LLS) is currently being introduced at Linde Gas. In the medium term, this program is slated for implementation throughout the Group. LLS is an internet-based plat-

form for continuing education and human resource management that ensures uniformly high standards worldwide. By 2006, some 18,000 users will be linked to the LLS.

Idea management

Linde traditionally awards monetary bonuses to employees submitting suggestions for improving internal processes. This also applies to proposals that contribute to preventing accidents or protecting the environment. In 2004, our German workforce submitted a total of 1,345 suggestions, which resulted in savings and a series of adjustments in production, safety, quality, and environmental conservation. Bonuses paid to employees exceeded the sum of 400,000 EUR.

In 2004, to mark the 125th anniversary of the enterprise, we conducted a worldwide competition to pool creative input. All our employees were invited to develop their individual ideas and desires into concrete proposals for process improvement, which were then put into practice wherever feasible. Personnel from 28 countries participated in the Linde Challenge.

A further initiative designed to more effectively harness the creative potential and innovative energy of our staff was the formation, in 2005, of the Linde Inventors Club. Every year Linde will confer five innovation awards upon employees who submit the most promising patent applications. The prizewinners will be inducted into the Inventors Club. Periodic meetings of the Club members will encourage the international exchange of knowledge across departmental and national borders.

Employees by Region	2004	2003
Germany	14,667	17,211
Europe (excl. Germany)	17,799	20,000
North America	4,062	3,958
South America	2,044	2,308
Asia	2,287	2,182
Australia/Africa	524	505
Total	41,383	46,164

Cooperation

Communication

In any business, frank and open communication forms the best platform for employee and customer satisfaction. The intense dialog between our organization and its members is ongoing and transcends hierarchical barriers. Many of our national companies already conduct employee surveys. The results provide valuable pointers on measures designed to further improve smooth cooperation.

One good example is the anonymous employee survey first carried out in 2004 at Linde Gas, in which some 3,000 staff took part. The long-term objective was to achieve a lasting improvement of the working climate and corporate culture as a whole. It is the duty of management to implement annual surveys to ensure the comparability of – and document progress in – fields such as the communication between supervisors and employees. These surveys have now been initiated in South America and Northern Europe as well, and the results of the Linde Gas pilot have been published in the intranet and are thus accessible to all employees. Our subsidiary OM Pimespo has also been leveraging the employee survey tool for several years with the goal of improving cooperation between management and the workforce.

Moreover, organizational changes and significant events are communicated quickly and in impactful ways. One of the channels we use is our in-house publication, "Linde Today," which is distributed worldwide in six different languages. We also encourage dialog with our co-workers by means of electronic "chatmails" addressed directly to them on behalf of the Executive Board or the heads of the relevant business segments.

Diversity

We respect and value the differences between human beings. Through our Code of Conduct, which is in place throughout the organization, we seek to guarantee our employees genuinely equal opportunities. Individual diversity enriches both our cooperation and the Linde corporate culture.

Our Group attaches great importance to retaining the local workforce in the various countries in which we operate. We strategically foster intercultural competence by systematically deploying human resources abroad.

To simplify matters for Linde staff employed in foreign countries and cultures, an Expatriate Center has been established at Linde Gas which provides a comprehensive IT solution. In addition to arranging foreign assignments, it offers detailed information about local customs and ways of communicating.

Linde AG supports the idea of a work-life balance enabling employees to successfully reconcile job and family-related work as well as leisure activities without undue stress. We therefore strive for a stronger family orientation as an integral component of our personnel policy. Because the percentage of women in a field dominated by engineering sciences – such as that at Linde AG – is still disproportionately low, it is our aim to step up efforts to make Linde more attractive to this group; we expressly welcome qualified women applicants. Our long-range goal is to significantly raise the percentage of women in the general workforce and most notably in senior management by taking appropriate action. In 2004 the share of women in leadership positions was 4.0 percent.

Our quota of disabled employees is currently 4.3 percent. This means that we are slightly below the 5.0 percent quota prescribed by German law. To remedy this, for many years we have been collaborating with selected workshops for the disabled, some of which produce

Integration

Aschaffenburg, Germany

Everyone needs hope for the future. We improve their prospects. As one of the largest employers in Aschaffenburg, Linde Material Handling plays an important role in the region's vocational training sector. And we don't forget those who might otherwise be left behind. For the second time, we are offering 15 disabled young people the opportunity to undergo a two-year training program that has already proven a success: many of the initial participants have gone on to find jobs.

9°

50°

metal and lathed wood parts for various uses. One such case is our successful partnership with the Isar-Würm-Lech (IWL) project.

Linde Material Handling is currently also supervising 15 disabled adolescents in a special pre-vocational training program. The physical or mental disabilities of the participants are such that they would be overchallenged by a traditional apprenticeship. On the other hand, they are underchallenged by the type of work usually performed in disabled occupational facilities. Linde endeavors, in collaboration with workers' welfare agencies, to provide a vocational perspective for these young people. The training period lasts up to two years.

Employee representation

Linde AG respects the right of workers to organize in unions. The cooperation between the organization and its employees, their representatives, and the unions is consistently keyed to the goal of constructive and lasting consensus-building, aiming for a fair balance between the economic interests of Linde AG and the interests of its employees.

In Germany the cooperation between management and employee representatives is governed by the Law on Industrial Relations. As of the beginning of 2004, employee representation has been two-tiered, consisting of decentralized works councils in the individual divisions and a central works council serving the organization as a whole. The previous system of Group-wide councils for the various business segments was abolished. Instead, specialized subcommittees within the central council, for example for Linde Gas or Material Handling, deal with concrete issues of co-determination on decisions that are relevant to them.

In addition to this dual co-determination system, Linde has for some years maintained a European works council. It acts as a forum for communication between employee representatives across national borders, and defines itself as an advisory committee to both the central works council and corporate management.

Job security

Our responsibility toward our employees begins with their job security. For this reason we not only invest continuously in improving their skill levels, but also regard structurally mandated changes as opportunities. With its diverse types of work, our organization offers myriad possibilities in this respect. Our employment fluctuation rate within Germany was 5.1 percent in 2004 (previous year: 5.0 percent); worldwide, the rate was 4.1 percent.

Linde AG is not, however, immune to the structural problems affecting some of its markets; these cannot always be solved without adjustments to the workforce. In such cases, it is our consistent practice to consult with the works council to determine whether changes can be made without dismissals, for example by leveraging natural fluctuation.

Employment benefits

Pensions

Our pension program is becoming increasingly important in view of the faltering state retirement schemes. In Germany, its core is the company pension program financed completely by Linde and designed as a modular credit system. The level of retirement payments depends upon the number of annual pension credits earned during the term of employment. Staffmembers also have the option of converting portions of their pay into additional pension credits to provide for their retirement. As part of the Linde pension plan, workers' contributions earn them shares in a special trust fund. They are the exclusive beneficiaries of its future appreciation, and Linde guarantees a certain minimum interest rate. By the end of 2004, 2,780 employees had made use of this opportunity to provide for their old age, 18 percent more than the previous year.

Our pension system is supplemented by direct insurance funded either by taxed income paid into the "Riester" system (a German state-subsidized pension fund), or by flat-rate contributions withheld from the employee's wages. At the close of 2004, the direct insurance option experienced one last boom before its discontinuation in 2005. However, a grandfather clause guarantees the continued flat-rate tax for contracts signed prior to the end of 2004.

During the 2004 fiscal year, Linde reported a total expenditure of 127 million EUR for pensions, 66 million EUR of which was disbursed to retirees in Germany.

Company health insurance

Linde AG maintains its own company health insurance plan. The number of insured has risen slightly in recent years. At December 31, 2004, the Linde health insurance fund ("BKK Linde") paid benefits to 25,823 members (previous year: 25,650), along with 12,781 dependents (previous year: 12,847). Premiums in all the German states were a uniform 13.6 percent and thus lower than the national average of 14.3 percent.

Through our health insurance system and company doctors, we offer comprehensive protection programs to our employees and their families at many locations. These include, for example, prophylactic colon and breast cancer exams and exercise programs for the spine. In addition, all employees – including those who do little or no job-related traveling – have the opportunity to receive free regular vaccinations against contagious diseases.

Society

Linde AG has assumed social responsibility since its very inception. The success of our relevant activities is periodically evaluated by the Corporate Responsibility Council; its assessment is used to identify any need for additional action. We are currently in the process of realigning our commitments. The future focus will lie on fields that are closely related to our core businesses: health, the environment, vocational training and education. In addition, we are pursuing various projects in the vicinities of the major Linde AG locations – generally in places where our employees work and live.

Healthcare

For more than 15 years, Linde has been supporting research facilities in their quest for new medicinal gas applications. In the past these efforts were concentrated mainly in Scandinavia, but with the founding of the GEMI Fund in the fall of 2003, we have expanded these activities to other countries as well. On a biennial basis we are donating one million EUR from the GEMI Fund (GEMI = Gas-Enabled Medical Innovations) together with Harvard Medical International, a non-profit organization at the Harvard Medical School, and the Swedish Karolinska Institute, one of Europe’s leading medical schools.

The grant is divided between five to ten research projects worldwide. The initial subsidies from the GEMI Fund have already been disbursed to seven European and U.S. institutes that conduct research into new medical uses for nitrogen, carbon monoxide, and fluorocarbon gases. Decisions as to the practical application of research results are left to the participating researchers and institutes.

Elements of Social Engagement

Healthcare	Environmental protection
Vocational training and education	Local engagement

Environmental protection

As the world’s largest provider of hydrogen plants, it is Linde’s aim to promote the development of hydrogen technology in systemic technological partnerships with both oil and energy suppliers and the automotive industry (for details, see “Environmental Protection and Safety,” p. 34, and “Markets,” pp. 78 ff.). In order to upgrade the basic social conditions for – and the public acceptance of – hydrogen, we organized the first “German Hydrogen Day” media forum in Munich in the fall of 2003, and held a companion international event in Berlin in early 2005. Both conventions, which were attended by leading experts from the fields of science, technology, economics and politics, met with a thoroughly positive public response.

In line with our strategic goal of establishing hydrogen as a prime source of energy in the future, we have also been supporting a research team at the Christian Albrecht University in Kiel since the end of 2004. The team is investigating methods of producing biohydrogen using microalgae. The researchers in Kiel have succeeded in altering these microorganisms through genetic engineering in such a way that their discharge of hydrogen, which is normally so minimal as to be impractical for technological applications, is significantly multiplied. The aim of this research is to eventually be in a position to make an environmentally-friendly contribution to the growing need for hydrogen, one that is fueled solely by the renewable resources of sunlight and water.

49°



Karlsruhe, Germany

Know-how secures competitive benefits. And qualifications secure know-how. Linde and nine partners have endowed a chair for Mobile Machinery at the University of Karlsruhe. This position has the potential to become a national and international authority on hydraulics and drive technology. The objective is to train qualified engineers and at the same time enhance the competitive strength of the partners in industry.

8°

Vocational training and education

Linde has always been an enterprise in which learning, research, and the practical application of technical know-how go hand in hand. In order to set an example for this traditional alliance between the worlds of education and business, Linde and the Technical University of Munich (TUM) jointly founded the Carl von Linde Academy there to commemorate the company's 125th anniversary in 2004.

Linde has subsidized the academy's construction with an endowment of more than eight million EUR. As an interdisciplinary institution, the academy equips young engineers, computer experts and natural scientists with a well-rounded knowledge of the humanities and the cultural and social sciences, enabling them to transcend the limits of technological expertise and training in their future careers. A further goal is the continuing education of natural sciences and mathematics teachers. Long-range plans include a first-semester integration program designed to give beginning students a head start in the university context.

In 2004, Linde AG and nine other companies endowed a chair for Mobile Machinery at the University of Karlsruhe. The endowment was prompted by the need for more qualified academic instructors to meet the burgeoning demand in this field. There is a strong practical orientation in research and teaching, with the goal of generating significant added value for both Linde Material Handling and the other participating organizations (none of which are in direct competition with Linde). Linde contributed one million EUR to the new chair. In 2005, Linde was one of the founding members of the research group "Intra-logistics/Conveyor Technology and Logistics Systems."

Linde also funds two foundations whose declared mission is to advance research and teaching in selected natural sciences and to provide scholarships to gifted members of the workforce.

The Carl von Linde Foundation at the Technical University of Munich was established in 1932 to support education and research, and to help train young scientists and technicians in Bavaria. The endowment was occasioned by the 90th birthday of Carl von Linde. The company founder was a professor at the Technical Institute – now the Technical University – of Munich; his specialist areas were the theory of thermal power and refrigeration, technical thermodynamics, freezer technology, and thermal research. The foundation was earmarked to support these fields in both academic teaching and research. The endowment sum is 360,000 EUR.

The Dr. Friedrich Linde Foundation was established in 1940 to mark the 70th birthday of Dr. Friedrich Linde, the son of our founder and then chairman of the Linde AG Executive Board. The foundation provides student financial aid to members of the workforce and their offspring, primarily supporting degree programs in technical fields related to the specific areas relevant to our organization, along with business programs. The endowment is valued at 310,000 EUR.

→ Linde aids victims of the tsunami catastrophe in Asia

In late 2004/early 2005, we provided aid to the victims of the tsunami catastrophe in the form of extensive relief programs and a monetary donation of 350,000 USD. In addition, Linde furnished hospitals in Thailand with free medicinal gases and supplies for treating the injured. We are also subsidizing the reconstruction of a library in one of the schools hit by the catastrophe.

Above and beyond this, Linde employees the world over responded generously to the Executive Board's call for private donations and the conversion of sick leave and vacation time. The resulting sum of more than 500,000 EUR also directly benefited the victims in Southeast Asia.

Local engagement

Within the framework of a public-private partnership, we and two other companies based in the Rhine/Main region have joined the federal state of Hesse in supporting exceptionally talented and promising students at the Schloss Hansenberg boarding school in Rheingau. Linde has been subsidizing the school since early 2004. In the course of five years, a total of 1.25 million EUR will be invested in an innovative teaching approach that moves beyond outmoded structures to take an active role in reshaping the German educational system. At Schloss Hansenberg, the students are optimally prepared for the demands of their future careers through a close meshing of theory and practice. In addition to providing financial help, Linde offers the students internships in its foreign subsidiaries.

Donations

In the summer of 2005, Linde AG adopted a set of donation guidelines establishing cogent rules applicable to the individual business segments and corporate administrative headquarters. The guidelines prescribe allocation criteria, donation limits, and rules for making donations.

Donations are to primarily target social services, vocational training, education, and environmental protection. The individual business segments at Linde AG make donations exclusively to regional organizations based at their venues within a specifically defined scope. The head administrative offices can give both to regional and nationwide organizations.

All donations that exceed the budget or are made to political parties require the formal approval of the Linde AG Executive Board. Organizations which operate outside the system of laws or do not serve a charitable cause are ineligible for support.

The CR Council receives comprehensive annual reports on the donations made by Linde AG.



● São Paulo, page 70

Stockholm, page 73 ●

Berlin, page 79 ●

Munich, page 81 ●

Markets

The success of our business is powered by pioneering inventions that have repeatedly enabled us to access new sales markets. Examples from our history include refrigeration machinery and technologies for liquefying and separating air. Our successes past and present are fueled by visionary thinking and an integrative approach to science and business.

In the future, we will be confronted more than ever with issues such as how to tap environment-friendly energy sources and how to best secure affordable healthcare. Linde is responding to these challenges in strategic ways: with hydrogen technologies, for instance; with environment-friendly natural gas liquefaction, and with a broad range of medical gas applications. These are our markets of tomorrow.

68–85 Markets

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24°

São Paulo, Brazil

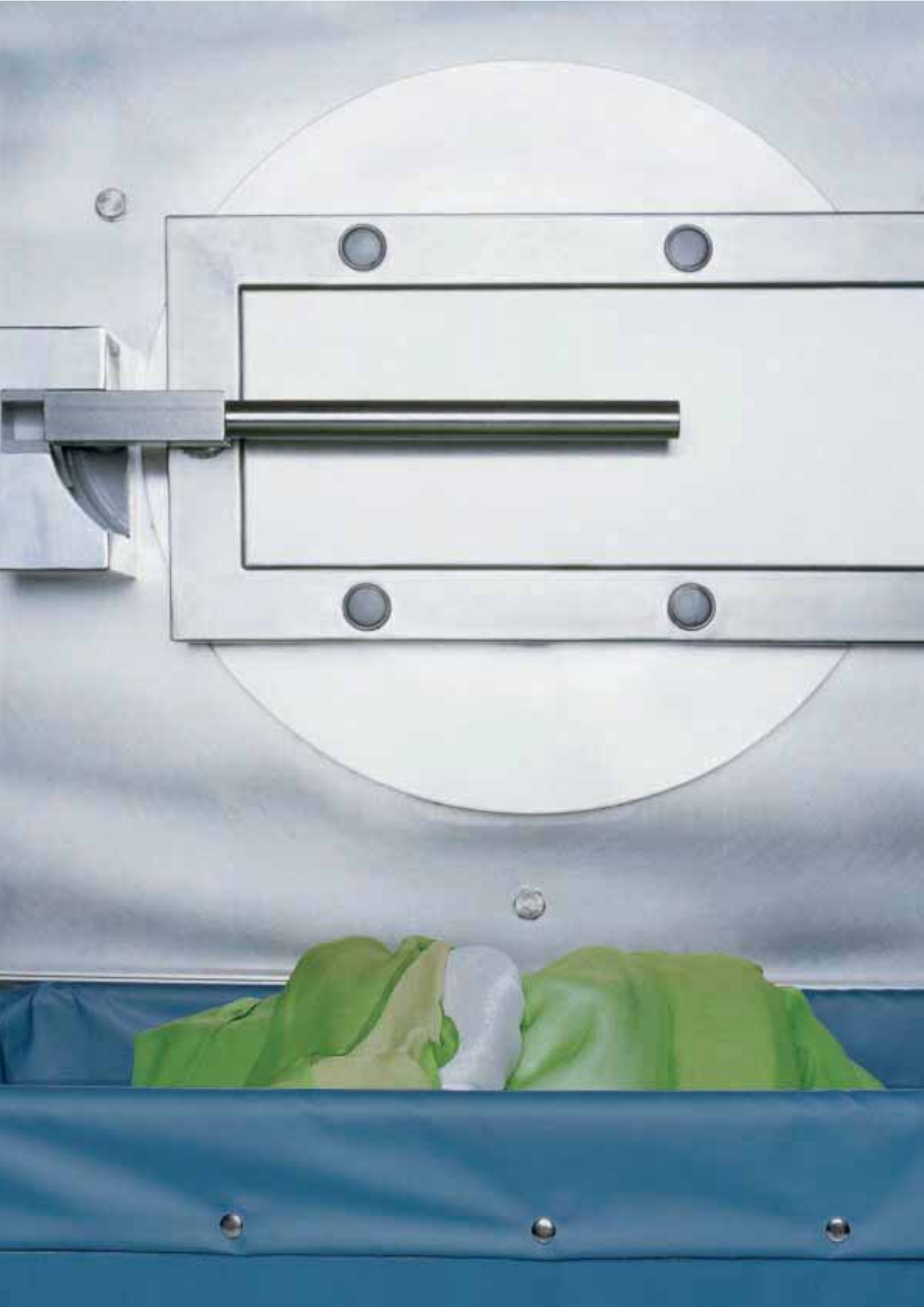
People with good health are fortunate. But with Linde, they don't have to be privileged. Longer life expectancies inevitably mean an increased susceptibility to illness. This places a huge financial burden on healthcare systems, particularly in the emerging economies. Linde Gas Therapeutics has developed solutions for treating patients with respiratory ailments at home. Of obvious benefit to patients, they also reduce the cost of treatment.

48°

🎯 Challenges







Innovation

Stockholm, Sweden

Some revolutions occur behind closed doors – and open up radically new vistas. In the past, dry cleaners have typically used chlorinated solvents like perchlorethylene – which has now been prohibited in the U.S. Together with its partners, Linde has developed an environment-friendly cleaning method. The carbon dioxide it requires is a chemical industry by-product and does not have to be specially produced. Just one shining example of innovation at work.

Research and Innovation for the Future

Bolstering innovative capacity is crucial to sustaining corporate development. In this context, we benefit from an all-embracing knowledge platform derived from our various business segments. The research synergies enable us to develop products such as fuel cell-powered forklifts which pool the expertise from a spectrum of industries.

In 2004, Linde spent 177 million EUR (previous year: 172 million EUR) on research and development. A total of 1,263 people were employed in this segment. The year before, the figure was 1,242 – adjusted for the divestment of the refrigeration technology division.

In 2004, Linde Gas invested 56 million EUR in the exploratory research and further development of medical gases, hydrogen technologies and other innovative and environmentally compatible technologies for our customers.

One particular focus of Linde Engineering's research and development work is on plants for the liquefaction of hydrogen, olefins and natural gas. The expenditure totaled 16 million EUR in 2004. This figure does not, however, include outlays associated with specific individual projects, which represent another major concentration in this segment's R&D endeavors.

In Material Handling, the focus of research and development activities was to achieve improvements in the performance, energy consumption and emission levels of our products.

Our efforts to promote progress and innovation are outlined in the following section on the Gas and Engineering division. Further information on Material Handling can be found in the section "Environmental Protection and Safety" starting on p. 45.

Linde Gas

To increase the efficiency of basic research and promote the development of gas-based applications, we at Linde Gas are specifically placing our faith in the comprehensive pooling of knowledge. The applications engineers working for us around the world share their expertise through a knowledge management platform called R&D Globe that has been specially developed for this purpose (see "People," p. 60).

As a result, the segment has access to information that had previously been distributed between disparate databases. Information processing was somewhat one-sided, being carried out by the 115

employees of the central Research and Development department. Now this data repository is being systematically supplemented by the expertise of just under 500 applications engineers stationed decentrally around the world. As a result, valuable information on customers and markets is now available to all employees, as indeed are the results of local problem-solving activities.

Other "think tanks" at Linde Gas include our Hydrogen Solutions department, which coordinates our hydrogen activities, and a newly established Innovations department devoted to examining and developing the potential of particularly promising business fields.

Linde Engineering

The central Research and Development department of our Linde Engineering segment provides continuous support to the production lines responsible for the various plants; the aim is to refine the technologies used. To gauge the division's own performance, the Research and Development department has developed key performance indicators (KPIs) to quantify factors such as competitiveness, resource utilization, cooperation potential, external and internal contacts, innovative capacity, and quality, safety and environmental protection.

Various routes are open to our employees for reporting improvements, new discoveries or inventions, and further developments. One example is the Intranet portal LIKE (Linde Information Knowledge Environment). Another option is direct contact with the three innovation teams: "Olefin," "Gas" and "Air." These three teams, which convene at regular intervals, each consist of 10 to 15 experts and decision-makers. The most important aim of these innovation teams is to pool ideas and subject them to a process of structured optimization, prior to passing them on to the "Development" steering group for a decision on implementation. This ensures that there is a fixed path for the entire process, starting with the initial idea and following through to the implementation of a strategic development project.

Energy

Since the invention of the steam engine, fossil fuels have been driving the engines of industrial development. In fact, they have remained the most important suppliers of energy up to the present day. As recently as 2004, some 88 percent of the world's primary energy needs (see Glossary) were met by petroleum, coal and natural gas.¹ In most regions of the world, petroleum tops the list.

Increases in worldwide energy demand occur as the poorer economies become emerging, industrializing countries and the world's population grows. The following figures illustrate the latent demand in the poorer nations: although only 23 percent of the world's population lives in the industrialized countries (including the eastern European economies and the successor states of the former Soviet Union), they account for 71 percent of global energy consumption. In contrast, the emerging and developing countries, home to 77 percent of the planet's population, use a mere 29 percent of the energy consumed worldwide. Studies on the subject² therefore conclude that global energy consumption will rise by two percent annually. These figures clearly demonstrate that the demand for fossil fuels is set to rise in the decades ahead. In light of this situation, the efficient management of fossil energy sources and their environment-friendly development and exploitation must be our top priorities.

Solutions and technologies from Linde offer prospects of moving beyond the problem of increasingly depleted petroleum reserves. Leveraging less harmful alternatives such as natural gas will facilitate a transition to environment-friendly energy production.

In the long term, conversion to renewable energy sources is inevitable due to the limited nature of fossil fuel resources and the atmospheric pollution caused by their combustion. To ensure subsequent generations can enjoy high standards of living in an intact environment, one of the key tasks our research departments face is finding economical ways to harness renewable energies. Our efforts in this field are being focused on hydrogen, as an environment-friendly energy carrier, and on developing the closely related field of fuel cell technology. The ultimate objective is to obtain hydrogen exclusively from renewable energy sources. As a leading industrial gas producer, we are involved in the entire hydrogen value chain – with the goal of fully exploiting this technology's enormous potential in both the medium and the long term.

Natural gas

From extraction and processing to final use, natural gas is a clean, environment-friendly and economical energy carrier that is destined to replace petroleum in most applications over the coming decades. Forecasts put the continuous annual increase in demand for natural gas at between 2.3 and 2.7 percent within the next few years.³ Over the coming two to three decades, natural gas will therefore emerge as the world's second most important energy carrier.

Based on current estimates, worldwide natural gas reserves will last considerably longer than the global petroleum reserves. Not least because of its high energy/volume ratio, constant calorific value and high degree of purity, natural gas is viewed as the world's most important fuel in the medium term. Engines powered by natural gas are extremely environment-friendly in their operation and can effectively replace conventional petrol and diesel engines.

Natural gas liquefaction (LNG)

The market for natural gas installations is currently growing at an annual rate of five percent. Our Linde Engineering segment serves this market with installations of every size, with a key focus on LNG facilities (Liquefied Natural Gas; see Glossary). According to experts, global demand for LNG plants, in which natural gas is condensed at temperatures down to minus 162 degrees Celsius, will rise 60 percent by the year 2010. This will spark demand for additional plants on the scale of our Hammerfest site, as described in detail in the section "Environmental Protection and Safety" (see pp. 42–43).

In 2004, the construction of a turnkey LNG plant in Shan Shan in the Chinese province of Xinjian heralded a new era in energy supply – in what is currently the world's fastest-growing economy. Liquefied natural gas from the plant in the inaccessible northwestern part of the country is transported thousands of miles to cities in the east of China.

¹ BP Statistical Review of World Energy, 2005.

² World Energy Report RWE, 2003.

³ International Energy Agency (IEA), U.S. Energy Information Administration EIA, 2004, and Directorate-General for Energy of the European Commission, 2003.

Together with the requisite transport infrastructure, the first plant of this kind in China will culminate in the dynamic opening and development of the local natural gas market. All in all, the new Shan Shan facility marks the beginning of a significant shift in China's primary energy mix. The increasing use of natural gas means that considerably lower levels of environmental pollution can be anticipated.

One visible manifestation of this development is the progressive use of CNG (Compressed Natural Gas; see Glossary) in the buses operating in Beijing's public transport system. This involves not only purchasing new vehicles, but also setting up the required storage facilities and filling stations. Linde Engineering has provided the relevant expertise and delivered a solid testimonial with the construction of the LNG plant in Shan Shan.

Gas to Liquid (GTL)

A new growth market for Linde Engineering is currently emerging from the increasing demand for air separation plants; these are instrumental in producing environment-friendly diesel fuel from natural gas (Gas to Liquid, GTL; see Glossary). Large volumes of oxygen are required in this environment-friendly technology – quantities that Linde can provide smoothly and at a low cost.

The environmental benefits of GTL fuels are self-evident: compared to conventional diesel fuel from refineries, GTL primarily consists of paraffins and is virtually free of harmful aromatics, nitrogen oxides and sulfur. It therefore complies with the increasingly stringent legal requirements for fuels in North America and Europe. The popularity of GTL can also be attributed to the efforts of increasing numbers of countries to reduce their dependency on petroleum.

Leading research institutes foresee significant market opportunities opening up for GTL-based fuel production. The international management consulting firm of Arthur D. Little and the London-based Centre of Global Energy Studies, for instance, predict that GTL production will rise to 1.5 million barrels per day by the year 2015. In comparison, some 11 million barrels of conventional diesel fuel are currently pro-

duced every day. GTL would be capable of gradually replacing a percentage of this. What is more, the largely environment-friendly by-products (heat, water, nitrogen, carbon dioxide and a range of noble gases) can also be marketed and sold.

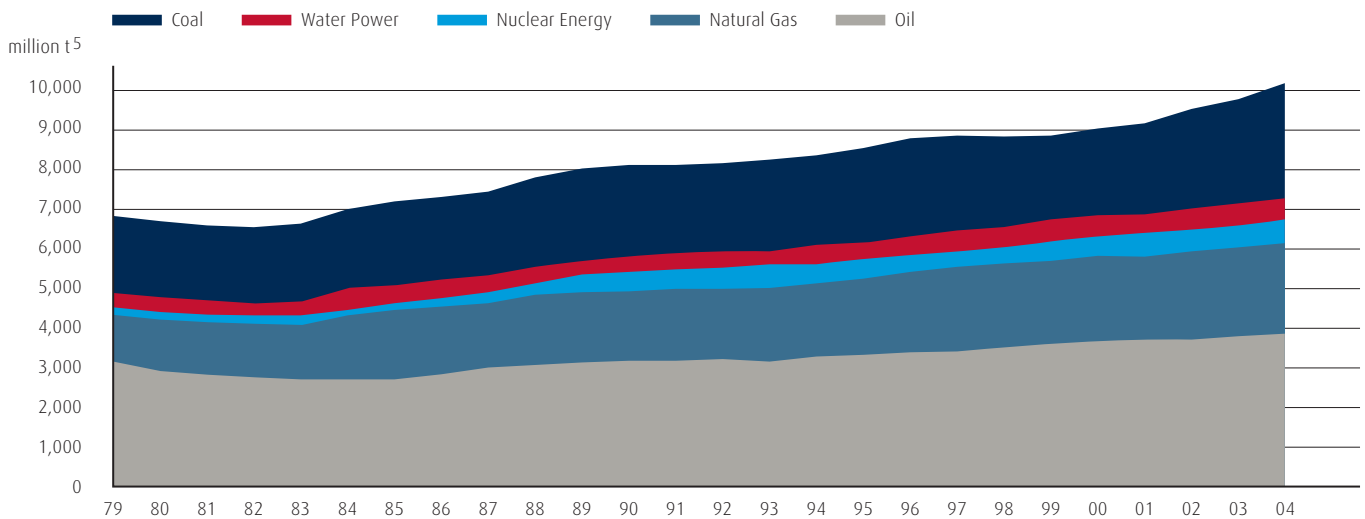
Linde possesses the expertise to construct the requisite oxygen plants and has already been involved in what is currently the world's largest GTL facility, operated by Moss gas Ltd. in South Africa. Our customer there produces 25,000 barrels of GTL per day.

Low-emission power plants

Given the aging of power stations, rated outputs of some 40,000 megawatts (MW) in Germany and some 200,000 MW throughout Europe will have to be replaced by 2020. An additional increase of 100,000 MW in overall demand is also anticipated for the same period in Europe. Worldwide energy needs will increase still further due to the non-European economies with their considerably more dynamic growth rates.

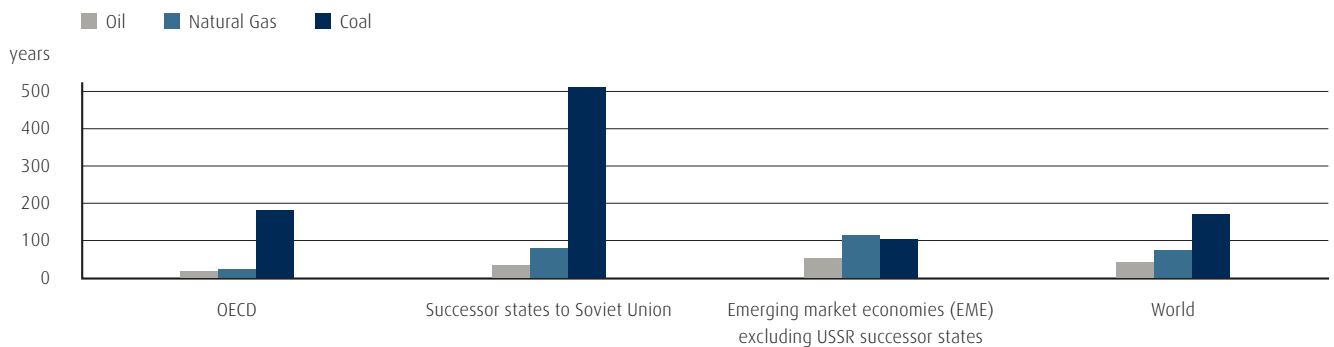
There is no reason to assume that renewable energies will be able to completely cover this supply shortfall within the next 20 years. Fossil energy carriers remain the only other alternative to the politically contentious option of nuclear energy. Along with natural gas, factors like long-term availability, security of supply and cost-effectiveness also make coal a particularly attractive solution. However, the rise in CO₂ emissions accompanying the increased use of coal represents a clear contravention of the Kyoto Protocol. Linde Engineering is therefore participating in a large number of diverse international and national projects focusing on methods of reducing carbon dioxide emissions. By way of illustration, the Research and Development department of the Linde Engineering division is a member of the "CO₂ Capture and Transport" task force of the Technical Group in the Carbon Sequestration Leadership Forum (CSFL) – an international organization in which the U.S. government also participates through its Department of Energy.

Global primary energy consumption 1979 – 2004⁴



During 2004, the rise in primary energy consumption was + 4.3 percent, the highest recorded surge to date. As was the case 25 years ago, oil, natural gas and coal remain the main energy sources.

Fossil fuels: ratio between reserves and production at end of 2004⁴



Global reserves of natural gas are projected to last for some 67 years at current production rates, and therefore longer than existing oil resources. Coal is expected to be available for longer still. The ratios between these energy sources vary considerably from region to region.

⁴ BP Statistical Review of World Energy, 2005, p. 39–40.

⁵ Crude oil equivalence.

Linde has been an industry leader in the hydrogen technologies sector for many years. All such initiatives are driven by the foreseeable exhaustion of fossil energy reserves. In the opinion of many experts, hydrogen is likely to become an increasingly important energy source in the future due to its universal availability and environment-friendly characteristics. Today it is already used in applications ranging from semiconductor production to the petrochemical industry.

The following projects provide a brief overview of our additional research activities in this area.

COORETEC

As part of the COORETEC program (CO₂ Reduction Technologies in fossil-fired power plants) launched by Germany's Ministry for Economics and Labor, Linde Gas is involved in two combined projects: OXYCOAL-AC and COORIVA.

OXYCOAL-AC deals with the development of a coal-burning process for power generation that produces no CO₂ emissions.

COORIVA, a combined project involving the Freiberg University of Mining and Technology, Linde AG and other industrial partners, has conducted feasibility studies for a so-called IGCC reference power station (combined power plant with integrated carbon gasification). Starting in 2015, the objective is to produce lignite and hard coal while retaining the CO₂.

CO₂ separation for the production of synthesis gas and hydrogen

In a German government-funded project on hydrogen and fuel cells, Linde and its partners are researching into the development of plants that produce synthesis gas and hydrogen with ceramic membranes conducting O₂ ions. CO₂ separation is a major focus of this project.

Sixth EU framework program for sustainable development

Linde is also participating in implementation of the sixth EU framework program for sustainable development. The company is involved in two projects: "ENCAP" (Enhanced Capture of CO₂) and "CHRISGAS" (Clean Hydrogen Rich Synthesis Gas).

ENCAP's objectives include developing the field known as pre-combustion technologies, which are aimed at substantially lowering the carbon dioxide emissions of power stations.

Thirty-three partners from industry together with numerous universities and prominent research organizations are participating in the project – which runs until spring 2009. The total budget is 22 million

EUR, of which roughly half stems from government subsidies. Linde Engineering is currently active in the two sub-projects "Process and Power Systems" and "High-Temperature Oxygen Generation of Power Cycles."

Hydrogen technologies

As a preeminent supplier of industrial gases and the world's largest supplier of hydrogen installations, Linde holds a leading position in the development of pioneering hydrogen technologies. All these initiatives are driven by the foreseeable exhaustion of fossil energy reserves. In the opinion of many experts, hydrogen is likely to become an increasingly important energy source in the future due to its universal availability and environment-friendly characteristics.

Hydrogen has been recognized as an energy source for more than 200 years and deployed in large-scale industrial applications for approximately 70 years. In research, it is used in liquid form at minus 253 degrees Celsius to generate low temperatures. Hydrogen comprised 50 percent of the town gas used in Europe during the mid-19th century. In space travel, hydrogen has been the rocket fuel of choice from the very beginning: one kilogram contains as much energy as 3.5 kilograms of oil.

Hydrogen applications

Today its range of applications extends from semiconductor production to petrochemicals, and touches on many other areas as well. In the chemical industry, for instance, hydrogen is used in the production of ethylene and methanol as well as for the manufacture of ammonia, an intermediate in the production of fertilizers. Some 75 percent of annual hydrogen production, currently at 600 to 700 billion cubic meters, is used in semiconductor production and in the chemical, petrochemical and steel industries.

13°

Trailblazing

Berlin, Germany

In the global marketplace, hydrogen will be a major energy source of the future. We are busy creating networks, building infrastructures and discovering new uses for hydrogen as a fuel. In Berlin, Linde has joined other corporations from the oil and carmaking industries to open the world's largest hydrogen filling station for the general public. The facility impressively exemplifies this clean fuel's viability for everyday applications, as the upcoming revolution in the automotive industry will surely demonstrate.

52°

The oil refineries offer the largest market for freely traded hydrogen. Their enormous demand for hydrogen in the desulfurization of fuels, as described above in the section "Environmental Protection and Safety" (see p. 34), has arisen due to the increasing stringency of environmental legislation. Running on low-sulfur gasoline, modern combustion engines are more efficient, use less fuel and emit fewer pollutants.

At present, the use of hydrogen as a fuel in the automotive industry does not yet figure prominently in our turnover. However, in our view it offers very substantial growth potential in the long term. Linde's R & D activities are concentrated on innovative technologies for using hydrogen above all in vehicle fuel tanks systems and filling stations. In addition, we are a key driving force in establishing a hydrogen infrastructure; in this field we are cooperating closely with leading automobile manufacturers (see also "Vision of a Hydrogen Society," p. 80).

However, hydrogen is not only important as an environment-friendly fuel for the automotive sector. A large number of niche markets are also emerging wherever stored energy is required. These niche markets play a key role in securing a foothold for hydrogen and anchoring it within our societies. One such promising market is the use of hydrogen-powered fuel cells as an interruption-free power supply for cell-phone masts. Since 2004, Linde has been teaming with the specialist fuel cell company P21 GmbH from Brunnthal near Munich to accelerate the development of this technology. Suitably low-cost fuel cells are due to be available at the end of 2005. Linde is also cooperating with other fuel cell manufacturers and working with them on joint projects spanning a range of fuel cell technology applications.

Production

Hydrogen can be obtained in a number of very different ways. At present, steam reforming is the most efficient method. In this process, natural gas is transformed into hydrogen and carbon dioxide with the aid of steam – at a temperature of approx. 800 degrees Celsius. Efficiency is in the order of 70 to 80 percent. The production process for obtaining hydrogen from coal and petroleum yields similar results. Approximately 40 percent of the hydrogen produced worldwide is generated as a by-product of chemical syntheses and in refineries.

Another – as yet rarely used – source of hydrogen is the fermentation and gasification of biomass. A report on our involvement in supporting the production of biohydrogen using microalgae can be found in "People" on p. 64.

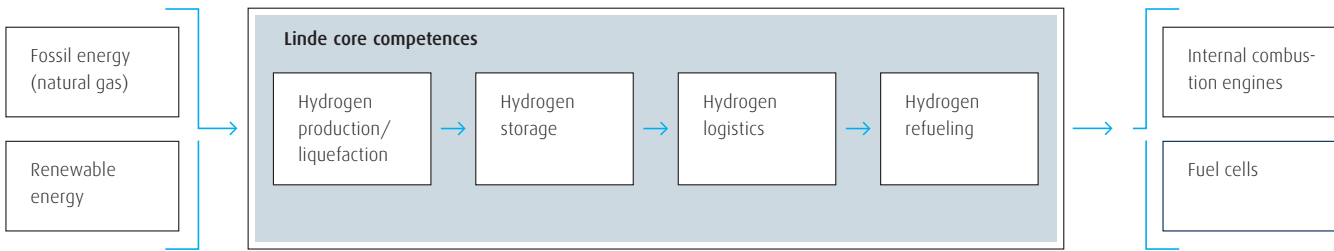
Another very interesting production technique is electrolysis, provided it is based on the use of electricity from renewable resources. This is achieved by splitting water into its constituent parts of hydrogen and oxygen using electrical energy.

Distribution and logistics

Distribution and logistics are crucial factors in establishing an infrastructure for the widespread use of hydrogen as an energy carrier. The varying methods available for its manufacture and storage mean that hydrogen can be produced and distributed from a central location or alternatively produced locally in on-site steam reformers or electrolysis plants. Hydrogen can be transported in both liquid and gaseous form.

The methods available range from individual cylinders through to bulk tank delivery and pipeline supply systems (compressed gas). In this field, Linde is the only provider offering the entire distribution chain for both liquid and gaseous hydrogen. For example, at the chemical and industrial facility in Leuna in Germany, Linde operates the most sophisticated hydrogen pipeline network in Europe, with a total length of over 60 miles.

The Hydrogen Value Chain



As a leading player in the industrial gas sector, Linde leverages its core competences to fully develop the huge potential of hydrogen technologies for medium and long-term uses.

Safety

As the use of hydrogen spreads and affects private consumers (e.g. by way of automobile fuels), safety aspects are becoming increasingly important. Hydrogen needs to be safe for untrained, non-professionals to use.

Hydrogen technology has already proven its suitability for everyday use in numerous pilot projects. We have made a substantial contribution in ensuring that hydrogen is not only safe and reliable to use, but also cost-effective and convenient to manage and handle. With the world's largest public hydrogen filling station, which was opened in Berlin during November 2004 as part of the "Clean Energy Partnership" program, we have been demonstrating that hydrogen is thoroughly viable in everyday situations as well. Linde not only supplies the liquid hydrogen but also the entire engineering for the hydrogen service station, which enables hydrogen to be filled in both liquid and gaseous form alongside conventional fuel pumps.

A clean future with hydrogen

Given the irregular output profile for renewable energy and the importance of covering peak load periods, a long-term form of storage is required that will guarantee a needs-based energy supply at all times. Using traditional electricity networks, it would be necessary to provide constant overcapacity, something which cannot be achieved with the renewable energy supply technology currently available. The transformation and storage of renewable energy in the form of hydrogen is capable of filling this gap: it enables peak demand to be satisfied with relatively small power stations. The result would be the significant reduction of emissions in the energy cycle.

Vision of a hydrogen society

The long-term goal for achieving a "hydrogen society" is to produce hydrogen exclusively from renewable energy sources. The foundations have already been laid for this in pilot projects. One illustration is Berlin's "Clean Energy Partnership" service station in Berlin described above. Here gaseous hydrogen is produced by on-site electrolysis using certified "green" electricity. Should attempts to replace coal, oil and gas as the fossil sources of primary energy ultimately prove successful, the zero-emission cycle might assume the following form: using wind energy, electrolysis converts water into hydrogen and oxygen. When this hydrogen is used in a fuel cell, water and steam are the only "waste products" from the electricity generated.

Today, hydrogen can already be used in automotive design as an environment-friendly alternative to conventional energy carriers. A study published by General Motors (GM) in 2002, for example, showed that fuel-cell vehicles running on compressed hydrogen from reformed natural gas cause significantly fewer greenhouse emissions than vehicles driven by gasoline or diesel engines.

Our commitment

In addition to developing new hydrogen applications, Linde is also actively involved in pilot and partnership projects ranging from the establishment of a hydrogen supply infrastructure to the development of EU-wide standards for hydrogen applications. In this context, special mention once again should be made of the Clean Energy Partnership initiative, in which eleven industrial partners supported by the German federal government are promoting the progressive development of a hydrogen infrastructure. Linde is also participating in the "Zero Regio" project in the Rhine-Main region. One of the goals of this project is to open an additional hydrogen filling station in the Höchst district of Frankfurt/Main by the end of 2005.

◎ Solutions

Munich, Germany

Development means taking technology one step further. And putting it to concrete use. Hydrogen technology holds enormous potential. One example: the emission-free, fuel cell-powered forklift we have deployed at the Munich airport. The vehicle can operate up to ten hours, and its twin hydrogen tanks can be refilled in just five minutes. What's more, its driving and lifting characteristics are superior to those of battery-operated models.

48°

12°

Furthermore, as part of the EU's Sixth Framework Program for sustainable development, we are also actively engaged in projects such as "HyWays" and cooperating with partners to develop a European roadmap for hydrogen energy.

In addition, we are also represented on numerous committees established by the European Commission and involved in the worldwide International Partnership for Hydrogen Economy (IPHE). Moreover, Linde is a committee member at the National Hydrogen Association in the U.S. and its German equivalent, the German Hydrogen Association, and is constantly working with other companies to improve awareness of hydrogen as an environment-friendly energy carrier of the future.

We instrumentalize International Hydrogen Day to increase public interest in hydrogen as a fuel source (see p. 64). At the 2005 International Hydrogen Day in Berlin, Linde launched an initiative aimed at creating a hydrogen infrastructure for Europe in the medium term. The economic feasibility of this "European Hydrogen Highway" has been underscored by an expert study commissioned by Linde. Further events are due to follow.

Synergies – the fuel cell forklift

Our subsidiary STILL based in Hamburg, Germany, is currently conducting field trials at the Munich airport to assess the practical deployment of a hydrogen-powered forklift. The operation of the truck represents the second phase of a project conducted by the airport's ARGEMUC project team over a period of several years. Hydrogen infrastructures and an array of vehicle types are being put to the test in practical operation at the airport.

The model R60 is a standard-series electric forklift that has been converted to run on hydrogen power by STILL, Linde Gas and the fuel cell specialist Proton Motor GmbH of Starnberg, Germany. It is already safe to say that the fuel cell-based solutions offer a number of benefits over the conventional batteries used in forklifts. A five-minute refueling session, for instance, obviates the need to change

or charge a battery (a process that takes six to ten hours). In addition, refueling can take place at any time, regardless of how full the tank is. In a direct comparison with battery-driven lift trucks, the performance and running characteristics also proved superior. The hydrogen forklift satisfies stringent safety standards and can also be deployed without reservation in indoor warehouse areas, where the absence of harmful emissions is particularly beneficial. Furthermore, at around 60 percent, the efficiency of the fuel cell is significantly higher than that of a modern combustion engine (maximum of 40 percent).

At the close of the trial operation period in 2007 – which has enabled us to assume a pioneering role in Europe – we are also expecting more accurate information on the service life of the power source, the fuel-cell stack. This was initially calculated at approximately 20,000 hours. By comparison, modern automobile engines have an average operating life of some 3,000 to 4,000 hours.

With the support of the city of Hamburg's recently established hydrogen initiative, we are currently launching a further field trial. If and when the fuel-cell forklift enters series production is not clear at present. In any event, the initial models will probably be hybrid vehicles.

Healthcare

As the population ages, especially in the industrialized countries, the healthcare sector is destined to remain a growth segment. Its activities focus on providing affordable medical care, curing disease, and ensuring a high quality of life into old age.

Linde Gas Therapeutics

Our Healthcare division operates as a pharmaceutical gas company, filling the gap that exists between the pure medical and industrial gas segments. Consistent with our aspirations and by virtue of our broad international presence, we offer our medical expertise in the emerging countries as well.

Linde's Healthcare operations embrace three sectors, namely Institutional (hospitals, doctors and rescue services), Respiratory Homecare (outpatients) and INO Therapeutics (intensive care). Our research concentrates on drug and device combinations for the respiratory system in the intensive care setting. Linde also supports the GEMI Fund, an organization devoted to stimulating research into medical applications for gas. (For detailed information on the GEMI Fund, see "People," p. 64.)

We are untiring in our efforts to offer users better and safer treatment methods based on medical gases. Our representatives are available to train and advise medical staff on site. We are also active in emerging nations such as those in South America, where we are a leading provider and generate more than ten percent of our Healthcare sales. We contribute to the further development of these countries by raising the standard of care and facilitating knowledge transfer.

In order to ensure maximum safety for patients, we operate a seamless quality control regime from the production facility to the place of application. We also document the safety and efficacy of our products in accordance with the applicable regulatory guidelines. In the event of new medical gas therapies, the pre-clinical and clinical documentation complies with the customary development directives for pharmaceutical products.

Institutional

Over the course of several years, Linde has been undergoing a step-by-step transformation from a traditional supplier of medical gases to a pharmaceutical gas company. To culminate this process, we intend to have obtained permits recognizing our medical gases as medi-

cal drugs throughout Europe by the year 2007. These efforts will be supported by the ROSES program developed by our own experts (see Glossary), in which we have intensified the further refinement of established medical gases, enabling them to be classified as genuine pharmaceutical products. This is made possible by optimizing various factors including the delivery chain, batch traceability, and production processes.

By pursuing the ROSES initiative, through which we fully comply with the EU directives governing the production and distribution of medical gases, we are ensuring the safe use of our products and making a crucial contribution to the success of the therapies concerned.

We are simultaneously expanding our business activities in regions that harbor strong growth potential. One example is the production facility (including filling plant) built exclusively for medical gases in Sweden in 2004. The new plant was established as a springboard for developing new markets in the Baltic States and northern Europe.

Our U.S. company LifeGas LLC has been in a similar position since it adopted a decentralized structure. It perfectly meets the special needs of smaller hospitals and care services, and offers not only daily deliveries, but also 24-hour support. This shift is part of the realignment of our worldwide distribution systems, which are increasingly tailored to serve the medical community under stringent quality requirements.

Modern inpatient treatment is almost invariably associated with the use of oxygen, nitrous oxide, compressed air, or vacuums. Linde supplies oxygen and nitrous oxide in tanks and gas containers, and leverages proven technologies to generate and provide compressed air and vacuum in situ decentrally as required. In hospitals, the various medical gases can be piped to the relevant points of use in operating rooms, patients' rooms and intensive care units, and administered via high-precision delivery systems. The key benefits of a central gas supply to the sharply rising number of private hospitals lie not only in considerable space savings, simpler container management and greater security of supply, but also in the system's enhanced economic efficiency. Besides providing gases, supply systems and delivery devices, Linde also offers a broad array of services, including the planning, assembly and maintenance of central gas supply installations.

Our close cooperation with patients, doctors, pharmacists and other key stakeholders in the clinical healthcare market requires that we understand the needs of our customers. These insights enable us to develop innovative and profitable new businesses in the areas of analgesia, anesthesia, asthma and COPD and general oxygen therapy (see Glossary). We focus on translating the identified therapeutic needs into innovative technological solutions and creative approaches to the market, thereby distinguishing ourselves from the competition. Our new commercial platforms, scientific evidence, support from opinion leaders, and strategic partnerships form the cornerstones of this strategy.

INO

The Healthcare division's INO Therapeutics business unit is poised to tap substantial growth potential. Our INOmax® is an approved drug used to treat pulmonary function disorders in newborns. Based on the properties of nitric oxide, the drug has a selective dilatory effect on the lung's blood vessels. INOmax® is part of our extensive INOtherapy® range, which also embraces the administration device required for successful treatment.

Linde obtained approval in 1999 and 2001 to use nitric oxide to treat pulmonary function disorders in the newborn from the U.S. Food and Drug Administration (FDA) and the European Medicines Evaluation Agency (EMA). The approval of INO as a drug in the U.S. and Europe was preceded by many years of preliminary scientific investigation and clinical testing to ascertain its efficacy and safety. During the past decade, we have invested more than 200 million EUR in researching and developing INOmax®.

With a view to sustaining the quality, safety and effectiveness of INOmax®, we have – in line with our responsibility as Marketing Authorization holder – been carefully and continuously monitoring the administration of INOtherapy since its market launch. In other words, any side effects or deficiencies in the product's use or supply are recorded, analyzed and immediately eliminated.

In this instance as well, we meet the demanding requirements of the international pharmaceutical authorities.

Linde is one of only a few enterprises that conduct pediatric research. Investing in this field is often considered irrelevant because the associated market segment is too small for many companies. The need, however, is substantial: some 80 percent of therapeutic agents used in pediatrics are not officially approved drugs. In other words, the risk of potential side effects should not be underestimated. Doctors and patients' associations have sought repeatedly to draw attention to this state of affairs. In order to minimize the risks, Linde will continue to uphold its active commitment to pediatrics. At present, for example, we are conducting Europe's biggest-ever clinical study into the treatment of premature babies. The ultimate goal is to avoid chronic pulmonary damage and its long-range consequences for patients.

Basic research continued despite patent disputes

At the end of 2004, the European Patent Office in Munich ruled that the patent covering the use of nitric oxide to treat pulmonary function disorders, owned by the Massachusetts General Hospital, was invalid. As licensee, we had been marketing INOmax® in Europe since 2002. Following the Patent Office's decision, any producer in Europe can now supply hospitals with nitric oxide, provided that the product complies with the requirements of the European health authorities as regards quality, safety and efficacy, and has been officially approved. With the exception of one product that has been cleared for the French market, INOmax® is currently the only nitric oxide product to be approved as a medicinal drug by the competent authorities in the U.S. and Europe.

We will be continuing to conduct basic research for INO even without the protection of a European patent. In 2005 we will once again be investing 20 million EUR in clinical testing. At present, some 1,500 patients worldwide are participating in clinical trials in more than 60 treatment centers.

Products for End Consumers

Although traditionally a classic provider in the capital goods sector, we are now keying some of our products and services more closely to private end consumers. We are pursuing further developments in this segment in tandem with our customers by implementing tools such as regular customer surveys. Two examples – one from our Healthcare division – illustrate our goal of capturing key markets by providing innovative, sustainable products.

Respiratory Homecare

Respiratory Homecare is the business unit with the highest growth rates. It offers care at home for patients with respiratory diseases. For the most part, Linde delivers directly to the patients.

The demand for medical oxygen and other respiratory homecare therapies is currently rising at an annual rate of some eight percent in the United States and by more than ten percent in Western Europe and Latin America. The cornerstones of Respiratory Homecare are oxygen therapy for numerous and sometimes life-threatening diseases, treatments for sleep apnea, and classic respiratory therapy using inhalation devices. In the future, the long-term care of patients who require ventilation and often suffer from multiple conditions will play an increasingly important role. In the medium term we expect approximately 30,000 patients to fall into this category in Europe.

Our care focuses primarily on the elderly, with therapies designed to help improve the patients' quality of life. Here we simultaneously maintain close contacts with our customers through our support staff.

Oxygen therapy

With certain respiratory conditions, the natural oxygen content of the air that we breathe, namely 21 percent, is no longer sufficient. In these cases, the air the patient breathes needs to be enriched with pure oxygen. In this segment, Linde's range extends from applications to overcome short-term oxygen deficiency (typically in the event of serious pneumonia), to long-term therapy entailing its continuous administration.

The principal conditions requiring oxygen therapy are chronic pulmonary diseases, pulmonary and cystic fibrosis, various heart diseases, and tumors. Studies show that continuous oxygen inhalation coupled with increased mobility can significantly improve patients' quality of life.

In addition to providing the oxygen itself, Linde offers the accessories required for portable therapy as well. Within the scope of comprehensive service packages for patients, doctors and nurses, we ensure continuous oxygen supply, offer repair and emergency services, and advise users on equipment operation.

Environmentally safe dry cleaning

Since the 1930s, the dry cleaning industry has typically used the chlorinated hydrocarbon perchloroethylene (also known as PERC). This solvent is particularly effective in absorbing fats and oils. However, it is also known to be extremely harmful both to humans and to the environment. This has a direct impact on those who wear clothing which has been cleaned using PERC. Due to the fact that this agent is capable of penetrating cement, wood, plastics and asphalt, it also poses a risk to those who live or work in close proximity to industries that deploy PERC. What is more, the substance decomposes at a very slow rate, and seeps deep into the groundwater.

Legislators have taken action. The EU Directive on volatile organic compounds strictly limits the use of chlorinated hydrocarbons such as PERC.

The basic technology for CO₂ dry cleaning was developed in the 1990s as an environmentally compatible alternative to PERC; it was first commercially exploited in the United States. Here the use of pressurized, liquefied carbon dioxide with the addition of special detergents produces results comparable to those achieved using PERC – without its hazardous side effects for humans and the environment. Linde holds the license for the detergents which form part of this new process. In 2002, the Swedish Center for Preventing Environmental Pollution recognized the CO₂ cleaning process as the year's "most valuable contribution" toward combating environmental pollution.

Linde acquired the European license for the new technology in 2003; this innovative cleaning process has since been further developed and refined.

The process we offer is economical and highly efficient. It requires some 30 percent higher investments, but uses one third less electricity, and absolutely no water or town gas. 98 percent of the carbon dioxide is recycled and can thus be harnessed for repeated use. We are firmly committed to the future of this method and are introducing our technology via a franchising system in the major European countries. This step-by-step process is being accelerated in light of its enormous market potential: of the 50,000 dry cleaning operators in Europe, which together handle 2.2 million tons of textiles every year, 85 percent are still using PERC.

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Facts & Figures

Our actions are based on guidelines and standards of good corporate responsibility reporting as also recommended by the Global Reporting Initiative (see Glossary) etc. We have keyed the quantity and quality of our analyses to these recommendations and augmented them with factors specific to our organization.

The year 2005 marked the first time the Linde Group recorded international data centrally on its human resources and health, safety and environment (HSE) activities. The information applies to the period under review, i.e. from January 1 through December 31, 2004. The data covers a total of 126 consolidated companies in 54 countries. In addition to production plants, administrative and distribution sites have also been included. As a result, the data covers approximately 96 percent of the Group's entire workforce.

We have reflected the differences between our Gas and Engineering and Material Handling business segments by providing figures for the Linde Group as a whole, and for each of the two segments individually. Companies which joined or left Linde AG within the reporting period have not been included in this analysis.

REPORTAL data acquisition system

To obtain personnel and HSE data, we have updated our web-based information and data recording system REPORTAL and implemented it for this purpose for the first time in the spring of 2005. REPORTAL has already been successfully used in our financial reporting for several years.

Detailed user manuals ensure that all the data gathered and the processes implemented are in compliance with the auditors' requirements from the very outset. The manuals describe and define the methods used to gather data, and also include documentation guidelines.

Flexibility

REPORTAL takes account of the specific requirements of each of Linde's business segments. The comparability of the data from the various segments is guaranteed by defining the queried data consistently throughout the Group. Data is entered online at local sites. The data can be entered immediately wherever it is generated, i.e. within the operational units. Comprehensive automated plausibility controls ensure high data quality while minimizing errors. Open import and export interfaces facilitate interdepartmental use, i.e. allowing direct links to economic performance data from balance sheets and the Finance and Controlling departments, and to the Balanced Scorecard (see Glossary).

Forecast

Personnel and HSE data was produced for the consolidated Group for the first time in 2005. However, consistently comparable figures are crucial to defining concrete targets and the strategies for achieving them. We have therefore decided to delay publishing details of targets and the relevant actions until future reports.

Our data acquisition system REPORTAL is being continuously improved and upgraded. In this context, the following steps have been slated for 2006:

- Extending data reporting worldwide to all consolidated companies and sites.
- Optimizing data quality by refining our key data definitions and plausibility controls.

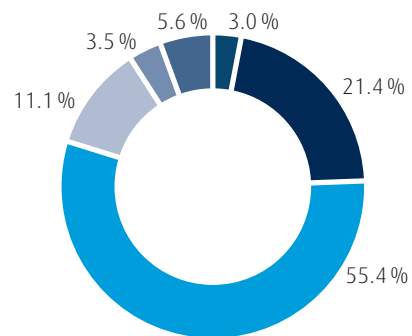
We will also be further aligning our performance indicators and reporting with internationally recognized standards and guidelines, and tailoring the above to the needs of our stakeholders.

Sales Revenues by Regions

North America (previous year 12.1%)
 South America (previous year 3.4%)

Asia (previous year 6.2%)
 Australia/Africa (previous year 1.9%)

Germany (previous year 22.9%)
 Other Europe (previous year 53.5%)



Sales in the Linde Group totaled 9.421 billion EUR during 2004. At approximately 77 percent, the highest share was posted in Europe.

Human Resources

Group

Employees

	2004	2003	2002
Total employees	41,383	46,164	46,521
Total personnel expenditure (in EUR million)	2,266	2,273	2,232

The workforce was considerably reduced in 2004 as a result of the divestment of our Refrigeration segment. At the date of its sale to the Carrier Group on October 1, 2004, it had 6,242 people (excluding Linde Ladenbau) in its employ.

The personnel indicators are based on some 96 percent of the staff employed in the Linde Group.

Employment Structure

	Group world-wide	German operations		
	2004	2004	2003	2002
Women	24.3	16.2	15.5	15.3
Disabled ¹	1.7	4.3	4.6	4.7
Part-time	3.2	3.9	3.5	3.4
Temporary	2.6	3.5	2.3	1.9
Fixed-term employment relationships ² (in %)	1.6	2.5	2.0	1.4
Unionized members (in %)	66.0	81.7	83.2	83.6

¹ Due to legislative differences, no information is available for some countries.

² Contracts lasting for a maximum of 24 months.

Staff Loyalty

	Group world-wide	German operations		
	2004	2004	2003	2002
Fluctuation ³ (in %)	4.1	5.1	5.0	4.7
Average length of service (years)	11.9	16.1	15.9	15.6
Apprenticeship quota (in %)	2.2	4.5	4.4	4.3
Number of industrial apprentices	610	452	558	545
Number of commercial apprentices	289	233	231	229
Apprentices subsequently entering regular employment (in %) ⁴	78	77.5	96	94

Further Education & Training

	Group world-wide	German operations		
	2004	2004	2003	2002
Average number of days spent in training/further education per employee	1.5	1.7	2.2	2.0
Percentage of employees taking advantage of training/further education programs	61.1	80.6	76.9	72.0
Percentage of employees ⁵ engaging in personnel development discussions with superiors	76.1	79	-	-

Data on further education expenditures – which totaled some 13 million EUR in 2004 – referred to approximately 88 percent of the Linde Group workforce. On a per capita basis, this translates into more than 350 EUR spent on further education and training. Its share of total personnel costs thus equates to 0.61 percent.

³ We have calculated the fluctuation rate using the recognized formula recommended by the Association of German Employers Organizations (BDA).

⁴ In 2002 and 2003, the percentage of apprentices subsequently taking up regular posts was only based on Linde AG Germany rather than the Group's German operations in total.

⁵ Refers to commercial employees only. No figures are available for German operations in the years 2002 and 2003.

Health, Safety, Environment

With the following exceptions, the HSE figures encompass all the national and international production, distribution and administrative sites operated by the Linde Group:

Linde Gas: we focused here on the production plants with the proportionately highest use of resources, i.e. the HyCo facilities (steam reformers and partial oxidation plants; see Glossary) and air separation plants.

Material Handling: for organizational reasons, no data was included for the Brazilian production plant (STILL) and the distribution and administrative sites operated by STILL and OM Pimespo in this initial review.

Group

Environmental Performance Indicators

		2004
Energy	Electricity (in GWh) ⁶	9,715
	Natural gas (in GWh)	10,962
	Naphtha (in GWh)	1,074
	Heating oil (in GWh)	2,243
	District heating (in GWh)	133
	Butane/Propane (in GWh)	33.4
Water	Water consumption (in million m ³)	12.5
Waste ⁷	Total waste (in t)	32,259
	Recyclable materials (in t)	25,720
	Waste for disposal (in t)	6,502
	Scrap metal (in t)	26,701
Emissions	Direct CO ₂ emissions (in million t)	1.9
	Indirect CO ₂ emissions (in million t)	4.2

The highest share of electricity is required by our air separation plants.

The consumption figures cited for the raw materials natural gas and Naphtha (see Glossary) include the quantities needed for hydrogen production using steam reformers and partial oxidation plants.

The water usage includes both public utility supplies and our own sources. The majority of water required by Linde is used during production processes.

None of the waste that is reused or disposed of contains construction waste, excavated soil, scrap metal or other metallic waste. The figures for scrap metal have been listed separately.

Direct CO₂ emissions result primarily from the production of hydrogen and from energy generating processes within the Linde Group. Natural gas, Naphtha, heating oil, butane and propane were the main energy sources used.

Indirect CO₂ emissions refer to carbon dioxide generated during the production of energy supplied by third parties (electricity, district heating) and not released directly at Linde sites. The figures were computed using the recognized country-specific CO₂ conversion factors provided by the United Nations Conference On Trade And Development (UNCTAD).⁸

⁶ GWh: gigawatt hours.

⁷ Waste excluding Linde Gas.

⁸ UNCTAD – “Eco-efficiency Indicators” Version 1.1, 2004.

Audits

	2004
Number of audits performed on occupational safety and health	1,638
Number of environmental audits performed	595

The above table shows the number of internal and external audits carried out at the Linde Group's production, administrative and distribution sites around the world.

Accidents at work

	Group world- wide ⁹	German operations ¹⁰		
	2004	2004	2003	2002
Total number of accidents at work	1,117	398	422	526
Number of accidents at work per 1,000 employees	27.0	25.7	27.5	34.4
Number of accidents at work per million working hours	17.4	17.8	18.7	24.2
Total number of accident-related working hours lost	120,435	40,365	42,834	54,436
Number of accident-related working hours lost in every million working hours	1,878	1,808	1,903	2,439

In German operations, only those industrial accidents¹¹ subject to mandatory reporting were included. A report must be filed if the injured party is unfit for work for more than three days, is killed in the accident, or is so severely injured that death results.

Above and beyond the statutory requirements in the various countries of operation, any industrial accidents resulting in absences of at least one day are reported within the Linde Group. In addition to facilitating international comparisons between our globally operative units, this also ensures increased transparency for the general public.

With the aim of avoiding accidents and reducing accident quotas in the Linde Group, preventive measures have been instituted in each of the business segments, as detailed in the section "Environmental Protection and Safety."

⁹ Excluding accidents en route to or from work.

¹⁰ Retrospectively adjusted for the accidents at work in the Refrigeration division which was divested in 2004.

¹¹ According to Section 193 German Code of Social Law (SGB) VII.

Linde Gas Division

For the Linde Gas division, all the national and international administrative and distribution sites have been included. In the case of production sites, we have concentrated on the facilities with the proportionately highest use of resources, i.e. the air separation and HyCo plants.

Environmental Performance Indicators

		2004
Energy	Electricity (in GWh)	9,491
	Natural gas (in GWh)	10,734
	Naphtha (in GWh)	1,074
	Heating oil (in GWh)	2,229
	District heating (in GWh)	113
	Butane/Propane (in GWh)	14.0
Water	Water consumption (in m ³)	11,329,808
Emissions	Direct CO ₂ emissions (in t)	1,871,380
	Indirect CO ₂ emissions (in t)	4,099,646

Environmental Performance Indicators for Air separation Plants

		2004
	Electricity use (in GWh)	8,662
	Water consumption (in m ³)	11,072,555
	Indirect CO ₂ emissions (in t)	3,587,417

Around the world, Linde Gas operates 115 major air separation plants. Air separation plants divide large quantities of air into its core constituents nitrogen (approx. 78 percent) and oxygen (approx. 21 percent). The residual 1 percent is a mixture of carbon dioxide, argon and other noble gases.

High quantities of electricity are needed to operate an air separation plant. The major part of all the water used at Linde Gas is required for cooling processes for air separation plants.

There are no combustion processes in the production chain; as a result, there are no direct emissions of carbon dioxide (CO₂), sulfur oxides (SO_x), nitrogen oxides (NO_x) or any other harmful substances. For details of indirect CO₂ emissions, see the explanatory text on the Group's environmental performance indicators.

Environmental Performance Indicators for HyCo Plants

		2004
	Natural gas consumption (in GWh)	10,107
	Naphtha consumption (in GWh)	1,074
	Heating oil consumption (in GWh)	1,977
	Direct CO ₂ emissions (in t)	1,130,598

The category "HyCo" plants (hydrogen/carbon monoxide plants) refers to a variety of facilities producing hydrogen (H₂) and carbon monoxide (CO). Linde Gas operates more than 50 such facilities around the world.

The figures cited above apply to the most important HyCo plants, the steam reformers and the partial oxidation plants. These plants are responsible for more than 75 percent of the Group's entire hydrogen production capacity. The direct CO₂ emissions at these plants are mainly generated by the synthesis of hydrogen and the use of fuels (e.g. natural gas, Naphtha or heating oil) to produce the reaction temperature demanded by the production process.

The majority of the heating oil required is used at a HyCo plant in Singapore for the production of carbon monoxide and hydrogen.

The environment-friendly aspects of hydrogen technologies are outlined in the section entitled "Markets."

Certification

	Worldwide 2004	Germany 2004
Percentage of national companies certified to ISO 9001	71.2	100
Percentage of national companies certified to ISO 14001	20.3	100
Percentage of national companies certified according to OHSAS 18001 or SCC	13.6	100
Sales generated by national companies certified to ISO 9001 (% share of total sales)	80.1	100
Sales generated by national companies certified to ISO 14001 (% share of total sales)	31.0	100
Sales generated by national companies certified according to OHSAS 18001 or SCC (% share of total sales)	27.3	100

The ISO 9001 norm established by the International Standardization Organisation (ISO) is an internationally recognized benchmark for quality management. At Linde Gas it provides the foundations of a comprehensive quality management system.

ISO 14001 is the internationally recognized norm for companies establishing environmental management systems. Such systems prescribe the stipulation of an environmental policy, ecological targets and an environmental program, and further entail the establishment of an environmental management system.

OHSAS 18001 (Occupational Health and Safety Assessment Series) is the standard for safety management systems. These systems serve to reduce accident rates by systematizing all occupational safety and health protection activities, and further to achieve legal security by ensuring consistent compliance with all relevant legislation.

Safety Certification Contractors (SCC) is an international standard for safety, health and environmental management at any organizations providing technical services on-site to a contractor. It codifies uniform requirements for subcontractors.

Audits

	2004
Number of audits performed on occupational safety and health	913
Number of environmental audits performed	378

The above table shows the number of internal and external audits carried out at Linde Gas production, administrative and distribution sites around the world.

The audits serve the purpose of regularly and systematically reviewing compliance with the relevant standards.

Key Performance Indicators for Transport Logistics

	2004
Number of kilometers traveled (bulk transport fleet) ¹² (in million km)	165.8
Number of kilometers traveled (cylinder transport fleet) ¹³ (in million km)	113.7

In the next few years, we will be continuously upgrading the efficiency of our transport logistics systems by means of optimized route planning, the remote monitoring of customer inventories and the ongoing expansion of our on-site business. This will reduce the impact on the environment.

Accidents at work

	2004	2003	2002
Total number of accidents at work	178	169	198
Number of accidents at work per 1,000 employees	10.1	9.7	11.3
Number of accidents at work per million working hours	5.2	5.3	6.4
Total number of accident-related working hours lost	22,414	18,344	27,216
Number of accident-related working hours lost in every million working hours	659	579	880

The section "Environmental Protection and Safety" details the preventive and communication initiatives undertaken at Linde Gas to minimize the number of industrial accidents.

¹² Transport and supply in tanks.

¹³ Transport and supply in bottles.

Linde Engineering Division

The HSE data accumulated encompasses all the international production, administrative and distribution sites operated by the Linde Engineering segment.

Environmental Performance Indicators

		2004
Energy	Electricity (in GWh)	41.9
	Natural gas (in GWh)	62.7
	Heating oil (in GWh)	0.88
	District heating (in GWh)	1.9
	Butane/Propane (in GWh)	17.3
Water	Water consumption (in m ³)	320,757
Waste	Total waste (in t)	2,832
	Recyclable materials (in t)	1,239
	Waste for disposal (in t)	1,592
	Scrap metal (in t)	1,823
Emissions	Direct CO ₂ emissions (in t)	16,947
	Indirect CO ₂ emissions (in t)	19,864
	VOC emissions ¹⁴ (in t)	14.2

The greatest part of value creation lies not in production, but in plant construction. This explains the relatively limited use of resources.

Audits

	2004
Number of audits performed on occupational safety and health	523
Number of environmental audits performed	53

The above table shows the number of internal and external audits carried out at Linde Engineering production, administrative and distribution sites around the world.

Accidents at work

	2004
Total number of accidents at work	87
Number of accidents at work per 1,000 employees	20.7
Number of accidents at work per million working hours	13.4
Total number of accident-related working hours lost	9,250
Number of accident-related working hours lost in every million working hours	1,421

The section "Environmental Protection and Safety" details the preventive and communication initiatives undertaken at Linde Engineering to minimize the number of industrial accidents.

¹⁴ VOC: Volatile Organic Compounds; see Glossary.

Material Handling Business Segment

The data on the Material Handling business segment covers all the domestic and international production sites with the exception of Brazil (STILL). In addition, all of its administrative and distribution sites worldwide have been included.

Environmental Performance Indicators

		2004
Energy	Electricity (in GWh)	176
	Natural gas (in GWh)	154
	Heating oil (in GWh)	13.4
	District heating (in GWh)	18.4
	Butane/Propane (in GWh)	2.1
Water	Water consumption (in m ³)	855,986
Waste	Total waste (in t)	28,984
	Recyclable materials (in t)	24,166
	Waste for disposal (in t)	4,783
	Scrap metal (in t)	22,958
Emissions	Direct CO ₂ emissions (in t)	48,690
	Indirect CO ₂ emissions (in t)	81,736
	VOC emissions (in t)	423

Audits

	2004
Number of audits performed on occupational safety and health	202
Number of environmental audits performed	164

As described in the section "Environmental Protection and Safety," the Linde Material Handling business segment conducts environmental protection and occupational safety audits in Germany based on its own specially developed "ArGUS" management system.

Accidents at work

	2004
Total number of accidents at work	839
Number of accidents at work per 1,000 employees	44.8
Number of accidents at work per million working hours	34.6
Total number of accident-related working hours lost	88,029
Number of accident-related working hours lost in every million working hours	3,634

The section "Environmental Protection and Safety" details the preventive and communication initiatives undertaken in the Material Handling business segment to minimize the number of industrial accidents.

Other

“Other” refers collectively to company headquarters in Wiesbaden, the MATRA works in Frankfurt and the Linde Ladenbau operations in Bad Hersfeld, Germany.

Environmental Performance Indicators

		2004
Energy	Electricity (in GWh)	5.8
	Natural gas (in GWh)	11.0
Water	Water consumption (in m ³)	15,449
Waste	Total waste (in t)	443
	Recyclable materials (in t)	315
	Waste for disposal (in t)	127
	Scrap metal (in t)	1,920
Emissions	Direct CO ₂ emissions (in t)	2,223
	Indirect CO ₂ emissions (in t)	2,862

Accidents at work

	2004 ¹⁵
Total number of accidents at work	13
Number of accidents at work per 1,000 employees	18.1
Number of accidents at work per million working hours	11.8
Total number of accident-related working hours lost	742
Number of accident-related working hours lost in every million working hours	800

The section “Environmental Protection and Safety” details the preventive and communication initiatives undertaken at the relevant companies to minimize the number of industrial accidents.

¹⁵ As the companies shown are exclusively German, only those industrial accidents defined under Section 193 of the German Code of Social Law (SGB, VII) have been included.

Glossary

Analgesia

Analgesia is a medical term denoting an insensitivity to pain. In some contexts, it is used as a synonym for anesthesia. However, whereas anesthesia numbs the senses completely, the sense of touch is retained during analgesia.

Balanced Scorecard

A strategy-oriented corporate management tool for reporting key company data within an overall context.

Codes of Best Practice

Guidelines that are usually based on previous learnings and stipulate the most effective practices for attaining specific goals.

Compressed Natural Gas (CNG)

This gas can effectively replace less environment-friendly fuels such as gasoline or diesel. It is made by purifying and then super-cooling natural gas.

COPD

Abbreviation for chronic obstructive pulmonary disease, a condition affecting the lungs.

Corporate Compliance Committee

Within the Linde organization, the Corporate Compliance Committee ensures Group-wide compliance with the Code of Conduct. It is further responsible for the ongoing optimization of the Code and dealing with any complaints. It is comprised of representatives from the Executive Board, the business segments, and the Legal and Human Resource departments.

Corporate volunteering

Involvement of personnel in charitable projects – encouraged and supported by employers through the donation of funds, materials or working time.

Gas to Liquid (GTL)

A process by which natural gas or another hydrocarbon is converted to liquid form.

Global Reporting Initiative (GRI)

International initiative created by numerous stakeholders in 1997 with the goal of establishing recognized and standardized rules for the way organizations report on their economic, social and environmental activities.

HSE-Policy

HSE stands for Health, Safety and Environment. An HSE policy is a formal statement of commitment documenting a company's position on these issues.

Key Performance Indicators (KPI)

Business indicators that measure mission-critical factors or progress towards key objectives within an organization.

Liquefied Natural Gas (LNG)

Regarded as the fuel of the future due to its high energy density, constant heat output and exceptional purity.

Naphtha

Describes a product made by refining crude oil. It is an important raw material for the plastics industry.

Partial oxidation plants (POX)

Partial oxidation plants are used to make synthesis gas or hydrogen. During this technically very sophisticated process, heavy hydrocarbons such as Naphtha and refinery residues are mixed with oxygen or air. As in steam reforming, process steam is added, producing – at very high temperatures – carbon monoxide (CO) and hydrogen (H₂). Partial oxidation plants are used most frequently in locations where heavy hydrocarbons need to be disposed of (e.g. at refineries) or are available cheaply.

Primary energy

A form of energy which has not been subjected to any type of deliberate conversion by people. It does not include fuels such as wood, peat or animal waste because no reliable statistical data on their use is available.

Reverse osmosis

Osmosis is the unidirectional movement of a solvent through a semi-permeable membrane. During this process, a solvent diffuses from the area with the lower concentration of a solute into the area with a higher concentration. In reverse osmosis, pressure is applied to reverse this natural process.

Scope 3

Category for emissions of greenhouse gases as stipulated by the GHG protocol initiative, an internationally recognized standard for CO₂ reporting. Scope 1 refers to all direct CO₂ emissions, and Scope 2 to the indirect emissions caused during the use of outside energy. The remaining indirect greenhouse gas emissions that occur during prior and subsequent processes are subsumed under Scope 3.

Six Sigma

Systematic, rigorous approach designed to achieving consistently sustainable improvements in corporate processes. The aim is to reduce potential errors to a minimum in all processes, increasing quality and hence customer satisfaction.

Steam reformer

Steam reformers are systems that produce synthesis gas, a mixture of carbon monoxide (CO) and hydrogen (H₂). In this process, light hydrocarbons such as natural gas are separated – using hot water vapor and a catalyst – into CO and H₂. In a subsequent step, the CO is then converted into carbon dioxide (CO₂) using steam, generating additional quantities of hydrogen. The gas mixture is then cleaned and the CO₂ and other unwanted constituents removed.

VOC (Volatile Organic Compounds)

Refers to a variety of organic compounds, many of which are used as solvents or thinners in paints and varnishes. They act as precursors of ground level ozone, also known as “summer smog.”

Credits

Credits

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Corporate Responsibility

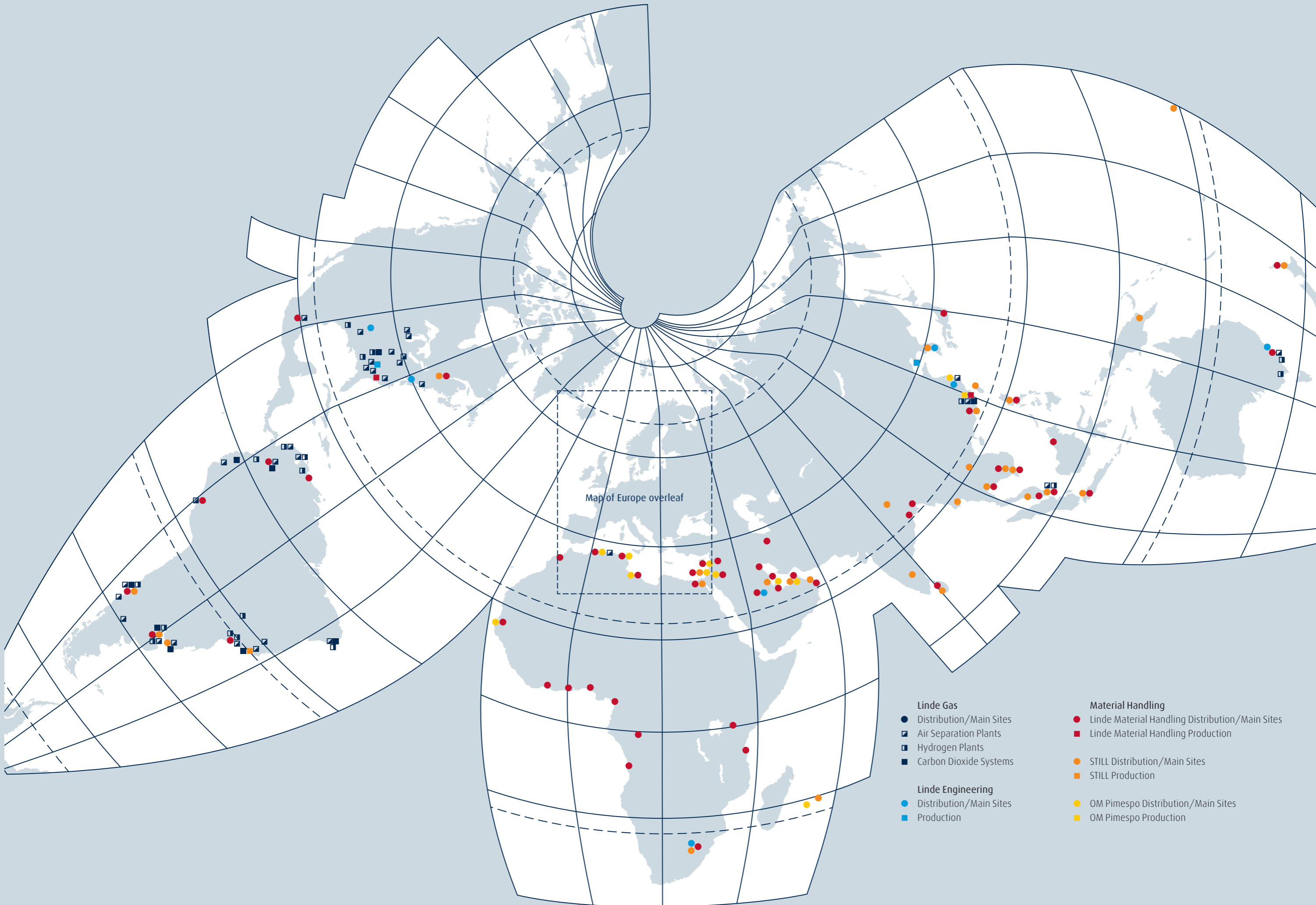
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The Linde AG Corporate Responsibility Report is available in English and German. Further documentation and an electronic version of the report can be downloaded at www.linde.com.

On request, we would be pleased to forward additional information on Linde free of charge.



Map of Europe overleaf

- | | |
|---------------------------|---|
| Linde Gas | Material Handling |
| ● Distribution/Main Sites | ● Linde Material Handling Distribution/Main Sites |
| ▣ Air Separation Plants | ■ Linde Material Handling Production |
| ▣ Hydrogen Plants | ● STILL Distribution/Main Sites |
| ■ Carbon Dioxide Systems | ■ STILL Production |
| Linde Engineering | ● OM Pimespo Distribution/Main Sites |
| ● Distribution/Main Sites | ■ OM Pimespo Production |
| ■ Production | |

Europe



Linde Gas

- Distribution/Main Sites
- ▣ Air Separation Plants
- ▣ Hydrogen Plants
- Carbon Dioxide Systems

Linde Engineering

- Distribution/Main Sites
- Production

Material Handling

- Linde Material Handling Distribution/Main Sites
- Linde Material Handling Production
- STILL Distribution/Main Sites
- STILL Production
- OM Pimespo Distribution/Main Sites
- OM Pimespo Production
- Component Manufacture

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