# **Empowering Tomorrow**

# **Executive Board**

interview

# **Metals/Innovations**

How we help shape the future

Our key figures in overview



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The fiscal year in 120 seconds: aurubis.cdn.picturepark.com/v/f0xGokpQ/

# Empowering Tomorrow

The green energy transition, the mobility shift, limited resources. As a society, we are facing huge challenges. And metals are always at the core. The world needs them – with rapidly rising demand. They are the key to solving many pressing problems.

We responsibly transform raw materials into metals – for an innovative and sustainable world. For over 150 years now. Today, we are working on technologies that will allow us to produce metals much more sustainably in future. Our metals are the foundation for an innovative, climate-friendly world. Our metals enable us to shape the future – Empowering Tomorrow.

We wish you a pleasant read!

You can find additional, exciting information online at: annualreport2021-22.aurubis.com





From left to right: Heiko Arnold (COO), Roland Harings (CEO), Inge Hofkens (COO), Rainer Verhoeven (CFO)



Empowering Tomorrow. Executive Board Chairman Roland Harings, Chief Financial Officer Rainer Verhoeven, Chief Operations Officer Heiko Arnold, and Inge Hofkens, Chief Operations Officer Multimetal Recycling as of January 2023, jointly discuss how Aurubis is helping shape the future, the roadmap for this process, and why the multimetal company stays strong even in times of crisis.

# Mr. Harings, Aurubis has had most successful year in the company's history. What role do you see for Aurubis in the future?

**ROLAND HARINGS** The past fiscal year was a highly successful one for Aurubis in every sense and highlights the importance of our company for the future. After all, without metals there can be no energy and mobility transition, no digitalization, and no innovations. Aurubis has a key role to play in supplying metal as a raw material for the industries of the future. An offshore wind turbine, for instance, requires around 30 t of copper, and batteries for electric vehicles contain other important industrial metals we produce, like nickel. This is what we mean with "Metals for Progress".

# This future is currently being overshadowed by an energy crisis due to the war in Ukraine. What does that mean for Aurubis?

**ROLAND HARINGS** The offensive has resulted in a significant shift in global energy policy. Russia is now weaponizing energy. As an energy-intensive company, we are particularly affected by these developments: Natural gas and electricity prices have reached unprecedented levels. We are therefore continuing to diversify our energy supply, while also cutting our fossil fuel use even further where we can. Because we responded quite early, I am now significantly more optimistic about the future than I was back in the spring of 2022. Furthermore, I even see an opportunity in this crisis.

"Aurubis has a key role to play in supplying metal as a raw material for the industries of the future."

– Roland Harings, CEO

#### Where do you see an opportunity?

**ROLAND HARINGS** We have the opportunity to hugely speed up the rollout of green and low-carbon energy production and to develop new supply chains for blue and green hydrogen derivatives in particular, like ammonia, sourced from the world's energy-rich regions. This is also a major opportunity for policymakers to establish pragmatic and science-based competitive conditions for industry to accelerate decarbonization. Aurubis is playing a pioneering role here. We have successfully demonstrated that hydrogen E page 18 can be directly used in copper production. We are now taking the next step and testing low-carbon ammonia as an energy source. We will continue our hard work here and are not going to wait around for policymakers or funding programs before moving forward in these areas. Policymakers need to act too though: The secure supply of raw materials and the availability of affordable energy have to be top priorities. In Europe, the first few particularly energy-intensive companies have already been forced to limit or even shut down production. This is causing additional supply chain disruptions. I don't anticipate the risk of a cutback in production at Aurubis. Our

energy supply is diversified and secure for the foreseeable future.

In October, Aurubis received the first delivery of blue ammonia from the United Arab Emirates, which was not produced using renewable energy. This has prompted criticism from environmental groups. Do you understand where they are coming from?

ROLAND HARINGS Not really. The key is to get started immediately and develop expertise rather than waiting around for the perfect solution. Our carbon footprint from the production of copper cathodes is already half the global average for our industry. Our production will be carbonneutral well before 2050. So we will certainly be using green hydrogen or green ammonia as a substitute for natural gas in the future. Currently, though, neither is available in sufficient quantities. Nonetheless, we are already testing alternative energy sources to replace natural gas in production on an industrial scale. We need some lead time for a technical feasibility review. We'll use this headstart to ensure that we are ready to go as soon as sufficient quantities of green hydrogen derivatives become available

in the future. And with our test series, we are setting an example for the basic materials industry.

# You revised the Aurubis strategy a year ago. Do you still stand by the results?

**ROLAND HARINGS** Yes, now more than ever! All the decisions we are making today align with our long-term strategic goals. We are continuing to grow, while safeguarding and expanding our core business - and adhering to our high sustainability standards in everything we do. Based on extensive market analyses, we have identified the right projects here and have a wonderful and highly qualified workforce that is driving our company forward with an unbelievable level of dedication and motivation. We have also expanded our Executive Board. Starting in January 2023, Inge Hofkens will take charge of our Multimetal Recycling business segment as a fourth member of the Executive Board. She is an excellent choice for us in an important market of the future set for growth.

# Mr. Verhoeven, as Chief Financial Officer how do you view the past fiscal year?

**RAINER VERHOEVEN** 2022 was a very successful year for us, despite various external factors.

We raised our forecast on two occasions and also met them for the year as a whole. We showed how well we work together to deal with exceptional situations, such as the coronavirus pandemic, the impact of the war in Ukraine on our business, and the cyberattack on our IT systems in late October. Despite the cyberattack, we were able to maintain production without any cutbacks at almost all the Group sites. We were able to rapidly isolate the affected areas and gradually restore our systems and databases in order of priority. We would like to thank our employees for their outstanding work in reestablishing a stable work environment in a very short period of time.

# Despite these challenges, Aurubis achieved an outstanding result. What do you attribute this to?

RAINER VERHOEVEN With an operating EBT of € 532 million in fiscal year 2021/22, we did in fact achieve the best annual result in Aurubis' history. For much of the year, of course, we benefited from very strong market conditions with high metals prices. At the same time, we produced an increased volume of metal, thus further improving our metal result, our Group's most important outcome measure. Very high demand

"We showed how well we work together to deal with exceptional situations, such as the coronavirus pandemic, the impact of the war in Ukraine on our energy supply, and the cyberattack we suffered."

- Rainer Verhoeven, CFO

for our copper products and for sulfuric acid also had a positive effect. The very good metal result more than offset the significantly higher energy prices over the year as a whole. Our production sites also reported solid operating performance.

# The best-ever annual result on the one hand – warnings of rising energy costs on the other. How does that fit together?

RAINER VERHOEVEN Higher energy costs will certainly impact our result in the coming year. We need to take the right steps now to ensure that our business continues to be a successful model in the future. We are operating in a competitive international environment and, in Germany especially, facing conditions that don't apply in other countries. Energy costs, for example, are considerably lower in the US than in Europe – not just for us, by the way, but for our competitors as well.

### What is your view of Aurubis' future?

**RAINER VERHOEVEN** Aurubis is a company with an excellent outlook for the future. Our business model is extremely robust and crisis resistant. We are free of debt and can fund future projects predominantly through operating cash flow. We

are confident about the coming fiscal year as well and expect to generate operating earnings before taxes (EBT) of between € 400 and 500 million. Thanks to the consistently positive market situation and high level of demand for metals and our copper products, we have largely been able to pass the higher costs on to our customers. For calendar year 2023, we increased Aurubis' copper premium from \$ 123/t to \$ 228/t, which amounts to 85%.

# Mr. Arnold, as Chief Operations Officer you are responsible for the performance of the Group sites. Where do Aurubis' strengths lie?

HEIKO ARNOLD Aurubis' huge strength is our international smelter network, which we are continuously optimizing and expanding through targeted projects. This is the basis for our growth. In addition to plant safety and production that surpasses environmental standards, decarbonizing the entire copper value chain is a core goal for Aurubis. We are following through in both of these areas with many important and strategically well-thoughtout projects and innovations at our sites – from our battery recycling project in Hamburg and

"We are building a completely new plant and setting new standards for the US recycling market."

Heiko Arnold,





BOB to the construction of a recycling plant for nickel and copper at our Olen site and ASPA, a new state-of-the-art recycling plant in Beerse. Our new Aurubis Richmond site in the US state of Georgia shows that we mean business – and that we know what we're doing. We are building a completely new plant and setting new standards for the US recycling market with our expertise, outstanding metallurgical processes, and know-how.

# Starting in the coming year, you will be focusing more on primary and product business, while Inge Hofkens takes charge of the secondary business area. What will your role involve?

HEIKO ARNOLD First of all, I am delighted that Inge Hofkens is joining us on the Executive Board. She has a proven track record as an expert in the field of multimetal recycling. It makes sense to have more than one person in charge of production in this strong growth phase. Growth requires focus and resources. That's the only way that we will be able to fully follow through on implementing our strategy. I will be concentrating on strengthening our key core business, primary copper production, and our product business. We are focusing on efficiency, plant availability, and continuous improvement. We have kicked off a large number of technical projects, are consistently leveraging the possibilities that digitalization offers in the area of production, and are improving our sustainability performance – in keeping with our motto: Driving Sustainable Growth.

# Ms. Hofkens, from January 2023 you will be a new member of the Aurubis Executive Board with responsibility for the Group's recycling business. Congratulations! What are your expectations for your new position?

INGE HOFKENS I am honored by the trust placed in me, and I look forward to working with my fellow Executive Board members and all the Group's employees. Aurubis is already a leading multimetal recycler in Europe today. This area offers huge potential for further growth. I will be using all of my experience to help develop our strategically important recycling business. We have set ourselves ambitious growth targets – and we will meet them!

There is a more detailed interview with Inge Hofkens in the "Empowering Recycling" chapter on page 23.



Our strategy provides a clear picture of how we will continue to develop our business in a targeted way, shaping the future while growing sustainably and profitably.





# Securing and strengthening the core business

Aurubis has a healthy, high-performing core business: processing raw materials containing metals – concentrates and recycling materials. By systematically linking our sites and optimizing material flows, we can make optimal use of synergies within the Group. This allows us to create the conditions for further growth.

"Following our ASPA project, the BOB project announced in February 2022 is our next concrete step towards recovering the full range of metals even more efficiently from the resources we use." - Heiko Arnold, COO

- ✓ Bleed Treatment Olen Beerse (BOB) for the recovery of nickel and copper from electrolyte is in progress, and the first contracts have been signed → page 27
- Advanced Sludge Processing by Aurubis (ASPA) project is on track: groundbreaking ceremony on December 15, 2022
  page 26
- Modernization of electrolysis in Lünen remains on schedule. Work due to be finished in the first half of 2024.

TOTAL APPROX.



OPERATING EBITDA CONTRIBUTION FROM 2025/26

More information at www.aurubis.com

# Enablers 📑

- » Digital Factory: continuous production improvement through the use of new technologies  $\rightarrow$  page 32
- » Digital Innovation Lab: development of digital services for customers and suppliers page 33
- » Fusion project: introduction of the latest S/4HANA software generation from SAP



# Pursuing growth options

We are leveraging our long-term process expertise in processing complex recycling materials as well as the latest smelter technology in order to develop and expand scalable recycling capacities. Further down the road, we want to expand our range to include battery materials and battery recycling.

# **Aurubis Modular Recycling System**

We combine expanding capacity with flexibility. We have thus developed a system that enables us to scale new recycling plants built modularly and tailored to meet need. The additional production volumes will be seamlessly integrated into Aurubis' expanded smelter network. Aurubis Richmond, USA, is the first plant Aurubis is building using this modular system.



# Enabler

» Our significantly expanded Group Engineering Organization (GEO) organizational unit supports growth projects by providing engineering services. — page 35



# **Expanding industry leadership** in sustainability

Sustainable conduct and business activities are integral components of the Aurubis strategy. We have set targets and specified concrete measures for reducing CO<sub>2</sub> emissions, with the goal of achieving carbon-neutral production well before 2050. Our production technologies and facilities are already making a crucial contribution to responsible resource use, supporting the energy transition along with our products.



Aurubis Olen is set to follow in 2023.  $\rightarrow$  page 44

More information in Annual Report starting on → page 53 (NFR)

Enabler (

» Digital Factory: continuous production improvement through the use of new technologies as well as support in identifying energy savings potential  $\rightarrow$  page 32

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Whether copper, nickel, zinc, or tellurium – our metals have an essential role to play in the transformation of our economy and the society we live in. Our products are used in a large number of industries and are at the heart of solutions to many different challenges, such as the energy transition. We are now the most efficient and sustainable smelter network worldwide. But Aurubis is dependent on a secure supply of energy at competitive prices. We are responding to the current energy crisis via a pragmatic, solution-oriented approach – and striking out on new paths.





urubis is facing a large number of challenges when it comes to ensuring a secure supply of energy for its sites, diversifying its energy mix, and identifying additional savings potential, while continuing to decarbonize and digitalize our production. Moreover, as a result of the global impact of the war in Ukraine and changing overall conditions,

our two main energy sources - electricity and natural gas - have now reached price levels that may impact our competitiveness. Metals and especially copper are traded at world market prices. We are operating in a competitive international environment alongside companies with considerably lower energy costs.



#### **EMPOWERING**

We ensure a secure and diversified energy supply for the production of our metals of the future.

#### Alternative energy sources

Over the past few months, we have been hard at work exploring the use of alternative energy sources, such as oil and propane gas, at our German sites, in order to significantly reduce our natural gas consumption and thus make our production more independent of this energy source. Our site in Bulgaria is not dependent on natural gas and is instead supplied with energy in the form of oil and liquefied petroleum gas (LPG), both of which are available in sufficient quantities. Our Belgian sites in Olen and Beerse have high levels of natural gas consumption, but are well placed thanks to various energy contracts and other natural gas resources.

In Europe, the high natural gas prices are also causing electricity costs to spiral upward as a result of the market mechanism currently in place, known as "merit order". Under the merit order system, the electricity price on the exchanges is always determined by the last (and as such the most expensive) power plant to feed in. This means that electricity from renewable energy sources and coal power plants is billed at the same price that natural gas power plants receive for their electricity due to the high natural gas costs. Our German Aurubis sites are not affected by this, since they have an adequate supply of electricity based on a very long-term supply contract. The price increases here are moderate compared to the broader market trend, since this contract is not dependent on the merit order mechanism. Prices are also rising at our other European sites due to limited supply and the high level of demand. In Bulgaria, energy-intensive industry is protected by a governmentguaranteed electricity price cap. We expect this provision will remain in place in 2023.

As an energy-intensive company, we are tackling these challenges. We are working pragmatically to find and consistently implement solutions, without losing sight of our goals and our strategy. We are confident in the flexibility and strength of our business model and value our employees' expertise highly. We are a healthy and robust company that is crisis-resistant and has already coped with quite a few challenges over the course of its long history. Nonetheless, we need to keep an eye on developments in the energy sector – and to continuously reassess the price levels at which we can continue to produce economically.

That said, we are forging ahead with our transformation process to use alternative energy sources throughout our Group – from the expansion of solar energy in Bulgaria to wind power in Olen. To reduce our indirect  $CO_2$  emissions, we are stepping up our use of green, certified electricity by optimizing our electricity portfolio in Germany and by signing long-term supply contracts (power purchase agreements), such as the green electricity supply contract we concluded with a ten-year term for our Belgian plant in Olen. From January 2023 onward, renewable energy will meet over 90% of the plant's overall electricity needs.



#### **GREEN ELECTRICITY**

The energy supply at our Olen site is now greener, thanks to the use of wind energy and long-term green electricity contracts.

#### Use of CO<sub>2</sub> neutral energy sources

We aim to reduce our direct emissions by using carbon neutral energy sources, such as hydrogen and ammonia. In 2021 at our Hamburg site, we successfully tested the use of hydrogen in an anode furnace on an industrial scale for the first time – with potential savings of up to 5,000 t of  $CO_2$  per year. In 2022, Aurubis in Germany received the first shipment of blue ammonia from the United Arab Emirates (UAE). This will allow for a reduction of approx. 20 % in the amount of natural gas normally used for copper wire production – and thus savings of up to 4,000 t of  $CO_2$  per year see "Empowering Innovations" chapter.

#### Keeping a firm eye on the goal

Alongside these efforts, we are also adhering to our goal of further reducing our  $CO_2$  emissions in order to achieve carbon neutral production well before 2050.

#### Efficient energy use and industrial heat provision

Apart from these forward-looking strategies, we have had an energy management system in place for many years to manage our energy needs more efficiently and identify potential savings. Our facilities and processes have become increasingly efficient – only limited by what is technically feasible. And we are breaking new ground. At our Hamburg site, we are

# Integration of Aurubis AG industrial heat



carrying out a lighthouse project involving the use of industrial heat generated by our production. Since the end of 2018, around 8,000 households in Hamburg's HafenCity district have been provided with virtually carbon-free heat. We are already hard at work on the next stage, which will supply heat to an additional 20,000 households starting in 2024/25. With this project, we have sustainably closed another energy cycle. Aurubis has thus become an industrial heat supplier. The project has attracted considerable recognition and already won a number of awards.

Customers

Through these initiatives, we are living up to our leading role as the most sustainable multimetal company in the world, and as a pioneer for innovative future energy sources in our industry.



# Aurubis is systemically relevant

This is particularly apparent in view of the energy transition, which we see as a catalyst for our transformation. The metals we produce are needed to generate and distribute renewable energy and for the switch to e-mobility.

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# Solar park

A solar park with an output of 1 MW requires 7 t of copper on average. In addition, its solar panels contain many other metals: e.g., cadmium, tellurium, silver, silicon, molybdenum, germanium, gallium, indium, and beryllium. Moreover, aluminum, zinc, manganese, and titanium are used in the frames.



Wind turbine

A 3 MW wind turbine requires around 4.7 t of copper, 3 t of aluminum and approx. 1.5 t of rare earths. Additional metals are also needed: e.g., lithium, nickel, manganese, cobalt, carbon, and vanadium for storage as well as zinc and molybdenum for corrosion protection. The amount of copper required for an offshore wind turbine increases to around 30 t due to the need to connect the turbine to the mainland.



# Electromobility

For battery production alone, cobalt, lithium, nickel, and other metals are essential. Demand for copper is also set to rise as a result of the shift to e-mobility: An electric vehicle contains up to four times as much copper as a car with a combustion engine.



#### Power lines with a copper core

Green electricity is by no means always generated exactly where it is needed. A successful energy transition includes being abel to transport this power. Three major power lines are currently being built in Germany for this purpose: A-Nord, SuedLink, and SuedOstLink. These names are shorthand for copper high-voltage cables as thick as a person's leg that our customer Prysmian - the world market leader in the field of energy and telecommunications cables - is currently constructing and laying underground on behalf of three different customers. These lines will carry wind energy from the offshore parks of northern Germany to the south of the country, where private households and companies can use it in the future. These power highways are several hundred kilometers long. The longest line, SuedLink, alone runs for 580 km and is one of the largest projects of its kind worldwide. Within the scope of these three power-line projects, Prysmian is responsible for around 2,300 km of cables. This requires around 10,000 t of

copper wire – and quality is key. This is why Prysmian chose Aurubis' wire rod. "The copper needs to have particularly good conductivity and must be easy to handle," project and contract manager Heiko Dirks says.

The underground cables consist of a copper wire core that is sheathed with special insulation - to protect against environmental impacts and ensure optimal, low-loss power transfer. Prysmian manufactures these cables in France and coils them around huge drums (which weigh approx. 80 t) for transport to Germany. Each drum carries around 2 km of cable. Prysmian also values Aurubis because it is reliable and delivers on time, ensuring seamless production. "Aurubis is one of the world's leading copper manufacturers and our key supplier. We have worked together for 25 years now and can look back on many successful projects together," Heiko Dirks says. That's why the two companies are successfully working toward the same goal: facilitating the energy transition with their products.

"Aurubis is one of the world's leading copper manufacturers and our key supplier. We have worked together for 25 years now and can look back on many successful projects together."

 Heiko Dirks, Prysmian project and contract manager

# Empowering Recycling

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We see recycling as the answer to industry's growing need for raw materials. That's why we are continuing to expand our forerunner position as one of the world's leading recyclers of copper and other metals. We are building a new recycling plant in the US and implementing two new strategic projects in Belgium that will enable us to return even more valuable metals to the material cycle.



The growing importance of recycling is also reflected in the expansion of our company's management team and the appointment of Inge Hofkens as our new Chief Operations Officer Multimetal Recycling as of January 2023.

# Where do you see a need for action to ensure that it succeeds? We have to have fair international competitive

**Recycling as a driver of the European Green Deal:** 

We have to have fair international competitive conditions, particularly when it comes to energy prices. At the same time, we have the world's highest sustainability and efficiency standards in Europe. To keep metal production in Europe and ensure that the Green Deal succeeds, we need competitive transformation electricity prices for energy-intensive industry.

Moreover, recycling materials have to be available. Every year, around 12 million t of e-scrap is produced in the EU. The volume of end-of-life consumer electronics and kitchen and household appliances is rapidly growing worldwide, but the European collection rate is still too low – despite legal guidelines. We have to ensure that recycling is cost-effective in the EU. In 2021, almost 2 million t of e-scrap was exported abroad. Those are reusable materials now lost to our material cycle.

Moreover, permit procedures in Europe need to be accelerated. Look at the US, where we are building our state-of-the-art multimetal recycling plant. The market potential here is huge, and the conditions – for everything from the planning and approval process to the price of electricity – are ideal. We now need to up the pace in order to achieve a sustainable, circular system. At Aurubis, we are ready to move forward if the conditions are right. We are convinced that the circular economy offers huge opportunities.

# Ms. Hofkens, you are a trained economist and enjoyed a career at Belgium's Metallo Group. After joining the Aurubis Group, you spent two years working as a plant manager at Aurubis Olen. What are your responsibilities in the newly created role of COO Multimetal Recycling?

I will be contributing my many years of extensive experience in the industry to develop the growing recycling business in Aurubis' international smelter network. Recycling is a cornerstone of our strategy and a key factor behind sustainable and profitable growth. Even now, Aurubis is already processing more than 1 million t of recycling materials. More than 45 % of our copper cathodes are produced from recycling materials.

# What role will recycling play in the future?

Definitely a crucial one. The growing need for raw materials for the energy transition and the digital transformation means that recycling plays a crucial role. Metals have enduring value. Theoretically, they can be recycled an indefinite number of times without any loss of quality. Our strategic projects are allowing us to set a course for further growth here see the following pages.



# A pioneer in the US

With the construction of our new state-of-the-art recycling plant in Richmond County in the state of Georgia, we are opening up growth areas and becoming a pioneer in the American recycling market. From left to right: Rainer Verhoeven, CFO, Roland Harings, CEO, Heiko Arnold, COO

urrently, around 6 million t of recycling materials containing metal accumulate every year in the US recycling market. Only a small percentage can be processed locally. Due to growing collection rates, declining exports of recycling materials and general industry growth, this market offers us enormous potential for sustainable growth. Aurubis Richmond will be our first secondary smelter for multimetal recycling in the

US. Our investment of around  $\in$  300 million is one of the largest international investments in the state of Georgia. We are creating more than 120 jobs there. Through our new plant, we are further expanding our position as the world's most sustainable and efficient smelter network, and we are making an important contribution to the circular economy.

Once our new plant is fully online in 2024, we will process around 90,000 t of complex recycling materials containing metals here every year - such as printed circuit boards, copper cables, and other electronic scrap - to produce blister copper. This is material that would otherwise be exported or disposed of in landfills. We will directly sell some of the intermediate products on the American market. However, most will undergo further processing at our European smelter sites. We will deliver valuable metals such as copper, nickel, and tin to industry, e.g., for solar power installations and wind turbines or to manufacturers of electric vehicles and batteries. The environmental technology at our new site meets, and in some cases even exceeds, the highest standards. Once Aurubis Richmond has reached its full output level starting in fiscal year 2025/26, we expect to achieve an annual EBITDA contribution of € 80 million.

"With our new site in the USA, we are delivering on our strategic agenda and further advancing our experience and technology to become a forerunner for recycling valuable materials containing copper, nickel, tin, and other industrial and precious metals."

 Roland Harings, CEO, at the groundbreaking ceremony in Augusta on June 17, 2022

Investment € ~300 million EBITDA € ~80 million p.a. (from 2025/26) Production launch **CY 2024**  Input material ~90,000 t Blister output ~35,000 t

Since the groundbreaking ceremony in June, construction of Aurubis Richmond is progressing rapidly.



# Expanding our recycling expertise in Europe

Aurubis is already one of the world's leading multimetal recyclers today. But that is not enough for us: With two additional trailblazing projects in Europe, we are expanding our recycling expertise step by step here too – and thus strengthening our core business.

# ASPA: metal recycling from anode sludge

Recycling discarded electronic consumer goods such as smartphones and laptops is becoming increasingly complex. The number of metals in them has risen sharply, and the product design is also becoming more intricate. Valorizing these metals in a sustainable way therefore requires particularly advanced recycling capabilities. We are meeting this need by investing € 27 million in the construction of a state-of-the-art hydrometallurgical recycling plant at our Beerse site in Belgium: Advanced Sludge Processing by Aurubis (ASPA) stands for innovative metals-from-waste recycling. Our new method allows us to recover an increased volume of precious metals, such as gold, silver, and tin, very rapidly from anode sludges - a valuable intermediate product of electrolitic copper refining - at our recycling sites (mainly Beerse and Lünen). The development of ASPA demonstrates Aurubis' capacity for innovation and is a prime example of the synergies created by the acquisition of Metallo. The groundbreaking ceremony was held on December 15, 2022, and the plant is due to be commissioned in the second half of 2024.

"ASPA is taking metal recycling to the next level. We're combining speed and efficiency to get even more out of it."

- Inge Hofkens, COO

approx. € 7 million p. a. EBITDA once full output volume reached FY 2024/25 production launch





€ 27 million investment volume

approx. 2,500 t p. a. input material in the form of anode slime

More information on ASPA: www.aurubis.com/aspa





More information on BOB: www.aurubis.com/en/olen



approx.

approx. € 70 million investment volume Summer 2024 Production launch "With BOB, we are introducing an energyefficient and fast process step that extracts nickel – an indispensable metal for lithium-ion batteries and thus an important component for the megatrend of e-mobility."

- Heiko Arnold, COO

### BOB: recovering valuable metals from bleed

At our Olen site in Belgium, we are investing around € 70 million to construct an innovative, energy-efficient bleed<sup>1</sup> processing plant. Bleed treatment Olen Beerse (BOB) is a hydrometallurgical process that recovers valuable metals such as nickel and copper from electrolyte streams generated in metal production during electrolysis at our Belgian sites in Beerse and Olen. The facility comprises a complete tankhouse purification system known as "bleed treatment" that removes impurities from the electrolyte (bleed). The project is in the implementation stage and commissioning is scheduled for summer of 2024. The new facility in Olen will allow us to optimize and achieve even greater efficiency in our material flows. Aurubis expects an EBITDA contribution of around € 15 million upon full operation of the new facility in fiscal year 2025/26.

<sup>&</sup>lt;sup>1</sup> Bleed: The term refers to the part of the tankhouse electrolyte that is continuously being purged, as some metals dissolve in the electrolyte. BOB allows copper, nickel, and other components to be recovered and removed from the bleed.

# Empowering Innovations

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For more than 150 years, we have stood for innovation. We are continuously optimizing our plants and metallurgical processes. Today, we are a forerunner in the green transformation in our industry and are actively driving it forward. We are a pioneer in testing alternative energy sources such as hydrogen and ammonia, are operating a pilot plant for recycling lithiumion batteries, and are capitalizing on the opportunities associated with digitalization in all areas. Together, we are building the Digital Factory of the future.

ust as when the company first started out, Aurubis' core focus continues to be producing metals of the highest quality from a range of raw materials. We are working on making even better use of the increasingly complex primary and secondary raw materials and on recovering more metals at a faster rate. Our research and development (R&D) activities are therefore based on optimizing our existing metallurgical processes and developing new processing methods. This involves a focus not just on copper, but on virtually every element of the periodic table – we are multimetal thinkers. Along with laboratories and pilot plants, computers are the most important tool for our R&D activities. We are leveraging all the options digitalization offers to model, understand, improve, and thus speed up our metallurgical processes. Our researchers and metallurgists work closely with our production engineers, mathematicians and data analysts here.

# **Exploring the future**

This is precisely what we are doing in one of our futureoriented projects: In March 2022, Aurubis commissioned a pilot plant for battery recycling at its Hamburg site. Our goal is to close the battery production cycle by recovering the valuable raw materials from the "black mass" out of used lithium-ion batteries from electric vehicles, as well as waste from battery production, and to make these metals available for battery production again.

To achieve this aim, black mass — a mixture resulting from the mechanical preprocessing of lithium-ion batteries — is broken down into its component parts, thus gradually releasing lithium, cobalt, manganese, and nickel. The addition of lithium would raise the number of metals produced by Aurubis to 21. Following the testing of our new, hydrometallurgical process in a laboratory phase and its successful patenting, we are testing on a larger scale at the pilot plant rese photo, further developing the process and collecting important data for the later construction of an industrial scale plant. In addition to economic feasibility and the availability of materials down the road, integrating this plant into Aurubis' smelter network is also a key issue. An appropriate site will be selected based on factors such as the potential use of existing infrastructure and optimal integration of metal flows along with space requirements and cost.



# **Closing the cycle**

Aurubis recovers valuable metals from the black mass out of recycled batteries from electric vehicles.





#### A green transformation pioneer

In 2021, Aurubis was the first company in the metal production industry to demonstrate that hydrogen could be used at an industrial scale in copper anode production see "Empowering Energy".

Now we are taking another step toward decarbonizing our multimetal production and once again highlighting our pioneering role in the green transformation of our industry: In October 2022, Aurubis took delivery of an initial 13 t of blue (low-carbon) ammonia from the United Arab Emirates (UAE) to be used in our copper wire rod facility at our Hamburg site. In the long term, we intend to fully replace blue ammonia, which is currently available, with green ammonia. The second is produced using renewable energy. We are thus further diversifying our energy supply and reducing our carbon footprint. Our goal is carbon neutral production well before 2050. At the same time, we are making an important contribution toward establishing a hydrogen supply chain between the UAE and Germany. The current delivery was part of the hydrogen collaboration between the UAE and Germany, which was intensified at the start of 2022. Aurubis and the Abu Dhabi National Oil Company (ADNOC) signed the supply contract during a delegation visit led by Germany's economic minister, Dr. Robert Habeck, in the spring of 2022.



The test series was symbolically commissioned on October 21, 2022 in the presence of the Federal Minister for Economic Affairs and Climate Action, Dr. Robert Habeck; Dr. Sultan Al Jaber, the UAE's minister for industry and advanced technology and CEO of the ADNOC; Hamburg's first mayor Dr. Peter Tschentscher; Torben Seebold, member of the executive board of HHLA AG; and Roland Harings.

"The creation of a blue — and in the future green — ammonia value chain is not just theoretically possible, but practically feasible."

- Roland Harings, CEO Aurubis



processed as a raw material.







# The opportunities of digitalization

We see digitalization as a driver of innovation leading to a permanent process of change that impacts every area of our company – processes, production, and customer relations – and as such forms the foundation of our company strategy.

# Aurubis is set to become a digital factory

The Digital Factory is both a vision and a path, as we use digitalization as a means for making continuous improvements to our production through the use of new technologies. With digital tools, we are making our production more efficient, more transparent, more sustainable, and safer – enabling, for instance, an improved mode of operation for facilities, earlier error analysis, and more accurate forecasting for processes. We are pursuing our Digital Factory program together with our smelter sites and our data engineering and data science teams. In the core team, around 15 members of staff (depending on the relevant use case) work on implementation on an interdisciplinary basis.

# New software generations and IT systems

To ensure the successful digitalization of its processes, production operations and customer relations, Aurubis is implementing various programs and projects at the same time. We are introducing the latest S/4HANA software generation from SAP under the "Fusion" project name and ensuring the standardization of business processes at our smelter sites. Non-SAP processes and IT systems are being harmonized in additional projects and linked with SAP.



Film about the Digital Factory: aurubis.cdn.picturepark.com/v/ vwGPAd3B/

#### **Aurubis' Business Partner Portal launched**

Our Digital Innovation Lab is an important aspect of the company's transition to a digital future. We develop digital services for customers and suppliers here. These include our Business Partner Portal, which began offering our customers and suppliers an initial range of services in August 2022. It is currently available for existing suppliers in the recycling business segment. Further product areas and sites are continuously being added. Within the scope of existing business relationships, the portal provides digital contract information, while also allowing users to check on and manage deliveries and to fix metal prices while gaining related insights and an overview.



For more information, see www.aurubis.com/en/products/ business-partner-portal

With the help of the Digital Factory, a dashboard was set up in our Hamburg lead plants for the daily analysis and utilization of production data.

## An Internet of Things platform for production operations

Aurubis acquired azeti GmbH, Berlin, in 2020. This software start-up is supporting our digitalization strategy with its Internet of Things platform, as a recent example from Aurubis Olen demonstrates: Here the platform is being used to monitor the condition of the inductor, the key component in the smelter furnace. azeti is also developing our new Manufacturing Execution System (MES), which covers areas such as our inventory management and will be rolled out throughout the Group. MES is Aurubis' second-most important software package after SAP.

### **Digitalization of logistics**

In addition to its broader impact at a structural level, digitalization is increasingly shaping the field of logistics. Our sites use digital tracking tools for incoming deliveries of materials or outgoing deliveries by ship, truck, or container. With the support of Group Logistics, a digital time slot system is being introduced for the last few meters to the plant to assist road haulers with loading and unloading.

The new digital time slot system at Deutsche Giessdraht (Emmerich) means shipments can now be processed more rapidly.



Employees

Our employees are Aurubis' future and the foundation of our success. We depend on the commitment and expertise of each and every one of them in realizing our company strategy. Developing and promoting talented individuals and expanding internal networks are therefore key issues. We are an attractive and dependable employer and continuously investing in training and qualifications. We stand together in times of crisis and our interdisciplinary collaboration across multiple sites is a source of strength.



GEO manager Christian Reibe (center) opened our new engineering office in Sofia (Bulgaria).

# In-house engineering office for local project support

To implement our strategically important future projects, we established the new Group Engineering Organization (GEO) organizational unit in October 2021. This central team, which operates group-wide, consists of internationally experienced project engineers who can be directly deployed to our sites with expertise that allows us to harmonize engineering processes. GEO is essentially an in-house engineering office. Due to the large number of strategically and technically demanding projects, we need to pool our activities and improve our engineering capabilities and capacities while making them available worldwide and providing support at a local level. GEO is thus a key building block in implementing the Aurubis strategy.

The GEO consists of three main units: our Center of Excellence (CoE), the Large Capital Project managers (LCP managers), and Project Engineering. The latter provides direct, on-site assistance in implementing projects. The CoE is responsible for general issues, such as process standardization, knowledge management, and technical approvals, while the LCP managers lead our major investment projects. Together with local colleagues at our various sites, the GEO enables flexible deployment of personnel to cover peak levels of demand as well as access to experienced engineering services.

The GEO management team and the CoE are based at our Hamburg site. Where necessary, our LCP managers and their project engineers are deployed throughout Aurubis' smelter network. They are assisting with the setup of Aurubis Richmond in the US, for example see "Empowering Innovations". One part of this unit operates from a new engineering office in Sofia, Bulgaria. This is a geographically attractive base for our international assignments, since it is close to our Bulgarian plant in Pirdop. Most of the over 30 new full-time positions were already filled in 2022 when the organizational structure was set up.

#### We offer perspectives

We have invested in our young employees for years and promote tomorrow's talents today. We offer young people apprenticeships at Aurubis and thus the opportunity to play a role in shaping a growing company with a promising future. In September 2022, 77 young people began as apprentices in Hamburg and 17 in Lünen. A wide range of career paths are available: apprenticeships in 14 different vocational areas are offered in Hamburg and seven in Lünen. We are proud to have filled all of our apprenticeship positions once again this year. 100 % of our apprentices have successfully completed training, and more than 85 % of them envision their future at Aurubis. Our dual vocational training programs allow students to combine theory and practice.

With the opening of our Innovation and Training Center (IAZ) in Hamburg and a new center in Lünen in 2019, we laid an important foundation for the Aurubis of the future. We are continuously developing our training plans and are aware of the opportunities and possibilities that digitalization offers for vocational training. The 2022 apprenticeship class was the first to be exclusively outfitted with digital learning tools.

Our efforts are paying off: We are the second-largest industrial apprenticeship provider in Hamburg, while at a national level Aurubis is one of Germany's "top apprenticeship providers" and is regularly lauded by associations and in the media.





Interested? www.aurubis.com/en/ career

# 80%

of apprentices envision their future at Aurubis after completing their apprenticeships and are offered continuing employment (figure for German sites).




More information on W4M: aurubis.com/en/ women4metals

#### We develop talent

Careers at Aurubis are as varied as our product range. In November 2022, Aurubis established a new talent mentoring program to promote and support our talented employees' personal development. The individuals enrolled receive twelve months of supervision and targeted support from an internal mentor. What's more, starting in 2023, all members of staff will be able to take part in a mentoring program via Aurubis' Women4Metals network – collegial support on a more frequent basis – that welcomes anyone of any gender.

#### We promote networks

Women4Metals (W4M) is an international network working to increase the visibility of women in the metal industry, strengthen their position, and inspire them to choose career paths – particularly in production and in technical areas – at Aurubis. What started out three years ago as an idea conceived by committed female members of staff now has a clear profile: W4M combines external partnerships with internal programs.

"We stand for diversity and that's why we invite people of any gender to be part of Women4Metals. This is the only way we can promote female members of staff in every sense and achieve this goal without prejudice."

– Tanja Winter, Head of Sales Rod, co-founder of W4M



#### We learn from one another

A multipart video series featuring production experts was created during our major maintenance shutdown "Future Smelter Hamburg 2022." The goal was to transparently present the dimensions and challenges associated with such a large project to all of our internal and external stakeholders, provide background knowledge, recognize the achievement of the employees involved, and generate greater enthusiasm for our production. These short films provide impressive and in some cases unprecedented views of the primary smelter at Aurubis Hamburg and were featured weekly Group-wide on the intranet and Viva Engage, our Group communication platform, as well as externally on social networks, where they were among Aurubis' most-viewed videos.



The video series on our shutdown in Hamburg: aurubis.cdn.picturepark. com/s/b37TJB9K



## Our crisis teams provide active risk management

Whether it's the coronavirus pandemic, the war in Ukraine, or the cyberattack our company suffered at the end of October – we tackle crises through teamwork. We keep a cool head in exceptional situations to ensure that we act with foresight and make the right decisions for Aurubis and its employees. Christoph Riesch, Corporate Risk Manager at Aurubis, explains how our internationally staffed crisis teams, which are supervised by the Executive Board, operate.

#### Mr. Riesch, what is your role as risk manager?

Everyone at Aurubis is a risk manager within their own area of responsibility. My task is to provide support to ensure that risks are identified on a timely basis and that uniform criteria for the necessary risk reporting are established.

#### When are crisis teams formed at Aurubis?

Crisis teams or task forces are set up whenever an event threatens to become so serious that intensive and rapid coordination across multiple departments and sites is needed to handle it, and the situation requires ongoing reevaluation. Particularly at the start of a crisis, it is important to rapidly identify and implement the appropriate measures or responses in order to protect the company and its workforce.

#### How does an Aurubis crisis team operate?

Our crisis teams meet online at regular intervals. In addition to our Executive Board and our risk management team, the Group's key sites are represented, as well as heads of functions directly involved in the crisis. Following a uniform agenda, those involved report on



the situation from their perspectives. This is how we ensure transparency for everyone. Direct contact with the Executive Board is essential for rapid and pragmatic decision-making.

#### How are decisions made?

Depending on the specific crisis and situation, a decision may be made immediately at the respective meeting. If something needs to be prepared or facts have to be gathered, a decision will be made by means of a circular resolution or at an Executive Board meeting. Continuous communication to and with our employees is important – on a reciprocal basis and immediately via internal channels, as well as in greater detail in Executive Board letters.

#### How successful is an internal crisis team?

At Aurubis, crisis teams are quite deliberately deployed in extraordinary situations. But they provide a practical, active and agile risk management response. To date, Aurubis has coped well with the recent crises thanks to very rapid decisions that have set appropriate countermeasures in motion. And crucially: Communication channels tailored to the specific situation and target group mean that the measures implemented have met with a high level of acceptance among our workforce and have thus contributed to our success.

#### What are the hallmarks of crisis teams at Aurubis?

An interdisciplinary team that examines and assesses a situation from different perspectives and deals with this additional task in a cooperative, trusting and highly motivated way can get a great deal done in a short span of time.



Our copper production carbon footprint is already less than half the average of our competitors worldwide. This competitive edge inspires us to go further: Sustainability is the defining principle of our company strategy. Our activities are always aligned with our commitment to responsibly transform raw materials into value. Our production will be carbon neutral well before 2050. To get there, we are assuming responsibility and making targeted investments in sustainable projects, obtaining certification of our processes and supply chains and, through Tomorrow Metals, living up to our sustainability promise to our customers.

"Decarbonization, supply chain management, the circular economy and sustainability performance reporting are the key sustainability trends. We are already extremely well positioned here!"

### Christian Hein, Head of Sustainability

We aspire to approach employees, suppliers, customers, and neighbors with a sense of responsibility, whether in direct business operations or in the areas surrounding our plants. The same applies to environmental issues, as we are aware of the limits of natural resources. We aim to secure long-term company success through responsible business practices and stable growth.

For Aurubis, responsible corporate governance is an integral contribution to securing the company's future. The 2030 sustainability targets have established the framework. They are an integral component of the Aurubis corporate strategy and are divided into three focus areas: people, environment, and economy.

The 2030 sustainability targets determine the main areas of activity, targets, and action plans for the coming years. Such as in the "energy and climate" action area, where our ambition is to be carbon-neutral well before 2050. In the "recycling solutions" action area, we intend to offer the entire value chain solutions for the circular economy.

Our roadmap is in place: We will continue solidifying our position as the most efficient and sustainable multimetal producer worldwide.

Aurubis' products play an important role in many transformation processes in today's society – from the energy transition to digitalization and e-mobility. We see ourselves as a responsible actor and as part of the solution for a more sustainable future.

We follow the company's mission of responsibly transforming raw materials into value to provide metals for an innovative and sustainable world. Our Group strategy, "Metals for Progress: Driving Sustainable Growth", will integrate our sustainability standards more throughly into all areas and expand our industry leadership in sustainability.

## Aurubis products have a reduced carbon footprint

Sustainability requires transparency. We take this responsibility seriously and analyze the potential environmental impacts and the energy balance of products over their entire lifetimes through life cycle assessments (LCA). As well as updating the life cycle assessment for copper cathodes, the first assessments were completed for copper wire rod, copper shapes, and tin, as well as gold and silver.

The holistic LCA approach covers all of the steps in the manufacture of these products – from the upstream processes for the extraction of the raw materials to the production of the pure metals. The assessment encompasses the impacts of all activities in the treatment of raw materials, as well as direct emissions, transport, energy consumption, and the auxiliary materials used. The study was carried out in accordance with ISO standards 14.040 and 14.044 for life cycle assessments.





Calculated in accordance with ISO norms 14040 and 14044 for life cycle analysis.

The results confirm the effectiveness of our commitment to sustainable metal production. Aurubis is on track to achieve the goals it set for itself. Over the past eight years, we have reduced the carbon footprint for copper cathodes by more than 35 %. It is now less than 50 % of the global average carbon footprint for copper cathodes. We have achieved the same results for gold and silver, while the figure for tin is an impressive 75 % below the global average. Reference figures are not yet available for wire rod or shapes. Here we are setting international standards through our achievements.



All our current factsheets: www.aurubis.com/en/ tomorrowmetals





## Tomorrow Metals: a sustainability promise to our customers

Our metals lead the way in the area of sustainability. Our Tomorrow Metals label communicates this message clearly. The label represents our promise to our customers that, in everything we do, we deliver more value with less environmental footprint, while complying with the highest standards in energy efficiency and environmental protection. Tomorrow Metals is based on the four pillars of environmental protection, carbon footprint, recycling, and responsibility.

#### Aurubis links financing with sustainability

In early February 2022, we took out a  $\leq$  350 million ESGlinked syndicated credit line over a period of five years. ESG stands for environmental and social governance. The loan conditions are tied to the company's EcoVadis rating, so commitment to sustainability is having a direct impact on the costs of Group financing. In June 2020, Aurubis very successfully placed a Schuldschein loan with a volume of  $\leq$  400 million with a sustainability component. Our latest financing package again emphasizes that our commitment to sustainability even extends as far as our company financing structures.





Our current non-financial report 2021/22 is available at: aurubis.com/en/responsibility/ reporting-kpis-and-esg-ratings

#### A fourth site is now aiming for Copper Mark certification

After Aurubis Bulgaria, this year our plants in Hamburg and Lünen were also granted the Copper Mark – the internationally recognized seal of quality for sustainability in the copper industry. A fourth plant in our smelter network, Aurubis Olen, is now ready to undergo the certification process. This quality seal is confirmation of our strategy of continuing to expand our position as an industry leader in sustainability.

As part of the certification process, the Copper Mark system reviews 32 internationally recognized sustainability criteria, such as protecting the environment and climate and energy efficiency; occupational health and safety; and compliance and human rights. Due diligence is an important new criterion, i.e., the duty of care to ensure compliance with human rights in the supply chain. To receive this quality seal, companies are now required to meet the joint due diligence standard for copper, nickel, zinc, and lead. All three Aurubis smelters successfully passed the review process ensuring compliance with the standard and thus also fulfilling the new London Metal Exchange (LME) responsible metal sourcing standards.



| RESPONSIBLY | PRODUCED | COPPER





More information on sustainability at Aurubis: aurubis.com/en/responsibility

#### Aurubis named a finalist for the German sustainability award

In 2022, Europe's largest prize for ecological and social engagement was awarded for the 15th time. Aurubis was one of twelve finalists in the "Resources" category – high recognition of our achievements in sustainability. A total of 71 companies were nominated in five categories for the prize. On December 2, 2022, the winners were announced at a gala event in Düsseldorf attended by Germany's chancellor Olaf Scholz.



More information www.nachhaltigkeitspreis.de/en/



Marie-Christine von Hahn at the 7th BDI Raw Materials Congress in conversation with Germany's economy minister Dr. Robert Habeck and BDI president Prof. Siegfried Russwurm.

## Greater sustainability requires an active, partnership-based approach

We intensively interact and communicate with partners in the business sector, and in the fields of politics, science, and society at large. Our international, five-person External Affairs team is primarily tasked with maintaining dialogue with policymakers and administrative bodies, thus influencing how legal regulations impact our complex business model. Accordingly, our colleagues in Brussels and Berlin stay in touch with members of parliament, ministry officials, undersecretaries, ministers, and commissioners at national, European, and international levels. They also work closely with associations that draw up joint positions for our industry, such as political proposals. Core issues include energy and the climate, recycling, the supply of raw materials, and sustainability. To this end, they are in close contact with our sites as well as with the relevant departments.

Effective, practical solutions require a dialogue that involves all stakeholders. Just two examples:

**Raw materials strategy:** Together with the German Chemical Industry Association (VCI) and the Federal Association of German Industry (BDI), we successfully – in particular through our work on the BDI's Raw Materials committee – ensured that the German government's current raw materials strategy includes the three pillars of an effective raw materials policy: raw material imports, domestic raw materials, and recycling.

**Raw materials markets:** In regular meetings with parliamentarians, government representatives, and their teams in the EU and the member states, we raise awareness of the huge quantities of metallic raw materials that will be required for a successful transformation, and for the fact that these must be produced by European smelters to ensure the lowest possible level of  $CO_2$  in production.

"The shape legislation takes will have a decisive influence on whether we can continue to drive the great process transformation of our time through our metals in the future."

– Marie-Christine von Hahn, Vice President Corporate External Affairs

# **Aurubis at** a glance

Group figures 2021/22



**OPERATING EARNINGS BEFORE TAXES (EBT)** 





NET CASH FLOW



6,913 **EMPLOYEES** 

#### Publisher

Aurubis AG Hovestrasse 50, 20539 Hamburg, Germany info@aurubis.com www.aurubis.com

#### **Photographs**

Aurubis AG, Andreas Schmidt-Wiethoff, Christian Kruppa, David Goltz, Getty Images, Johannes Arlt, Rick Rothenberg, Scott Webb, Thomas Panzau, Prysmian

#### **Concept and design**

Kirchhoff Consult AG, Hamburg

#### Printing

Beisner Druck GmbH & Co. KG, Buchholz in der Nordheide



RECYCLING MATERIAL





CONCENTRATE THROUGHPUT



€ **362** million

CAPEX



LTIFR (LOST TIME INJURY FREQUENCY RATE)

RECYCLING MATERIAL PER COPPER CATHODE



ENERGY COSTS INCL. COMPENSATIONS

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#### **Additional environmental measures**

CO<sub>2</sub>-neutral production with a Gold Standard certificate.

www.klima-druck.de/klimainitiative/?lang=en



Daper BD3

The paper and the printer are certified in accordance with the current Blauer Engel standards (DE-UZ 195).



You can find our magazine and the full Annual Report online at annualreport2021-22.aurubis.com

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**Metals for Progress** 

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