

SAXONY-ANHALT

Inspiring Germany's future



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Saxony-Anhalt: A state of culture and technology

Best known for its vast industrial and cultural heritage, the German region is the ideal place to invest, live and work in today

As the birthplace of the Reformation five centuries ago and the cradle of Bauhausian industrial modernism in the 1920s, Saxony-Anhalt has always been a fertile home for world-changing ideas.

Located at the heart of Germany, the eighth-largest of the country's 16 states is still taking a lead in global revolutions, having built on its renowned strengths in chemical, engineering, automotive and food industries to become a major force in technologies covering areas such as batteries, hydrogen, the bioeconomy, life sciences, medtech, digitalization, industry 4.0, electric mobility, renewable energy, sustainability and smart materials. Throughout the state are thriving clusters for many of those sectors that include collaborative scientific institutions, established companies and startups. Among them are a growing number of global players like Akzo Nobel, Bayer, Borealis, IBM, IDT Biologika, Mercer and Novartis, along with international entrepreneurs and other individuals that have chosen to invest, live, work and study in the dynamic region.

“International companies appreciate our outstanding infrastructure, innovative research landscape, effective transfer of technology, qualified workforce and attractive funding.”

Dr. Reiner Haseloff, Minister President

Saxony-Anhalt is the preeminent destination for foreign investment in eastern Germany and analysis of just a few recent investments illustrates how the state has pivoted toward high-tech and green industries. For instance, Finland's UPM is investing in a refinery that will extract biochemicals from sustainable wood, while the U.K.'s AlgaeCytes plans to set up the world's first algae-based biorefinery in the region. Both these projects will further boost Saxony-Anhalt's bioeconomy, which already generates over 16 percent of its industrial revenues. Oil and gas multinational TotalEnergies, on the other hand, is capitalizing on the state's expansive hydrogen expertise and infrastructure in a joint venture with Fraunhofer researchers and the German electrolyser manufacturer Sunfire to create synthetic methanol from locally produced hydrogen.

Saxony-Anhalt has also accrued projects across the e-battery value chain, running from Dutch company AMG's building of a lithium hydroxide refinery, through to Tesvolt's establishment of Europe's first e-battery giga factory in the state. One of the state's most recent investors is another good example: this March, Intel announced that its capital, Magdeburg, had seen off global competition to be the site of a new \$17-billion semicon-



Collegiate Church of St. Servatius in Quedlinburg

ductor factory. Dr. Reiner Haseloff, Minister President of Saxony-Anhalt, sums up some of the reasons why the relatively small region has become a notable preferred destination for investors and is so attractive to enterprises like these: “National and international companies appreciate our outstanding infrastructure, innovative research landscape, effective transfer of technology, qualified workforce and attractive funding.”

Although just 2.2 million people reside in Saxony-Anhalt, 125 million consumers—25% of Europe's total population—live within 500 kilometers of the state. That market is accessible through a multimodal transportation and logistics network containing pan-European expressways, Leipzig/Halle International Airport, over 3,000 kilometers of railway tracks and 600 kilometers of waterways with 18 ports. As it strives to phase out its coal plants by 2038, the region's green energy infrastructure is also highly developed, with wind and solar power already supplying about 60 percent of its electricity needs, far ahead of the average in the country. Saxony-Anhalt's climate for business and investment is a cut above others as well.

Aided by economic development agency Investment and Marketing Corporation Saxony-Anhalt (IMG), enticing incentives can be quickly accessed and links are easily made with local authorities or partners. Among those potential partners are 29 research institutes, 12 centers of research and development excellence, two universities and eight universities of applied sciences that make up one of Germany's densest research landscapes. Saxony-Anhalt's highly international further education institutions provide practical training to around 55,000 students a year in total, with an impressive 90 percent of the state's skilled workforce having completed professional or university courses.

A truly special and unique location

One of the state's crucial advantages for international companies and their employees, entrepreneurs and others is the incredible quality of life on offer in welcoming Saxony-Anhalt. For instance, there are abundant career opportunities in future-focused businesses and institutions. It also leads its nation in services for parents, with all children up to the age of 14 having a statutory right to full-day care. Living, land and housing costs are substantially below the German average as well, while world-class internet connections are available in vibrant, cosmopolitan cities and the region's idyllic countryside, which helps explain why almost 32 percent of all



The oldest Gothic cathedral in Germany is in Magdeburg

startups are based in rural communities. Saxony-Anhalt is truly stunning in terms of both its natural environment and its vast cultural resources, factors that enthrall residents and visitors. Indeed, the state has recorded higher annual growth in tourist numbers than any other part of the country in recent years.

Boasting 60,000 cultural, architectural, historical and archaeological monuments, plus 200 museums, it is the heartland of German history. Among a cornucopia of castles, palaces, cathedrals, picturesque old towns, manicured gardens and 1,000 parks are five spectacular UNESCO World Heritage Sites. At the Martin Luther Memorials, it is possible to visit the houses and churches where the Reformation's instigator lived and worked, while in nearby Dessau are the largest number of buildings associated with the Bauhaus school of art, design and architecture, which settled in the town in 1925 and transformed it into a capital of modernism.

Two more World Heritage Sites lie on the state's 1,000-kilometer Romanesque Route that links reminders of its central role in medieval Germany. Naumburg's cathedral is one of Europe's most significant monuments of the Middle Ages, with sculptural art that includes the captivating figure of the most beautiful woman of her era, Uta von Naumburg. North west of there is Quedlinburg, a medieval city of half-timbered houses and cobbled alleys that wind up to a hill-top castle and church. The fifth site is entirely different: the 18th-century Garden Kingdom of Dessau-Wörlitz is the jewel of a Garden Dreams trail that connects the region's 43 most beautiful and historic landscaped gardens. Other treasures noted by UNESCO include the Bronze Age Nebra Sky Disc, the world's oldest representation of the cosmos, which is listed on its Memory of the World Register.

The region also has a strong heritage in art, theater and, especially, music. Handel, Bach, Telemann and Weill all lived and composed there and their music is celebrated at performances and festivals throughout the year. Far from being preserved in aspic, however, culture is alive and flourishing in Saxony-Anhalt. The annual MELT! Festival, for example, is among Europe's biggest contemporary music events, while the University for Art and Design in Halle is one of the world's most prominent academies for aspiring artists. The state's main cities—Magdeburg and Halle—are also constantly evolving, with billions of euros having been invested in their refurbishment and modernization in recent years. Today, the two riverside metropolises successfully blend their cultural history with small galleries,



The glorious Garden Kingdom of Dessau-Wörlitz

street art, designer and artisan workshops, plus a plethora of performing and visual art venues.

It's not just the state's cultural heritage that UNESCO has recognized. The wildlife-full wetlands of its Middle Elbe Biosphere Reserve are a UNESCO study location for sustainable development and Harz National Park is part of the Global UNESCO Network of GeoParks. Throughout Saxony-Anhalt are diverse, unspoiled landscapes that run from lowland meadows to the forests and magical mountains of Harz, which are complemented by innumerable rivers and lakes. That makes it a paradise for those who enjoy lazy walks, boat trips and tranquil picnics, as well as people seeking more strenuous activities. The invigorating possibilities include hiking, horse riding, sailing, surfing, rock climbing, cycling on 40,000 kilometers of rural paths and flying along the Megazipline, Europe's longest double-rope slide that spans a breathtaking river gorge in Harz.

With three Michelin-starred venues and many other traditional, creative and international restaurants across the state sourcing local ingredients for their dishes, Saxony-Anhalt's unique culinary delights are also worth investigating. Some of its standout products are Harz cheese, Halloren balls from Germany's oldest chocolate factory, wines from its Saale-Unstrut region, the world's oldest branded beer Garley and craft beers from emerging breweries such as Brewckau. Overall, as State Minister for Economic Affairs, Tourism, Agriculture and Forestry Sven Schulze says: “It's a beautiful, livable and culturally rich region. We look forward to welcoming visitors and new residents who want to discover it.”

Introducing Saxony-Anhalt



Population:
2.2m



Total area:
20,451 km²



Capital city:
Magdeburg



No.1 for investments:
In eastern Germany

Europe's center for high-tech and green investments

Thomas Einsfelder, Managing Director, Investment and Marketing Corporation (IMG) Saxony-Anhalt, presents a new hotspot for investors

Saxony-Anhalt has positioned itself on the radar of investors. As head of the economic development agency Investment and Marketing Corporation (IMG) Saxony-Anhalt, what are some of the state's strengths?

It is an up-and-coming federal state in Germany that has undergone tremendous development. 10 years ago, we had a gross domestic product of roughly €50 billion. By the end of 2021, that had risen by about 20 percent to €63 billion, which is extremely solid growth over such a short period. Within the last five years, we have also attracted 272 new investment projects worth €3.2 billion that have created 7,776 new jobs and there are a variety of factors that have contributed to that. For instance, we've been an industry-focused location for over 150 years and have always been strong in forward-looking, innovative areas such as mechanical engineering, chemicals and the automotive sector, all of which are industries that have continued to advance here.

Overall, the state is future-oriented and technology savvy, with a well-trained workforce, highly skilled talent and an immensely robust scientific landscape that includes a rich density of research institutions. We also have two prominent universities in Magdeburg and Halle that focus on



Thomas Einsfelder
Managing Director
IMG Saxony-Anhalt



300 automotive industry suppliers are based in Saxony-Anhalt

mathematics, engineering, medical science and computer science, while our business and research sectors are closely intertwined. In addition, we are conveniently located between Berlin and Hanover at the heart of Germany and Europe, and one of our advantages is that we have very modern transport infrastructure in terms of motorways, railways, waterways and Germany's second-largest cargo hub—the airport of Leipzig-Halle.

To help maintain Saxony-Anhalt as an industrial and research hotspot, IMG acts as a partner for all potential and established investors, which receive advice from us regarding, for instance, potential partners in technology, funding, financing and marketing. We're a small state, which enables our government and other institutions to react with agility in its investment and business processes. However, even though we are small, there's substantial industrial space available here for large-scale investments.

2021 saw a record number of investors moving into Saxony-Anhalt. IMG was involved in 68 new projects, most of which concerned high-tech industries. Is that trend continuing in 2022?

This trend is certainly continuing as Saxony-Anhalt has become interesting for major investments by global companies that now recognize it as a region of future technologies and the government has set up a special unit to offer optimal support for this type of project. This year, we were thrilled when Intel decided that our capital Magdeburg is the right location for a

A dynamic destination for forward-focused international investors



GDP has risen **20%** in 10 years to reach **€63bn** in 2021



Between 2017 and 2021, IMG attracted investments worth **€3.2bn** to Saxony-Anhalt



2022 investment commitments include **€17bn** from Intel and over **€225m** from Avnet



Leipzig-Halle airport is Germany's **2nd-largest** cargo hub



Home to **29 business-oriented** research institutes



60% of Saxony-Anhalt's energy mix is green

mega semiconductor factory. It's among the largest inward investments Germany, and indeed the European Union, has ever seen. In February, leading U.S. technology company Avnet revealed it is investing over €225 million in a high-performance distribution center for semiconductors and electronic components here. On a site covering around 190,000 square meters, this eco-certified logistics center will serve Europe's growing market for these products. Avnet has stated that the main factors behind it choosing the city of Bernburg for the facility were Saxony-Anhalt's central European location and the convenient connection to Leipzig-Halle airport, while IMG's rapid assistance on planning requirements for the site paid off as well.

Saxony-Anhalt also stands out for its high-tech bioeconomy and is making a name as a destination for investors prioritizing sustainability in a broad range of sectors. Why is it so successful in these areas?

Our bioeconomy is booming and one reason for that is our extensive chemical industry, which has a focus on green issues and is working together with players in the bioeconomy sector on ways to replace fossil fuels—for example, by making plastics from alternative materials such as wood or sugar. Saxony-Anhalt has the capabilities to scale up bioeconomy processes like that and we have many investment projects in this area. In terms of investors in other industries that want to make their processes more sustainable, 60 percent of the energy produced in Saxony-Anhalt is green—we generate significant amounts of wind and solar power. Our energy mix is much greener than you typically find in Germany, but energy costs here are at par with the rest of the country. We also offer extensive plug-and-play hydrogen infrastructure that includes a large hydrogen pipeline and a platform for testing electrolyzers. To put it simply, Saxony-Anhalt has the means to make production green.

As the electric-vehicle (EV) revolution continues to gather pace, can Germany's automotive industry keep its competitive edge globally?

Part of our state's heritage is a network of 300 automotive industry suppliers and we've recently amassed a lot of international investors around EVs, particularly in relation to lithium. That's mainly because you need a central location to produce and distribute lithium and batteries, and we are close to huge EV production facilities of Tesla and Volkswagen. As well as proximity to big vehicle manufacturers, investments are being driven by our green energy, the chemical engineering know-how of our universities and the opportunity to make partnerships here. Our downstream e-battery industry is also remarkable: we have a strong thread of research going on in battery recycling and great battery testing facilities, for instance.

How attractive are Saxony-Anhalt's cities for those considering investing, living or working in the state?

The high quality of life in Saxony-Anhalt has helped us attract many investors. I would like to illustrate this by looking at Halle. Within that city is Germany's second-largest park for tech industries, which is strong in biotechnology, life sciences and pharmaceuticals. It's also a beautiful, green city, with the River Saale flowing through it and a historic landscape: if you're a fan of architecture, you can find great buildings from every century, from medieval Gothic to Renaissance Baroque and contemporary industrial style. Halle is also a university city full of culture, art, a lively social scene, cozy co-working spaces and it's easily traversable by bicycle. Saxony-Anhalt as a whole is the perfect place to live and work.

A Silicon Junction that connects the EU

In March 2022, Intel announced that it would be developing a mega semiconductor factory in Magdeburg. Worth \$17 billion, two state-of-the-art facilities will cover 1,000 square hectares and will be 100-percent powered by green energy. We asked Christin Eisenschmid, managing director of Intel Germany, what the deciding reasons were for choosing the capital city of Saxony-Anhalt as the location for this substantial investment project.

Germany's skilled workforce and central geographical location were important factors, but it shouldn't be forgotten that Germany is the fourth-largest economy worldwide. The country also offers an unparalleled ecosystem of small and medium-sized enterprises, suppliers and houses many so-called hidden champions. In addition, the city of Magdeburg itself provides the necessary infrastructure and space, plus it scores highly due to its close proximity to universities.



Christin Eisenschmid
Managing Director
Intel Germany

"At the center of Europe and with top talent, superb infrastructure and an existing ecosystem of suppliers and customers, Saxony-Anhalt is an ideal place to establish a new hub."

Christin Eisenschmid, Managing Director, Intel Germany

Intel CEO Pat Gelsinger coined the term Silicon Junction in relation to your new factory acting as a hub for advanced chip making. Could you describe Intel's Silicon Junction concept in more detail?

At the center of Europe and with top talent, superb infrastructure and an existing ecosystem of suppliers and customers, Saxony-Anhalt is an ideal place to establish a new hub. Intel plans to refer to the Magdeburg site as the Silicon Junction that is connecting technology. This Silicon Junction will serve as the connection point for other centers of innovation and manufacturing across the European Union: besides this leading-edge semiconductor factory in Germany, there are plans to establish a new research, development (R&D) and design hub in France, and to expand capacities in R&D, manufacturing and foundry services in Ireland, Italy, Poland and Spain.

More than 3,000 jobs will be created at Intel Magdeburg and many others in companies that will supply it. In your experience, how important are soft location factors for attracting the international talent Intel needs in order to prosper?

As a company, Intel offers an extensive package of benefits for employees and their families, such as performance rewards, a stock program or sabbatical programs. Besides that, soft factors can definitely make a location more attractive. Intel assesses a possible new location according to some general parameters of livability. All indicators of a high quality of life are important, which include elements such as education, leisure activities and cultural offers.

Excellence in sustainable chemistry

Saxony-Anhalt has capitalized on its traditional strengths in chemistry to emerge as an innovative hub for green chemicals and hydrogen

Among the attractions for investors in Saxony-Anhalt are twelve Centers of Excellence, where businesses and researchers innovate together to take products from initial ideas to global markets in sectors such as chemicals, pharmaceuticals, medtech, e-mobility, the bioeconomy and hydrogen.

Each location combines the talents and resources of leading industry players, startups, universities and research institutions, as well as relevant component manufacturers, technical colleges and other service providers. As befits the state's heritage, five of the centers are large-scale chemical parks that form the core of the renowned Central German Chemical Triangle. Overall, more than 500 companies employ around 23,000 people, generate about €9 billion a year and work alongside 15 research centers in these five parks. Collectively, they cover the value chain from basic chemicals to finished products, and they are driving global innovation in areas like agrochemicals, pharmaceuticals, synthetic resins and fibers, fine and specialty chemicals, chemistry for electric drives and batteries, sustainable chemistry and high-performance materials.

“The biggest global trends in chemistry are renewable materials, the circular economy and hydrogen, and we are attracting important investments in these areas.”

Dr. Christof Günther, Managing Director, InfraLeuna

As well as networking opportunities and substantial space to grow, residency in the parks brings other benefits. All contain cutting-edge infrastructure plus technology, logistics and security services that enable plug-and-play efficiency. All are well connected to Europe's transport network via road, rail and Leipzig-Halle airport. And all share a feedstock integration system that ensures a rapid, cheap supply of raw materials. Each park is distinctly different, however. The oldest, 1,200-hectare Bitterfeld-Wolfen Chemical Park, is home to businesses of all sizes and ages, including entities such as Dow, Bayer, AkzoNobel and ICL. It specializes in areas like chlorine, phosphorous, color, pharmaceuticals, fine chemicals, alloys, plastics, solar and battery technologies, with the Netherland's AMG currently constructing a \$120-million refinery for lithium hydroxide there.

Powered by solar and with an on-site facility producing methane from maize, Zeitz Chemical and Industry Park is also making a name for itself as a location for green chemistry, particularly in relation to water-intensive industries. On the site at the moment, for instance, Ukraine's Interstarch is



Leuna is the heart of the Central German chemical triangle

converting wheat into industrial starch, while U.S.-based Puraglobe's process for manufacturing base oil from spent oil is significantly reducing carbon emissions. The remaining three Centers of Excellence are plastics-focused Schkopau-Böhlen Dow Value Park, Piesteritz Agro-Chemical Park and Chemical Site Leuna, the country's largest park for the industry.

Since 1990, 100 firms that include Domo, Dow, Shell and TotalEnergies have invested over €9 billion in Leuna, a figure that is rising sharply, says Dr. Christof Günther, managing director of the site's operator InfraLeuna. “We're experiencing dynamic growth, with companies currently investing more than €2 billion. The biggest global trends in chemistry are renewable materials, the circular economy and hydrogen, and we're attracting important investments in these areas. Decisive factors in this include our competitive and comprehensive infrastructure and excellent supply of green energy.” Among the site's latest investment projects, Finland's UPM is constructing a €750-million biorefinery to create next-gen biochemicals from locally sourced sustainable wood, Japan's Topas Advanced Polymers is installing a new plant for innovative, easily recyclable plastic and Linde is building the world's largest plant for generating and liquefying green hydrogen, which will double the local gas group's hydrogen production to 3,200 metric tons.

Saxony-Anhalt has been developing its hydrogen economy for decades and is seen as a model region for the fuel's development, notes Günther. “Leuna is at the heart of that, as the hydrogen we produce is already supplied to clients through Central Europe's second-longest pipeline system for the gas. We also have the Fraunhofer Hydrogen Lab Leuna, which includes an industrial-scale test platform.” Saxony-Anhalt's pioneering competences in hydrogen extend beyond a single park. The world's first underground hydrogen storage facility is being established in the state, for instance, while the new H2 test village at Bitterfeld-Wolfen Chemical Park is used for projects that aim to assimilate hydrogen into future mobility and as an energy carrier for industry, commerce or houses.

The state intends to retain its position as one of Europe's most innovative hubs for sustainable chemistry, Günther stresses. “We will carry on investing strongly in the development of our infrastructure, so that companies continue to find the optimal conditions for growth and new projects here.”



Dr. Christof Günther
Managing Director
InfraLeuna

A healthy location for innovators in life sciences

The state's concerted cultivation of its pharmaceutical, biotechnology and medtech industries helped the world fight back against COVID-19

Saxony-Anhalt has long been a prime location for innovation in life sciences, with high-performance clusters, Centers of Excellence and government bodies encouraging both investments and profitable collaborations between companies, research institutions and universities in pharmaceuticals, biotechnology and medtech.

The state's pharmaceutical sector alone generates over €1 billion in export revenues a year from businesses that include subsidiaries of international giants such as Bayer and Sandoz, world-leading local firms and emerging high-tech specialists. They are supported in bringing new products to market rapidly by the close presence of active ingredient, packaging, equipment, contract research and other suppliers. One hotspot for pharmaceuticals is Biopharmapark Dessau, a 136-hectare center of excellence offering cutting-edge infrastructure and services that are specifically designed to meet the industry's needs. Among the tenants of the spacious industrial park are Merz, the global operator in aesthetic- and neurotoxin-related pharmaceuticals, and Ceva, the front-runner in animal health that has production and innovation centers at the site. Another, IDT Biologika, illustrates a core strength of Saxony-Anhalt: vaccines.

IDT is one of the world's most important developers and contract manufacturers of virus vaccines, viral vectors and other biologics, with a workforce of 1,600 in Biopharmapark providing worldwide clients with end-to-end services from preclinical research to commercial supply. IDT's response to COVID-19 demonstrates how adeptly the state's pharmaceutical industry responds to challenges: as well as initiating the development of its own vaccine with the German Center for Vaccine Research, it formed early partnerships with both Johnson & Johnson and AstraZeneca to manufacture their vaccines for global distribution. IDT was able to start producing vast quantities of these vaccines quickly by adjusting its workflows, but is now investing €100 million in the expansion of its manufacturing plant that will make it the biggest facility of its type in Europe.

Other pharmaceutical and biotech companies are based at Technology Park Weinberg Campus in Halle, the largest site for life and material sciences in central Germany. At this center of excellence, over 100 companies work alongside renowned research institutes and the Martin Luther University of Halle-Wittenberg, while its innovation hub for entrepreneurs



Close to 5,000 people work in Saxony-Anhalt's pharma industry

has helped launch about 200 startups to date. Notable examples include Verovaccines, a spin-off from the on-site university, which is developing revolutionary animal vaccines from yeasts.

Many of the park's tenants are innovators in medtech, a sector in which Saxony-Anhalt boasts around 120 companies overall. Those firms are producing solutions covering all aspects of health, with conspicuous strengths being e-health, imaging, autonomy in old age, prostheses and surgical robots. Among the global players in the state are Chile's Novoplast, which specializes in small-diameter hoses, and Mecotec, a leader in high-tech cooling chambers for the health, wellness and sport industries.

In 2020, Mecotec made international headlines for its pioneering development of stationary and mobile container units that safely transport and cool the BioNTech-Pfizer mRNA COVID-19 vaccine and similar products. These unique units can maintain vaccines at a temperature of -80°C, store over 500,000 doses and operate for 24 hours without an external power source. “Innovative solutions are required for the storage and distribution of COVID-19 vaccines and we're delighted that we're contributing to that due to our 20 years of experience in industrial deep cooling,” says Enrico Klauer, Mecotec's managing director. “Our containers cover the entire logistics chain, from deep freezing of the vaccine directly after its manufacturing to withdrawal at distribution centers.” As a result of its innovation, Mecotec expects to double in size over the next five years.

“Innovative solutions are required for the storage and distribution of COVID-19 vaccines and we're delighted that we're contributing to that.”

Enrico Klauer, Managing Director, Mecotec

Numerous other firms can now take advantage of Saxony-Anhalt's increasing investment in its medtech capabilities to grow their businesses. For instance, an industrial cluster for medtech and plastics has formed in the town of Halberstadt and two other hubs have been established in the capital. The first is a medtech research campus that is a joint venture between Otto von Guericke University Magdeburg, Siemens Healthcare and the STIMULATE association of companies and research institutions. The second is the Health + IT Campus, which is providing local and international startups with affordable space and accelerator services to promote Saxony-Anhalt's next generation of high-tech life science innovations.

The right ingredients for bio-industries

The state's thriving bioeconomy benefits from a perfect mix of raw materials, infrastructure, industry know-how and scientific expertise

Saxony-Anhalt is a key node in the European Union's booming bioeconomy, which has been expanding in value by 13 percent a year and currently generates around €2 trillion in annual sales.

Germany contributes about €300 billion of that and Saxony-Anhalt leads the country's embrace of emerging bio-industries: the local government has been providing financial support for them since 2013 and they already contribute 16.4 percent of the state's industrial revenues. There are many reasons why its bioeconomy is flourishing. One is the plentiful availability of the raw materials these sectors are built on—the region benefits from some of Germany's most fertile lands and expansive agricultural and forestry sectors, which supply high-quality wood, cereals and sugar, along with a vast array of other crops, biological byproducts and biomass. Bio-manufacturers can also rely on a ready supply of clean energy from wind, solar and hydrogen to ensure end-to-end sustainable production processes.

“Saxony-Anhalt is home to a unique spectrum of competencies and research facilities that give it the potential to become a global model region for a sustainable bioeconomy.”

Michael Duetsch, Vice President, Biochemicals Business, UPM

Just as crucially, “Saxony-Anhalt is home to a unique spectrum of competencies and research facilities that give it the potential to become a global model region for a sustainable bioeconomy,” asserts Michael Duetsch, vice president of biochemicals business at UPM, the Finland-headquartered market leader in bio-based forestry products. The competencies he highlights include know-how and infrastructure contributed by the state's long-standing traditional industries—such as chemistry, pharmaceuticals, engineering, plastics, food and energy—as well as the skills of a multitude of bioeconomy companies with diverse focuses that have launched in Saxony-Anhalt or settled there.

Among the latter is UPM, which is currently building an industrial-scale biorefinery on a 1,300-hectare site in the Chemical Site Leuna industrial park to produce green basic chemicals from sustainable hardwood grown in the region. UPM's €550-million investment project, which was named Bio Act of the Year at the World BioEconomy Forum 2020, will pump out 220,000 metric tons of biochemicals every year that will enable its clients in plastics, textiles, cosmetics and other industries to move away from fossil-based alternatives. UPM is joining a thriving refinery sector



Much of Saxony-Anhalt is covered in sustainable forests

that contains firms like Verbio Ethanol Zörbig, which has been producing bioethanol from cereals since 2004, and CropEnergies that processes grains and sugar beet into bioethanol, protein animal feed and liquefied carbon dioxide.

Further strong sectors include bioplastics, novel plant-based foods, contract large-scale manufacturing of biochemicals and biopharmaceuticals. Hidden champion Heppe Medical Chitosan, for instance, is the world's preeminent supplier of high-purity chitosan, a naturally sourced polysaccharide that improves wound healing, while the latest investor in this area is the Netherlands' Echo Pharmaceuticals, which is about to start developing and manufacturing pharmaceutical, cosmetic and nutraceutical products from plants in Saxony-Anhalt. At the biotech campus of Green Gate Gatersleben, on the other hand, companies like Bayer are taking advantage of the on-site presence of one of the oldest and biggest agricultural and horticultural gene banks to develop improved varieties for more sustainable farming.

Many of the companies within all these industries are members of the state's BioEconomy Cluster, an organization that promotes collaboration in research, technology and other areas between bio-industry firms, enterprises working in associated sectors and research institutes. When it comes to bioeconomy research, the wide range of excellence in the region is second to none and has attracted many investors. For instance, a major factor in UPM choice of Saxony-Anhalt as a location for its biorefinery was the close proximity to the Fraunhofer Center for Chemical-Biotechnological Processes (CBP) that is currently researching the industrial production of chemicals and fuels from sustainable raw materials and has the capabilities to scale projects up from laboratory to pilot testing.

Other local specialists include the Anhalt University of Applied Sciences that has made groundbreaking developments for industry through its study of natural substances like algae and rhubarb; the Science Campus for Plant-Based Bioeconomy in Halle; the Fraunhofer Institute for Microstructure of Materials and Systems, which is researching composites made from renewable materials; the Institute of Agricultural and Food Sciences at Martin Luther University Halle-Wittenberg; and the German Biomass Research Centre. In order to encourage further innovation, the BioEconomy Cluster and CBP have recently established the BioEconomy Hub in Leuna's chemical park. This technology, production and service center is supporting startups and young companies to turn their innovative ideas into marketable reality. In the process, the hub is creating even more effective links and new value chains within the state's bioeconomy industries and helping to drive the state's green transition.

Realizing the incredible potential in algae

Collaboration between state, science and industry turns Saxony-Anhalt into a world-class competence center for green technologies

In 2021, U.K. company AlgaeCytes announced it was going to construct the world's largest algae production factory in the Saxony-Anhalt city of Dessau-Roßlau, an investment project valued at about €55 million.

Having operated a successful pilot plant for its innovative technologies in England, the firm carried out a worldwide search to find the ideal location for moving them up to an industrial scale. AlgaeCytes Germany's managing director, Andrew J. Cosentino, reveals why it picked Dessau: “Our choice was driven by the cooperation and support of the state, city and German governments; the avayzbrilable site; the location relative to European Union markets; and the intellectual resources in algae biotechnology offered at Anhalt University of Applied Sciences.”

Anchored by that institution, which has been engaged in applied research on the aquatic plants for over two decades, “Saxony-Anhalt has developed into an important center for algae technology,” says Carola Griehl, professor of biochemistry and head of the university's working group for algae biotechnology. The scientist explains why she is so passionate about the topic: “Algae can help the world address big challenges, such as climate change, declining food supplies and the need to replace fossil fuels. We want to develop the active substances these versatile organisms contain for use in foods, medicines, cosmetics, sustainable fuels and other industries. They have incredible potential as a renewable raw material.”

Algae deliver numerous advantages in comparison to other natural sources of ingredients: they can be cultivated all year round in bioreactors rather than on scarce agricultural land, while they also reproduce faster, produce larger harvests and capture more carbon dioxide than many traditional crops. And alongside compounds like vitamins, proteins, dyes and carotenoids, some generate omega-3 fatty acids, making them a vastly more sustainable option for obtaining those vital nutrients than the depleting fish stocks in our oceans. What is most exciting about the organisms, however, is how much there is still to discover, Griehl enthuses. “53,000 species have been classified to date and we know little about their ingredients, with only about 15 microalgae currently being used in industry. One way the university is working to solve that is by constantly building up our own collection of worldwide strains for our research.” Griehl highlights two projects her team are engaged in to illustrate the diversity of its research. The first is the development of a blue beer that not only tastes great, but could also have



Carola Griehl
Professor of Biochemistry
Anhalt University of Applied Sciences



Roquette Klötze manufactures highly pure microalgae products

anti-inflammatory and anti-carcinogenic health benefits. In the second, the scientists have devised a scalable technique for ‘milking’ an algae which secretes petroleum-like hydrocarbons.

The university is supported in its endeavors to realize the opportunities in algae by a network of organizations in Saxony-Anhalt. For example, it collaborates on scaling up laboratory successes with the Fraunhofer Centre for Chemical-Biotechnological Processes and with Roquette Klötze, a company that established the world's first industrial photobioreactor for reproducing microalgae. It also partnered with local engineering group GICON to establish the Biosolar Center in Köthen that is developing technologies for the large-scale production of active algal ingredients. Most recently, in 2021, Anhalt University teamed up with the Fraunhofer Institute for Cell Therapy and Immunology to launch the Center for Natural Product-Based Therapeutics, which is researching algae-based substances for treating neurodegenerative diseases.

“We share a common goal with Saxony-Anhalt to promote biotechnology and algae research and to provide sustainable solutions for industry.”

Andrew J. Cosentino, Managing Director, AlgaeCytes Germany

The next step, states Griehl, is the establishment of a national algae center in Saxony-Anhalt that will function as a cluster for industrial and research partners. A key cog in this ecosystem will be AlgaeCytes and its huge plant that is due to open in 2023. Covering 10-hectares and powered by renewable energy, it is expected to produce 300 metric tons of algae a year, which will be processed into omega-3 oils, beta-carotene and other ingredients, with the residue being used in fertilizer. According to Jörn Saß, venture partner at Zybra Capital, which is advising the firm, “AlgaeCytes's focus on sustainability by providing vegan nutrients and removing reliance on fish resonates well with investors and the pharmaceutical industry. We expect that this will make it one of the most valuable biotechnology businesses in the coming years.” The company is equally optimistic about the future, says Cosentino: “Building our first commercial facility in Dessau is an exciting milestone for us as we seek to meet the high demand for our products. We share a common goal with Saxony-Anhalt to promote biotechnology and algae research and to provide sustainable solutions for industry. The regional government and stakeholders have been extremely supportive and we look forward to developing our local partnerships.”

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