

# MARKETS

**GERMANY**

2/20



## CONFRONTING CORONA

Sensible health policy, scientific infrastructure, support for businesses, social solidarity and a bit of inspiration and luck ...  
all reasons why Germany's early crisis measures have worked.

→ **pages 4, 6, 8**

E-Mobility:

***German automotive's  
electrifying move  
forward***

**page 10**

Technology:

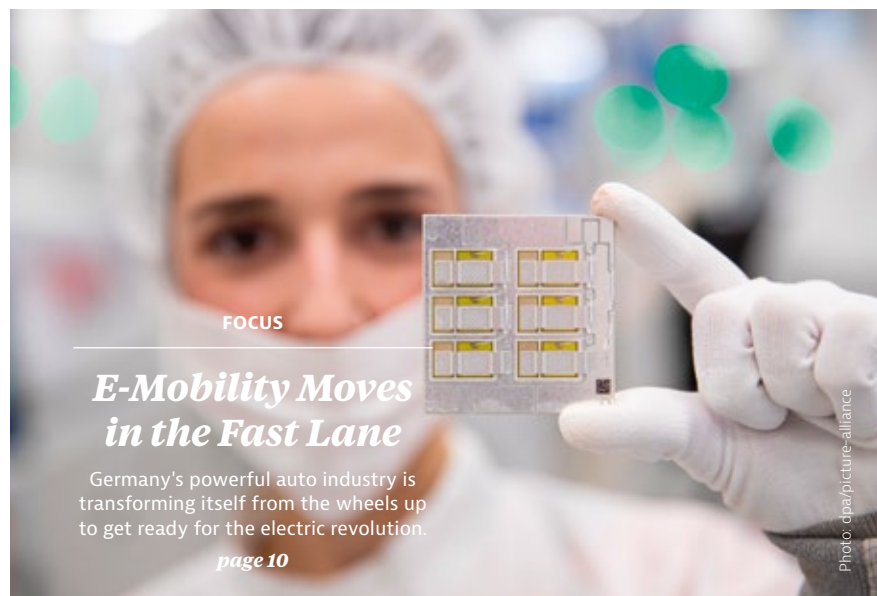
***Digitalization is  
changing Germany's  
agricultural landscape***

**page 20**

Technology:

***Inside Germany's  
billion-euro robotics  
industry***

**page 24**



FOCUS

## E-Mobility Moves in the Fast Lane

Germany's powerful auto industry is transforming itself from the wheels up to get ready for the electric revolution.

page 10

Photo: dpa/picture-alliance

### TECHNOLOGY



Photo: BASF

## Get Ready for Agtech

From machinery-as-a-service to modular vertical farms, digitalization is changing Germany's agricultural landscape.

page 20

### TECHNOLOGY

## Robots Redux

Germany's billion-euro robotics industry has a wealth of solutions to the problems of tomorrow – and today.

page 24

### CORONAVIRUS

## Fighting SARS-CoV-2

German pharma companies are working on potential vaccines.

page 6

### MORE ARTICLES IN THIS ISSUE:

**Corona and the Economy:** Germany is showing resilience in the face of the global crisis ..... page 4

**Corona Crisis Insight:** Leading pharmaceutical representative Han Steutel on continuing pharma research ..... page 8

**Weinberg Campus:** Saxony-Anhalt's tech park for life and materials sciences ..... page 9

**In Brief:** The Hawk supercomputer, a digital-environmental agenda and Germans in space ... page 18

**Bootstrap Germany:** Entrepreneurs have flocked to Berlin, Hamburg and other cities ..... page 27

**Beyond Brexit:** GTAI's London team has been rather busy since the UK's 2016 vote ... page 28

**Interview:** Jochen Homann is the man in charge of Germany's 5G ..... page 30



— The Digital Magazine

Online at:

[www.marketsgermany.com](http://www.marketsgermany.com)

**Publisher:** Germany Trade & Invest Gesellschaft für Außenwirtschaft und Standortmarketing mbH, Friedrichstraße 60, 10117 Berlin, T. +49 30 200 099-0, F. +49 30 200 099-111, office@gtai.com, www.gtai.com

**Executive Board:** Dr. Jürgen Friedrich, Chairman/CEO; Dr. Robert Hermann, CEO

**Director Corporate Communications:** Andreas Bilfinger

**Managing and Content Editor:** Eva Forinyak

**Editor:** Jefferson Chase

**Editorial Team Kammann Rossi/wortwert:** Imogen O'Rourke, David Batty, Christoph Hus, Jürgen Jehle

**Design and Layout:** Arne Büdts, Verena Matl, Jens Tappe

**Print:** Kern GmbH, 66450 Bexbach, www.kerndruck.de

**Circulation:** 5,000

**Distribution:** Markets Germany is distributed solely by the publisher all over the world.

**Notes:** © Germany Trade & Invest, June 2020

All information provided by Germany Trade & Invest has been gathered with the utmost care. We assume no liability, however, for the accuracy of the information provided. Articles published under specific names do not necessarily reflect the opinion of the publisher. No reprints may be made without the prior consent of the publisher. Unless specified otherwise, the copyright for pictures is held by Germany Trade & Invest.

**Order number:** 21171

**Cover:** © dpa/picture-alliance



Federal Ministry  
for Economic Affairs  
and Energy

on the basis of a decision  
by the German Bundestag



**»If there is any cause for optimism, it's the tremendous creativity that people around the world, including in Germany, display.«**

Dear Reader,

As I write these words, Germany is in an unprecedented social and economic lockdown to combat the coronavirus pandemic. By the time you read them, much will have undoubtedly changed in the world, and far be it from me or Germany Trade & Invest to predict what the future will hold. For this reason, you will note that this issue of Markets Germany is mostly not about the pandemic. We simply don't know what is to come.

The one major exception is our interviews. GTAI Managing Director of Investor Consulting Achim Hartig talks about the effects of the coronavirus crisis on Germany and the opportunities that may result. Meanwhile, GTAI Director of Chemicals and Health Marcus Schmidt discusses German pharmaceutical and biotech companies' efforts to develop a vaccine against SARS-CoV-2. Those firms include CureVac, which made headlines as the extent of the virus in the West was becoming known this spring, and BioNTech, which is working together with U.S. pharmaceutical giant Pfizer.

The coronavirus has destroyed lives and livelihoods around the world. Yet life goes on. If there is any cause for optimism, it's the tremendous creativity that people around the world, including Germany, are displaying in finding solutions to all sorts of problems. Examples of this ingenuity abound on these pages. I hope you enjoy discovering them.

**Dr. Robert Hermann, CEO**

Email: [invest@gtai.com](mailto:invest@gtai.com)



# ONE TO WATCH

## *Lidia Nachbaur, managing director of Qventis*

An office, a lab and EUR 50,000 – that's all Lidia Nachbaur needed to start Qventis, a medical devices firm in Hennigsdorf, a small town in the state of Brandenburg, outside Berlin. It was here in 2016 that Nachbaur, a chemist from Portugal with 18 years' experience in the medical devices industry, took a chance and founded her start-up. "When you take a decision, you just jump in – you're not aware of all the burdens and barriers you will face," she says. "I wanted to develop innovative products for regenerative medicine, and only people with passion do this."

Regenerative medicine entails a paradigm shift in medical treatment: Instead of treating symptoms, it is about stimulating the regenerative potential of the human body. Nachbaur's work is guided by what she calls the "four R's": rejuvenating, repairing, replacing and restoring. "Our strategy is to develop products that are based on the body's own building blocks." The applications are wide-ranging: from smoothing wrinkles to restoring joint fluids and healing wounds faster. Qventis' top brand is RENÉE, a product line based on hyaluronic acid gels for facial rejuvenation, but the company has a number of patents in progress.

Nachbaur chose Germany because it has the best infrastructure for supporting new companies. "In the biotech and medtech sector in Europe, Germany is just No. 1."

### *Quick facts*

**Name** Lidia Nachbaur **Nationality** Portuguese/German

**Company name** Qventis GmbH **Founded** 2016

**Based in** Hennigsdorf, Brandenburg **Industry** Medical devices

**Capital invested** €50,000 **Number of employees** 5



[www.qventis.com](http://www.qventis.com)





# Corona and the German Economy

We speak with Achim Hartig, Germany Trade & Invest's managing director of investor consulting, about Germany's relative success in dealing with the coronavirus threat and what is likely to come next.

**The coronavirus crisis is going to change the world, including Germany. Can you see any early trends that should be of interest to potential investors?**

**ACHIM HARTIG:** Without doubt, the crisis will affect the growth and output of all economies, including Germany's. But we already have to start looking beyond it. Germany's economic structure is not going to be significantly different after the crisis. All we're expecting is temporary restrictions on growth. It will still be attractive for foreign companies to invest in a technologically advanced business location like Germany with a highly prominent, diversified landscape of SMEs and a wealthy consumer market.

**The effects of the coronavirus will continue for some time, but Germany looks as though it has limited the damage. What has Germany done right?**

**HARTIG:** One thing that helps us in the crisis is our decentralization. In Germany's federal system, political responsibilities, including those in the healthcare system, are devolved throughout the country right down to the regional level. That means that local authorities are able to directly address concerns that land on their doorstep quickly and flexibly.

Also, the prevalence of SMEs in the economic landscape has meant that hundreds of laboratories could conduct tests. This has saved a significant amount of time. Moreover, Germany's efforts to combat Covid-19 have been able to build on a well-developed healthcare system with an impressive network of university research hospitals spread across the country. All these factors have been major contributors to Germany's success.

**Can things continue as they were before?**


**HARTIG:** As is the case with politics and the economy, the German healthcare system constantly monitors how effective measures are and makes adjustments. Mid- and post-crisis, it's important to constantly re-evaluate the measures that have been taken and implemented.

We're learning all the time, and I'm convinced that in the emotional heat of the crisis we will not abandon the things that have previously proven so effective. Instead, we'll examine where value chains are most fragile, how we can support businesses that have become most vulnerable, for instance, to hostile takeovers, and what technologies and resources will help us to better weather crises in the future.

**Coronavirus has been a stress test for digitalization globally. How's Germany doing in this regard?**

**HARTIG:** Germany hasn't always had the best reputation where the digital realm is concerned, but it's passed this stress test remarkably well, as indicated by the numbers of people who are able to work remotely without the Internet breaking down. Without question, the crisis has given a major boost to digitalization in Germany. You only need to look at the number of people who pay for their supermarket groceries electronically now compared with pre-corona times to see that the acceptance of digital solutions is growing by leaps and bounds.

Moreover, and crucially for the further development of German industry, the crisis has encouraged businesses to adopt a higher degree of automation, which will ultimately lead to more innovation and economic competitiveness (see p. 24).



Back to work: Protective masks are worn on Volkswagen's assembly line. VW restarted Europe's largest car factory in Wolfsburg on April 27, after the coronavirus shutdown.



**Like many countries, the German government has pumped massive amounts of money into the economy. In the previous economic crisis of 2008, policies like state support for furloughed workers helped Germany emerge as one of the global winners. Will the same be true in this crisis?**

**HARTIG:** The German government has been widely praised for swift assistance measures for businesses in the early phase of the pandemic. These measures – which range from direct subsidies to as-

sistance with payrolls to state guarantees for low-interest loans – have helped many firms remain solvent as sources of income are suspended. But it's too early to say what the final upshot will be.

**As things stand now (in early May), how would you convince a foreign company to invest in Germany?**

**HARTIG:** I would stress three things. The crisis has not destroyed Germany's know-how and economic structure, which are its main advantages over other countries and main reasons for foreign companies to invest here. Moreover, the corona crisis shows how important it is for businesses to have broad foundations – being a part of Europe's largest market is a good way of doing just that. And the German government's response shows that companies that do decide to set up shop in Germany can count on rational, swift and effective state leadership and assistance when times get tough.

**What effect has the crisis had on your own efforts to attract foreign investment to Germany?**

**HARTIG:** Interest across the various sectors is currently down between 15 and

20 percent. But from our conversations with investors and exchanges with other investment promotion agencies, we're seeing that most investors have merely deferred projects, not cancelled them. That's what we expected, but it's still good news.

**Experts think that global supply chains could be permanently altered by the corona crisis. In particular, the world's industrial nations could try to shorten chains to suppliers. Is this a positive scenario for potential investors in Germany?**

**HARTIG:** Here we need to differentiate. Some expert groups like the IfM in Germany have come out strongly against any attempts to renationalize added-value and supply chains. That makes sense insofar as it's questionable whether things can be produced profitably in one's own country alone, or whether it's more competitive to divide value chains up into segments.

We can expect that governments will be taking a look at fundamental products and services critical to the functioning of the system and then deciding if they should influence the market in these areas. Ideally, in Europe, this would happen at the European level.

**Finally, is there any particular area in Germany that you predict will emerge stronger from the corona crisis?**

**HARTIG:** It's hard to imagine that the medtech sector wouldn't be strengthened by the current crisis. The world is looking to Germany right now for solutions to these enormous challenges, and Germany's reputation for technical excellence and know-how in this area has been reinforced. It's no accident that American television stations are eager to interview the German Health Minister, Jens Spahn, to gain insights into the "German secret" in dealing with corona. Beyond that, however, any businesses that focus on digitalization will likely stand to gain since the crisis has underscored the need for solutions that work remotely without the need for face-to-face contact.



Contact:  
**Achim Hartig**  
[invest@gtai.com](mailto:invest@gtai.com)  
*GTAI Managing Director  
of Investor Consulting*





# German Firms Fighting SARS-CoV-2

Photo: Avatar\_023/ Getty Images

German companies are at the heart of the emergency development of potential coronavirus vaccines. That's no accident considering Germany's importance in both the pharmaceutical and biotechnology sectors. Germany Trade & Invest Director of Chemicals and Health Marcus Schmidt gives us the lowdown on this crucial area.

**The company CureVac made the headlines in early March, but it's not the only German firm working on a vaccine against the coronavirus and other pathogens. How big is this sector? Where are the hubs?**

**MARCUS SCHMIDT:** Right now there are dozens of companies worldwide developing anti-corona vaccines, including the German firms CureVac in Tübingen and BioNTech in Mainz. Also actively involved in researching vaccines in general are, for example, Vaxxilon in Berlin and Bavarian Nordic near Munich.

There are also large international vaccine manufacturers with subsidiaries in Germany.

They include GlaxoSmithKline with its manufacturing locations in Marburg and Dresden and Merck Sharp & Dohme (MSD), which employs more than 2,000 people at seven locations in Germany. Among other things, they produce vaccines to prevent influenza, tick-borne encephalitis (TBE), diphtheria, whooping cough and rabies.

The Japanese company Takeda recently opened a sterile production facility in Singen in southwestern Germany for a vaccine to combat dengue fever. The EUR 130 million facility is expected to employ 200 people.

The market for vaccines worldwide is currently around USD 40 billion and is growing disproportionately fast.

**What are the typical procedures for developing a vaccine and having it approved? How long can it take to get a vaccine on the market?**

**SCHMIDT:** Developing new medicines is a highly complex endeavor. The complete process from developing a vaccine to getting it approved consists of many hundreds of individual steps and takes, on average, more than 13 years despite modern technology. After all, medicine needs to be effective and safe.

Because of the special urgency in this case, vaccine producers and regulators work together to expedite processes. To this end, years ago, the EU established the PRIME (Priority Medicines) procedure to make badly needed and previously unavailable medicines available as soon as possible without sacrificing public safety.

It took around four years to get vaccines against Ebola and avian flu approved. However, the process could be significantly faster with SARS-CoV-2 because companies aren't starting from scratch. Antipathogens that could help in the fight against the disease already exist and now need to be clinically tested. There are reasons to think that the



## »As Europe's leading pharmaceuticals location, Germany offers a particularly good environment.«

Marcus Schmidt, GTAI Director of Chemicals and Health

first vaccines might be available this year. But before they can be prescribed generally, they will have to be approved by an internationally recognized regulatory authority.

### Germany seems to be at the forefront of vaccine research. Why is this?

**SCHMIDT:** Like all modern medicines, vaccines are high-tech products. To research and develop them, you need the latest analysis and synthesis technology, genetic laboratories, high-performance computers, analytic robots and a lot of other things. Equally important are highly qualified pharmaceutical scientists, an effective research landscape and efficient regulatory authorities.

So it's no accident that the large Western vaccine companies have concentrated 70 percent of their industrial R&D efforts and an impressive 80 percent of their worldwide production facilities in Europe. As Europe's leading pharmaceutical location, Germany offers a particularly good environment. No other country spends as much money as Germany on pharmaceutical R&D.

### How does the government support research?

**SCHMIDT:** Germany is very concerned with the areas of health and caring for the sick in general. Consequently, in the government's 2025 High-Tech Strategy, which sets the framework for policies aimed at encouraging innovation in the coming years, one particular focus is on pharmaceutical research.

The development of vaccines and other medicines in Germany is supported by a number of tools to encourage research. Projects that are particularly important right now and for the future are constantly being unwritten.

SMEs can profit from what is known as the Zentrales Innovationsprogramm Mittelstand (ZIM) – Central Innovation Program for SMEs – from the Ministry for Economic Affairs and Energy, which financially supports research projects and networks. In addition, from the beginning of this year, all companies in Germany get tax breaks for research expenditures.

But what's just as important as financial support is the entire research landscape, which also receives significant assistance from the government. This encompasses German universities and other institutions that educate specialists, Germany's research hospitals and the country's numerous, highly specialized biotechnology clusters.

### How well connected internationally are Germany's research institutions, and how does the pharmaceutical industry work together with biotech companies?

**SCHMIDT:** Because of the great complexity of the subject, international cooperation is common within the pharmaceutical sector. So, too, is collaboration between large pharmaceutical companies and innovative biotech firms. One example is the cooperation between BioNTech and U.S. pharmaceuticals giant Pfizer to develop a messenger-RNA-based SARS-CoV-2 vaccine. The Chinese pharmaceutical company Fosun also provided BioNTech with EUR 120 million to develop an anti-coronavirus vaccine.

There are lots of similar examples. German biotechnology companies like Immutics, Affimed, CureVac and Medigene are hardly household names. But they also work closely together with international pharmaceutical conglomerates like Novartis, Roche, Pfizer and Amgen and have a bright future if their research is successful.

In the context of the coronavirus pandemic, it's also important to mention the Coalition for Epidemic Preparedness Innovations (CEPI). CEPI brings together international public and private vaccine developers, for example in Germany, CureVac and the Deutsches Zentrum für Infektionsforschung (German Center for Infection Research).

### Could you give us a recent example of a successful German-developed vaccine?

**SCHMIDT:** Since the end of 2019, there has been a European Medicines Agency-approved vaccine against the highly infectious Ebola virus. It was largely developed in Germany and is produced here. This medication has been in use for quite a while but was finally approved by a regulatory authority for general use last year.

The vaccine originated in a research project of Health Canada, and it was completed by the American company MSD in Germany. To do so, MSD collaborated closely with the University Medical Center Hamburg-Eppendorf and the Paul Ehrlich Institute. Funding for the vaccine's development was provided by the German Ministry of Education and Research as well as Gavi, the Vaccine Alliance (Global Alliance for Vaccines and Immunization), which Germany also helps finance. The vaccine is produced at the MSD location in Burgwedel near the city of Hannover in northern Germany. From there it is distributed to everywhere in the world that needs it.

This example shows how important international cooperation is in this area and what a positive role Germany is playing in the development and production of crucial medicines.

# German Pharma Leads the Fightback

With the world looking for responses to the corona pandemic, Germany's pharmaceutical firms are attracting a lot of attention. Han Steutel, president of the German Association of Research-Based Pharmaceutical Companies (vfa), provides an overview.

## What is the state of play concerning coronavirus vaccines and medications to combat SARS-CoV-2?

**HAN STEUTEL:** There are around 60 companies and institutes around the world working at full speed on vaccines. Several dozens of existing medications are being tested to see if they can help corona patients, and a series of new medications are being developed, mostly on the basis of antibodies. German companies and institutes are taking part in all three efforts.

## Can existing medications be repurposed to provide a quicker route to treating the coronavirus?

**STEUTEL:** The compatibility of approved medications with human health has already been confirmed, and mass production is already up and running, whereas these two aspects still need to be secured for newly developed medications.

## How are pharma companies cooperating with biotech firms? And how international are the efforts to develop vaccines?

**STEUTEL:** Companies generally cooperate internationally. Big firms work together to develop new pharmaceuticals. Biotech companies work with large multinationals to test out their studies and mass-produce new medications. Many companies offer their expertise and resources to other companies to help them make progress as well.

## Can drugs companies benefit from the knowledge generated by the university medical network on Covid-19 research?

**STEUTEL:** University medicine, which is

### FACTS & FIGURES



Within Germany's biotech and medtech clusters, there is close cooperation between research institutes and the private sector. In 2018, biotech companies in Germany spent EUR 1.2 billion on research and development.



**Han Steutel** took the reins at vfa (an association which represents two-thirds of the German pharmaceutical market) in 2019. The Dutchman is also managing director of Bristol-Myers Squibb.

performed at a very high level in Germany, is another source of important ideas for Covid-19 treatments. Here, too, cooperative agreements are arranged to develop generally available products. University medicine is an essential partner for testing medications for Covid-19 patients.

## Are there pharmaceutical companies in Germany that don't do research?

**STEUTEL:** At present, there are 44 research-based pharmaceutical companies in Germany. In addition, there are firms with a palette of older medications and ones that exclusively produce generics.

## Is it correct to talk about "German companies" in the age of globalization?

**STEUTEL:** We should speak of pharmaceutical companies that do their work in Germany. They make Germany the pharmaceutical location that it is – one that plays a leading role internationally.

## Do you believe the corona crisis will lead to a rethink within the drugs industry?

### For example, will companies locate more of their production in Germany?

**STEUTEL:** Germany is one of the world's strongest production locations where innovative, patented medications are concerned. Even amid the stress test of the corona pandemic, Germany has remained capable of delivering products; for example, it exports significantly more patented medications to China than it imports from there. Could Germany take on a greater share of global production? Well, we would certainly enter that debate from a position of strength.



# Rich & Deep in R&D

Halle's Weinberg Campus Technology Park is a prime location in eastern Germany for international R&D in the fields of life sciences and materials sciences. Since opening its doors in 1993, it has provided a platform for around 250 start-ups.

**T**he Weinberg Campus technology park in the state of Saxony-Anhalt is the largest institution of its kind in eastern Germany and brings together more than 100 innovative companies and renowned research institutes focusing on life sciences and materials sciences.

Established in 1993 in the city of Halle, the Weinberg Campus hosts some 5,500 scientists and employees, among them biochemists, biotechnologists, materials scientists, pharmacists, agronomists and nutritionists. The site offers an ideal collaborative environment for applied R&D and production.

Due to its rich research environment – the campus is home to the Fraunhofer Institute for Microstructure of Materials and Systems (IMWS), the Helmholtz Centre for Environmental Research, the Leibniz Institute of Plant Biochemistry and the Max Planck Institute of Microstructure Physics – it has become a prime location for both domestic and foreign companies, including Heppe Medical Chitosan (HMC+) and RGCC Central Europe, a division of Swiss medical genetics company RGCC Group.

“We are in a particularly advantageous situation thanks to the compact nature of the Weinberg Campus, which means we are near to both the university and the research institutes,” says Katja Richter, managing director of HMC+, which produces a type of biopolymer derived from the shells of crustaceans. “This facilitates productive collaboration and helps us to find new partners.”

## OVERVIEW

### A Hub for Life and Materials Sciences



The Weinberg Campus has grown from a single building for tech start-ups in 1993 to a science park that employs 5,500 people.

#### Driving growth and employment

# 250

Approximate number of start-ups founded at the Weinberg Campus Technology Park since its establishment in 1993

# 5,500

Approximate number of people currently employed at the Weinberg Campus Technology Park

Source: Weinberg Campus;  
Photo: TGZ Halle GmbH/Marco Warmuths

Resident firms also include Vivoryon Therapeutics, which develops treatments for Alzheimer's disease. The company's investors include a Danish consortium led by Dr. Claus Christiansen, chairman of Denmark's Nordic Bioscience. Vivoryon is currently partnering with Nordic Bioscience on the development of its PQ912 therapy for Alzheimer's.

#### Dynamic campus with a global focus

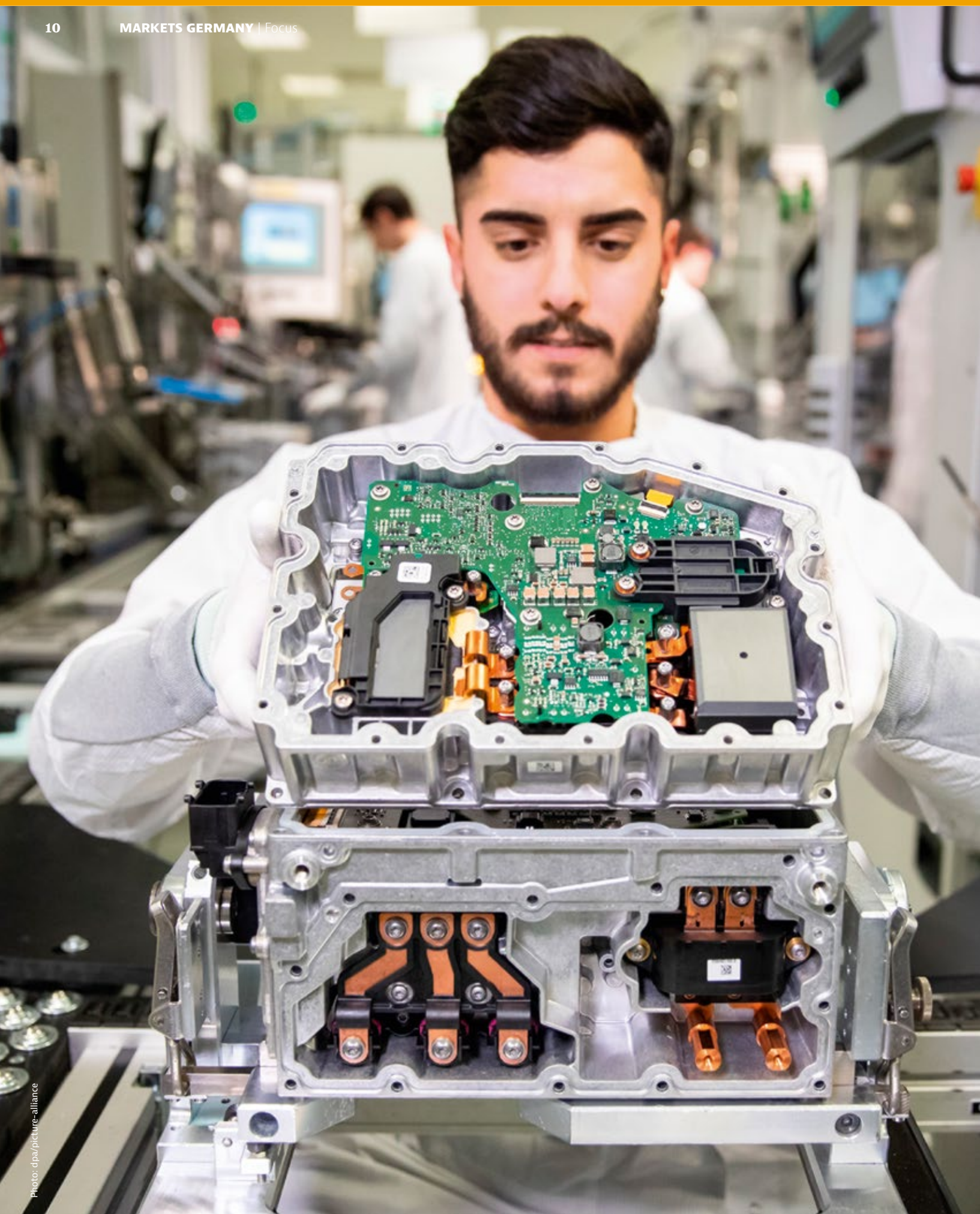
Also located on site is Icon Genetics GmbH, a leading player in the plant-based production of biopharmaceuticals and diagnostic reagents. Originally founded in the U.S., Icon is now a subsidiary of Japanese chemical giant Denka. Icon plans to expand operations at the campus to strengthen its position in the biopharma field internationally. The move will bring more highly skilled jobs to the region.

“The researchers and businesses based here have more of a global than a regional focus, so it makes sense for other international businesses to locate here or to seek out potential partners,” says the managing director of the Weinberg Campus, Dr. Ulf-Marten Schmieder. “Our vision is that we will have joined the top flight of international tech parks in 10 years' time.”




Further information:

<https://www.technologie-park-weinberg-campus.de/en>







In the cleanroom of Continental Nuremberg, an employee holds up a circuit board showing the engine's switching system. The company makes components for electric vehicles.

# Pushing the Pace of E-Mobility

Political pressure and concerns about climate change are transforming Germany's automotive sector from the wheels up. This major cross-sector upheaval has created unparalleled investment opportunities.

**A**fter years of dawdling on minor roads and byways, the electric vehicle industry in Germany has finally shifted gear and moved into the fast lane. The race for dominance in the e-mobility sector is officially on – 2020 really will be the year of the electric car in Germany.

The numbers speak for themselves. In Europe this year, 176 new models of electric vehicles (EVs) will come onto the market. Next year there will be 214. And by 2023, German manufacturers alone will be selling 150 types of e-vehicles, says Henning Kagermann, chairman of The National Platform Future of Mobility (NPM), a group of advisors to the German Government.

In 2019, adds automotive analyst Matthias Schmidt, "Europe's largest passenger car market, Germany, also became Europe's largest purely electric passenger car market in terms of annual registration volumes." Writing in the monthly West European Electric Car Market Intelligence Report, which he compiles, Schmidt also predicts that the numbers are set to grow, thanks to increased

---

**»Volkswagen is starting the largest electro-offensive in the auto industry.«**

*Ralf Brandstaetter, chief operating officer of Volkswagen*

---

government subsidies for buying EVs and hybrids in Germany.

Industry insiders point to the dramatic changes happening at Volkswagen (VW), Germany's largest carmaker and one of the biggest in the world. "We are on the cusp of a new era," the company's COO, Ralf Brandstaetter, told shareholders late last year. "Volkswagen is launching the largest electro-offensive in the auto industry."



## Joachim Damasky »Germany is super- charging EVs.«

Joachim Damasky is a managing director at the German Association of the Automotive Industry (VDA). The association represents about 600 companies, including VW, BMW and Daimler.

**German carmakers have dominated in the past, but critics say they are late when it comes to electric vehicles. Can Germany still take the lead in this field?**

E-mobility is not a sprint to the finish; it's more of a marathon. What is decisive is who can be most innovative in the long term. In that sense, I see German manufacturers and suppliers as well positioned. We are already leaders in e-mobility and alternative power trains – every third patent in this sector worldwide comes from Germany. And by 2024, German automotive companies will have invested EUR 50 billion in this area.

**What challenges do you see up the road for Germany's auto industry?**

To meet the EU's ambitious fleet emissions limits by 2030, e-vehicles must achieve high market penetration quickly. By 2030, Germany must have 7 to 10.5 million e-vehicles on the road. The fact that we're now seeing new models coming in greater numbers will be well received by the market. But e-mobility can only succeed if the appropriate charging infrastructure is available and if vehicles can be charged in a consumer-friendly way all over Europe.

So charging infrastructure urgently needs to be prioritized. We will only be able to do this if the auto industry, the energy sector, communities and start-ups all work together. The German auto industry itself will invest in 100,000 charging points by 2030. A fast charging network is also being built on main roads by IONITY (a joint venture between major car manufacturers) – 100 fast chargers will be in service in Germany by the end of 2020.

Basically, we are looking at a fundamental structural change that requires enormous investment. What is urgently needed is an industrial policy with clear goals and timelines.

Over the next five years, VW will invest between EUR 19 and 33 billion in developing electric engines. "We are saying goodbye to the fuel-powered engine," explained the head of strategy, Michael Jost, at a conference in Berlin in 2018, adding that the company's last diesel- or petrol-powered engine will be sold in 2040.

### Legislation is driving change

By 2025, VW plans to have 1.5 million electric cars on the road, and within a decade, they will be producing 75 different models of EV. Much of this is being done using VW's "modular electric drive matrix" system. The MEB is a standardized toolkit of sorts that can be used to make the basic building blocks of all kinds of EVs. The system will also be used by VW subsidiaries SEAT and Skoda and shared with U.S. carmaker Ford. By standardizing the basics, VW hopes to avoid the kind of production hold-ups Tesla has experienced, which cost the U.S. carmaker a lot of money.

Of course, this isn't just happening because conscience-stricken carmakers suddenly want to save the planet. There is increased pressure from German and European authorities legislating to ensure that emissions reductions goals are achievable. Stringent emissions rules mean that manufacturers' fleets of new EU vehicles must average no more than 95 grams of CO<sub>2</sub> emissions per kilometer by 2021 (emissions are calculated by fleet to take into account different vehicle sizes and weights). The limit will sink to 59.4 grams in 2030. If manufacturers

don't hit those targets, they have to pay penalties. And these could be huge. For example, according to London-based PA Consulting, VW could end up looking at fines close to EUR 4.5 billion depending on how many cars they sell in Europe. Daimler and BMW could both face sanctions of close to EUR 1 billion. Carmakers are scrambling to avoid this.

Furthermore, in a new package of national climate-related regulations passed at the end of 2019, the German Government stated that it envisaged 7–10 million EVs on the road by 2030. To achieve that, state incentives will have to continue. When researchers at Germany's Petroleum Industry Association added up all the current state benefits and incentives, they concluded that, from 2021 onwards, buying an electric VW instead of a car with a conventional motor would save around EUR 26,200 over four years.

Of course, there are still significant challenges. "At this critical turning point, there are three things necessary in order to smooth the way to e-mobility," Fermin Bustamante, head of German e-mobility at multinational power company Vattenfall, wrote in *Handelsblatt* newspaper: "Firstly, the sales of electric cars must rise exponentially, and there are positive signs this is happening. Secondly, a sufficient charging infrastructure is needed. And thirdly, charging infrastructure, cars and suppliers must all be seamlessly connected in order to make it as simple and efficient as possible for customers – so-called interoperability."



## FACTS &amp; FIGURES

## An Industry Geared for Growth

€6,000

Amount that German buyers of an EV costing up to €40,000 can claim in subsidies <sup>1)</sup>

2.2m

Number of EVs in Europe carmakers need to sell in 2021 to meet tough new fleet emissions rules <sup>2)</sup>

400k

Number of publicly available charging stations needed to power 2.2 million vehicles by 2021 <sup>2)</sup>

42%

Amount by which transport emissions must fall in comparison to 1990 levels to achieve Germany's 2030 climate goals <sup>3)</sup>

The pressure to do all that, and quickly, is having a major transformative effect on the industry, say experts. Some changes may have a negative impact on employment. Electric drive trains, for example, only have about 200 parts as opposed to 1,200 for combustion engines, so they require fewer workers. But other disruptions create new opportunities.

## An industry in flux

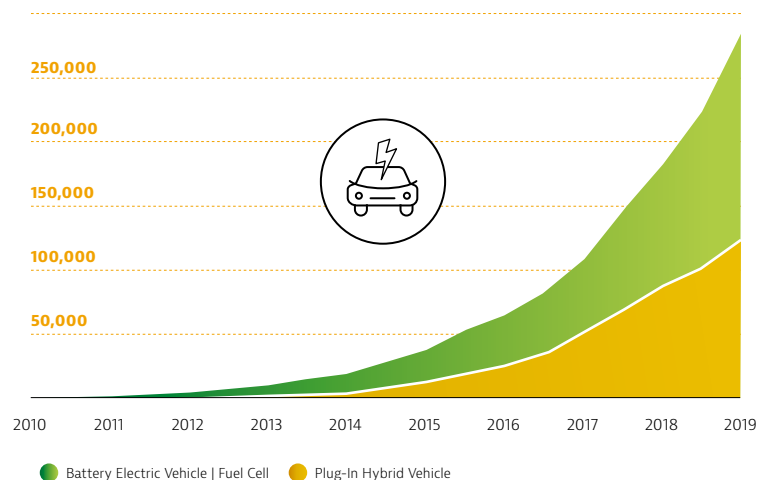
"At the moment, the auto industry is experiencing massive transformation," confirms Peter Fuß, senior advisory partner for the automotive sector at consultancy EY Germany. "Things like electrification of power trains, autonomous driving and mobility services or connectivity demand completely new expertise in many different areas of technology. And that opens up enormous opportunities for new players to stake out their place in Germany's automotive sector."

"The competitiveness of the German auto industry and the security of jobs in Germany really depends on the success of e-mobility," Henning Kagermann argues. And that "will depend strongly on whether the basic components – such as batteries – can be manufactured in Germany, rather than outside the country." Furthermore, Kagermann doesn't believe that e-mobility should be viewed as an issue that affects only the auto industry. "It is a key technology along the path to sustainable and integrated energy," he argues.

Kagermann also envisages opportunities arising in peripheral and connected areas like alternative energy sources, digital concepts and intelligent platforms. Money is already pouring in. Last year, mobility-related start-ups, most of which were based in Berlin, received EUR 1.6 billion in venture capital, according to EY's Start-up-Barometer. That's four times more than in 2018 and more than what erstwhile investor favorites fintech- or e-commerce-related start-ups received.

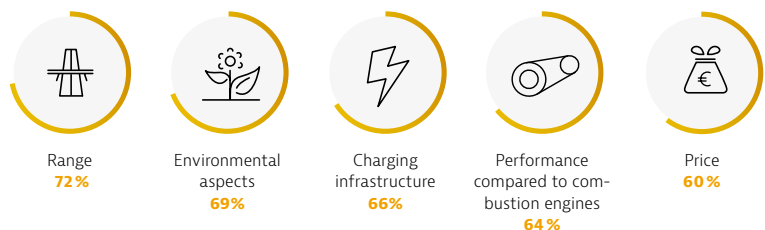
## THE RISE OF THE E-VEHICLE

Around half of all new registrations of vehicles using alternative power trains in Germany in 2019 were for EVs. This meant a rise of around 75% in the number of purely electric vehicles. Almost 3% of cars on German roads are now electric or hybrids. <sup>4)</sup>



## GERMAN CUSTOMER PRIORITIES

When 1,000 respondents were asked if e-mobility would be increasingly important to them in the next few years, three-quarters said, "Yes." And around 40% could see themselves buying an EV. <sup>5)</sup> These were their main priorities:



Source: 1) VW; 2) McKinsey; 3) Federal Ministry for the Environment, Nature Conservation and Nuclear Safety; 4) VDA; cumulative new registrations from January 2009 until October 2019; 5) EFAHRER.com / Kantar

## *Whoever comes up with the electric battery of the future – or controls the raw materials from which it is made – could dominate the international market.*

### Technologies are changing

Infrastructure is also expanding. At the moment Germany has about 24,000 charging stations for the estimated 300,000 electric cars already on the road. The number of publicly accessible ones rose by 50 percent between December 2018 and 2019. And in two years there will be 50,000 stations, partly because the German Government has pledged over EUR 3 billion to make sure additional ones are built.

Stefan Di Bitonto, Germany Trade & Invest's automotive expert, predicts more investment and research into materials that can make electric cars lighter. "There are likely to be more innovative lightweight steel construction solutions" he suggests. "The industry is moving in that direction."

Battery production is another major focus. "It's quite a wide-open field at the moment because standards have not yet been decided upon," explains Di Bitonto. "Lithium-ion, hydrogen fuel cells or something else – right now, I couldn't tell you what kind of electric vehicles we will be using in 10 to 15 years."

Whoever comes up with the electric battery of the future – or controls the raw materials from which it is made – could dominate the international market. Currently, international manufacturers (particularly those based in Asia) are the main producers of e-vehicle batteries. But European governments have now realized that this essential aspect of e-mobility can no longer simply be contracted out.

The EU is putting an estimated EUR 3.2 billion of subsidies into a European battery consortium currently made up of around 17

companies from around the bloc. A number of the battery technology and research initiatives will be based in Germany because of the proximity of experts and researchers and the fact that customers (the car companies that will use the batteries) and the German Government are willing to subsidize the push into this area.

Consultancy firm Arthur D. Little reckons that battery production grew by 50 percent to become a global 90-billion-dollar industry in

the next five years, while McKinsey analysts predict the market will expand by 19 times in the next decade. Over the past year alone, the number of factories producing lithium-ion batteries around the world has almost doubled – largely due to the demand from the auto industry.

### Lithium refining in Germany

Interestingly, the biggest international increase has not been in China but in Germany, where seven of those factories are planned. Experts say, growth opportunities in this sector range from raw materials and manufacturing to recycling and research.

Deutsche Lithium – a joint venture between London-traded lithium company Bacanora and Germany's SolarWorld – plans to start mining one of Europe's largest lithium deposits in the eastern German state of Saxony. Dutch company AMG – short for Advanced Metallurgical Group – have announced investments of up to EUR 54 million in Germany's first lithium hydroxide refinery in the eastern state of Saxony-Anhalt. Production at a site close to car manufacturers is slated to begin in three years. "We are convinced that this refinery is arriving at exactly the right time," Stefan Scherer, the managing director of AMG in Germany, says.

### Foreign investment in German tech

One of the biggest battery makers in the world, Chinese firm CATL, is building a factory costing EUR 1.8 billion in the eastern state of Thuringia. The company looked at several possible sites but decided on Germany for a number of reasons, including, according to CATL's European chief Matthias Zentgraf,



#### FUTURE FOCUS

### Cutting-edge Battery Research Center

By February 2022, there will be 150 scientists working at a new battery research facility in Münster that has been called "one of the most important and innovative projects of the energy transition" in Germany. It will be based at the Münster Electrochemical Energy Technology research department at the city's university and will collaborate with the Fraunhofer Battery Alliance. It will try out technologies of all sorts, and companies will be able to test and manufacture experimental batteries in quantity to see if their ideas will work in the real world. Companies like Daimler Benz, Ford, Toyota, Evonik and Remondis are already keen to get involved. Using cutting-edge battery technology offers companies "a real competitive edge," says Kai-Christian Moeller, a spokesperson from the Fraunhofer Battery Alliance. The center has received more than EUR 700 million in German Government funding.



## Tesla Coming to Germany

The first 100,000 Tesla EVs that are made in Germany are scheduled to roll out of the American company's new "Gigafactory Europe" in Brandenburg by July 2021. So what was behind CEO Elon Musk's decision to start manufacturing in the eastern German state of Brandenburg, just outside Berlin?



When Elon Musk, the charismatic and often iconoclastic boss of U.S. electric vehicle manufacturer Tesla, announced last year at an award ceremony in Berlin that he was planning to open his fourth "Gigafactory" in

Germany, the audience gasped. Was this a foreign investment triumph for Germany? Or an outside challenge to Germany's world-famous auto industry?

One commentator at Handelsblatt, Germany's leading business newspaper, wrote: "The Germans slept through the first round of e-mobility, so they're now entering this market with even greater determination. Musk knows that if he wants to remain at the forefront of e-mobility during the second round, he needs to be where the most significant progress will be made."

Tesla had been looking to locate a factory in Europe since 2017, and the company had already gained a foothold in Germany, hiring engineers away from Audi and acquiring German engineering company Grohmann to help automate their manufacturing. "That's part of the reason why we're locating our Gigafactory Europe in Germany," Musk explained in Berlin. "Everyone knows that German engineering is outstanding."

Tesla's factory will be built in Grünheide, Brandenburg. Reports suggest the company paid EUR 41 million for the 300-hectare site, where work on the EUR 4 billion project has begun. Tesla ultimately plans to be making half a million cars here a year. If the company's ambitious schedule is met, the first 100,000 will roll off the assembly line next July.

Tesla is currently Germany's most popular brand of EV and proximity to new customers undoubtedly played a role in the decision to invest in the country. Musk also said the fact that the site was a 25-minute drive from Berlin, one of Europe's most exciting cities and a hub for innovative start-ups and software development, was a major factor.

The Tesla site will be close to the new Berlin-Brandenburg airport, railway lines and several universities and research institutions. "That kind of constellation [of amenities] is like gold dust," enthuses Brandenburg Minister for Economic Affairs Jörg Steinbach.

Tesla paid EUR 41 million for the 300-hectare site in Grünheide, where it will build its next Gigafactory.





## BMW iX3



<b>Due</b>	Autumn 2020	BMW's first all-electric SUV is meant to compete with the Audi e-tron and Tesla's Model X. It's built on the same frame as the popular, conventionally powered BMW X3.
<b>Cost</b>	n/a	
<b>Fast charge</b>	30 minutes	
<b>Range</b>	Between 440 and 700 kilometers*	
<b>Top speed</b>	200 km/h	

\* depending on battery configuration

## VW ID.3



With this flagship release, VW hope to make its accessible ID series car (which is similar in style to the popular VW Golf) their breakthrough model.	<b>Due</b>	Summer 2020 (not in U.S.)
	<b>Cost</b>	around € 22,000
	<b>Fast charge</b>	30 minutes
	<b>Range</b>	Between 320 and 550 kilometers*
	<b>Top speed</b>	160 km/h

\* depending on battery configuration

*Champions  
of the electric  
revolution*

## PORSCHE Taycan Turbo S



The luxury German car manufacturer made headlines when it unveiled its first fully electric sportscar – the competition between the Turbo S and Tesla's Model S has been on ever since.

<b>Due</b>	2020
<b>Cost</b>	€185,400
<b>Fast charge</b>	21 minutes
<b>Range</b>	Between 270 and 515 kilometers*
<b>Top speed</b>	260 km/h

\* depending on battery configuration

## DAIMLER Mercedes Benz EQC



Rivals will follow, but when Daimler releases the EQV, its up-to-eight-seater premium, electric van, which is over 5 meters long, there will be almost nothing else like it on the market.

<b>Due</b>	2020
<b>Cost</b>	Around €70,000
<b>Fast charge</b>	45 minutes
<b>Range</b>	405 kilometers*
<b>Top speed</b>	160 km/h

\* depending on battery configuration



→ the central location in Europe and accompanying transport options, the proximity to experienced automotive and engineering professionals, and perhaps even more importantly, the option of renewable energy sources. Zentgraf adds: “That’s vital when you’re trying to make a low-emissions product like this.” He also mentions that Thuringia is already powered by around 40 percent renewable energy.

Meanwhile, Chinese-American battery manufacturer Farasis is spending around EUR 600 million on a new European headquarters and factory in Saxony-Anhalt, one of the biggest investments there in over a decade. And VW itself has entered into an alliance with Swedish company Northvolt to produce batteries in the city of Salzgitter from 2024.

Demand for raw materials like cobalt and lithium, whose extraction can be both environmentally and socially damaging, is going to quadruple in the next 5 to 10 years, the Ba-

varian Business Association concluded in a 2019 study. Given that only a few countries possess large quantities of these substances, there are major risks for German car manufacturers’ supply chains. So the idea is to diversify, which is where Germany’s top engineering universities and research institutes come in.

### New battery technologies

Researchers at the Helmholtz Institute Ulm, which specializes in electrochemical battery research, and the Faculty of Electrical Engineering and Information Technology at Munich’s Technical University are hard at work trying to develop new kinds of batteries that use more widely accessible substances such as sodium or vanadium salts.

German researchers are particularly focused on making batteries more environmentally friendly and hope to become world leaders in this regard. Audi says it is able to recycle more than 90 percent of the cobalt

and nickel in its popular e-tron model’s batteries, and starting this year, VW will be able to recycle 3,000 EV batteries per annum at their pilot recycling plant in Salzgitter.

All the prerequisites are there for Germany’s e-car revolution to finally become a reality, says Henning Kagermann, citing “new technologies, new business models, new innovative and well-funded competitors that will arise.” And that presents Germany with a singular opportunity. “This transformation also offers a unique chance to think more comprehensively about the mobility of the future,” says Kagermann. “Germany can become the leading international example for affordable, competitive and environmentally friendly mobility.”



Contact:

**stefan.dibitonto@gtai.com**  
GTAI expert for transportation technologies

## TRADE FAIRS

## Keep up with the Latest Auto Trends

September 15-17, 2020, in Novi, Michigan, USA

THE **BATTERY** SHOW  
NORTH AMERICA

### The Battery Show

Over 9,000 engineers, researchers and managers attend conferences and seminars and view product showcases from 700 suppliers. The event runs in tandem with the Electric & Hybrid Vehicle Technology Expo at which car companies shop for battery tech innovations. The show’s popularity has expanded with demand for battery-powered vehicles, growing 20% in 2018–2019.

For more information:  
<https://thebatteryshow.com>

October 6-8, 2020, in Wolfsburg, Germany



### IZB – International Suppliers’ Fair

The biannual Internationale Zuliefererbörse – or IZB for short – is Europe’s largest trade fair for automotive suppliers. In 2018, the fair had 50,000 visitors browsing the stands of over 800 exhibitors from 34 countries. On display were more than 100 new products, of which 34 were world premieres. Over the past few years, there has been an increased focus on digital technologies.

For more information:  
<https://www.izb-online.com>

**GTAI will have a booth at the Battery Show and will host a business breakfast at IZB.**

## Healthcare

## Digital-Environmental Agenda

This March, the German Ministry for the Environment, Nature Conservation and Nuclear Safety published a catalogue of 70 measures it touted as the world's first-ever digital-environmental agenda.

The thrust of the initiative, which was developed together with 200 experts, was how to ensure digitalization is also environmentally friendly.

"With this digital agenda, we are doing genuinely pioneering work," said Environment Minister Svenja Schulze. "Protecting the environment should be part of every algorithm since, if it is not steered, digitalization will become an environmental problem. With the proper guidelines, however, digitalization can help contain climate change and prevent species from dying out."

The measures extended from mandating the energy efficiency of computing centers to requirements that devices like smartphones and tablets have longer usable lives.

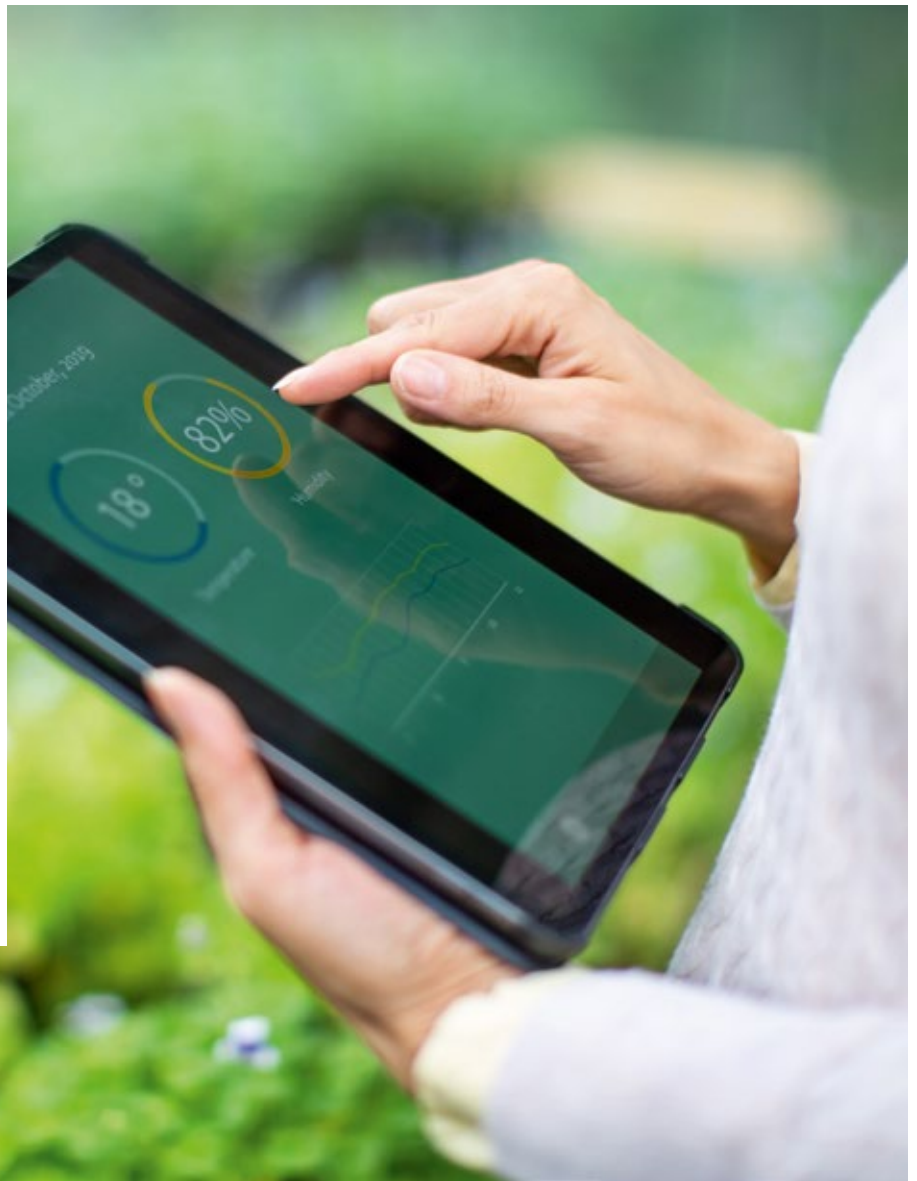


Photo: Luis Alvarez/Gettyimage

## Technology and ICT

## Indian and German Start-ups Cooperate

Technology and IT support will benefit Germany



**GTAI Senior Manager Asha-Maria Sharma is an ambassador for the GINSEP exchange program between Indian and German start-ups. We asked her what it entails.**

Sharma: "The initiative has existed since 2018 and is a child of the German Association of Start-Ups and the Ministry of Economic Affairs and Energy. The idea is to build bridges and establish a more structured network between the two ecosystems. For instance, Indian companies can learn how to start a business in Germany. We also want to help integrate Indian specialists into the German labor market."

### Any success stories?

Sharma: There are several German-Indian start-ups active in this environment. One is involved in placing experts, others work in the health sector and app development.

### What can the two business cultures gain from one another?

Sharma: Indian start-ups see that if they establish themselves in Germany, they can be successful throughout Europe. And German start-ups see how much developmental potential there is in India because of the country's sheer size.

<https://ginsep.co/>

Photo: Illing &amp; Vossbeck Fotografie



## Computing

## Quick as a Hawk

Stuttgart's Hawk supercomputer surpasses SuperMUC-NG



Photo: Veronika Hohenegger/LRZ

February 20, 2020, was the day Hawk became operational at the University of Stuttgart – a historic moment in computing history. The supercomputer is 20,000 times faster and has 250,000 times more memory than a laptop and was built by Hewlett Packard for EUR 38 million. The German Government and the state of Baden-Württemberg are splitting the cost. With a top performance of 26 petaflops, it outperforms the SuperMUC-NG near Munich as Germany's fastest computer. It will be used to carry out complex scientific and industrial simulations.

## Green transport

## Cargo Bike Run

A Hamburg program to get people on two wheels proves a big hit

# 33%

of the cargo bikes' purchase price was subsidized

As state subsidy programs go, the premiums offered last year by the city of Hamburg for the purchase of cargo bikes was a huge hit. On October 15, 2019, EUR 1.5 million were released as part of a program designed to last three years. The subsidies were available to companies and private citizens and covered 33 percent of the cargo bikes' purchase price, up to a maximum of EUR 2,000 for electric models and EUR 500 each for non-electric bikes and cargo trailers. After just three weeks, all the money had been claimed.

## Aerospace

## Germans in Space

National space program has powerful new ally



Photo: ESA – Science Office

Germany's leading industrial advocacy group, BDI, is calling for massive increases in the national space program. In a public declaration, BDI President Dieter Kempf said that funding for the federal government's National Programme for Space and Innovation should be raised from EUR 297 million to 700 million. BDI claims that the global space travel market will be worth EUR 2.4 trillion by 2040. Meanwhile, more and more start-ups and German SMEs are getting into space by designing micro-launchers to hoist smaller satellites into orbit.

## Robotics

## Robotic Clean-up

Driverless sweepers tackle the streets of Berlin

The start-up ENWAY aims to make the job of street cleaning more cost-effective. Its founders, Thanuja Ambegoda, Bo Chen and Julian Nordt, come from Zurich – a "very clean city," as they describe it – but chose to set up shop in considerably more chaotic Berlin in 2017 to develop an autonomous mobile cleaning vehicle. They maintain that their industrial sweeping robot will reduce costs by 65 percent while delivering better cleaning results than machines driven by human beings. State-of-the-art sensors and 3D cameras guarantee that the vehicle has a 360-degree vision of its surroundings as it drives itself around city streets.

Founded in 2017, ENWAY has 25 employees and services clients who include the municipal public works company *Wirtschaftsbetriebe Duisburg* and the government of Singapore. Investor Felix Haas gave ENWAY "five out of five" in a rating for *Wirtschaftswoche* magazine.



Photo: ENWAY



Until very recently, operators of combine harvesters had to judge things like the best threshing drum speed and gap for themselves. With the autonomous threshing unit from CLAAS, these sorts of decisions are now automated.



# Sowing the Seeds of Innovation

The market for agricultural technology and innovation in Germany is growing, driven by digital transformation and global factors such as climate change and population increases. Smart farming can have a big impact on productivity and efficiency – especially for smaller farms.

**G**ermany has a global reputation as an industrial powerhouse. But it also possesses a large and highly innovative agricultural industry that is developing rapidly thanks to digitalization. Farmers are tackling challenges like climate change by improving productivity and efficiency with digital tools and modern technology. The seeds have been sown for modernizing agriculture in Germany, and international investors are already reaping the benefits.

Germany has the world's largest agricultural equipment industry, with a global market share of 19.1 percent in 2017. The amount of venture capital flowing into German "agtech" start-ups is growing and growing. In 2017 it was just EUR 11 million, but by 2019 it had skyrocketed to EUR 96 million, accord-

***»You need strong partners with good connections.«***

**Tim Siebert,**  
*start-up manager, Seedhouse*

ing to the latest Start-up-Barometer from EY. In some cases, the solutions to climate change issues are hiding in plain sight. Big data on crops and livestock exists, but it takes innovators to activate the numbers. "Sometimes crucial information is available, but it's siloed, often not available to the farmer," explains Christian Janze, EY's expert on agtech start-ups. "These smart solutions can give a farmer specific advice based on weather conditions. It's a completely new situation for agriculture."

## **New agricultural models**

"We're seeing traditional agricultural machinery companies reinventing themselves with software-based business models or highly automated machinery and machine parts," says Claudia Grüne, GTAI smart farm-



*Christian Janze*  
***“We’re seeing both  
domestic and  
international  
investors.”***

Investment in German agtech and agribusiness has skyrocketed in the past two years. *Markets Germany* spoke with Christian Janze, EY’s expert on agtech start-ups, to get the inside scoop.

Photo: BASF-EY

ing and agtech expert. That helps farmers work smarter, implementing new technology to improve sustainability, increase yields, reduce costs and reach new markets. “Germany is a very attractive location for international investors interested in agtech,” Grüne says.

German agtech start-ups are making waves both domestically and internationally, while established firms are increasingly going digital, creating divisions to focus on innovation. Engineering giant Bosch now employs 32,300 people in its Rexroth subsidiary, which develops next-generation agricultural equipment. Tractor maker Fendt, now in its 90th year, connects the fields with the business office with a software suite. And Siemens has created 3D modeling software to help manufacturers work more efficiently.

#### **Agribusiness gets smart**

Some equipment companies are getting into farm equipment-as-a-service – leasing expensive machinery instead of selling it. Tractor manufacturer CLAAS, founded a century ago in Harsewinkel, North Rhine-Westphalia, now operates a farm management platform. 365FarmNet connects up machine manufacturers, herbicide and fertilizer producers, breeding companies, feed suppliers and live-

#### **What makes the German agtech market unique?**

We have a lot of very interesting start-ups in Germany in the agribusiness sector. As established agriculture and food companies try to strengthen their positions on sustainability, they’re investing in these start-ups. Many ‘hidden champions’ in manufacturing have a lot of interest in new technology and are looking to start-ups for innovation.

#### **Why has investment in agtech grown so much?**

Three or four years ago there was a phase of new start-ups sprouting, and ever since there has been extreme growth in agtech. We’re seeing both domestic and international investors. Increased discussion in society about climate change and alternative meat options are also spurring interest in start-ups that focus on decreasing farmers’ carbon footprints or reducing water consumption.

#### **Why should international investors be interested in Germany’s agtech market in 2020 and beyond?**

In the coming years, agtech will be a booming sector with a lot of potential profit. The trend toward urban living will change how we do farming. Supplying a big city with fresh food is a challenge already, and supply chains and logistics will have to adapt. But German business is innovative, and solutions from Germany will be implemented globally.

stock technologies. The software is available in five languages and is used by more than 50,000 farmers in more than 25 countries.

Agriculture accounts for more than 50 percent of all land in Germany. But the size of the average farm is quite small – 68.5 percent of all farms in Germany are under 50 hectares – so the market remains very fragmented.

Lower Saxony has become a hub for agtech and agribusiness, earning it the nickname Agrotech Valley. The federal government has funded a number of “digital experimental fields for agriculture” in the region, and DFKI recently opened an artificial intelligence research hub in Osnabrück.

Tim Siebert manages the start-up accelerator Seedhouse in Osnabrück. It is one of a number of public-private partnership start-up centers to receive funding from the state of Lower Saxony but the only one which focuses on agtech and foodtech. Seedhouse welcomes three to five start-ups in two classes per year and chooses to invest in select start-up graduates from a pot of EUR 1 million in funding that comes from partner companies. “You need strong partners with good connections,” says Siebert.

Digitalization of agriculture is a nationwide trend. Germany aims to become a world



leader in smart farming – the current government has pledged EUR 60 million to the cause up to 2022.

The e-commerce marketplace ag.supply, based in Münster, has been called the “Amazon of agtech” and has caught the eye of international investors. “The more we looked, the more excited we became by what it was and what it could be,” says Aidan Connolly of AgriTech Capital, an investment firm based in North Carolina that made a multimillion-dollar investment in ag.supply in 2019. “Farmers’ ability to find parts, seeds and the things they need to run their farm is a very critical problem.” Connolly believes that ag.supply will successfully translate to other markets.

### Tipping point for agtech

He thinks 2020 will be a breakout year for agtech in Germany and globally. “We’re definitely at an inflection point,” Connolly says. “We are facing existential threats to agriculture that we’ve never had before. The need for tech has never been greater to make the business more sustainable and respond to consumers.”

In addition to the money given to agtech start-ups, narrowly defined, London’s Atomico and other investors have put USD 100 million (EUR 91.6 million) into infarm, a Berlin-based company that creates modular farms for urban areas. infarm’s vertical farms are already growing microgreens and herbs in grocery stores across Europe.

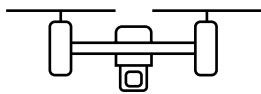
“In recent years, investors from around the globe have been drawn to innovation that addresses the need for sustainable solutions to the challenges that affect our planet,” says Osnat Michaeli, CMO of infarm. “There is a potential to combine the advances of the last 10 years – including the Internet of Things, machine learning, image recognition, renewable energies and similar technologies – with advances in plant and agricultural sciences to create innovative, sustainable solutions in food distribution that will serve our planet for the next 100 years.”



Contact:

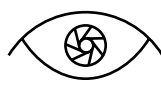
**claudia.gruene@gtai.com**  
GTAI expert for smart farming  
and robotics

## FACTS & FIGURES



### DRONES

More acres, more problems. Using drones outfitted with cameras allows farmers to monitor their land from a bird's eye view. With the images or video collected, farmers can better gauge crop growth and identify problems with pests or weeds.



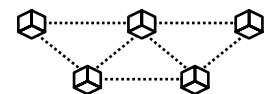
### MACHINE VISION

Companies are combining camera images with artificial intelligence to enable farmers to keep an eye on their plants and livestock, even from a distance. Tools using machine vision can alert the farmer to sick animals or insect infestations.



### SENSORS

The fastest way to make a farm smart is with sensors. Sensors can monitor data such as temperature and humidity in a barn or in soil, the vital signs of individual animals or even farm equipment energy use.

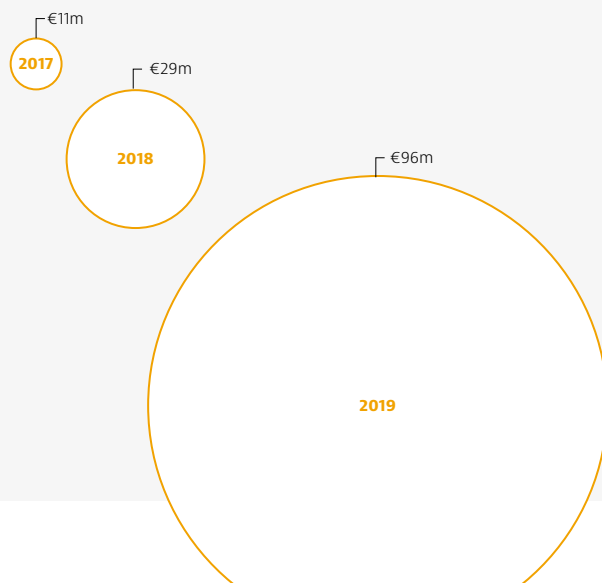


### BLOCKCHAIN

Blockchain allows for encrypted, open and immutable records to be kept about agricultural food products. This kind of supply chain tool can be invaluable if an issue such as contamination arises, potentially saving lives.

## GROWING STEADILY

Amount of venture capital received by agtech start-ups in Germany<sup>1)</sup>



## GERMAN MARKET

**50.7 %**

Share of German land used for agriculture<sup>2)</sup>

**266,700**

Number of farms and agricultural businesses in Germany in 2018<sup>2)</sup>

**€ 9.8 bn**

Production value of Germany's agricultural machinery market in 2017<sup>3)</sup>

**19.1 %**

Germany's share of the world's agricultural machinery industry<sup>4)</sup>

# Learning to Love Robots

The self-evolving cyborg intent on destroying humankind is a staple of classic sci-fi films like *Terminator*. But while malleability and extreme efficiency are characteristics of real-life robots, malevolence is not – as Germany's billion-euro robotics industry illustrates.



Industrial robots working away at a Volkswagen plant.

Photo: Volkswagen AG





## »Robotics has an infinite potential for possible applications.«

**Claudia Grüne,**  
GTAI expert for smart farming and robotics

**T**ake a tour through any car assembly plant in Germany and you'll be impressed by the elegance with which automatons carry out appointed tasks. Even luxury automaker Porsche, which prides itself on its reputation for made-by-hand construction, uses robots to install heavyweight parts, such as windshields, that demand superhuman precision.

The automotive industry is just one sector where robots will play an invaluable role in the future and help to bring about process transformation. Germany is the world's fifth most frequent user of robots after China, Japan, the U.S. and South Korea, and the scope ranges from tiny biotech nanobots to the now familiar sight of imposing industrial giants on assembly lines.

### A rapidly evolving industry

"In Germany, along with the auto industry, metalworking, machine construction and chemicals and plastics will have to become more automatized to remain competitive," says Susanne Bieller, the general secretary of the International Federation of Robotics (IFR).

"Robotics has an infinite potential for a range of possible applications," says Germany Trade & Invest robotics expert Claudia Grüne. "In the food industry, for example, or logistics, where self-driving robot vehicles should become increasingly prevalent."

German turnover in robotics and automation has grown by 50 percent in recent years, from EUR 10.4 billion in 2013 to an es-

### FACTS & FIGURES

## Bionic Man

**Eric Eitel is head of communications for German Bionic.**

**German Bionic is best known for exoskeletons. Why that and not robots or cobots?**

Market research. Our technical founder comes from cobots, but he got a lot of feedback from industry that there were many situations, for example in logistics, where full automation makes no economic sense. Human beings are still the best troubleshooters.

**In what areas is German Bionic looking to grow?**

Obviously, in classic logistics and intralogistics. Another new area, which surprised us at the start, is SMEs and tradespeople. And the industry of caring for the elderly.

**Cost can be an impediment to SMEs working with robots – what's your solution?**

Since last year, we've been offering robotics-as-a-service. For example, every year lots of people change from winter to summer tires and vice versa. For those busy months, garages can rent our exoskeletons.

**What's your advice to foreign investors interested in this sector?**

It's definitely worth taking a look at the German robotics industry. It has lots of small innovative firms.

timated EUR 15.7 billion in 2019. The percentage of German-made robots for export is also on the rise – the International Federation of Robotics forecasts 12 percent annual global growth between now and 2022.

The value of Germany's robotics industry became evident in 2016 when China's Midea Group took over industrial robot powerhouse Kuka in Augsburg. But mergers and acquisitions are just one way for international players to get involved in the German sector.

Robots are evolving all the time. Alongside networked industrial models, increasing numbers of service robots will assist human beings in our homes, places of work and hospitals. And in addition to industry giants like Kuka, Siemens or Dürr, there are hundreds of SMEs in Germany working in the field.

One of the top trends is for 'cobots' – collaborative industrial robots that work in conjunction with human beings rather than replacing them entirely. "Industry analysts expect cobots to become more and more important in the years to come, particularly as the price for things like sensors and other technology falls," says Grüne.

### Cobots and robotics-as-a-service

Another intriguing phenomenon is the exoskeleton cobot. The automated back support "Cray X" from German Bionics helps industrial workers lift heavy objects. The Augsburg-based start-up won the prestigious German Entrepreneur Award last year.

As innovation in artificial intelligence and sensor technology accelerates, robots are





increasingly teaming up with humans. Soft robots, constructed from compliant materials like those in living organisms, are a major and growing subsector, while safety cordons and “kill switches” could someday become obsolete thanks to sensor ingenuity.

The new watchword in robotics is flexibility. Tomorrow’s robots need to be able to perform multiple tasks instead of endlessly repeating single functions. And they may be rented instead of purchased. “Another trend is a new business model: robotics-as-a-service for industry to relieve the relatively high initial investment costs for robotics neophytes,” says Bieller.

For example, thanks to programmable apps and more than a hundred sensors, the

Panda Powertool from Franka Emika can perform a variety of tasks in both mass production and high-mix, low volume production runs. Franca Emika bills it as “currently the fastest-selling industry-suited robot in the world.”

### Training your robot

The start-up Wandelbots is taking the idea even further: It has invented a programming ‘trace pen’ that helps owners to teach their robots new tricks. Founded in 2017 by IT sci-

entists at the Technical University of Dresden, the firm already has 70 employees and a Japan office.

So far, there’s a lot more to admire than fear about German robotics. In the workplace of the future, robots will collaborate with workers rather than making them extinct.

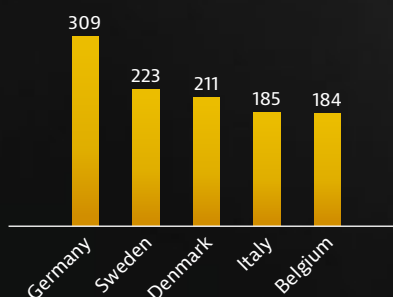


Contact:

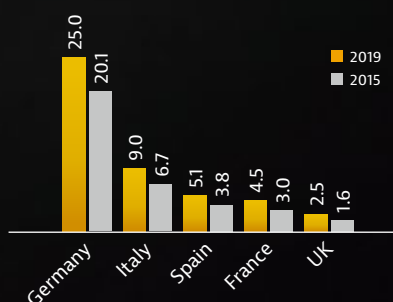
**[claudia.gruene@gtai.com](mailto:claudia.gruene@gtai.com)**  
*GTAI expert for smart farming  
and robotics*

### FACTS & FIGURES

**Robot density: Number of installed industrial robots per 10,000 workers, 2016 <sup>1)</sup>**



**Estimated yearly shipments of industrial multipurpose robots (in thousand units) <sup>2)</sup>**



Sources: 1) IFR 2018;

2) IFR 2016, International Federation of Robotics



Volunteer Lillith Teusch tests the functionality of the exoskeleton Cray X from German Bionic. It was specially designed to assist the manual handling of heavy goods and tools and works by reducing pressure on the lower back area.



# Bootstrap Germany

Over the past decade, Germany has turned itself into a hot destination for international start-up investors. Berlin is particularly attractive to innovative, young technology companies, while other parts of the country are drawing entrepreneurs in the green energy and solutions sectors. Lower rents and salaries are undercutting Silicon Valley.

**G**ermany's start-up scene is booming – largely thanks to foreign investment. In 2018, German start-ups raised nearly EUR 5 billion, most of it from overseas. There are solid reasons for this. According to Stefan Franzke, CEO of Berlin Partner, Berlin's start-up promotion agency, Germany's extensive industrial expertise and science and research institutions "provide a sound foundation" for investors and "deep experience in Germany's core industries."

## Mobility and green energy sectors

For example, TIER, a micro-mobility start-up based in Berlin, was able to leverage Germany's reputation for mobility and engineering to attract investment. Having succeeded in renting out electric scooters by the minute in a car-crazy country, the company convinced investors that its business model could work elsewhere. The company recently raised EUR 100 million, 90 percent of which came from outside Germany. "The level of investments and exits has really changed in the last five years," says TIER spokesman Bodo Braunmühl. "The scene has become more professional in all aspects."

Green energy is another coveted sector. INERATEC, based in Karlsruhe in southern Germany, has developed a technology to produce gasoline and jet fuel from CO<sub>2</sub> and renewable electricity. As a small, research-based start-up, INERATEC received German Government funding to help commercialize its technology, and now has clients in Finland and Spain. As it has grown, INERATEC's CEO



€3.691 bn

Total investment in Berlin start-ups in 2019<sup>1)</sup>

Sources: 1) E&Y Start-up-Barometer January 2020

2) [www.gruenderwoche.de/fileadmin/gew/downloads/ueber-gruenderwoche/internationalisierung-von-start-ups.pdf](http://www.gruenderwoche.de/fileadmin/gew/downloads/ueber-gruenderwoche/internationalisierung-von-start-ups.pdf)

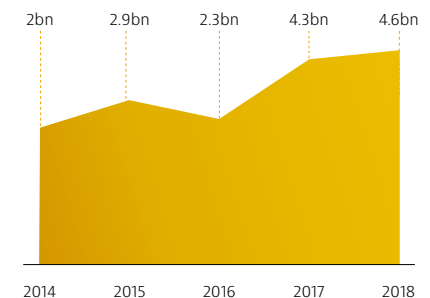
Philipp Engelkamp says that foreign investors have become more important. "From EUR 500,000 to 5 million, finding investors in Germany is not a problem," he says. "As soon as you go into the EUR 10 to 50 million range, you have to go international."

## Understanding the German market

Franzke cautions that foreign investors often stumble when entering the German market because they are unfamiliar with the business culture and legal environment. Berlin Partner runs courses to introduce newcomers to the peculiarities of the German scene, from the paperwork required to hire and fire to the laws concerning funding. "Even if we're all international, cultural differences are big," says Franzke.

## FACTS & FIGURES

Investment in German start-ups has risen sharply in the last 5 years.<sup>2)</sup>



Regardless, entrepreneurs find it easy to attract talent from around the world to Germany, with its high quality of life, even though salaries are typically lower than in Silicon Valley. "Our team consists of 45 different nations and we are very proud that so many international employees came to Germany to work with us," says Gunnar Froh, CEO of Hamburg-based mobility software start-up Wunder Mobility. "Investors are always positively surprised at the value they get."



Contact:

**oliver.wilken@gtai.com**  
GTAI expert for start-ups

A stone's throw from Buckingham Palace, GTAI's London office is located in Mecklenburg House, which served as a residence for members of the British royal family in the 18th century. It is co-located with the German-British Chamber of Industry & Commerce.

GTAI London  
16 Buckingham Gate  
London SW1E 6LB





# Beyond Brexit

Germany Trade & Invest's two-man team in London helps British companies that are interested in expanding into Germany, and supports German exporters that are looking for opportunities in the UK market. Since the Brexit vote in 2016, the number of enquiries they handle has increased significantly and continues to rise.

**The two of you have been sharing duties for a few months now. What motivated GTAI to increase its presence in London?**

**ROBERT SCHEID:** The UK is one of our top trading partners and one of the most important source countries for businesses looking to expand to Germany. It made sense to have dedicated roles for these distinct target audiences.

**MARC LEHNFELD:** We have a similar structure in cities like Paris, Shanghai and San Francisco. It was just a matter of time before we increased our presence in London, and Brexit made us speed things up a bit.

**So was Brexit the driving factor in this decision?**

**LEHNFELD:** Not exactly. The bilateral economic ties between Germany and the UK are important and will remain so in future. But Brexit was a catalyst. German companies are looking for up-to-date and reliable market information because they are unsure how they should prepare for Brexit.

**What about British companies? How are they reacting to Brexit?**

**SCHEID:** We've noticed a significant uptick in enquiries from the UK since 2016. At first, companies were contacting us just to learn about the business environment in Germany and legal framework for starting a business. More and more enquiries are now turning into concrete investment projects. In our preliminary statistics for 2019, the number of investments is up, and the size of the projects has increased significantly. The number of



**»Just don't call us Team Brexit.«**

GTAI's two-man team in London works to foster German-UK business ties: Robert Scheid (left) helps UK-based companies looking to expand to Germany; while Marc Lehnfeld provides market intelligence for German exporters seeking new business opportunities in the UK. Since the Brexit vote in 2016, they have both been coping with very different challenges.

manufacturing projects is rising, which indicates a long-term commitment to Germany.

**Do you have any banner examples of companies coming to Germany because of Brexit?**

**SCHEID:** It's important to underline that most companies expand to Germany because they have growing business there, but Brexit has indeed sped up the decision-making process. BAP Pharma, for example, set up recently in Höchstädt with help from GTAI. They are investing several million euros and hiring hundreds of employees over the next five years. For them, the proximity to clients and suppliers in Germany was a key factor.

**Which is more challenging: helping UK companies expand or finding answers for German companies?**

**LEHNFELD:** The challenges are quite different. Take, for example, the German auto industry: Companies have to examine every detail of their supply chain and deal with potential changes to customs regulations, rules of origin, etc. For British companies, the question typically centers on the need to set up an office in the EU to reinforce business links after Brexit. In both scenarios, general responses are not enough. We need to ask many questions and provide precise information.

**How are things evolving? Is there a light at the end of the tunnel with regards to Brexit?**

**SCHEID:** I think Winston Churchill said it best: "Now this is not the end. It is not even the beginning of the end. But it is, perhaps, the end of the beginning." It looks like we will be dealing with Brexit and its effects for a long time.



Contact:

**marc.lehnfeld@gtai.com**  
Director, GTAI trade representative in London

**robert.scheid@gtai.com**  
Director, GTAI invest representative in London

**gabriela.heinrichs@gtai.com**  
Executive Unit Strategic Partnerships (GTAI) and liaison to the German Chambers of Commerce Abroad

# Networker-in-Chief

Jochen Homann is the president of the Bundesnetzagentur, the national agency responsible for regulating, among other things, Germany's telecommunications industry. He talks to *Markets Germany* about the opportunities and challenges presented by 5G.

## Which sectors in Germany are going to see better competitiveness thanks to 5G?

**JOCHEN HOMANN:** I'm confident that 5G will enhance Germany's global competitiveness. The process of digital transformation and 5G will open up new and innovative opportunities. Smart developments, such as automated driving, Industry 4.0 and Smart Cities, will revolutionize the telecommunications market. Even today, forms of artificial intelligence are coming into use almost unnoticed in numerous mobile applications. Digital technology is unstoppable, but it brings huge challenges for all concerned. One area where we're really seeing this at the moment is mobile communications.

The 2 GHz and 3.6 GHz spectrum auctions last year led to unprecedented attention for 5G both nationally and internationally, reaching well beyond the telecommunications sector. The arrival of a fourth network operator, in particular, will sharpen competition on the German mobile market, which is a good thing for consumers.

There is still a need for ambitious goals – which we have – and determination on the part of all players from the spheres of politics, administration and business. I think we're heading in the right direction. If everyone does their bit, Germany will be able to take a leading position in the global race for broadband coverage.

## The Agency for Rail, Utilities and 5G

Jochen Homann is the president of the Bundesnetzagentur (BNetzA), Germany's national network agency. Responsible for regulating Germany's electricity, gas, telecommunications, post and railway markets, the BNetzA coordinated the auction of frequencies for Germany's much-anticipated 5G rollout. As well as expanding faster much-needed Internet connectivity in rural areas, the development promises a major boost to several industrial sectors, particularly by allowing much faster networking of mobile devices, which will make Internet of Things networks vastly more efficient. 5G will also let companies introduce better internal online networks, enhancing the efficacy of automated vehicles and factory robots. The auction was not without controversy, though. The inclusion of Chinese firm Huawei led some critics to raise security concerns, and the BNetzA has implemented new security standards for all auction participants.

## What are the greatest challenges in the rollout of the 5G network?

**HOMANN:** Companies are facing major planning and technical challenges as the next-generation high-speed broadband networks have to be 5G-ready.

The new mobile generation will bring with it a technological shift. Previous generations of mobile technology connected people, with 2G enabling phone calls and text messages,

while 3G and 4G brought mobile broadband. With 5G, processes are linked in a way that allows them to communicate independently with each other, leading to completely new applications such as connected production lines, e-agriculture, smart healthcare, etc. These new applications place very high demands on the networks. For example, far higher data rates are planned, which will enable transmission speeds of up to 10 gigabits per second.

## What sort of timeframe are we looking at for the expansion of 5G? What are the top priorities?

**HOMANN:** The spectrum auctioned last year requires companies to meet far-reaching coverage obligations. By the end of 2022, the established mobile network operators must each provide coverage of at least 100 Mbit/s for 98 percent of households in each federal state and for all highways as well as the most important state roads and rail routes. All other federal roads must have coverage of at least 100 Mbit/s by the end of 2024, while state roads, seaports and major waterways, and all other railway lines are to have coverage of at least 50 Mbit/s.

## What are the key demands from companies with regard to the 5G network?

**HOMANN:** As in all other areas of the economy, businesses primarily want planning and





***»If everyone does their bit, Germany will take a leading position.«***

*Jochen Homann, president of the Bundesnetzagentur (BNetzA)*

roll out the 5G network as fast as possible, but industrial and security-related issues are equally important. With a view to security and the latest technology for telecommunications networks and services, the Bundesnetzagentur revised its catalogue of security requirements in cooperation with the Federal Office for Information Security (BSI) and the Federal Commissioner for Data Protection and Freedom of Information (BfDI) and published it in 2019. Tighter requirements, particularly with regard to 5G, were announced in February 2019 in agreement with all authorities concerned.

The idea is that the security measures will form the basis of a high level of security coordinated with the BSI and BfDI. The advantage of this approach is that the measures will be expanded to cover all products and networks, so both existing and future technology beyond 5G will be protected even better than before.

Although it is never possible to completely eliminate risk, the additional security requirements will increase confidence in the reliability of the networks as well as that of manufacturers and system suppliers.

investment certainty as well as regulatory predictability. The Bundesnetzagentur takes this demand very seriously, which is why it consults closely with all stakeholders in order to make balanced regulatory decisions based on open, transparent and non-discriminatory procedures.

Companies are also calling for simple, quick approval procedures. The improvements in this area are already becoming clear as some border regions that did not previously have mobile broadband have now received coverage.

**Cable broadband Internet is being expanded as well. What kind of shortcomings are there at the moment and what effect will the expansion have?**

**HOMANN:** The various expansion activities of companies, partly initiated by the implementation of the federal government's broad-

band strategy, have ensured that more and more households have received high-speed broadband connections in recent years, but, despite this progress, rural areas are still lagging behind in terms of coverage. The principal reason for this is the variation in roll-out costs in areas with different population densities. Expanding in the countryside is a particular financial challenge for companies because of the considerably higher costs for each connection. So in areas that cannot achieve coverage with private-sector funding alone, the government's state aid programs are supporting market-driven expansion.

**Some companies have security concerns because the Chinese firm Huawei might be involved in the 5G network. How can you allay these fears?**

**HOMANN:** It is extremely important for Germany, politically and economically, that we

At your service!

# SET UP BUSINESS IN GERMANY

Want to be part of Europe's largest market? We're your first point of contact. **Germany Trade & Invest** (GTAI) provides potential investors with free, reliable information on the latest opportunities and risks in the German market.

## GETTING STARTED IN GERMANY

*Our experts are there to help  
you in all phases of establishing  
a business in Germany.*

*→ [www.gtai.de/  
gtai-en/invest](http://www.gtai.de/gtai-en/invest)*

### **Our extensive range of services for foreign investors, free of charge, include:**

- Market and industry analyses
- Market entry strategy support
- Individually tailored tax and legal information, e.g. on company establishment, labor law and visa options
- Recommendations concerning financing & funding opportunities
- Project partner identification and contact (location and financial)
- Site identification, site visit support

### **Germany Trade & Invest**

Friedrichstraße 60, 10117 Berlin  
T. +49 30 200 099-0  
[info@gtai.com](mailto:info@gtai.com)

**Get in touch to find out what we can do for you.**



**Silvia Obajdin**  
[silvia.obajdin@gtai.com](mailto:silvia.obajdin@gtai.com)



**Alexander Walter**  
[alexander.walter@gtai.com](mailto:alexander.walter@gtai.com)