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MESSER
Gases for Life

Gases for Life

The industrial gases magazine

Think green, print black

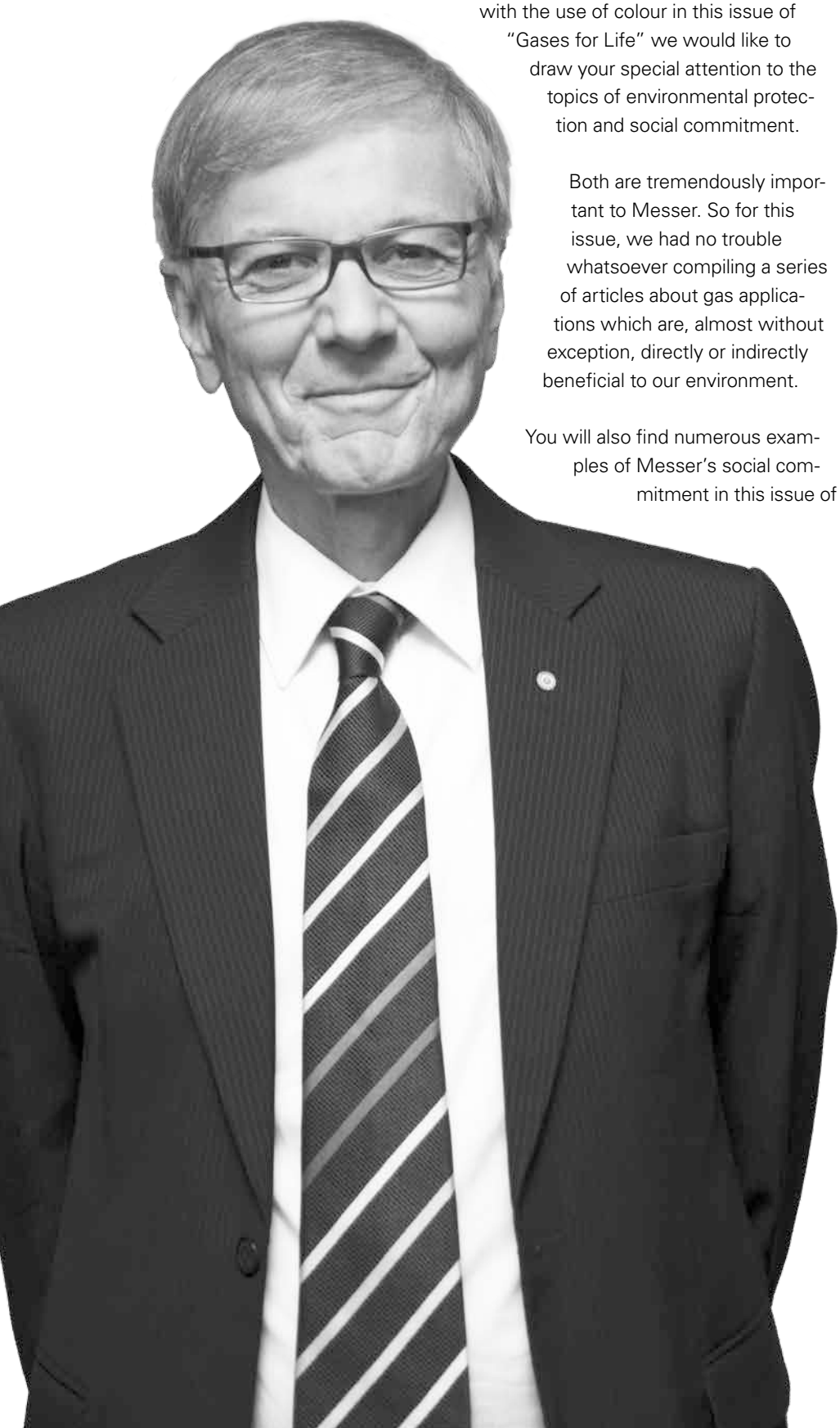
Offshore wind turbines:
Every tonne counts

Social commitment:
Helping with hearts and hands

Using gases:
No poison, no salt, more recycling

Editorial

Dear Readers



As you can see, you are seeing black and white. This is not some sort of cost-saving measure, but rather by dispensing with the use of colour in this issue of "Gases for Life" we would like to draw your special attention to the topics of environmental protection and social commitment.

Both are tremendously important to Messer. So for this issue, we had no trouble whatsoever compiling a series of articles about gas applications which are, almost without exception, directly or indirectly beneficial to our environment.

You will also find numerous examples of Messer's social commitment in this issue of "Gases for Life". In both areas, I would like to express my gratitude to our employees for their commitment – which is by no means something to be taken for granted. Through their professional and personal involvement, they create the conditions which enable Messer to act prudently, sustainably and responsibly. For this my heartfelt thanks!

By the way: the money we saved by printing this issue of "Gases for Life" in black and white instead of colour has been donated to charity. The savings paid for paint and materials which the editorial team used to make interior renovations to some of the rooms of Saint Joseph's Day Care Centre in Krefeld, Germany, which, as good deeds go, strikes me as a particularly colourful one.

Best wishes,

Stefan Messer

PS: We consider the concept and implementation of this issue of "Gases for Life" as an experiment, which is likely to have future successors – also in other media. That's why we are especially interested in your opinion: send us a few lines by e-mail, telling us what you think of our concept of foregoing colour ink and donating the money saved. We look forward to your feedback.

Content

Cover photo:
With this unusual issue, we want to send a message: do publications really have to be so glossy – even if it makes our environmental future gloomy?

Cover Story

Practical Focus

Social Commitment

Good for you and the environment

This magazine not only brings you interesting articles and interviews – it is also kind to the environment. "Gases for Life" is printed on 100% recycled paper.

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You can do this by sending a short e-mail to angela.bockstegers@messergroup.com. We would kindly ask you to dispose of any magazines that you have finished reading as waste paper.

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Other Sections

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Contact: diana.buss@messergroup.com

Lowering the share of active gases in the shielding gas can measurably reduce welding fumes (photo).

Germany: Shielding gas tames welding fumes

Less dust

With a lower proportion of active gases, such as CO_2, in shielding gas used for welding, the quantity of unhealthy welding fumes diminishes as well. This conclusion is based on analyses of total particulate emissions during MAG welding of low-alloy structural steel. Along with the welding rod and the type of electric arc, the composition of the shielding gas has a major impact on the magnitude of the particulate emissions. The size of the dust particles was unaffected by the choice of gas. That's why the new ternary mixtures from Messer, such as Ferroline C12X2 and Ferroline C6X1, offer not only higher performance and better weld seam quality but they also help to improve occupational safety and health through reduced particulate generation.

Dr. Bernd Hildebrandt, Messer Group

Czech Republic: Oxyfuel burners for Mittal

Less fuel and flue gas

Messer recently modernised four blast furnaces owned and operated by the world's largest steel company, ArcelorMittal, in the Czech town of Ostrava. The project included the replacement of the conventional burners by oxyfuel burners. The investment is expected to begin paying dividends for ArcelorMittal already this year: thanks to considerably greater efficiency, an oxygen-fired burner enables the company to save 50 per cent of the natural gas required as fuel while dramatically lowering the emission of flue gases. Messer in the Czech Republic supplies the oxygen directly via pipeline.

Václav Šlosárek, Messer Technogas

Oxygen makes combustion processes more efficient, and therefore more eco-friendly.

Eco-efficient high speed computer

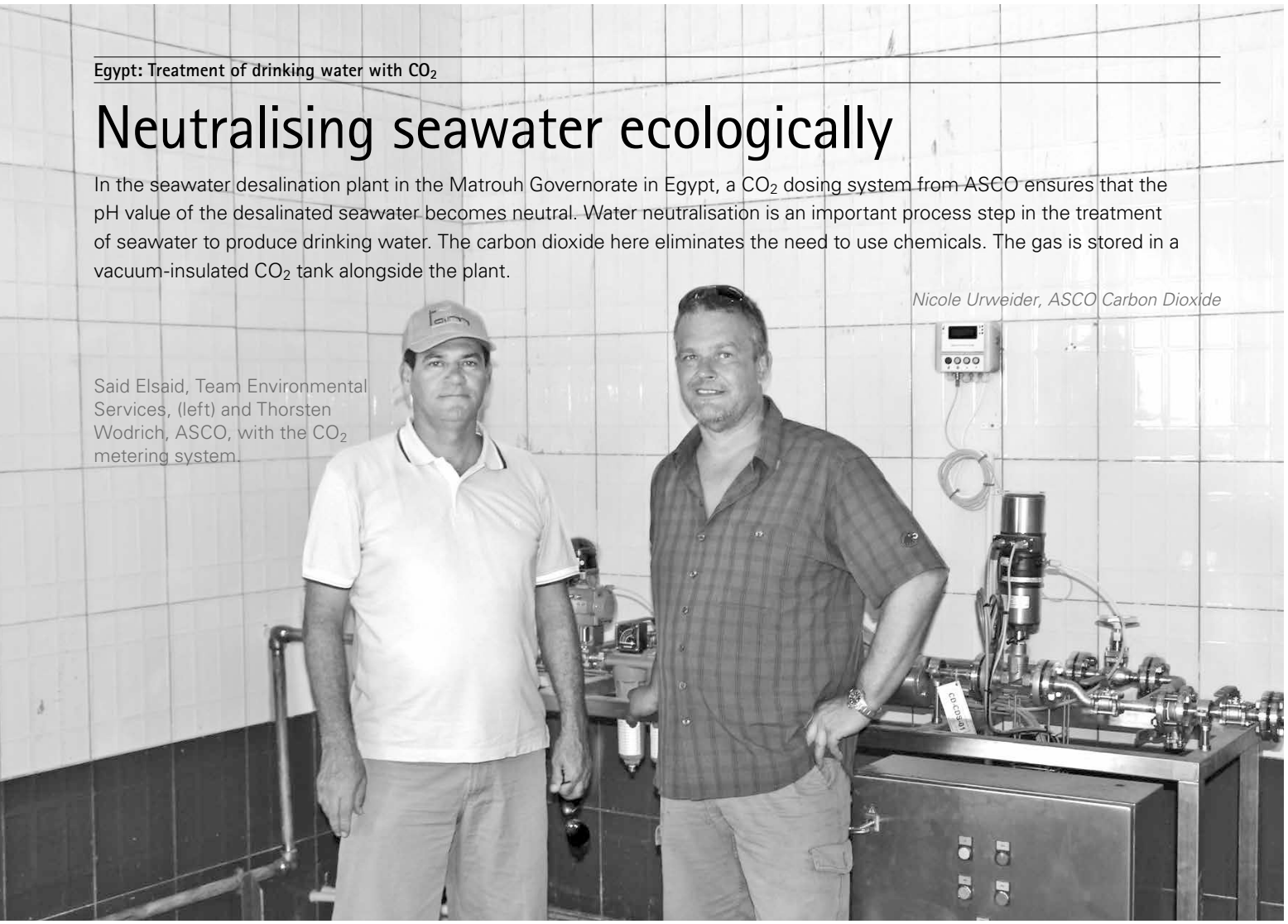
A new app from Messer provides information about waste water neutralisation with carbon dioxide (CO_2). This process is an efficient and eco-friendly alternative to conventional methods that use acids or sulphates which pollute the environment. The app offers plant operators a calculator that can rapidly calculate the quantity of CO_2 required to replace the acid they normally use. It also includes a questionnaire which advises the user about the most important considerations when converting to CO_2 neutralisation. Individual consultation can be requested from Messer with just one click. CO_2 neutralisation of alkaline waste water offers numerous ecological and economic advantages over conventional processes. It requires only a modest investment, is very easily automated, and lowers operating costs. The inert gas causes neither safety risks nor corrosion problems. A very weak acid is formed and therefore it cannot trigger any over-acidification. And after treatment, the waste water is also not loaded with harmful levels of salt. As a CO_2 sink, the process contributes to the reduction of greenhouse gas emissions. Messer has already installed hundreds of CO_2 plants for the treatment of industrial and municipal waste water.

Marc Dierckx, Messer Group

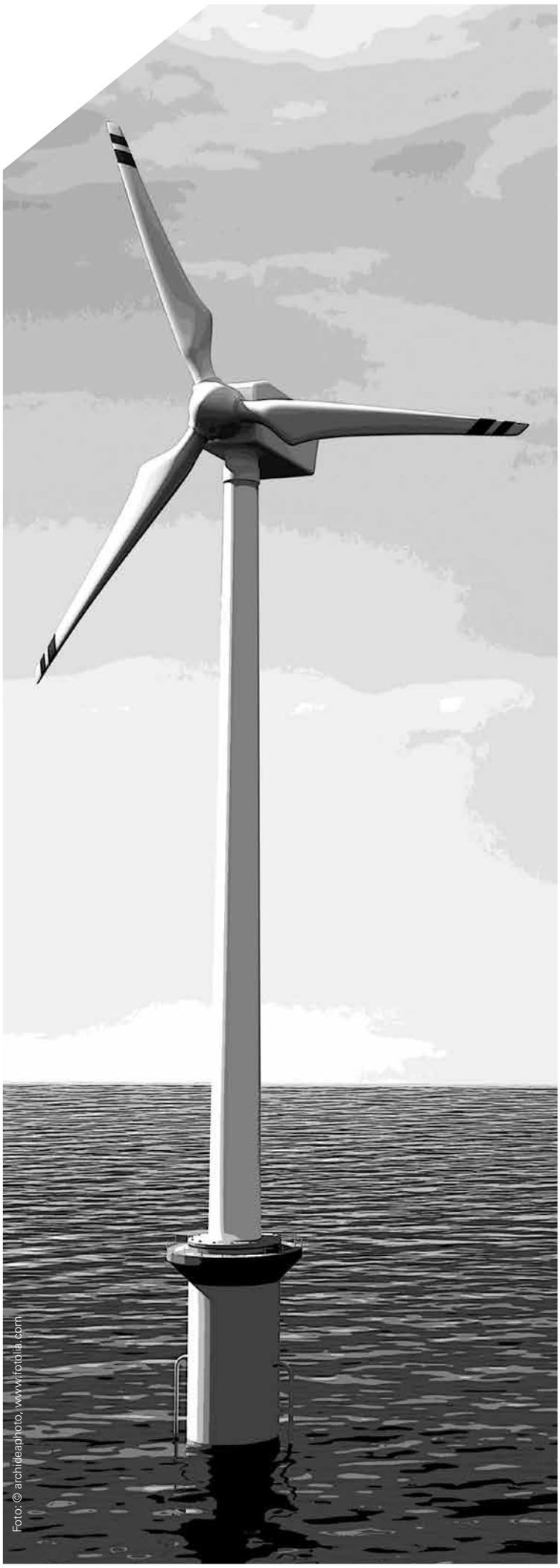
Neutralising seawater ecologically

In the seawater desalination plant in the Matrouh Governorate in Egypt, a CO_2 dosing system from ASCO ensures that the pH value of the desalinated seawater becomes neutral. Water neutralisation is an important process step in the treatment of seawater to produce drinking water. The carbon dioxide here eliminates the need to use chemicals. The gas is stored in a vacuum-insulated CO_2 tank alongside the plant.

Nicole Urweider, ASCO Carbon Dioxide



Said Elsaid, Team Environmental Services, (left) and Thorsten Wodrich, ASCO, with the CO_2 metering system.



Every tonne counts

When the German Öko-Institut coined the word "Energiewende" (energy transition) back in 1980, a fundamental change in the consumption and production of electricity still seemed hardly more than a utopian vision. Now many countries are working to make green energy a reality. Offshore wind turbines in coastal waters are playing a major role here, because they hold the promise of particularly high energy yields. However installing huge towers on the open sea is a difficult job in every regard. High strength steels are designed to make them lighter, but joining the parts made of this improved material takes a special welding technique.

The masts of wind turbines at sea have to endure extremely punishing conditions. This starts with the tremendous mechanical forces during installation; and then, over the course of time, the towers are subjected to wind pressure and wave action, corrosive saltwater, the changes between wet and dry phases, and strong UV radiation. Material and weld seams must be able to withstand all of this reliably for several decades.

Thousand-tonne chunks

Up until now, towers were generally made of low-allow steels which afforded relatively low strength. The plates and tubes used to build the towers had to be that much thicker as a result, and that makes the structures heavy, of course: take the case of the North Sea wind turbines at Alpha Ventus, the first German offshore wind farm, for example, where the steel masses of the tripod foundation, the tower and the nacelle weigh about 1,000 tonnes each. Anchoring such huge chunks with precisely vertical orientation is a huge technical task, especially since they are assembled at sea from only just a few giant pieces which have been previously assembled on land.

Only a limited number of special ships are available for transport and assembly of such huge components. And the time windows during which they can actually be deployed are also very restrictive, because the offshore work requires low winds and calm seas. These are just some of the main reasons why in the future, high strength steels will also be used to produce towers with significantly reduced wall thicknesses which will make them considerably lighter. The special ships can then carry a larger number of them during each trip, and those lighter weight towers will also be easier to install.

Laser beam welding technology opens up new opportunities

Modern high strength and higher strength steels obtain their mechanical properties mainly via their metallurgical microstructure, which is adjusted by means of heat treatments and/or rolling operations. It is extremely difficult to weld such steels using conventional arc welding methods, because they apply so much heat in the area of the weld seam – heat which breaks down the metallurgical microstructure again, thereby destroying the mechanical properties as well. New joining processes characterised by a concentrated application of heat are particularly beneficial here. They make it possible to form extremely deep and narrow seams in a single pass while minimising material deformation at the same time.

That's why the Research Association for Steel Application (FOSTA) is financing research projects at the University of Hannover and the University of Aachen with the objective of developing new processes for rapidly and reliably joining the high strength steel components of wind turbine towers. Both projects concern electron beam welding, which involves the concentrated application of heat to the component. While Aachen is studying the classic electron beam welding in a vacuum, Hannover is investigating the non-vacuum process in atmosphere. Messer is serving in an advisory capacity for both projects.

Moreover, Messer is a partner in the HYBRILAS project of the German Federal Ministry of Education and Research. Among other things, the project involves the laser hybrid welding of wind turbines – a method which combines the advantages of laser beam welding with electric arc welding. Laser beam welding enables a concentrated application of heat, and the electric arc welding method allows for greater dimensional tolerances.

For the foreseeable future, base structures – in the Alpha Ventus wind farm these comprise gigantic tripod and jacket structures which serve as the foundation for each tower – will continue to be made of low allow steels. This is to permit on-site repairs as needed, because electric arc welding is still the only process suitable for welding below the water surface. Due to the effect of heat on the metal and the rapid cooling by the seawater, high strength steels cannot be used here, because embrittlement would occur in the area of the weld seam.

The structures of wind farms currently under construction are being assembled on land using the classical electric arc welding method. The welding gases required for this purpose protect welds from the effects of the atmosphere and ensure the high quality of the welded joint.

Dr. Dirk Kampffmeyer, Messer Group

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Photo: Institute for Material Science, University of Hannover

Electric arc welding is still the only process suitable for welding undersea steel structures today.

Photo: © Charles Welch - Fotolia.com

Welding is required not only for new constructions, but also for the repair of existing systems.

Rush-hour traffic in the Hungarian capital of Budapest – with correspondingly high exhaust levels.

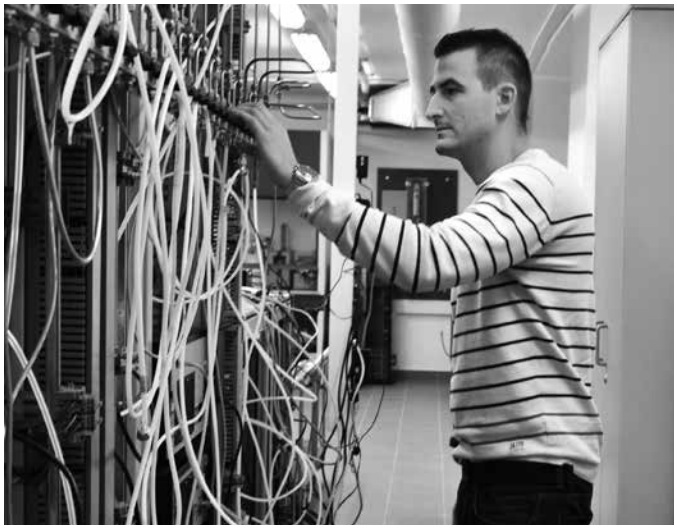
Hungary: Calibration gases for air monitoring

Recording pollutants precisely

The Hungarian Air Quality Reference Laboratory is part of the national weather service and conducts air quality measurements in collaboration with environmental authorities with responsibility at the local level. The latter maintain a nationwide network of 56 automatic measurement stations which continuously measure the most important pollutants, such as sulphur dioxide, nitrogen oxides, carbon monoxide, ozone, benzene and particulates.

The accredited laboratory in which the measurement instruments are calibrated ensures nationwide traceability of the measurement results and also stores the reference material – including the national ozone standard – required for that purpose. Conversion of the raw data into volumetric gas fractions requires a calibration in which the measured values are compared with gases of known composition. This process uses high purity zero gas and a calibration gas with a precisely defined composition. Messer has been supplying both in Hungary for years now. In 2013, Messer also installed the complete gas supply system for the reference centre's new laboratory.

Krisztina Lovas, Messer Hungarogáz



Viktor Dézsi, Department Head of the Air Quality Reference Laboratory, checks the gas supply to the measurement instruments.

Switzerland: Dry ice blasting for old buildings

Gentle on facades and the environment

Historic buildings are often cleaned with dry ice – in this case, the facade of an old building in the historic town centre of Basel. The ASCOJET dry ice blasting process is gentle not only on the outer skin of the historic building, but also on the environment. Unlike other cleaning methods, it works without solvents or other chemicals. Nor are there any cleaning agents such as sand, glass beads or water to be disposed of afterwards.

Upon impact, the dry ice (CO_2) loosens the dirt without damaging the surface and then sublimates immediately into the gaseous state. Depending on the model, the high capacity of the ASCOJET dry ice blasting units permit vertical extension of the blasting hose up to 35 metres without loss of performance, so dry ice can also be used to clean efficiently even at great heights.

Nicole Urweider, ASCO Carbon Dioxide

Cleaning with dry ice is gentle on facades and the environment.

Germany: Electronic billing

Saving paper by the tonne

Messer sends out more than 30,000 invoices per month by e-mail – that corresponds to nearly 400,000 invoices per year – and saves about eight tonnes of paper in the process. The company launched its electronic billing programme, also known as e-invoicing, in 2010. In the preceding year, the stack of all invoices issued would have been 500 metres high. Since that time, a large share of customers have opted for electronic billing and the height of that stack has diminished considerably. Along with the ecological benefits, e-invoicing also offers practical advantages: It accelerates the process of issuing invoices and minimises transport costs. Invoices can be processed electronically and stored without interim steps, thereby simplifying communication between the customer and Messer. You can find further information about e-invoicing at http://my.messergroup.com. All customers who still receive paper invoices are welcome to switch to e-invoicing.

Ulrich Thorwarth, Messer Group

People Focus

6 questions for

Didem Bastan

Didem Bastan (32) has been working for Messer since May 2007. Today she is Sales Manager for Messer in Turkey. She lives in Kocaeli Province.

1. My biggest professional challenge at Messer so far has been...
… supporting the establishment of the new Turkish subsidiary, from the investment analysis right through to the actual realisation.

2. What typifies Messer for me is ...
… that there is always an open ear for good ideas and even young people can make a real contribution to the success of the business.

3. My strong points ...
… are my analytical and implementation skills.

4. I have a weakness for ...
… good food and touring on my motorcycle.

5. What fascinates you about gases and gas applications?
It's not any specific application which fascinates me per se, but rather the fact that gases are present in all aspects of our daily lives.

6. The most important invention of the last century is ...
… the Kyoto Protocol. I wish that more countries would sign it.

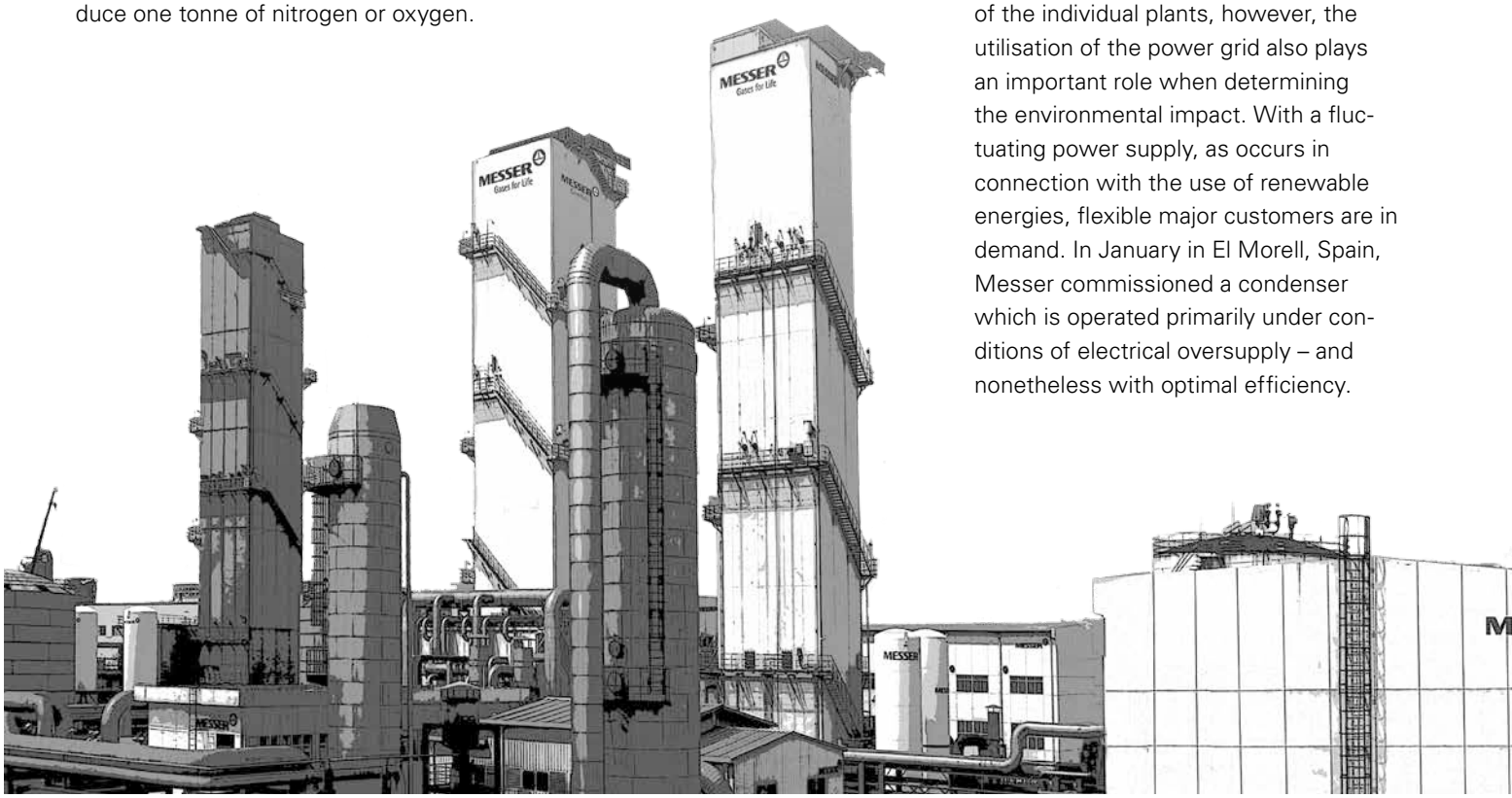
Energy factor

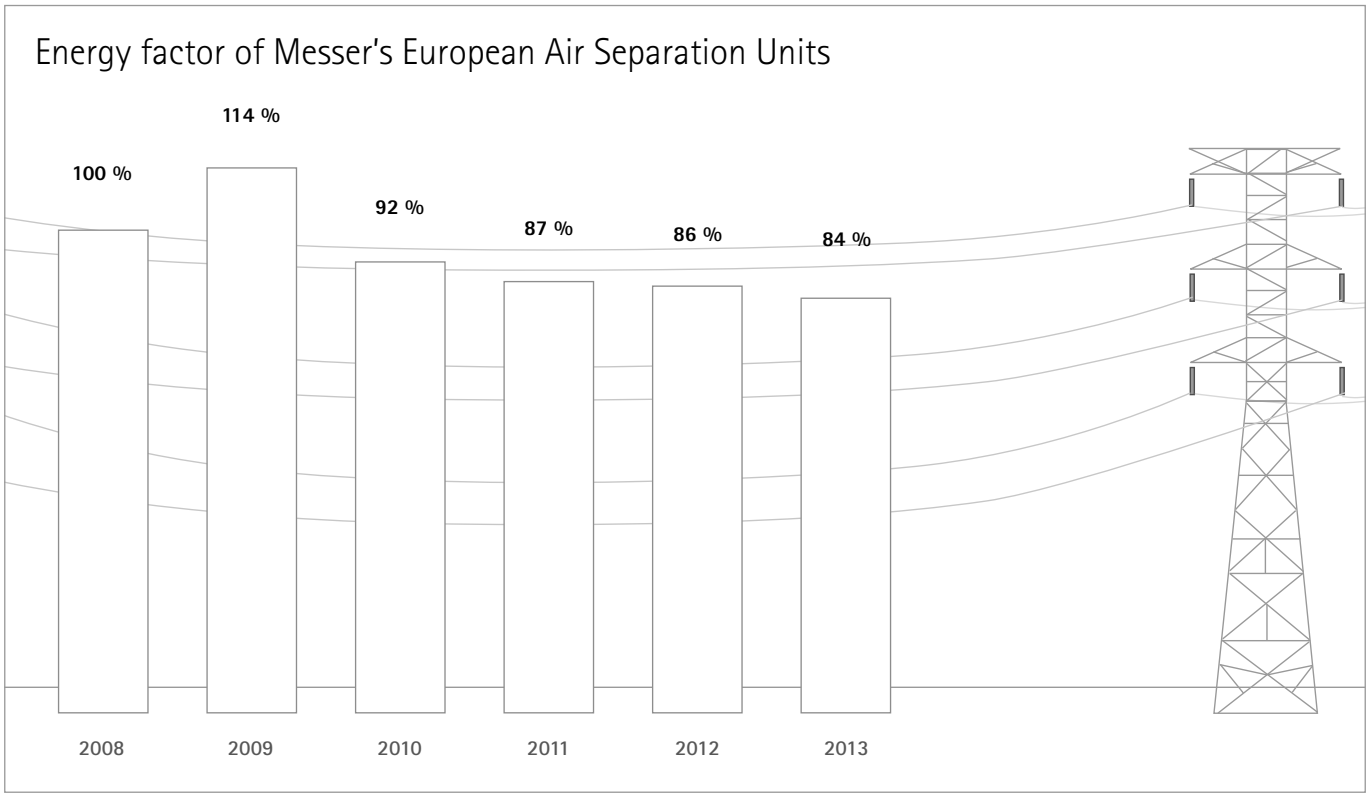
Gases can be a matter of life and death – when scuba diving or in the intensive care unit, for example. Many industrial processes and medical procedures, such as inertisation, cryo-recycling or magnetic resonance imaging, would be completely impossible without gases. In others they help save energy and reduce CO_2 emissions or replace toxic chemicals. In sum, gases are indispensable, also for environmental protection. And yet it takes energy to recover those very gases. At Messer we do everything in our power to ensure that this energy is used as efficiently as possible. That's the most important activity – but certainly not the only one – by means of which Messer exercises ecological responsibility.

The lion's share of gases used for industrial purposes originates literally out of thin air: nitrogen, oxygen and argon are recovered by air separation units. The air is pressurised with large compressors, cooled to temperatures between minus 170 and minus 196 degrees Celsius and partially liquefied. Through continuous evaporation and condensation in tower-like separation columns, the components of the air are separated from one another. The process demands a lot of electrical energy: it takes about 600 kilowatt-hours to produce one tonne of nitrogen or oxygen. A typical Air Separation Unit (ASU) consumes as much power as all of the households in a town of 40,000 residents.

Efficiency and green electricity

"Those figures alone make it clear just how important the efficiency of an ASU is with regard to its CO_2 footprint – to its impact on climate change," says Dirk Reuter, Global Energy Officer (GEO) of the Messer Group. As a renowned ASU expert, he manages the continuous optimisation of these plants all around the world. "The key question is this: How much gas can we produce per unit of energy used?" And that's why one task of the process engineers has always been to optimise efficiency. The GEO supports them with the collective experience of the entire company. Their success is apparent in the energy factor, which is the ratio of power consumption to gas yield. In just five years, Messer has managed to reduce that factor by 16 percent for the ASUs in Europe. Along with the efficiency of the individual plants, however, the utilisation of the power grid also plays an important role when determining the environmental impact. With a fluctuating power supply, as occurs in connection with the use of renewable energies, flexible major customers are in demand. In January in El Morell, Spain, Messer commissioned a condenser which is operated primarily under conditions of electrical oversupply – and nonetheless with optimal efficiency.





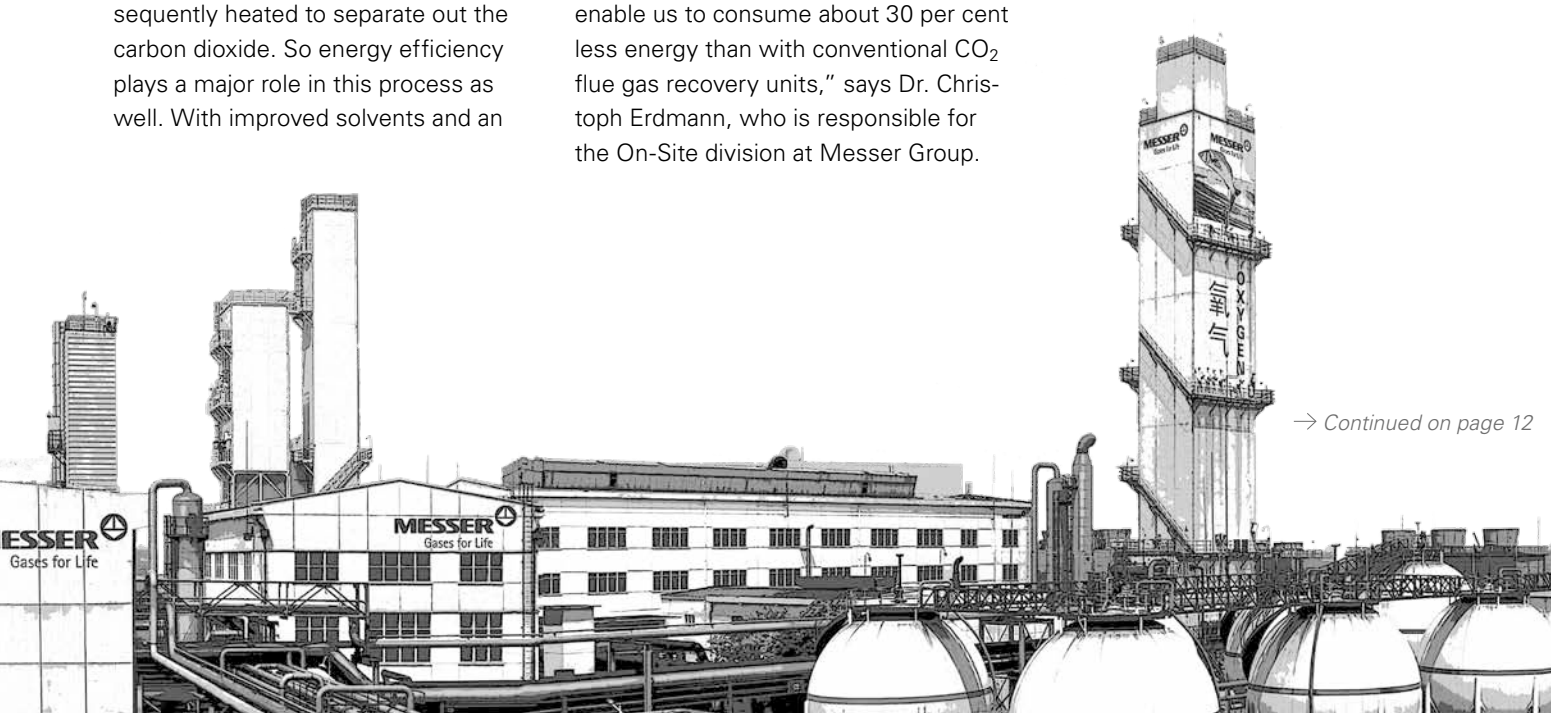
Evolution of energy factor over time (energy input per quantity of gas produced, 2008 = 100%). In 2009, the economic crisis reduced utilisation, thereby raising the relative energy consumption of the ASUs.

Energy-efficient recovery of CO_2

Carbon dioxide (CO_2) is not recovered by air separation, but can be recovered from various other sources, including industrial flue gas. In vertical absorbers, the waste gas flows countercurrent to an amine-containing solvent, which binds to the CO_2. The solution is subsequently heated to separate out the carbon dioxide. So energy efficiency plays a major role in this process as well. With improved solvents and an optimised process, the Canadian company HTC has managed to dramatically reduce energy consumption during the heating process. Messer subsidiary ASCO Carbon Dioxide has acquired a 21-year-license from HTC for the exclusive use of this CO_2 separation process outside of North America. "This will enable us to consume about 30 per cent less energy than with conventional CO_2 flue gas recovery units," says Dr. Christoph Erdmann, who is responsible for the On-Site division at Messer Group.

Liquid or gaseous

The state of matter of the end product also affects the energy balance. Obtaining atmospheric gases in liquid form requires more than twice the energy needed for a gaseous end product, which suffices for many applications.



→ *Continued on page 12*

Green chemistry

The gas and process engineering experts from Messer work together with customers to develop environmentally friendly and energy-saving processes which offer significant ecological benefits. A few examples:

Oxygen versus nitrogen oxides
Some 55 tonnes of nitric acid (HNO3) are manufactured worldwide each year as a base material for inorganic chemistry and fertilizers. Targeted use of oxygen can dramatically reduce the nitrogen oxide emissions which would otherwise have to be rendered harmless by large quantities of ammonia and natural gas.

30 per cent less electricity
About two thirds of all chemical products are made with chlorine, 95 per cent of which is produced through the electrolysis of sodium chloride. The oxygen depolarising cathode process developed by the Bayer chemicals group can save 30 per cent of the electrical power used to produce that chlorine. Together with Bayer, Messer has applied for a patent for an oxygen supply system specifically optimised for this application. The oxygen-rich waste gas is reused. If this technology were applied throughout the Germany, 1 per cent of the country's total electrical demand could be saved.

Raw material from greenhouse gas
Polyether polyols are petrochemical intermediates which are primarily used to manufacture polyurethanes (PUR). Polyurethanes (world market > 13 million tonnes per year, and trending upward) have an extremely broad spectrum of applications ranging from paints and coatings to foam and insulation to artificial leather and textiles. Today the world's leading chemical companies are investing massive R&D resources aimed at chemically incorporating up to 20 per cent carbon dioxide into those polyether polyols. One key in this regard is the development of high performance catalysts to make the very stable CO_2 molecule react. The polyether polycarbonate polyols (PPP) produced in this way not only save raw materials, but also incorporate considerable quantities of the greenhouse gas CO_2 into the end product. Messer is working closely with leading manufacturers on the development of such CO_2 reduction programmes.

Dr. Walter Bachleitner, Messer Group

→ *Continued from Page 11*

On the other hand, a tank holds about a thousand times more product in its liquid state than in its gaseous state. "If atmospheric gases are to be transported in a tank by vehicle, then we need them to be in liquid form – otherwise the added cost incurred during just the first few kilometres travelled will already eat up everything saved during production," explains Dirk Reuter.

MegaPack
cylinder bundles

Provision in the gaseous state is possible via pipeline or by means of gas production on site at the customer's premises. As a rule, piped-in gas is only available to industrial parks with significant levels of continuous demand. Messer designs, builds and operates large ASUs which are located directly at the customer's site. They can be found, among other places, in the steel industry, which requires huge quantities of oxygen. Cryogenic generators suffice for producing slightly lower quantities of oxygen or nitrogen. Nitrogen or oxygen can also be recovered by means of non-cryogenic generators without intensive cooling. Such systems use pressure swing adsorption or semi-permeable membranes. Automotive supplier Bosch, for example, recently took delivery of its third cryogenic nitrogen generator with a capacity of 600 cubic metres per hour for its site in Hatvan, Hungary. The two existing generators work with a capacity of 900 and 500 cubic metres per hour, respectively.

Cylinder innovation
Similarly for the transport of small quantities, energy efficiency can also be raised:

Interview with Dirk Reuter, Global Energy Officer for the Messer Group

"We want to minimise the use of energy."

if a gas cylinder is filled with 300 bars instead of the usual 200 bars of pressure, it already contains 50 per cent more gas, thereby reducing transport costs significantly. Improved steel quality accommodates these higher pressures while barely increasing the weight of the cylinder. Messer has been a pioneer in this area for about ten years now. Messer took an even greater step forward with the new MegaPack (Gases for Life 3/2013). The completely redesigned cylinder bundle is considerably lighter, contains more gas, and also provides tremendous advantages in terms of handling. Dirk Reuter sums it up this way: "We keep the overall optimum conditions in mind while using continuous efficiency optimisation and technical advancements to reduce energy consumption further and further."

Editorial Team

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Gases for Life: How does one become a Global Energy Officer?

Dirk Reuter: I am a process engineer and throughout my career, I have been primarily involved with air separation units (ASUs). I designed many of the Messer units myself, and I also helped plan their construction and then commissioned them, so I have extensive knowledge of them right down to the details.

Gases for Life: Why did Messer create this position?

Dirk Reuter: Air separation takes a lot of electrical energy. Since, as a conscientious industrial corporation, we want to minimise the use of energy as far as possible – and avoid CO_2 emissions to the greatest possible extent – we have to work on the efficiency of these key processes intensively and continuously.

Gases for Life: How can you have an impact?

Dirk Reuter: I have direct access to all important data from the company ASUs and regularly check to see how efficiently they operate. When they deviate from the optimum conditions, I contact my colleagues there on-site and we consult with one another about the necessary measures to take.

Gases for Life: Can you give us an example?

Dirk Reuter: For customers who are supplied with gas via pipeline, the operating conditions of the ASU must be continuously adapted to the demand. If this is not done properly, the rate of production can exceed the rate of consumption. In such cases, product which required a great deal of energy to generate must be vented into the atmosphere. Such situations can occur, for example, when the customer significantly changes their consumption practices. We might address the problem then with customised control system designs or automation. In extreme cases, it may be necessary to modify the unit.

Gases for Life: Are there other areas which play a role in energy efficiency?

Dirk Reuter: The transport of the gases plays a major role and is directly linked to the efficiency of the ASU. The ASU should be operated as close as possible to full capacity, and transport routes should be as short as possible. For a demand of 200 cubic metres per hour or more, the customer should consider the option of having the gas produced on-site on their own premises.

Gases for Life: What challenges will Messer have to face in the future?

Dirk Reuter: Over the course of the next few years, we expect to see new steel production processes which will require significantly larger quantities of oxygen then the industry requires today. So we will need larger ASUs, which of course will have to be especially efficient. We have already begun to lay plans for such units.

Editorial Team

No toxins, no salt, more recycling

Water Framework Directive 2000/60/EC (WFD) of the European Union stipulates a requirement which is as simple as it is clear: good ecological and chemical conditions must be achieved in all surface waters no later than 15 years after this Directive goes into effect. With the CO_2 process for waste water neutralisation, Messer is making a relevant contribution toward that goal.

Salt content is one of six general chemical parameters which are evaluated when assessing the condition of a body of water within the framework of the WFD. For that reason, whoever discharges process water or treated waste water into rivers can be specifically required by local authorities to reduce the salt loading. Part of the salt loading is often attributable to the neutralisation of process water or waste water whose pH value is too high. As a rule, aggressive mineral acids are used for this purpose. The treated waste water is still loaded with salt, however. This does not occur when the neutralisation is carried out with carbon dioxide. The latter dissolves in liquids to become carbonic acid – familiar to everyone who drinks carbonated beverages – thereby replacing hydrochloric acid or sulphuric acid during the neutralisation process. These acids are considered to be hazardous materials and subject operations to additional requirements. Nor does the cost-benefit restriction contained in the EU Directive apply for neutralisation with CO_2. To the contrary, CO_2 neutralisation is not only inexpensive in its own right, but in many cases also enables reuse of the waste water in industrial production, thereby resulting in additional savings. Messer has planned and installed a large number of such plants. You will find the latest examples in this section.

Dr. Monica Hermans, Messer Group

Vietnam: Pulp neutralised with CO_2

Not corrosive at all

Last year Saigon Paper Corporation (SGP) replaced sulphuric acid with carbon dioxide in the neutralisation process of a pulp bleaching plant. It was the first company in Vietnam to do so. This conversion not only made it possible to eliminate the use of the highly corrosive acid here, but also helped reduce the chemical costs associated with this bleaching process. In addition, CO_2 enables operators to adjust the pH value more precisely and maintain it more consistently. Messer Vietnam planned and installed the new process starting from July 2013. SGP is one of the country's biggest paper manufacturers, producing 48,360 tonnes of toilet paper per year and 224,600 tonnes per year of the base paper used to make corrugated cardboard.

Dave Phan Thanh Binh, Messer Vietnam

Ivan Perez (Application Engineering Manager), Bernhard Thaller (Application Engineering, Pulp and Paper), Dave Phan Thanh Binh (Technology Manager Chemistry/Paper/Environment) and Prapasuchart Chalermphol (Technology Manager Food) started the trial run at Saigon Paper 2013.

Slovenia: CO_2 regulates pH value

Thermal bath in Zreče

Thermal baths without sulphuric acid

Replacing sulphuric acid with carbon dioxide in order to regulate the pH value of the bathing water – in medical, ecological and economic respects, this turned out to be a good trade. Following trials by Messer, the operators of the Zreče, Topolščica and Banovci thermal baths in Slovenia achieved extraordinarily good results with the new process. Eleven swimming pools at the health spa in Zreče are being treated with carbon dioxide. An additional benefit is that the carbon dioxide has an efficiency of 100 per cent, which means that it dissolves completely in the water. Ecologists in the spa and wellness towns of Slovenia are showing keen interest in these alternative and natural methods.

Alenka Mekiš, Messer Slovenija

Spain: CO_2 replaces sulphuric acid

Front row: Pau Casasus (Technical Consultant NALCO) and Marcos Torcal (Application Engineer Messer Ibérica); back row: José Mocha (Manager ASU Vila-seca) and Silvia Sola (Water & Process Service Sales NALCO).

Cooling water treated, incrustation prevented

In the liquefaction of gases such as oxygen, nitrogen and argon, cooling water is required. Its pH value must be reliably stabilised in order to comply with the requirements of environmental legislation and to prevent corrosion and incrustation in the circuit and in the heat exchangers. Sulphuric acid is often used for this purpose. Beside the fact that this acid is a hazardous material its use also carries a few additional disadvantages. That's why Messer replaced the sulphuric acid with carbon dioxide at the town of Vilaseca near Tarragona, Spain. Using carbon dioxide to regulate the pH value of the cooling water reduced the sulphate content in the recirculation water and blow-down water by about 30 per cent. There is another major benefit for the piping, because the use of carbon dioxide for neutralisation makes the water less corrosive. That saves money and makes the plant safer.

Marion Riedel, Messer Ibérica de Gases

Social Commitment

France: Integration and health

In sporting form for good causes

Messer in France raised the awareness of its own workforce with the aid of an information campaign about disabilities. The employees participated in a variety of activities, thereby strengthening the campaign: in Nantes, several employees ran a relay race together with mentally handicapped people. The event was organised by the Special Olympics, the world's larges sports organisation for people with mental or multiple disabilities. At the Virades de l'espoir (hope laps) in Bordeaux, the Messer team organised a balloon event. In so doing they made a contribution to the fight against cystic fibrosis, a hereditary disease of the respiratory system and digestive tract.

Balloon event organised by Messer in connection with the "Virades de l'espoir" (hope laps) to help fight cystic fibrosis.

The annual telethon, which was held this year from 1-15 December, collects donations throughout France to fund research into hereditary diseases. In 2013, Messer donated helium for the balloons used at this event.

Angélique Renier, Messer France

Hungary: Medical oxygen for children

First children's hospice in Hungary

Oxygen helps treat children with incurable diseases.

In Pécs, Messer donated and installed a supply system for medical oxygen at Hungary's first hospice for children with incurable diseases. The oxygen, which is inhaled, helps treat the children housed in the "Dóri Ház". The institution is operated by the Szemem Fénye (Apple of My Eye) Foundation. It also receives financial support from Messer in Hungary.

Krisztina Lovas, Messer Hungarogáz

Spain: Solidarity actions

Donations for the needy

In December 2012, the employees of Messer in Spain donated 300 kilograms of food to the Banc dels Aliments Comarques de Tarragona (Food Bank of the Province of Tarragona). The Spanish charity provides support to needy people in the form of meals and groceries. In addition, Messer presented a monetary donation in the amount of 2,000 euros to help maintain the food bank's fleet of vehicles. In 2013, the solidarity action of the Spanish subsidiary rallied under the motto "The kings of solidarity". At the end of the year, employees donated games and toys which, in collaboration with the Jove Cambre de Tarragona (an association of young entrepreneurs), were distributed among children's homes and charities such as Caritas. Thanks to the employees' commitment, the Three Wise Men, who in Spain traditionally bring gifts to the children, also brought smiles to the faces of families without financial means.

Marion Riedel, Messer Ibérica de Gases

Slovakia: Championships in welding

Honouring the best welders

In October 2013, in cooperation with the Slovakian Welding Society, Messer in Slovakia held the first Slovakian welding competition. More than 280 competitors from the eight biggest welding schools participated in the event. The welders had to put their skills to the test while welding under a CO_2 shielding gas atmosphere (Ferroline C18 – MAG welding 135). Each participant had to weld one butt weld and one fillet weld. In addition, the five highest scoring participants were honoured at the 41st international welding conference. In 2013, the Slovakian welding champion was Tomáš Lipták of Košice.

Erika Hergottová, Messer Tatragas

Bosnia-Herzegovina: Relief supplies for Zenica

Transport of school supplies

A donation to the Zenica Red Cross comprised school satchels, school supplies, smart boards, notebook computers and other learning aids. Messer financed the transport of the relief supplies from Germany to Bosnia-Herzegovina. The relief supplies for the school children in the central Bosnian town were collected in Berlin and Laupheim, Germany. The Sarajevo-based aid organisation Smješko – Bosnian for "smiles" – also participated in the action. In Zenica, Messer operates an air separation unit which produces oxygen, nitrogen and argon.

Maja Softić, Messer Tehnoplin

Satisfied adults, happy children: with the assistance of Messer, the material donations arrived safely in Bosnia-Herzegovina.

Slovenia: Holiday camp for children

New friendships

In August of 2013, Messer in Slovenia organised a holiday camp for school children in the town of Pore, Croatia. Thirteen children between the ages of six and fifteen were able to enjoy a week of recreation on the Adriatic coast and make new friends.

Alenka Mekiš, Messer Slovenija

Serbia: Support for engineering education

Infrastructure for welding technology

For years now, Messer and the Messer affiliate Castolin Eutectic have been providing support to the Faculty for Mechanical Design at the University of Belgrade through donations and scholarships and by sponsoring research projects and conferences. Recently, in an initiative by Messer, a new department for welding and welded structures was established as part of the faculty. It received key pieces of equipment from Messer and its students can work in the laboratory donated by CastoLab. Representatives of the company also take an active role in the instruction process by giving lectures and making presentations. Every year in November each second-year student visits Messer's Serbian subsidiary to observe operations there for five days. The subsidiary includes the companies Messer Tehnogas and Castolin. In recognition of the services rendered on behalf of the faculty, Messer Tehnogas was awarded an honorary plaque.

Sanja Šamatić, Messer Tehnogas

CO_2 equivalent – a unit of measure for climate protection

Compared to carbon dioxide (CO_2), sulphur hexafluoride (SF_6) is nearly 22,800 times more harmful to our climate, methane is about 25 times more harmful, and nitrous oxide is 298 times more harmful. In order to determine and compare the harmfulness of greenhouse gases, and ultimately to measure their overall emission levels and to place reasonable limits on them, the unit of measure "CO_2 equivalent" (CO_2e) was developed. It serves as the basis of calculation for international agreements on climate protection.

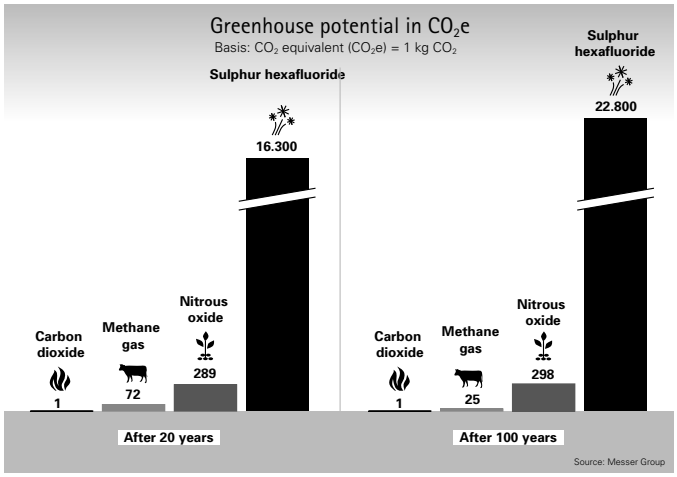
Before the Kyoto Protocol for curbing the greenhouse effect could be enacted in 1997, a few prerequisites had to be clarified first. Which greenhouse gases should be regulated? And how can their impact on the climate be defined? Consensus was ultimately reached on seven gases whose emission should be reduced: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrochlorofluorocarbons (HFC), perfluorocarbons (PFC), sulphur hexafluoride (SF_6) and nitrogen trifluoride (NF_3). The CO_2 equivalent is used to determine the impact that these gases have on the climate.

The adsorption properties of a gas in response to heat radiation reflected from the Earth's surface, and its mean residence time in the atmosphere are of crucial significance to the environmental impact of a gas.

CO_2e describes the mean warming effect of a gas over a specific time interval relative to carbon dioxide. According to estimates by the Intergovernmental Panel on Climate Change (IPCC 2007), during the first 100 years after release, one kilogram of methane contributes 25 times more to the greenhouse effect than one kilogram of CO_2 does.

Carbon dioxide, however, is the greenhouse gas which is emitted in by far the greatest quantity. Although its CO_2e is very low as compared with the others, it has, in absolute terms, the strongest greenhouse effect.

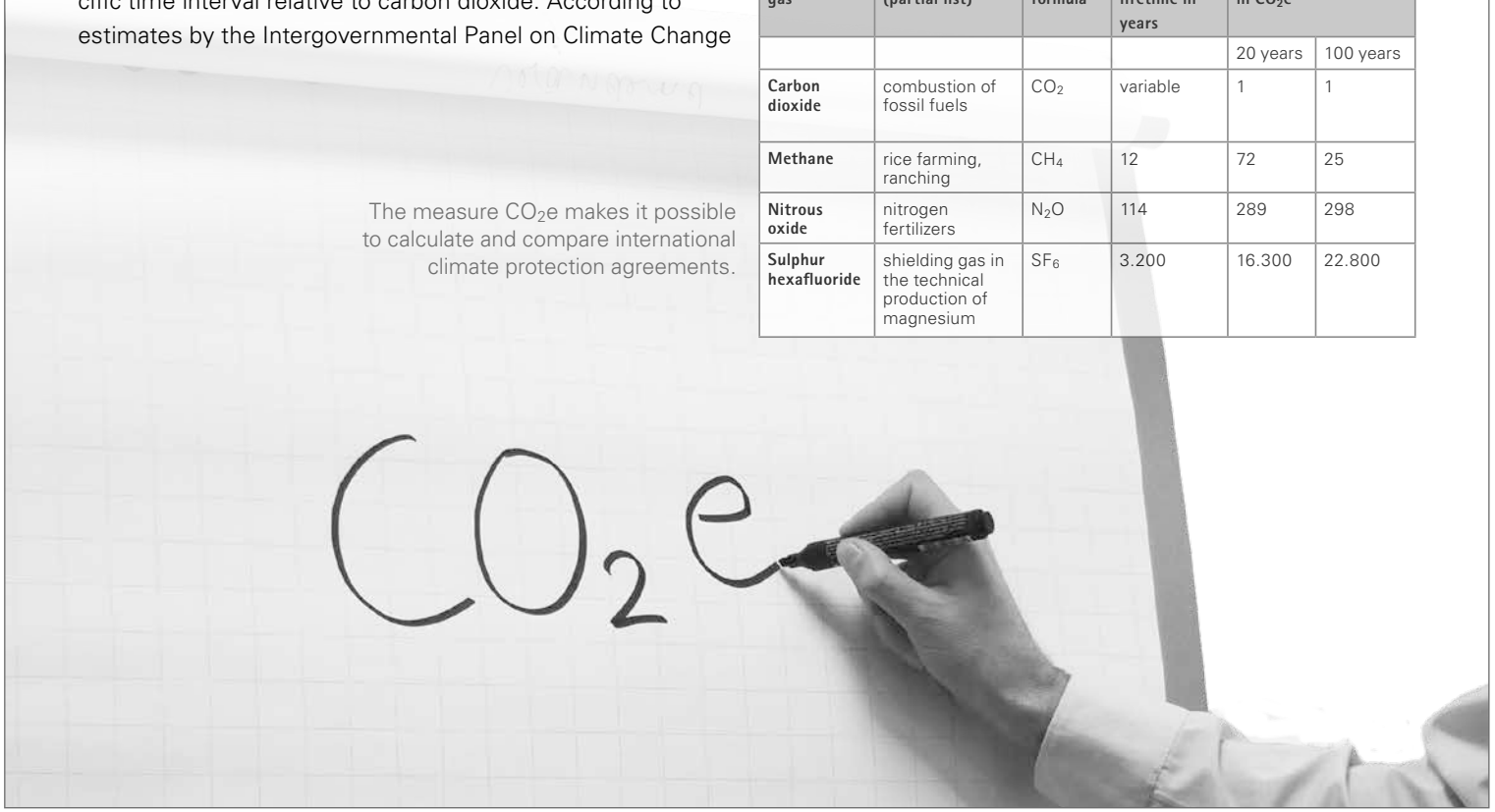
Editorial Team



Sulphur hexafluoride has the strongest effect on the climate per kilogram.

Greenhouse gas	Source (partial list)	Molecular formula	Atmospheric lifetime in years	Greenhouse potential in CO_2e	
				20 years	100 years
Carbon dioxide	combustion of fossil fuels	CO_2	variable	1	1
Methane	rice farming, ranching	CH_4	12	72	25
Nitrous oxide	nitrogen fertilizers	N_2O	114	289	298
Sulphur hexafluoride	shielding gas in the technical production of magnesium	SF_6	3.200	16.300	22.800

The measure CO_2e makes it possible to calculate and compare international climate protection agreements.



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The Gases for Life Editorial Team

We are ...

From left to right: Dr. Bernd Hildebrandt, Reiner Knittel, Michael Holy, Angela Bockstegers, Diana Buss, Marlen Schäfer, Benjamin Auweiler, Dr. Joachim Münzel, Nicole Urweider and Caroline Blauvac
(Not pictured: Dr. Christoph Erdmann, Tim Evison, Dr. Dirk Kampffmeyer, Monika Lammertz, Krisztina Lovas, Marion Riedel and Roberto Talluto)

Competition

Naturally delicious!

The winner of this issue's prize draw will receive a package of delicacies from ecological and sustainable sources. To become eligible to win, all you need to do is answer our questions about the current issue of "Gases for Life". The letters in the numbered boxes spell out the solution. Send it to us at diana.buss@messergroup.com by 16 June 2014 under the heading "Gases for Life contest" and indicate your name and address.

Unfortunately, employees of the companies of the Messer Group and their families may not participate. In case of multiple correct answers, the draw determines the winner. The judges' decision is final.

What does the unit of measurement CO_2e stand for?

☐☐☐ –
6
☐☐☐☐☐☐☐☐☐☐
8 2

In Egypt, a CO_2 dosing system from ASCO is performing what function?

☐☐☐☐☐☐☐☐
1 10 5
☐☐☐☐☐☐☐☐☐☐☐
7 9

What country held its first welding championships?

☐☐☐☐☐☐☐☐
3 4

Congratulations!

The winner of the last contest is Helmut Breitmeyer of Bremen, Germany. The solution was "STEELWORKING".

Answer: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ M 8 ☐ 9 ☐ 10 ☐

Have fun and (with a bit of luck) enjoy the delicacies!
Your "Gases for Life" team!

We donate colour

This issue of "Gases for Life" is no reason for the world to seem monotone – and certainly not at the Saint Joseph day care centre in Krefeld, Germany. Through the Krefeld volunteer agency, this kindergarten was selected to have a coat of fresh paint applied to a few interior rooms. The required materials were provided by "Gases for Life" – and so were the painters: mid-December, volunteer helpers from the editorial team painted selected rooms so that the kindergarten operation could resume business as usual on the next morning. A nice bit of social commitment – and it was also a lot of fun.