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Sarah Giblin is the British-German founder of RiutBag, a Berlin-based travel accessories company that has adapted to coronavirus.



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Federal Ministry
for Economic Affairs
and Energy

on the basis of a decision
by the German Bundestag



»The German government intervened swiftly to combat the alarming rise in Covid-19 infections.«

Dear Reader,

The title of this edition of *Markets Germany*, "Let's Carry On," may have a slightly British ring to it. That's entirely intentional. The Federal Republic of Germany has learned many lessons from its friends and partners over the years. History buffs might characterize the German approach to the coronavirus as showing a mixture of "Anglo" pragmatism, determination and cool, and "Saxon" know-how, togetherness and rationalism.

That attitude of rational pragmatism was very much on display as the second wave of the pandemic hit the globe last fall, but it also only imposed restrictions as they became absolutely necessary and offered unprecedented state aid to those sectors and businesses forced to close temporarily.

But what happened from the top down is only half the story. Equally crucial is the creativity and spirit shown on the ground by businesses in Germany in adapting to the demands of the corona world. That's why this issue also focuses on six examples of companies that have succeeded in carrying on through it. One of them, the British-German designer and entrepreneur Sarah Giblin, graces our cover.

I found her story – and the others in this edition of *Markets Germany* – admirable and inspirational. I hope you will, too.

Dr. Robert Hermann, CEO

Email: invest@gtai.com



ONE TO WATCH

WHY **SIMON RENARD** FROM FRANCE FOUNDED A COMPANY IN GERMANY

When the French microfluidics company Fluigent decided to expand into Germany in 2014, Simon Renard was the natural choice to head up the subsidiary. The French physicist not only had the requisite experience in basic and applied research, he also knew the market well, having lived in Germany for 15 years, two of them working for Fluigent.

He chose to locate in Jena, a small city in the eastern state of Thuringia, on account of its tradition of scientific innovation but also, he says, because “it’s a really nice place to live.” Since its founding, Fluigent Germany has grown by around 20 percent annually and now operates in more than a dozen countries supplying research institutions, biotech and pharmaceutical firms with laboratory solu-

tions. Fluigent makes air pressure pumps capable of producing drops of liquid smaller than the width of a human hair, but unlike conventional syringe pumps they have very few moving parts. “That means you can have very precise flows and create droplets all of the same size,” he explains. “Physics, chemistry and cell biology – they all intersect here.”

The six-person Jena office focuses on sales and service, while manufacturing is done by the parent company in France. Renard has found the perfect conditions in Thuringia for combining science and business. “In France, it’s far more difficult to move innovations from the research arena to applied fields. In Germany, the two are much closer together,” he says.

Quick facts

NAME	Simon Renard Managing Director
AGE	48
NATIONALITY	French
EDUCATION	Humboldt University of Berlin (Physics)
COMPANY NAME	Fluigent Deutschland GmbH
LOCATION	Jena, Thuringia
INDUSTRY	Microfluidics
LINK	www.fluigent.com



ADAPTIVE THINKING

How one British-German designer's problem-solving acuity opened the door to Europe for selling Covid-adapted backpacks

Sarah Giblin is a great example of the entrepreneurial ingenuity small business owners have shown during the pandemic. Her company RiutBag (Riut: Revolution in user thinking) was born out of a simple observation: that many travelers held their backpacks awkwardly, slung across their chests. She concluded that rucksacks were constructed the wrong way around and that wearers actually felt more secure when the zip was against their backs.

Giblin quit her day job in a law firm and threw herself into producing prototypes and designs, inspired by online surveys she made for her customers, while raising capital on Kickstarter. A finalist in the 2015 British Inventors' Project and winner of a 2016 travel luggage design award, she spent three years working non-stop to build up the company. Then in spring 2020, after producing several different RiutBag models for customers all over Europe, the crash came. The RiutBag was targeted at commuters and travelers, but suddenly people were working from home and holidays were dramatically restricted.

Out of the emergency came the next inspiration. One of Giblin's customers – a Mexican doctor – got in touch with a problem: He was frantically treating Covid-19 patients but wasn't allowed to bring his backpack into the hospital. Could Giblin help?

Fast forward to September, and Giblin – now based in Manchester and Berlin – was again stress-testing materials, running social media surveys and producing various prototypes with the help of her workshop in China. After another successful Kickstarter campaign, she produced a new tarpaulin Riut-Bag including attachments on the straps for face masks and hand sanitizer bottles. Its easy-to-disinfect material gives anxious travelers extra peace of mind – this time concerning hygiene, not theft. "People want to minimize risks," says Giblin, "and backpacks go everywhere and touch everything."

Now, in the wake of Brexit, Giblin is embarking on the next part of her journey: looking for a logistics warehouse in Germany to distribute her new design throughout Europe.

PERSISTENCE IN A PANDEMIC

As cases of Covid-19 surged again across the world last fall, German authorities took quick action to limit infection numbers. The measures were typical of Germany's response to the unprecedented situation: attempting to balance economic concerns with necessary and timely health interventions.

No one said it was going to be easy. After a summer when Germany largely succeeded in limiting the coronavirus pandemic, rising numbers of Covid-19 infections across the globe led German health experts and political leaders to decide that measures were needed to prevent a full-blown second wave.

In early November, restaurants, bars and cafes had to limit their service to takeout and delivery, while culture, recreation and sports venues were shut down, and tourist accommo-

THE BOTTOM LINE

Germany's response to the second wave of the coronavirus pandemic sought to keep as much of the economy open as possible. Not everything worked, but there are reasons to believe recovery will resume in 2021.

dation banned. These measures were stepped up in mid-December to include most retail businesses and in-person education.

But there were also glimmers of hope on the health front. Unlike many countries, Germany did not face a shortage of intensive care unit beds in hospitals. In late December, the European Union gave regular approval to the coronavirus vaccine codeveloped by German company BioNTech (see page 10) and Pfizer. The first inoculations commenced before the end of the year.

German governments at both the national and regional state levels were keen to make sure those businesses most affected would be able to bridge the economic gap created by the renewed Covid restrictions. An additional EUR 10 billion was immediately set aside to help them – on top of the unparalleled EUR 600 billion stabilization fund created in March. That fund was bolstered and extended as the lockdown continued. These preventative measures were applauded by the Organization for Economic Cooperation and Development (OECD).

“It’s certainly true that the quick work of the governments was a factor,” says Nicola Brandt, director of the OECD Berlin Centre. “But so were the credit guarantees for companies and the direct financial support. All that certainly helped. Taken together, these made up one of the biggest fiscal packages to bridge the pandemic in the whole OECD area.”

Proactivity and restraint

“In this serious situation, we are not leaving our companies and workers in the lurch,” said Min-

ister for Economic Affairs and Energy Peter Altmaier, as the new measures were announced.

Under the relief program, firms could apply for up to 75 percent of their 2019 November turnover in government aid, small companies were in line for one-off payments of up to EUR 10,000, and the self-employed were able to claim a one-off grant of EUR 5,000. Loans from the state-owned development bank KfW were extended and made available to companies with fewer than ten employees. Previously, value-added tax had been reduced from 19 to 16 percent through 2020 to encourage consumer spending. And the government also decided that its popular *Kurzarbeit* furlough program would be continued until the end of 2021 (see page 35). Under *Kurzarbeit*, the state temporarily covers the salaries of employees so that firms can retain their workforces.

Germany did not grind to a standstill. Most people continued to work, many in home offices, a solution born of necessity that worked better than anyone expected and even turned out to have considerable advantages. Initial predictions forecast less economic damage from the second lockdown than from the first.

As a result, while the economy did dip in late 2020, industrial production – upon which 15 million jobs directly or indirectly depend – remained steady. So too did the truck toll mileage index, which reflects the numbers of trucks on German highways and is considered a good measure of economic activity.

Reasons for optimism

There are reasons for cautious economic optimism in 2021 and beyond – for example, the progress Germany made between the first and the second shutdown. In the third quarter of 2020, before the second lockdown, growth increased by 8.5 percent, leaving the economy operating at 96 percent of its pre-pandemic level.

“In general, the German economy is still going well, even though several individual sectors are suffering a lot,” concluded Christian Rusche from the Cologne-based German Economic Institute (IW Köln) in the fall. “Automobile construction, for instance, is slowly picking up again.”

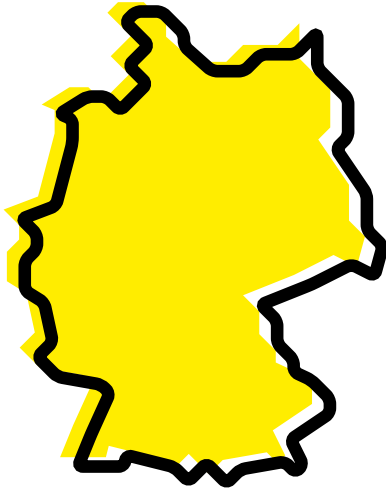
HOW DOES THE FEDERAL SYSTEM WORK?

The federal system in Germany consists of two main levels: the national parliament and the national government cabinet, headed by the chancellor (presently, Angela Merkel), and the regional parliaments and governments of the 16 German states, headed by the state premiers. Examples of the states include Bavaria and North Rhine-Westphalia.

The regional states have substantial powers of their own, being responsible for things like education and policing as well as large parts of the health system. During the coronavirus pandemic, they have made important decisions about rules and guidelines. This is why corona-related measures may differ slightly from state to state. The state premiers meet regularly for video conferences with the chancellor to coordinate policy across Germany and to take joint decisions.

EMERGING STRONGER

Three good reasons why the German economy should prove resilient



GERMAN COMPANIES ARE DIGITALIZING FAST

German companies are investing heavily in digitalization because of the coronavirus, and **61.2 PERCENT** of German firms are planning to make digital innovations in the next two years.

Source: tinyurl.com/yx8jts9r



MAJORITY OF GERMAN EXPORTS MADE WITHIN THE EU

German exports worth **EUR 48.2 BILLION** (52 percent of all exports) went to countries within the EU in August 2020. While the pandemic has weakened global supply chains, trade within the EU has remained stable.

Source: tinyurl.com/y2xsqz77



AUTOMIZATION IS SPEEDING UP

Automation and smart technologies – especially those relating to networked industry and the Internet of Things (IoT) – are expected to increase yearly turnover across all sectors by between **6.3 AND 9.8 PERCENT** by 2025.

Source: tinyurl.com/y67xtgfg



Photo: Gaby Gerster/latif

KURZARBEIT IN PRACTICE

How a venerable German company used the government's furlough program to maintain production and retain its workforce

The 100-year-old precision engineering firm SchuF, based near Frankfurt, specializes in manufacturing valves for petrochemical companies and other firms. As well as in Germany, the company currently has plants in Ireland, the US, the UK, Italy and India, and exports to markets on every continent – which means a shortfall in one can often be made up in another.

But neither that nor the relative stability of the petrochemicals sector could fully insulate SchuF from the effects of a global pandemic. In spring 2020, CEO Dr. Martin Frank found himself staring at a downhill trend, with sales worldwide dropping 30 percent.

He decided to take advantage of one of the options in Germany's pandemic toolbox: the *Kurzarbeit* program – where the German government pays a minimum of 60 percent of the net income of employees for the period there is no work for them to do. "I think German *Kurzarbeit* is very solidly balanced because it doesn't go overboard," Frank says. "Sixty percent is a great deal, but not one where you'd want to be not working for too long." Governmental payroll support for employees whose services were temporarily no longer needed meant the company didn't have to lay off anyone.



Photo: Gordon Welters/laif

TAKING ADVANTAGE OF EMERGENCY CREDIT

How a family-run carpentry shop in Braunschweig – which exceeded its 2019 turnover in November 2020 – stayed solvent and got through the worst of the economic disruption

Back in March, Dirk Evers, manager of Evers Tischlerei, a small but successful family-run carpenter's workshop in Braunschweig, was very worried. As the pandemic spread, Evers' customers were desperately canceling their orders, worried that tradesmen would infect them when they came to fit their new doors and windows. Evers was left sitting on completed woodwork worth EUR 80,000, with nowhere to fit it, and a big liquidity problem. It was a critical time for Evers and his ten employees.

To bridge the gap, he took out a loan from the KfW, Germany's state-owned development bank. The EUR 30,000 he received is to be paid back over six years at the low interest rate of 1.46 percent. As someone with plenty of experience of German bureaucracy, Evers was surprised at how simple the procedure turned out to be. "The money was in the bank account within a week," he said. "It would be great if it worked out like that in future, too, to make things a bit less bureaucratic."

Just eight months later, things are looking considerably better: Business took a sharp upturn over the summer that followed the first lockdown, and by early November, the

firm had already exceeded its 2019 turnover. Evers believes this is down to various factors.

"A lot of people were at home during the first lockdown and couldn't go on holiday – and that meant, of course, that they had a certain financial cushion in their bank accounts," he explains. "Then they'd say, 'Haven't we always wanted a new floor?'"

The pandemic also created new niches. Shops, for instance, suddenly needed aerosol-protection screens between cashiers and customers. Restaurants were looking for new ways to present their menus, takeout and dine-in, without physical contact. So Evers created what he calls his "pyramids." These 15-centimeter pieces of tabletop furniture, resembling metronomes, have QR codes laser-burned into them, which diners can use to call up the menu on their phones. Restaurants love the concept, because they don't have to laminate and disinfect menus.

"I developed the idea together with a media consultant I know – and we've already been commissioned to make the first thousand copies of them," he says. "It's become a great story."

Further reasons for confidence in Germany's resilience include its structural advantages and its ability to draw on solutions that worked during the last period of economic turmoil, namely the financial crisis of 2007–2008. Compared to other European countries, Germany is less reliant upon service sectors with lots of face-to-face human interaction. When the pandemic began, Germany had far lower infection rates than, for example, Italy or Spain, and its decentralized healthcare system gave local hospitals the flexibility they needed to quickly adapt.

Healthy structures

Meanwhile, tools that proved successful back in 2008 were redeployed. In addition to the furlough program, they included suspensions of mandatory bankruptcy declarations and the rollout of fast, unbureaucratic loans from public banks.

Last but not least, in reaction to the financial crisis, German national and regional governments and the business community had the foresight to create insurance funds for more difficult times. The experience of the global financial crisis encouraged many German companies, especially small to medium-sized enterprises (SMEs), to exercise financial prudence. According to the German Savings Banks Association (DSGV), the country's mid-sized firms enjoy an equity ratio of 39 percent, which has kept bankruptcies to a minimum. In other words, many of Germany's SMEs, often called the engine room of the economy, were in a position to compensate for temporary losses in income.

Individual creativity

Stories abound throughout Germany of SMEs getting through the pandemic by taking advantage of the tools the state has put at their disposal and also by thinking outside of the box.

Take SchuF, a 100-year-old precision engineering firm that specializes in making valves. SchuF had to tell some employees to stay home for the first time in over ten years. Twenty percent of its workforce was furloughed, but "only in the office," as CEO Martin Frank stressed in the fall. Despite a moderate decline in orders, the



»The coronavirus did slow us down a little bit, particularly at the beginning of the year, but we never had to close down production.«

Thomas Chrometzka, head of strategy, Enapter

workshop stayed open and production carried on. By keeping his workforce together, Frank expects that his company will be able to pick up where it left off when the economy recovers.

Other entrepreneurs are changing their approach and product range to match new social realities. The British-German backpack manufacturer RiutBags, for instance, found demand plummeting amidst all manner of travel restrictions. So founder Sarah Giblin adapted

and created an easy-to-disinfect rucksack especially for the Covid-19 world.

“There are some businesses out there who are going to start rebuilding the world around us to respond to how we’re feeling at the moment,” she predicts. “The world has changed, I accept that it has changed – so is there something I should be doing as a designer to help humans adapt to the new world through the objects that I make?”

Digital innovation and acceleration

Necessity is not only the mother of invention but also a great accelerator. As detailed in the previous issue of *Markets Germany*, the Covid-19 pandemic has bolstered everything digital in Germany, particularly as more and more people work from home and avoid face-to-face meetings. The German digital industries association Bitkom reports that 75 percent of Germany’s biggest companies expanded

LEVERAGING GERMAN EXPERTISE

How Swiss pharma group Roche is accelerating antibody and antigen testing for Covid-19 by investing heavily in its German facilities

In May 2020, Bavaria’s state premier Markus Söder finally had some good news to report. The coronavirus had been badly affecting the southern German state for weeks. Söder was the first regional leader in Germany to have to declare a state of emergency, imposing a lockdown on public life and businesses that disrupted the lives of many Bavarians.

Now, at a press conference in Penzberg, he and the German Health Minister Jens Spahn were able to announce that an antibody test developed in the small Bavarian town by a German subsidiary of the Swiss pharmaceutical company Roche had just been approved by the United States Food and Drug Administration. The company claimed that their new antibody test was 99.8 percent accurate. That gave Roche one more reason to invest another EUR 400 million into the Penzberg plant, allowing the German subsidiary to manufacture five million tests every month. The state of Bavaria also invested EUR 40 million.

“This is not just a regional event – it’s an important international step in the fight against the coronavirus,” said Söder.



Photo: Roche



Özlem Türeci is a Turkish-German physician and immunologist who teaches at the University of Mainz. Together with her husband Uğur Şahin, she founded two companies in the field of biotechnology, including BioNTech.

their investment in digitalization in 2020. The German government has also sped up its plans to develop digital infrastructure.

German industry is now well on the way toward creating more flexible, efficient and customized manufacturing processes, which in turn are yielding new business models and opportunities. Figures from the Ministry for Economic Affairs and Energy show the government plans to invest EUR 40 billion in the digital networking of industry. Some 20 percent of German automotive companies already have automatized plants, while 83 percent of companies predict a “high level of digitalization” in their supply chains. To maintain that advantage, the German government is also continuing to fund the EUR 50 million technology program PAiCE, which promotes the development of digital industry platforms as well as collaboration between firms using those platforms.

Long-term trends

Moreover, the pandemic has highlighted the fragility of global supply chains, and growing numbers of companies are expected to start manufacturing locally. In turn, that could mean more and more German firms trying to exploit the advantages of sectors like robotics. According to figures released in June 2020 by the International Federation of Robotics (IFR), Germany has one of the highest numbers of industrial robots per worker in the world, with 388 robots for every 10,000 manual laborers. This ratio is much higher than the international average of 99 and only exceeded by Singapore and South Korea.

Green energy shows resilience

Some sectors are by their very nature more pandemic-resilient than others. Germany’s transition to renewable energy, for instance, is significantly less impacted by the coronavi-

SCIENTISTS WITHOUT BORDERS

How Pfizer’s coronavirus vaccine breakthrough was achieved together with a previously obscure Mainz-based firm, BioNTech, which is now worth over a billion euros

In November 2020, in the midst of rising coronavirus cases across Europe and Germany’s second lockdown, there was a ray of light: the US pharmaceutical giant Pfizer, in collaboration with German biotech firm BioNTech, announced preliminary test results for a vaccine that was 95 percent effective.

“Today is a great day for science and humanity,” Dr. Albert Bourla, Pfizer’s chairman and CEO, said in a statement at the time. He also paid tribute to his German partner.

BioNTech is a billion-dollar husband-and-wife team consisting of CEO Uğur Şahin and his spouse and chief medical officer Özlem Türeci, both highly accomplished scientists and experts in immunology and immunotherapy. Şahin was born in Turkey and studied medicine at the University of Cologne before meeting Türeci at the Saarland University Medical Center. Their company usually specializes in cancer research, developing ways to harness the body’s natural ability to defend itself from bacteria and viruses.

Pfizer and BioNTech announced in March – when the pandemic was still in its infancy – that they were pooling their resources to accelerate their vaccine development program called Project Lightspeed. It was a logical

step, since the two companies had already been working together on the research and development of mRNA flu vaccines since 2018. Lightspeed turned out to be an appropriate name. BioNTech was able to bring its first vaccine candidates to clinical development within less than three months. “Safety, speed and flexibility are of the utmost importance in reacting to the current pandemic,” the company said in a statement.

The two companies began manufacturing tens of millions of doses at the end of 2020 and expect to produce more than 1.3 billion by the end of 2021. In part, this is thanks to the financial support of the German government, which in September invested EUR 375 million into BioNTech from its special coronavirus research fund.

For Mikael Dolsten, Pfizer’s chief scientific officer and president of Worldwide Research, Development & Medical, the cooperation between the two companies has provided an ideal platform for the development of the vaccine. “We’re happy that the successful relationship between Pfizer and BioNTech made it possible for both companies to mobilize our resources in the face of this global challenge,” he said.

Photo: Marzena Skubatz/laif

CARRYING ON IN TIMES OF CORONA

How an international green energy company is pushing ahead with expansion into Germany and starting production of hydrogen electrolyzers

Despite the climate of uncertainty that still hangs around coronavirus, it's worth noting that the investment plans of some companies, like the Italian-Thai electrolyzer manufacturer Enapter, have still gone ahead more or less on schedule. Enapter works in green hydrogen technology, which is considered one of the best bets for solving the world's environmental emergencies, with potential applications in the transport, steel and chemical sectors.

In June 2020, Minister for Economic Affairs and Energy Peter Altmaier announced a EUR 9 billion government program to develop hydrogen technologies. Germany, he said, aimed to become "the number one in the world" in the area.

That governmental commitment was one more incentive for Enapter to expand to Germany despite ongoing concerns and restrictions around the pandemic. The company, which has clients in 33 countries, is set to open a new plant for manufacturing its Anion Exchange Membrane (AEM) electrolyzers in

the western German town of Saerbeck in 2021. The EUR 100 million project will mass-produce Enapter's groundbreaking "plug and play" electrolyzers, which produce hydrogen that can be integrated into any energy system. By lowering the manufacturing overheads, the firm hopes to make their electrolyzers more affordable and contribute to Germany's transition to renewable energy.

Germany Trade & Invest provided Enapter with support in finding a location to build the factory. Although the process was slowed down a bit by the coronavirus, according to Enapter's head of strategy Thomas Chrometzka, Enapter remained focused on its long-term objective. It was important that the construction plans went ahead and the production schedule remained on track even as the virus spread throughout Europe.

"We were even able to increase production in some countries," Chrometzka said. "We were nimble enough to react to the changes and able to work with them."

rus – and the government has invested heavily in it. That's one reason why Enapter, the Italian-Thai manufacturer of hydrogen generators, or electrolyzers, has decided to go through with building a EUR 100 million construction facility in the western German town of Saerbeck despite the pandemic disruption.

For Enapter, the biggest problem in 2020 was how the coronavirus impeded the search for a location. "The coronavirus did slow us down a little bit, particularly at the beginning of the year, but we never had to close down production," says Enapter's head of strategy Thomas Chrometzka. "That was very important to us because our motto is: 'We're offering a solution to climate change, so we really can't be slowed down – we need to speed up.'"

"We chose Germany because we think it is a very good location for the stage we're at," he adds. "Some people ask us: 'Why don't you just go to the Far East and mass-produce electrolyzers there?' The answer is that we need to come up with the processes for how to mass-produce. Our product is in serial production, but to bring that to mass production we need to redesign it and then get the machines and processes in place to produce thousands and thousands of them."

To achieve that aim, Chrometzka explains, Enapter needs "a structurally strong environment with highly qualified HR capacities, with good connections to the research and development community and to suppliers. All of this we found in Germany."

The first year of the coronavirus pandemic has been full of ups and downs, with the situation remaining fluid and subject to rapid changes and reversals of fortune. Despite all the legitimate causes for concern, however, the outlook for Europe's largest economy is on the whole optimistic – Germany is carrying on.



Photo: Paul Langrock/aif

FRANK SPORTOLARI

As well as being the president of AmCham Germany – which promotes global trade relations built on the strong foundation of the US-German partnership – Frank Sportolari is president of the logistics firm UPS Germany. An American by birth, he began his career with UPS in Munich in the 1980s.

Photo: AmCham Germany/Jan Zappner



“Stability is what people look for”

Germany's reputation as a business location has never been better amongst US companies. Frank Sportolari, the president of the American Chamber of Commerce (AmCham) in Germany, puts that down to a number of factors – geophysical, cultural and economic.

In this year's AmCham Germany survey of the top 50 US companies in Germany, the country earned an even higher approval rating than in 2019. Why the improvement?

FRANKSPORTOLARI: I think the main point is that US companies for a long time have given Germany a very high rating. It's not an anomaly that so many of them say: "We're very eager to continue doing business in Germany." The ones that are here continue to invest, and many other companies are looking at setting up their European operations in Germany.

Might this have something to do with a favorable view of Germany's response to Covid-19?

SPORTOLARI: Yes, that was one of the factors. It's just another manifestation of the fact that many US companies view Germany as a well-managed country. The government is very stable, and there's a respect for law, legal processes, intellectual property, etc. There's just a very good atmosphere in Germany and that's attractive to American companies.

Your report finds that the IT and service industries are particularly benefiting from the disruption caused by the ongoing pandemic. Could you expand a bit on that?

SPORTOLARI: You don't want to use the word benefit in a way, but let's face it: Some people have gotten some advantages through this. Certainly, the world was on a trajectory to become more and more digitalized, so it's no surprise that IT companies would have an opportunity to sell their services more, as untold numbers of people in Germany were sent into home office. Many of them are still there. You also have the logistics industry, which is actually the third largest employer in Germany.

And then you have large online retailers. People quite frankly ordered a lot more stuff. Those are the branches that did really well.

For the first time in the new survey, Amazon has overtaken Ford as the US company with the largest turnover in Germany. How significant is that?

SPORTOLARI: It certainly sounds very symbolic, doesn't it? The online retailer overtakes the traditional, 100-year-old car company. But if you look back to the 1990s and ask: What were the biggest listed companies? They were all in the utilities, energy, chemicals and automotive. And now we've got FANG: Facebook, Amazon, Netflix and Google. It's a trend that's going to keep on going and won't be stopped anytime soon. We shouldn't be surprised by the Amazon-Ford development, although I think it came sooner than it would have because of the disruption caused by the pandemic and the need for more stuff to be shipped to people's homes.

What aspect of the German government's economic policies do you think US companies like?

SPORTOLARI: What's appreciated is a very clear legal framework for doing business, stability in government, and the education system. There is the issue of the government holding stakes in companies in a way that's not the case in the US. That's an issue we always keep an eye on and help our members by making sure there's a level playing field.

Why should US companies be looking to get involved on this playing field?

SPORTOLARI: One thing that speaks very much in Germany's favor is its central lo-

cation. That's something you're not going to lose. Other countries aren't going to get closer to the center of Europe. Germany is at the crossroads of north-south traffic in Europe. We've got the Rhine, which is the major navigable river in Europe. These are all very big natural things that speak toward Germany always enjoying a central position in connecting the transatlantic economies. I also think the ability of companies to set up relatively easily here compared to other countries is another thing that will encourage people to look at Germany very favorably. We see by the number of companies that choose to locate in Germany that it's a very attractive place to be. I also applaud the efforts that Germany makes, with active "salespeople" in the US, helping companies make their investment decisions, providing them with guidance and steering them toward available grants. Those are all things that are really helpful. I think it's a real leg-up for Germany.

Are there any particular sectors you'd encourage to come here?

SPORTOLARI: I can't think of any sector that shouldn't be looking to internationalize, and I can't think of any sector that wouldn't want to come to Germany, be it beverages, autos or whatever. It's a good marketplace, and I can't say it too often: Stability is what people look for. Anyone who does any kind of precision manufacturing very much values the German education system. I don't know that there's anywhere in the world you can hang out your shingle and get people showing up, thoroughly trained, with a diploma. You don't have to invest so much in training from day one for them to do their jobs correctly. Those qualities make Germany very interesting for American companies.

Firing up Germany's Post-Coal Economies

Germany will be phasing out coal-produced power by 2038, and the government's Structural Development Act is underwriting a massive effort to shift the focus of the regions most affected over to clean energy. We look at four innovative projects.

Lusatia in eastern Germany was once one of the biggest lignite mining regions in Europe and a notorious polluter. But all that is changing. Now the area wants to be known as an innovation hub for clean energy.

Just ask Frank Mehlow, director for business opportunity promotion at energy giant LEAG, that has built a battery storage facility at Schwarze Pumpe near Spremberg, a lignite-fired power plant which is due to be decommissioned. With 50MW capacity, the new facility is the biggest of its kind in Europe.

"The battery is a perfect match for the existing power plant infrastructure, as its feed-in stabilizes the grid and forms the basis for a build-up of future energy technology in the area," Mehlow says. "Schwarze Pumpe has an industrial park attached to it, and the battery will make the park more attractive for investments in electricity-intensive manufacturing." LEAG is owned jointly by Prague-based Energeticky and Jersey-based PPF Investments.

Battery storage technology will play a vital role in Germany's energy future, which is enshrined in the Coal Phase-out Act, while the accompanying Structural Development Act (SDA) will see the government invest EUR 40 billion to transform economic structures in the country's coal-producing areas between now and 2038.

THE BOTTOM LINE

The rapid change in former coal mining areas in Germany makes the regions attractive locations for foreign companies in the energy sector.

Electrolyzers for Leuna

Further to the west, the city of Leuna is part of what's known as the Central German Coal Region and home to the Fraunhofer Institute for Microstructure of Materials and Systems (IMWS) and its GreenHydroChem project in cooperation with Siemens and Linde AG.

In July 2020, the project became one of twenty winners of the Ministry for Economic Affairs and Energy's "Living Labs for Energy Transition" competition. At its core is an electrolyzer for transforming green electricity into hydrogen (H₂), which will serve as a primary energy source for the massive chemical plant cluster around Leuna. The French oil and gas giant Total is among the future consumers and is already launching R&D projects in the region.

"The first-phase completion of GreenHydroChem by 2024 will mark the crucial step of scaling up hydrogen technology from the pilot to the large demonstrator stage, which can efficiently flip to commercialization," IMWS's deputy director Sylvia Schattauer says. "Our efforts here are complemented by both Germany's National Hydrogen Strategy and the Structural Development Act, as well as numerous affiliated sub-programs on the national and regional state levels."

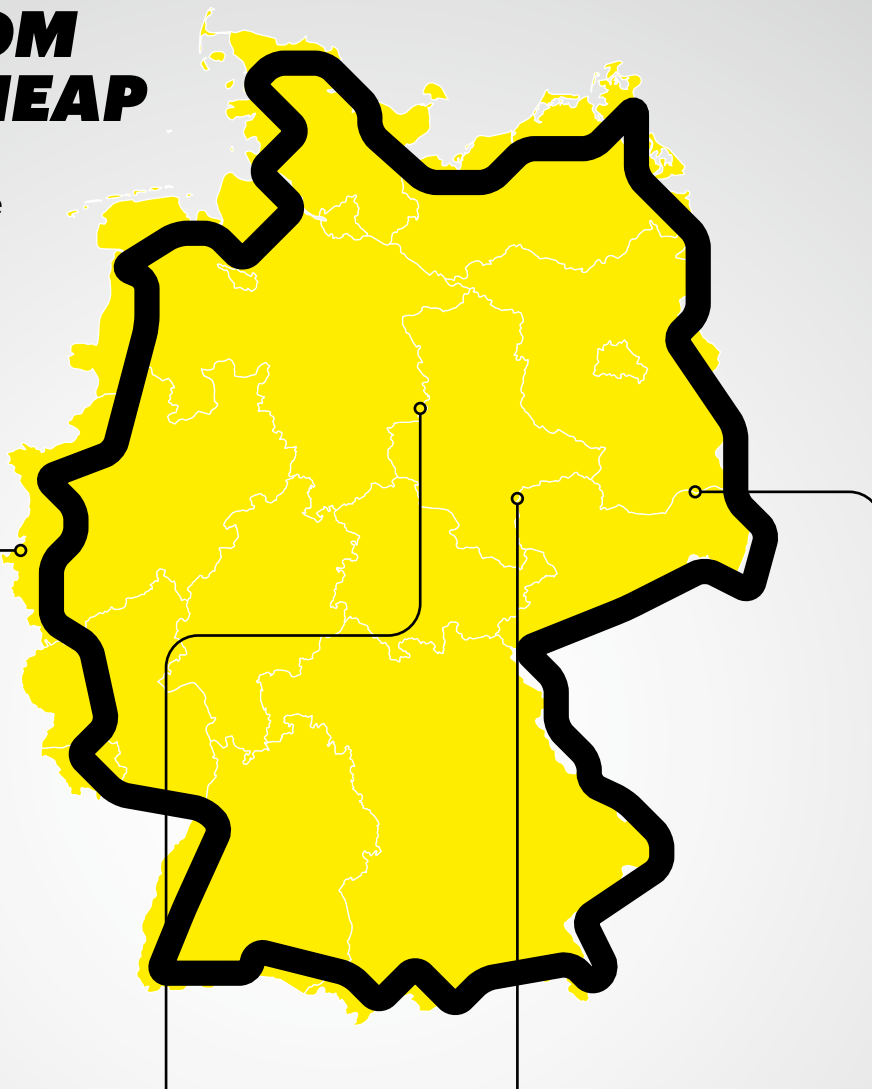
Biosolids in Helmstedt

Meanwhile, in Helmstedt, a former coal-producing region on the then border between West and East Germany, Bernard M. Kemper, CEO of EEW Energy from Waste, an operator of thermal waste power plants across Europe, is awaiting the go-ahead for a project linking a new biosolids incineration plant and an electrolyzer for hydrogen production.

"We are burning 150,000t of biosolids per year, and our electrolyzer will have an output of 20MW, so our projects drive both the transition to clean energy and transformation of the coal regions," Kemper says. "A radiating effect across borders has already become apparent, with a foreign manufacturer of hydrogen buses considering the establishment of production lines nearby," he adds.

RISING FROM THE SLAG HEAP

Germany's traditional coal-producing regions are set to become the focus of the green energy revolution: from heat storage to power-to-gas, wind energy and the hydrogen economy.



RHINE

The most industrialized of Germany's four coal regions, it is now home to a number of trailblazing energy projects and a store-to-power development project, which focuses on adapting existing lignite power plants into heat storage plants.

HELMSTEDT

The region has supplemented power from lignite-fired plants with electricity from municipal waste since the 1990s. Transition projects are focusing on power-to-gas in order to make renewable energy easy to store, transport and use cross-sector.

CENTRAL GERMANY

The "Chemical Triangle" of Germany is home to massive clusters of chemical and oil refining industries. With a mix of robust chemical infrastructure, large industrial consumers of H₂ and ample wind energy, the region is now scaling up H₂ technology demonstration.

LUSATIA

An enormous and still-active lignite open-pit mine supplies four power plants in the eastern German region. One of them, Schwarze Pumpe, is set to become a flagship facility for large-scale battery storage and hydrogen (H₂) projects.

Heat storage for the Rhineland

Finally, further to the west, changes are also afoot in the Rhine Coal Region. One of its many beacon projects is StoreToPower, which involves converting parts of an existing lignite power plant into a heat storage power facility. "The transformation of Germany's four coal regions has become very dynamic, with decision-makers busy analyzing how to position their respective region and what to focus on,"

says Heiko Staubitz, Senior Manager for investor consulting within GTAI's Smart Grids & Energy division. "There are attractive government funds and grants to facilitate this part of Germany's transition to clean energy, and many companies are seeking synergetic cooperation with innovative players from abroad."

Watch our short film on the coal regions as "Germany's next generation energy hubs":
www.gtai.com/coal-regions



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How to Handle Heat

Industrial activity is a major source of greenhouse gas emissions in Germany, but facilities across the country are changing the way they operate to reduce that pollution. Foreign suppliers of environmental heating and storage technologies are profiting.

Located not far from Germany's North Sea coast is one of Europe's largest paper factories – the Papier- und Kartonfabrik Varel (PKV). It emits 280,000t of carbon dioxide (CO₂) per year, largely from burning fossil gas to produce the steam needed for manufacturing.

But PKV has committed to achieving climate neutrality and is taking steps to reduce that carbon footprint. In late 2019, the company installed a power-to-heat (PTH) module, which operates much like an immersion heater, producing steam from green electricity generated by the numerous wind turbines along the nearby coastline.

The PTH module was supplied by the Norwegian company Parat, which developed the technology for Scandinavia's many hydropower plants. "The Norwegians had proven technology and the expertise to set up a PTH of an industrially viable scale of 20MW, which is very large by German standards," says PKV's managing director Dettmar Fischer. "The know-how needed to achieve climate neutrality can only be gained by leaving behind the stage of pilot projects and entering the stage of such large-scale demonstrators." He adds that the PTH module feeds data into the area's Enera project, which was funded as part of the German Ministry for Economic Affairs and Energy's SINTEG initiative. It supports attempts to generate electricity exclusively from renewable energy sources in large-scale test regions.

SINTEG is one of the many programs associated with Germany's goal of achieving greenhouse gas neutrality by 2050 without reducing its international competitiveness.



THOMAS HÄHL
*Consultant at
Guidehouse Energy*

How can international companies benefit from German industry's CO₂ reduction effort?

German government subsidy programs have lately been scaling up in the industrial sector, in particular for innovative industrial pilot projects such as those in the field of hydrogen. This is a key step towards achieving the overall aim of industrial decarbonization. It presents ample opportunities for foreign suppliers of relevant technologies willing to set up a presence in Germany.

What services stand to gain?

In the past, the government generally pushed the private sector for carbon emission reductions. The adoption of the UN Sustainable Development Goals (SDGs) and the signing of the Paris Agreement in 2015 and 2016, respectively, has also now provided a very strong impetus in the private sector. Investors and shareholders increasingly expect banks, energy utilities and industrial enterprises to review their existing CO₂ policies.

Good uses for excess industrial heat

Meanwhile, some 200km to the east of PKV, tenants in Hamburg's newly constructed HafenCity port district can relax in the knowledge that their homes are heated in an innovative, climate-friendly fashion. Since 2018, the district's home heating has been supplied by Aurubis, one of Europe's largest copper producers. Its industrial processes generate excess heat that, if not captured and used, would require the equivalent of 4,800 Olympic pools per year in water for cooling. As such, it is Germany's largest industrial model heating project.

At the center of the system is a heat-exchanging device supplied by the Swedish company Alfa Laval. "This self-financing project creates significant CO₂ reduction for Aurubis and is a great example of international cooperation in the service of a future-oriented, environmentally friendly and resource-saving solution for German industry," says Sven Schreiber, managing director of the company's German subsidiary Alfa Laval Mid Europe.

The HafenCity project was supported by a range of government subsidies, including funds from the Federal Ministry for Economic Affairs and Energy.

Reducing pollution and costs

The German Energy Agency dena calculates that companies in Germany could prevent up to 37 million tons of CO₂ emissions per year and save EUR 5 billion in energy costs if industrial waste heat could be gainfully exploited.

Many commercial opportunities have arisen from Germany's CO₂ reduction efforts and the accompanying need to improve handling of industrial waste heat. Norway-based Ener-

gyNest, which has developed a novel thermal battery technology, is another Scandinavian firm that has seized the moment: In May 2020, it opened up a project development office in Hamburg. EnergyNest's batteries, which are made from a concrete-like material, store excess industrial heat until it is needed for tasks like preheating, green steam production or green electricity generation. Among the current users are a brickyard in Austria, an oil and gas

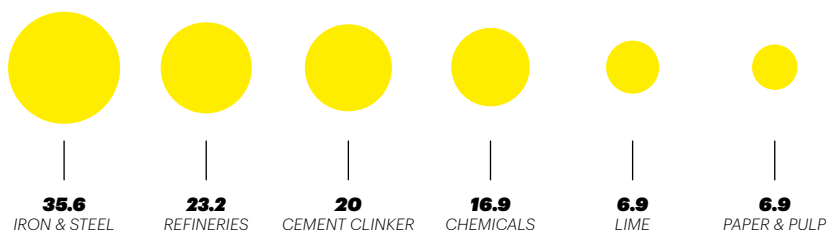
THE BOTTOM LINE

German industry is committed to reducing CO₂ emissions by harnessing waste heat – a situation that has proven lucrative for a handful of innovative international companies.

refinery in Italy and a major fertilizer manufacturer in Norway. "Any company that takes its environmental, social and governance targets seriously will be favorably inclined toward our thermal battery solutions," says EnergyNest CEO Christian Thiel. "We're happy that the industrial sector is finally beginning to rethink its thermal processes, because in the overall picture, industrial emissions are a problem more in need of tackling than even ground transport emissions."

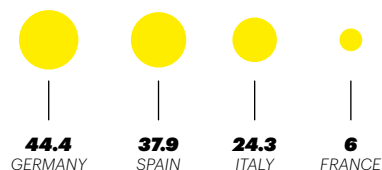
THE TOP SIX

Greenhouse gas emissions in Germany in the whole of 2019 by industrial sector



CLEANING UP EUROPE'S INDUSTRY

Investments by European companies in low-carbon technologies in 2019 (in EUR billion)



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German Photonics Come into Focus

Germany's optics and photonics sector is growing vigorously and attracting major foreign investment. Its applications span from optical components for communications and medical technology to quantum computing and even space exploration.

On October 20, 2020, German extra-terrestrial technology made history. NASA's OSIRIS-REx spacecraft unfurled its robotic arm to collect rock from the ancient asteroid known as Bennu more than 320 million kilometers from Earth. The samples may hold primordial secrets, offering a glimpse into our solar system when it was first taking shape billions of years ago and hurling out material that could have helped seed life on our planet.

OSIRIS-REx is equipped with highly complex and sensitive optical measuring instruments (OCAMS), protected by Berghof Fluoroplastic Technology's black optical polytetrafluoroethylene (PTFE) material, which minimizes light interference.

Berghof is a leading German manufacturer of high-performance optical materials based on PTFE. One of Germany's fastest-growing industries, photonics plays a key role in the field of semiconductors and sectors such as medical technology, photovoltaics, mechanical engineering and aviation. From computer tomography and automobile sensors to fiber-optic communications and barcode scanners, photonics has become an essential part of life in the 21st century.

THE BOTTOM LINE

Optics and photonics is an exciting, fast-growing, future-oriented sector in Germany with lots of room for foreign companies.

A thousand leading-edge companies

About 1,000 companies in Germany currently operate in the sector, including major names like Bosch, Jenoptik, Trumpf, Zeiss, Schott, Agfa-Gevaert, Osram and Laserline, and business has been booming. Between 2005 and 2019, revenue rose 220 percent, from EUR 17 billion to EUR 37.5 billion. Exports grew 1.6 percent last year to EUR 27.1 billion, with the greatest number of sales in the European Union, followed by Asia and North America.

"Photonics has been outperforming GDP growth in Germany for years, thus steadily increasing its importance," says Max Milbredt, photonics senior manager at Germany Trade & Invest. "We have also seen growing interest

in terms of foreign direct investment. The German market is shifting toward measurement and control, medical technology and production technology, largely due to Germany's efforts to make the digital networking of industry a reality."

The country also boasts its share of luminaries, among them Stefan W. Hell, director at the Max Planck Institute for Biophysical Chemistry in Göttingen, who won the Nobel Prize in Chemistry in 2014 for his pioneering work in ultra-high-resolution fluorescence microscopy, which surpassed the limitations of the light microscope.

State support and resources

Germany's photonics sector enjoys support from the national and regional state governments, research institutions, universities and industry associations, such as OptecNet, which represents eight regional Optical Technologies Innovation Networks across the country.

"Optical technologies have seen constant above-average economic growth in recent years, with new markets like AR/VR (augmented and virtual reality), autonomous driving, digital health, machine vision and indoor farming creating new business opportunities," says Gerrit

Rössler, cluster manager for optics and photonics at the Berlin Partner for Business and Technology. Increasing public investment and R&D efforts in quantum communication and computing have increased the number of start-ups in the field and grown the market for optical components in quantum applications.

Bosch, for instance, is a global leader in microelectromechanical systems (MEMS), a key technology in smartphones, cars, drones, robots and the Internet of Things (IoT). Bosch recently made its single biggest investment ever with its new EUR 1 billion semiconductor manufacturing facility in Dresden. It's set to begin operation in 2021, producing MEMS-based light detection and ranging (Lidar) sensors in order to meet growing demand from mobility and IoT applications.

Gaining a foothold in Germany

International players are already getting involved. Canadian industrial camera manufacturer Emergent Vision Technologies opened a European subsidiary near Stuttgart in July. The new office offers closer proximity to the largest markets in Europe, the Middle East and Africa.

ASML, a leading Dutch manufacturer of photolithography systems for the semiconductor sector, recently acquired Berliner Glas, which produces the ceramic and optical modules used in its lithography products. Berliner Glas has continued to grow in recent years and is, as Rössler puts it, "a great example of the German industry backbone – small to medium-sized enterprises."

The Swiss-American technology company TE Connectivity acquired Berlin-based sensor system supplier First Sensor this year, accelerating its growth in the increasingly competitive global market. The company's capabilities and products "strongly align with the markets we serve and create greater opportunity to serve our customers," says John Mitchell, the senior VP and general manager of TE's sensors business.

INVESTOR'S PERSPECTIVE

Swiss Engineering Group Invests in Solar



Photo: Meyer-Burger-Bitterfeld
Meyer Burger's Solar Cell Production in Bitterfeld

Despite the coronavirus pandemic, German optics and photonics have remained robust, attracting major investments from abroad in key areas such as photovoltaics. This year saw a significant boost to Germany's lagging solar sector thanks in large part to Swiss mechanical engineering group Meyer Burger Technology. The company is establishing its own solar cell and module production facilities in the eastern German regional states of Saxony-Anhalt and Saxony, taking over the former sites of the now defunct firms Solarworld Industries and Sovello. Meyer Burger is investing some EUR 154 million in the new facilities, which are due to begin production in 2021 and will bring up to 3,000 new jobs.

"We are looking forward to revitalizing two of the most traditional solar locations in Europe and creating new jobs," said Meyer Burger's CEO Gunter Erfurt. "Using existing infrastructures and the high level of expertise in the regions is a conscious strategic decision that will enable us to achieve short ramp-up times and high product quality."

€37.5 BN

Total photonics industry revenue in Germany

1,000

Number of photonics companies in Germany

142,500

Number of employees in the photonics industry in Germany

41%

Germany's market share of the European photonics market



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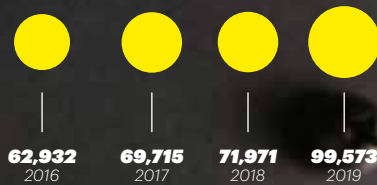
Source: Spectaris, Germany's Photonics Sector in Figures (2019)

At the Max Planck Institute for Dynamics of Complex Technical Systems, located in Magdeburg, scientists i.a. are running tests to determine how glycosylation of the spike protein of SARS-CoV-2 will impact the capacity of the virus to cause disease in humans. Their findings are a valuable contribution to the pool of research focused on developing effective vaccines.

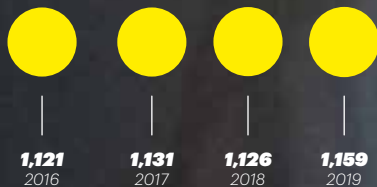
GROWING SECTOR

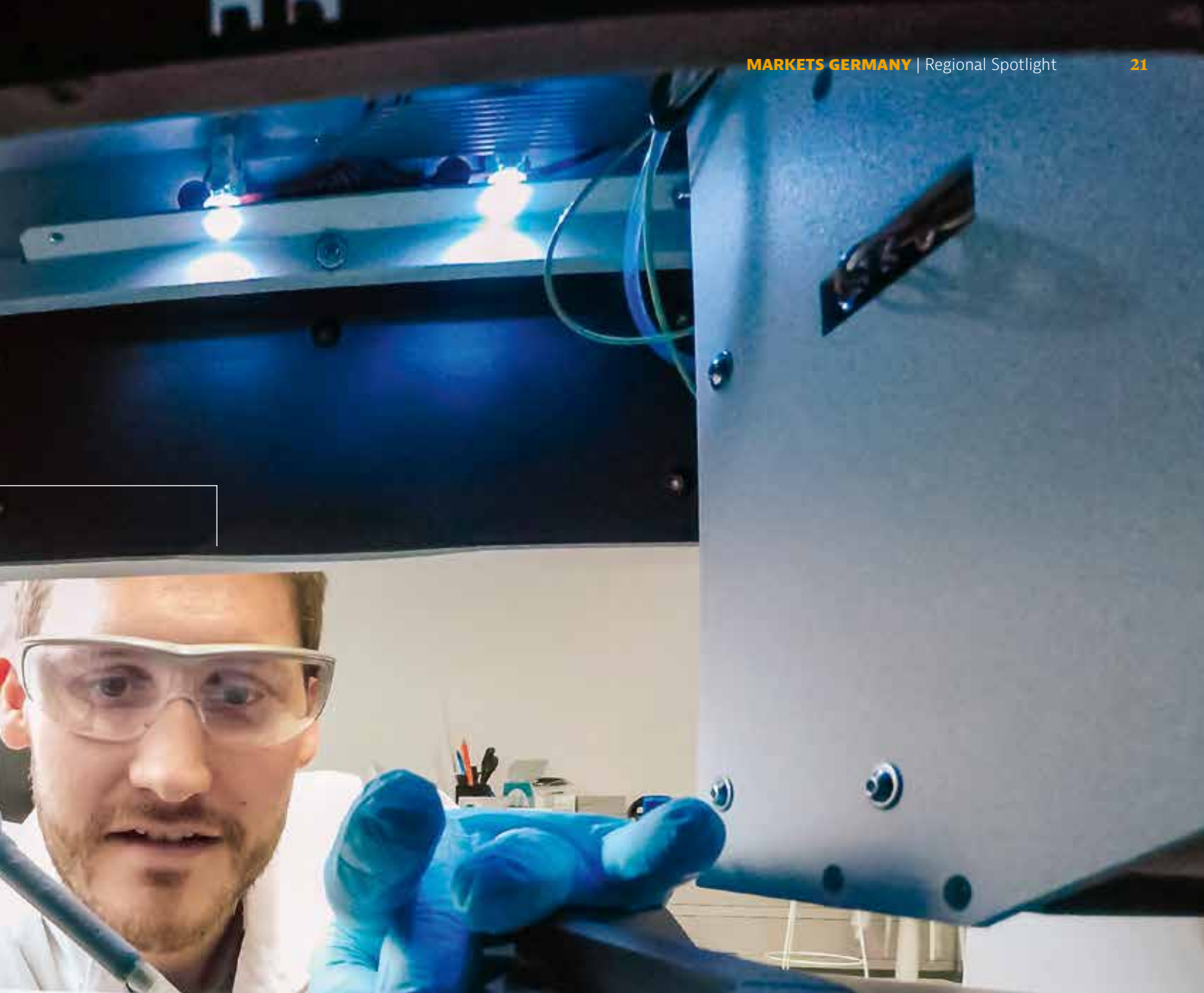
Number of employees and turnover of the companies in the medical technology and pharmaceutical industries in Magdeburg

ANNUAL TURNOVER (IN EUR THOUSAND)



NUMBER OF EMPLOYEES





Regional Spotlight **MAGDEBURG**



In our new "Regional Spotlight" series, *Markets Germany* profiles attractive German investment locations as well as industry and research clusters. Our first candidate is the Magdeburg region, where the Max Planck Institute (MPI) researches chemical systems engineering, bioprocess technology and energy systems.

HEALTH TECHNOLOGY BLOOMS IN MAGDEBURG

The city of Magdeburg in eastern Germany, just a 90-minute drive from Berlin, is facing momentous change. In recent years, the capital of Saxony-Anhalt has blossomed into a healthtech hotspot. Several dozen healthtech

and pharmaceutical companies have settled there – including some notable international players. One example is Salutas Pharma, a division of the Novartis group, which is now a major employer in the region and one of many companies from abroad capitalizing on the growing opportunities in the health-tech cluster.

One of the major attractions of Magdeburg is the presence of a Max Planck Institute and a network of research centers. Already in 2018, for example, the institute launched a technology that vastly accelerates the production of virus vaccines. In a world that is adapting to coronavirus, having access to that kind of expertise is a distinct advantage for healthcare firms.

Germans Embrace Online Shopping

German consumers have long been skeptical of e-commerce. But pandemic restrictions coupled with the sheer convenience of it have won Europe's most conservative shoppers over to Internet retail platforms, as one sector in particular illustrates.

In some parts of Berlin, the blue thermal containers worn by bicycle couriers are now as ubiquitous as the yellow of the city's public transport authority. In August, the Finnish restaurant delivery service Wolt set up shop in the German capital as part of a global expansion drive, and they haven't looked back.

"Berlin is the fastest-growing city for us in terms of the first months since launch, and there's clear demand for our service," says Patrick Dümer, regional manager for Wolt Nordics & Baltics. The Helsinki-based company began operations in 2015 and is now present in 23 countries and 100 cities.

German online food sales in the third quarter of 2020 shot up by 52.9 percent (year on year), grossing EUR 633 million, according to the German e-commerce association bevih. Wolt has also benefited from consolidation in the sector and is now one of only two main players in Berlin, along with Lieferando, the German subsidiary of Dutch company Takeaway.com. Both firms are great examples of how international companies can take advantage of what amounts to a sea change in consumer habits in Germany.

"Germans have traditionally been quite skeptical about e-commerce, but Covid-19 has now given them a bit of a push toward online retail," says Germany Trade & Invest's e-commerce expert Johannes Fischer. "For many Germans, it's frankly kind of exciting that we can do our daily shopping online."

Huge market, helpful government

And food isn't the only thing flying off online retailers' shelves. In the second quarter of 2020,

ONLINE GROWTH

2020 was the year the average German consumer got on board with Internet shopping. Food delivery, software and services, and consumer goods are just some of the online sectors that surged.

Consumer goods: Germany is Europe's biggest economy, but shopping habits long remained conservative. Last year, however, German consumers really embraced online shopping. Average revenue per user shot up from EUR 1,091 to EUR 1,244 between 2019 and 2020 and is expected to climb to EUR 1,303 in 2021.

Food delivery: Younger Germans have acquired a taste for eating well while staying in, and older people have discovered the convenience of takeouts. The number of Germans enjoying restaurant delivery is expected to grow 9 percent to 14.3 million this year.

Online services: Working from home and remote learning weren't new when corona hit, but the pandemic has opened up markets for video conferencing, online tools and remote education. The German government's digital education pact contains the equivalent of EUR 500 spent per pupil or student.

B2B: German companies have also come around to online solutions, whether that's finding the perfect supplier or using software-as-a-service to control costs. Some 63 percent of German companies in a recent digital industry association survey said the use of digital platforms is key to their corporate future.

the apex of the first wave of the pandemic, German online sales leapt 16.5 percent (year on year) to EUR 20 billion. The corresponding Q3 figures were 13.3 percent and EUR 19.3 billion, even as coronavirus restrictions were eased.

Of course, this is not all down to corona. German e-commerce has been growing by EUR 400–500 million per annum in recent years. Ironically, overall growth rates might be down slightly in 2020 because of corona-related disruptions to the travel industry, electronic event tickets and other sectors.

Wolt became interested in Germany not just because of its market size but also because of the country's welcoming attitude. "We were impressed by some of the government investment agencies reaching out to us proactively to offer their help once we announced we would launch in Germany," Dümer says. "Beyond that, Germany is a technologically advanced country, with a high mobile-phone penetration, high GDP growth and high purchase parity. Germans are very educated."

Door-to-door food and drink

In addition to restaurant food, home delivered groceries and beverages represent an important and promising German market. Dr. Oetker, Germany's largest food company and largest brewing conglomerate, recognized that back in 2017, when it launched the Durstexpress beverage delivery service. In October, it agreed to buy rival flaschenpost for a reported EUR 1 billion – an indicator of the strength of the market.

The German grocery sector is worth about EUR 250 billion. Germany's biggest grocery store chains, EDEKA and REWE, now operate

THE BOTTOM LINE

Once wary of e-commerce, German consumers are now embracing online retail in a big way, opening up new business opportunities – as the food and beverage sector demonstrates.

their own delivery services. Amazon Fresh is also up and running in Germany, but demand for their services is so great that consumers in German cities often have to wait to get a delivery slot.

That means plenty of market potential for other, local services and international businesses. Picnic, which has a Dutch parent company, has begun serving the western German state of North Rhine-Westphalia, and the Czech company Rohlik is expanding to Munich under the name Knuspr. There is plenty of scope and capacity for similar services in other German cities and regions, too.

Moreover, traditional e-commerce staples like clothing still offer plenty of growth potential. Chinese discount fashion retailer Shein, for example, has recently started doing business in Germany. It's a trend that is unlikely to stop, regardless of how the coronavirus pandemic pans out.

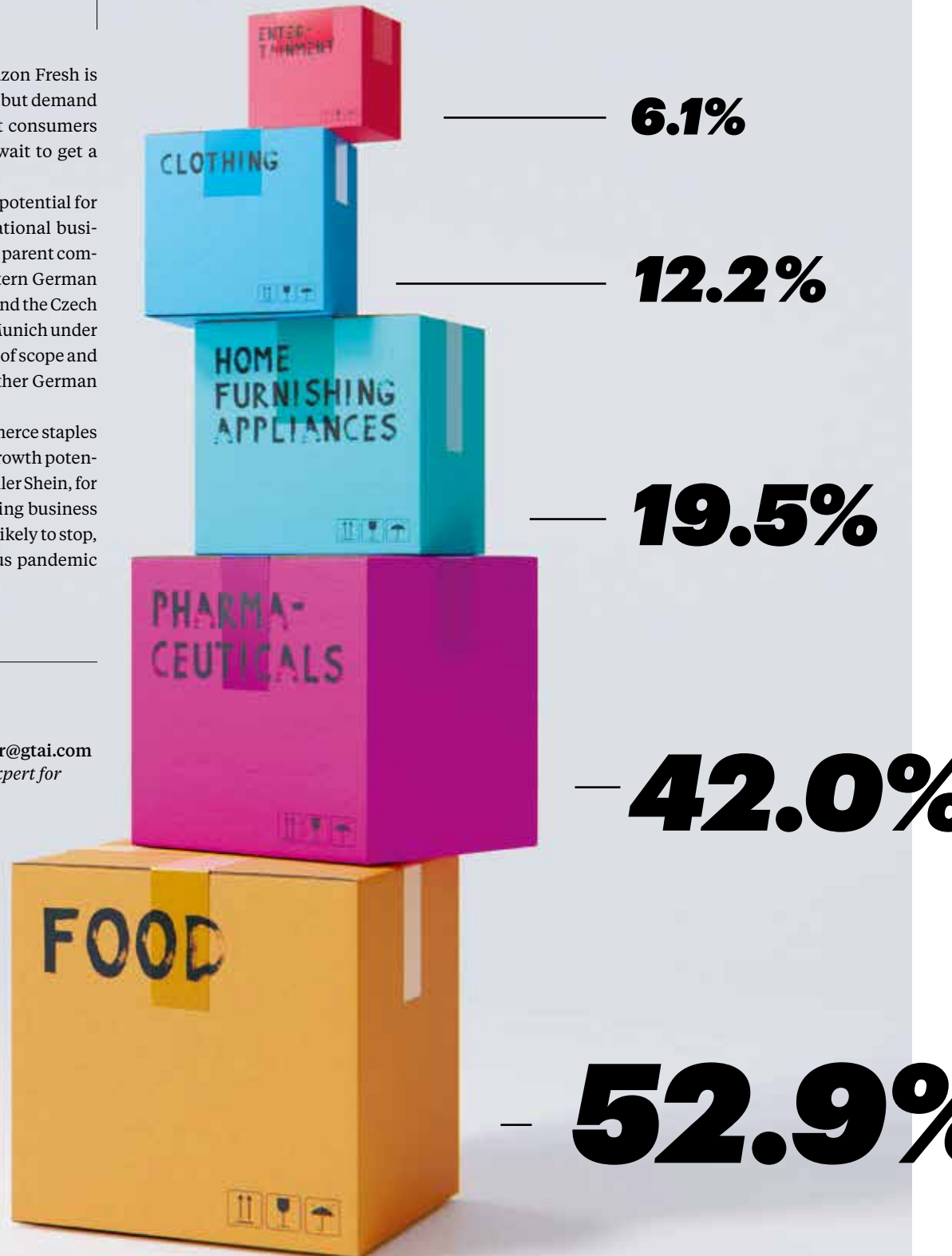


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GERMANY'S MOST POPULAR CONSUMER GOODS ONLINE

E-commerce growth in Germany in the third quarter of 2020
(compared year on year)





THREE MAJOR DRONE APPLICATIONS

Data collection: This includes tasks like surveying, inspection and cartography. Almost 80% of users employ drones, some of which can be equipped with infrared devices, for these purposes. Experts say the potential for saving time and money is enormous.

Film and photography: Aerial footage is becoming increasingly affordable and widely used in film, television and video. It accounts for 35% of drone users. Companies like Digicopter and Dronebrothers have sprung up to service the growing demand.

Transport and logistics: Air taxis make the headlines, but it's likely that delivery drones will be integrated into everyday life sooner, especially given the explosion of online retail. At present, only around 5% of drone operators use them for transport.

Sunny Skies Ahead

Unmanned aviation is taking off in a big way in Germany, with turnover in the sector expected to grow by billions over the next decade. International players have begun to take notice, particularly of an air mobility hub that is developing in the south.

When most people think of Munich, what springs to mind are beer gardens, dirndls and Champions League football, not vertical-take-off-and-landing (VTOL) electric air taxis. But that's precisely what Joby Aviation, a recent addition to the city's business landscape, hopes to bring to the Bavarian capital.

This summer, the American eVTOL manufacturer (flush from a capital injection of USD 590 million from Japanese automotive giant Toyota) set up shop at a University of Munich special campus dedicated to flight systems and transportation planning. As this was Joby's first expansion outside the US, regional know-how and government policy were major factors in the company's choice of location.

Bavarian drone hub taking off

"While the depth of the talent pool and the strength of the supply chain would be reason enough for Joby to have a base here, what really made an impression on us was how Bavaria, Germany and the European Union are leaning in on the challenges posed by climate change and on the incredible opportunity to create a carbon-free future for aviation," says Joby's founder Joe Ben Bevirt. "Bavaria has been a tremendous early advocate for the eVTOL sector, with programs like the Hightech Agenda and Ingolstadt's Urban Air Mobility Initiative playing an important part in supporting the development of a strong air taxi market across Germany and Europe."

Joby's designs are kept top secret, but the new aircraft it envisions has been described in US media as a "cross between a drone and an air taxi." In Munich, one of the company's closest neighbors is also one of its main competitors: Lilium Aviation, which is developing an air taxi that can be either piloted or theoretically used unmanned.

THE BOTTOM LINE

The German unmanned flight (drone) sector is on course for massive growth in the coming years: opportunities abound for international companies wanting to get on board.

Massive growth potential

Over the next decade, increasing numbers of drones of all descriptions will be buzzing around German skies. And while the majority may be diminutive in scale, they amount to a big business – one that's growing larger by the day. The German Aviation Association (BDL) says that the German drone market is currently the world's fourth largest and projects it will rise from its current EUR 574 million to nearly EUR 3 billion by 2030. That represents an annual growth rate of 14 percent. Some 4,000 companies and 10,000 employees already work in the sector.

"Unmanned air vehicles are useful to people in both megacities and regions with undeveloped infrastructure," says Achim Friedl, chairman of the Association for Unmanned Flight (UAV DACH). "For that reason, the civilian drone economy will grow disproportionately all over the world. Drones help open up innovative business models and improve production, logistics mobility and security."

Unmanned flight can also help to decarbonize aviation, Friedl adds. Potential uses for drones, aside from air taxis, include surveying/data collection and the transportation of goods –

to name just two. Overall, unmanned aviation is a market where international specialists can find a niche with relative ease.

"The use of drones is being explored conceptually and tested out," says Friedl. "The business community and German industry are prepared for this, but they still need proven experts for unmanned flight."

Openings for start-ups

It's no surprise, then, that the German government is also throwing its weight behind the sector. In May 2021, the German Aerospace Center (DLR) is set to open a national testing center for unmanned civilian aviation systems at an underused regional airport in the eastern German town of Cochstedt.

"The German government sees the opportunities that result from the future-oriented markets of civilian drones and urban air mobility," said National Aerospace Coordinator Thomas Jarzombek in a statement back in 2020. "We want to give companies, particularly start-ups, the chance to participate in this new high-tech market. With the testing center, we want to lay the foundations for getting drone applications out of the laboratory and into the field."

With government support for innovative companies, all is clear for lift-off in this exciting, cutting-edge sector.



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Leg-up for Digital Help for Start-ups

Germany's 12 digital hubs have continued to offer valuable resources to fledgling businesses during the pandemic. Workshops and networking events now take place as video conferences, offering foreign firms a unique opportunity to take part remotely.

As any savvy tech entrepreneur knows, there is always opportunity in any period of disruption – after all, Uber, Airbnb and Slack were all founded in the wake of the 2008 financial crisis. A German example is Dashbike, a start-up from Leipzig that is developing an app to help the growing numbers of cyclists on urban streets plan the safest and best routes through town.

Dashbike began as a pet project by two cyclists who “wanted to make biking safer,” but they needed help to move beyond the hobby stage. Enter the Dresden/Leipzig digital hub, which focuses on urban mobility. It mediated contact between Dashbike and the relevant Leipzig authorities. The start-up is now working together with the city to map out the cycling infrastructure. Founder Leila König hopes this will be the first step toward expansion throughout Germany.

In ordinary times, this intense phase of business development would have involved a lot of face-to-face meetings, but Dashbike and the local hub worked together in 2020 using virtual conferences.

THE BOTTOM LINE

Germany's Digital Hub Initiative has adapted to the current health requirements and continues to assist a large number of international start-ups looking to enter the Germany market.

Networking in a changed world

The Digital Hub Initiative is funded by Germany's Ministry for Economic Affairs and Energy and describes its mission as “networking small and medium-sized enterprises and corporates with innovative partners from science and the start-up scene.” The 12 hubs are spread out from Hamburg to Munich and focus on everything from logistics and insurtech to cybersecurity and the Internet of Things (IoT).

In spite of, or perhaps because of, the pandemic, there are still plenty of young entrepre-

neurs eager to set up business. The database Startupdetector reported as many as 60 new companies being registered every week in mid-2020, with the most popular sectors being software, e-commerce, medical services and food. The pandemic has clearly not stopped innovation.

A growing audience

That trend applies to the digital hubs themselves, which have moved most of their activities online. One example is the Start-Up Games sessions, in which ten start-ups nominated by various hubs pitch to an expert jury and an online audience in a live-streamed event.

“We are now meeting people for short video conferences, who might never have had time for an appointment with us in real life,” König explains. “And you usually know within ten minutes or so if it's a good fit. If it's not a good match, then it doesn't matter, because neither of us wasted our time.”

“It's now normal to meet everyone from clients and job applicants to potential investors online,” concurs Tobias Bäuml,er,

A HANDFUL OF DIGITAL HUBS

Germany's 12 digital ecosystems were set up under the Digital Hub Initiative to connect SMEs and larger corporations with innovative digital partners from the scientific and start-up communities. Some examples:

5-HT DIGITAL

Focus: Digital chemistry and digital health.

Online now: Coaching, codevelopment, matchmaking, connecting with medical insurers, university departments and chemical corporates. Includes 5-HT Linker, a five-day bootcamp for start-ups with corporate matchmaking, and the eHealth Symposium Southwest.

www.5-ht.com



Location:
Mannheim/
Ludwigshafen

INSURLAB GERMANY

Focus: E-payments, blockchain, IoT, e-health, virtual reality and Big Data.

Online now: All events and the accelerator program. Includes member-to-member workshops where founders introduce ideas or demonstrate products, as well as best practice roundtables with insurance industry experts.

www.insurlab-germany.com



Location:
Cologne

SMART SYSTEMS HUB

Focus: Hardware, software, smart systems, IoT platforms, application-based solutions, and IoT ecosystems.

Online now: Events like hub:disrupt and Hightech Venture Days – where 40 start-ups meet 180 potential investors. Advice on topics like robotic coworking and digital industry, as well as product demos.

www.smart-systems-hub.de/en/home



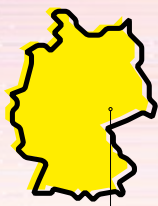
Location:
Dresden

SPINLAB

Focus: Energy, smart city, and e-health.

Online now: Meetups, mentoring, HHL SpinLab Investors Day with matchmaking for potential investors, and one-to-one online meetings coming soon. Also associated with Leipzig's smart infrastructure hub, and RootCamp for agrifood tech.

www.spinlab.co



Location:
Leipzig

ZOLLHOF - TECH INCUBATOR

Focus: Digital health.

Online now: Start-up breakfasts, presentations by industry experts, discussions on topics such as industrial automation, and design thinking workshops, among other

www.zollhof.de



Location:
Nuremberg/
Erlangen

the founder of Vitas, an artificial-intelligence-driven, voice-recognition customer service assistant, which is affiliated with the hub in Nuremberg.

Virtual help for foreign start-ups

Online formats mean a greater number of foreign entrepreneurs and young companies can now attend and benefit from the hubs' training and networking events.

"In the three years since it was established, the Digital Hub Initiative has proven an invaluable and unique resource for fledgling

companies with great ideas," says GTAI Trend & Innovation Scouting director Stefanie Burgdorff. "They're a fantastic tool to help start-ups from abroad find the suppliers, workforces, partners and potential customers they need in their new home. Once foreign start-ups and investors connect with a hub, they benefit from the whole network and its services and the remote programs," she adds. "Becoming part of the Digital Hub Initiative means becoming part of the German ecosystem."

If you're an innovative new tech business with an interest in entering the German mar-

ket, the best place to start is the Digital Hub Initiative's website, www.de-hub.de, which lists all events and start-ups associated with the network.



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NEXT STOP: SMART CITY

German cities are keener than ever to get smart – especially in the wake of coronavirus – and this digitalization drive is creating real opportunity for foreign businesses. The government has pledged almost a billion euros for smart city projects over the next decade.

When the first commercial flight departed from the new Berlin Brandenburg Airport in November, it spelled the end for the city's beloved Tegel Airport as a transportation hub. But it also cleared the runway for a long-awaited smart city project.

The former airport and its environs are becoming the Urban Tech Republic, a research and industrial park with

THE BOTTOM LINE

Germany's cities are getting smarter by going digital in every possible way, creating new niche for nimble international entrepreneurs.

a university campus. It will include a fully networked, climate-neutral residential area, the Schumacher Quartier, where smart mobility concepts will be tested.

The Urban Tech Republic is just one of many smart city projects under way in Germany, touching every aspect of city life, from infrastructure and transport to schools and administration. And these developments

This new metro station and the entire rail network will be integrated into Hamburg's digital platform for monitoring and analyzing the city's infrastructure. Hamburg is rated Germany's smartest city.

are creating unprecedented opportunities for international entrepreneurs to help shape Germany's future.

"Cities are always changing," says Michael Pfefferle, an expert on smart cities at the German digital association Bitkom. "Smart cities are a new vision of cities that use data to make better decisions and improve the quality of life for people living there."

It's not about tearing everything down and building anew. By adding the latest technology to a city to collect and analyze data about how people really use their urban environment, it becomes easier to improve mobility, conserve energy, save money and resources, and streamline bureaucracy. Covid-19 has put much of the municipal status quo up for discussion, and niches are opening everywhere for forward-looking entrepreneurs and companies with smart concepts.

Hamburg leads the way

Which German city is winning the race to the future? According to Bitkom, which ranked the country's smartest cities in 2020, Hamburg comes out on top by a big margin. "Hamburg is very strong in mobility and social efforts," Pfefferle says, noting the city's innovative multimodal transit app and, crucially, its open data platform.

Going smart early on is what gave the northern German city an advantage, says Hamburg's chief digital officer Christian Pfromm. "What we also realized is that digital change can only succeed if everyone pulls together – digitalization is a team sport," he says. Pfromm cites partnerships with international companies on intelligent traffic control, urban energy management and new mobility concepts. And, most importantly, sufficient bandwidth to accommodate data flows.

5

REASONS WHY GERMANY IS RIPE FOR SMART CITIES

1

Germany's cities drive Europe's economy.

Europe's largest economy has 81 cities of more than 100,000 residents, and Germany accounts for 5 of the top 15 European cities as ranked by GDP.

2

German cities are autonomous.

In many respects, German cities are free to create their own regulations and run their local administrations as they see fit. This provides the opportunity for unique public-private smart-city partnerships.

3

Cities are actively looking for tech solutions.

A survey from Capgemini found that 74 percent of municipal leaders in Germany believe collaboration with "outside entities" and international partners is essential to create smart cities.

4

The national government offers major funding for smart cities.

The Interior Ministry has pledged EUR 820 million for pilot smart city projects and digital solutions that can be emulated across the country.

5

The coronavirus pandemic is accelerating digitalization.

The recent Online Access Act (OZG) requires all 11,000 local governments to make their public administrative services accessible online by the end of 2022. Contact restrictions due to the coronavirus pandemic have sped up this transition.

Attracting smart money

Smart cities require robust information infrastructures. The US information services company Equinix selected Hamburg for its new data center because of its proximity to both the North Sea cable landings and the trading floors of Frankfurt. The company invested a total of USD 150 million between 2018 and 2019.

"Hamburg is an important strategic European digital hub and has an extremely strong trade sector," says EMEA Equinix president Eugene Bergen Henegouwen. "The new location will not only help us cover the growing demand for interconnection services in the German market, it will also strengthen our European data center footprint."

Hamburg's Digital Twin project with Munich and Leipzig, funded with EUR 32 million in national funds, is developing interconnected digital twins, which are based on urban data platforms, for monitoring and analyzing city infrastructure. Meanwhile, its smartPORT project is networking the streets, bridges and locks of Germany's busiest harbor to better coordinate traffic, reducing expenditures and emissions.

Intelligence matters, not size

Some other, internationally less well-known cities also rank highly on Bitkom's list. Osnabrück, for example, jumped to number eight thanks to its expanded e-government services, while Gelsenkirchen rose to number 22 because it improved its Internet connectivity.

"It's not always about the size of the budget," Pfefferle says. Smaller cities, too, can benefit from the many national and regional funding opportunities for projects. Germany's Interior Ministry has pledged EUR 820 million for what it calls "Lighthouse" smart city projects over the next decade. These public projects require

experienced companies to deploy solutions that work. A study by consultants Capgemini found that 74 percent of municipal leaders in Germany favor public-private partnerships.

For instance, back in Berlin, the Tegel Projekt has already signed a cooperation agreement with New York University to research Big Data, blockchain and artificial intelligence solutions.

Urban challenges drive innovation

The repurposed airport is expected to become a hub for start-ups and create about 20,000 jobs

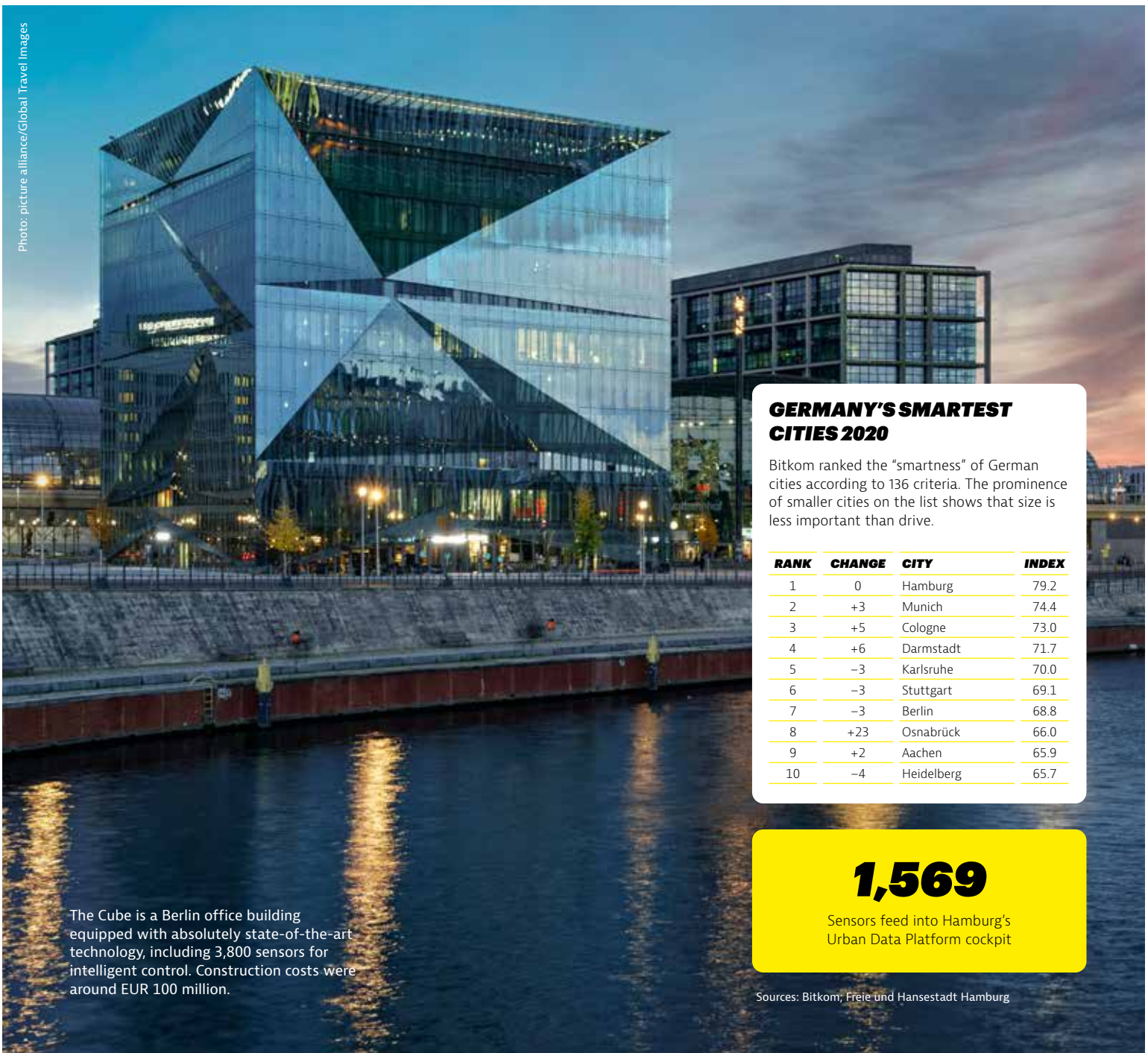
in the German capital. It's the perfect location for international companies looking to partner with educational and research institutions. "In the face of the climate crisis and demographic changes, the challenges for fast-growing cities are immense," says the Tegel Projekt's director Bernhard Hildebrand. "And that is why, more than ever before, we need to develop new concepts and put into practice coherent structural innovation." The old Tegel Airport was a twentieth-century institution rooted in its time. Now that its runways lie empty, it is about to enter the twenty-first century.



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Photo: picture alliance/Global Travel Images



The Cube is a Berlin office building equipped with absolutely state-of-the-art technology, including 3,800 sensors for intelligent control. Construction costs were around EUR 100 million.

GERMANY'S SMARTEST CITIES 2020

Bitkom ranked the "smartness" of German cities according to 136 criteria. The prominence of smaller cities on the list shows that size is less important than drive.

RANK	CHANGE	CITY	INDEX
1	0	Hamburg	79.2
2	+3	Munich	74.4
3	+5	Cologne	73.0
4	+6	Darmstadt	71.7
5	-3	Karlsruhe	70.0
6	-3	Stuttgart	69.1
7	-3	Berlin	68.8
8	+23	Osnabrück	66.0
9	+2	Aachen	65.9
10	-4	Heidelberg	65.7

1,569

Sensors feed into Hamburg's Urban Data Platform cockpit

Sources: Bitkom; Freie und Hansestadt Hamburg

A Powerful Green Innovation

Across the country, there are hosts of start-ups developing cutting-edge solutions in the energy sector. Instagrid, a company from Ludwigsburg in southwest Germany which makes clean portable power solutions, is one example of German creativity in the area.

While working for Bosch in the electronics and battery division, Andreas Sedlmayr and Sebastian Berning noticed that whenever they were deployed outside, electricity was a major headache. It gave them an idea. Construction sites rely on diesel generators to provide power, but they are big environmental offenders. “They emit one hundred times more toxins than a car,” says Berning.

It was a lightbulb moment which resulted in the birth of instagrid. The start-up, which also has an office in Helsinki, makes 15kg industrial batteries that cause zero local emissions and can last an entire day, whether they’re powering a jackhammer or a music festival’s PA system.

Instagrid has exploited Germany’s engineering expertise and its proximity to customers in the Netherlands and Scandinavia. In 2020, it won the prestigious Start Up Energy Transition Award and has attracted the interest of investors. “They’re actively looking in Germany because they know the technology is here,” says Sedlmayr.

Powerful potential backers

Indeed, instagrid is just one of a raft of start-ups in Germany working to provide sustainable energy solutions. “There are a lot of home-grown start-ups,” says Germany Trade & Invest’s cleantech expert Robert Compton. “That shows that the conditions here are right.”

That’s no accident. Germany is at the heart of Europe’s energy industry, with countless young companies developing not only digital

innovations for existing energy products but also hardware to solve future energy needs. Environmental awareness is an integral part of German culture, and the government is committed to decarbonizing the country’s energy supply by 2050. Also, the country produces a lot of well-trained engineers, many of whom are keen to start out in the cleantech sector.

Energy heavyweights such as German companies E.ON and RWE as well as Sweden’s Vattenfall, which is heavily involved in

Replacing diesel generators with instagrid’s carbon-neutral batteries to provide power for market stalls is just one of the initiatives the city of Stuttgart has launched to increase climate protection.



Germany, are actively looking for start-ups to promote innovation. So, the chances for small German-based energy companies to scale up have never been better.



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The Year Trade Fairs Went Digital

Jörn Holtmeier, managing director of the Association of the German Trade Fair Industry (AUMA), discusses how the sector is coping with coronavirus restrictions.

How have AUMA members reacted to the pandemic restrictions?

JÖRN HOLTMEIER: For most trade fairs, alternative digital formats were developed. They offered good opportunities to get in touch with potential partners. Some fairs developed hybrid formats to specially cater for foreign participants who couldn't physically attend due to travel restrictions. However, it is inherently difficult to convince new customers of product quality using only digital and hybrid formats. For that reason, we are all working hard to help brick-and-mortar fairs resume as soon as possible.

Germany drew praise for its early handling of corona. To what extent did this translate into a competitive advantage for its trade fair industry?

HOLTMEIER: The relatively sound footing of the German economy certainly represents an advantage. Nevertheless, when our neighbors lack purchasing power and scale back investments due to the pandemic, fewer buyers will attend our trade fairs, and those who do come will have smaller purchasing budgets. In other words, cross-border stability is crucial.

Coronavirus vaccines should become widely available this year. What could change for the sector?



JÖRN HOLTMEIER AUMA

Jörn Holtmeier took over as MD of AUMA in January 2020. He was previously with the Daimler Group, where he was deputy office manager for the company's Office for Federal Affairs, with a focus on transport and the environment.

TOUGH TIMES FOR TRADE FAIRS

2020 was a difficult year for the 74 members of the Association of the German Trade Fair Industry (AUMA).

In April, the world-famous Hannover Trade Fair was canceled entirely amid the first wave of the coronavirus pandemic. Other major fairs had more time to prepare and were able to shift from on-site to online, setting up new digital platforms for showrooms, seminars and workshops. The healthcare industry fair MEDICA, for example, took place virtually with 1,500 exhibitors from 63 countries and proved a big hit, attracting 45,000 unique users and 400,000 page impressions. Seventy-eight percent of participants came from outside Germany – from 169 countries. The trend toward online is likely to continue in 2021.

Updates of current entry requirements for German trade fairs can be found at www.auma.de/en.

HOLTMEIER: We think the situation won't improve immediately. With or without a vaccine, we expect a consolidation of the trade fair business in Germany in 2021. However, that will be followed by a clear upward trend. This improvement will initially apply to the regional- and national-level fairs, with major international shows needing a bit longer. We are confident that the acceleration of digitalization, as well as German trade fairs' recent investments in digital supplementation, will soon help them reclaim their strong standing in companies' marketing mix.

What role do trade fairs play in making Germany more attractive to international players as a business hub?

HOLTMEIER: The internationalism of German trade fairs reflects the integration of the German economy with the rest of the world in terms of both exports and imports. Our trade fairs are not only about buying and selling but also long-term partnerships and investments. The high proportion of foreign participants facilitates robust third-country (non-EU) interaction: Spaniards do deals with Japanese, and African suppliers meet North American buyers.

MORE INFORMATION
www.auma.de/en

Overlooking Turkey's capital city of Ankara sits the imposing mausoleum of Mustafa Kemal Atatürk, who was the founder of modern Turkey and the republic's first president.

EAST LOOKING WEST

We asked Dr. Thilo Pahl, managing director and board member of the German-Turkish Chamber of Industry and Commerce (AHK Turkey), headquartered in Istanbul, about relations between the two countries during corona.

The coronavirus pandemic has changed many companies' approach to doing business abroad. What has been the perception of Germany as a business location during these challenging times?

DR. THILO PAHL: Without doubt the pandemic has severely affected the global economy, and this development has negatively impacted German-Turkish commercial relations as well. Nonetheless, in our conversations with local business representatives, partners and members, we've had some significant, positive experiences. During the first peak of the pandemic, Germany has been the only country in Europe to which Turkish firms could still export their products and services. That was important for German-Turkish relations. There is enormous economic potential in intensifying cooperation between Turkey and Germany. Post-corona, when German companies reevaluate their supply chains, Turkey has a good chance to position itself as a new major supplier. Turkey has a broad and deep industrial foundation and excellent logistics infrastructure – these advantages have proven their worth during the corona pandemic.

Which German sectors are Turkish companies particularly interested in, and why?



DR. THILO PAHL
AHK Turkey

Dr. Thilo Pahl is managing director of AHK Turkey, which was founded in Istanbul in 1994. With over 900 members, it is one of the largest overseas German economic organizations.

PAHL: Companies in the construction industry are particularly interested in investing in Germany. Many Turkish companies are already involved in construction projects in Germany as subcontractors. Many of them would like to enter the German market directly, especially because Turkish companies can provide German firms with qualified specialists.

What do Turkish companies like most about Germany as an investment location?

PAHL: Germany is very attractive to Turkish companies as an international location because of its central position within the EU market and as a gateway to the markets in central and eastern Europe.

What does the German-Turkish Chamber of Industry and Commerce do to help businesses like these, and what is the relationship between AHK Turkey and Germany Trade & Invest?

PAHL: AHK Turkey identifies companies in Turkey that are interested in expanding to Germany and is the first point of contact. The idea is to offer entrepreneurs a full range of services and support until they have found a location and been handed over to one of the 16 regional German states' business development agencies. GTAI intensifies the initial AHK Turkey consultation and goes into more depth, helping entrepreneurs to create networks in Germany.

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How Germany Works

KURZARBEIT*

*the furlough program

Kurzarbeit (literal translation: 'short work') is Germany's furlough program. It sees the German government take over a

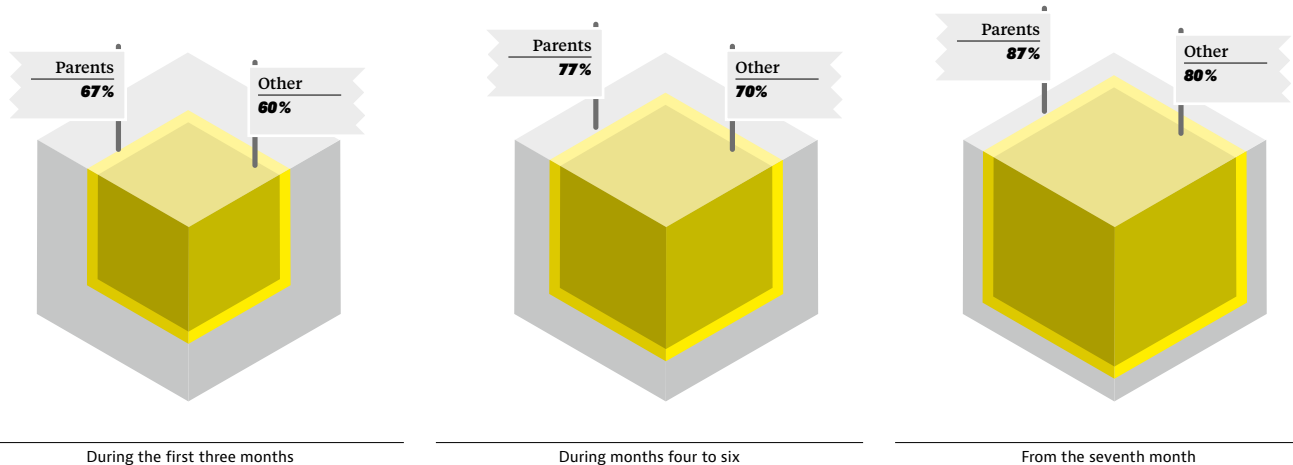
large proportion of the salaries of employees whose services are temporarily not needed in times of economic or health emergen-

cies. The idea is to save jobs and preserve workforces so that companies can hit the ground running when the period of dis-

ruption is over. More than half of all large German companies say it has helped them during the Covid-19 pandemic.

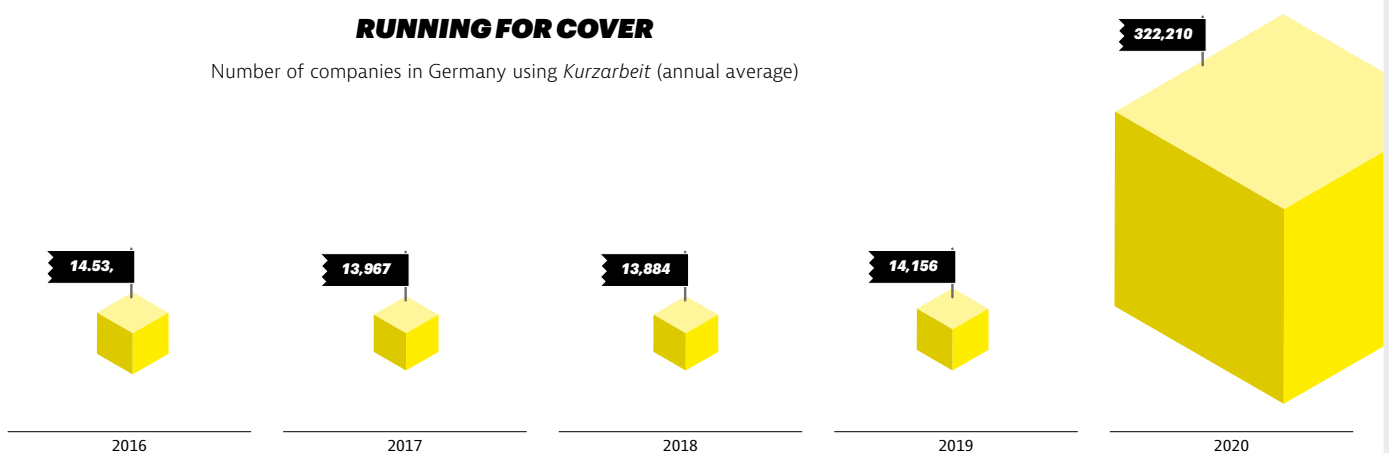
FURLOUGH: SLIDING SCALE OF SUPPORT

Share of the net pay employees receive when in *Kurzarbeit* (work hours cut by half or more)



RUNNING FOR COVER

Number of companies in Germany using *Kurzarbeit* (annual average)



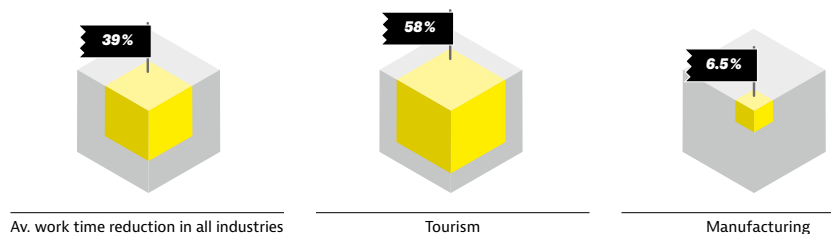
10BN

EUROS

Estimated additional fiscal burden from the German government extending the *Kurzarbeit* program for employees from 12 to 24 months

RECOVERY: DIFFERENCES BETWEEN INDUSTRIES

Work-time reduction in different industries in Germany, September 2020



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