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segment

News and information for customers and business partners

steag POWER MINERALS

STEAG Power Minerals and Dyckerhoff:

successful together with power plant by-products

Scenario rife with question marks

A conditioned phase-out pathway for coal-fired power generation

Blasting abrasive business: quo vadis?

How STEAG Power Minerals is preparing for the "post-coal slag" era

Young master power in the mixing plant

Two new master tradesmen in industry about their goals and their motivation

For more than 10 years now, STEAG Power Minerals has been storing hard coal fly ash in the former product silos of Dyckerhoff's closed Neubeckum cement plant. In 2009, Dyckerhoff and STEAG Power Minerals jointly applied for approval for the change of use of the site.

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Dear readers,

Sustainable and long-lasting business relationships are among the corporate values at the heart of STEAG Power Minerals. This edition introduces you to a partner who has accompanied us since our early days in a cooperation which has proved valuable for both parties: Dyckerhoff GmbH, where our power plant by-products serve as important raw materials in the production of cement and concrete. Find out from page 6 on how, in particular, our fly ash not only contributes to a special quality of cements and concretes, but also to reducing Dyckerhoff's carbon footprint in its production. And how, together with Dyckerhoff, we want to continue putting big ideas for cement and concrete into effect. Dirk Beese from Dyckerhoff's board of management outlines in his answers to three questions on page 13 what makes the partnership stand out from Dyckerhoff's point of view.

This edition of SEGMENT focuses by and large on the future. The new, powerful structure of the blasting abrasives unit in Lünen already featured in the 2018 winter edition. Starting on page 20 you can read about what we are doing product-wise to keep this division on a secure footing in the long term given the diminishing coal slag resources.

Career advancement with the best possible reconciliation of work, family and leisure – vocational training is another of STEAG Power Minerals' core values. Two colleagues from the MINERALplus mixing plant tell us what this can actually be like in practice: two young employees who took advantage of the opportunity to get fit for their next career step in our company by doing further training alongside work to become master tradesmen. Read about what motivated them to do so and how they managed to cope with the additional learning. Many congratulations to both colleagues on successfully qualifying as master tradesmen.

These are just some of the many topics SEGMENT covers this time round - we hope they all make for informative and entertaining reading.

Best regards,

Andreas Hugot

Stephan Altendeitering

The Directors of STEAG Power Minerals GmbH

You can find an online version of this issue at www.bit.ly/spm_segment or use this QR code to access the online online version.

For big ideas

Bridges, tunnels, cooling towers, wind turbines, canals, motorways, facades - and, of course, foundations for modern buildings from small to large: As the "building material of the 20th century", concrete is all around us, and is now even fine enough for use in living spaces. Cooperations like that between Dyckerhoff and STEAG Power Minerals contribute to it remaining a popular material in the 21st century too.

Not so long ago, concrete tended to be more something for practical thinkers: a reliable building material that was hidden or "packed" as far as possible, especially as far as aesthetic considerations were concerned. This all changed in the second half of the 20th century. In Germany, it was not least the image campaign by the concrete industry that played its part in this, advertising the versatile material from the end of the 1970s onwards with the slogan "It all depends on what you make out of it."

It all depends on what you make out of it

Perhaps it was this line of thought that was behind those responsible at STEAG Power Minerals and Dyckerhoff when they each independently recognized the importance of power plant by-products for themselves. For STEAG Power Minerals, these proved to be promising products, and marketing them has now become one of the main pillars for the company - as a service provider to the power industry and partner to the construction industry. And for the cement and concrete manufacturer Dyckerhoff, power plant by-products turned out to be raw materials which, from today's point of view, can contribute not least to securing concrete's place as a sustainable building material despite its energy-intensive production. And so it came about, back in the 1980s, that the two companies concluded independent contracts for the reliable purchase of fly ash from Bergkamen power plant. Besides FGD gypsum, which as a sulfate carrier is an important setting regulator in cement production, fly ash is a central element.

Fly ash in concrete: the added extra for better performance

But why fly ash? Fly ash consists of pulverized, mineral particles with a chemical composition very similar to those found in nature, for example as volcanic ashes and soils. It is precisely these substances – the so-called pozzolanas – that concrete needs for its fundamental property: They are essential for the hardening process, which turns the mixture of cement, concrete additives and aggregates in combination with water into a permanently solid, resilient artificial stone. With its high silica content, fly ash from coal-fired power plants, as marketed by STEAG Power Minerals as a quality assured building material, is ideal for this. And not only that: Its fine, round particles act like small ball bearings, which help make the concrete easier to process and compact. In addition, the particles fill the cavities in the concrete and react with calcium hydroxide from the hydration of the cement, which significantly increases its strength and durability.

About Dyckerhoff

- founded in 1884 under the name "Portland-Cement-Fabrik Dyckerhoff & Söhne" in Amöneburg near Wiesbaden
- continuously expanded into an international, multi-regional group focused on cement, concrete and aggregates, today part of Buzzi Unicem S.p.A.
- nation-wide presence in Germany with seven cement plants and 110 ready-mixed concrete plants; head office (Dyckerhoff GmbH) still located in Wiesbaden
- subsidiaries and production sites in Luxembourg, the Netherlands, Poland, the Czech Republic, Slovakia, Ukraine and Russia

One of the company's success factors is a long-term corporate vision with clear goals and strategies for sustainable development, high-quality and environmentally friendly production facilities and the responsible use of limited raw materials.
Dyckerhoff customers benefit not only from products based on the latest findings in construction materials technology, but also from construction-related consulting and other services.

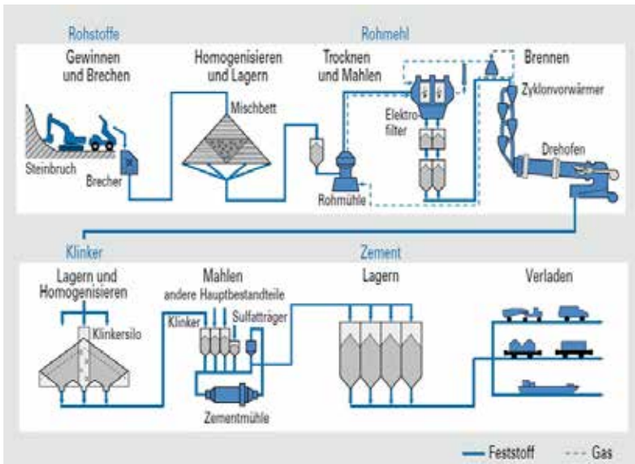
www.dyckerhoff.com

Cooperation to guarantee security of supply

No wonder, then, that fly ash quickly became popular and sought after as an additive in concrete production. However, a drawback just as quickly became apparent: Fly ash is increasingly produced during the heating period, in other words in the winter, while it is the summer months, precisely the opposite time of year, that are the height of the concrete season. In order to level out these seasonal fluctuations and guarantee security of supply for customers in the cement and concrete industry, STEAG Power Minerals sought suitable possibilities for interim storage – and found these at the cooperation partner Dyckerhoff: in the company's former cement plant in Neubeckum, ideally situated on the east-west axis Berlin-Hanover-Ruhr region, just a few kilometers from the A2 motorway. In 2009, STEAG Power Minerals and Dyckerhoff signed a long-term contract for the lease of five of the former works silos for powdery goods, in order to store dry fly ash in them and supply it again in line with demand. In close cooperation between the two companies, the silos were retrofitted with blast feed lines and loading facilities, as well as being modernized in terms of switchgear and power supply.

Capacities for the sorted storage of several fly ash types from different power plants

At first, therefore, up to five single-origin fly ash types with a total volume of up to 23,000 m³ could be stored. In the meantime, capacities have been further expanded to the extent that today, around 36,000 m³ of storage volume is available in nine different silos, some with multi-chamber design. Dyckerhoff provides the entire infrastructure, as well as energy in the form of electricity and compressed air, weighing equipment, personnel for operating the facilities, administration and security services. "Both the location and the cooperation with Dyckerhoff are very favorable, and so we have just recently extended the contract by another five years up to the end of 2024," Dr. Hans Hermann, Head of Logistics at STEAG Power Minerals points out in emphasizing the significance of the cooperation.



Source: Verein Deutscher Zementwerke

Cement explained: What stands for what in "CEM-II-M-(V-LL)-32.5"?

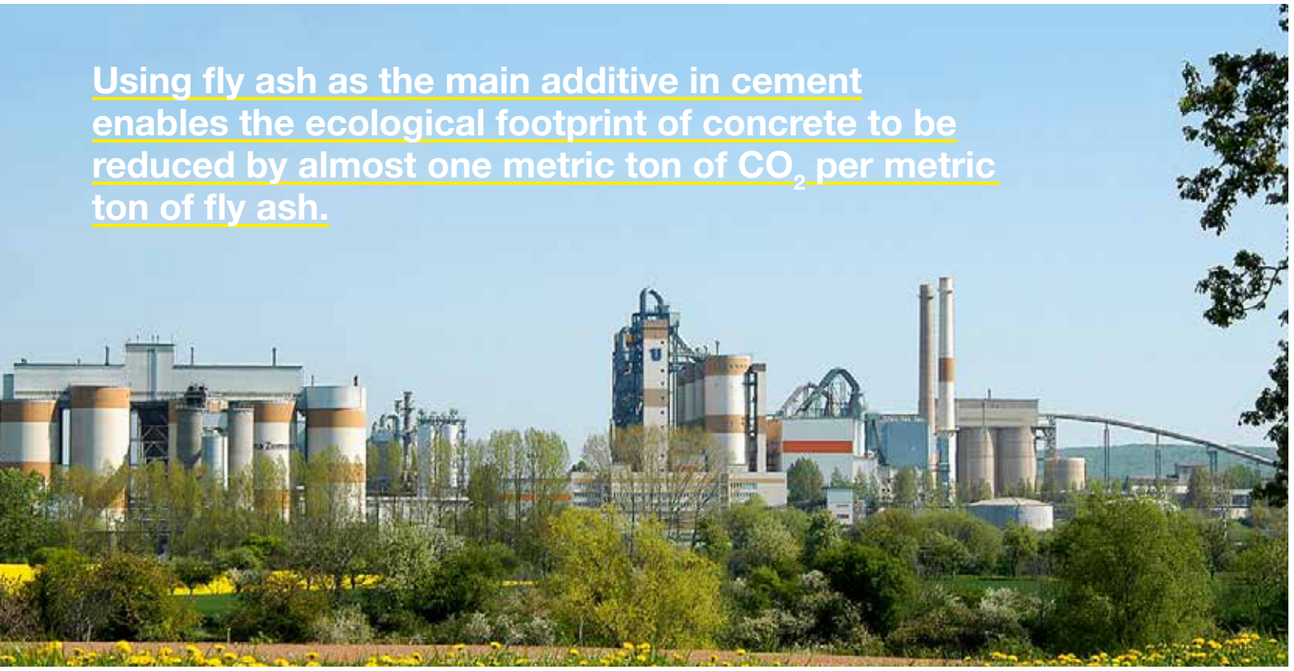
- CEM-II = Portland composite cement (s. infobox on the following site)
- M = Portland composite cement, in which all main constituents (granulated blast furnace slag, silica dust, pozzolanas, fly ash, slate, limestone) are possible
- V = hard coal fly ash with high silica content
- LL = limestone
- 32.5 = cement strength class (here: 32.5 N/mm²)

Innovation partnership for sustainable cements

Besides using the former cement plant silos as interim storage facilities, fly ash itself is also a central, connecting element in the long-standing partnership between STEAG Power Minerals and Dyckerhoff. For the vertically integrated building materials manufacturer, who produces and markets not only concrete but also cement as the necessary base material, power plant by-products such as the fly ash sold by STEAG Power Minerals are today an essential pillar in securing its strong market position. For particularly in the cement industry, environmental and climate protection pose major challenges alongside the usual cost aspects: The production of high-grade cement consumes not only raw materials, but above all a great deal of energy on account of the clinker burning process, which takes place at very high temperatures. A solution emerged a few years ago in the form of so-called composite cements, in which part of the clinker is replaced by other main constituents that perform a comparable function – for example fly ash with its pozzolanic properties. And so Dyckerhoff decided around ten years ago to work on developing innovative “M cements” - together with STEAG Power Minerals, at that time still under the name Evonik Power Minerals: “Dyckerhoff and Evonik embraced the same philosophy at the same time, namely the idea to use fly ash not only in concrete, but also in an upstream stage, in the cement,” Dr. Ditmar Hornung, the then authorized officer and Head of Portfolio Management and Application Consulting at Dyckerhoff AG, explained in the summer 2011 edition of SEGMENT. It was therefore only natural that the successful cooperation be broadened into a development partnership. The choice for implementing the project fell on Dyckerhoff’s Deuna and Amöneburg plants, with Dyckerhoff first investing in extensive retrofitting in the Deuna plant: A whole year was spent here installing the entire logistics relating to the fly ash - from the station for unloading and storage to the dosing device in the cement mill. As a result, two innovative composite cements containing fly ash were developed in the facilities, and have become firmly established in Dyckerhoff’s product range as CEM-II-M-(V-LL) in the strength classes 32.5 and 42.5.

Composite cements with fly ash: more scope for the future

In the future, Dyckerhoff will focus in Deuna on the strength class "42.5 R" for composite cement with fly ash: a Portland composite cement characterized above all by its good water retention capacity and thus less “bleeding” in soft concretes. The high degree of fineness and the good grain grading of the cement enables even surfaces to be achieved for exposed concretes. Earth-moist concretes, which are used, for example, in paving stone production, can be significantly better compacted and are less sensitive to fluctuations in the water content of the concrete mixes.



Using fly ash as the main additive in cement enables the ecological footprint of concrete to be reduced by almost one metric ton of CO_2 per metric ton of fly ash.

Concrete, cement, composite cement – what’s what?

Concrete is originally a mixture of cement, aggregates (sand and gravel) and water, the properties of which can be individually influenced for specific requirements with the use of various additives (pulverized rock, pigments, fly ash, granulated blast furnace slag, etc.).

Cement is based on naturally occurring pozzolanas: substances such as silicon dioxide, alumina, limestone, iron oxide, etc. which have hydraulic properties, in other words which react with water and harden in the process. In cement production, the raw materials are heated to approx. 1,450°C until they partially melt (sinter). The resulting cement clinker is cooled and then finely ground. Since 1824, high-grade cement has been produced according to the patented Portland process developed by the British mason Joseph Aspdin (Portland cement, CEM-I).

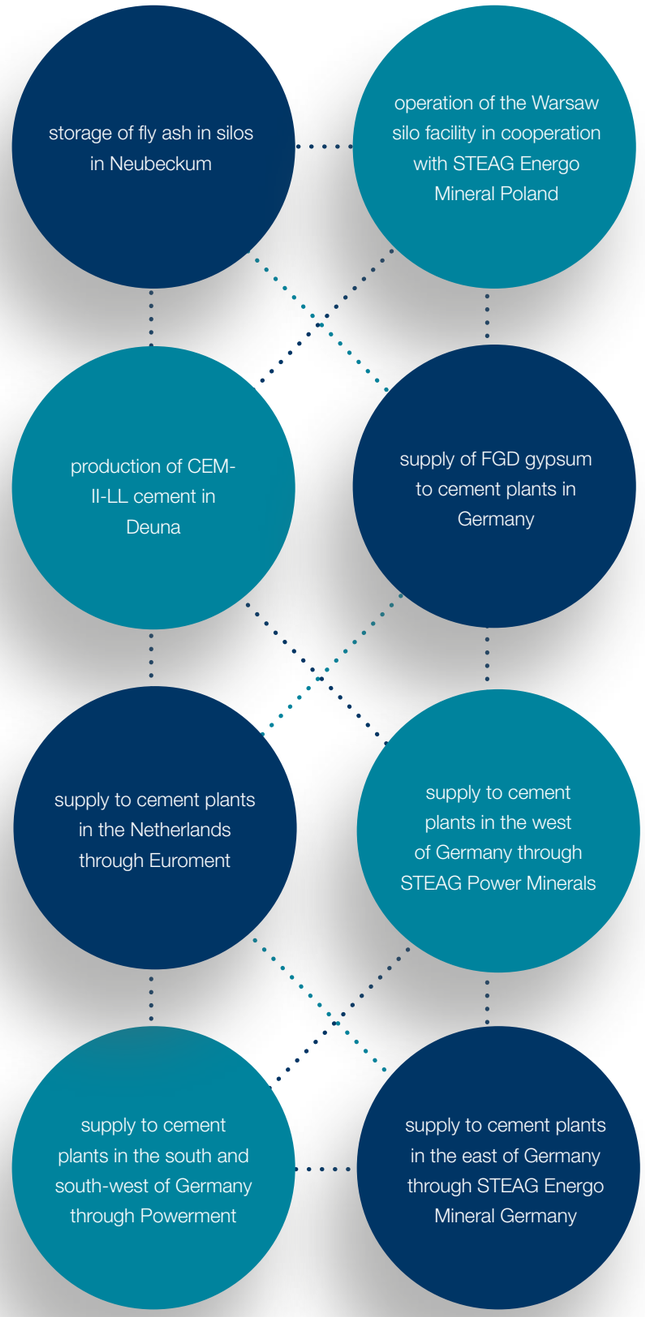
Composite cements are increasingly being used in place of Portland cement on account of their more favorable carbon footprint resulting from the substitution of part of the cement clinker. One of the most important types is Portland composite cement (CEM-II), which in addition to fine limestone powder contains selected granulated blast furnace slag or hard coal fly ash.

The cement is therefore used for prefabricated elements, as well as increasingly in core concrete for the production of paving stones, for which, says Paul Vogel, Head of Sales at Dyckerhoff GmbH, much more robust formulations are possible with M-(V-LL) cements. And it is this greater flexibility that he sees as making Portland composite cements with fly ash so interesting for Dyckerhoff's customers in the future: “Basically, we want and have to reduce the clinker factor in our cements, especially with a view to reducing CO_2 emissions. Composite cements with fly ash give us a lot of leeway here: Our grinding and classifier technology enables the production of very uniform qualities, as changing the degree of fineness and the proportion of fly ash or limestone powder gives us several possibilities for correction.”

An excellent position, therefore, from which to turn big ideas with concrete into reality in the future, which is precisely what the concrete industry’s current image campaign (www.beton-fuer-grosse-ideen.de) seeks to inspire. STEAG Power Minerals looks forward to continuing to support Dyckerhoff as one of the leading manufacturers of cement and ready-mixed concrete over the next decades.

Bleeding: Colloquial term for the tendency of concrete mixes to segregate water.

Cooperation between Dyckerhoff and STEAG Power Minerals



And Dr. Thomas Sievert, Head of Quality and Technical Consulting at Dyckerhoff GmbH, adds: **"**To improve sustainability, we want to keep the clinker content in our cements as low as possible. We can achieve this by using latent hydraulic additives (blast furnace slag) or pozzolanically active additives (fly ash). In combination with limestone, as is the case with CEM II/B-M cements, the formulation and combination of components with differing fineness provide very good conditions for a high degree of uniformity of the products. The reduced clinker content slows down the hydration process, which diminishes the development of hydration heat.
The spherical particles of the fly ash reduce the amount of water needed by the cement, hence benefiting the processing properties of the fresh concrete. The use of fly ash in the cement thus ultimately alters the pore structure of the hardened concrete. Compaction of the pore structure leads to improved resistance to frost and chloride-induced diffusion, as well as a higher degree of chemical resistance.**"**

3 questions for …

Dirk Beese
Managing Director of Dyckerhoff GmbH

1 Dyckerhoff and STEAG Power Minerals have been working together for decades. What makes this partnership so lasting, what do you particularly appreciate in it?

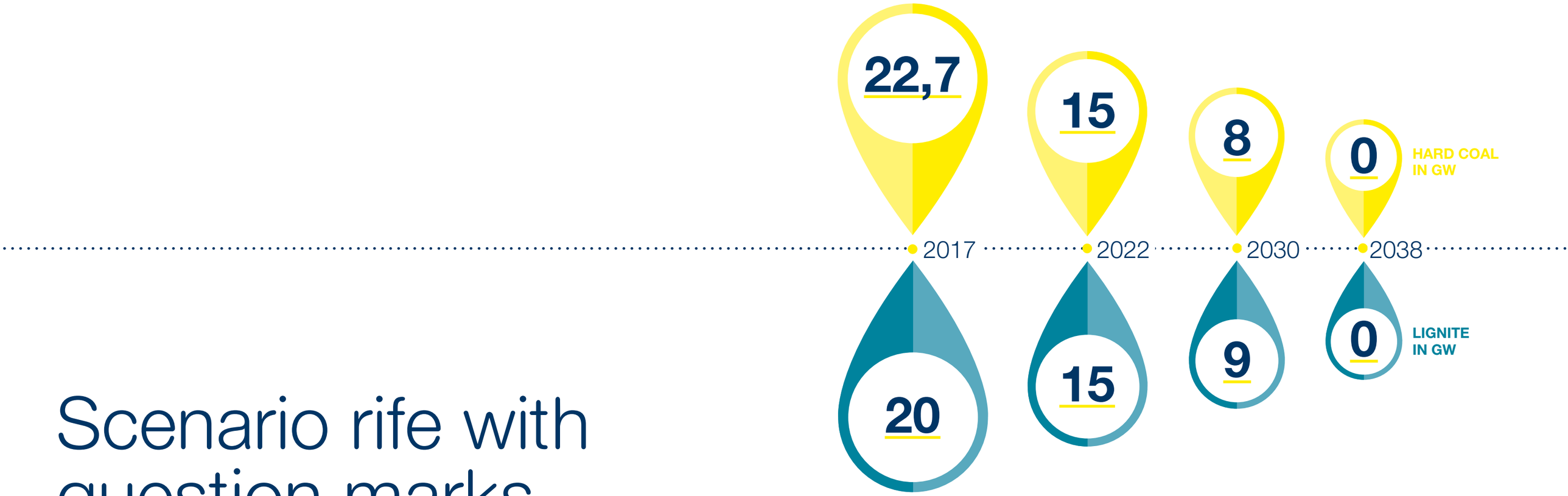
STEAG Power Minerals has been supplying us reliably with by-products from coal-fired power plants for 40 years now: In cement production, we use FGD gypsum as a substitute for natural gypsum, and fly ash as a corrective substance. Above all, though, we use fly ash in concrete production, where it helps us meet special requirements in respect of the concrete. And by using fly ash in burning clinker during cement production, we reduce our consumption of resources in the form of limestone and fuels, so at the same time indirectly cutting back our CO_2 emissions.
We count on suppliers who provide us with a reliable supply of high-quality raw materials. STEAG Power Minerals supplies us with FGD gypsum and fly ash with guaranteed, consistent material properties. This means that we, too, can deliver a product of consistently high quality to our customers.

2 What have Dyckerhoff and STEAG Power Minerals been able to learn from each other in the past?

At the beginning of the cooperation between STEAG Power Minerals and Dyckerhoff, the aim was to achieve building supervision approval of fly ash cements for producing concrete. We pooled our expertise and experimented with STEAG Power Minerals fly ash and cement clinker from Dyckerhoff cement plants until we had a product that was ultimately approved by the German Institute for Building Technology (DIBt). In addition to that, both companies sought from the outset to look into possible uses for FGD gypsum in order to avoid landfilling and to put it to good use instead. This also ultimately ensured the economical operation of flue gas desulfurization facilities in the power plants.
The cooperation between STEAG Power Minerals and Dyckerhoff has developed over decades. This resulted in a wide range of business relationships. STEAG Power Minerals works with power plants in the various regions of Germany, which in turn benefits us in supplying our regional production sites.

3 Where do you see the future focus of the cooperation, which challenges would you like to tackle with STEAG Power Minerals?

Securing raw materials will remain one of our greatest challenges in the future. The political decision to phase out coal in Germany will reduce the availability of FGD gypsum and fly ash. This is where STEAG Power Minerals' international activities particularly come into play.
It therefore serves the interests of our partnership that we maintain reliable business relationships there as well.



Scenario rife with question marks

In June 2018, the Commission on "Growth, Structural Change and Employment" (WSB) was appointed by the German government to submit concrete proposals by the end of the year for implementing the climate protection plan with which Germany can meet the targets of the Paris climate agreement by 2050. The recommendations put forward are comprehensive, but how they are actually to be implemented remains unclear.

On January 26, 2019, the Commission on "Growth, Structural Change and Employment" reached almost unanimous agreement – with only one vote against – on the closing version of its final report. The discussions particularly focused on finding a consensus on the future of coal-fired power generation in Germany. Numerous parties were involved in the process: the trade unions, environmental groups and the municipalities concerned, associations representing the companies affected on the customer and power generation side, scientists, the Red Cross, even Deutsche Telekom – and, of course, the federal states.

Harsh cuts for hard coal

The recommendations in the final report stipulate that by the end of 2022 only 15 GW of hard coal capacity are to be available on the market. Measured against 2017, around 7.7 GW from hard coal-fired power plants will therefore have to be taken off the grid as a first step. Compared with lignite, which only has to take around 4.9 GW off the market by then, hard coal will thus make a significantly higher contribution to reducing capacity in the short term. The installed capacity based on hard coal is to be reduced to 8 GW by the end of 2030, the recommendation in order to achieve this being that all power plant units that were connected to the grid earlier than 1990 be shut down. The Commission proposes Germany phasing out coal completely by 2038. However, after 2022 three so-called "check points" - in 2023, 2026 and 2029 - are planned at which, among other things, security of supply and price effects in the electricity market are to be assessed.

> **"It is commendable that the Commission has addressed this complexity and that it is also reflected in the final report. The final report thus enables the debate on a new energy system to be rationalized."**

Implementation: a complex challenge

So a proposal for a conditioned phase-out pathway for coal-fired power plants in Germany is now on the table. But that does not mean that the legal implementation is mapped out, because the Commission has also defined a number of conditions and prerequisites for "cushioning hardship, safeguarding value chains and opening up prospects for people, regions and the industry". A big challenge, with no less big tasks: from the proposed structural aid for the states concerned, to security of supply, compensation for the electricity sector, industry and private end consumers, through to the expansion of networks and renewable energies. All of this is extremely complex.

What is important first is whether this consensus will endure in its complexity, and whether the proposal is sufficiently close to reality at both energy industry and political level – in other words whether it can be implemented. Outstanding financial and state aid issues play a key role here, as the Commission's recommendations provide that the aspired political interventions in the operation of power generation facilities emitting CO_2 should be cushioned by compensation and the consequences of the intervention for energy customers mitigated.

There is much more at stake than just coal-fired power generation in Germany

What is important, too, though, is the broader context, because ultimately, this is not just about coal-fired power generation, it's about the future of our industrial society. Industry accounts for 47% of net power consumption in Germany, half of which alone is accounted for by energy-intensive sectors. And electricity customers are also affected, especially those with low incomes.

> **"Because ultimately, this is not just about coal-fired power generation, it's about the future of our industrial society."**

Overall, the scale of the planned shutdowns is so vast that the Commission's recommendations relating to Germany also affect the energy systems of its European neighbors. Germany is the largest electricity market in Europe. If the secured output in Germany is reduced by around 30 GW by 2030, this corresponds to the conventional output of Belgium, Switzerland and the Czech Republic combined or more than the current conventional output of the energy sector in Poland.

Further reading

The Commission's complete final report is available as a PDF file on the website of the Federal Ministry for Economic Affairs and Energy

To found at: https://bit.ly/2VpFwXc

How can supply and investments be secured?

Security of supply in Germany in the near future – but not beyond the year 2050 – is to be guaranteed primarily by gas-fired power plants, so a number of new gas-fired power plants will have to be built in the near-term. Even before the Commission had concluded its discussions, the European transmission system operators, banded together in Entso-E, forecast a need for new gas-fired power plants in the EU of up to 43 GW by the year 2030. Germany's phase out of coal will see this need increasing prematurely by around 20 to 30 GW. This raises questions as to the security of natural gas supplies and the financing of gas-fired power plants. Investments need security, or in other words a stable regulatory framework. In the event of there being concerns that such plants might lose their operating license in the foreseeable future for reasons relating to CO_2, investments will be cautious.

> **"The scale of the planned shutdowns is so vast that the Commission's recommendations relating to Germany also affect the energy systems of its European neighbors."**

As a condition for the end of coal-fired power generation, the Commission report also states that renewable energies must increasingly replace conventional power plants. For this calculation to work out, the corresponding infrastructure, i.e. the grid landscape, has to be available and the demand for electricity coupled with generation in terms of timing.

The consensus could be endangered by the fact that, besides the Commission's proposals, a climate protection law and other emission control provisions for power plants are under discussion. Any such implementation would entail additional target levels and further interventions.

Yet despite all the criticism, it must not be overlooked that the debate on coal-fired power generation in Germany has also drawn attention to the correlations and their impact on issues of power plant by-products or gypsum supply. And that is a key point.

Interview with Joachim Rumstadt, Chairman of the Board of Management of STEAG GmbH, on the coal phase-out

We’re prepared

Following months of negotiations, the Commission on Growth, Structural Change and Employment (“WSB-Kommission”) at the end of January presented its recommendation that Germany completely phase out coal-fired power generation by the year 2038. Peter Altmaier, Germany’s Minister for Economic Affairs and Energy, is talking of “one of the most challenging transformation processes of the past decades.”

Mr. Rumstadt, what is your assessment of the Commission’s final report?
The Commission has set a big target, but the report contains only a few indications as to how the gradual phasing out of coal-fired power generation is to be implemented in practice. It also specifies a number of concepts requiring significant changes in the overall legal framework. Things will depend now on the outcome of the political debate over the coming months. A positive aspect is that heat supply plays an important role. STEAG can contribute expertise in many respects here.

What is missing from your point of view?
One very important thing is missing: the answer to the question as to how the energy system of the future will work. Nor does the Commission say what the complicated and expensive transformation of our energy supply system will ultimately cost. As electricity prices are not to rise any further, the taxpayer, in other words each and every one of us, will end up footing the bill.

What importance does the Commission attach to security of supply in Germany?
In my view, far too little account is taken of this aspect. Germany will have phased out nuclear power entirely by the end of 2022. And now more than twelve gigawatts of output from coal-fired power plants are to be taken off the grid by then as well. That is anything but trivial. So I do, though, welcome the fact that the Commission has included our recommendation for a stress test of the energy supply system in its report.

It looks like coal-fired power plants will bear the brunt of the coal phase-out.
That is the case, unfortunately, in the first exit phase. Their significantly better carbon footprint compared to lignite and the greater flexibility of hard coal units are evidently of no significance. I find it incomprehensible that coal-fired power plants are being burdened to a greater extent. The Commission also recommends that East German lignite be completely spared in the first decommissioning phase. This is a purely political decision in view of the upcoming state elections in autumn. NRW is at a distinct disadvantage here.

What do the Commission’s recommendations imply for STEAG?
There are indeed positive points we can build on, for example as far as our grid reserve power plants in the Saarland or the construction of new CCGT facilities at existing power plant sites are concerned. We need to take a close look at what funding opportunities there will be, for example, for conversions and new investments.

The Commission also proposes premiums if power plants are decommissioned earlier than scheduled. Will STEAG take advantage of these?
These premiums are to be offered as part of an auction procedure. It will depend to a decisive extent on the actual wording of the planned law on phasing out coal-fired power generation. We will firstly take another close look at the economic viability of each individual power plant, and on this basis decide whether and how we will participate in the auction procedure.

What will happen in terms of jobs at STEAG?
The coal phase-out hasn’t caught us unawares. We were prepared for it and have consistently adjusted to it in the updating of our corporate strategy. For more than a decade now, the generation of electricity from hard coal has no longer been the focus of our domestic investments. Look at the Herne 6 project or the Prosper coke oven gas power plant. We also plan to expand in the field of distributed facilities, build further on our service business and become even more international. At the same time, we’re working hard on keeping our power plants connected to the grid for as long as is economically viable.

Blasting abrasive business: quo vadis?

Products based on coal slag from coal-fired power plants form the core of STEAG Power Minerals' range of disposable blasting abrasives. STEAG Power Minerals is addressing the growing concern on the part of consumers about security of supply following supply shortages last year and the recommendations now put forward by the Commission on "Growth, Structural Change and Employment" with a well thought-out concept for the future.

From the Rhine-Ruhr-Express trains to a South Korean shipyard: Customers from all over the world rely on ASILIKOS, AFESIKOS and ASILIT. Quality coupled with efficiency means that the STEAG Power Minerals blasting abrasives are in increasing demand.

High-quality, valued products

As purely mineral products with small amounts of free silica, the disposable blasting abrasives from the STEAG Power Minerals blasting abrasives plant in Lünen are not only particularly environmentally friendly, but also ideal for use on various surfaces. They have enjoyed a continuous increase in popularity in recent years, as their grain size can be set precisely, depending on requirements, between 0.04 and 3 millimeters, which means they can be tailor-made for any application. The plant in Lünen, which remains one of the most modern of its kind, can produce around 145,000 metric tons per year.

> **“We currently have enough raw material in stock to produce blasting abrasives until at least 2023.”**
>
> Marcus Klenke,
> Head of Business Line Abrasives

Record year for Lünen

“2018 was an absolute record year, our blasting abrasive production in Lünen was working to full capacity," Marcus Klenke, Head of Business Line Abrasives, remarks in summing up the situation. Besides the popularity of the products among existing customers, various developments in the market have also contributed to this: In recent years, for example, some competitors have either had to shut down their coal slag-based production or switch to other raw materials. "At times, demand unexpectedly shot up to such an extent that in spite of our production running at full speed, we had a struggle keeping up with requests", Marcus Klenke points out.

Securing raw materials in the medium term ...

And what if, in the course of protecting the environment, the raw materials from the (German) coal-fired power plants become fewer and fewer, and disappear entirely in the foreseeable future? For several years now, STEAG Power Minerals has been preparing itself consistently and with foresight for the scenario sketched out by the recommendations of the the Commission on “Growth, Structural Change and Employment”.

In a first step, for instance, STEAG Power Minerals has secured the availability of existing coal slag sources in Germany. At present, the company can still rely on significant quantities of “fresh” slag from two German coal-fired power plants; STEAG Power Minerals has signed an exclusive contract for the bulk of this for the coming years. In addition, every ton not needed for production over the past years has been kept in stock. This means that sufficient quantities are currently available on call for the production of blasting abrasives until at least 2023.

> **“After almost 10 years of intensive searching, we have now found a raw material that we rate as being an adequate successor to coal slag.”**
>
> Marco David, Deputy Head of Sales

... and in the long run

And STEAG Power Minerals has also now come up with an answer regarding the raw material of the future: “After almost 10 years of intensive searching, we have now found a raw material that we rate as being an adequate successor to coal slag,” Marco David, Deputy Head of Sales, can report. The supply contracts were signed at the beginning of the year.

Over the coming years, the company will invest substantially to ensure a smooth transition to the new raw material. “Blasting abrasive production in Lünen will continue undiminished during the changeover,” Marcus Klenke confirms. The concentration of production and sales in Lünen which took place in mid-2018 (detailed report in the Winter 2018 edition of SEGMENT), will ultimately provide for smooth, optimized logistics.

Look forward to finding out in the forthcoming issues of SEGMENT which raw material STEAG Power Minerals will be relying on for future blasting abrasive production and which products will result from it. We’ll only say this much here: If you find ASILIKOS a convincing product, you can look forward to the new generation of disposable blasting abrasives – environmentally friendly and with excellent performance. ■

Filling of Troisdorf landfill ongoing

The Troisdorf landfill is not only a cornerstone of the forward-looking business development of MINERALplus (see reports in the Summer 2018 issue of SEGMENT), but also contributes to the security of disposal in North Rhine-Westphalia. With completion of section DA5 Lot 2, landfill operation is secured until the end of planning permission in 2026.

As one of eight pure landfill class III repositories, the Troisdorf landfill plays an important part in the NRW waste management plan. The expansion means that a total further 350,000 m³ of landfill capacity are now available for the storage of mineral problem waste. Extensive preparatory measures have been underway at the site over the past 12 months. First of all, around 110,000 m³ of soil were excavated over an area equivalent to almost three football pitches. By end of February, a total of ten employees had completed the base sealing of the landfill section over the entire area in the form of a consisting of...

- a 1.5 m thick mineral layer of clay,
- an HDPE geomembrane (**H**igh**D**ensity **P**oly**E**thylene 2.5 mm thick),
- a protective and drainage layer.

The composite liner ensures that no pollutants from the deposited material enter the soil or groundwater. The excavated soil was homogenized and reapplied as a covering layer. In addition, an HDPE-lined flushing and maintenance shaft was built on the southern edge of the site, connecting the bulk area to the leachate collection system.

Well-prepared for future recultivation

MINERALplus GmbH mine surveyor Martin Spiekermann: “This preparation lays the foundation stone for this landfill section to be recultivated after filling, and for the regional flora and fauna to be able to reclaim the area as a habitat, as is already the case with the previous landfill section 7.”

Construction work on developing Lot 2 of the DA5 landfill section began in November 2017 and was completed in February 2019. With the official approval by the regional administration of Cologne in April, filling of the new storage area has now been given the go-ahead.

21.000 m³
Material backfilled for improved homogenized soil layer

110.000 m³
Soil excavated to lower edge of improved homogenized soil layer

32.000 m³
Material backfilled for mineral sealing

21.000 m²
Plastic geomembrane installed

21.000 m²
Protective fleece installed

11.000 m³
Mineral surface drainage material backfilled

Traces of the past 80 years

After 80 years of energy production, the lights went out in STEAG's Lünen power plant shortly before Christmas 2018. MINERALplus is responsible for the proper disposal of all waste in the clearing process now getting underway, and will provide comprehensive support in the industrial cleaning.

A mood of change where it all began for STEAG: Where, back in 1938, the foundation stone was laid for "Steinkohlen-Elektrizität AG" to evolve into a leading energy company with the construction of a power plant to supply the neighboring aluminum plant, the motto is now "clearing out". And in this case, it's not only a painful process for many involved, but also a particularly demanding one. MINERALplus can draw here among other things on the experience gained in clearing West/Voerde power plant, which developed into a logistical masterpiece (see SEGMENT Summer 2018, page 15). But: "Lünen needs its own concept," Andreas Bertling, project manager at MINERALplus, stresses. "The composition of the waste produced there in the course of clearing is to a large extent significantly different from that in Voerde and Herne 3. Eight decades of power plant operation have left their own mark here in the form of waste with highly variable character," says Andreas Bertling. Whereby "waste" here also refers to still intact facilities and machines, because over the decades Lünen power plant has undergone continuous specific retrofitting in respect of efficiency, automation and environmental protection in order to maintain energy production at a competitive level. Gone are the times, though, when intact facilities could be dismantled and sold to other countries; dismantling, shipping and reconstruction are now more expensive than building new plants.

MINERALplus is responsible on behalf of STEAG for ensuring that all existing equipment, facilities and materials are collected and transported in compliance with technical guidelines and all regulations on hazardous materials, dangerous goods and waste, and that they receive the proper final treatment. This also includes the final industrial cleaning, which eliminates any last hazardous substances and fire hazards. "With the help of an independent expert who specifies the relevant degree of cleanliness, STEAG has to provide the authorities with proof that all these substances have been eliminated. This is why MINERALplus remains in close contact both with the persons responsible for the facility and the appointed expert during all work," Andreas Bertling explains.

Step by step, facilities are now being separated and opened, liquid residues pumped out, and solid residues collected and transported away. First came large quantities of residual transformer oils in January, followed in February by the disposal of 35 transformers including the three large unit transformers, which were dismantled on site by a specialist firm.

Parallel to this from the beginning of February, environmental engineering facilities such as water treatment, lime slaker and flue gas desulfurization plant were cleared of hazardous substances and cleaned. As regards the machinery, large quantities of lubricating oils have to be disposed of, and bearing oil tanks have to be thoroughly cleaned before being removed and dismantled. The boiler technicians ventilate the fuel oil supply system from the burner levels to the fuel oil tank, before cleaning the piping system to remove any last fire hazards. STEAG Power Minerals removes any power plant by-products still remaining in the silos, such as fly ash, bottom ash and gypsum, before embarking on cleaning here as well.

In all, a period of six months is scheduled for the complete disposal of the waste from Lünen power plant.

What does a transformer do?

Transformers convert electrical energy in certain ratios. Unit transformers in power plants initially ensure that the electricity produced by the generators in the power plant is converted into high voltage for transport. In so-called transformer stations, other transformers then convert this high voltage current back into low voltage current for the distribution networks, which supply it to the end consumers. Around the house there are further transformers in the power supply units of various appliances, which in turn need lower voltage than that in the mains.

In terms of design, all transformers ...

... are essentially comparable: Inside, there is an iron core in the shape of a horseshoe or an open square, the side arms of which are wrapped by two insulated coils. In power plants, however, unit transformers are real giants and can weigh 300 or even 400 metric tons.

Transformer oil

Highly refined mineral oil or low-viscosity silicone oil, which is used in the transformer housing in particular for insulating the windings and for cooling.

Young master power in the mixing plant

Creating prospects and opportunities for professional and personal development: all part of STEAG Power Minerals' corporate values. Two employees from the MINERALplus mixing plant took advantage of the opportunity to qualify as master tradesmen in industry by doing further training alongside work. SEGMENT congratulates them both on successfully completing their training, and takes pleasure in introducing them in this article

Focus on the future
For the two "new" master tradesmen in the mixing plant, the next step in their professional careers is already mapped out: Mimoun Arbaoui is due to succeed Jürgen Roll as Plant Manager at the end of 2020, and Miron Nicklas will take over as Head of Maintenance in his place.

Miron Nicklas, born in 1993, began his apprenticeship as an industrial mechanic at MINERALplus in 2013 and, having passed the skilled worker examination, quickly qualified as deputy shift supervisor. In January 2017, he began further training to become a master tradesman in metal processing.

Mr. Niklas, what particularly appealed to you about the further training to become a master tradesman in industry?
I didn't do the training to become a master tradesman in industry just for my current job, I did it for myself too, of course. I see further training as an important aspect, and one that might perhaps open up other doors to a better position or job for me at some stage in the future. It's quite simply that I'm always looking to get that little bit better.

How did you find the training to become a master tradesman? Did you have to restrict your free time very much?
The training didn't really affect my free time at all. I like playing football with friends, and also enjoy motor sports and sometimes go to car shows at the Nürburgring. The courses were always held on Saturdays in the ETEC building in Essen, which left me the same time as usual during the week after work. So it was quite possible.

Is there any message you'd like to pass on to colleagues in this respect?
I would certainly recommend further training to anyone, even alongside work. Of course, it's important you feel confident about doing it. But it really is feasible, and if you spare the time one day a week and work on it with a bit of ambition, it's really enjoyable. I'm very glad I decided to do it.

Mimoun Arbaoui, born in 1984, was taken on as a shift mechatronics technician in 2009 after two years as a temp. In 2014 he was appointed Head of Maintenance and Deputy Works Manager. The classical and rock music fan, who also enjoys letting things go off with a bang in his spare time with pyrotechnics and firework displays, began his further training as a master tradesman in mechatronics in mid-2016.

Mr. Arbaoui, what prompted you to take up further training to become a master tradesman?
I already held a master position prior to my master training, so it all fit in together in a way. I really enjoyed it, because my master position and the training simply linked up with each other and everything made much more sense to me. If it's that easy to get a deeper insight into the subject and do your job even better, I'd gladly do it again and again.

How did you find the training to become a master tradesman? Was it tough?
Looking back, I'd say that although further training alongside work is by no means presented to you on a plate, it really is possible. I think anyone who has completed a good apprenticeship is capable of becoming a master tradesman. My free time didn't suffer much from it. Besides, you know what you're doing it for, and it's only for a limited period of time, after all.

Is there any message you'd like to pass on to colleagues in this respect?
Master tradesmen here are in a very good position. They can form a link between the skilled workers and the management. Also, you can fit in really well at STEAG and enjoy the opportunity of getting to learn a lot and simply keep growing with every task. I'm very glad I took the opportunity of doing further training.

Lessons and living together

without violence and having fear

School without racism – school with courage

No room for racism: Pupils and teachers at Brambauer secondary school work together to combat bullying, prejudice and discrimination. STEAG Power Minerals has been supporting the project since 2015.

The “School without racism – school with courage” network has long stood for equality, tolerance, unity, peace and civic courage, giving pupils the opportunity to contribute to shaping their school climate. During project days and actions, the children learn how to go about dealing with bullying and discrimination. They explore the meaning of equality and tolerance, and learn how important this all is for a peaceful and functioning society.

These are all values shared by STEAG Power Minerals, which is why the company takes great pleasure in supporting this initiative. STEAG Power Minerals has been involved in the project at Brambauer secondary school and providing financial support for it since 2015. Year in, year out, managing director Andreas Hugot, patron of the project, is impressed and delighted by the developments and the unconditional commitment of the pupils and teachers.

Show commitment – experience solidarity

This year’s project day was attended by two employees from the marketing department. Accompanied by headmaster Michael Schulten and three sixth grade pupils, they toured the classrooms in which a wide variety of projects suited to the different ages of the pupils were being prepared and presented: While the younger ones were exploring Africa and its culture, for example, the older pupils were dealing with the topics of exclusion and civic courage, and working together to develop a suitable course of action on the basis of case studies. Throughout the school there were opportunities for the children to demonstrate their knowledge, ability, craftsmanship and creativity. In the sports hall, the focus was on getting moving and having fun, with games from around the world. And in the technology room, colorful wooden hands were being crafted which are now displayed on the school fence to symbolize the diversity of the school to the outside world. This was also impressively demonstrated by a game showing how much stronger you can be if you stand by each other and stick together when it matters: Each child starts off standing on an individual sheet of paper. The teacher then has to pull the children off the paper, which he easily manages to do. If the pupils all stand together and hold on to each other, though, the teacher no longer stands a chance of separating even just one child from the group. Witnessing the strength of a community at first hand is an important experience for the children, and one they will hopefully remember well on their life path.

In the age of the Internet, apps and smartphones, a digital component was naturally just as much part of the project as all the playful and craft elements, and the pupils were this year able to voice their opinion and assessment of the project day in an online survey. "The evaluation of the survey will show us which aspects we can adapt and improve for future project days, so that the children continue to have fun and can participate even more actively in determining how their day of action develops," explains Alice Jamnig, who is involved in organizing and implementing the school project every year with her colleagues.

The bottom line: A rewarding commitment in many respects, and one that STEAG Power Minerals looks forward to continuing to accompany in the future. “It’s simply great to see the dedication and motivation with which the teachers and pupils work together. The focus is quite clearly on the children at this school,” remarks Anja Beer from the Marketing Department, summing up her impressions of the day.

“Our society needs courage, equality and understanding of one another. I think it is very important that children of this age are sensitized to the topic, and that they hopefully take what they’ve experienced with them into the future and show other people the right way of going about things.”

Liesa Wingert, Marketing and Communications STEAG Power Minerals

Lids against Polio: Collecting is easy!

Plastic lids and caps might not be part of our day-to-day business at STEAG Power Minerals, but when it comes to helping others, the willingness of our employees is immense. And so for some time now, there have been boxes on all floors throughout the company for collecting the lids and caps of disposable and deposit bottles, drink packs, cartons etc. So what's it all about?

The idea: Lids against Polio

The idea originated from the "Deckel drauf" organization, which collects recycling material in the form of plastic lids with its "Lids against Polio" project and donates the sales proceeds to charitable projects. As a first step, the association is supporting the "End Polio Now" project in pursuit of an important goal: ensuring that no child is any longer afflicted by polio!

500 lids = 1 life without polio

Disposable bottles and all manner of cartons or packs for milk, drinking chocolate or juices all use plastic lids or caps. And 500 of these add up to around 1 kg of recycling material, which is sufficient to cover the costs of a vaccination against polio.

So: Join in the collection!

Would you like to help too? It's so easy and requires so little effort: Simply collect any HDPE and PP lids, and take them to a collection point (locations can be found on the internet) - that's all there is to it! Tip: Follow the link to find out which plastic products can be recycled.

An initial stock-take shows just how much can be achieved: STEAG Power Minerals was able to hand in around 3000 lids to "Deckel drauf" over a period of six months. Many thanks - keep it up!

More information at:
deckel-gegen-polio.de

What is polio?

Polio (short for poliomyelitis) is an infectious disease caused by polioviruses. Whilst now having been eradicated throughout much of the world, it still occurs in three countries. The effects of polio range from signs of paralysis to death, and the disease is incurable - but one vaccination is sufficient for life-long protection.

Christmas party makes children's hearts leap for joy

"Secret Santa for the Tafel": This has become a cherished custom for the STEAG Power Minerals employees in the run-up to Christmas, and once again last year, the Dinslakener Tafel food bank, in cooperation with the Burghofbühne regional theater, was able to give around 40 children a very special Christmas celebration at the Tenterhof.

Eyes aglow and brimming with anticipation, the children sang Christmas carols until the angel lowered down the key to the Christmas room. Here, awaiting them next to a colorfully decorated Christmas tree, stood Santa, who personally handed each child a lovingly wrapped gift. The children could even have their photo taken with the Christmas angel if they wanted to, much to the delight of their parents: "A fantastic gift for Grandma and Grandpa!"

Marion Muhic, chairwoman of the Dinslakener Tafel e.V. was equally delighted: "Year after year, it's wonderful to see what we can do for the children by working together. We couldn't ask for a better gift than their shining eyes around the Christmas tree, and we'd like to express our thanks to all the helping hands at STEAG Power Minerals for their part in that."

> **"Year after year, it's wonderful to see what we can do for the children by working together."**
>
> Marion Muhic, chairwomen of the Dinslakener Tafel e.V.

Day of the Goblins – The Broken Promise

STEAG Power Minerals has this year once again supported the children's club run by the Burghofbühne theater group in Dinslaken in the production of its new play. The result was a fantastic work in the truest sense of the word.

This children's play was to be all about "promises". And what went on stage at the March 14 premiere at the Tenterhof, a former stud farm in Dinslaken, after half a year's work with weekly rehearsals once again left no one in any doubt about the children's creative potential and inventiveness. Under the title "The Day of the Goblins – The Broken Promise", they presented a fantasy play in which the actors immerse themselves in a video game where they have to solve problems in the virtual world which are only too similar to those in the real world...

"Time and time again, the results are fantastic," enthuses Mirko Schombert, director of the Dinslaken Burghofbühne. "The imagination and enthusiasm that the 8 to 12 year olds display in developing the idea into a play together with their drama teacher, Amira Bakhit, are so impressive. The children flesh out the story, write the texts, and design and create the stage set. In doing so, they not only immerse themselves in cultural creativity, but also experience a huge boost in terms of their self-esteem - it's just so great seeing and experiencing all that."

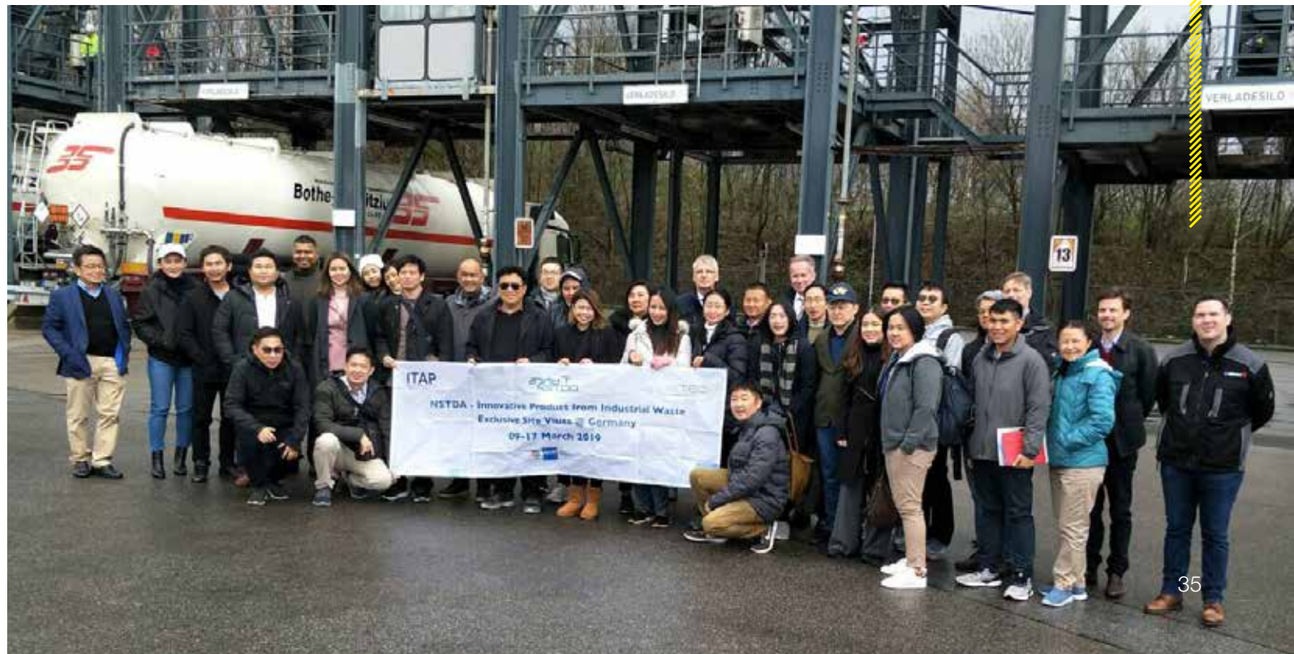
Reason enough for STEAG Power Minerals to carry on supporting the Dinslaken Burghofbühne children's club theater productions, enabling children to take part free of charge regardless of their parents' income. Planning will resume in the summer, with the premiere of the new play scheduled for June 2020. SEGMENT will keep you informed about the children's club's next performances.

Visitors from Thailand

In the context of a visitor program for Thai business representatives organized by the German-Thai Chamber of Commerce, a delegation from the building materials, mineral raw materials and waste management sectors visited the STEAG Group in March.

Andreas Hugot welcomed the visitors to STEAG's head office in Essen and gave them an introduction to the Group and the STEAG Power Minerals activities, after which Dr. Christian Herr, Manager International Business Development, outlined the activities of STEAG Energy Services, in particular those in Thailand. The subsequent presentation of the MINERALplus activities in the waste sector was followed with interest by the participants. The focus here was on the backfilling material MinComDVM01K made of flue dusts and reaction salts from waste incineration plants, which is produced in Gladbeck and backfilled in the salt mining caverns in Stassfurt. In concluding the visit, the group was given an insight into the production and quality assurance of the material in the mixing plant and the Gladbeck laboratory.

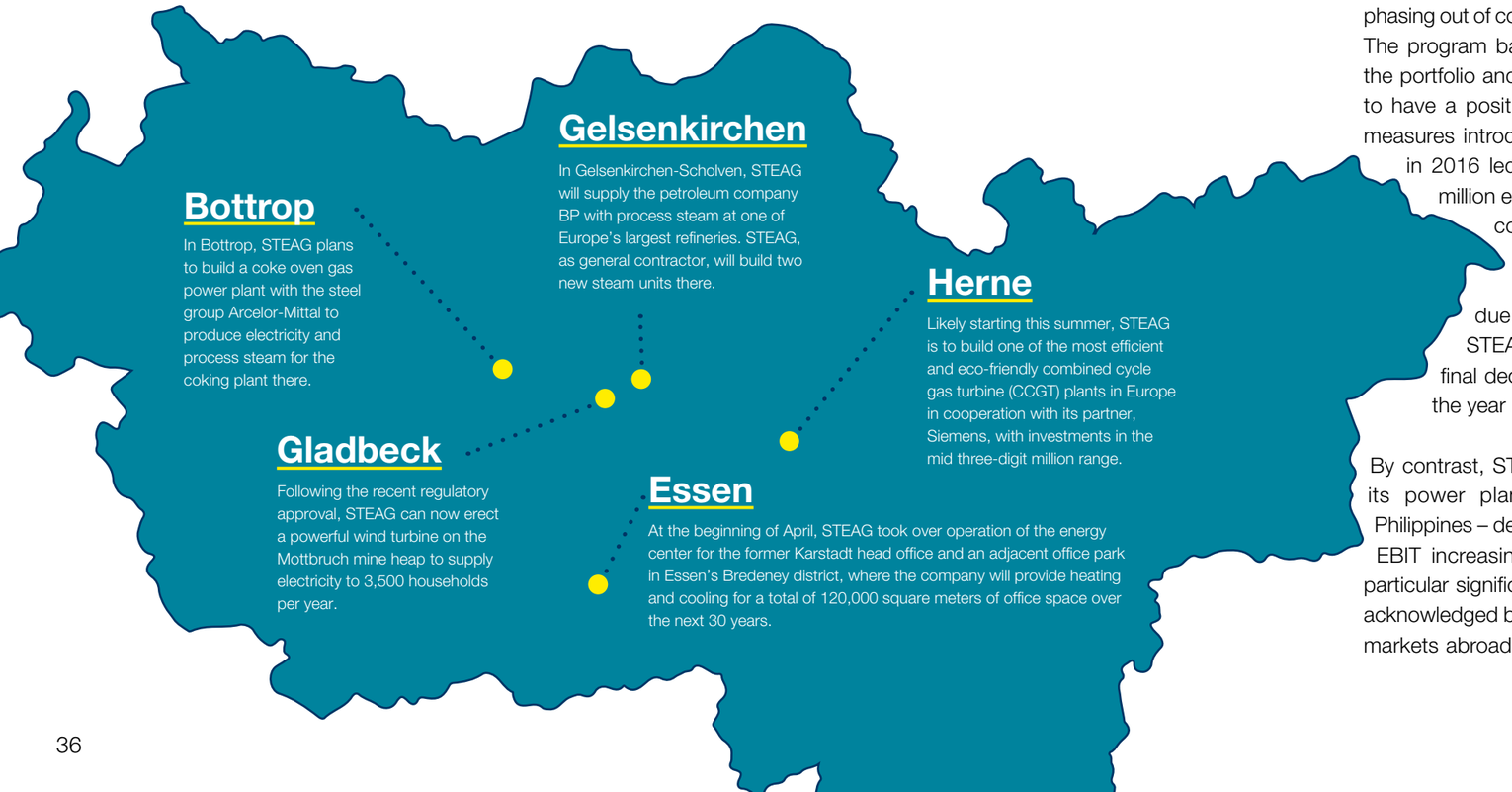
Frank Borchers, managing director of MINERALplus drew a positive conclusion: "All in all a very pleasant visit with an inspiring exchange of views, from which we as hosts also gained interesting insights into the Thai economy and business culture."



STEAG meets expectations

Good news from STEAG GmbH's annual press conference held in Essen on April 9: The Board of Management reported on a 45 million euro profit transfer to the municipal shareholder KSBG, and gave a positive outlook both for the current financial year and for the future of the company in connection with the energy transition.

For the STEAG GmbH shareholders, investing in the energy company from Essen has paid off once again: STEAG is transferring a total 45 million euros in profit to its sole shareholder, Kommunale Beteiligungsgesellschaft KSBG, for the 2018 financial year. With earnings before interest and taxes (EBIT) of 160 million euros, STEAG has also significantly exceeded the earnings forecast issued at the beginning of the past financial year. Rather than dwelling on the past year, however, the annual press conference at the head office in Essen focused on the outlook for the future. Joachim Rumstadt, Chairman of the Board of Management, explained how the energy transition is being practiced on the company's doorstep in the Ruhr region (s. the graphic below) with specific investment projects in the vicinity of STEAG's head office:



Answering questions at the annual press conference in the headquarters of STEAG in Essen (from left): Alfred Geißler, Member of the Management Board, Dr. Ing. Wolfgang Cieslik, Member of the Board, Joachim Rumstadt, Chairman of the Board of Management of STEAG GmbH, Michael Baumgärtner, Member of the Management Board.

"With these projects, STEAG is making a direct contribution towards overcoming the difficult transformation process posed by the energy transition," Joachim Rumstadt stated to the representatives from the local and national press. "Our strategy reflects the requirements of the future."

With the transformation program "STEAG 2022", the company has reacted to the energy transition and the phasing out of coal-fired power generation at an early stage. The program based on increasing efficiency, optimizing the portfolio and occupying new growth areas continued to have a positive effect in the past financial year: The measures introduced by the STEAG management back in 2016 led to an improvement in earnings of 107 million euros in the 2018 financial year. The market conditions were nevertheless challenging, especially in Germany. Group sales fell from 3.6 billion euros to 2.9 billion in 2018 due to lower overall capacity utilization at STEAG's hard coal-fired power plants and the final decommissioning of three power plant units the year beforehand.

By contrast, STEAG's international business – including its power plants in Colombia, Turkey and on the Philippines – developed positively, its share of the Group's EBIT increasing from 48 to 57 percent in 2018. The particular significance of the international business is also acknowledged by the municipal shareholders: "The energy markets abroad exhibit considerable potential. STEAG is consistently exploiting the opportunities offered by foreign markets and applying its expertise in order to make full use of the earnings potential there," remarked Guntram Pehlke, Chairman of the Supervisory Board of STEAG GmbH and Chairman of the Executive Board of DSW21. With its 36 percent stake, DSW21 is indirectly the largest shareholders in the energy company. Besides DSW21, the municipal utility companies serving the Ruhr cities Bochum, Dinslaken, Duisburg, Essen and Oberhausen are STEAG shareholders through the Kommunale Beteiligungsgesellschaft KSBG.

The Distributed Facilities and Renewables division contributed substantially to the good result: In Germany, France, Poland, Spain, Romania and Turkey, STEAG now operates more than 200 distributed facilities for power generation from renewables and thermal energy, which, with a total capacity of around 800 megawatts, in sum contributed around 30 percent to the 2018 Group EBIT. The overall outlook for the current financial year was positive: **"**We expect an increase in sales to 3.1 billion euros for the financial year as a whole. In terms of Group earnings before interest and taxes (EBIT), we plan on growth of 20 to 25 percent over the previous year," the STEAG manager declared in concluding the annual press conference. The energy company will also be expanding its investments in 2019: 230 million euros have been earmarked for this, around one third more than in 2018. Joachim Rumstadt was correspondingly confident in summing up: "As you see, the outlook for STEAG is good.**"**

Just between us,

You could've knocked me down with a feather ...

Dunno bout you, but as far as I'm concerned, a weekend's a weekend! Better stay that way too. Football on the telly, chips and beer - that's what I say. Can't get it into my head that there's some down at MINERALplus who slog it out all week then go learning on their own say-so on Saturdays. Master tradesman in industry alongside work... Don't get me wrong, but in our house I'm the guv and nobody's teaching me anything. I'm done with learning. You know what I say? The more you know, the more you gotta do.

Still... hats off to you guys! Great stuff!

Must be off! See you next time!

Yours, Betonkopp

What's wrong?

Can you spot all the mistakes in the picture?

Send the number of mistakes to **gewinnspiel@steag.com** under the heading "Competition". Last date for entries: September 20, 2019.

It's worth your while taking part: All participants who send in correct answers will be entered into a draw for "Kindle Paperwhite eBook-reader".
Have fun searching and good luck in the draw.*

* The judges' decision is final. Employees of the STEAG Power Minerals Group and their family members may not take part. By entering the competition, the participant agrees that in the event of winning, his / her name will be published in the SEGMENT magazine.

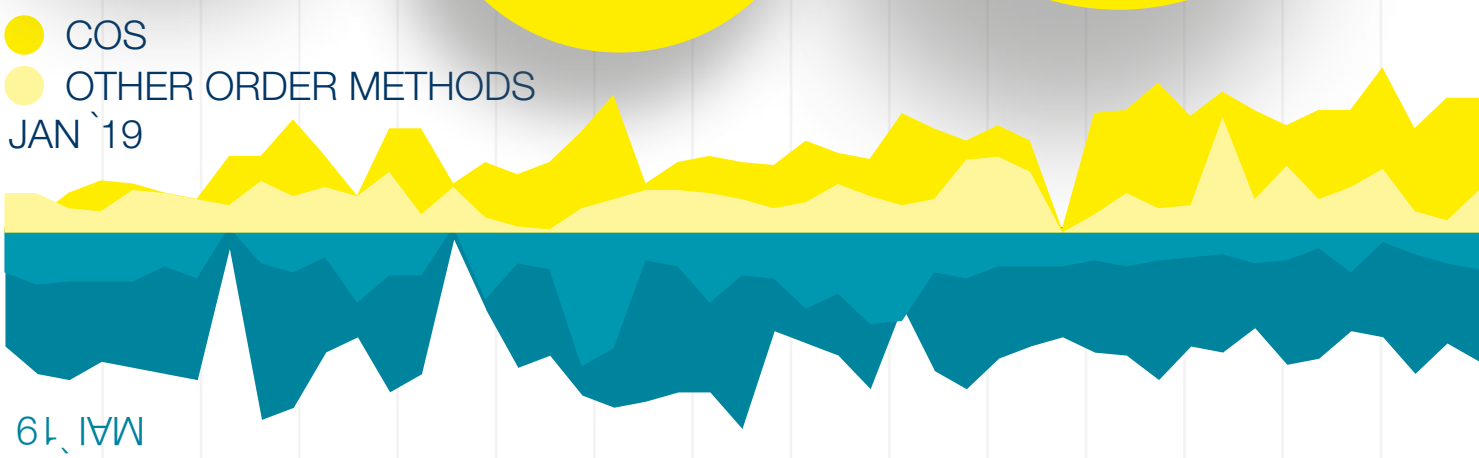
Congratulations!

In the last edition we asked you which technical term from the lead article was hidden in the word search puzzle. The correct answer was "Betofill". The following winner was drawn from all correct entries:
Steffi Rettig! Congratulations - enjoy your mydays gift box!

6.536
ORDERS PLACED IN THE PAST 12 MONTHS

25%
OF CUSTOMERS USE THE PLATFORM

CUSTOMER ACCEPTANCE OF THE COS SINCE APRIL/MAY 2018



Customer Order Shop reports successful results

For over a year now, STEAG Power Minerals has been offering its customers the Customer Order Shop (COS), the user-friendly online platform for managing all processes and orders. The feedback from users and the fact that registered customers now place more orders through the COS than through traditional channels proves that the tool was well received. Diagrams show: Especially on public holidays and weekends, i.e. outside STEAG Power Minerals business hours, many orders are booked via the platform.

spm-cos.com

We invite you to register for our Customer Order Shop and take advantage of our flexible online service offer.