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GERMANY

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ALL HANDS ON DECK

In the race to find a coronavirus vaccine and treatments, the German government has teamed up with pharma and biotech firms. And that's not all. The healthcare sector is booming as a result of the crisis, and opportunities for international investors are opening up in many industries in Germany.

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German biopharmaceutical company BioNTech has gotten the green light from Pfizer to begin advanced trials of its corona vaccine.

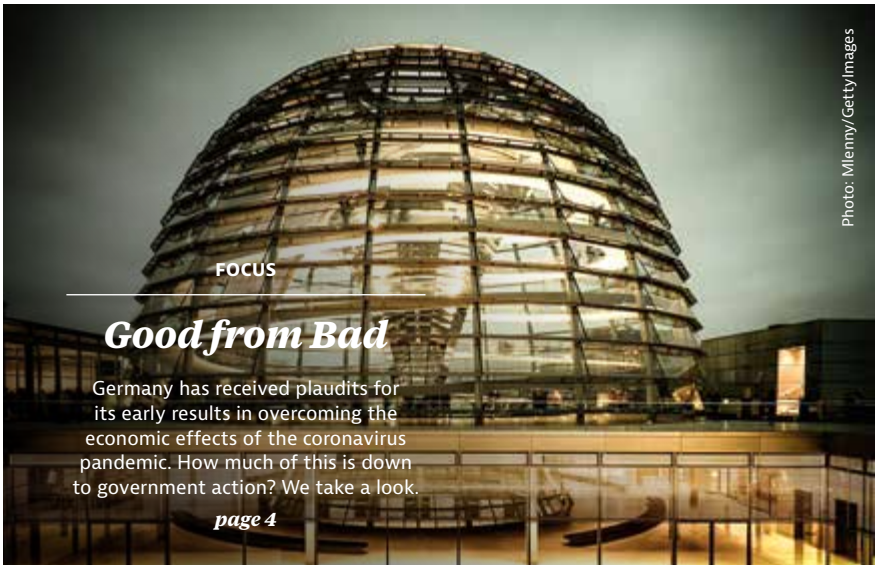

Photo: MIenny/GettyImages

FOCUS

Good from Bad

Germany has received plaudits for its early results in overcoming the economic effects of the coronavirus pandemic. How much of this is down to government action? We take a look.

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ENERGY

Photo: Andreas Arnold/dpa

H_2 Is the Future

Backed by billions in government investment, Germany's hydrogen power-to-gas sector is set to take on a central role.

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BIOTECH

Molecular Coupling

The acquisition of molecular diagnostics company Molzym by U.S. firm Gradian shows how Germany's innovative biotech sector is attracting global attention.

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FDI Still on a High

2019 was a promising year overall for foreign direct investment into Germany.

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»The need to transport people and things sustainably is perhaps the most pressing issue of our times.«

Dear Reader,

"The new normal" is a phrase we hear a lot these days. But how 'new' is the new normal? Has the business landscape in Germany really altered that much as a result of the coronavirus pandemic?

Certainly, if you had predicted a year ago that Germany would see meteoric rises in demand for things like surgical masks, virtual education solutions and robot cleaners, a lot of people would have given you a funny look.

The initial shock of Covid-19 certainly created a tidal wave of new needs. But it has also accelerated and intensified transformations that were already taking hold in Germany prior to spring 2020: automation, digitalization, sustainability, artificial intelligence and additive manufacturing, to name but a few. These pages abound with examples of business ideas whose day has come much sooner because of all the disruption.

What has not changed is the nurturing environment Germany provides for the vast majority of business ideas from all over the country and the world. The FDI numbers from 2019 remind us where the German economy was before the pandemic. And the German government's response in coping with temporary emergencies and stimulating recovery is very much in keeping with the country's tradition of both a socially responsible and a free-market economy. We all win if everyone does – that could be the motto of this issue of *Markets Germany*. Enjoy it!

Dr. Robert Hermann, *CEO*
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ONE TO WATCH

Photo: Gordon Welters/laif

Sowmya Thyagarajan, *founder and CEO of Foviatech*

"Not by design, but by destiny," says Sowmya Thyagarajan, describing how her digital start-up Foviatech came to be based in Hamburg. "I had opportunities in America and Australia, but Hamburg is known for its aviation industry, and I realized there is a lot of potential here."

Hailing from India, Thyagarajan came to Hamburg in 2016 to do a PhD in aviation engineering. But academia proved too slow for her entrepreneurial spirit and she had already become interested in optimizing day-to-day processes in aviation. "I wanted to implement my ideas in the real world and contribute to the new industrial age," she tells *Markets Germany*.

Foviatech concentrates on maximizing efficiency in the transportation and healthcare sectors through integrated smart tech, such as artificial intelligence and graphene technology (a heat-resistant, flexible material). Foviatech's software aids process optimization and provides virtual assistance for planes and other transportation systems. "The technologies and ideas we implement are complex and new to the market," Thyagarajan says.

The company she cofounded in 2018 is now developing hardware as well as software, such as sensor interfaces to enhance comfort, provide ergonomics instruction and evaluate biometric data. Her driving vision is to make life easier for passengers as well as carriers.

Quick facts

Name Sowmya Thyagarajan
Age 27
Nationality Indian

Company name Foviatech GmbH
Founded 2018
Based in Hamburg
Industry Smart automation
Value EUR 3.5 million

www.foviatech.com

Pointing the Way Forward

Germany has received international praise for the early measures it took to limit the negative economic effects of the coronavirus pandemic. But how much of this was down to government policy? We take a closer look.

At the core of Germany's response to Covid-19 has been the realization that public health policy is a *sine qua non* for economic revival. As far back as April 9, in a joint press conference, German Minister for Economic Affairs and Energy Peter Altmaier and German Health Minister Jens Spahn underlined that "health protection is the top priority."

This coordinated approach has limited the harm to Germany's economy as well. Cooperation between the chancellor's office, the national ministries and the 16 regional states that make up the Federal Republic of Germany helped keep coronavirus restrictions relatively moderate and allowed them to be eased sooner than in many other countries in the EU.

Even so, the damage was significant. The same as many other nations, Germany suffered record drops in economic activity as a direct result of the lockdown. Immediate action to halt the downturn was necessary, and indeed it was already under way.

A helping hand

By the end of March 2020, when the extent of the crisis had become clear, the federal government put together a package of grants and emergency lines of credit from Germany's developmental bank, the KfW, to ensure liquidity for small to medium-sized enterprises (SMEs). No upper limit was imposed on the program. In its first hundred days, almost EUR 50 billion was loaned out to 69,278 applicants. The vast majority were SMEs, which generate 98 percent of Germany's gross revenue.

The government also agreed to pay a part of salaries for employees if companies furloughed instead of firing them. Furlough schemes had already been employed during the financial crisis of 2008–2009 to positive effect. Amidst the pandemic, they have again kept unemployment rates relatively low while ensuring that companies have the qualified staff they need when business picks up again.

Thinking ahead

Then, in early June, the government followed this up with a longer-term "Economic Stimulus and Crisis Manage-

Photo: Mlenny/GettyImages

ment Package" worth EUR 130 billion. This legislative bundle encompasses a wide range of measures, including a temporary reduction of VAT and a cap on social insurance contributions, corporate tax benefits and billions in increased support for new hybrid and electric car purchases, charging stations and battery-cell production, hydrogen technology and the 5G mobile network.

The aim was not only to stimulate growth but also to accelerate the digital and environmental transitions Germany needs to function in the future.

Thus far, the government's measures have had the desired effect. The Business Climate Index of the economic think tank Institute for Economic Research (ifo) immediately recorded its biggest-ever rise from May to June 2020, and most experts are predicting robust growth for 2021.

Companies like farm equipment maker CLAAS credit the government's measures with helping them to survive and even innovate during the crisis.

"The corona period made us quicker and more digital and increased the feeling of togetherness among our employees – we were able to accelerate innovations and continue talking with customers despite all of the limitations," says CLAAS CEO Thomas Böck. "Stable government structures that function even during times of crisis are especially important for companies."

Economic Outlook

Michael Hüther, director of the German Economic Institute in Cologne, considers Germany's response to the corona crisis and the direction the economy will take.

What did Germany get right in its economic response to corona?

We have to remember that there is no purely financial or economic reason for this crisis. At the root of the last financial crisis in 2008 was mismanagement of financial markets and a lack of coordination, which led to a massive loss of trust, and that had a commensurate effect on the system. And the decline went on through Q4 of 2008 into Q1 of 2009.

The situation in the first half of 2020 was different because the decline was a straight plunge down – almost as if someone used a ruler – because of the lockdown. And this time the government reacted correctly in various phases. First, it ensured stable corporate liquidity in March and April. That also applies to the furlough program. Then, during the second phase, it looked at preserving supply chains with an eye towards Europe, but also via interventions with the Economic Stabilisation Fund. Then, on June 3, it passed a stimulus package to address a situation where demand has fallen. The instruments and the timing were both well chosen.

Was any one instrument particularly important?

The furlough program was certainly important. It was introduced and tested out during the financial crisis (2008 – 2009). A lot was done in credit availability, which I also see as important. And now there is a surprise VAT cut of EUR 20 billion in the second half of 2020, which is helping to provide economic impulses. We are going well beyond what was in both economic packages 10 years ago.

Is Germany making sufficient progress on issues like digital infrastructure and climate-friendly technology?

Firstly, economic stimulus policy is not structural policy. The first part of the June 3 package was about stimulating the economy, which was the right way to go. Economic stimulus has to be timely, targeted and temporary. That has been the case, so it should be effective.

Secondly, in May, some colleagues and I presented a second program to stimulate growth. It includes electric vehicle charging infrastructure, hydrogen strategy and 5G – these are the structural elements that will be needed in the mid-term and that will last well into 2021 and 2022.

How is Germany trying to attract foreign investors?

The government is trying to create favorable conditions for Germany as a business location. Part of the stimulus package is that we'll be reviewing our entire business tax legislation. Efforts to reduce bureaucracy have been going on for years. And then there's the support for research and development. These are all important elements.

Photo: Institut der deutschen Wirtschaft

Opportunity from Crisis

The coronavirus pandemic has created new arenas and chances for investors interested in German businesses. The openings are particularly apparent in robotics, 3D printing, data protection and e-learning.

ZenZoe works at night. When things calm down in the corridors and examination rooms of the Burgos University Hospital in northern Spain, the sanitation robot autonomously cleanses surfaces of pathogens, possibly including the coronavirus that has claimed so many lives. Instead of using disinfectants, ZenZoe bathes them in UV light, preventing patients and hospital staff from being exposed to potentially harmful chemicals.

ZenZoe was developed by Berlin-based InSystems Automation after the small high-tech firm was acquired by Spain's ASTI Mobile Robotics in October 2019. At the height of the Covid-19 outbreak, InSystems' orders shot up – just one of many examples of the corona-influenced opportunities in the German robotics and automation sector.

In 2019, the industry generated EUR 14.7 billion in revenue, with integrated assembly solutions and robotics contributing 8 billion and 4 billion, respectively, and machine vision making up the remainder.

»Overall, I see positive effects of the pandemic.«

Stephan Fricke,
CEO of the German Outsourcing Association

The full interview:
www.marketsgermany.com

"The merger with ASTI allowed us to scale up quickly, enough to take on such orders, while for ASTI it brought a foothold in the German market," says Andre Schmiljun, ASTI InSystems' officer for media affairs. "There is a lot of demand in German industry for intelligent transport robots, a field we have been heavily engaged in for nearly a decade."

"Covid-19 has shown us that supply chains can snap and that we need more automatization to make repetitive yet crucial work tasks feasible in high-cost countries like Germany," Schmiljun adds.

Australians take the plunge

Another company to view the challenges of coronavirus as an opportunity is SPEE3D. In April, at the height of the lockdown, the Australian manufacturer of 3D printers pressed on with its expansion plans in the northern German city of Lübeck.

The company's 3D printers can work at three times the speed of sound and are aimed at industries such as shipbuilding, aerospace, electronics and defense. Their specialty is "cold spray" technology, which significantly expands the array of metals that can be processed by 3D printing while opening up new industrial uses as well. SPEE3D's printers can also coat surfaces with copper, making them better able to repel and help kill viruses.

Many observers think 3D printers will be key to safeguarding German manufacturing's global competitiveness, since the technology can remove the necessity of mass producing at economies of scale. Germany generated around EUR 1 billion

→

Photo: Cloud&Heat

1

Entrepreneurship in Extremis

Three Corona Pioneers

1 & 2 Since 2011, Cloud&Heat Technologies has been revolutionizing the global cloud and data center market with its sustainable technology. It evolved from the idea of using the waste heat from Internet servers for heating. 3 SPEE3D printers enable the world's most affordable metal-additive manufacturing process and can coat surfaces with copper to repel viruses. 4 ZenZoe is a disinfection robot developed by Spanish ASTI Mobile Robotics and Berlin-based InSystems Automation, together with BOOS Technical Lighting. It emits an ultraviolet light that penetrates all areas of rooms, killing 99.9 percent of the Covid-19 virus in the air and on surfaces and objects. Its effectiveness has been proven in hospital settings.

2

Photo: Cloud&Heat

3

Photo: SPEE3D Europe


4

Photo: ASTI TechGroup/InSystems Automation

in additive-manufacturing-related revenues during 2019, making it the world's largest single market, ahead of the U.S. and China.

"Covid-19's supply chain disruptions showed us that manufacturing must become more autonomous and agile, and 3D printing with its ability to produce parts *ad hoc* facilitates this shift," says SPEE3D's European managing director Stefan Ritt. "We see major potential deriving from the German economy's robustness as well as the country's strong focus on metal engineering."

Data, data and more data

Smart manufacturing involves ever-greater data volumes exchanged between devices, and here, too, the coronavirus has accelerated existing trends and created new needs and niches for businesses.

For example, the German government has long been committed to building a nationwide 5G network, and the GAIA-X project kicked off by France and Germany in October 2019 has been working toward creating a secure data infrastructure system in Europe. But the accompanying requirements for secure data infrastructure increased incrementally because of corona, as countless businesses turned to video conferencing tools, only to find that some of them had data security issues.

"Covid-19 has boosted demand for cloud solutions, and that, in turn, is forcing Europe to get its security approach up to date," says Ronny Reinhardt, innovation manager at Cloud&Heat, a Dresden-based IT service provider involved in GAIA-X.

Oliver Köth, CTO of NTT DATA DACH, a subsidiary of Nippon Telegraph and Tele-

Case Study

Tulip Blossoming

One U.S. company is pushing ahead with European expansion plans from its new base in Munich despite the corona crisis. Digitalization platform provider Tulip is confident that its future looks bright in Germany.

Photo: Tulip Interfaces

It's always a good sign when companies are hiring. Despite the challenges of coronavirus, Tulip – the American manufacturing app platform provider – says it will add nine positions to its customer and software engineering teams in Munich by the middle of next year.

Tulip set up its European headquarters in the Bavarian capital in 2019 to benefit from the high density of small and medium-sized high-end manufacturers in the region as well as the talent from local universities with their strong focus on technology.

The firm's app allows manufacturers to digitalize machinery, even those machines built well before the invention of the Internet. That eliminates the costly need to replace systems that have evolved as operators finetuned their processes. And last but not least, Tulip lets manufacturers create their own apps without having to write code.

"We help factories digitalize themselves, giving them opportunities to take on tasks that would otherwise not be feasible in a high-cost country like Germany," says Wolf Kolb, Tulip's CEO for Europe.

"Although the ecosystem of small and medium-sized manufacturers in southern Germany is highly competitive globally, it has largely been ignored by the big tech solution providers," he adds. "That's where we come in." Once they solve one highly technical problem with the app, Kolb says, manufacturers usually return to Tulip to tackle their next tech headache.

Taza Chocolate – an organic chocolate manufacturer that, like Tulip, hails from Somerville, Massachusetts – is one example. After securing a new deal with a major wholesale retailer, Taza had to increase production by nearly 30 percent while simultaneously lowering costs per unit. The problem was that the firm's manufacturing equipment, acquired in the 1960s, made it impossible to collect key production data during runs.

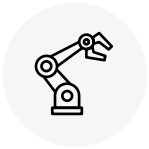
"We added sensors for cycle time, engine speed, machine efficiency, temperature and humidity, so that Taza could finally track how the machine was running," says Kolb. "This helped to get rid of long-standing bottlenecks, increasing Taza's throughput dramatically at a much lower cost than purchasing new machines."

TREND VIEW

Lasting Change: Three Megatrends Increasing Germany's Pulling Power

Covid-19 has been a wake-up call to decision-makers in global corporations and SMEs alike. It has shaken up the way we work, accelerating the shift to automatization, driving forward digitalization plans and compelling companies to shorten their supply chains.

Automatization

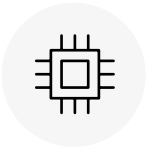


61%

of production processes have been automatized. German manufacturers are the world leaders in the machinery and equipment sectors.

Source: GTAI

Digitalization



51%

of German SMEs saw digitalization as a strategic project in 2019, up from 45% in the previous year.

Source: Digitalisierungsindex Mittelstand 2019, Deutsche Telekom

Supply Chains

73%

of German SMEs experienced supply chain issues due to Covid-19; 43% of them plan to modify their supply chains.

Source: McKinsey survey, mid-May 2020

phone Corporation (NTT) and another contributor to GAIA-X, sees particular needs in heavily regulated sectors such as aviation, financial services and insurance. Due to the especially sensitive nature of their data, public cloud computing simply is not suitable for businesses in these areas. Moreover, NTT DATA's clients are keen to manage costs.

"In times of crisis, company data must be dealt with swiftly using real-time analytics as opposed to weekly or monthly reports," Köth says. "NTT DATA is taking part in this trend, among other things, by investing heavily in artificial intelligence (AI), which is crucial to cost reduction, and in cloud technology, which is a very dynamic market with a fluid, competitive landscape."

Excellent times for e-learning

Finally, the pandemic has also opened up space for innovation in digital learning. In early May, with many educational institutions shuttered down, the German government allocated EUR 100 million for the establishment of new e-learning platforms and the upgrading of existing ones. This was in addition to the "DigitalPakt Schule," which made EUR 5 billion available for the digitalization of Germany's schools until 2024. These measures mean new opportunities for SMEs like VOCANTO, which provides tools for vocational training for everyone from bankers to electricians. Since the beginning of the pandemic, license sales have tripled, with Bosch, for instance, recently adding nearly 2,000 licenses.

»In times of crisis, the economy relies on digitalization to keep going.«

Thomas Jarzombek,
see full interview on page 10

"Learning via interactive 3D animation is so much more attractive than using conventional textbooks," says VOCANTO CEO Johannes Schulte. "That means apprentices are more motivated and better prepared."

With around 400 German universities and more than 40,000 schools facing an uncertain future this autumn, e-learning is another sector worth some intensive study.

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Photo: Tobias Koch

Digital Innovation & Start-ups

Covid Crisis Has Accelerated Progress

Thomas Jarzombek, the Ministry for Economic Affairs' commissioner for the digital industry and start-ups, says that despite the severe downturn resulting from the corona pandemic, many start-ups have rallied. Furthermore, some new businesses are directly profiting from the new realities created by the crisis demands.

How has Covid-19 affected digitalization in Germany?
Covid-19 illustrated that in times of crisis the economy relies on digitalization to keep going. Therefore, it accelerated some long-standing debates, for instance on data security and on whether digital projects have to be understood by everybody before finally getting the go-ahead.

In every organization you have both those who promote digital progress and those who would rather leave things as they are. Covid-19 has strengthened the former group.

Will this momentum be sustained?
One major hindrance to digitalization in Germany is the overemphasis on data protection. It remains to be seen whether the marked shift to a pragmatic hands-on approach we have witnessed during the pandemic will last. Businesses and other organizations will likely keep on using video conference tools to cut down on business trips and physical conferences even after the crisis has ended.

What's the outlook for e-learning?
E-learning is certainly a good example of a key sector hampered by an exaggerated emphasis on data protection that has gained momentum due to Covid-19. E-learning is much more than remote home learning during school closures. It's worth asking whether a teacher is always needed to motivate students or whether teaching could perhaps be done by digital content delivered through certified platforms – particularly for STEM subjects and IT, for which we have a dearth of teachers. Teachers would still be physically present in the classroom but shift to more of a coach-like role.

Does Covid-19 present more opportunity or risk for digital start-ups?
Covid-19 has been the cause of a serious economic downturn, increasing the risks for business in general. There is one category of start-ups that had promising technology to offer but no revenue when the pandemic hit, and there is another category of start-ups that were already expanding. Then, there is the third category spanning start-ups that are directly profiting from the crisis, such as platforms for home delivery and telematic work. While now might be just the time for them to grow, they may find investors are growing wary of commitment in the face of the economic downturn. These three categories are covered by our two-billion-euro aid package, launched in April, which bears 50 percent of the risk of investing in Germany-based start-ups.

Has Covid-19 been accelerating the rollout of digital infrastructure?
In early June, the governmental cabinet committed EUR 5 billion to building a nationwide 5G network by 2025. Much of this will focus on the countryside, which is crucial given that many small and medium-sized high-end manufacturers are based in the rural corners of Germany. We have implemented a regulatory framework for 5G campus networks that allows individual companies and organizations to set up their own 5G infrastructure in places that are not completely covered by the telecoms. This is a unique regulatory approach by global standards and makes the 5G rollout much quicker and more targeted.

Medtech: Covering an Exploding Market

Germany's market for medical technology – worth EUR 38 billion in 2019 – was already one of the largest in the world before the coronavirus. But the arrival of Covid-19 brought exponential growth in demand for German medical solutions.

In the words of the German government on April 9, one of the "central concerns" for Germany during the early days of the coronavirus pandemic was whether the country would have sufficient diagnostic equipment, intensive care units and personal protective equipment (PPE), gloves and disinfectant. But nothing came to embody the new emphasis on reliable supplies of medical necessities like the exploding demand for surgical masks.

Germany was already a world leader in medical hardware like ventilators, but as the case of masks shows, the new reality of corona has created major new needs and opportunities. GTAI medtech expert Gabriel Flemming estimates that Germany is likely to require between 8 and 20 billion masks every year.

"Anyone who can improve on existing standards in masks – by making them more recyclable, reusable and easier to wear or by using biological rather than petroleum-based raw materials – will have up to half of their investment costs refunded by the German government," Flemming points out.

A collaborative project between the Free University of Berlin, Aachen's Institute of Textile Technology and Swiss company Livinguard Technologies provides one case in point. It claims to have produced masks that can destroy up to 99.9 percent of Covid-19 viruses when correctly used, thanks to a special fabric. The masks can also be reused up to 200 times.

The subsidiary of American giant 3M in Germany is another company planning new facilities devoted to making PPE and masks. 3M's managing director for central Europe, Dirk Lange, thinks his company's expertise in materials may give it a distinct advantage. "Our goal is to add market share," Lange told local media. "You can do that in a crisis, too. We need to see how we can become more competitive."

With a portfolio of over 55,000 products, the U.S. medical technology company 3M brings around 1,000 new products to market every year worldwide.

Photo: Danny Gys/Reporters/laif

Investors who come to Germany benefit from being able to partner with experts and link up with world-class academic and research institutions organized into national clusters. The German government has offered ample financial support, while various umbrella organizations have been set up to promote research. There are also direct grants, repayable advances and tax advantages for those engaged in medical research and production.

And while masks and the virus itself have dominated public attention, opportunities abound throughout the medtech sector in Germany. Flemming mentions artificial intelligence and digitalization in dentistry as just one area in which foreign investors and companies are profiting from the new needs and practices created by the pandemic.

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German Pharma Shifts Gear

In the global race to deal with Covid-19, Germany's extensive network of pharmaceutical companies are involved in major international collaborations and are benefiting from generous government support. German pharma is driving digitalization forward.

Germany is at the forefront of attempts to develop a coronavirus vaccine, and a number of German companies are searching for ways to treat SARS-CoV-2. At the same time, the pandemic is changing the face of the pharmaceutical sector in Germany.

One important milestone came in mid-July, when Mainz-based BioNTech and its international partner Pfizer received fast-track testing designation from the U.S. Food and Drug Administration for two of its mRNA-based vaccine candidates. The company has also been granted EUR 100 million from the European Investment Bank.

Likewise, the German government has put up EUR 300 million to acquire a 23 percent share of Tübingen biotech company CureVac – the other major German firm working on a vaccine. CureVac is also collaborating with the German engineering subsidiary of carmaker Tesla on RNA "microfactories" that could eventually manufacture a vaccine.

But corona research is expensive, the vast majority of vaccine attempts fail, and treatments for SARS-CoV-2 will be needed for as long as the disease cannot be prevented. So the German government has also allocated additional hundreds of millions to support everything from accelerated testing to a computer network for researchers.

Coronavirus has shifted the focus of the entire sector. In 2019, the consultancy firm EY found that the biggest pharma companies worldwide were concentrating on cancer, with 2,586 drugs in clinical development compared with only 605 anti-infection medications. That's now changing.

"We can expect that, thanks to the coronavirus crisis, topics like infection and antibiotic resistance will come to the fore," says Siegfried Bialojan, head of EY's Life Science Center in Germany.

Covid-19's other major impact has been on sourcing strategies – many firms are reassessing their dependence on suppliers in India or China – and in the digital realm. The pharma industry has been forced online, digitalizing everyday tasks and working on healthcare concepts that go "beyond pills."

Japanese company Takeda, which has two sites in Germany, is working on a number of plasma-derived Covid-19 therapies. It sees its activities there as crucial to its future in Europe. "Germany – and especially Berlin – is a leading ecosystem for the healthcare industry," Giles Platford, head of Takeda's EU and Canada unit, told local media. "In the meantime, Berlin also has a leading digital sector." He went on to say that the company holds regular meetings with local e-health start-ups – just another example of international pharmaceutical teamwork in Germany.

FACTS & FIGURES

47%

Share of drugs exported by members of the German Association of Research-Based Pharmaceutical Companies (VFA) in 2018

Pharmaceutical Number Crunching

€152.1bn
Total spent on pharma R&D worldwide in 2018

€15.9bn
Value of products by VFA members in 2018

€7.3bn
Amount VFA members spend on R&D each year

€30m
Average amount VFA members spend on R&D per working day

Sources: VFA; EY

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Photo: BioNTech

Covid-19

If the final clinical testing of the mRNA frontrunner vaccine is successful, Pfizer and the Mainz-based company BioNTech (photo) will soon initiate regulatory testing and could deliver up to 100 million doses worldwide by the end of 2020 and 1.3 billion doses by the end of 2021.

CureVac

Mariola Fotin-Mleczek is the CTO of CureVac, the world's first company to successfully harness mRNA for medical purposes.

BioNTech

Ugur Sahin is the CEO of BioNTech, a leading global biotech company that pioneers individualized immunotherapies for cancer and other diseases.

BioNTech and U.S. conglomerate Pfizer, who joined forces this year to fight SARS-CoV-2, have entered fast-tracked, advanced testing of their vaccine candidate after initial positive results.

Photos: left/CureVac, centered and right/BioNTech

Doctors on Call

Telemedicine in Germany has made the leap from maybe-someday to must-have, and the sector continues to evolve at "corona crisis speed."

Photo: picture alliance/REUTERS

Stanislas Niox-Chateau is the cofounder and CEO of Doctolib, a mobile booking platform for doctor appointments that has expanded to Germany.

The everyday workings of German healthcare are evolving faster than previously imaginable due to the corona pandemic. In a survey of 2,024 German physicians before the crisis, the German Health Ministry's Health Innovation Hub found that the majority (76 percent) were not using any form of online consultation with patients. Among psychiatric doctors and psychotherapists, the figure was 88 percent. After the outbreak, more than 88 percent of doctors in general and more than 90 percent of psychiatric professionals said they were now offering online consultations for at least a small proportion of their patients.

Those numbers square with figures from local and international companies offering telemedical services since the onset of coronavirus. Munich's TeleClinic has seen growth of over 250 percent, while another firm from the city, jameda, boasts of having increased business by over 1,000 percent. Swedish medical start-up KRY's consultations shot up by 350 percent between February and March 2020, and France's Doctolib has more than doubled the number of German doctors on their service.

"The pandemic has seen both doctors and patients experience how helpful digital applications like video consultations can be," says Doctolib's managing director Ilias Tsimpoulis.

Not just a corona trend

Notwithstanding the pandemic, it was perhaps inevitable that Germany, ranked second to last in a 2018 Bertelsmann Foundation telemedicine study, would make up ground. In a 2019 survey, one third of those asked said they were willing to use telemedicine, and around half of younger Germans under the age of 45 viewed the idea favorably.

Thus, even before Covid there was plenty of business potential. In its 2019 health industry report, financial services company MLP found that 89 percent of doctors in Germany expected the number of telemedicine services on offer to rise, while 78 percent predicted that patients would increasingly use them.

Germany's initial sluggishness in this area was due partly to what investors perceived as heavy-handed regulation. That had already begun to shift before the pandemic. In December 2019, the German government passed the Digital Care Act, relaxing the rules concerning telemedicine, allowing doctors to prescribe health apps and easing market entry for new companies. Covid-19 loosened things further still, resulting in what Henrik Matthies, managing director of the Health Innovation Hub, calls a "giant leap toward a digital-backed healthcare system."

German Health Minister Jens Spahn has made no bones about his lofty ambitions for digital healthcare, and the ministry has mandated that electronic health records and e-prescriptions be available by 2021.

More changes in the offing

There is so much more to the sector, though, than just video consultations. Stefan Biesdorf, digital health expert at consultants McKinsey, told digital health provider ottonova that he doesn't like the term "telemedicine." He prefers to talk about e-health or digital health because, he argues, that wording best "incorporates all the technologies that are doctor-oriented."

In a white paper published in July 2020, the German Medical Association described how the pandemic had changed German healthcare for the better. "This new culture of trying things out and collecting the results represents a step forward in German healthcare provision because it's in fact oriented around actual treatment needs," the Association wrote. It called for more telemonitoring of chronically ill and infectious patients, improved data banks and testing possibilities, and better communication between doctors, care homes and government officials.

Some international companies are getting in on the act by offering remote and patient-self-monitoring medical services. For example, Canada's Dialogue recently acquired German workplace health and safety consultancy Argumend, while Swiss skin disease specialist OnlineDoctor is also rapidly growing in popularity in Germany.

An app a day keeps the doc away

Other increasingly commonplace solutions include apps that allow patients to self-monitor chronic conditions like asthma, diabetes, sleep apnea or intestinal health. There are digital assistants to make appointments, injury rehabilitation apps, prenatal classes, online self-help and psychological therapy, as well as digital triage to ensure that all pre-appointment tasks, such as blood tests, have been carried out.

"The digital health sector is only just getting started now [in Germany]," KRY Germany's general manager Daniel Schneider told local broadcasters. "There are really only a few digital sectors that you have the chance to get involved in so early on."

Competition in well-established fields like e-commerce and fintech is already fierce, he noted, but not so much in digital health. "In terms of e-health, we're still asking beginners' questions," Schneider said. "'What do patients think? What do they want?' I believe we are going to learn a lot in the next few months and years. The coronavirus actually only gave us a strong push. There is a lot more to come."

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FACTS & FIGURES

German Attitudes Toward E-Health

89.7%
of doctors say Covid-19 impacted the use of video consultations in their practices.

76%
of patients would use e-prescriptions.

70%
of patients used video consultations for the first time in the pandemic.

Who uses video consultations the most in Germany?

*Source: Stiftung Gesundheit (non-profit health foundation) May 2020 survey

Fintech's Role in Germany's Recovery

The coronavirus has had a major impact on all aspects of the German economy, but for the fintech sector in particular, the challenges created by the pandemic are quickly turning into opportunities.

The social and economic disruption arising from Covid-19 has hit Germany's small and medium-sized businesses (SMEs) hard, but it is also leading to changes in operations and strategy within financial institutions. Banks are increasing outsourcing, intensifying their digitalization efforts and expanding remote working. They are also reprioritizing their strategic goals.

Enter the fintechs – in Germany, a dynamic and growing sector comprising some 900 companies, which managed to raise EUR 1.3 billion in venture capital in 2019. "To achieve these top strategic goals, partnerships with external service providers or fintechs are essential, especially in this crisis," says Tomas Rederer, head of PwC's Financial Services Operations Consulting. He adds that Covid-19 has accelerated many banks' existing plans to further optimize processes and strengthen business models.

One fintech that is gearing up to partner with big lenders is Teylor AG. The Zurich-based company develops digital credit solutions for SMEs and also provides the technology to banks, allowing them to digitalize and automatize every aspect of their SME lending business.

In June, the company announced its expansion into Germany after raising CHF 8 million (EUR 7.5 million) from investors.

Teylor says the significant increase in demand for digital banking solutions has bolstered growth and allowed the company to raise additional capital. It is opening an office in Berlin in 2020 as it expands its business in Germany and Europe.

In another example of collaboration between large- and small-scale players, the Berlin-based fintech Pylot is developing an integrated solution that will help SMEs operate more efficiently. The start-up is backed by German insurance giant Signal Iduna and leading European fintech builder FinLeap. "With Pylot, any company can digitalize their processes, products and services quickly and easily," says the firm's CEO Michael Hartwig.

In a recent interview with financial news site Finanz-Szene.de, FinLeap's CEO Ramin Niroumand predicted that while the crisis would lead to short-term consolidation within the sector, it would favor fintechs in the long run.

There's no shortage of success stories. In April, investors led by U.S. venture capital firms Accel and Founders Fund raised EUR 62 million for Berlin-based Trade Republic, a mobile broker developing a platform that allows users to invest in stocks, exchange-traded funds and derivatives commission-free via a smartphone app. Meanwhile, Berlin-based mobile bank N26 took in a whopping EUR 91 million in the first half of 2020.

FACTS & FIGURES

900

Approximate number of fintechs in Germany in 2019 [1]

€1.3bn

Venture capital investment in fintech companies in Germany in 2019 [2]

75%

Share of banks that say fintechs and external service providers offer key leverage in increasing profits and reducing costs [3]

Sources: 1) comdirect; 2) EY; 3) PwC

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Photo: Lebazele

Corona and the EU Green Deal

In their joint response to the pandemic, Europe and Germany are coupling economic and environmental policy in order to make climate neutrality a reality by 2050.

Brussels, July 8, 2020: Frans Timmermans, European Commission VP in charge of the European Green Deal, holds a joint press conference with the EU Commissioner for energy, Kadri Simson.

Photo: picture alliance/AA

While the coronavirus has dominated the agenda of all European governments since spring 2020, the EU's Green Deal has also taken on new significance, with demands growing in many member states for stimulus efforts to be aligned with the Paris Agreement.

All the way back in April, EU Commission President Ursula von der Leyen told a European Parliament plenary that responding to the corona crisis meant "doubling down on our growth strategy by investing in the European Green Deal." She added: "As the global recovery picks up, global warming will not slow down. First-mover advantage will count double, and finding the right projects to invest in will be key."

The Green Deal aims to ensure Europe is climate-neutral across the board by 2050. It mandates that existing European legislation be reviewed for compatibility with climate goals. It also proposes new policies on everything from the circular economy and building renovation to biodiversity and farming, foreseeing at least EUR 1 trillion in sustainable investments over the next decade.

"I think corks will have been popping in quite a few boardrooms," says Esther Frey, head of Energy, Building & Environmental Technologies at GTAI. "Making the 2050 climate-neutrality target legally binding across the EU creates new certainty about the direction from now on – and that is good for businesses in cleantech. The target suggests that there will be big orders in the wind, solar and biofuels industries as well as emerging technologies like Power-to-X and green hydrogen."

The Green Deal is extremely broad – energy is just one of its many topics – and Germany, as one of 27 member states, is only part of the picture. Nonetheless, Frey considers certain aspects of the Green Deal particularly relevant for Germany.

"The EU Commission has promised to revise state aid rules with a focus on industrial groupings like the new Clean Hydrogen Alliance," she says, referring to an initiative to support the widespread deployment of hydrogen technologies by 2030 (see our story on pages 24-27). "European alliances like this have proved their worth in the past, for example in battery production."

German Minister for Economic Affairs and Energy Peter Altmaier has also called for an overhaul of European merger and competition rules to allow European champions to compete on the world stage. Other member states have joined him and the EU Commission will make a proposal next year.

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Germany: Ripe for Investment

GTAI's new report on foreign direct investment shows that Germany remains a top destination for global investors.

Germany remains one of the world's leading destinations for foreign investment. Last year, non-German companies set up 1,851 businesses projects – not including mergers and acquisitions (M&A) transactions – in the country. That's according to GTAI's annual FDI report.

Promising KPIs

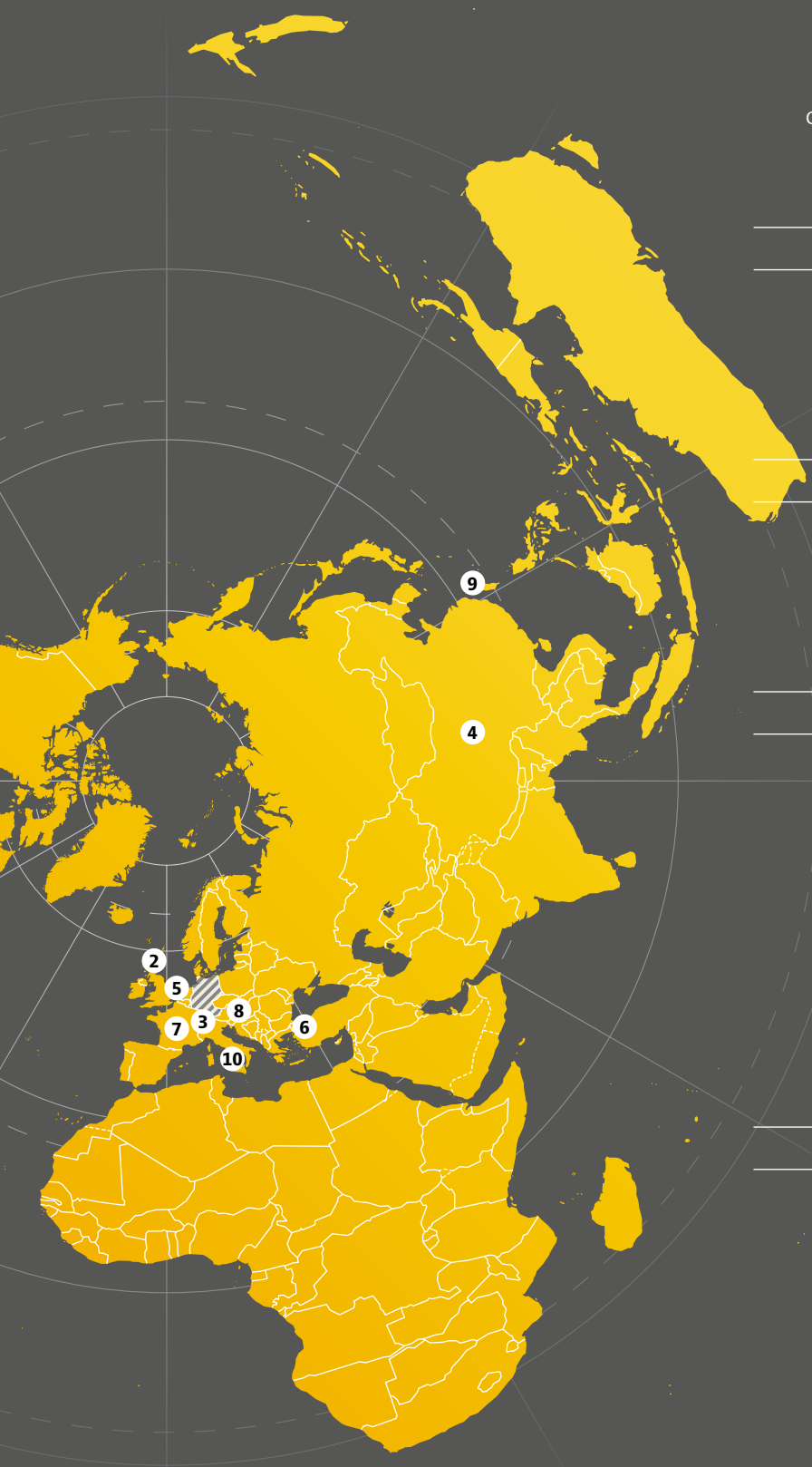
Although the number of investment projects declined last year by around 10 percent from 2018 (which was a record year), the number of jobs created by these projects increased considerably, from 24,000 in 2018 to 42,000 in 2019. More significantly, the overall investment volume rose in 2019 to EUR 5.1 billion from EUR 4.8 billion in 2018.

"This underscores our belief that Germany is one of the most attractive business locations in the world," says Thomas Bozoyan, GTAI's senior manager of market intelligence for Germany.

Top investors in Germany

The United States remained at the top of the list of countries investing in Germany with 302 new projects in 2019. The country's skilled workforce and supply chain connections were the biggest draws for investors. A study by the American Chamber of Commerce and Roland Berger found that 91 percent of U.S. companies think the quality of German employees is very good and 79 percent believe the quality of supplier networks is very good.

→



FACTS & FIGURES

FDI: Let It Grow

1,851
Greenfield and expansion projects

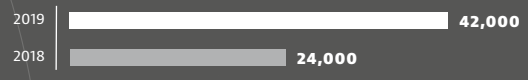
419
Merger and acquisition (M&A) projects

Growth in FDI

The volume of foreign direct investment in Germany rose by almost 6% last year.

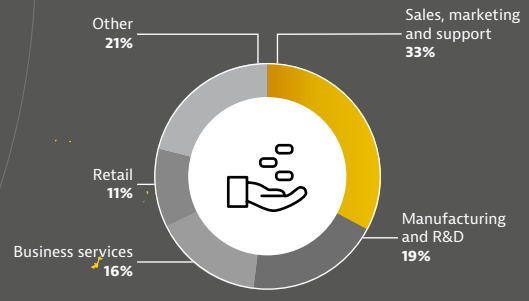
Increased jobs

The number of planned new jobs from FDI in Germany increased by 75%.



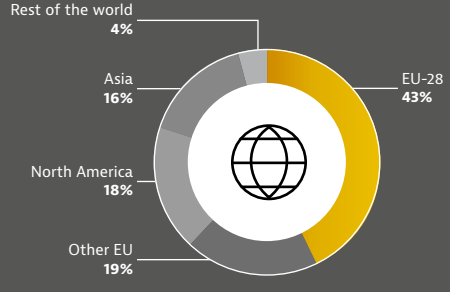
Areas of activity

FDI in Germany in 2019 by type of business activity



Origins of investment

FDI in Germany in 2019 by company region of origin



Source: GTAI FDI Reporting 2019

China dropped down to fourth from its usual place in the top three in 2019. Bozoyan attributes this to increased capital export controls in China as well as some new measures in the EU that more closely scrutinize Chinese investment.

Strength in innovation

Consultancy firm KPMG reports that more than 36,000 companies in Germany are owned by a foreign majority shareholder. Although these foreign-owned ventures account for less than 2 percent of the total number of companies in Germany, they contribute about 27 percent of the country's total added value.

So why does Germany continue to be such an attractive location? Much of the appeal has to do with the skilled workforce. KPMG found that 75 percent of chief financial officers see Germany among the top five countries in the world in terms of labor productivity.

Innovation is another big draw. Germany filed a total of 26,805 patents in 2019, second only in world rankings to the United States and up half a percentage point from the previous year. The number of companies that want to use Germany as a production or research and development location rose by two points to 19 percent in 2019.

What the future holds

Despite the uncertainty regarding Covid-19, "Germany is still open to every new investment," says GTAI's market intelligence guru Bozoyan. While the coronavirus pandemic pushed the 'pause button' on several projects in 2020, he expects 2021 to show strong growth again. "There's a huge backlog right now," he says. "Companies that are already planning investments in Germany will complete their plans as soon as everything returns to normal."

Germany is likely to see a drop in GDP in 2020 and foreign direct investment in countries around the world. Nonetheless, Bozoyan says: "The German government expects the economy to see a strong increase in GDP growth in 2021, and we presume we will see full recovery in 2022."

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View from the Top: Germany Trade & Invest

»We are positive that Germany will maintain its position as a safe haven.«

GTAI's managing director Achim Hartig discusses this year's FDI report, which shows an increase of interest from foreign investors in Germany during the last two years.

Which industries will find Germany increasingly attractive in the coming years?

I think the healthcare and pharmaceutical industries will remain a major focus. As the entire world is striving to fight Covid-19, Germany has a world-class healthcare system and research and development facilities. Digitalization in all of its forms is also extremely important, and digital delivery of information, goods and services is moving faster than ever.

Manufacturing industries have always been the backbone of Germany's economy. Manufacturing's contribution to GDP remains around 30 percent, which is unparalleled in Europe. I expect the size, strength and structure of German manufacturing, which is mostly comprised of small and medium-sized enterprises, to become even more attractive due to its versatility and resilience.

Furthermore, renewable energy and energy efficiency are cornerstones of the German government's plan to reboot the economy. Germany's position in the areas of renewable energy and energy efficiency was already strong, and it will become even more attractive in years to come.

How do you think Brexit will affect FDI in Germany?

The UK has been a strong trade partner for Germany, but in the past few years, exports to the UK have dropped by 6 percent as exports to other European countries grew by 7 percent. Companies are already restructuring their value chains to avoid new tariffs and other barriers after Brexit. Germany has seen increasing interest from foreign investors in the past two years.

What's Germany's biggest selling point for potential investors?

Trust. After the UK, Germany is the most attractive European country for foreign direct investment. The pandemic-related measures in Germany were effective in an early stage to stabilize our society and economy. We are positive that Germany will maintain its position as a safe haven for investors in turbulent times.

Photo: GTAI

The Brexit Effect

Increasing numbers of British companies are setting up new bases in Germany in order to maintain an all-important foothold in the European Union. There has been a surge in the number of companies wishing to extend trademarks and patents into the trade bloc.

The Royal Exchange in the City of London, the UK's financial center

Photo: Matteo Colombo/GettyImages

Since the UK voted to leave the European Union in 2016, a total of 630 British companies have established new operations in Germany. The number of companies from the UK expanding to Germany hit an all-time record of 185 in 2019.

»The decision to set up [in Germany] became a no-brainer.«

Bashir Parkar,
managing director of BAP Pharma

"The uptick in investment from the UK began even before Brexit," says Richard Todd, who leads GTAI's Brexit service. "A major driver for companies investing in Germany is continuing market access to the entire EU."

Safe haven for pharmaceuticals

The largest UK investment in Germany in 2019 in terms of number of employees was by pharmaceutical firm BAP Pharma. The global company, which specializes in the clinical trial supply of comparator drugs, established a state-of-the-art facility in Höchstädt an der Donau in Bavaria last year, creating 200 jobs. "Germany is the largest pharmaceuticals market in Europe and is home to many key players in the industry," says BAP Pharma's managing director Bashir Parkar. "We have seen an increase in business with German companies over the last few years, so one of the main drivers for us was access and proximity to suppliers and customers. The issue of Brexit and the uncertainty surrounding the future access to the European market accelerated our decision-making process. After we had paid an initial visit to the country and seen the opportunities available to us, the decision to set up there became a no-brainer."

Another UK company, leading intellectual property law firm Boult Wade Tennant, established a new office in Berlin in 2019, followed by a new office in Frankfurt in 2020. The reason was to better serve companies that need to file patents and trademarks in the EU as well as the UK. "Germany overall is a very important market within the EU," says Michael C. Maier, a partner at Boult Wade Tennant. "There's a lot of innovation."

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Photo: BAP Pharma

Sports Technology

Playing to Win

Bringing AI to the soccer pitch

To get good results you need good strategy, both in business and sports. That was what led Hyunwook Kang to move his artificial-intelligence-based soccer analysis platform bepro11 from Seoul to Hamburg in 2017.

"The largest soccer market is in Europe," Kang told the Korean edition of *Wired* magazine. "If bepro11 cannot survive in Europe, it does not make any sense for me to continue this business." Kang ended up in northern Germany because a close friend was working with a Hamburg-based sports marketing company. Since moving to the city, bepro11 has racked up one success after another, twice raising around USD 10 million.

The bepro11 platform encompasses both camera systems and software. With the help of AI, clubs can better analyze their own players' and opponents' performance on crosses and clearances, set pieces and "give-and-gos."

Scores of clubs in professional leagues from Asia and Europe already use the bepro11 system. Kang himself was named in *Forbes Magazine's* "30 Under 30 Asia 2019: Enterprise Technology" list.

www.bepro11.com

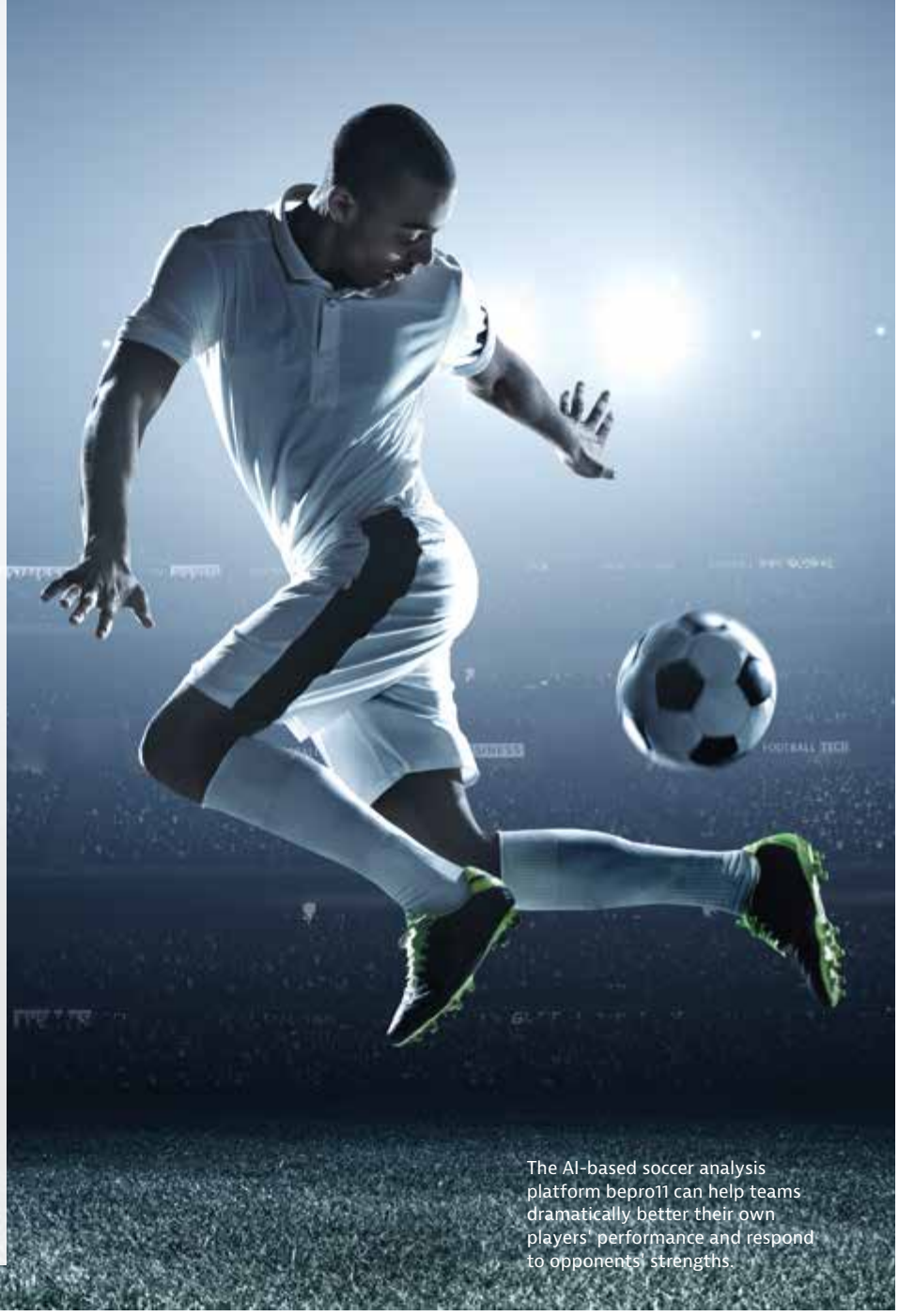


Photo: Dmytro Aksonov/Getty Images

The AI-based soccer analysis platform bepro11 can help teams dramatically better their own players' performance and respond to opponents' strengths.

Automobility

3 Questions: CATARC

Bin Zhao is deputy general manager of CATARC Europe Testing and Certification, active in Munich since 2015.

Photo: CATARC Europe/private

Why Munich?

Munich is a city with a strong economy and a lot of innovation, and a center of the automotive industry. Within 200km you have world-famous carmakers like BMW, Audi and Mercedes Benz.

Why Germany?

We wanted to offer our European and German customers local services to help them get their products onto the Chinese market as quickly as possible. The whole investment process was relatively simple and smooth. Within a year, we had registered our business, created our facility and bought and installed our equipment.

How's business?

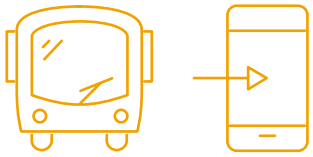
It's going very well. Shortly after the opening, a lot of well-known local companies contacted us and wanted to do business as soon as possible. That's exceeded expectations.

http://europe.catarctc.com/en

Transportation

Travel Buzz

Real-time updates to mobile



The Future Mobility Award 2020 has gone to Berlin start-up BeeSonix for a system that allows bus and rail companies to communicate travel advisories and information to individual passengers at specific stops via their mobile phones. The idea utilizes ultrasonic frequencies over 18,000Hz.

BeeSonix has been invited to present its project at the international IT-TRANS trade fair, scheduled for December in Karlsruhe. The start-up is already working together with Germany's national rail company Deutsche Bahn.

www.beesonix.de

Cleantech

Waste Heat 2 Power

Green electricity from plastic

Photo: poligy

The production of energy often results in losses due to surplus heat. Düsseldorf cleantech start-up poligy has come up with a solution for harvesting waste heat and converting it into electricity. The technology uses relatively low heat to bend and flex strips consisting of two different polymers fused together ("Bipolymers") to generate green electricity through motion. According to poligy, its solution is cheaper than solar units. The German Energy Agency estimates that by avoiding or using waste heat Germany could save up to 37m tons of CO_2 a year.

www.poligy.com

Healthtech

Pointers for Patients

Selecting the right hospital

Germany has nearly 2,000 hospitals with the capacity to serve 19.4 million inpatients a year, so choosing the right one for a specific examination or operation can be an arduous task. But help has arrived in the form of a new website put together by various hospital organizations on the national and regional state level.

The German Hospital Directory, available in both German and English, is an easy-to-use database allowing users to search for healthcare facilities based on location, size, specialties, and other criteria.

One particularly eye-catching feature is the "body navigation": By positioning their computer mouse on a diagram of a human body, users are shown lists of ailments and can choose a hospital to meet their needs.

www.german-hospital-directory.com

Healthcare

Brainy Idea

Making electroencephalography simpler

Researchers at Carl von Ossietzky University in Oldenburg have successfully tested a brain-monitoring device that can be used outside of clinics and could replace conventional encephalography (EEG).

Developers say their fEEGrid (flex-printed forehead EEG grid) device is not only more convenient, but more comfortable. The standard EEG involves affixing numerous electrodes directly to the scalp, and measuring procedures can last more than two hours, causing itching and headaches.

"[Our] measuring device consists of a transparent, flexible carrier material onto which 22 small sensors and conducting paths are printed with silver ink," says an article on the university's website. "The device is not placed on the hair but on the forehead and temples. An electrically conductive gel is used to connect the device to the skin, and a small transmitter transmits the signals wirelessly to a smartphone or computer."

www.uol.de

Diagnostic devices need to be convenient and comfortable for the electrical activity of the brain to be measured over a long period of time.

Photo: Universität Oldenburg/Abteilung Neuropsychologie

❶ Hydrogen tanks are stacked up in a trailer, ready to fill up the first vehicles at the H_2 filling station in the Energy Park Mainz. ❷ The workings of the electrolysis plant are visible to visitors inside the Energy Park Mainz. ❸ Germany has committed to dramatically expanding its hydrogen fuelling infrastructure.

Photo: picture alliance/Andreas Arnold/dpa

❶

❷

Photo: picture alliance/Andreas Arnold/dpa

❸

Photo: Philipp Wente/laif

Hitting the Gas: H_2 Is the Future

With billions of euros in government investment and ample infrastructure already in place, Germany's hydrogen sector is the next big thing. Foreign investors are actively encouraged to join the country's hydrogen revolution.

A decade ago, power utilities serving the area in and around the city of Mainz in the western German state of Rhineland-Palatinate had a problem. The city was keen to promote renewables like wind and solar, but the power grid struggled to absorb surpluses on particularly sunny or windy days. On the other hand, when renewable electricity output dropped, the power company had to make up the difference.

"We wanted a way to relieve the pressure," says Birgit Scheppat, a professor at the Hochschule RheinMain/University of Applied Sciences in Wiesbaden and a specialist in hydrogen (H_2) and fuel cell technologies.

In 2015, work was begun on the Energy Park Mainz facility, which converts electricity generated from renewables to hydrogen. The gas can then be stored, sold or pumped into pipelines serving local heating plants. Known as power-to-gas or power-to-hydrogen, the technology addresses one of the biggest hurdles to Germany's transition to clean energy or *Energiewende*.

»Europe's H_2 strategy is pursuing the right goal.«

Armin Schnettler,
CEO of Siemens Energy's New Energy Business division

Siemens already has hydrogen power facilities in the 10MW class and is developing 100MW. Schnettler is expecting to ramp up production into "gigawatt dimensions."

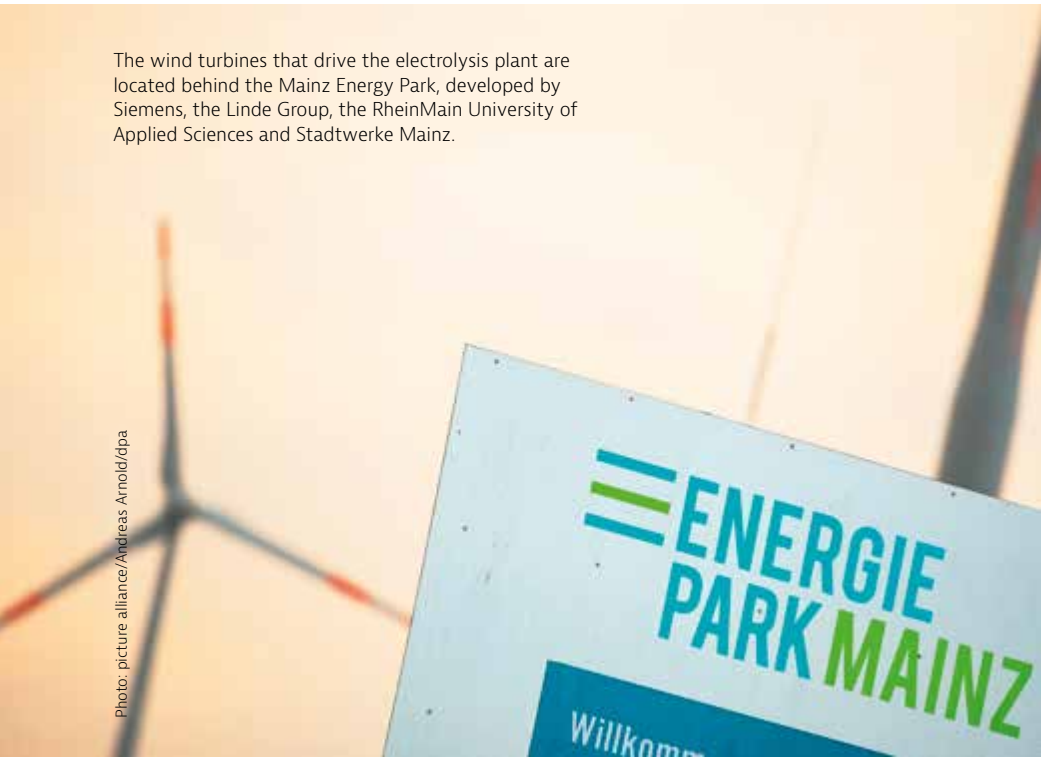
See full interview at:
www.marketsgermany.com

Smoothing out energy supply

Power-to-gas is an efficient way of smoothing out the peaks and troughs, stocking up energy when generated and releasing it when needed. Hydrogen is the most plentiful substance in the universe and is easy to produce via a process called electrolysis, which uses electricity to split water molecules into O_2 and H_2. If the electricity is drawn completely from renewable sources, the product is what's known as "green" H_2. Scheppat describes power-to-gas as "the missing link between renewable energy sources and a zero-emissions future."

The German government is also fully backing the power-to-gas sector. "Solutions that will let us transform renewable electricity into other forms of energy are key to

Photo: Siemens



The wind turbines that drive the electrolysis plant are located behind the Mainz Energy Park, developed by Siemens, the Linde Group, the RheinMain University of Applied Sciences and Stadtwerke Mainz.

Photo: picture alliance/Andreas Arnold/dpa

a successful energy transition," explains Stefan Kaufmann, Innovation Commissioner for Green Hydrogen at the Federal Ministry of Education and Research (BMBF), who leads the ministry's Power-to-X efforts. "Power-to-X has a big role to play in reaching those goals," he says. The BMBF strategy includes measures designed to spur long-term, effective investment, including tax breaks for industrial electrolyzers and EUR 2 billion designated for investment in international partnerships.

Attracting serious investment

The Energy Park Mainz has proven to be a model for other projects. When it went oper-

FACTS & FIGURES

Power-to-Gas and the Hydrogen Project

The Shape of Things to Come: Hydrogen in Everyday Life

Heating homes and businesses

By mixing green hydrogen (H_2) with natural gas, renewables can be used to heat homes and commercial spaces in the winter. Many German cities already use gas for heating, so the infrastructure is already in place.

Fuelling trucks, automobiles and even airplanes

Vehicles powered by hydrogen fuel cells can be quickly tanked up at specially built fuelling stations using green hydrogen. Particularly for trucks and trains, the technology offers a good alternative to electric mobility.

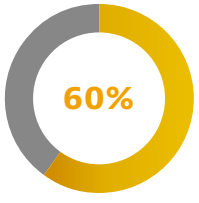
As an industrial ingredient

Manufacturing chemicals, steel and glass requires vast amounts of H_2 each year. Sourcing green H_2 would reduce the carbon emissions of major industries. At present, green H_2 is more expensive, but that is set to change.

Generating electricity

Natural-gas-fired power plants could add green H_2 to their mix in order to generate electricity, making the power they produce partly renewable. H_2 could be stored to smooth out peaks and troughs in renewable production cycles.

Germany's Energy Transition



Share of renewable energies in Germany by 2050

The term *Energiewende* refers to the German government's policy of transitioning to reliable and affordable clean energy. Germany has committed to replacing coal-fired power plants with renewables (particularly wind and solar) and increasing energy efficiency. The aim is to reduce greenhouse gas emissions by 80 to 95% (relative to 1990) and to increase the share of renewable energy in Germany to 60% by 2050.

ational in 2018, it was the largest facility of its kind in the world, capable of converting 6MW of electricity a year into H_2. "We showed how to do it, what safety measures were needed, and that it could be done," Scheppat says.

Investors from inside and outside Germany took notice. Last year, German and Dutch power companies TenneT, Thyssengas and Gasunie Deutschland announced plans to launch a power-to-gas plant in Germany's industrial heartland. With a planned 100MW capacity, it would dwarf its Mainz predecessor.

Siemens is also expanding its capacities by leaps and bounds. "At the moment, we have facilities in the 10MW class and are developing ones for more than 100MW" says Armin Schnettler, CEO of New Energy Business of Siemens Energy. "We're expanding our overall production capacity into the gigawatt dimensions." Schnettler welcomes the H_2 initiatives of both Germany and the EU, which has set a strategic objective of installing at least 6GW of renewable H_2 electrolyzers in the bloc by 2024.

"The European hydrogen strategy is pursuing the right goal as well: creating a new competitive industry that serves European and global markets, generates and preserves jobs, and has the potential for being climate neutral," Schnettler says.

"With its experience with numerous projects such as the Energy Park Mainz, its excellent research institutes and its stated goals, Germany provides the perfect soil for innovative hydrogen companies from across the world to expand to the country," says GTAI senior manager investor consulting Heiko Staubitz.

Decarbonizing industry

Perhaps unsurprisingly, petroleum companies are also getting in on the act. The industry giant Shell Oil recently broke ground on a power-to-gas plant at its refinery in Wesseling, Germany. "Shell is excited by hydrogen and sees huge potential in it," says Shell's executive VP for New Energies, Elisabeth Brinton. "That is why we are committed to its development – as a storage vector for renewables and a net-zero energy source for commercial, industrial and transportation customers."

Partially funded by the EU, the REFHYNE project will be capable of converting renewable electricity into 1,300t of H_2 per year. That can be employed in a variety of ways (see box), for instance in the chemical and steel industries, both of which use hundreds of thousands of tons each year.

"Green electrolysis has the potential to decarbonize many industrial processes that use hydrogen," says Graham Cooley, CEO of the British company ITM Power, which specializes in electrolyzers, and H_2 for fuel cells.

Using existing infrastructure

Much of the infrastructure needed to store and transport H_2 is already in place, thanks to more than a century of natural gas use in Germany. It would be theoretically possible to store nearly 200TWh of electricity in the existing gas network, about 5000 times as much energy as could be kept in electricity storage systems. That's enough to power thirteen cities the size of Berlin for a year.

The potential network is huge, and that's the good thing, Germany already has this infrastructure. Expanding or modifying existing infrastructure to carry more green H_2 is easier than building new high-capacity power lines. "In the north of Germany, we've got lots of extra power generation capacity," Scheppat says. "We can build one gas pipeline to move all that across the country, or 12 electricity transmissions networks."

INDUSTRY INSIGHT

Germany's National Hydrogen Strategy

The aim of the government's plan is to turn Germany into an "H_2 republic."

In June 2020, the German government made a major commitment to the hydrogen sector, pledging more than EUR 9 billion to develop technology and infrastructure over the next decade as part its National Hydrogen Strategy. That sum includes EUR 2 billion for international partnerships.

Underscoring the government's commitment to hydrogen, no fewer than five ministries jointly announced the strategy. Minister for Economic Affairs and Energy Peter Altmaier has said Germany aims to become the "world No 1" in H_2 technology. Promoting hydrogen is a main focus of Germany's drive to become carbon neutral by 2050. The strategy is explicitly targeted at the future markets of H_2 production, industry, transport and heating. Germany's plans dovetail with the EU's strategy, which was adopted in July and foresees the creation of a multi-billion-euro market supporting up to one million jobs by 2050.

The National Hydrogen Strategy can be accessed on the ministry's website below.

Further information:
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More information:
www.gtai.com/energystorage

Photos: Bundesministerium für Wirtschaft und Energie/BMWi

Biotech Matchmaking

As Europe's largest medical biotech market, Germany continues to attract foreign investment thanks to its many established companies and dynamic start-up sector. Gradian Diagnostics' recent acquisition of Molzym is a fine example of international matchmaking, facilitated by Germany Trade & Invest.

When Gradian met Molzym ...

Germany Trade & Invest (GTAI) began advising Gradian in 2018 and accompanied its entry into the German market. CEO Gabriel Tirouflet says: "Gradian benefited from [GTAI's] advice and network – hard to get for us as we don't have access to the right people otherwise."

He adds that the German government and Bremen officials were also instrumental in providing networking opportunities and orientation. "Gradian's acquisition of Molzym was a connection from which both sides could benefit and which offered considerable growth opportunities," says GTAI's biotech expert Gregor Kemper. "We are pleased that we could contribute to this positive outcome."

With more than 50 offices in Germany and abroad, and a network of international partners, GTAI promotes Germany as a business location, assists foreign companies setting up in Germany and supports German companies launching in foreign markets.

Photo: Gradian Diagnostics/Molzym

Bremen-based biotech company Molzym has extensive expertise in molecular biology and a wide range of products and services in microbial analysis. **www.molzym.com**

INDUSTRY SPOTLIGHT

Molecular Coupling

Last February, the recently established U.S. holding company Gradian Diagnostics acquired Molzym, a leading microbial molecular diagnosis company founded in Bremen, in northwest Germany, in 2003.

A leader in the development of innovative solutions in biological research and the diagnosis of infectious diseases, Molzym's team includes 20 doctors, researchers, technicians and laboratory specialists. Gradian plans to double Molzym's staff and expand the company's export business.

Molzym develops solutions for molecular microbiology research and routine microbial pathogen diagnostics relied upon by leading hospitals and laboratories around the world. The company recently reported that several European and Asian centers have started a collaborative study to use the company's Micro-Dx and SepsiTest-UMD diagnostic tests to identify co-infections in Covid-19-positive patients early on.

Molzym's founder Michael Lorenz says the two companies "are a perfect match – we share the same values and pursue the same goals." Being part of Gradian will allow Molzym to accelerate its growth and gain a foothold in the U.S. market, he adds. "Our customers will benefit, our staff will benefit, our current and new partners will benefit – a fantastic result all around."

Photo: Gradian Diagnostics/Molzym

Gradian Diagnostics CEO Gabriel Tirouflet joins with Molzym founder Michael Lorenz.

Biotech in Numbers

€38bn

2019's record spending in Germany's medtech market – the largest in Europe and third largest in the world

65%

Export rate of Germany's manufacturing medtech companies

Source: GTAI / BVMed

Gradian president Alex Malbran says the group's goal "is to deliver best-in-class solutions that help hospitals and labs with the challenges and opportunities they face today and in the future." With Molzym on board, he says, Gradian "is in a better position to improve molecular diagnosis for a broad range of customers."

Gradian was formed in 2018 with the aim of acquiring medtech companies with validated products around the world and expanding diagnostic solutions. Molzym is Gradian's first acquisition. The Vienna-based business angel network primeCROWD backed Gradian's purchase of Molzym with EUR 2 million – the largest single investment ever for the company.

"We see Molzym as an absolute technological leader," primeCROWD said in a statement about the partnership. "With our investment, this leadership should now be used above all to scale up considerably in the relevant markets."

primeCROWD added that Gradian's experienced leadership, including CEO Gabriel Tirouflet's "good relations to the French market, coupled with Alex Malbran's important connections in the USA and Latin America," convinced the company to present Gradian and Molzym to its investor network.

More information:
www.gtai.com/biotech

Storing Energy for the Future

The international "enera" project in Germany's windy northwest is helping make wind power more reliable by supplying new electric batteries to stabilize the grid.

Photo: EWE AG

A hybrid renewable energy storage facility in Varel, northwestern Germany. The term 'hybrid' refers to the combination of two different technologies: Lithium-ion batteries are used along with sodium-sulfur ones to store wind power.

One problem with wind-based electricity is always meeting demand – that puts a premium on storing power generated in windy periods to use in calmer times. This is precisely the goal of the "enera" project: a hybrid storage system in the northwestern German town of Varel.

The publicly funded initiative which partners German energy supplier EWE with Japanese companies – including Showa Denko Materials (formerly Hitachi Chemical), Hitachi Power Solutions and NGK Insulators – has now successfully completed its test phase, and its batteries are supplying electricity to the grid.

"Storage is vital to Germany's transition to clean energy," said Germany Trade & Invest energy expert Heiko Staubitz. "The enera project shows that Germany offers a lot of opportunities when it comes to integrating renewables into the energy market."

The project combines two state-of-the-art battery technologies –"sprinters" and "marathon runners" – to stabilize the power supply. The sprinters are the lithium-ion batteries that can be rapidly charged and discharged, while the marathon runners are sodium-sulfur batteries, for long-term, larger capacity storage.

"I always compare these two technologies to a glass and a bottle of water," says Magnus Pielke, head of be.storaged, the subsidiary set up to manage the project by EWE. "The glass is the lithium battery because it has a relatively small volume but a wide opening, so you can empty it quickly. The bottle has more volume, but the neck means you can't get at the water as quickly."

Saori Hamamura manages the NEDO consortium on the Japanese side. She says Japan is developing its own renewable energy system, similar to Germany's. "We wanted to contribute to stabilizing the grid and developing a new business model with our battery system, but we didn't have much experience in Japan because the market is different. Germany is the best country for renewable energy."

Showa Denko made the lithium-ion batteries with a high power charge/discharge output, while NGK manufactured durable, large-capacity NAS® batteries. Hitachi developed the power grid data and battery control system.

Hamamura is very satisfied with the five-year cooperation with EWE. "We shared a lot of information and results with each other," she says.

The two technologies are linked by computer banks that determine which batteries need to meet demand and which ones have to be charged. Data is crucial. So enera is planning to fit 30,000 smart meters into households and companies in the northwest. The state of Lower Saxony has become a pioneer of Germany's transition to clean energy, using a higher proportion of renewables than most other German regions. "We expect battery storage to play a whole new role in the market," says Pielke with satisfaction.

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Crisis Drives Sustainable Thinking

Judith Herzog-Kuballa, sustainability and CSR consultant for Germany's Mechanical Engineering Industry Association (VDMA), argues that the corona pandemic has shown the need to combine environmental consciousness with responsible business practices.

The coronavirus crisis presents a huge challenge. Many companies have reported sharp declines in sales and a large number of employees furloughed. Orders have collapsed in some cases, and for some companies the coming months will be about sheer survival. But what at first seemed only negative could prove to be an opportunity for positive change in the direction of sustainability.

»The industry is a pioneer in sustainable development.«

Judith Herzog-Kuballa,
sustainability consultant for the VDMA

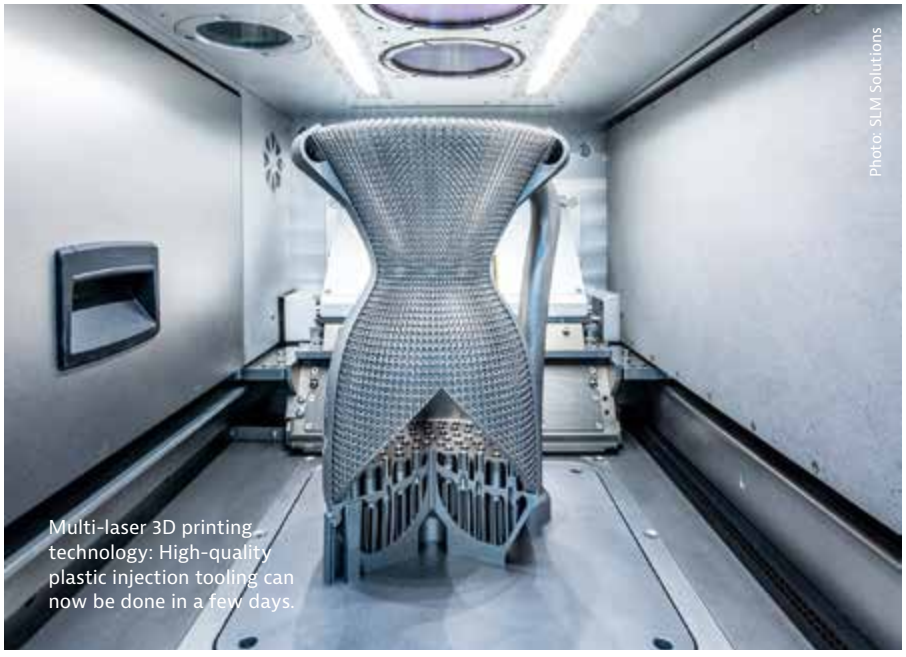

Photo: SLM Solutions

Multi-laser 3D printing technology: High-quality plastic injection tooling can now be done in a few days.

Both before and during the current crisis, the German mechanical engineering industry recognized this opportunity and has proven itself to be something of a pioneer in sustainable development. On the one hand, the industry provides technical sustainability solutions, while on the other it is concerned with resource-efficient production and responsible corporate governance.

At the same time, companies are discovering how vital good cooperation is in overcoming a crisis. The Lübeck company SLM Solutions, which specializes in 3D metal printers, has launched the initiative Additive Alliance against Corona. It is intended to bundle the industry's forces and close the gaps in supply chains that have arisen from the closure of production facilities worldwide. The lifting equipment manufacturer J.D. Neuhaus Group is now printing masks for key workers and supermarket staff on site in Witten, for example. And within a few weeks, heating expert Viessmann began developing a mobile ventilation device, using parts of its heating equipment and heat pumps.

Companies can apply what they've learned from this crisis to other areas. Part of good company preparation is considering the impact of external factors (environment, labor, human rights, etc.) in risk assessment and aligning strategy accordingly. The VDMA initiative Blue Competence supports this process with guidelines and best practice and shows how helpful cooperation between different players can be for sustainability.

German mechanical engineering firms have demonstrated their ability to identify societal risks and turn them into new opportunities. When this crisis eventually comes to an end, it will be important to stay on track.

Further information about the VDMA (Verband der Maschinen- und Anlagenbauindustrie) can be found here:
www.vdma.org

Photo: VDMA

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