METAL RECYCLING IS OUR DNA.

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NICKELHÜTTE AUE

Member of JACOB METAL GROUP

“RESOURCES ARE THE FOUNDATION FOR OUR FUTURE. PRESERVING THEM IS WHAT MOVES US.”

Siegfried Jacob

OUR MISSION:
For us, there's no wastes, just raw materials.
We stand for safe and environmentally compatible recycling of non-ferrous metals from the industry and trade sectors. By professionally processing these metals, we produce valuable recycled raw materials, which we then return to the economic cycle.

OUR VISION:
Resources are limited. Our ideas are not.
By consistently broadening our ability to recycle, we are promoting a more sustainable use of materials to help minimise the global extraction of limited natural resources. All our concepts are based on the almost unlimited recyclability of non-ferrous metals, enabling us to ensure the availability of valuable raw materials for future generations.

JACOB METAL GROUP
WE PRESERVE RAW MATERIALS FOR GENERATIONS.

Expertise and passion are essential in the world of metal recycling. Seven specialized companies have come together in the **strong network of the Jacob Metal Group** to leverage unique knowledge and experience **from almost 400 years of metal expertise** – each group member with its own unique skills and deep regional roots.

We set milestones in international competition by virtue of our profound strength. As one of the world's leading family-owned companies in metal recycling and trading, the Jacob Metal Group is today an independent European group of companies that tackles one of the greatest challenges of all times – **to sustainably preserve the earth's resources.**

JACOB METAL GROUP

The Jacob Metal Group has **almost 1,000 employees across Europe on a total industrial area of more than 1,000,000 m².** Our services range from classic metal trading to recycling complex industrial residues in state-of-the-art recycling plants. Our highly trained technical staff can rely on innovative equipment, handling systems, and analysis technologies.

ACIERS INOXYDABLES SPÉCIAUX
Member of JACOB METAL GROUP

SIEGFRIED JACOB METALLWERKE
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JACOMIJ ELECTRONICS RECYCLING
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NICKELHÜTTE AUE
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IRELAND ALLOYS
Member of JACOB METAL GROUP

DISTINGUISHED EXPERTISE: THE GERMAN SUSTAINABILITY AWARD.

After almost 400 years, Nickelhütte Aue is still well ahead of times. In recognition of their valuable contribution to enhanced climate protection, this Saxon member of Jacob Metal Group received the **German Sustainability Award.** This national prize is awarded by the "German Sustainability Award Foundation" for outstanding achievements in the realm of sustainability in businesses, local authorities and research.

AN ESSENTIAL NEOLOGISM COINED IN THE "ERZGEBIRGE"

Many pioneering ideas have their roots in Saxony: The term "sustainability" was first introduced by Hans Carl von Carlowitz – the appointed representative of the Saxon "Kurfürst" as chamber and mining councillor and as chief mining governor of the "Erzgebirge" – he defined the term in Freiberg in 1713.

It takes only eleven minutes to walk from the Aue old market square to the western gate of Nickelhütte. The metallurgical plant is situated in the middle of the town, which is a bit unusual today, as industrial enterprises tend to be established outside of cities. However, the close ties between mining, industry and residential areas as well as the interconnection of work, life and culture is a tradition that has grown over centuries in the region.

COMMITTED TO PROGRESS – CONNECTED TO TRADITION.

Metal can be found everywhere on the extensive premises of the company. Large and small metal crucibles stand in the factory yard behind the production facilities, while they cool down. In the indoor and outdoor sorting areas, various scrap metals are being prepared for recycling. Colourful metal peaks, several meters high, gleam in the sun. As a reception, a large magnet swings over a pile of shiny aluminium sheets, and soon after searches for any iron-containing metal scraps within. **Welcome to Nickelhütte Aue.**

Our corporate values

WE MAKE DIFFICULT THINGS EASY.

At Nickelhütte Aue, while transforming wastes into raw materials, we consistently close the recycling loop. This is neither magic, nor something that can be taken for granted. **Due to many years of experience, our know-how and our technologies set standards in the industry.** Today we are the global leader in recycling waste materials containing nickel, copper, cobalt, molybdenum and vanadium. Looking towards the future, this expertise is more important than ever. Nowadays, around half of non-ferrous metals produced in Germany are obtained from secondary metals – and the demand is rising.

450+ qualified employees

95.000+ tons of recycled materials

385+ years of experience

100 per cent sustainable

OUR VALUES-BASED SELF-PERCEPTION AT A SINGLE CAST.

State-of-the-art metal recycling must be ready to meet the highest standards. **Our actions are always based on legal requirements and customer-specific demands.** Our management board and the heads of department are our role models. Acting responsibly is core to our corporate philosophy, and it is self-evident that this is true for every employee as well. We are continuously working to become even better. This applies to the sustainable production of our products, as well as the areas of environmental protection, health and safety at work. Our integrated management system allows regular assessments and customizations on demand, as well as implementation of the actions required. Our corporate values and philosophy are binding for our employees. We also demand a strong sense of responsibility and sustainable actions from our partners, suppliers and subcontractors.

OVER 385 YEARS AT THE CUTTING EDGE.

20th February 1635

Founding as a blue dye works. Pigments containing cobalt were used in paints and glazes, and as whiteners for laundry and paper.

1694

Cooperation with three other Saxon blue dye works. From that time on, the world market for cobalt coloring is controlled by the **"blue dye works consortium".**

1851

Nickel production begins. Originally, the metal was used for cutlery, later for steel refinement.

1855

Acquisition of the blue dye works Modum in Norway.

1862 to 1873

Clemens Winkler, who discovered the chemical element "Germanium", works in the company as a metallurgical chemist and designs, among other equipment, the **first flue gas desulfurization plant in the world.**

Anyone familiar with the history of Nickelhütte Aue will be even more impressed by this traditional company. Located directly on the small “Schwarzwasser” river, surrounded by the hills of the "Erzgebirge", Nickelhütte Aue has influenced the town, community and region for centuries. The fact that a blue dye works, whose history began in 1635, has developed into one of the most state-of-the-art metal recycling specialists in Europe, is primarily due to the **strength and pioneering spirit of the people who live here.** But it is also attributed to the adaptability of a forward-looking company that has always recognized the trends and mastered historical turning points with strength and endurance.

BLUE TURNS RED.

In 1635, at Nickelhütte Aue’s current location, the blue dye works Niederpfannenstiel, began to produce blue pigments made of cobalt, which were used in Delft tiles and Meissen porcelain. Although the era of blue pigments is now over, cobalt is still important for metal recycling. However, we produce the red-brown colored cobalt sulfate today. This is obtained from scrap batteries and is the base material to manufacture new batteries.

1946 to 1957

Large parts of the company are seized by the Soviet occupying force.

1957 to 1965

Reorganization of the plant as a nationally owned enterprise (VEB Nickelhütte Aue). Nickelhütte was **the only producer of nickel salts and electrolyte nickel in the GDR.**

1991

Siegfried Jacob acquires the company from the “Treuhand” fiduciary company. **Integration of Nickelhütte into the Siegfried Jacob Group (today the Jacob Metal Group).** Comprehensive investment to renew the entire smelting department and introduction of modern environmental protection technologies.

1999 to 2006

The tradition is followed as cobalt sulfate is introduced into the product portfolio. **Building of a sodium vanadate plant.**

2016

Acquisition of the magnet producing company GMB Magnete Bitterfeld GmbH. Continuation of special magnet production under the firm name GMB Deutsche Magnetwerke GmbH.

FIRST CLASS KNOW-HOW FOR STATE-OF-THE-ART RECYCLING.

As a medium-sized enterprise, we have just the right capacity to fulfill the requirements of our customers and partners. From the beginning, the wide range of services provided by Nickelhütte Aue have been characterized by innovative competence and quality standards. We are always setting our standards a little higher. We use latest technologies to process various types of metals. As a reliable partner, we also fulfill the most challenging customer demands.

RECYCLING OF CATALYSTS, RESIDUES, DUSTS AND SLUDGES:

Out of catalysts and residues from chemical, petrochemical, pharmaceutical, and metal processing industries we produce non-ferrous metal concentrates using metallurgical processes and refine these concentrates to chemicals:

- Recycling of nickel, copper, cobalt, tungsten, vanadium, molybdenum, zinc and precious- metal containing catalysts from processes such as desulphurization, purification, steam reforming, methanation, hydro-cracking, hydrotreating, hydrogenation and refining.
- Recycling of electroplating sludge and wastewater sludge, filter cakes, dusts, and ashes in combination with nickel, copper, cobalt, tungsten, vanadium, molyb-denum, zinc, and precious metals.

RECYCLING OF SCRAP METAL:

We process a wide range of scrap metals from various sources. Our treatment processes include shredding, crushing, sieving, charging, pressing, and sorting, as well as efficient elimination of impurities. We maximize value creation by adding state of the art assaying methods according to the requirements of the end consumer.

RECYCLING OF LITHIUM-ION BATTERIES:

We specialize in recycling of batteries used in electro-mobility. Combining pyro- and hydrometallurgical methods with mechanical treatment, we recover raw materials for industry. We also offer our customers complete packing and transportation solutions.

WHY SHIP PROPELLERS ARE SO ROBUST:

The secret is the CuAl9-B alloy consisting of copper, aluminium, and a low percentage of iron. Due to its high strength, resistance to corrosion, and wear resistance, CuAl9-B is ideal for use in sea water – and thus perfect for making ship propellers. These components are exposed to enormous loads and must withstand gigantic forces. The alloy can also be used in aviation, industrial casting molds, as well as in pump and valve components. It is also suitable for high temperature furnaces thanks to its high heat resistance.

WE CLOSE THE LOOP – SUSTAINABLE AND EFFICIENT.

RECYCLING OF ETCHING SOLUTIONS AND NON-FERROUS METALLIC SOLUTIONS:

Our special technology allows the complete recycling of used etching solutions. Even the excess hydrochloric acid available in these solutions can be recovered and is fed back into the material system. Avoiding of wastewater and CO_2 emissions demonstrates our technological superiority over our competitors.

RECYCLING OF VANADIUM COMPOUNDS:

Gasification and combustion residues containing vanadium and nickel, produced primarily in the petrochemical industry, are refined in state-of-the-art pyro- and hydrometallurgical processes. The ultrapure sodium vanadate obtained here is used to produce environmentally friendly pigments.

RECYCLING OF TRANSFORMERS AND FUEL CELLS:

We recycle transformers, fuel cells, and similar components, and feed the raw materials they contain back into the economic cycle.

RECYCLING OF PRECIOUS METALS:

In our facilities we recover residues containing precious metals for the economic cycle. Our processes include enrichment by means of special smelting and roasting techniques. For intentional thermal disposal of harmful pollutants, we also cooperate with selected refineries.

For further information and your contact partners, see:

INVESTING IN HIGH STANDARDS.

We dedicate the greatest importance to innovative recycling in combination with the latest technologies in environmental protection. For this reason, we constantly invest in our equipment and laboratories, as well as in the professional development of our employees. In this way, we have established ourselves as a leader in recycling complex secondary raw materials.

“GLÜCK AUF!”

The use of “Glück auf!“, as a greeting, arose in the Saxon “Erzgebirge” in the 16th century. It was used by miners when entering a mine and was intended to bring luck to anyone coming into the mine shaft and to wish them a healthy and successful return to the surface. Today this greeting is still used in the region.

SPECIALIZING IN YOUR REQUIREMENTS.

Naturally, we are masters of the standard tasks – but what we really like are the large and small challenges our customers present us. We engineer customized recycling solutions and products on demand to meet the needs of various businesses. To quickly respond to the ever- increasing market requirements, we make use of the synergies inherent in the Jacob Metal Group. Thus, we guarantee that our customers always receive the best possible results. We look forward to the challenges you have for us!

SUSTAINABLE RAW MATERIALS FOR DEMANDING INDUSTRIES:

- **AUTOMOTIVE:** We make our customers more independent of the raw materials market by using secondary metals.
- **CHEMICAL INDUSTRY, OIL, GAS:** We treat waste materials and transform them into valuable raw material for reuse.
- **ELECTRICAL INDUSTRY:** This industry needs a variety of non-ferrous metals and alloys. Our know-how and wide range of products set standards.
- **METAL PROCESSING INDUSTRY:** We process metal scrap and provide consistently high-quality secondary materials.
- **ENERGY GENERATION AND STORAGE:** Sustainable battery recycling is already the key to success. We are forward-thinking and are continuously engaged in developing methods and technologies that suit future requirements.

WE BLEND RESEARCH EXPERTISE AND QUALITY STANDARDS.

Delivering quality for us means confirming trust – no matter for which businesses and requirements our products are made for. One of the most important quality assurance steps starts in our plant at the very beginning: Our in-house laboratories inspect the quality of all scrap and waste materials delivered. Thanks to direct contact with our subcontractors and waste generators, we can perfectly determine the material's origin. Continuous analyses and the newest processing technologies meet even the highest quality demands. As a result, we can plan all recycling opportunities and the expected metal values. Our integrated management system continuously monitors and assesses all operations and processes for quality assurance. We are at our best when facing a new challenge. This is the most powerful driver for innovations. We respond to complex requirements by developing new methods and technologies – always looking towards the future.

THROUGH PERSEVERANCE TO INFINITE LITHIUM.

Currently Nickelhütte's R&D team is working intensively to recover lithium from lithium-ion batteries. Because in the near future, recycled lithium will be more sought after than ever. Our aim is to develop a new recycling process that preserves the finite raw material lithium infinitely.

OUR PRODUCTS ARE THE BASIS FOR SUSTAINABLE GROWTH.

We supply the sought-after raw materials that drive the economic cycle. With our expertise and motivated employees, we use state-of-the-art recycling technologies and **transform waste into high-value products** at competitive prices.

1 METALS

One of our internationally esteemed flagship disciplines is the business with first-class and sustainable non-ferrous metals from recycled raw materials. For industry and commercial customers, we go into the depth of the possible processing methods of each individual recyclable material and thus keep metals in the value chain. This also benefits the environment, because the use of recycled metals reduces CO_2 emissions by up to 60 %.

OUR PRODUCT PORTFOLIO

- Aluminium/alloys
- Copper/alloys
- Lead/zinc/tin alloys
- Nickel/alloys/master alloys
- Alloyed steels
- Special metals/minor metals
- Ferroalloys
- Magnetic alloys
- Cobalt/alloys
- Tungsten/alloys
- Titanium/alloys

2 INGOT ALLOYS

To produce ingot alloys, we smelt metals and scrap in our own furnaces. Thanks to our more than 30 years of ingot production experience and our flexible processes, we can quickly supply all the common alloys according to DIN 17656, DIN 17657, and EN 1982, as well as products tailored to individual customer specifications.

Ingot mass: approx. 10 to 15 kg
Pallet weight: according to customer demands
Ingot geometry: narrow side approximately 50 x 390 mm, wide side approximately 100 x 435 mm, height approximately 60 mm

OUR PRODUCT PORTFOLIO

- Copper master-alloys (CuFe20, CuFe30, CuSi10, CuSi15, CuMn30, CuMn50, CuAl50)
- Aluminium alloys
- Copper alloys
- Primary metals

3

CONCENTRATES

Our site produces non-ferrous metal concentrates and intermediate products, that are capable to replace primary metals. These products are, for example, used to produce chemicals.

OUR PRODUCT PORTFOLIO

- Nickel
- Copper
- Cobalt
- Molybdenum
- Vanadium
- Tungsten
- Zinc
- Precious metals

For further information and the corresponding contact partners, see:

NAMED AFTER MINE GHOSTS AND ON THE MOVE IN THE UNIVERSE.

In 1754, the Swedish chemist Axel Frederic Cronstedt gave “nickel” its distinctive name. The term was derived from the Swedish word “kopparnickel” (copper nickel), which originated in the “Erzgebirge” and meant niccolite. This was the name the miners gave to the unpopular ore that looked like copper ore but contained no copper. This was blamed on the mine ghosts - the so-called "nickels" who are said to have laid a curse on the material. The true value of nickel was only discovered many years later. The metal is relatively common, but mostly in low concentrations. In pure form, nickel only exists in the earth’s core and in iron meteorites in the universe. Nickel makes materials such as steel extremely tough. In many other high-value alloys, it is indispensable thanks to its almost magical properties.

4 CHEMICALS

From electroplating sludge and industrial residuals, we produce non-ferrous metal concentrates that are refined to cobalt, nickel, copper, molybdenum and vanadium chemicals in hydrometallurgical processes. These products are utilized to produce catalysts, batteries, or special chemicals. They are used, for instance, in the oil and automotive industries, surface and energy storage technology as well as in agriculture. We also process copper chloride etching solutions from printed circuit board production. We are producing chemicals out of waste.

OUR PRODUCT PORTFOLIO

- Nickel sulfate-6-hydrate
- Nickel chloride-6-hydrate
- Nickel nitrate solution
- Cobalt sulfate-7-hydrate
- Cobalt sulfate solution
- Copper sulfate-5-hydrate
- Copper oxychloride, technical
- Hydrochloric acid, technical
- Sodium vanadate solution

5

ENERGY

We at Nickelhütte rely on sustainable energy generation from different sources. We produce electricity and heat in our highly efficient combined heat and power plant (CHP) and use renewable energies. A modern waterpower station provides energy for our processes. On the firm's premises, we also use photovoltaic systems, a gas turbine, and a gas motor.

The use of waste heat from our pyrometallurgical facilities is also proving to be particularly sustainable. The industrial rotary reverberatory furnaces and rotary kilns used in the company generate enough heat to ensure the energy supply of Nickelhütte and other enterprises in Aue.

CONCERNING SUSTAINABILITY.

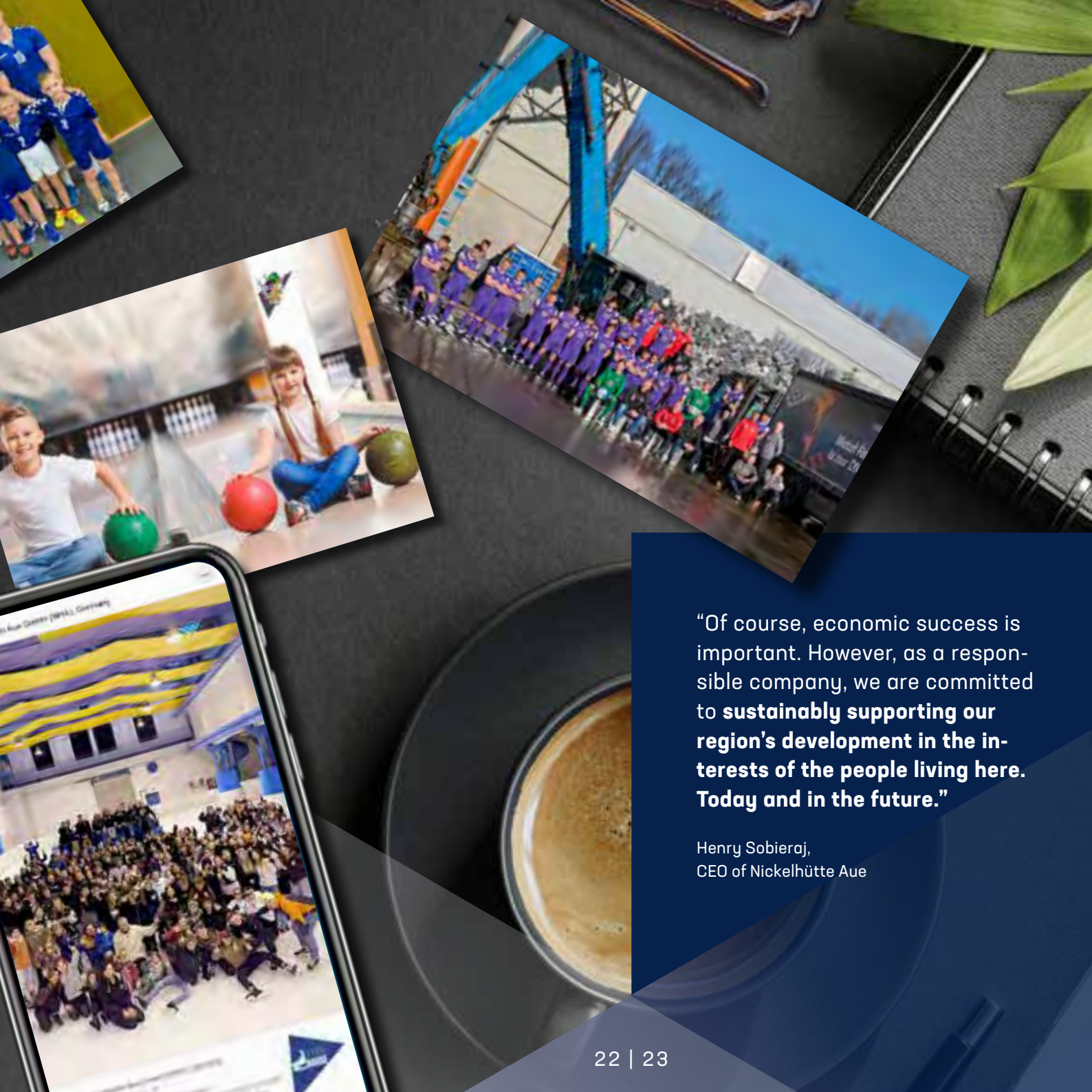
As an energy supplier committed to environmental protection, we use renewable resources, such as vegetable fat, for heating. We also recover the energy contained in the mostly high-calorific waste efficiently and in line with demand. This is what we call sustainable metal recycling.

Our responsibility does not end at the company gates. We are also committed to a sustainable future within the community. Nickelhütte Aue has deep roots in its region, where sport is particularly important.

OUR ENTERPRISE TAKES RESPONSIBILITY.

We financially support this with passion – from sponsoring the soccer club FC Erzgebirge Aue to popular sports activities in the company-owned sports association SG Nickelhütte Aue, with divisions for handball, soccer, Taekwondo and bowling. The best-known member of our sports club, which has more than 450 members, is the former ski-jumper and team world champion Richard Freitag. We also support many social and cultural projects. A cinema, a gym, an ice rink and a bowling alley, operated by us, broadens leisure activities in the city of Aue. We want to actively contribute to make our region a great place to live that attracts many people.

Matter of the heart: CEO Henry Sobieraj next to one of two defibrillators financed by Nickelhütte Aue in cooperation with the Björn Steiger foundation for the town of Aue-Bad Schlema.



"Of course, economic success is important. However, as a responsible company, we are committed to **sustainably supporting our region's development in the interests of the people living here. Today and in the future."**

Henry Sobieraj,
CEO of Nickelhütte Aue

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Print product with financial
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